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A Sustainable Brownfields Model Framework



**Sustainable Redevelopment
Linking the Community and Business for a Brighter Future**

A SUSTAINABLE BROWNFIELDS MODEL FRAMEWORK

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Executive Summary

This report is based on the premise that successful Brownfields redevelopment can also be ecologically, economically, and socially sustainable. The nature, context, and perspective of the challenges confronting Brownfields practitioners demand this new approach. By integrating the concepts of sustainable development, community involvement, risk management, and collaborative project teams with Brownfields redevelopment, Brownfields redevelopers can avoid re-creating Brownfields and continuing their legacy. Ideally, sustainable Brownfields redevelopment can be achieved - but only by those communities that are committed to considering and including the elements of sustainability into local Brownfields project operations.

Until now, the factors upon which the viability of redeveloped Brownfields projects depend have neither been adequately defined nor characterized in models that can be used by the EPA to assess and support Brownfields environmental restoration and economic development over an extended time period. The complexity of a Brownfields project, as evident by the number of different ways the process has been characterized, the realm of particular variations in the nature of a site and how the process can be approached and performed, poses a significant challenge to the development of a model framework that can represent the full range of possible projects.

The purpose of this study is to integrate the concept of sustainable development into the Brownfields redevelopment process. The effort is intended to organize and associate those parameters, elements, and characteristics of a sustainable

approach with the operational context of a Brownfields project. The result is a model framework that outlines the process and thereby contributes to the understanding and tools of those pursuing sustainable Brownfields redevelopment.

This study has been divided into two parts. The first, published by the U.S. Environmental Protection Agency (EPA) in July of 1998 as “Characteristics of Sustainable Brownfields Projects,” addressed the development of background information on the concept of sustainability in order to isolate key parameters, elements, and characteristics of a sustainable development project that could be associated with and are indicative of successful Brownfields redevelopment. The second part of the study, represented here, organizes these ten key elements (highlighted in Table ES-1 below) and their respective characteristics into a model framework based on where and how they may be applied within the six major phases (see Table ES-2) defined for the Brownfields redevelopment process. This approach emphasizes the incorporation of the principles of sustainability into the redevelopment process.

The general approach taken to the development of the model framework is that of a standard modeling process. Initially, the purpose and objectives of the model framework are identified along with the potentially affected components of the processes and systems involved. The context in which the model framework operates is also defined. From this framework, the type of model to be developed is determined, and the identification and definition of the primary elements to be included in the model can proceed.

The scope of this study and the limited available information on actual completed projects constrained the extent to which the model framework could be validated or verified. However, a comparison of the framework with the structural elements of other models of sustainability provides a method for

substantiating the validity of the component elements defined for the Brownfields model framework.

Table ES-1: Summary of Key Elements Associated with Sustainable Brownfields Redevelopment

<u>Elements</u>	<u>Effect on Sustainable Brownfields Redevelopment</u>
Community Profiling	Sets the foundation for project decisions and future growth.
Comprehensive Community Planning	Involves community participants and stakeholders in creating a common vision and goals.
Organizational Focus and Structure	Integrates the project into the local political and administrative setting.
Site Identification and Characterization	Reduces risks associated with financing and marketing.
Risk Management and Restoration	Addresses fear and misconception by clarifying uncertainty and balancing cost with benefit.
Legal/Regulatory Issues	Prescribes requirements for property transfer and utilization, and defines liabilities of owners, operators, lenders, buyers, and municipal government.
Site Marketing and Redevelopment	Highlights the importance of balancing social, economic and ecological factors in land use decisions.
Technology Applications	Increases cost efficiency and quality of life as new technologies are developed and integrated.
Project Funding and Finance	Provides the basis to initiate and continue projects until market forces take over.
Environmental Justice	Ensures equitable costs and benefits across all sectors of the community.

Table ES-2: Major Phases or Events of a Brownfields Redevelopment Project

Event	Primary Characteristic(s)
Initiation	Begins with an expression of interest or concern for the actual or potential existence of Brownfields and represents the beginning of a continual commitment to improvement among project stakeholders.
Planning	Represents an effort to conceptualize and implement the project while maintaining flexibility that allows the project to evolve throughout the process.
Evaluation	Systematically examines events and conditions and their relationship to community values and goals to establish the project's direction, priority for action, and resource commitment.
Staging	Focuses on negotiated agreements for proposed site plans, financing, ownership, risk allocation and indemnification, as well as any required institutional controls.
Implementation	Marks the actual onset of physical activity at the site; finalizes and incorporates stakeholder decisions and agreements regarding cleanup, risk management, proposed reuse, and funding in order to undertake the selected project alternative.
Synthesis	Continues the collaborative effort and commitment to adapt and refine the project to future needs by integrating the project into the ongoing fabric of community life.

In addition to the review of conceptual models, the study also uses two actual cases from on-going Brownfields projects (the Oregon Mill Sites project that is rural in character, and the City of Baltimore, MD, an urbanized area) to serve as a comparison with real-world projects.

The resulting model framework is depicted below in Figure ES-3. The model framework is based on six major events ranging from the first recognition of the potential benefit of Brownfields redevelopment through the final integration of the project into the ongoing life of the community. At each of the six major

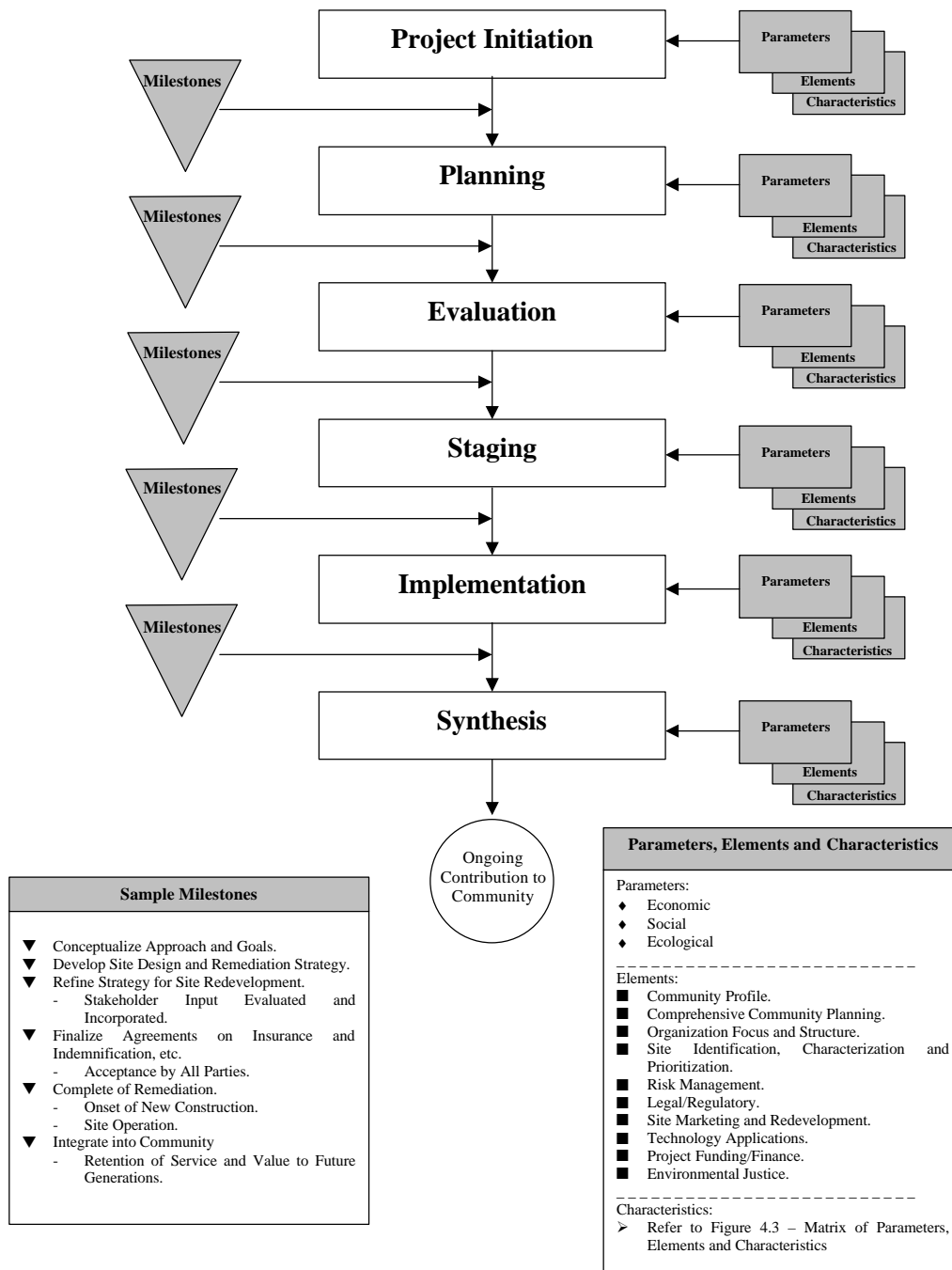
events, elements and characteristics that contribute to the ultimate sustainability of the project are identified. Milestones define the movement of the process through the various event stages.

This model framework is intended to serve as a guide to assist municipalities and other Brownfields practitioners in structuring the planning and development process. It also serves to structure subsequent efforts directed toward identifying those factors on which the viability and sustainability of a Brownfields redevelopment effort depend. The features described in this model framework also provide EPA with an additional basis for the organization and evaluation of Pilot Project results in order to assist in the development of predictive criteria for the success of individual Brownfields Pilot Projects.

The study found that a single model framework can be broad enough to include multiple contexts of Brownfields redevelopment projects ranging from single to multi-site and urban to rural scales. In fact, the primary differences between urban and rural projects are mainly details in the infrastructure and resources locally available that apply to the project. These differences can be minimized in their influence depending on how the project is approached and how the process is implemented within the overall model framework.

Another important finding is that the ability to incorporate the concepts of sustainability into the project is a natural extension of the project and can actually help facilitate many activities involved in the process. This finding is contrary to concerns raised by project officials interviewed during this study who feared the addition of requirements for sustainable development would impose another layer of obstacles to burden the process.

Figure ES.3: Model Framework for a Sustainable Brownfields Redevelopment Process



The study identified several other important factors. A sustainable Brownfields redevelopment:

- Recognizes that the social structure, economy, and the natural environment of a community, rather than being discrete and separate entities, are interconnected in fundamental and critical ways;
- Does not reflect a standard set of sustainability criteria universal for all projects, but rather that sustainability depends on the changing community attitudes, values, demographics, ecological health and economic trends which together comprise the quality of life desired by a community;
- Must be planned, coordinated at the local level of government, and integrated into a community-wide strategic planning approach;
- Maintains flexibility to promote creative financing and acceptable risk management practices so as not to be dependent solely on market forces;
- Assures public involvement throughout the process to foster equity among all community groups;
- Makes maximum use of new and innovative technological applications for resource conservation, materials reuse, information availability, and public safety and mobility;
- Contributes to community efforts that link the past, present, and future in order to create a sense of place and belonging that promotes individual pride and accountability for future project outcomes; and,
- Establishes a means for continuous learning and improvement to help prevent Brownfields in the future.

Finally, the study offers the following four recommendations that will help contribute to the ability to predict and promote sustainable Brownfields redevelopment projects in the future:

- Include measurable factors for sustainability as key components of all future projects and formally incorporate them into project reporting requirements;
- Develop a comprehensive set of activities, milestones, elements, characteristics, and indicators by reviewing the broadest possible set of EPA Demonstration Pilot Projects and other Brownfields related projects;
- Analyze privately funded Brownfields projects to identify variations in approach and content that may be useful in developing new projects; and,
- Re-evaluate sustainable Brownfields projects every few years to identify cause-and-effect relationships to particular outcomes of the process.

This study represents an initial attempt to identify and examine the factors that contribute to the viability of Brownfields redevelopment projects. Its goal is to develop a model framework that can ultimately be used in assessing and guiding Brownfields environmental restoration and economic development over an extended time period.

The development of this preliminary model framework indicates a high degree of correlation between the types of activities that people are already performing on Brownfields sites and the elements of sustainable development associated with Brownfields projects. This supports the one over-arching concept regarding the pursuit of sustainable Brownfields redevelopment: What is ultimately sustainable is what makes the most sense for a community's future.

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INTRODUCTION
➤ Brownfields Context
➤ Purpose and Scope

1.0 Introduction

Contemporary American communities are a physical representation of the history of economic and social development in the United States. These communities are the result of attempts to resolve problems emerging from the industrial growth and geographic expansion of the 19th and 20th centuries. The solutions have created architectural designs and social patterns that are specific to the temporal, physical and social context of the communities in which they were created. But, in many cases, this context has changed. What was once a solution, is today the source for a new set of economic development, public health, environmental quality, and land use concerns.

1.1 The Brownfields Context

Changes in the way in which goods and services are produced, as well as the transition from a national to a world-based economy, have created a new economic environment for contemporary urban and rural communities. The demographic shift of the nation's population from the northeast and north central regions to the south and west, as well as a more local shift in economic activity from urban areas to suburban areas, have also contributed to this changing context. The result is an overall decline in the economic and social infrastructure of many communities, and a corresponding legacy of economically unproductive, abandoned or underutilized industrial sites.

In addition to impediments to development presented by the prevailing economic and social conditions, many sites are also burdened with an assortment of environmental problems. The actual or perceived presence of hazardous wastes or other pollutants further complicates the effective reuse of these sites. These properties have come to be known as Brownfields – abandoned, idled or underused industrial and commercial facilities, where expansion or redevelopment is complicated by real or perceived environmental contamination (Fields, 1995).

Along with the creation of Brownfields sites, communities have experienced a growing loss of greenspace as land development spreads into the urban fringe; a decrease in the level of investment in the urban center; a diminishing employment and tax base within the core community; and, increased cost to local governments for associated infrastructure development. However, as the potential benefits of restoration and redevelopment are realized, Brownfields sites are increasingly being understood as an opportunity or resource. Growing public interest in Brownfields redevelopment centers around such core issues as: environmental clean-up and restoration of specific sites; job creation and retention in the local community; attraction or creation of new, compatible business or commercial interests; retention of the existing business base; and the broadest possible involvement of the public in planning, decision-making, and implementation. Through cooperative effort among stakeholders, many of these Brownfields sites are being redeveloped into facilities that support both the immediate neighborhood and the community as a whole.

As a result, Brownfields redevelopment, in addition to benefiting human health and the environment by the restoration of once-contaminated properties to productive uses, can also become an essential component of the economic and social revitalization of the community itself. Communities are beginning to recognize that a combination of historic processes (both economic and social, as

well as environmental) is responsible for the loss of potentially valuable and productive properties and the creation of Brownfields sites. This has led many communities to look for more sustainable alternatives as opposed to the traditional or conventional approaches that have been characteristic of past development practice.

The sustainable development perspective recognizes that the social structure, economy, and natural environment of a community, rather than being discrete and separate entities, are interconnected in fundamental and critical ways. The incorporation of sustainability into the Brownfields redevelopment process is an important mechanism for ensuring not only the restoration and reuse of existing Brownfields properties, but also that previous cycles of decay and abandonment are not repeated.

But, sustainable development must be planned. It does not happen by accident or without specific direction from the planning process. Market forces alone cannot achieve the integration of environmental, social, and economic concerns that are necessary. Of particular importance is the integration of such diverse factors as natural resources management, urban economic process, social issues, economic mobility and accessibility, land use planning, urban development and preservation of cultural heritage (European Community, 1998).

Similarly, a Brownfields redevelopment cannot depend solely on the processes of the marketplace to deal with abandoned or underutilized properties. The market cannot always assure that what is rational and attractive to the developer will also be beneficial to the community, or that building what people want is a natural function of the market system. As McMahon (1997) notes, despite a concern for the increase in sprawl development and subsequent loss of greenspace, developers are still inclined to ignore opportunities for high quality infill development in the city and concentrate their efforts on the fringe.

For Brownfields redevelopment, what is required is a planned, comprehensive and concerted approach (Jones, 1998). This approach recognizes the needs of the local community and provides incentives to potential developers to stimulate the kinds of development that will meet those needs. The planned development has a greater potential to be successful in the long term (sustainable) than one that relies only on the immediacy of market demand as the basis of planning and decision making.

1.2 Purpose and Scope of this Phase of the Project

The purpose of this study is to integrate the concept of sustainable development into the Brownfields redevelopment process. The effort is intended to identify and categorize those components of a sustainable approach that can also be associated with a Brownfields redevelopment project; and that can be used to differentiate it from more traditional redevelopment efforts. The objective is to outline these elements in a model framework for sustainable Brownfields redevelopment.

This study is divided into two parts. The first, published by the U.S. Environmental Protection Agency (EPA) in July of 1998 as “Characteristics of Sustainable Brownfields Projects,” addressed the development of background information on the concept of sustainability in order to isolate key parameters, elements, and characteristics of a sustainable development project that could be associated with and are indicative of successful Brownfields redevelopment.

The second part of the study, represented here, organizes these parameters, elements and characteristics into a model framework that can serve to inform and guide the process of Brownfields redevelopment in a manner that emphasizes the incorporation of the principles of sustainability into this process.

This framework is intended to serve as a guide to assist municipalities and other governmental entities in structuring the planning and development process, and to inform subsequent research efforts directed toward identifying those factors on which the viability and sustainability of a Brownfields redevelopment effort depend. The model framework also provides EPA with an additional basis for the organization and evaluation of demonstration project results in order to assist in the development of predictive criteria for the success of individual Brownfields projects.

The scope of this study and the limited available information on actual completed projects constrained the extent to which the model framework could be validated or verified. However, a comparison of the framework with the structural elements of other models of sustainability provides a method for substantiating the validity of the component elements defined for the Brownfields model framework.

This introduction establishes the context and purpose for the model framework to be developed in the subsequent sections. In Chapter Two, the general approach and criteria for the development of the model framework are discussed along with the assumptions on which the model framework is based. A review of the basic elements of the concept of sustainable development and an overview of the Brownfields redevelopment process are presented in Chapter Three. Chapter Four discusses the difference between urban and rural projects, then presents the model framework itself including the elements and characteristics identified with sustainability and the Brownfields redevelopment process.

To provide a comparison of the model framework against the experience of existing theoretical and real world project perspectives, Chapter Five contrasts the major themes of the model framework with four existing sustainable development models, and with two actual Brownfields efforts that have been

completed. A summary of the key principles that are relevant to the application of the model framework is provided in Chapter Six, including recommendations for future research to support the model development effort that have emerged from this study.

TECHNICAL	
APPROACH	
➤	Design and Application
➤	Model Framework Scale
➤	Analytical Limitations

2.0 Technical Approach

This report is designed to analytically construct a conceptual model framework of sustainability as it relates to the Brownfields redevelopment effort. The model outline is intended both to inform communities engaged in the Brownfields redevelopment effort of those aspects of the project that may contribute to its overall sustainability, and to serve as the precursor of more detailed and focused models that may be developed in the future, as the experience of individual Brownfields projects unfolds.

The material presented here is intended to act as a planning aid for the implementation of a Brownfields redevelopment project; but it does not define or support a single, specific procedure. Individual development projects will be unique to the communities in which they are initiated. At the project level, this model outline will be further enhanced or refined as each community identifies the specific processes it will follow in the Brownfields redevelopment process.

2.1 Analytical Design and Application of the Model Framework

The approach to development of this model framework is designed around two specific objectives. In Part 1 of the study (EPA, 1998), the objective was to collect and organize background information to support the analysis of sustainable Brownfields redevelopment and the development of the model framework. Of concern was the manner in which the concept of sustainability

and the associated process of sustainable development have been described and understood both in the literature and in the general perception of what is sustainable on the part of Brownfields participants and the public at large. The outcome was the description of parameters, elements and characteristics (PECs) that are associated with sustainable Brownfields projects.

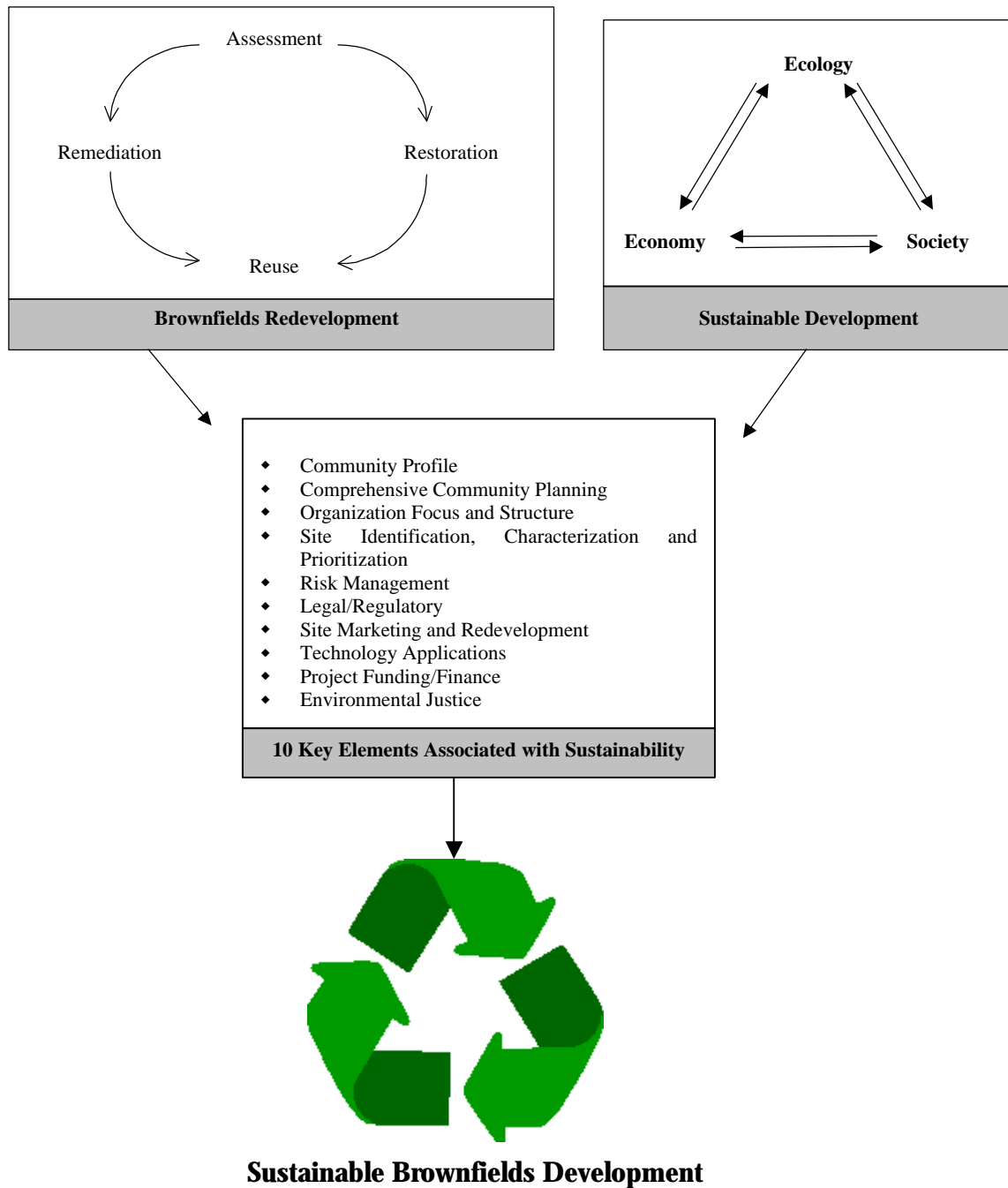
Another area of inquiry was centered on the characterization of the Brownfields process itself. This effort was concentrated on those structures, activities and issues (i.e. assessment, restoration, reuse and remediation), that are common to the process in differing contexts and that serve to distinguish the redevelopment of a contaminated property from other forms of real estate or community economic development. A major emphasis was the identification of the key events and factors that occur in Brownfields redevelopment projects and the assessment of how those events and factors are associated with successful environmental restoration and the economic redevelopment of affected communities.

The second part of this study is the development of a model outline or framework. The model framework is created by integrating the events and factors that constitute a successful Brownfields redevelopment process with the three parameters and ten key elements that contribute to the sustainability of a Brownfields project. Each of the ten elements is described in terms of those characteristics that could be specifically associated with sustainability. The analytical process employed to integrate these variables is shown in Figure 2.1.

The model framework, once constructed, is compared against four other development models that contained the concept of sustainability as their primary focus. It is also compared against two actual projects; one rural in character, the other from an urbanized area. Although this comparison is not sufficient to establish a rigorous validation of the framework, it is made to assure that there is an association

between the model framework, the analytically derived concepts of what is sustainable, and the real world practice of Brownfields redevelopment.

Figure 2.1: The Analytical Approach



A comparison with the structural elements of other models of sustainability provides a method for substantiating the validity of the component elements defined for the Brownfields model framework presented here.

Several additional factors are also considered as relevant to the study approach. The model framework design incorporates existing theory or ideas related to planning and sustainable development. It is a representation of those aspects of the process that are considered significant, and that can be affected or controlled by the project participants. To the extent possible, the model framework allows for the uncertainties inherent in the redevelopment process and recognizes their influence in the decision making process

2.2 Scale of the Model Framework

The implications of scale are important to the approach used in the development of this model framework. The literature on sustainable development represents multiple and varied positions with respect to the relationship of scale differences to the sustainability of a redevelopment effort and in particular to the Brownfields effort. Scale is primarily categorized into large-scale projects such as regions and densely populated urban areas, and small-scale projects such as those in rural areas, small communities, and towns. This would initially appear to support a primary distinction between urban and rural projects in the development of the model framework.

Scale, however, may be better characterized by estimating the potential effect of the development and determining where these effects will be experienced (e.g., affected populations and ecosystems). Scale considerations may be influenced by the size of the affected community, as well as by the size of the development project itself. They may include such factors as the availability of community

resources; the extent of any affected ecosystems, watersheds, and specific habitats; and any political, geographic or cultural considerations. As a result, the distinction between rural and urban may not be the most useful for the development of the Brownfields model framework.

For this reason, the model framework developed here will be structured to address the question of sustainability generically across all communities. Where distinctions based on scope are considered important, they are presented individually in the context of the particular element or element characteristic to which they are relevant. The result is a single model framework that addresses the component elements of sustainability without regard to distinction between rural and urban projects.

2.3 Analytical Limitations and Controlling Assumptions

In order to construct the model framework proposed here, it is necessary to note certain controlling assumptions that influence its development.

The perspective employed here emphasizes the construction of a Brownfields model framework that considers sustainability as an integral value of the development process. Because of the complexity of the component processes that govern sustainability and their intricate interconnections to the external environment, it is difficult to determine that the outcome of a project will be sustainable over time. By incorporating concepts and practices associated with a sustainable development process, the model framework contributes to the potential sustainability of the outcome, but does not ensure, by itself, that the outcome will be absolutely sustainable.

In addition, although a number of characteristics are associated with the sustainability of a project, they are evaluated only in terms of their presence or

absence from the overall project. The level of success achieved, the skill with which project participants have carried out a particular project, and the affect that priorities, timeframes and delays associated with various activities have on sustainability, have not been included as variables under consideration in this study.

Because the individual communities involved in Brownfields redevelopment cannot be isolated from the influences of the larger socioeconomic structure of American society and its larger ecological context, certain macro-structural variables may also influence the development of sustainability. In defining sustainability at the community level and subsequently at the project level, this study assumes that all other extraneous variables are held constant in order to identify specifically those variables that may be under the influence and control of Brownfields project participants.

Further, for the purposes of this study, sustainable Brownfields redevelopment has been defined as redevelopment and growth maintained over the long-term and occurring within the limits of the environment so that the current needs of citizens are met without compromising the ability of future generations to meet theirs (EPA, 1998). However, the degree to which projects impact the limits of their environment or may impair the abilities of future generations is difficult to evaluate in the present context. This is because the ultimate outcome of these projects is not yet known. Therefore, an empirical basis for direct correlation of subject projects with the defined criteria for sustainable Brownfields redevelopment is not possible. Instead, it is assumed that a direct or indirect association of the elements and characteristics of Brownfields redevelopment with the theoretical principles and factors of sustainability and sustainable development at the community and project levels can serve as a reasonable basis for analyzing the potential for sustainability of any given project.

OVERVIEW	
➤	Concept of Sustainable Development
➤	Historical Overview

3.0 Overview of Sustainable Brownfields Redevelopment

In one sense, a Brownfields redevelopment project appears much like any other redevelopment project and embodies many of the same requirements from stakeholders and participants. But, the unique character of the Brownfields redevelopment effort - defined by the presence, or perceived presence, of hazardous substances, the associated ecological and economic risks, and the unique partnership between public, private, and community resources - distinguishes it from other, more conventional, development initiatives.

Once implemented, the Brownfields process becomes connected to an extensive and complex structure of economic, ecological, and social systems, all of which influence not only what can be done with a specific property, but also how sustainable the outcome will be. The Brownfields redevelopment process also represents a unique combination of stakeholder interests, technical skills, planning theory, public policy and program management techniques.

Distinguishing Features of Brownfields Redevelopment

- Real or perceived presence of hazardous materials or pollutants.
- Unique combination of public and private initiatives.
- Community participation in all levels of planning and decision making.
- Human health, environmental, and economic risk management.
- Legal and regulatory requirements (environmental liability, zoning, covenants).
- Environmental justice issues.

The principle objectives of the EPA's Brownfields Initiative are to encourage states, communities, tribes, and other stakeholders in economic redevelopment to work to prevent, assess, safely remediate, and sustainably reuse Brownfields; and to rectify concomitant environmental inequalities and human health impacts that have evolved over time (EPA, 1997). For the purposes of the development of the model framework proposed here, a sustainable Brownfields redevelopment project is defined as one in which redevelopment and growth are maintained over the long term and occur within the limits of the environment so that the current needs of citizens are met without compromising the ability of future generations to meet their needs (EPA, 1998).

3.1 The Concept of Sustainable Development

Although there are a number of ways in which to represent or define the concept of sustainability, one of its elemental features is a recognition of the relationship between the environment and the economy. All economic activity requires that materials and energy be drawn from the environment. Conversely, these materials are returned to the environment again in the form of waste products that are the by-products of both production and consumption. The result is the evolution of a system that is adapted to the way in which resources are appropriated and consumed.

The relationship between environment and economy is therefore established in a manner in which the economy, defined by patterns of production, distribution, and consumption, functions essentially as a subsystem of the ecological system. The environment, in turn, supports the economy and, by extension, the social structure through the provision of necessary resources and the acceptance of wastes. Sustainability is defined in the context of this relationship.

The systems on which current economic development is based have evolved in a manner that is adapted to this context. Sustainability, however, requires a new mechanism for examining the economic and social reality which future development will be based. In order to alter the pattern of development, it is also necessary to change the conventional way of viewing the socioeconomic world in favor of a more sustainable approach. This approach, in addition to considering the standard economic inputs of land, labor and capital, expands to include the natural environment, in its entirety, as well as human capital, social capital, manufactured capital, and credit capital as additional forms of wealth that are both created and depleted by economic processes.

This concept departs from previous conceptions of economic development and requires changes in the manner in which development is planned, the organization of the social mechanisms that control and implement planning, and the role of the community in the planning process. In this manner, the elements of a sustainable approach can be differentiated from more traditional approaches. This distinction can be characterized as a shift from the old paradigm of community economic development to a new more sustainable approach (Schaffer, 1995).

The old paradigm assumes that:

- growth is more of the same;
- the benefits of growth will naturally trickle down and out to others;
- technological change is always good and will solve most problems;
- externalities of space, time and class are typically of minor concern and will likely take care of themselves; and
- socioeconomic-biological elements are largely independent, or can be treated as such.

In contrast to the old paradigm, the new development paradigm assumes that:

- development is a long-term transformation;
- benefits of growth require conscious policy efforts to ensure equity;
- technological change is only one of many possible solutions, and may not be the best solution;
- externalities of space, time and social groups must be explicitly considered;
- dynamic economies create new choices, reframe issues, and change perceptions of markets, resources and value; and
- socioeconomic-biological elements are so interdependent that failure to consider linkages creates problems.

During the first part of this study (EPA, 1998), several key parameters and elements of sustainability were identified. Sustainability, itself, is a function of what activity is carried out; who performs the activity and how many performers there are; the manner in which the activity is carried out; the level of material consumption incorporated as a part of the activity; the potential environmental damage associated with production or consumption of the associated material; when and where the activity is performed; and who benefits from the activity. In this sense, sustainable development refers both to the process by which a sustainable outcome is achieved and to the sustainable outcome itself. In order to be sustainable, a process must consider the three systems associated with ecology, economy, and society, as component parameters.

Key Elements of Sustainability

- ◆ Implies protection and maintenance of the economic, social and ecological systems of the community.
- ◆ Is considered as a process in which decisions and trade-offs occur between perceived requirements of present and future generations, and the potential for damage or destruction of the environment.
- ◆ Is a normative concept in that both the requirements of the social system and how those requirements are to be met within the parameters of a sustainable redevelopment are considered.
- ◆ Is an evolutionary process requiring multiple iterations in order to achieve a balance between the three dominant parameters, social, economic, and ecological, as well as considerations for human health.
- ◆ Is context dependent in that it is determined by factors that are unique to the individual interests, needs, and culture of the community.
- ◆ Relates to the manner in which growth and development are accomplished as well as to the ultimate outcome.
- ◆ Requires emphasis on new structures and approaches, including changes in the overall paradigm of community planning and economic development.

Sustainable development then, requires that a development project operate within limits, or boundaries prescribed by the requirements of the human social system and the ecological systems which surround and support it. All of the economic forces associated with the market system continue to function, but they function within defined constraints and, in many cases, require supports or incentives defined by the public sector. These constraints act both to limit uncertainty with respect to the impact of the development on the environment and to influence development that is socially beneficial, will address social needs, and can be supported by prevailing social patterns as perceived for the present and anticipated in the future.

The process of determining which variables will be defined as those representing sustainability for any specific community is a social process and will be specific to the perceived goals and requirements of individual communities. What is sustainable under one set of circumstances, will not be under others. Similarly, the selection of appropriate indicators of these variables and the subsequent threshold, or limiting values associated with these indicators becomes an element of the sustainable development process that is, for the most part, also outside the range of a standardized model of development

3.2 Brownfields Historical Overview

Brownfields sites are not just remnants of contaminated lands that have scared off developers and investors, but, as with any other social event or issue, are the result of the interplay of multiple and complex processes and events, many of which are outside the control of the community and may have little or no direct connection to a particular site. These patterns develop over time and may include external events, such as changes in the national economy, or locally based issues such as the decline of a particular neighborhood or section of a city. Some of the factors (Pellow, 1998) which may be important to the formation of Brownfields include:

- A demographic shift away from the city to the suburbs and urban fringe areas;
- Expanded transportation networks - throughways and highways built in post World War II America that almost entirely by-pass the inner city and provide little incentive to develop there, contributing to suburban sprawl growth;
- A regional shift of economic production and population centers within the United States that limits or restricts investment in the older industrial cities and towns of the northeast.

- A global change in the technology of post-industrial economic production that renders much of the early 20th century development obsolete, particularly with respect to electronic communications.
- The rising global competition from trans-national corporations and their increasing drive to cut costs, maximize profits, and increase capital mobility - all of which are antithetical to attracting and maintaining economic enterprise and jobs in Brownfields areas, especially in inner city neighborhoods where socioeconomically disadvantaged residents are unable to follow the flight of investment capital to the suburban fringe.

These and other social changes have contributed to a general decline of urban and rural industrial sites in the United States. Community resources and wealth flow very quickly away from communities where these sites are located and into areas (usually the growing suburban and urban fringe zones) where there is a profusion of public and private investment (La More, 1995). Because there are few institutions remaining in these communities, residents are forced to go outside the community for necessary or desired goods and services, thus increasing the flow of capital out of the community and perpetuating the cycle of deterioration.

The result has been a deterioration of the affected communities and a pattern of disinvestment in central cities that is increasing and further contributing to the formation of Brownfields. In order to be successful, the redevelopment of Brownfields sites, as with any other renewal project, must include a mechanism to attract investment capital back into these depressed areas.

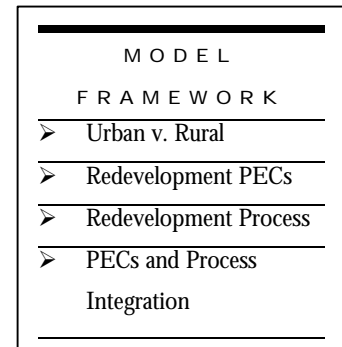
In addition to the problems caused by the presence or perceived presence of hazardous materials posed by Brownfields sites, a sustainable model for their development must also consider the historical context that resulted in the original abandonment or under-utilization of these sites. To design a plan to

meet current and future human and ecological needs, it is necessary to understand social and economic processes not only in isolation at the present, but also over time as trends within the community. “No program to enhance sustainability can be considered practical if it does not incorporate such fundamental knowledge” (Tainter, 1996).

The sustainable redevelopment of Brownfields sites requires recognition that the impediments to Brownfields redevelopment are not limited to the specific risk issues associated with environmental clean-up, but also include an array of community based social and economic issues that contribute to their formation and may still continue to affect their development. Thus, what causes Brownfields is the same combination of social, economic, and ecological factors that, when recognized and addressed, creates the basis for their sustainable redevelopment.

The integration of sustainability with the Brownfields redevelopment process represents a true paradigm shift to the extent that it reflects changes in the manner in which development is planned, the organization of the social mechanisms that control and implement planning, and the role of the community in the planning process. Correspondingly, the process of development itself requires new mechanisms and structures for linking issues, goals, interests, and organizations into a combined redevelopment effort. A more detailed discussion of the role of environmental issues in the development process can be found in “The Effects of Environmental Hazards and Regulation on Urban Environment” (HUD, 1997).

4.0 Model Framework for Sustainable Brownfields Redevelopment



The social world is complex, interconnected, and dynamic. Urban planning and the design of policies and programs for sustainable economic development all pose the problem of dealing with systems in which natural and human factors are thoroughly intertwined. Systems such as those involved in the Brownfields process must be understood and managed as dynamic wholes so that changes in current patterns can be absorbed by the community and system integrity is maintained.

Because of the multiple and varied externalities that influence the process of development, it is difficult to assure absolutely that the outcome of a single project will always be sustainable. However, by incorporating the concept of sustainability into the development process itself, the model framework increases the probability that the finished development project will contribute to the overall sustainability of the community as a whole, and will be less likely to become a Brownfields site again in the future.

For purposes of the model framework outline, the orientation of the sustainable development effort is on those components of the process itself that contribute to the sustainability of the outcome. Sustainable development is thus defined as

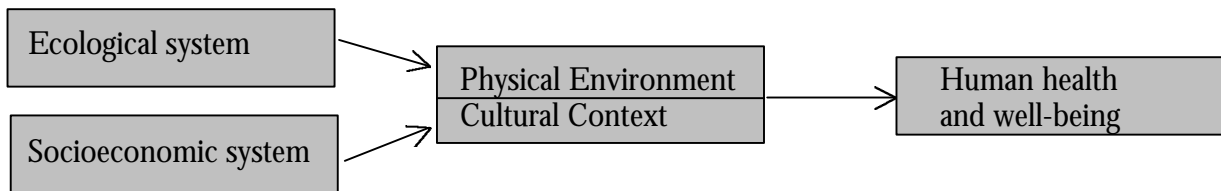
an evolutionary process of change in which both the needs of the environment and the needs of human society are balanced.

The information gathering effort conducted during the first part of this study (EPA, 1998) indicated several key aspects of sustainability as a process associated with Brownfields redevelopment. These key aspects are:

- Sustainability tends to be treated either as an abstract concept or in terms of specific, discrete, and frequently isolated ecological or socioeconomic indicators.
- The local community's approach to Brownfields redevelopment may include sustainability as a consideration, but often does not recognize the sustainability component in all phases of the project.
- Two major break points for the community in the Brownfields redevelopment effort are the transition from the initial development of community goals and vision to the formulation of the actual plan; and the transition from the plan to actual implementation of the project.
- There is a need to connect sustainability to activities that are already part of a Brownfields project conceptualization, organization and implementation so that it becomes relevant at the individual project level and that future Brownfields are avoided.
- There is a requirement for a pragmatic or operational model that is oriented toward a local "how-to" approach that incorporates sustainability into the overall Brownfields redevelopment process.

The focus of any development effort is ultimately the improvement of the well being and quality of life of the affected populations. The requirement for the development of a sustainable Brownfields model framework is to integrate the three primary components: ecological remediation; economic development; and social equity into an overall strategy that emphasizes development within the

boundaries set by the local communities' resources, and its current and future goals. In simplified form, the process described can be represented as:



There is no simple formula that can be applied mechanically to resolve all questions associated with complex programmatic issues such as the sustainability of a Brownfields redevelopment project. As previously noted the number of variables and the unique character of each individual community preclude the use of a standard procedure that may be applicable in all situations. However, it is possible to develop a descriptive model framework of the Brownfields process that includes and highlights those aspects of the development that may contribute to its long-term sustainability.

Because the recognition and subsequent emphasis on Brownfields redevelopment as a part of the overall development strategy of a community is relatively recent, there is a limited body of successful projects on which to draw for experience. Each community will find itself in the position of both learning from the experience of other communities and in many cases becoming the leader in exploring and communicating complex new ideas to those other communities.

The development of a model framework to depict how the processes of sustainability and Brownfields redevelopment relate at the project level must be broad and conceptual in nature. The model framework for this study is predicated upon the correlation of the key parameters, elements, and characteristics (PECs) of sustainability with the major events and milestones

associated with the Brownfields redevelopment process. The model framework presented here outlines an abstraction or interpretation of the reality that these communities experience. As the model framework evolves and becomes more detailed and sophisticated, it will provide a basis to guide the organization and coordination of the complex actions required for the Brownfields redevelopment process.

In this section, the characteristics of Brownfields projects in two contexts, rural and urban, will be examined to determine their applicability to the model framework and recommended approaches for their implementation. A review of the parameters, elements, and characteristics (PECs) of sustainable Brownfields projects and an overview of the Brownfields redevelopment process at the operational project level is presented to highlight what contributes to a sustainable Brownfields project. The components of these two processes are then integrated to form the actual model framework.

4.1 The Urban vs. Rural Distinction

Distinctions based on urban and rural differences do exist between projects. However, there is some limitation to this distinction. It does not account for the requirements associated with rural development in unincorporated areas or regions, such as the isolated mill or plant, as distinguished from those located in small, incorporated towns. Other projects may include isolated industrial facilities or processing plants, or various military installations which may be located close to or may be immediately adjacent to an urban region, but are not necessarily located in a political jurisdiction that has the resource base or internal political coordination of service delivery systems to support the required program.

These differences do not appear in a uniform or consistent manner at the level at which the model framework is developed. In many cases, the model framework elements would be structurally the same for projects without regard to the type of community or the scale of the project. Variations in project structure and operation are more likely to respond to local conditions specific to the individual community rather than being categorically identifiable across communities.

Within the individual communities, certain other distinctions may be more influential than identity with urban or rural lifestyle. Various parts of large cities often do not share a common identity, goals, or sense of solidarity with other parts of the same city. There is an increasing gap between wealthier and poorer neighborhoods within the same community. In some cases, suburbs or outlying regions may have more in common (i.e. political, economic, social, and development interests) with each other and with similar regions of other cities, than they do with their respective central cities.

The outward sprawl of urbanized areas, as well as technological advances in agricultural production, increased distribution capabilities, extension of commuting distances, development of bedroom communities, information application resources, influx of acreage development, transportation advances, suburban compaction, economic shifts, functional reclassification and more; have served to dilute the distinction between urban and rural areas. Many areas may fit into the classification of one, but may be more associated or reliant on the other. For example, a small town located hours from a city may see a large summer population influx because it also serves as a seasonal resort community. Other small towns may retain constant populations year-round, because they serve as bedroom communities for commuters escaping city life.

City growth often takes on a rural feel and countenance with acreage developments and large tracts of open space. In addition, mass market television

and radio programming and newspaper distribution may influence common social values in both rural and urban areas. As population grows, distinctions in values, education, and traditions are muted and the gaps of influence are reduced. Hence, new definitions and terms such as suburban, edge city, metropolitan area, and megalopolis are constantly attempting to capture the pace, effect, and definition of community growth.

The growing inability to distinguish categorically between urban and rural communities has led to a commonality of styles, systems, economies, and problems. A sharing of services, amenities, and information between urban and rural communities has proven feasible and beneficial. Many communities are finding similarities in these areas despite population size, density, demographics, and social or industrial differences. Hence, growth-oriented land use initiatives in these communities are increasingly approached from a broader perspective.

The Regional Approach

A regional approach is a method of coordinating project or program activities within the context of a region, benefiting the surrounding communities, and preventing individual jurisdictions from directly competing with each other for resources and similar projects. A regional approach is often very beneficial to rural communities, which differ from urban areas primarily in the extent and diversity of existing resources and infrastructure. Using regional and state agencies to coordinate and control projects can help to effectively fill this gap.

Regional planning agencies function as a voluntary association or council of local governments under the terms of an inter-local agreement to provide a forum for coordinating local planning and

development activities. As an organization of local governments, these agencies exist to help member governments address problems that are regional in scope, may cross jurisdictional boundaries, and could overwhelm the capability of an individual local government. The agencies bring local government officials together to address mutual and overlapping concerns in the areas of transportation, solid and hazardous waste, community and economic growth and development, air quality, energy, and information management.

Perhaps the most important aspect in the functioning of regional planning agencies is providing interface among local officials. Usually these officials feel that their role is limited in scope to their own jurisdiction. However, many issues cross political boundaries and have farther-reaching effects.

Regional planning agencies also serve the specific functions of promoting intergovernmental cooperation, collecting and exchanging information, coordinating services, planning regional facilities and programs, providing technical assistance, and advocating local needs and issues. Under these guidelines, the agencies produce essential maps, data files and other materials; meet with cities and counties to identify needs; analyze traffic impacts; prepare comprehensive and revitalization plans; and much more. Regional planning agencies can thereby serve to enhance the quality of life and preserve the public health, safety, and welfare of the citizens in the region.

Communities often perceive themselves as different or more urban than others and view their problems as place-specific and unique. Many communities act without considering the effect of their actions on adjacent, neighboring communities. Regional agencies can

mitigate these practices by providing a mechanism for the sharing of data and a forum for interaction among officials.

The need for these regional agencies is becoming more pronounced as metropolitan areas continue growing, but with fragmented local control agencies. This leads to a fragmented growth pattern and an increasing variety of obstacles to redevelopment projects. Problems are becoming larger and more complex as metropolitan areas become larger, and urban and rural areas grow together to become more similar. Officials, investors, and stakeholders need to realize the mutuality of concern and action needed for a region.

A regional approach is also a valid course for urban or rural sustainable Brownfields redevelopment. Many Brownfields exist at least in part because of the competition for similar projects, tax and other relocation incentives, new growth areas, development of rural greenfields, and more. As a result, the primary differences between rural and urban areas are unique to each community and related to the infrastructure and resources that the respective areas have to allocate to a specific project.

For example, because many rural community officials are “part-time” or volunteers, they often lack the time, experience, and technical knowledge required to address and resolve the unique issues related to Brownfields sites and their redevelopment. Consequently, these communities may facilitate projects that are not sustainable in order to resolve a project quickly, or they may be reluctant to initiate Brownfields projects due to the perception of the overwhelming complexity and resource commitment required. Likewise, developers, investors, stakeholders, and the local public may lack the

confidence in a rural community needed to address environmental and financial risks, and thereby support the sustainability of the project.

A regional collaboration could provide the technical resources and knowledge needed while maintaining a local agenda. Recognition by regional, state, or national entities through awards, grants, or other acclaim programs also promotes confidence in rural community efforts which can help sustain long term support for Brownfields projects. The Cape Charles, VA project is one example of a community that has benefited from such national recognition (EPA, 1998).

Visibility of a project plays a greater role in urban than rural projects because a greater concentration of people live near the site and may be more affected by the redevelopment project. As a result, the community stakeholders seek greater involvement and control of the project. This demands a greater need and more skillful effort at consensus building to ensure equitable consideration of all stakeholder interests and concerns. New Orleans, LA and Boston, MA are good examples of urban areas with highly visible Brownfields sites occurring in high density populated areas. Correspondingly, both communities have very active and involved community organizations and public stakeholders involved in the redevelopment process (EPA, 1998).

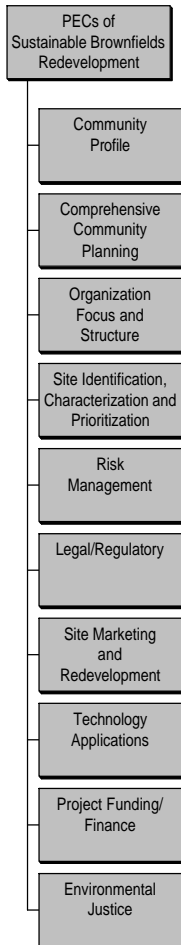
Urban sites are more vulnerable and closely linked to changes and influences in the surrounding community matrix, which is typically less stable than rural areas due to increased population mobility, growth, and ethnic diversity. Further, urban sites are often small

parcels of land scattered throughout the community or in a patchwork within an existing development area. These factors require tailored approaches not as likely to occur in rural areas. An example is the State of Rhode Island Pilot Project in which the state is coordinating the redevelopment of multiple Brownfields sites within the Woonasquatucket and Blackstone Watersheds, many of which exist within the urban areas of Providence and other smaller towns (EPA, 1998).

The values and goals of rural community projects will also differ markedly from urban projects. Ecological considerations may require greater priority, the need to provide employment opportunities may be more immediate, and the redevelopment alternatives may be more limited due to the skills of the local workforce in rural areas. As a result, rural communities are more likely to provide special incentives or to subsidize the necessary infrastructure development to support a project. These areas may offer lower taxes or other tax incentives, less restrictive zoning and proffers, and faster processing and approval of licenses, permits, or other local requirements. Such efforts need to be closely evaluated for their long-term impacts on a sustainable project and the surrounding community.

As is evident from these examples, the differences in sustainable Brownfields redevelopment between urban and rural projects are not in the overall process, but in how each event of the process and specific considerations of the project may be approached and implemented. Regardless of the project's location or classification, successful redevelopment will generally follow the overall process described later in Section 4.3. The factors that will promote the sustainability of the project, either urban or rural, are reviewed in the following section.

4.2 The Parameters, Elements, and Characteristics (PECs) of Sustainable Brownfields Redevelopment



The development of the model framework for sustainable Brownfields redevelopment is supported by the identification and correlation of the key parameters, elements and characteristics (PECs) associated with successful, sustainable Brownfields redevelopment. These PECs were characterized on the basis of a systematic analysis of when, how, and the degree to which the factors are present and interact to influence the sustainable redevelopment of Brownfields. They represent a categorical representation of the more salient features of sustainability as it is related to the Brownfields redevelopment process at the project level. Each category can also be addressed, in essence, as a process unto itself.

The result is the set of ten key elements defined in this section and presented as sub-processes of the overall sustainable Brownfields redevelopment process. This compilation of key elements and characteristics however, should not be considered as all-inclusive or final. Rather, it is a dynamically evolving list that will change as more Brownfields projects mature and additional experience is acquired.

4.2.1 *Community Profile*

Community profiling is the critical process through which a community develops self-knowledge of its social and economic history, its culture and collective character, its current composition, community assets, and the physical, biological and functional attributes of the natural ecosystem(s) with which its members interact. The profile sets the context in which the proposed redevelopment will take place.

The sustainability of a proposed development depends heavily on the degree of “fit” between the intended future uses of the site and the community’s understanding of itself, its quality of life standards and its projected goals for the future. In addition to providing critical decision support information to community leaders, planners, other public officials, and the community as a whole, the community profile also provides potential property developers with a guide to assist in the preparation of their proposals. It further serves as a basis for interpreting and evaluating the effect of those proposals and establishing a degree of community control over the project outcome.

Key characteristics of the community profiling process include:

- Developing a comprehensive environmental baseline inventory that includes natural and biological resources, pollution sources, and potential areas of contamination.
- Estimating limits of natural resource consumption use and loss based on historical patterns.
- Identifying significant landscape features, physical assets, sensitive habitats, endangered and keystone species, and unique areas to be protected.
- Associating ecological assets with community values.
- Defining the demographic composition and general character of a community.
- Developing a general understanding of sociocultural conditions that contribute to community stability or instability, family cohesion, crime, and social institutions.
- Recognizing and understanding what features make the community attractive.
- Describing and preserving significant archeological and historical resources.

- Identifying the degree to which the community has established a sense of self-reliance and developed external linkages that strengthen its ties to the outside world.
- Characterizing of the economic basis of the community.
- Assessing the formation of social capital in the form of the skill, education level, and availability of the potential workforce.
- Assessing the existing and potential, future climate for investment both within the community and in the larger society.

4.2.2 Comprehensive Community Planning

The primary goal of a comprehensive approach to community planning is to integrate the Brownfields redevelopment process into a larger community development plan. The process of development is a public process and correspondingly, the planning of that process must include not only narrow sections of the public interest, but also a response to the community's larger needs.

The focus of community planning is the planning process itself, rather than any single, specific outcome. It is through the planning process that community participants, including individual stakeholders, become involved and committed. The plan itself evolves as the community's needs change, thus enhancing the potential sustainability of the plan by maintaining a predictive balance between needs and services – both in the near-term and long-term future.

The requirements, needs and goals incorporated into the planning process will be unique and specific to each community. Brownfields program or project based planning is more likely to make a sustainable contribution to the community if it takes these specific needs into consideration early in the process and maintains a community based planning focus throughout the life of the project. The plan is

also focused on defining who the development is directed to assist, where they are located and what assets and liabilities of the community are involved.

Because of the number of individual entities, agencies, organizations and areas of professional expertise involved in a Brownfields redevelopment process, the comprehensive planning process requires the forging and nurturing of relationships across several different institutions and agencies. The planning process therefore becomes a conscious, intended collaboration between private sector organizations, public agencies and the community as a whole.

One of the more productive strategies incorporated into the planning process is a revised conception of the role of public agencies in facilitating and supporting the development process, including the redevelopment of private properties. The public sector can serve as the stimulus, or catalyst to change in those situations where private companies would be precluded due to risks, costs, or market conditions. The nature of the Brownfields process also requires a strong cooperation between public entities and private developers both in the planning and implementation stages.

The community can have a number of influences on the Brownfields redevelopment process. The range of activity includes the formation of community advisory boards to assist in the development of selection criteria and the site screening process, as well as the participation of community representatives in design charrettes to formulate and review the design plans for proposed facilities, or site uses.

The inclusion of a regional and/or ecosystem perspective in the planning process affords the benefit of linking the project to a wider base of resources, natural functions and personnel expertise. This is especially important for rural projects that have limited organizational resources in the immediate community, but are

rich in natural resources. A regional model also contributes to the overall marketability of the area and increases the potential to generate new investment and business expansion.

Several important socioeconomic and ecological considerations of the planning process can be identified.

- A comprehensive approach that includes external factors such as changes in the national economy, and local conditions such as the decay of a particular neighborhood or region of a city.
- Assessment of carrying capacity not only of the affected ecological area, but also the ability of the community to support the proposed activity.
- Urban growth boundaries, institutionalized through the planning process, provide the community with a basis for rejecting development proposals that are unacceptable, unbalanced, or that exceed the tolerances and limits of socioeconomic and ecological systems.
- Consideration of surrounding land uses, not only at present, but also in the foreseeable future.
- Emphasis on a mixed-use environment with pedestrian orientation is especially appropriate for development in inner city and suburban neighborhoods.
- Emphasis on economic self-sufficiency highlights the importance of reducing reliance on external resources or imports, increases the potential flow of money into the area resulting in increased employment and business opportunities.
- Community-Stakeholder consensus is essential to the planning process, especially where some measure of compromise of the goals and vision of the community is required.

- Uncertainty is an inevitable fact of the planning process. Thus, any planning process must account for variables and maintain sufficient flexibility to allow for the maximum possible freedom in terms of ranges of acceptable options at every stage of the process.
- Emphasis on equal benefits and burdens of Brownfields redevelopment increases the potential support for the project from all segments of the community increasing its potential stability and continuity.

4.2.3 Organizational Focus and Structure

The Brownfields process has been described as an iterative one in that a number of parallel sub-processes, all of which are operating simultaneously during the life of the project, exist and must be successfully integrated. Through the focus and organizational structure of the Brownfields project, each project and each community has to develop its own distinct approach to the successful effort. The ability of the project to maintain itself and function over time and the role the project plays in the redevelopment and revitalization process of the community are important concerns.

Although each Brownfields redevelopment project is in many ways distinct, there are several characteristics of project organization and function that can be commonly associated with sustainability. These characteristics include control of the program by local jurisdictions, a conducive institutional structure, the need for extensive intergovernmental coordination, and resource commitment.

The program also requires the successful involvement of a number of people in the community (stakeholders and other participants) to make the program work. Individual stakeholders may be part of one or more interest groups or categories, and therefore will approach an issue differentially, depending on the perceived effect on their interest group.

Typical Stakeholder Configuration	
Stakeholder	Interest
Current Owner	release from current liability income from sale or redevelopment
Prospective Owner/ Developer	identify marketable property reduce uncertainty/quantify risk balance liability against return on investment minimize development cost
Investors (Banking Organizations)	maximize return on investment avoid liability on potential foreclosure
Neighborhood Groups	provide needed facilities or services remove hazardous, dangerous or undesirable conditions increase employment improve quality of life
Municipal /State Agencies	carry out regulatory, funding, or redevelopment mandate
The Local Business Lobby (Chamber of Commerce)	improve community image increase level and diversity of business activity
Community or Citizens Groups	improve general condition or specific segment of community eliminate contamination / hazardous conditions
Grassroots Groups	advance single issue agenda
Legal, Scientific and Technical Personnel	clarify statutory/regulatory requirements improve ecological quality increase technical knowledge improve or innovate new techniques
National Public Interest Lobbies	support agendas to be incorporated as a part of proposed development.

4.2.4 Site Identification, Characterization and Prioritization

The degree of knowledge regarding the presence, type, source, extent, and severity of the contamination directly influences project success, in terms of marketing, redevelopment, financing, and legal or regulatory strategies and options. The goal is to obtain as much information through an integrated, streamlined approach as project funding permits.

The approach and strategy required to implement this element will vary on a site-by-site and project-by-project basis. There are several possible mechanisms by which the process may be initiated, such as:

- current property owner operating responsibly or under consent agreements;
- prospective property owner/user operating under related state laws;
- private developer and non-profit development organization also operating responsibly or under state laws; and
- Federal, state, or municipal government agency operating under applicable statutory or delegated authority (e.g. CERCLA, RCRA, TSCA, State “Superfund”, etc.).

Regardless of who initiates and performs the site identification, characterization and prioritization process, a number of important ecological considerations contribute to the overall success and sustainability of the redevelopment effort. These include:

- An accurate delineation of site location, boundaries, historical use/ownership, and physical characteristics with regard to the local landscape, ecosystem, and municipal plat;
- An accurate representation of the nature of the contamination including type of contaminants, source(s), concentrations, location on site, extent and potential for migration, pathways of exposure to the public health and local biota, and relative toxicology or health threat;
- Streamlined or “targeted” site assessments using field screening technologies and mobile analytical laboratories;
- Integrating Brownfields site assessments with other environmental compliance audits, e.g. Due Diligence, Phase I and Phase II Environmental Site Assessments (ASTM 1997a and 1997b);
- Identification and characterization of groundwater contamination - especially critical due to the complexity of evaluating its extent and remediation options;

- Integrating site characterization information into the community profile to create a continuous updating procedure;
- Developing site prioritization schemes that include ecosystem management criteria that reflect community goals and values, natural resource assets, and the benefits/impacts of redevelopment;
- Utilizing a prioritization model that classifies sites according to two criteria, the nature and extent of site contamination, and the inherent redevelopment potential or site marketability; and
- Utilization of technical resources available to small communities and private owners/developers through Federal agencies, academic institutions, and private consultants.

Two factors considered important to the potential sustainability of site redevelopment are the nature and extent of site contamination, and the inherent redevelopment potential of the site. Other factors that may be important to establishing the current status of the site and therefore its potential long-term success as a Brownfields redevelopment project are:

- The site's relationship with surrounding land uses and adjacent landowners;
- The time and level of effort involved in acquiring the site and implementing any final plans for its redevelopment;
- The potential cost of remediation;
- The socioeconomic context presented by the surrounding community;
- Transportation and infrastructure considerations;
- Significant features such as waterfront or shoreline (e.g. harbor, lake, riverfront), historic districts, entertainment or recreational areas, greenways, significant architectural features, traditional ethnic neighborhoods, etc.; and

- Current economic conditions of the immediate neighborhood, local community, or nation as a whole that heavily impact the site and its potential for future reuse.

Of equal importance to the Brownfields process is the question of selecting which of the inventory of potential sites will be redeveloped and which will be given priority in the redevelopment process. Community stakeholders should be involved in, or at least well informed of, these efforts so that the results are mutually understood and the potential for unrealistic cleanup expectations is minimized. Site ranking criteria are usually developed through some combination of information modeling, public input, and other trial or intuitive factors.

4.2.5 Risk Management and Site Restoration

Brownfields site restoration and reuse is one component of a broader economic development process that must deal not only with the traditional risks involved with real estate transaction and development, but also with the concern for protecting the public health and environment from exposure to hazardous chemical contaminants. These risks include, among others:

- environmental liability;
- time and cost overruns caused by project delays;
- technology faults and obsolescence;
- personal and third party liability for accidents;
- diminished property value;
- loss of investment;
- changes in market conditions;
- community fears regarding public health; and
- the need for community support.

Risk management and site remediation processes can promote sustainable Brownfields redevelopment by addressing a number of key project requirements that relate to the immediate and long-term interests of different stakeholder groups. Overall, the risk associated with a Brownfields redevelopment process has essentially two components. The first is the potential risk of chemical exposure to the community surrounding the site. The second is the level of uncertain liability that the potential project participants (e.g., owner, developer, lender) face in the management of the project.

The community as a whole is concerned with the benefits associated with the reduction of risk to public health posed by a contaminated property and the potential adverse effect of any increased exposure encountered during the restoration process. This can include the residual contamination remaining after the redevelopment process is completed. The direct project participants (e.g., owner, developer, lender) are confronted by the potential risk associated with a continuing responsibility for any previously undetected contamination of the property.

The key factors influencing the response to risk relate to the manner in which the potential risk is presented and interpreted, and the level of trust or confidence the public places in the defining institution or agency. Although the types of risk inherent in a Brownfields redevelopment are not new, they are unfamiliar to, and not fully understood by, the broader range of stakeholders and the community at large.

The important connection of risk communication to the sustainability of a Brownfields project, rests with this need to provide not only for the transmission of information, but also to develop shared meanings among individual stakeholders, institutions, and communities, and to establish relationships of

trust. This is a specialized effort undertaken to reach out to those stakeholders and public citizens who are interested in the project, to educate them, and to involve them. The objective is to achieve community and stakeholder acceptance and support for the proposed site cleanup and reuse or restoration plans.

In many ways, the most serious obstacle to the potential redevelopment of a Brownfields property is not the presence of contamination, but the perception of contamination. The project participants (e.g., owner, developer and potential investor) associate economic concerns with the uncertainty of future liability. These project participants are interested in the potential benefit that may be derived from development of the property in question. However, they are significantly impeded by the adverse impact that may result from an incomplete characterization of existing site contamination. Also, the potential for discovery of new contamination at some future time, the failure of institutional controls related to a limited reuse development, or changes to government policies that threaten the basis for earlier negotiations or agreements play a role.

4.2.6 Legal / Regulatory Issues

The effects of legal/regulatory issues are woven throughout the fabric of Brownfields projects. They may take such forms as barriers to property transfer (e.g. investigation and commitment to cleanup triggered at time of change in ownership) and utilization (e.g. zoning, wetlands) or limitations on owner (e.g. restrictive covenants) or governmental authority (e.g. municipality's inability to spend its money on privately owned sites). Most of these impacts, however, are known and their associated cost or risk can be defined and quantified.

The legal/regulatory issues of most concern to the Brownfields' investor are not the ones that impact cost directly or indirectly, but those that introduce risk,

particularly undefined or ill-defined risks. The investor is comfortable with legal/regulatory obstacles when the cost to overcome these obstacles can be factored into the economic viability equation.

The principal source of Brownfields environmental liability is the liability for cleanup under the Federal Superfund Statute – the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The intent of CERCLA is to impose strict, joint and several liability for the cost of cleanup of a contaminated site on the parties responsible for the contamination. As a result, concerns for environmental liability can act as a disincentive for the following parties associated with a Brownfields project:

- potential purchasers, developers, and occupants of such properties;
- current owners who wish to avoid investigation of or loss of control over such properties in connection with redevelopment;
- lenders for Brownfields projects; and
- corporate entities and individuals associated with such parties whose activities or responsibilities might cause them to be considered as included within the categories of owner or operator, disposer, transporter, or others who may take responsibility for arranging for treatment, disposal, or transport, or who accept materials (see CERCLA §107, 42 U.S.C., Section 9607 for a more detailed explanation of these categories).

Other environmental laws may also impact the environmental liabilities of the parties involved in a Brownfields project during the cleanup and redevelopment phases. Air emissions during this stage may be regulated by the Clean Air Act. Process stormwater discharges may be regulated by the Clean Water Act. Even PCBs or other substances subject to the Toxic Substances Control Act may be involved.

However, the law most likely to impact a Brownfields site is the Resource Conservation and Recovery Act (RCRA). It was enacted to regulate hazardous waste treatment, storage, and disposal (TSD) facilities and underground storage tanks (UST). Most Brownfields sites, if not classified as hazardous waste TSD facilities, will have a UST somewhere on the site. Even if a Brownfields site is not regulated because of USTs, or because it was a former hazardous waste TSD facility, the developer may become a “generator” under RCRA simply by excavating any substances on the site which come within the definition of a “hazardous waste” (RCRA Section 3002). Either way, the RCRA “corrective action”, “manifesting”, “permitting”, and “land-ban” restrictions may come into play and have a severe impact on the environmental liabilities and costs associated with development of the site.

4.2.7 Site Marketing and Redevelopment Approach

Since Brownfields sites were once active industrial or commercial businesses, redevelopment strategies for these sites typically focus on rehabilitating them into vibrant new commercial or industrial uses. But new strategies are needed for many sites to prevent them from reverting again to a Brownfields condition, and to allow them to contribute to the sustainable growth in the community.

One such strategy is to link the intended land use and architectural design with ecological and aesthetic qualities valued by the community. This strategy applies to urban as well as rural Brownfields sites. Several approaches that apply this strategy and thereby promote the sustainability of Brownfields site redevelopment can be identified:

Brownfields Sustainability Approaches

- ✓ Eco-Industrial Parks
- ✓ Reclaimed Brownfields for Parks and Open Spaces
- ✓ Greenspace as Interim Use
- ✓ Reclaiming Brownfields in Ecologically Sensitive Areas
- ✓ Landscape Design Factors

Eco-Industrial Parks - Combining manufacturing and service businesses in a design that coordinates their collective resource needs and processes in order to increase efficient use of raw materials, minimize waste outputs, conserve energy and natural resources, reduce transportation requirements, and provide an aesthetically attractive place to work.

Reclaimed Brownfields for Parks and Open Space - Creating parks, gardens, greenways (linear corridors of protected land that connect important resources and provide for human access), trails, and open space (large expanses of natural or sparsely developed land) as an effective and inexpensive way to catalyze sustainable redevelopment, especially of infill properties.

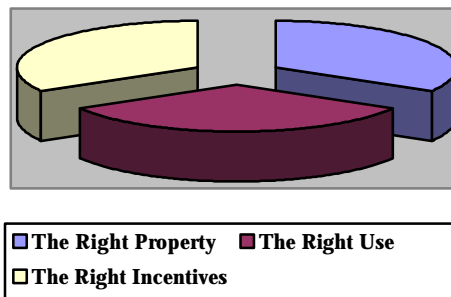
Greenspace as Interim Use - Redeveloping a Brownfields site by converting it into an urban forest, park or garden on an interim basis until the parcel can be integrated into a larger redevelopment plan for the area.

Reclaiming Brownfields in Ecologically Sensitive Areas - Restoring Brownfields to blend into the surrounding ecological systems offers many indirect benefits to sustainable communities.

Landscape Design Factors - Integrating Brownfields design and land use with natural landscape features builds sustainable links between the redevelopment and the ecology.

The Brownfields redevelopment process should contribute in some way to the overall sustainability of the community, as a community. To a great extent, the design parameters for an individual project will be affected by the site characteristics, the influence of surrounding land uses, and the goals of the comprehensive plan. But the proposed reuse of the subject site should also conform to the overall vision of the community's economic and social future. From the standpoint of the project itself, the most important factors contributing to overall success can be summarized as:

Brownfields Success Factors



The Right Property – The property must have some value. In the case of the Brownfields site, this value is calculated in terms of the desirability of a clean site at the current location. Several factors can influence this determination, including: the value and use of surrounding real estate; the cost of the initial acquisition of the property; and the level of environmental uncertainty associated with the project.

The Right Use - Determination of the right land use for a candidate site is critical. Important to this process, in addition to site history and surrounding land uses, is the role of the community in specifying its needs, values and most especially, its understanding of the project and its role in the community.

The Right Incentives - The successful development of incentives and trade-offs to increase the potential value or return on a Brownfields redevelopment are

important both to the overall success of the project and to the interests of individual stakeholders as an inducement to sell or cleanup existing contaminated property; a potential for increased return on investment by decreasing uncertainty; a balance against other real estate or market investments; and encouragement to community residents to patronize or support the intended use.

One of the most frequently cited challenges associated with a Brownfields redevelopment is the process of marketing the site to potential developers. This includes not only the process of selling the redevelopment project to potential developers, investors, or lenders, but also to the community as a whole. The question for a Brownfields redevelopment is that of balancing community values and goals against the requirements of the marketplace and what the market will bear and support.

4.2.8 Technology Applications

Technology and its application are clearly major elements of sustainability. The process of identifying, developing, evaluating, and integrating new technology applications into community redevelopment provides opportunities to achieve significant cost and resource savings for projects and quality of life improvements for the residents. This process can also help change traditional social, economic and ecological perspectives and values that contribute to unsustainable development.

The Public Technology, Inc. (PTI, 1998), a non-profit organization supporting city and county governments nationwide, has identified five primary areas of technology that provide an effective framework for characterizing technology applications that promote immediate and sustainable Brownfields redevelopment in urban and rural communities. These areas are:

Technology Applications

- ✓ Energy Technology
- ✓ Environmental Technology
- ✓ Transportation Technology
- ✓ Telecommunication and Information Management Technology
- ✓ Public Safety and Health Technology

Energy technology - Sustainable Brownfields redevelopment seeks to improve energy efficiency, conserve energy resources, reduce energy demands, cut costs, and develop revenue from local energy assets. Energy consumption is therefore an effective indicator for measuring sustainability.

Environmental technology - New and innovative environmental technologies are emerging to promote community sustainability and sustainable Brownfields redevelopment including pollution prevention and waste management, site assessment and remediation, and ecological monitoring and assessment.

Transportation technology - Transportation systems and the various modes or “hardware” to move people and goods are being enhanced by major technology improvements. Two specific transportation technologies that can be associated with sustainable Brownfields redevelopment are: Intelligent Transportation Systems - utilizing advanced computer, electronics, and communications technologies to increase the effectiveness, efficiency, cleanliness, and safety of surface transportation systems, and Alternative Fuels and Vehicles - incorporating innovative applications of natural gas, electricity, and other alternative fuels to power privately owned and commercial fleet vehicles is growing in public acceptance and economic feasibility.

Telecommunication and information management technologies – The sustainability of Brownfields redevelopment is enhanced by improving services, cutting costs, and

developing new businesses that are environmentally “clean” and readily adaptable to existing Brownfields buildings.

Public safety and health technology – Experiencing a wide range of new trends and capabilities, these areas can promote Brownfields sustainability by enhancing the marketability of a site and reassuring the community’s confidence that safety and health risks are effectively addressed.

4.2.9 Project Funding and Finance

The association between long-term financing and the sustainability of a Brownfields redevelopment project is fundamental. Access to equity financing and early-stage capital is often considered not only to be the most important factor in a project, but also the most difficult to secure (Brookings, 1997). Conversely, the under commitment of resources and a lack of funding are considered a major impediment to the redevelopment of a Brownfields site.

Brownfields project funding requirements can be seen as a continuum ranging from a project that is expected to be ultimately self-sustaining within the private marketplace to one that is completely supported by public funds throughout its anticipated life-cycle. The mix of private and public funds embodied in a Brownfields redevelopment project will differ from project to project, based on the characteristics of the specific site in question, capabilities of the current owners, and the planned future use of the site. On the basis of the funding sources, Brownfields projects can be characterized into three types; those funded primarily by private organizations, those funded by public entities, and those that are a mixture of public and private funds.

Essentially, the Brownfields redevelopment process can be characterized as five separate processes, each of which requires some form of funding:

- the Brownfields program and program related expenses;
- site characterization and remediation;
- planning, public outreach and design approval;
- development and reconstruction; and
- long term operational support.

For the greater majority of Brownfields redevelopment projects, the initial project funding will come from public sources. However, a sustainable project cannot depend solely on external resources. Important to the long-term success of the project is the process of defining where the project is going, in terms of its long-range goals, and then identifying both public and private funding that supports what the community has decided to do. Based on the prevailing site characteristics and the anticipated future uses of a proposed site, a mixture of private and public funds will be required for development. Important characteristics associated with sustainability are the early and accurate identification of financing requirements, a high level of community awareness and knowledge of the financing process and the careful preparation and analysis of the project characteristics as a part of the overall strategy to attract outside investment.

4.2.10 Environmental Justice

In recent years, concern has been raised that persons from low-income and minority communities are suffering a disproportionate burden of adverse health consequences from the siting of industrial plants and waste dumps at nearby locations, and from exposures to pesticides and other toxic chemicals within their home and occupational environments. There is also concern that the environmental programs and policies being established by government agencies do not adequately addressing these disproportionate exposures.

Environmental justice represents an attempt to address these issues in the context of the sustainable Brownfields redevelopment.

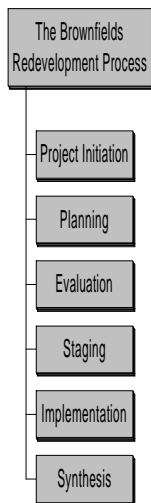
“Environmental justice and Brownfields are inextricably linked: the inescapable context for discussion of the Brownfields issue is environmental justice and urban revitalization. At the core of a justice perspective is recognition of the interconnectedness of the physical environment to the overall economic, social, human, and cultural/spiritual health of a community. The vision of environmental justice is the development of a paradigm to achieve socially equitable, environmental health, and economically secure, psychologically vital, spiritually whole, and ecologically sustainable communities. To this end, Brownfields redevelopment must be linked to helping address this broader set of community needs and goals” (NEJAC, 1996).

The important aspect of environmental justice as it relates to sustainable Brownfields redevelopment is the participation and involvement of the community in the decision-making process. This includes:

- early, adequate and meaningful community involvement in the decision-making process;
- a group of stakeholders committed to effecting a change for the better;
- all parties having equal access to all information relating to the proposed redevelopment;
- honesty and integrity for all participants for dealings between stakeholders;
- willingness to negotiate in order to achieve the necessary balance for the final decisions so that ideally all participants see the results as a win-win situation.

Environmental justice contributes to the sustainability of a Brownfields redevelopment project in a way that is somewhat unique when compared to that of the other elements. Brownfields tend to be located in close proximity to the neighborhoods of low-income and minority populations. When a redevelopment project is implemented in such a community, there will naturally be degrees of community and quality of life improvement experienced by the nearby residents.

4.3 The Brownfields Redevelopment Process



One significant aspect of a Brownfields project is its apparent (but illusory) simplicity. Initially, a Brownfields redevelopment project appears as a straightforward process of reclaiming an abandoned or underutilized property through the elimination or control of potential contaminants, and putting the land to some new use for the benefit of the community. But, the moment that this process is begun, the Brownfields redevelopment effort becomes connected to an extensive and complex web of ecological, economic and social systems, all of which influence not only what can be done at the site, but also how, when, and at what cost it can be done.

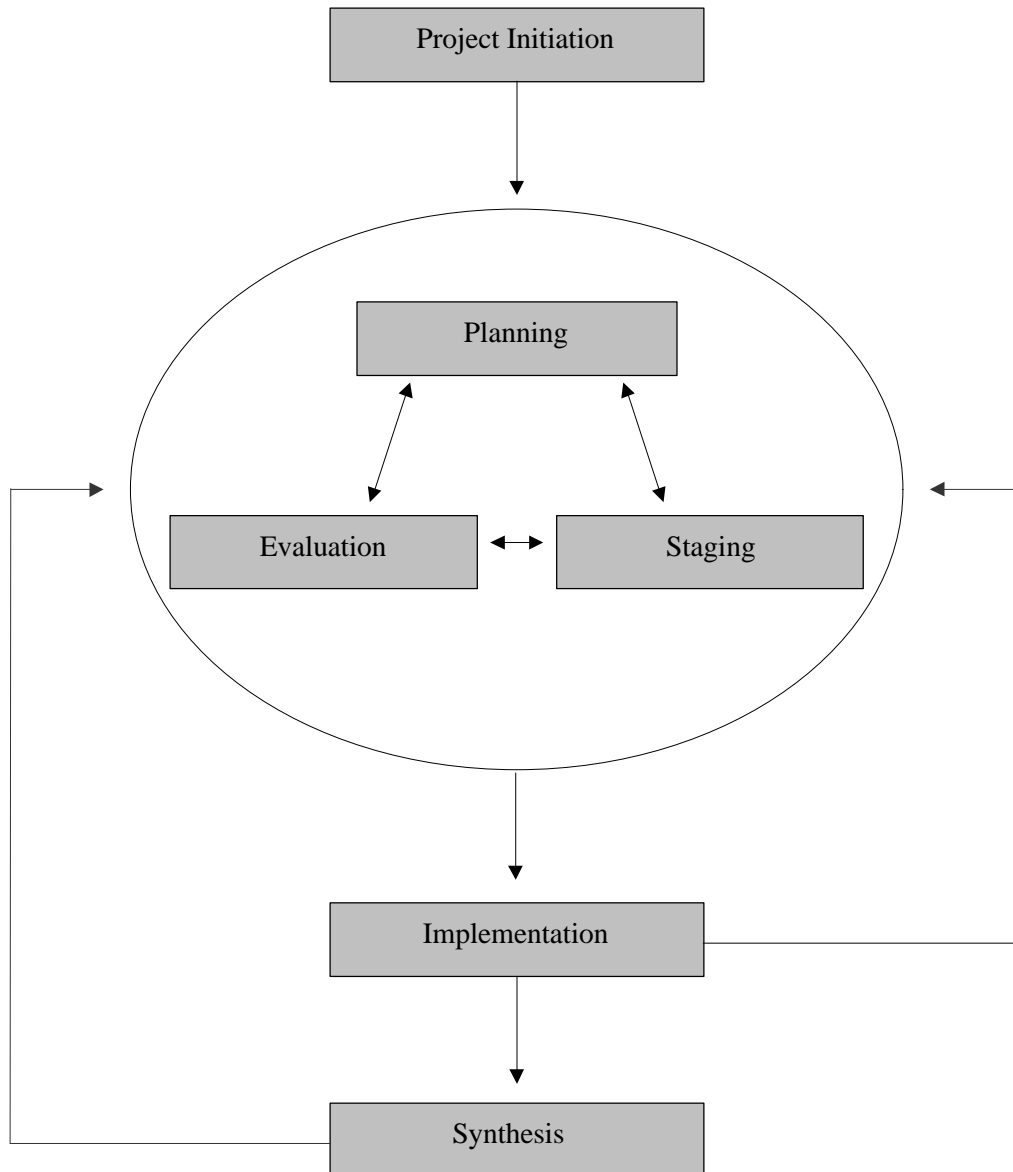
The complexity of a Brownfields redevelopment project is evident in the number of different ways in which the Brownfields process itself has been characterized, both in the literature and by the project participants and government officials who were interviewed for this study. Apart from the problems associated with contamination, the Brownfields redevelopment process has been described as a real estate transaction, a land use issue, a planning issue, a community development issue, and an economic development issue, among others. From the information collected during the first phase of the study, it is evident that a

Brownfields redevelopment effort is probably all of these at once, and none of these in particular.

Closer analysis reveals that each of these perspectives have a common characteristic, they manifest themselves through a traditional project management process. Every Brownfields project contains certain aspects associated with each phase of the project management process: definition, organizing, planning, executing, monitoring, and correcting. What makes a Brownfields redevelopment project challenging to define for modeling purposes is that no two projects routinely follow the linear project management process in a sequential and similar manner. The point where a project begins will vary depending on the project participants' perspective and their respective reasons for involvement. Typically, multiple phases will be occurring simultaneously; progress towards specified milestones, rather than their actual achievement, is often enough to initiate the next event; and feedback loops can occur continuously or during intermittent time periods throughout the overall process. During the initial research for this study, one project participant commented that conducting a Brownfields redevelopment project is like working a Rubik's cube puzzle, one keeps trying different combinations until you find the combination that works.

Nevertheless, in order to develop a model framework applicable to all Brownfields projects, a simplified process diagram has been derived that captures all the major phases, significant milestones, and range of activities that may occur. Although the proposed model framework correlates to the traditional project management process, it deviates slightly to focus on the key events of Brownfields redevelopment projects identified in the analysis of EPA Pilot Projects. Figure 4.1 presents this overall process.

Figure 4.1: The Brownfields Redevelopment Process



4.3.1 Project Initiation

The Project Initiation event is characterized by an expression of interest or concern, by any of a number of organizations or individuals, in the actual or potential existence of Brownfields. It may occur as part of a more encompassing

community development or regional economic development effort, or as a distinct and focused effort to identify one or more Brownfields properties. It is significant because it represents the beginning of a continual commitment to improvement among the members of a community or private property owners.

The Community's recognition of Brownfields as a real or potential challenge begins with an increasing public awareness of the potential for reuse of Brownfields sites and the local government's desire to address abandoned and underutilized properties. Connections are established between community components and the property of interest that add credibility and value to the project. As a result, the community begins to examine itself, preliminary organizational needs are identified, and public opinion is stirred as the potential benefits of sustainable Brownfields are envisioned.

Conceptual approaches to addressing a Brownfields property are developed to determine the scope and scale appropriate for a community or individual response based on the local conditions and number, type, and location of Brownfields properties.

Project authority is formalized as an organization is empowered and made responsible for overall control and achievements in sustaining the Brownfields project(s). This can be established by a local, regional, or state authority and provides focus, decision-making capability, and commitment to the project.

MILESTONE(S):

The process generally evolves to the next major event or series of events when one or more of the following milestones are reached:

- Community recognizes existence of Brownfields and value of redevelopment.
- Organizational point-of-contact formally established.
- Community/land owner/developer display commitment to proceed with project.
- Conceptual approach identified that addresses context of project and basic goals to be achieved.

4.3.2 Planning

The Planning phase is characterized by a focus on the planning process itself. This process is an amalgamation of planning approaches put to a uniform use. It is significant because it represents an effort to conceptualize and implement the project as a continuous process, while maintaining degrees of flexibility that allow the project to evolve and change throughout its lifespan.

The planning process incorporates many variables such as transportation, neighborhood identity, pedestrian orientation, land use planning, and more. The intent is to provide for adequate open space for traffic, recreation, buildings, and infrastructure; and for the distribution of population and traffic in orderly conditions favorable to health, safety, and convenience.

The planning process begins with an analysis of the project goals as outlined during the Project Initiation event. The community profile is used as the basis for establishing the context of the planning effort. A target market survey delineates who will benefit and who will be affected by the project. Analyses of possible project areas are undertaken to gather information on land use, demographics, transportation, and environmental systems. The information is analyzed to decipher problem areas and identify approaches to the goals of the project. Surveys (geotechnical, topographic) are then conducted to observe

wetlands, elevations, drainage, and soil. A functional analysis is conducted to examine the relationship of activities among the various land uses and how they relate to each other and circulation systems. Design initiatives are instituted to display activity nodes, site features, attractions, and study transition in use. Financial analysis begins as an ongoing cost study into the feasibility of the various approaches.

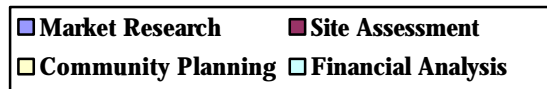
The gathered data and analysis of the situation and potential problems are synthesized into plans or proposals for action. These proposals become alternatives to accomplishing the goals of the project that will be reviewed by stakeholders and community.

The Planning event encapsulates a range of functions throughout the project that are continuously updated and refined. The ongoing process revolves around these key functions:

- Define who the project is intended to benefit and who will be effected by the project;
- Develop/identify various alternatives for site use, design, and remediation that can achieve the intended goals;
- Match the site to the context and stated goals of the stakeholders, community, target market, and the intended use;
- Determine various approaches that are best able to contribute to the sustainability of the community;
- Design a project that fits the social, environmental, economic, legal, political, and physical make-up of the community; and
- Identify and attain funding capable of bringing the project to fruition and maintain it as a component of the community.

The planning methodology includes an ongoing process of obtaining, analyzing, and formulating information pertaining to the project. This involves several sub-processes such as:

Planning Methodology Sub-processes



Market Research -

- Develop and analyze the community profile to determine lucid approaches to the community context;
- Review the data to define the best fit for sustainable development within the community, allowing the decision-makers to weigh different options that relate to current conditions;
- Identify economic trends that influence the project at various levels or scale;
- Determine possible marketing strategies to be undertaken;
- Define who the project is intended to benefit (determine target market) and approaches to be undertaken to achieve this;
- Observe proximity to amenities for location attraction and value;
- Assess adjacent properties to define neighborhood context and achieve integration of uses; and
- Assess the historical character of the site to determine effects of past efforts, obstacles, historical/architectural/archaeological significance, and infrastructure enhancements.

Site Assessment -

- Develop site characterization criteria and data quality objectives to support site screening and prioritization processes;
- Analyze geotechnical conditions (geological, soil, and hydrological) that influence infrastructure placement (utilities), buildable depth, types of roads and building foundation, and stormwater management;
- Analyze topographic conditions (contours and elevations) that influence drainage, stormwater management, and earthwork;
- Study the physical characteristics of a site to determine the adequacy and attributes of a site's location;
- Conduct an ASTM (1997a and 1997b) Phase I "Due Diligence" Assessment to highlight possible past hazardous uses;
- Perform a baseline Environmental Impact Survey to determine extent of project impact on present conditions of the area;
- Conduct a Brownfields Site Assessment to identify contamination type, danger, spread, and remediation options;
- Integrate ASTM Phase I and II Assessment and Brownfields Site Assessment data collection with the baseline Environmental Impact Survey and wetlands delineation, floodplain mapping, tree survey, stormwater drainage analysis, and other pertinent studies that effect site engineering, design, or cost; and
- Assess and clarify environmental risks and legal/regulatory liability.

Community Planning -

- Review the Comprehensive Plan, Subdivision Ordinance and Zoning Ordinance to determine requirements, options and limitations on uses;
- Clarify code enforcement and permitting requirements;
- Determine need for easements;

- Assess the political climate of the community and the political context of the stakeholders;
- Conduct traffic impact study to understand effect on patterns, access, volumes, parking, and circulation; and
- Establish architectural, technological, and other physical design initiatives that complement community features.

Financial Analysis -

- Estimate project's total cost in order to assess local financial condition/capability to incur debt, equity availability and bonding capacity;
- Research options and requirements for grants and/or loans, secure grant writer for applications;
- Determine methods of measuring cost;
- Delineate required rate of return; and
- Identify lending institutions or other funding mechanisms.

MILESTONE(S):

- Plans that assess development alternatives.
- Development of site design considerations.
- Identification of a developer as a stakeholder.
- Understanding and agreement of liability issues.
- Identification of presumptive remediation approaches.
- Identification of financial considerations.

4.3.3 Evaluation

The Evaluation phase is the systematic examination of plans, situations, or conditions associated with the Brownfields property, the community, the region, and other macro-scale influences, that have occurred or are ongoing and their comparison to desired community goals, objectives, standards, traditions, and trends. This examination may or may not be a distinct event within the Brownfields redevelopment process. In practice, the evaluation of a project will often be an ongoing event associated concurrently with the planning, staging, and implementation phases of the project.

The objective of the Evaluation phase is to determine the viability of various alternatives developed in the Planning phase in order to develop an overall strategy for how to proceed and what contingencies should be included. The evaluation considers the input of the full range of stakeholders as well as the local community. Its fundamental aspect is to ensure that key factors affecting sustainability are examined by ensuring the right questions are asked. For example:

- What are we dealing with?
- What alternatives do we have to improve the site?
- How does an alternative make sense for the community?
- Has the alternative proven to be sustainable elsewhere? If so, were the conditions the same?
- What long-term controls will be necessary?
- How does the preferred alternative balance the ecological, economic, and social benefits and impacts?

This phase has a significant impact on the project's long-term sustainability because it defines the project's direction, establishes the project's priority for

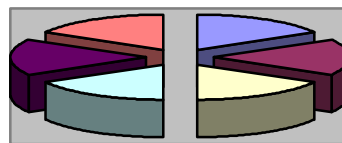
action and resource commitment, and solidifies the stakeholders' and community's support. The timeframe and extent to which the evaluation is performed will vary based on the complexity of the site/project, time, potential cost, personnel expertise needed, location, infrastructure, and degree to which useful information is obtained.

Three key functions or activities are performed during the Evaluation Phase. These functions are:

- Notifying and involving key stakeholders;
- Designing an effective evaluation methodology; and
- Determining how evaluation information is to be managed and used to support ongoing efforts.

The evaluation methodology focuses on obtaining and analyzing information pertaining to, or derived from these six components:

Evaluation Methodology



■ Site Assessment	■ Market Research
■ Community Planning Variables	■ Risk Analysis
■ Feasibility Analysis	■ Site Prioritization

Site Assessment -

- Identify the status of property ownership, liens, loans, etc.;

- Identify physical characteristics and natural features such as topography, frontage, access, soil/substrate, wetlands/drainage, flora/fauna, and historic/archeological;
- Identify chemical hazards, their source, extent of contamination and containment, compliance status, general remediation approaches, and estimated remedial action costs; and
- Determine integrity and adaptability of existing structures, infrastructure, and utilities.

Market Research -

- Select type of study – general market, site-specific, highest-and-best-use, target market profile;
- Determine regional, community and site-specific demographics, transportation, business environment, and psychographic profile;
- Assess capture ratio needed; and
- Identify contiguous property and positive/negative off-site factors such as the influence of nearby developments, parks, businesses, etc.

Community Planning Variables -

- Identify legal and political factors;
- Consider comprehensive land use requirements, zoning classification, variance potential, subdivision ordinances;
- Integrate community planning vision, goals, and objectives; and
- Consider environmental justice concerns.

Risk Analysis -

- Identify and clarify environmental liabilities;

- Determine public awareness, perception, and concerns with existing property conditions;
- Identify potential stakeholder communication and coordination barriers;
- Consider completeness and accuracy of site characterization data;
- Consider impact of possible changes in government policy and requirements;
- Determine market opportunity window and estimated project timeline; and
- Identify characteristic tools and approaches for managing risks.

Feasibility Analysis -

- Identify alternative site approaches to remediation and construction designs;
- Determine actual requirements and estimated cost of engineering, ownership, taxation, and risk management factors;
- Estimate property values before and after redevelopment;
- Determine affordability, financing potential and services; and
- Identify development alternatives and their potential impacts, advantages, disadvantages, resources available and underutilized, implementation timelines, and cost/benefit.

Site Prioritization (applies to projects that deal with multiple sites, properties, and property components) -

- Develop site remediation and redevelopment criteria;
- Develop methodology for ranking sites;
- Incorporate community involvement; and
- Develop approach for addressing sites on priority basis.

MILESTONE(S):

The major milestone for the Evaluation event is a refined strategy for redeveloping the project site(s) that has support of all key stakeholders and incorporates the community's goals for sustainability. This strategy identifies the approaches to overcoming barriers to sustainable redevelopment, includes acceptable alternatives for negotiation and project implementation, and is technically and financially feasible.

SECONDARY MILESTONES INCLUDE –

- Clarification of property ownership and owner cooperation.
- Proposal of a Remedial/Corrective Action Plan for site cleanup and restoration that is risk based and incorporates future uses of the site as defined in the community's zoning ordinances or other master plans.
- A market feasibility study that identifies alternative land uses, economic trends, opportunities, and potential fiscal returns.
- Acceptance of site prioritization methodology.
- Risk management strategy developed and accepted.
- Identification and preliminary discussions with prospective buyers/developers/lenders.
- Input by all interested community/public groups has been considered to ensure environmental equity, equitable costs, and equitable benefits for the neighboring residents.

4.3.4 Staging

The Staging event is that portion of the process during which proposed site plans and financing arrangements are negotiated and agreement is reached. In certain cases, an actual change in the ownership of the property/project will occur.

During this phase, the proposed corrective action plan is finalized, allocation of risk to all participating parties is determined, indemnification agreements are established, and any required institutional controls are formalized. In many cases, it is at this stage that permits are transferred, and new consent orders, voluntary corrective actions, or comfort letters and covenants not to sue are established between the new owner and the regulatory agency.

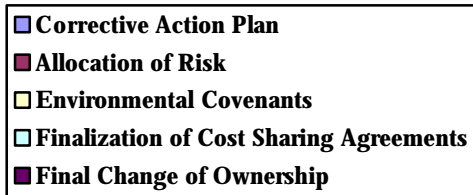
At this point in the redevelopment process, the initial site assessment and community profiling and visioning process have been completed. Final decisions by the owner or developer about the proposed reuse of the property have also been made and funding for the implementation of the selected alternative should have been secured.

Normally, the stakeholders participating in this phase are limited to those who have some direct, critical contribution to make to the negotiation/transaction processes that are taking place and include: representatives of government agencies (local, State, Federal), the current owner and prospective buyer, the developer (if other than the prospective owner), consultants, attorneys, and representatives of financial institutions or funding agencies that are supporting the project. The role of the public or community based stakeholders is reduced at this point and is limited to an oversight and support function. Important decisions involving community stakeholders will already have been made prior to this point. The guidance and criteria established through community participation in the earlier Planning and Decision phases will already be in place to channel negotiations and transaction activity.

Each of the processes normally carried out during this phase depends on activities and decisions reached during previous phases of the process and are in some way connected to the transfer of ownership and liability, funding and finance considerations, or the ultimate creation, enhancement, or maintenance of

the marketability of the property. Apart from those activities related to the liability and financing of the remediation or removal of contaminated materials from the site (typically associated with a Brownfields type redevelopment project), the various processes ongoing during this phase are not dissimilar from those characteristic of any other typical redevelopment effort. Activities or processes carried out during this phase include:

Transaction Event Processes



Corrective Action Plan -

- finalized and accepted by all participating stakeholders.

Allocation of Risk -

- Determination of the method to manage and allocate risk;
- Insurance or indemnification requirements;
- Acceptance by all parties with a fiduciary interest.

Environmental Covenants -

- Resolution of any existing covenants or institutional controls established to address risk from previous contamination;
- Formal acceptance of Operating Covenants for any proposed new development.

Finalization of any cost sharing agreements -

- Limits and caps are established;
- Role and liability of participating public and private entities is defined.

Final change of ownership is accomplished -

- Pre-closing agreements are executed;
- Representations and warranties are made.

MILESTONE(S):

- Acceptance of the property by the prospective new owner.
- Acceptance of remediation approach and risk management criteria by all parties.
- Finalization of the agreements related to indemnification, insurance and formalization of the sources of funding, whether by equity investor, owner, or public funding agencies.

4.3.5 Implementation

Upon implementation of the project, all major decisions reached during the process of the Brownfields redevelopment effort come together. Where necessary, transfer of the property to new ownership has been completed. Project related negotiations with the owner and potential developer are completed, or are nearing completion. A site clean-up plan that incorporates acceptable levels of risk based on the proposed new land use designation has been established and accepted by all stakeholders, and the site clean-up process can begin.

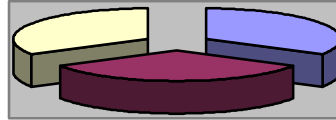
Completion of the project is anticipated once the proposed remediation is accomplished, any new institutional controls are in place, and construction of the proposed new facility for the site has begun. In some situations, especially where the site is initially transferred to a public agency, a marketing effort may be required to ensure proper completion of the project. In certain cases, the manner and process by which the Brownfields redevelopment authority will turn the project over to its final owner/operator is defined and formally executed to ensure that the site will be effectively utilized and managed into the future.

Stakeholder involvement at this phase is somewhat limited as most of the processes included as part of this event will be the responsibility of technical personnel in the various fields covered. Continuing public involvement in monitoring the progress of the project and its conformance to the proposed plan is important.

With the culmination of the planning and decision making aspects of the project essentially completed, the implementation phase marks the actual onset of physical activity at the site related to any demolition, renovation, or remedial action that may be required because of the Brownfields nature of the selected property. Any new or innovative technologies that have been incorporated into the remediation plan are tested and approved for use.

Once the site has been successfully restored to the appropriate level of risk associated with the proposed land use, the completion of the site redevelopment process proceeds in a manner similar to any other site development or redevelopment project. In many cases, it is preferred that the remediation activities at the site be integrated with the site's restoration and reconstruction of the new facility in order to achieve time, technology, permitting, and cost efficiencies. Key functions carried out during this phase include:

Implementation Phase Functions



■ Site Construction ■ Marketing/Sales ■ Project Completion

Site Construction -

- Regulatory requirements and institutional controls are established and monitoring procedures are instituted;
- All necessary permits and agreements are executed and in place;
- Remedial action occurs;
- Developer negotiations are completed; and
- Site preparation and reconstruction activities are initiated or integrated with remediation effort.

Marketing/Sales -

- A plan to market the site itself or to sell the finished facility in whole, or in part, are completed and put into effect;
- Any necessary workforce requirements are defined and training programs are established to support site cleanup and reuse of the property.

Project Completion -

- A plan for transition of the project from the Brownfields public/private authority to the new owner or final operating entity is prepared;
- Project responsibility is transferred to new owner; and
- Public communication and monitoring of site progress continues.

MILESTONE(S):

- Completion of site remediation and restoration activities.
- Confirmation of new developer and the development plan.
- Onset of new construction.
- Exit of the initial Brownfields project organization and transfer of project responsibility to the operating public agency and/or private developer.
- Ultimate operation of the site or redevelopment business.

With respect to the sustainability of the project, a future milestone is represented by the point at which the project is successfully transitioned from the use of public grant funds to support ongoing operations to a status as fully self-supporting (whether by private capital or through private endowment or grant support). For public facilities, this milestone may be marked by the achievement of some other operational success criteria.

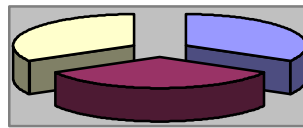
4.3.6 Synthesis

A primary goal of a sustainable Brownfields project is to prevent the redeveloped site from reverting to a Brownfields property in the future. Simply following the Brownfields redevelopment process from Initiation through the Implementation phases does not assure long-term success and sustainability of the project. All the factors that were considered in the earlier events will change over time. For example, the demographics of the neighborhood will shift by age, income levels, or nationality; the products or services provided by the new business enterprise may no longer be competitive or even desired; the cultural and architectural features once sought to be preserved may no longer be valued; and, the natural or ecological resources will evolve, degrade, or eventually diminish.

The final event within the process must be a continuing effort and commitment to continuously monitor, re-evaluate, and refine the process in order to adapt the project to changes in the balance between ecological, economic and sociocultural systems. This facilitates the integration of project operations and outcomes into the fabric and daily functions of the community. This effort is performed through the collaboration of private property and business owners, local community leaders, the local and regional government organizations, and the general public. In this manner, a continuing synthesis is maintained between the goals of the Brownfields redevelopment project and the community's goals for economic development and environmental health.

The synthesis of the Brownfields project within the community requires that three key functions be performed throughout the time frame during which the community seeks to sustain its economic, social, and ecological health.

Three Key Functions for Brownfields Prevention



- *Adaptive Management* – ensures that the owners or oversight organization, new business, community plans, and project criteria remain flexible enough to adapt to changing ecological-economic conditions, human behavior and objectives, and technological advances. Important features of adaptive management that contribute to a sustainable Brownfields project include:
 - ✓ Continuing organizational and individual accountability for process outcomes;

- ✓ Recurring strategic planning and decision-making based on updated community values, vision, and goals;
 - ✓ Systematic monitoring and evaluation of existing conditions to learn from experience and correct for desired outcomes;
 - ✓ Adjustment of risk management and land use controls as needed; and
 - ✓ Integration of innovative community/building design experiments with the planning process in order to replace learning by “trial-and-error” with careful testing.
- *Information Management* – ensures that all stakeholders have access to, and understand the data required for effective monitoring and decision-making. Important features include:
 - ✓ Integrated data compilation, organization, assessment, and retention;
 - ✓ Effective interpretation, presentation, and sharing of information;
 - ✓ Collection of comparable data and clarification of facts versus uncertainties;
 - ✓ Equal access to the best available information for decision-making; and
 - ✓ Enrichment of the community’s knowledge-building processes.
 - *Resource Management* – ensures that the continued use and impacts upon ecological, economic and social resources do not exceed their respective threshold capacities appropriate for the various project scales in which the resource use is planned. Important features include:
 - ✓ Measurement, monitoring, and evaluation of internal and external resources against established baselines in order to identify changes, their causes, and effects;
 - ✓ Quality enhancement of intergenerational trade-offs and cost-benefit analyses;
 - ✓ Assurance of no net gains in energy consumption; and

- ✓ Assurance that resource preservation and conservation practices are applied as needed.

MILESTONE(S):

- Future liability concerns associated with site ownership, operations, and subsequent transfer of ownership are clarified and resolved.
- The new project is supported by the community and remains economically viable over the time period intended by the project plans and community objectives.
- The project retains its service and value to future generations thereby preventing future Brownfields.
- Collaborative project teams apply their recent experience to initiate new Brownfields projects.
- The local community members involved in the project are satisfied that the project achieved equitable balance between ecological, economic and social values.
- Specific project goals and objectives were achieved, such as jobs created, job training program conducted, air quality improved, soil and groundwater cleaned-up, renewable energy sources tapped, resources recycled and reused, natural/historic resources and biological diversity protected, individual health and wealth improved among community residents, etc.
- The individual project is accepted as an integral part of the community as a contributing element, which is also supported by the community's residents.

4.4 Integrating the Parameters, Elements and Characteristics (PECs) and the Brownfields Redevelopment Process

Sustainable Brownfields redevelopment refers to redevelopment and growth that are maintained over the long-term, and occur within the limits of the

environment so that the current needs of the citizens are met without compromising the ability of future generations to meet their needs. There is a distinction between a successful Brownfields redevelopment project and a sustainable Brownfields project. One definition of a successful project includes “cleaning up the contamination to levels appropriate for the new use of the property [and] that the new development is appropriate and beneficial to both the city and the neighborhood” (R. Morrison, 1996). Whereas, a sustainable Brownfields project meets the criteria defined for sustainability that may not be a prerequisite for the immediate success of the Brownfields project itself. The ultimate goal of this study is to connect the sustainability criteria with activities at successful Brownfields projects and to depict this relationship in a model framework.

Section 4.2 of this Chapter reviewed the parameters, elements, and characteristics (PECs) of sustainability that have been derived through research and are associated with Brownfields at the project level. Section 4.3 presented and discussed the major events and milestones that typically occur during the successful implementation of a Brownfields redevelopment project. By integrating the PECs into the operational Brownfields redevelopment process, a model framework is established to help guide communities seeking to successfully redevelop sustainable Brownfields projects. The intention of this model framework is not to establish “hard-and-fast” requirements that may impede a project, but to assist the project in identifying what sustainability is and what project factors may support sustainability.

Based on research into EPA Brownfields Assessment Demonstration Pilot Projects and the City of Chattanooga’s Brownfields project (EPA, 1998), each of the six major events within the Brownfields redevelopment process were found to entail elements and characteristics attributed to sustainability. Various PECs of sustainable Brownfields projects are inherent within each event but may differ

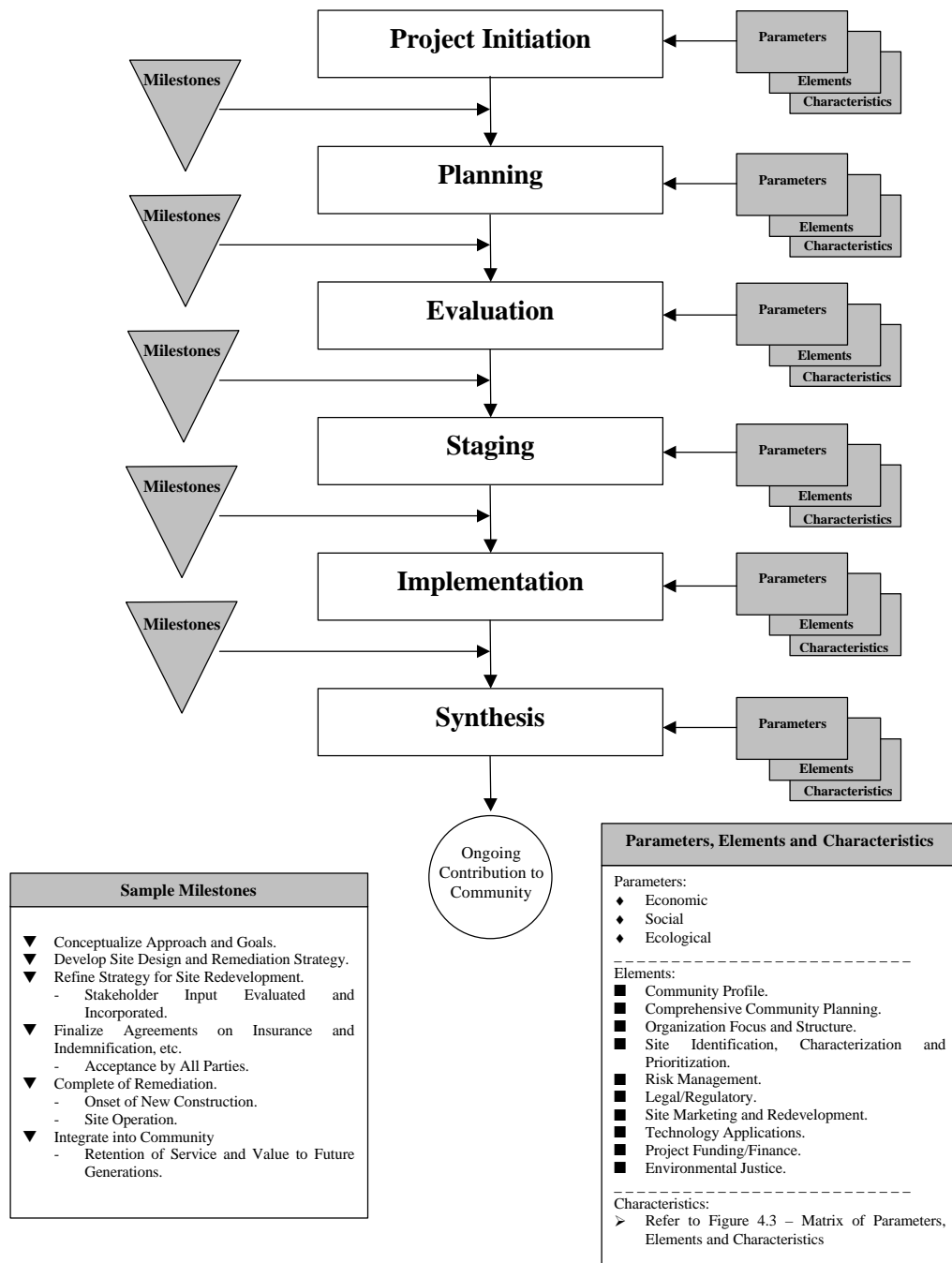
with regard to when, how, and to what degree they occur depending on the individual project goals, objectives, and requirements. The dynamic relationship between the PECs and the events of a Brownfields redevelopment process is represented in Figure 4.2. The remainder of this section illustrates how the elements can relate to each event and why they are significant. Figure 4.3 (located at the end of the chapter) represents a summary matrix of the PECs and the events of the Brownfields redevelopment process within the model framework.

PROJECT INITIATION EVENT:

The following elements of sustainable Brownfields redevelopment projects are applicable to this event.

- *Community Profile* – serves as the basis for community awareness of its needs and the interrelationships between the land, development, people, economy, and quality of life; establishes the context for the next phase’s planning efforts; and, begins to define the “best fit” for a sustainable development within the community.
- *Environmental Justice* – involves the community early-on in the process, helps ensure fair and equitable treatment of low-income and minority communities to support the long-term sustainability of the project, and reduces the chance of inadvertently creating additional future Brownfields in distressed neighborhoods.
- *Organizational Focus & Structure* – establishes the primary point-of-contact for the project (either public, private, or municipal), authority, government commitment of resources, initial stakeholders, and preliminary channels of communication and project coordination.

Figure 4.2: Model Framework for a Sustainable Brownfields Redevelopment Process



PLANNING EVENT:

In addition to those elements that are continuing from the Initiation event, the following elements of sustainable Brownfields redevelopment projects are appropriate for this event.

- Comprehensive Community Planning – integrates the Brownfields redevelopment process into a larger community development plan that incorporates requirements, needs, and goals specific to each community.
- Site Identification, Characterization & Prioritization – delineates all aspects of a site (topography, infrastructure, ownership, economic conditions, etc.) to determine the level of site contamination and the inherent redevelopment potential of the site.
- Risk Management and Site Restoration – provides maximum flexibility and balance between facilitating the project and protecting the public health, environment, and personal or corporate liability by involving, educating, and translating scientific/technical results to stakeholders and citizens who are interested in the project.
- Legal/Regulatory Issues – uncovers potentially inimical issues that hamper redevelopment because of inherent risk factors that are ill-defined, and establishes a range of options and opportunities that decision-makers can implement into their decision-making process.
- Site Marketing and Redevelopment Approach – balances economic factors with social and ecological factors to contribute to overall sustainability of the Brownfields process through community development goals; develops

marketing skills and strategies that entice business or industry in a process of selling the project to potential developers as well as the community.

- *Technological Applications* – identifies, develops, evaluates, and integrates new technology applications into the characterization, remediation, and reuse of the property to provide cost benefits to the communities and developers, foster community confidence in technology, provide quality of life improvements for the residents, and directly promote long-term sustainability of the project.
- *Project Funding/Finance* – analyzes the funding needs of a project, both incrementally and in whole addresses the viability of investment in all of the redevelopment alternatives, outlines public funding as an inducement to development, identifies/confirms the long term funding source(s), and maintains a continuous source of income throughout the life of the project.
- *Environmental Justice* – develops a holistic approach for community participation/involvement to ensure equitable distribution of the costs, benefits and burdens of the redevelopment plan as it will incorporate into the community.

EVALUATION EVENT:

All ten elements of sustainable Brownfields projects apply to this event in varying degrees. Basically, the organizational focus and structure will determine who performs the evaluation, when, and with what resources. Information generated by the community profile, community planning, environmental justice, site identification and characterization, legal/regulatory issue clarification, and market research forms the baseline for evaluating alternative approaches in order to generate a redevelopment strategy. The strategy is further refined to address

risk management, financing, and technology application factors, uncertainties, and opportunities.

STAGING EVENT:

In this phase, earlier project activity related to the elements of sustainability is realized. Information regarding site selection and characterization, the community profile, and the subsequent community visioning process have directly affected project success up to this point. Similarly, most of the considerations established during the comprehensive planning process have come to fruition by this stage. Actively important during this phase of the process are the elements of project organization, risk management and restoration, legal and regulatory issues, and site marketing and redevelopment concerns, especially with respect to decision making and the establishment of effective operating covenants and management of risk. The importance of early identification and agreement on project funding sources is emphasized at this stage.

IMPLEMENTATION EVENT:

The proposed plan for redevelopment incorporates all of the sustainability considerations that have been identified in the previous four phases. Appropriate consideration is given to any population segments that may be negatively affected by the remediation action, including careful consideration of environmental justice issues. The sustainability of the project at this point is heavily dependent on the success of the prior project organization and the level of communication that is established between project participants, especially the developer, owner, regulatory agencies, funding sources/investors, and the community as a whole. Such communication facilitates the resolution of problems and other project related issues, including schedule delays.

Also important to the sustainability of the project is the identification of the necessary labor skills that may be required to support the project, both during development and in the later operational phase, and the availability of those skills in the existing workforce. Partnerships between the project and local education and training institutions are also important to the creation and maintenance of necessary skills in the resident population throughout the life of the project.

SYNTHESIS EVENT:

In order for the project to be sustainable, it must be fully integrated into community functions in order to continually adapt to changes in the balance between the three parameters of sustainability – ecological, economic, and social systems. These parameters are reflected in the following elements:

- *Organizational Focus and Structure* – maintains consistency and reliance in a single point-of-contact that has the authority for decision-making and can be held accountable for outcomes, includes stakeholders representing ecological, economic, and social values within the community, and serves as a coordinating body over the long-term for conducting the various management functions discussed above.
- *Community Profile* – is updated periodically to reflect changes in the community vision and goals, economy, demographics, and landscape; thereby serving as a dynamically evolving baseline for ongoing project evaluation.
- *Environmental Justice* - becomes an ongoing effort achieved through continual community awareness and involvement.

- Comprehensive Community Planning – continues as an ongoing process in order to reflect the input from the adaptive, information, and resource management functions performed.
- Legal/Regulatory Issues – changes in statutory and regulatory requirements are continuously monitored and evaluated for potential impacts on the project while new laws, regulations, and ordinances are established based on lessons learned and new technologies becoming available.
- Risk Management and Restoration – continues to apply as the effectiveness of the remediation and institutional controls is re-evaluated, tools for managing any residual risks are revised as necessary, and project participant/community concerns are resolved or further addressed.
- Technology Applications – provide a major influence on traditional or existing social, economic, and ecological perspectives and values and requires that new technologies are continually evaluated in terms of how they contribute to provides the quality of life desired for future generations.
- Project Funding/Finance – emphasizes the ability to maintain long-term operational support for risk reduction (i.e., groundwater treatment systems), and reinvestment of proceeds from redevelopment back into the community to continue the funding of local governments' Brownfields initiative programs for future projects.

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FIGURE 4.3: MATRIX OF INTEGRATED PARAMETERS, ELEMENTS AND CHARACTERISTICS (PECS) AND BROWNFIELDS PROCESSES

EVENT / ELEMENT	Organizational Focus and Structure	Community Profile	Comprehensive Planning	Environmental Justice	Site Characterization
Project Initiation	<ul style="list-style-type: none"> Emphasize need for strong community and public leadership Include all project stakeholders and concerned or interested citizens Centralize local government coordination, point-of-contact, and authority 	<ul style="list-style-type: none"> Associate ecological assets with community values Determine the economic basis of the community and climate for investment Understand the socio-cultural influences and needs that promote stability Seek to preserve natural, cultural, and historic resources for inter-generational continuity 		<ul style="list-style-type: none"> Environmental equity, equitable costs and equitable benefits for all Early, adequate and meaningful community involvement in decision making Stakeholders who are committed to effecting a change for the better 	
Planning	<ul style="list-style-type: none"> Integrate all public and private resources 	<ul style="list-style-type: none"> Develop environmental baseline inventory for future ecosystem management Estimate natural resource consumption limits Incorporate important landscape and attractive community features Define the composition and character of the community Develop a sense of community self-reliance Recognize the skills and knowledge of the community labor force 	<ul style="list-style-type: none"> Develop private-public partnership Incorporate community concerns into the decision-making processes Integrate the regional ecosystem(s) perspective Include "Best Practices" for sustainability Develop a comprehensive approach to all concerns Identify the carrying capacity of the ecosystem Establish urban growth boundaries Determine current and planned surrounding land use Promote the potential benefits for minimizing automobile use Determine economic self-sufficiency Depend on community-stakeholders' consensus Identify uncertainties and build-in flexibility in planning options 	<ul style="list-style-type: none"> Equal access to all information relating to the redevelopment Willingness to negotiate to achieve a win-win situation Early, adequate and meaningful community involvement in decision making Stakeholders who are committed to effecting a change for the better 	<ul style="list-style-type: none"> Obtain accurate ecological information ✓ Delineation of site characteristics ✓ Representation of nature of contamination ✓ Integration of site assessments, audits and inspections ✓ Identification of groundwater contamination • Create continuous updating procedure • Use of technical resources available • Assess the redevelopment potential of the site ✓ Adjacent land owners and uses ✓ Cooperation of the owner ✓ Cost of remediation ✓ Socioeconomic conditions of the community ✓ Transportation and infrastructure ✓ Attractive natural or historic features
Evaluation	<ul style="list-style-type: none"> Emphasize need for strong community and public leadership Include all project stakeholders and concerned or interested citizens Centralize local government coordination, point-of-contact, and authority Integrate all public and private resources 	<ul style="list-style-type: none"> Develop environmental baseline inventory for future ecosystem management Estimate natural resource consumption limits Incorporate important landscape and attractive community features Define the composition and character of the community 	<ul style="list-style-type: none"> Develop private-public partnership Incorporate community concerns into the decision-making processes Integrate the regional/ecosystem(s) perspective Include "Best Practices" for sustainability ✓ Develop a comprehensive 	<ul style="list-style-type: none"> Early, adequate and meaningful community involvement in decision making Involve Stakeholders who are committed to effecting a change for the better Provide equal access to all information relating to the redevelopment 	<ul style="list-style-type: none"> ✓ Incorporate ecological information into decision-making ✓ Delineation of site characteristics and nature of contamination ✓ Integration of assessments, audits and inspections results ✓ Magnitude of groundwater contamination ✓ Create continuous updating procedure

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FIGURE 4.3: MATRIX OF INTEGRATED PARAMETERS, ELEMENTS AND CHARACTERISTICS (PECS) AND BROWNFIELDS PROCESSES

		<ul style="list-style-type: none"> • Develop a sense of community self-reliance • Recognize the skills and knowledge of the community labor force 	<ul style="list-style-type: none"> ✓ approach to all concerns ✓ Assess impact to the carrying capacity of the ecosystem ✓ Establish urban growth boundaries ✓ Determine current and planned surrounding land use ✓ Consider the potential benefits for minimizing automobile use ✓ Determine economic self-sufficiency ✓ Depend on community-stakeholders' consensus ✓ Equalize benefits and burdens for the community and stakeholders 	<ul style="list-style-type: none"> • Willingness to negotiate to achieve a win-win situation • Environmental equity, equitable costs and equitable benefits for all 	<ul style="list-style-type: none"> ✓ Use of technical resources available ✓ Assess the redevelopment potential of the site ✓ Adjacent land owners and uses ✓ Cooperation of the owner ✓ Cost of remediation ✓ Socioeconomic conditions of the community ✓ Transportation and infrastructure ✓ Attractive natural or historic features • Illustrate the basis of prioritizing the site over other candidate sites ✓ Site prioritization schemes ✓ Multi-level screening process/prioritization model
Staging	<ul style="list-style-type: none"> • Include all project stakeholders and concerned or interested citizens • Integrate all public and private resources 			<ul style="list-style-type: none"> • Willingness to negotiate to achieve a win-win situation • Environmental equity, equitable costs and equitable benefits for all 	
Implementation	<ul style="list-style-type: none"> • Emphasize need for strong community and public leadership • Include all project stakeholders and concerned or interested citizens • Centralize local government coordination, point-of-contact, and authority • Integrate all public and private resources 			<ul style="list-style-type: none"> • Early, adequate and meaningful community involvement in decision making • Involve Stakeholders who are committed to effecting a change for the better • Provide equal access to all information relating to the redevelopment • Environmental equity, equitable costs and equitable benefits for all 	
Synthesis	<ul style="list-style-type: none"> • Emphasize need for strong community and public leadership • Include all project stakeholders and concerned or interested citizens • Centralize local government coordination, point-of-contact, and authority • Integrate all public and private resources 	<ul style="list-style-type: none"> • Monitor natural resource consumption vs. limits • Re-Define the composition and character of the community • Monitor the socio-cultural influences and needs that promote stability • Preserve natural, cultural, and historic resources for inter-generational continuity • Develop a sense of community self-reliance • Enhance the skills and knowledge of the community labor force 	<ul style="list-style-type: none"> • Develop private-public partnership • Incorporate community concerns into the decision-making processes • Integrate the regional/ecosystem(s) perspective • Include "Best Practices" for sustainability 	<ul style="list-style-type: none"> • Continuous community involvement in decision making • Involve Stakeholders who are committed to effecting a change for the better • Provide equal access to all information relating to the redevelopment • Environmental equity, equitable costs and equitable benefits for all 	

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FIGURE 4.3: MATRIX OF INTEGRATED PARAMETERS, ELEMENTS AND CHARACTERISTICS (PECS) AND BROWNFIELDS PROCESSES

EVENT / ELEMENT	Risk Management	Legal / Regulatory Issues	Marketing And Redevelopment	Financing	Technology Applications
Project Initiation				<ul style="list-style-type: none"> Identify potential sources of funds, primarily for the initial stages of the project 	
Planning	<ul style="list-style-type: none"> Identify and clarify the barriers to effective risk management ✓ Lack of communication and coordination with stake holders ✓ Reluctant or hesitant stakeholders ✓ Community priorities and objectives ✓ Incomplete or inaccurate site characterization ✓ Threat of contamination spread ✓ Long-term remedial approaches • Address the community concerns ✓ Relate scientific results and risks to community understanding ✓ Inform the public of issues critical to their interests ✓ Empower the public to act with respect to the risk communicated • Address the project participant concerns ✓ Reluctance to participate and liability indemnification for current owner ✓ Return on investment and risk factors/perception for buyer & developer ✓ Borrower circumstances and property value maintenance for lender • Identify the tools for Risk Management ✓ Project organizing ✓ Include Federal and State agency roles ✓ Use risk based corrective actions based on future uses • Identify property ownership alternatives 	<ul style="list-style-type: none"> • CERCLA ✓ "Joint and Several Liability" ✓ SARA, 1986 ✓ EPA Guidance, 1992 "Covenant not to Sue" "Prospective Purchase Agreements" ✓ CERCLA Amendment, 1996 "Comfort Letter Policy" "Secured Lenders and Fiduciaries" protections • RCRA, Clean Air Act, Clean Water Act, Toxic Substances Control Act, etc. 	<ul style="list-style-type: none"> • Promote program factors ✓ Community expectations ✓ Rationality and incentives ✓ Ownership ✓ Program life cycle ✓ Control of development • Promote ecological factors ✓ Eco-Industrial parks ✓ Reclaimed Brownfields for parks and open spaces ✓ Green space and open space as interim use ✓ Reclaimed Brownfields in ecologically sensitive areas ✓ Landscape design considerations • Promote socioeconomic factors ✓ The right property ✓ The right use ✓ The right incentives • Site Marketing ✓ Sites as community assets ✓ Role of prevailing market forces ✓ Market or feasibility analyses 	<ul style="list-style-type: none"> • Redevelopment processes requiring funding ✓ Site characterization and remediation ✓ Planning, public outreach and design approval ✓ Development and reconstruction ✓ Long term operational support • Public Sources of funds, primarily for the initial stages of the project ✓ Federal – EPA, HUD, DOT, DOC, SBA ✓ State – environmental or economic agencies, tax programs, loans ✓ Local – incentive programs, tax increment financing programs, grants • Private Sources of funds ✓ Property owners or other responsible parties ✓ Prospective purchasers or developers ✓ Equity investors ✓ Commercial banks ✓ Private foundations and universities 	<ul style="list-style-type: none"> • Energy Technology ✓ Reducing energy demands ✓ Renewable energy • Environmental Technology ✓ Industrial Ecology ✓ Eco-Industrial parks ✓ Pollution prevention and waste minimization ✓ Site assessments and remediation ✓ Ecological monitoring and assessment • Transportation Technology ✓ Intelligent Transportation Systems (ITS) ✓ Alternative fuels and vehicles • Telecom/Information Technology ✓ Geographic Information System (GIS) • Public Safety Technology
Evaluation	<ul style="list-style-type: none"> • Determine how to resolve the barriers to effective risk management ✓ Lack of communication and coordination with stake holders 	<ul style="list-style-type: none"> • CERCLA ✓ "Joint and Several Liability" ✓ SARA, 1986 ✓ EPA Guidance, 1992 "Covenant not to Sue" 	<ul style="list-style-type: none"> • Promote program factors ✓ Community expectations ✓ Rationality and incentives ✓ Ownership ✓ Program life cycle 	<ul style="list-style-type: none"> • Redevelopment processes requiring funding ✓ Site characterization and remediation 	<ul style="list-style-type: none"> • Energy Technology ✓ Reducing energy demands ✓ Renewable energy • Environmental Technology ✓ Industrial Ecology

FIGURE 4.3: MATRIX OF INTEGRATED PARAMETERS, ELEMENTS AND CHARACTERISTICS (PECS) AND BROWNFIELDS PROCESSES

<ul style="list-style-type: none"> ✓ Reluctant or hesitant stakeholders ✓ Community priorities and objectives ✓ Incomplete or inaccurate site characterization ✓ Threat of contamination spread ✓ Long-term remedial approaches ✓ Government policy and requirement changes ✓ Loss of market opportunity window ✓ Contingent risks of owners/developers • Address the community concerns ✓ Relate scientific results and risks to community understanding ✓ Inform the public of issues critical to their interests ✓ Empower the public to act with respect to the risk communicated • Address the project participant concerns ✓ Reluctance to participate and liability indemnification for current owner ✓ Return on investment and risk factors/perception for buyer & developer ✓ Borrower circumstances and property value maintenance for lender • Identify the tools for Risk Management ✓ Project organizing ✓ Include Federal and State agency roles ✓ Consider risk based corrective actions based on future uses ✓ Consider property ownership alternatives ✓ Establish institutional controls and insurance 	<ul style="list-style-type: none"> ✓ "Prospective Purchase Agreements" ✓ CERCLA Amendment, 1996 ✓ "Comfort Letter Policy" ✓ "Secured Lenders and Fiduciaries" protections • RCRA, Clean Air Act, Clean Water Act, Toxic Substances Control Act, etc. 	<ul style="list-style-type: none"> ✓ Control of development • Promote ecological factors ✓ Eco-Industrial parks ✓ Reclaimed Brownfields for parks and open spaces ✓ Green space and open space as interim use ✓ Reclaimed Brownfields in ecologically sensitive areas ✓ Landscape design considerations • Promote socioeconomic factors ✓ The right property ✓ The right use ✓ The right incentives • Site Marketing ✓ Sites as community assets ✓ Role of prevailing market forces ✓ Market or feasibility analyses 	<ul style="list-style-type: none"> ✓ Planning, public outreach and design approval ✓ Development and reconstruction ✓ Long term operational support • Public Sources of funds, primarily for the initial stages of the project ✓ Federal – EPA, HUD, DOT, DOC, SBA ✓ State – environmental or economic agencies, tax programs, loans ✓ Local – incentive programs, tax increment financing programs, grants • Private Sources of funds ✓ Property owners or other responsible parties ✓ Prospective purchasers or developers ✓ Equity investors ✓ Commercial banks ✓ Private foundations and universities 	<ul style="list-style-type: none"> ✓ Eco-Industrial parks ✓ Pollution prevention and waste minimization ✓ Site assessments and remediation ✓ Ecological monitoring and assessment • Transportation Technology ✓ Intelligent Transportation Systems (ITS) ✓ Alternative fuels and vehicles • Telecom/Information Technology ✓ Geographic Information System (GIS) • Public Safety Technology
<p>Staging</p> <ul style="list-style-type: none"> • Resolve the barriers to effective risk management ✓ Lack of communication and coordination with stake holders ✓ Community priorities and objectives ✓ Long-term remedial approaches 	<ul style="list-style-type: none"> • CERCLA ✓ "Joint and Several Liability" ✓ SARA, 1986 ✓ EPA Guidance, 1992 ✓ "Covenant not to Sue" ✓ "Prospective Purchase Agreements" ✓ CERCLA Amendment, 1996 	<ul style="list-style-type: none"> • Promote program factors ✓ Community expectations ✓ Rationality and incentives ✓ Ownership ✓ Program life cycle ✓ Control of development • Promote ecological factors 	<ul style="list-style-type: none"> • Redevelopment processes requiring funding ✓ Site characterization and remediation, planning, public outreach and design approval, development and reconstruction, long term operational support 	

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FIGURE 4.3: MATRIX OF INTEGRATED PARAMETERS, ELEMENTS AND CHARACTERISTICS (PECS) AND BROWNFIELDS PROCESSES

	<ul style="list-style-type: none"> ✓ Loss of market opportunity window ✓ Contingent risks of owners/developers • Address the community concerns • Address the project participant concerns ✓ Reluctance to participate and liability indemnification for current owner ✓ Return on investment and risk factors/perception for buyer & developer ✓ Borrower circumstances and property value maintenance for lender 	<ul style="list-style-type: none"> • "Comfort Letter Policy" • "Secured Lenders and Fiduciaries" protections • RCRA, Clean Air Act, Clean Water Act, Toxic Substances Control Act, etc. 	<ul style="list-style-type: none"> ✓ Eco-Industrial parks ✓ Reclaimed Brownfields for parks and open spaces ✓ Green space and open space as interim use ✓ Reclaimed Brownfields in ecologically sensitive areas ✓ Landscape design considerations • Promote socioeconomic factors ✓ The right property ✓ The right use ✓ The right incentives • Site Marketing ✓ Sites as community assets ✓ Role of prevailing market forces ✓ Market/feasibility analyses 	<ul style="list-style-type: none"> • Public Sources of funds, primarily for the initial stages of the project ✓ Federal – EPA, HUD, DOT, DOC, SBA ✓ State – environmental or economic agencies, tax programs, loans ✓ Local – incentive programs, tax increment financing programs, grants • Private Sources of funds ✓ Property owners or other responsible parties ✓ Prospective purchasers or developers ✓ Equity investors ✓ Commercial banks ✓ Private foundations and universities 	
Implementation	<ul style="list-style-type: none"> • Resolve the barriers to effective risk management ✓ Lack of communication and coordination with stake holders ✓ Community priorities and objectives ✓ Incomplete or inaccurate site characterization ✓ Threat of contamination spread ✓ Long-term remedial approaches ✓ Government policy and requirement changes • Address the community concerns ✓ Relate scientific results and risks to community understanding ✓ Inform the public of issues critical to their interests ✓ Empower the public to act with respect to the risk communicated • Address the project participant concerns ✓ for current owner ✓ Return on investment and risk factors/perception for buyer & developer ✓ Borrower circumstances and property value maintenance for lender • Use the tools for Risk Management 	<ul style="list-style-type: none"> • CERCLA ✓ "Joint and Several Liability" ✓ SARA, 1986 ✓ EPA Guidance, 1992 • "Covenant not to Sue" • "Prospective Purchase Agreements" ✓ CERCLA Amendment, 1996 • "Comfort Letter Policy" • "Secured Lenders and Fiduciaries" protections • RCRA, Clean Air Act, Clean Water Act, Toxic Substances Control Act, etc. 	<ul style="list-style-type: none"> • Promote program factors ✓ Community expectations ✓ Rationality and incentives ✓ Ownership ✓ Program life cycle ✓ Control of development • Promote ecological factors ✓ Eco-Industrial parks ✓ Reclaimed Brownfields for parks and open spaces ✓ Green space and open space as interim use ✓ Reclaimed Brownfields in ecologically sensitive areas ✓ Landscape design considerations • Promote socioeconomic factors ✓ The right property ✓ The right use ✓ The right incentives • Site Marketing ✓ Sites as community assets ✓ Role of prevailing market forces 	<ul style="list-style-type: none"> • Redevelopment processes requiring funding ✓ Site characterization and remediation ✓ Development and reconstruction ✓ Long term operational support • Public Sources of funds, primarily for the initial stages of the project ✓ Federal – EPA, HUD, DOT, DOC, SBA ✓ State – environmental or economic agencies, tax programs, loans ✓ Local – incentive programs, tax increment financing programs, grants • Private Sources of funds ✓ Property owners or other responsible parties ✓ Prospective purchasers or developers ✓ Equity investors ✓ Commercial banks ✓ Private foundations and universities 	<ul style="list-style-type: none"> • Energy Technology ✓ Reducing energy demands ✓ Renewable energy • Environmental Technology ✓ Industrial Ecology ✓ Eco-Industrial parks ✓ Pollution prevention and waste minimization ✓ Site assessments and remediation ✓ Ecological monitoring and assessment • Transportation Technology ✓ Intelligent Transportation Systems (ITS) ✓ Alternative fuels and vehicles • Telecom/Information Technology ✓ Geographic Information System (GIS) • Public Safety Technology

CHAPTER FOUR
MODEL FRAMEWORK FOR SUSTAINABLE BROWNFIELDS REDEVELOPMENT

FIGURE 4.3: MATRIX OF INTEGRATED PARAMETERS, ELEMENTS AND CHARACTERISTICS (PECS) AND BROWNFIELDS PROCESSES

	<ul style="list-style-type: none"> ✓ Project organizing ✓ Federal and State agency roles ✓ Use risk based corrective actions based on future uses ✓ Apply institutional controls and insurance 				
Synthesis	<ul style="list-style-type: none"> • Address the community concerns ✓ Relate scientific results and risks to community understanding ✓ Inform the public of issues critical to their interests ✓ Empower the public to act with respect to the risk communicated • Use the tools for Risk Management ✓ Project organizing ✓ Continue Federal and State agency roles ✓ Use risk based corrective actions based on future uses ✓ Monitor property ownership changes ✓ Monitor effectiveness of institutional controls and insurance 	<ul style="list-style-type: none"> • Monitor CERCLA agreements ✓ "Joint and Several Liability" ✓ SARA, 1986 ✓ EPA Guidance, 1992 "Covenant not to Sue" ✓ CERCLA Amendment, 1996 "Comfort Letter Policy" • "Secured Lenders and Fiduciaries" protections • RCRA, Clean Air Act, Clean Water Act, Toxic Substances Control Act, etc. • Monitor changes in laws and regulations 	<ul style="list-style-type: none"> • Monitor program factors ✓ Community expectations ✓ Rationality and incentives ✓ Ownership ✓ Program life cycle ✓ Control of development • Promote ecological factors • Promote socioeconomic factors • Site Marketing ✓ Maintain sites as community assets ✓ Monitor changes in prevailing market forces 	<ul style="list-style-type: none"> • Identify new Redevelopment processes requiring funding ✓ Development and reconstruction ✓ Long term operational support • Identify new public sources of funds, primarily for the re-initiating projects ✓ State – environmental or economic agencies, tax programs, loans, revolving funds ✓ Local – incentive programs, tax increment financing programs, grants • Private Sources of funds ✓ Property owners or other responsible parties ✓ Prospective purchasers or developers ✓ Equity investors ✓ Commercial banks ✓ Private foundations and universities 	<ul style="list-style-type: none"> • Energy Technology ✓ Reducing energy demands ✓ Renewable energy • Environmental Technology ✓ Industrial Ecology ✓ Eco-Industrial parks ✓ Pollution prevention and waste minimization ✓ Site assessments and remediation ✓ Ecological monitoring and assessment • Transportation Technology ✓ Intelligent Transportation Systems (ITS) ✓ Alternative fuels and vehicles • Telecom/Information Technology ✓ Geographic Information System (GIS) • Public Safety Technology

5.0 Confirmation of Model Frameworks

CONFIRMATION OF	
MODEL	
FRAMEWORKS	
➤	Comparative Models
➤	Brownfields Project Comparisons

A model is an approximation (or interpretation) of reality that represents a system or process in sufficient detail that it can be used as a means of communicating and illustrating information in a manner that is more easily understood and manipulated than the actual subject it represents. It serves as a mechanism for establishing consensus on basic values, rules, procedures, and provides an understanding of the mechanisms by which various actions and processes work together. Normally the model structure is composed of one or more elements or characteristics defined as independent variables, that is accessible and subject to manipulation by sources external to the model, while the remaining elements are understood to be dependent variables, or assumed to be the consequences of the actions taken to alter or manipulate the independent variables.

The purpose of this study is to create the framework for a model such as that described above. This framework integrates the essential components of the concept of sustainability with the requirements of a Brownfields redevelopment process in order to establish the essential outline of the process of sustainable Brownfields redevelopment. The approach employed in the development of this framework was focused on those aspects of the Brownfields process that are within the purview of project participants to guide and direct, and that are identified as having some association with the process of sustainable development.

This framework is based on a dynamic perspective. It describes a process of Brownfields redevelopment that is generic to multiple contexts and is broad enough to serve as an aide to the understanding of the essential elements of sustainability that are important to the process. It also allows sufficient flexibility to accommodate the individual variations that make each project unique to the community context in which it takes place. As with any model, the framework developed here is only as good as its initial assumptions and the quality and level of detail of the data developed, both to support the creation of the framework and to support the subsequent actions of the model framework as it is applied to a specific situation.

In order to confirm that the resulting model framework accurately reflects the Brownfields redevelopment process, it is necessary to verify its primary elements against real world experience (see the schematic of the model process, Figure 2.2). A detailed verification of the model framework is not possible within the scope and limitations of this study. However, it is possible to establish a mechanism by which the major elements are confirmed in their association with the key elements of sustainable development and the basic requirements of a Brownfields redevelopment project. This is accomplished by a comparison with other similar models.

Comparison with other existing models of sustainable development that do not address Brownfields directly provides a form of validity. That is, does the model actually represent what it purports to represent, the elements and characteristics of sustainable development? In this case, identification with key components of other models of sustainable development provides a basis for confirming that the elements and characteristics defined for the model framework here are those generally associated with the concept of sustainability in other contexts and therefore can be assumed to be integral to the process of sustainable development.

Also, by comparing the model framework with the experience of two existing Brownfields redevelopment projects, one urban in character and one rural, a preliminary evaluation of the applicability of the model elements to successful real-world situations can be conducted. Although this comparison is limited by the small number of projects examined and the availability of specific information related to these projects, it is sufficient to establish a basis for demonstrating the ability of the model framework to anticipate the requirements of actual projects.

5.1 Comparative Models

The concept of sustainability and the companion process of sustainable development have become important components of a growing number of development models. Although these models can exhibit large differences in focus and approach, they are also complementary in terms of their overall objectives, elements considered, and insight into the sustainable development process.

For the purposes of this comparison, a number of models of sustainable development were considered and reviewed. Four of these were selected on the basis of differing scope, context, and emphasis:

Ecosystems Approach - a conceptual planning model framework defined primarily by the boundaries of ecological systems and based on the key issues of: maintaining viable economic development; ensuring pristine ecological conditions; and addressing natural resource impacts from socioeconomic developments.

Eco-village Model - a model that incorporates the concept of the human scale community in which all major functions necessary to support human activity are maintained in balanced proportions and integrated into the natural environment.

New Urbanism - an approach that seeks to reverse the patterns of urban sprawl, disinvestment in central cities, environmental deterioration, segregation of communities, and loss of open space through an emphasis on the design of a supportive physical framework

Smart Growth - a model framework that emphasizes the process of making development within the community more sustainable by directing new growth to designated areas, protecting sensitive land and habitat, avoiding increased sprawl development, and emphasizing quality of life and community identity and cohesion.

To facilitate the comparison of each of the models with the Brownfields model framework presented here, each of the models was arrayed individually across the ten key elements of sustainable Brownfields Projects. The results are presented in Table 5.1, The Matrix of Comparable Development Models. A more detailed summary of the four sustainable development models employed for this comparison is presented in Appendix C.

Although Brownfields redevelopment is not a specific objective of any of the four models examined in detail, each of these models emphasizes land use, avoidance of sprawl development, preservation of green space, and the interrelationship of social, economic, and ecological factors. These are all factors that are an integral part of the Brownfields redevelopment process. The approach and points of emphasis (e.g. physical design, ecosystem management, community development, economic development) are different, but the

emphasis on these factors as essential elements in the achievement of sustainability is common to each.

Figure 5.1: Matrix of Comparable Development Models

Model	Scope	Context	Approach	Objective	Benefits	Elements of Sustainability														
						Community Profile	Community Plan	Site Structure	Risk Characterization	Legal Management	Market & Redevelop	Technology App.	Project Funding	Env. Justice						
Ecosystems Approach	Ecological resources and the supported communities	Regional or geographic framework	Descriptive, ecosystem management approach	Sustaining or restoring the health, productivity, and biological diversity of natural systems, and development of a future vision that integrates ecological, economic and social factors.	Contributes through consensus-building, prompt action, reduced uncertainty, managerial efficiency, economic equity, and balancing development goals with resource conservation.	*	*	*	*				*	*						
Eco-Village Model	Sustainable community development	Community (urban and rural)	Conceptual framework - process	Meeting human needs while protecting the ecology by developing human scale communities where major human functions are in balanced proportion, integrated into the natural environment, and sustainably organized.	Responds to a broad range of conditions in both rural and urban contexts; emphasizes conservation of existing community, while also providing for ongoing development of more sustainable alternatives.	*	*	*						*					*	
New Urbanism	Urban planning and design practice	Urban centers and towns within metropolitan regions.	Community development planning - physical design	Reverse community and ecological deterioration through creation of cohesive mixed use neighborhoods that are linked to a larger, regional open space framework.	Growth that is compatible with existing scale; improved air quality; lower services cost; and greenspace preservation through decreased consumption of land and resources.	*	*	*	*			*		*					*	
Smart Growth	Sustainable Development	Community-wide	Procedural	Directed growth to avoid sprawl development and protect sensitive land, making development more sustainable and minimizing the overall impact on the community and its environment.	Emphasizes development as a quality of life issue; increases sense of community; protects neighborhood investment; facilitates environmental protection and the effective use of public capital.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	

On this basis, it is a reasonable assumption that the components of the successful Brownfields redevelopment are amenable to treatment from a perspective that emphasizes sustainability. This supports the potential importance of a sustainable model in the Brownfields planning process as both a practical mechanism for addressing the immediate problems of Brownfields redevelopment, and as a means of decreasing the probability that a site may become a Brownfields site in the future.

Of the ten key elements defined by the model framework presented in this study, all were included by at least one of the four models that served as a basis for comparison. With the exception of risk management, technology applications and project funding considerations, all of the other elements figure prominently in more than one of the models.

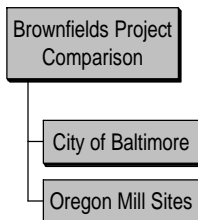
Concerns for risk management and technology applications would not be expected for most of these approaches, since they do not directly address contaminated or potentially contaminated property as a central theme in the same manner that the Brownfields redevelopment process does. However, specific consideration for environmental effects are a component part of all four of the models. Technology, especially transportation related technology, does play an important role in these models. Similarly, although project funding and public/private initiatives are not given specific attention as components of three of the models discussed, they are acknowledged as an area of consideration.

Three of the ten elements - the use of a community or baseline profile, the employment of a comprehensive planning process based on extensive community involvement, and the role of a defined organizational structure in the planning and implementation of the development effort are essential components of all four of the models studied. Also important were site characterization techniques and prioritization criteria that were an important element in three of the four models, but did not emerge as a prominent concern for the eco-village model.

The results of the review would indicate that all ten of the elements identified can be considered to have a part in the consideration of sustainability for the Brownfields redevelopment process. There is sufficient correspondence with other models of sustainability to also justify their inclusion as a part of the framework presented here. Several specific components addressing the

environmental remediation of contaminated sites are not as important to some community development approaches since these approaches are more focused on prevention and future protection than on the remediation of existing contamination. In all cases, the role of the community and its involvement in the planning and decision making process is emphasized as a key element in assuring future community support and participation in the project, thereby reducing the potential for the development again becoming abandoned or underutilized.

5.2 Comparison to Actual Brownfields Community Projects



To further evaluate the applicability of the model framework and potential for project predictability, two successful real-world projects have been analyzed to determine how their features compare to the model framework. Based on the recommendation of various EPA officials, the Baltimore, MD and Oregon Mills Sites Brownfields projects were selected. These two sites are representative of urban and rural projects respectively, and are both EPA Brownfields Assessment Demonstration Pilot Projects. They have progressed further along than most others, and they are generally recognized as having achieved successful results.

Site-related information highlighted in the following summaries has been extracted from a variety of published sources including the Pilot Projects' own internet websites and EPA's Brownfields Information Management System. Significant features of the projects, composed of either key elements, activities, outcomes, or achievements, that may be related to the elements and characteristics of sustainability from the model framework are identified. The significant features are listed according to the general phase of the project in which they may likely have occurred. In most cases, assumptions have been made as to when certain features occur because this data component was not a requirement of project reports.

URBAN - CITY OF BALTIMORE, MARYLAND BROWNFIELDS CASE STUDY

The City of Baltimore, Maryland's Brownfields project is representative of a large urban/metropolitan community redevelopment project. Approximately 1,000 acres of potential brownfields are located on industrial properties in Baltimore's Federal Empowerment Zone, half of which are suspected to be contaminated and could therefore present an additional obstacle to economic revitalization. Sites range in size from under an acre to about 60 acres and cleanup costs are estimated at less than \$500,000 at most sites.

Since September 1995, when the city was awarded an EPA Brownfields Assessment Demonstration Pilot and received \$200,000, the Baltimore Brownfields Initiative has assessed more than 30 sites through federal, state, local, and private partnerships and has voluntary cleanup actions being conducted at four city-owned sites. The goals of Baltimore's Brownfields Initiative are similar to other city, regional, and statewide revitalization efforts, including the Baltimore City Comprehensive Plan, Presidential Empowerment Zone Initiative, and Maryland's "Smart Growth Initiative." The focus is to encourage economic growth and redevelopment in urban areas while continuing to provide appropriate and sufficient ecosystem protection, especially within the regionally sensitive Chesapeake Bay watershed.

The following synopsis highlights the key events, elements, characteristics, and activities from the Baltimore Brownfields project that compare to this study's proposed model framework for sustainable Brownfields redevelopment.

- **Project Initiation** – occurred in 1995 when the City's Planning Office applied for the EPA Pilot Project grant to complement ongoing economic development efforts within the Federal Empowerment Zone.
 - ✓ City's Planning Department and Brownfields Industrial Redevelopment Council empowered by the City Mayor to provide organizational focus and central management structure;

- ✓ Brownfields Redevelopment Council (comprising community representatives, State agencies, environmental advocacy groups, and economic development groups) serves as a project coordination and technical advisory body;
 - ✓ Partnerships were fostered between Baltimore city departments, State of Maryland agencies, EPA, HUD, and the Baltimore Redevelopment Corporation to develop an inventory of sites;
 - ✓ Outreach meetings were conducted to inform public stakeholders and to examine State legislation and its effect on Brownfields revitalization.
- **Project Planning** – conducted by the City’s Planning Department under a city-wide or Empowerment Zone approach to include multiple Brownfields sites within the project area, and to be integrated with routine planning activities of City such as developing community profiles and Comprehensive Master Plans.
 - ✓ Key component of strategy is to leverage City planning and funds with other programs and organizations having similar goals and objectives for economic development and environmental protection;
 - ✓ Community profile’s socio-economic data used to direct attention of Federal Empowerment Zone planning and implementation;
 - ✓ Census data used to delineate neighborhood composition of community profile to direct outreach, steer minority participation efforts, and delineate environmental justice concerns;
 - ✓ Computerized inventory of vacant, under-used, and potential Brownfields properties was developed as a planning tool and linked with GIS and other information technology systems (ex. COSTAR) and Baltimore’s real property files;
 - ✓ A new citywide Comprehensive Plan is being developed to integrate Smart Growth initiative and other sustainable development criteria;

- ✓ Funding for site assessments used to identify and characterize sites by determining contamination and marketability;
 - ✓ Project information presented to the public in various settings in order to further public understanding of the issues and encourage prospective purchasers/developers to act;
 - ✓ Community outreach and education conducted among the general public through meetings, forums, and organized speaking engagements with political, community groups, and national conferences;
 - ✓ Community associations involved to help identify neighborhood opportunities for revitalization;
 - ✓ Partnering with MD Department of the Environment (DEP) to conduct ASTM Phase I and preliminary ASTM Phase II site assessments on 24 sites (ASTM, 1997a and 1997b);
 - ✓ Local academic resources and educational technology used to assist in creating the site inventory, assessing merit and functions of an eco-industrial park, and identifying Ph.D. research dissertation topics on innovative technology applications; and,
 - ✓ Links developed among local agencies and the Baltimore Urban League to help find project jobs for minorities, and to assist in job training and placement to address environmental justice concerns.
- **Project Evaluation** – includes many of the same activities as the Planning event conducted concurrently as information is created, assessed, and now evaluated in terms of the City’s goals and individual site/project objectives.
 - ✓ Planning and assessment information evaluated for development of a strategic plan for each site;
 - ✓ A *Baltimore Brownfields Report* newsletter is published and periodic tours are conducted of Brownfields sites to promote project marketing and redevelopment opportunities;

- ✓ City's Brownfields Industrial Redevelopment Council conducts regular meetings with stakeholders to examine issues;
 - ✓ State of Maryland's Voluntary Cleanup Program (VCP) statute designating innocent purchaser as inculpable person is applied to risk assessment and management;
 - ✓ Interaction with MD DEP to identify legal/regulatory obstacles and produce a better and more accessible regulatory environment for investors;
 - ✓ Interaction with City's Department of Public Works on needed infrastructure improvements to better market and support redevelopment projects;
 - ✓ City Planning Department assisting potential developers with matching sites and projects; and,
 - ✓ Waste-to-energy technology application program integrated into ecopark redevelopment design to make project largely self-contained with tenants using the waste generated by other tenants as raw materials.
- **Project Staging** – many staging-related activities have occurred simultaneously with other Planning and Evaluation activities in order to achieve efficiency in addressing multiple sites within a single project, and because of the different timeframes associated with individual sites within the project.
 - ✓ Interaction with MD DEP to clarify liability and other environmental risks and to help resolve any other legal/regulatory obstacles;
 - ✓ MD VCP provides indemnification as a risk management tool to attract and protect new users and lenders pursuing remediation of contaminated property;
 - ✓ Maryland Smart Growth Initiative (SGI) statute defines and implements necessary improvements for site restoration;

- ✓ Baltimore City and MD SGI promote urban revitalization by focusing infrastructure spending in previously developed areas or designated growth areas;
 - ✓ Development of a site marketing and redevelopment trust being explored that will act as broker/ombudsman to promote private industrial development and act as a redevelopment authority (acquiring, remediating, and marketing property for private development);
 - ✓ EPA Brownfields Assessment Demonstration Pilot and Brownfields Showcase Community award provides federal funds for site assessment, community outreach, project planning, and seed monies to establish a revolving loan fund;
 - ✓ State Department of Business and Economic Development and MD Economic Development Corporation providing low interest loans and loan guarantees;
 - ✓ Federally-designated (HUD) Empowerment Zone (for poor urban areas) to fund \$100 million in federal investment capital and \$250 million in business tax incentives; and,
 - ✓ Other partnerships with public agencies are being pursued for federal funding and technical assistance (ex. DOC Economic Development Administration, DOD Corps of Engineers, and DOE);
 - ✓ Local lending institutions and individual investors providing private financing which has proved key to making the project happen.
- **Project Implementation** – represents the culmination of many activities initiated during the Planning, Evaluation, and Staging phases and the transition to actual site restoration or construction of new enterprises/uses on the property.
 - ✓ Continue to publish the *Baltimore Brownfields Report* newsletter and conduct tours of project to maintain community understanding and continued marketing;

- ✓ MD SGI statute establishes necessary improvement of guidelines for restoration;
 - ✓ The Mayor's Office of Employment Development assists with job placement;
 - ✓ Fairfield Ecological Industrial Park (EIP) established making Baltimore the only Empowerment Zone City grantee with a designed EIP;
 - ✓ Inter-modal transportation opportunities and mass transit commuting options linked to economic redevelopment initiatives;
 - ✓ Academic institutions and education technology resources tapped to provide technical assistance in site-specific bioremediation solutions and establishing operating parameters for eco-industrial park;
 - ✓ EIP linkages to explore connections that target waste exchanges; and,
 - ✓ Unique EIP recruiting process targets "Green" or clean manufacturing or commercial businesses, potential environmental technology firms to expand pollution prevention, business networking, and closed-loop capabilities within the Park, and small service-oriented companies to fill strategic needs within the EIP.
- **Project Synthesis** – involves activities that “look to the future” in order to integrate redevelopment projects into the community fabric and prevent the occurrence of more Brownfields.
 - ✓ Experience from EPA Pilot Project served as a catalyst for the assessment, remediation, and redevelopment processes at the ASARCO Smelter property, another Brownfields project;
 - ✓ Agreement reached between the City and State on improving public education as a Brownfields Initiative objective;
 - ✓ Technology transfer program from local military industries to community development being explored;
 - ✓ Selection criteria developed for determining where innovative technologies may be applied;

- ✓ \$3 million revolving loan and grant program with the City Planning Department and Empower Baltimore Management Corporation dedicated to financing future Brownfields revitalization projects in the City's Empowerment Zone; and,
- ✓ Working with EPA's Small and Disadvantaged Business Utilization Office and the National Association of Minority Contractors to discuss opportunities for environmental training programs for minority business owners and employees.

RURAL - OREGON MILL SITES, OREGON BROWNFIELDS CASE STUDY

The Oregon Mill Sites conversion project is an example of a Brownfields redevelopment project based in a predominately rural context. The goal of the project is the rehabilitation of vacant and abandoned mill sites into productive, readily usable, industrial and commercial properties, that can be targeted for recruitment, expansion, or retention of businesses suitable to the communities' resources and development strategies. The Pilot project has expanded from the original seven sites to address nine target sites with a combined coverage of 550 acres. An additional five sites have been added to the project since the initial pilot was begun, bringing the total number of sites considered by the project to fourteen.

The project organization is a public/private partnership managed by a non-profit corporation under the overall coordination of the State Economic Development Department. A project advisory committee has been formed with representatives from the partnership groups as well as others with particular expertise. The pilot is an example of the use of a regional approach to take advantage of expanded resources and shared efforts in areas where resources available to individual projects may be limited. Local Action Committees (LAC) are responsible for developing and implementing redevelopment plans tailored to

each site that consider land use, wetland mitigation, cleanup, and redevelopment incentives. Each LAC creates outreach plans to ensure broad community input to cleanup and redevelopment efforts.

Most sites have completed ASTM Phase I and Phase II site assessments combined with wetlands delineations. The project is emphasizing community awareness programs to address risk communication with local citizens. The project is also evaluating the potential for using generic cleanup options to help developers assess cleanup liability, financing options and development risks; and to establish cleanup standards for similar abandoned mill sites.

The following synopsis highlights events, elements, characteristics, and activities from the Oregon Mill Sites Conversion Project that compare to this study's proposed model framework for sustainable Brownfields redevelopment. This summary is not intended to be a comprehensive description of all project related activity and is limited by the availability of project related information available to this study.

- **Project Initiation** – occurred as a result of increasing awareness of the effects of cutbacks in local industries resulting in depressed property values, decreasing tax base, abandoned infrastructure, and decreasing family incomes. The pilot project was initiated by a joint venture group who applied to the EPA for a demonstration pilot in 1966.
 - ✓ Project is a joint venture, public/private partnership consisting of a non-profit development firm, a private utility, the State economic development department, a bank, and a private law firm;
 - ✓ Initial project objective was to provide a range of technical support and funding to support the identification and evaluation of the mill site properties as potential sites for alternative uses;

- ✓ Project was formed as a public/private partnership with a private, non-profit organization, the Rural Development Initiative (RDI) under the overall coordination of the Oregon Economic Development Department to serve as the public entity to oversee activity;
 - ✓ A Project Advisory Committee with representatives from the partnership group as well as others with specific area expertise was formed at the overall project level to advise the partnership; and
 - ✓ Because of the geographic dispersion of the sites involved, Local Action Committees (LAC) were formed to guide efforts at each individual site.
- **Project Planning** - project planning is being conducted through the Project Advisory Committee and Local Action Committees and is centered around public participation on a series of design charrettes, and the formation of specific redevelopment plans tailored to the needs of each site.
 - ✓ Project established Local Citizens Action committees to promote neighborhood input to private owners and developers, to create redevelopment plans tailored to each site, and to advise the site owner on appropriate and acceptable uses of the site;
 - ✓ Individual site redevelopment plans are created for each specific site consistent with local economic redevelopment plans and consider local land uses, wetland migration, cleanup, and other active redevelopment initiatives;
 - ✓ A Generic Remedies Report was created to examine generic remedies for selected contaminants typically found in soils and ground water of timber mill sites that will significantly focus site remediation and streamline feasibility studies reducing time and cleanup;
 - ✓ Generic Remedies will influence the owner of a site to be more willing to proceed with a site redevelopment strategy assuming that agencies' responses will be easier to predict and overall cost will be more definable;

- ✓ Initial project funding is provided by the partnership members, EPA grant funds and additional sources of public funds that are being pursued as grant support for the project;
 - ✓ Local action committees in each affected community assure broad community participation in the planning process through directed public outreach programs; and
 - ✓ Phase I and Phase II environmental assessments and wetlands delineation's have been integrated and conducted for seven of the mill sites, providing a basis for quantifying the magnitude of work to be accomplished and in developing a generic model for other similar sites.
- **Project Evaluation** – is based on a combination of economic, environmental and market based assessments conducted in conjunction with the public's participation in the establishment of site prioritization criteria and final selection of redevelopment alternative and sites to be cleaned up.
 - ✓ Conducted complete market development and analysis study on certain sites;
 - ✓ Creating a computer model that measures cleanup alternatives and payback horizons based on various commercial and public funding alternatives for cleanup and redevelopment as a means to measure cost/benefit of various cleanup options;
 - ✓ Project acquired outside expertise to supplement exiting capabilities in the development of cleanup strategies for the sites;
 - ✓ Site prioritization criteria for preferred and appropriate site uses are being established through the design charrette process and supported by third party design consultants;
 - ✓ Site ranking process conducted by the organization managing the pilot program selected a total of twelve properties involved in the program according to the criteria list developed through the design charrette process;

- ✓ Local action committees participate in the design charrette process and assist in the public outreach effort to achieve community acceptance of the proposed redevelopment program; and
- ✓ Project has established a working relationship with the State's banking committee to assure that banks will be interested in lending for the redevelopment effort once the site environmental remediation is completed.

- **Project Staging** – involves multiple activities directed toward moving sites toward the implementation of the redevelopment project. A number of sites have begun this phase of development, with one already seeking qualified candidates to undertake the redevelopment effort.
 - ✓ State is considering a tax credit for owners of Brownfields sites who are participating in site remediation and cleanup; and
 - ✓ Due to the environmental and financial risk and liability associated with site cleanup, the mill sites are either taken over by the community for back taxes or the mill owner's warehouse the properties.

- **Project Implementation** - involves separate sequences of action at each of the sites selected for participation in the program. Several sites have progressed to the point of actual restoration and construction of new facilities.
 - ✓ Funding for infrastructure and other technical assistance is provided through cooperation with the State Economic Development Administration as an active participant in the Federal Northwest Economic Adjustment Initiative;
 - ✓ The mill site owners have solicited support and cooperation from other State and Federal agencies;

- ✓ Astoria site, identified as a priority remediation effort, is utilizing a combination of grant and loan funding to provide new shopping, commercial and residential units for surrounding neighborhood;
 - ✓ Funding strategies for the development effort are in the exploratory phase, with the expectation that site owners will be required to participate in the funding, particularly in terms of the site assessments; and
 - ✓ Expanding coordination with the State Department of Environmental Quality to address site-specific requirements.
- **Project Synthesis** - emphasizes effective selection of sites, redevelopment alternatives, and the maintenance of continued future economic development to support existing projects.
 - ✓ Business Assistance team offers technical assistance in Brownfields restoration to small businesses in rural Oregon Communities.

Clearly, these projects exhibit all the elements and many of the characteristics of sustainability highlighted in the model framework. The specific series of events related to these projects cannot be clearly delineated and milestones not definitively determined. This can be attributed to the nature of the source documentation and the fact that multiple sites were addressed within a single project. Further, the coincidental occurrence of activities may actually have led to greater effectiveness and efficiency in resource use over the duration of the effort. From this comparison, the overall progress of the Baltimore and Oregon Mill Sites projects coincide to a considerable degree with the general events, milestones, elements and characteristics of the sustainable Brownfields redevelopment process as depicted in the model framework.

CHAPTER FIVE
MODEL FRAMEWORK FOR SUSTAINABLE
BROWNFIELDS REDEVELOPMENT

CONCLUSION AND RECOMMENDATIONS	
➤	Application of Model Frameworks
➤	Recommendations

6.0 Conclusion and Recommendations

U ntil now, the factors upon which the viability of redeveloped Brownfields projects depend have neither been adequately defined nor characterized in models that can be used by the EPA to assess and support Brownfields environmental restoration and economic development over an extended time period. The complexity of a Brownfields project, as evident by the number of different ways the process has been characterized, the realm of particular variations in the nature of a site, and how the process can be approached and performed, poses a significant challenge to the development of a single model that can represent the full range of possible projects. In addition, the desire to include in the model the concept of sustainability applied at an operational level further complicates the modeling effort.

The objective of this study was to use those parameters, elements, and characteristics indicative of successful Brownfields sustainable redevelopment that were developed during the initial research phase of the study to build a model framework that can be used by EPA to evaluate and support potential scenarios for future Brownfields cleanup, restoration, and redevelopment. This objective was achieved by evaluating the occurrence of activities in the fifteen Brownfields Assessment Demonstration Pilot Project case studies that were part of the initial research effort, in order to define major events and significant milestones, where possible, that could be all-inclusive of activities from any Brownfields project. By applying this range of activities against a model of the

basic project management process, a framework was developed to represent the overall process for Brownfields redevelopment projects. Then, by integrating the parameters, elements, and characteristics (PECs) of sustainable Brownfields projects according to their observed and potential occurrence within the overall process, it was possible to create a model framework (depicted in Figure 4.2) that represents a sustainable Brownfields redevelopment project.

The study also found that the model framework is generally broad enough to include multiple contexts of Brownfields redevelopment projects ranging from single to multi-site and urban to rural scale projects. In fact, the primary differences between urban and rural projects are mainly details in the infrastructure and resources locally available that apply to the project. These differences can be minimized in their influence depending on how the project is approached and how the process is implemented within the overall model framework. For example, though still adhering to the model framework, a regional approach leverages resources by incorporating partnerships and inter-governmental (and inter-community) collaborations, effectively normalizing the perceived resource deficiencies in rural projects and promoting greater economies of scale in resource effectiveness. The fundamental concepts of this regional approach also apply to multi-site projects within a community, regardless of its urban or rural character.

The challenge of connecting the concepts of sustainability to activities at the project level can be achieved in a manner that does not impede the redevelopment process. The high degree of correlation between the elements and characteristics theoretically associated with sustainable Brownfields projects and their frequent occurrence within the two case studies is evidence that a balance of social, economic, and ecological requirements can be integrated through a structured approach with successful results.

6.1 Application of the Model Framework

The model framework has been designed to assist EPA in evaluating and supporting various scenarios of Brownfields projects. By incorporating concepts and practices associated with a sustainable development process, the model framework contributes to the potential sustainability of the outcome, but does not ensure, by itself, that the outcome will be absolutely sustainable.

The process described here is neither rigid nor essentially a linear process. Because of the broad range of variation across communities in terms of values, goals, available resources, and existing economic and social conditions, no community will start and end the process at the same point. Similarly, not every component of the model framework will be applicable to every community. Although all of the component elements of sustainability are essential to the successful completion of the project, there appears to be no single step in the process that is required (i.e. a step that if missed would cause the project to fail). Apart from the remediation of contaminated areas, the legal and regulatory requirements, and local requirements to permit and transfer real estate, there is really no single element of the model framework that absolutely must be accomplished.

Similarly, the framework can be used by communities as a general guide to identifying Brownfields project factors to be considered if sustainability is a project goal. However, because goals and objectives are unique to each community's program or project, no standard set of criteria was defined for successful and unsuccessful Brownfields redevelopment. Each project's progress will vary according to the various organizational goals, property location, economic market conditions, existing legal and regulatory contexts, timeframes established in which to achieve its objectives or milestones, and other factors often beyond the project management control.

The social system is dynamic. Events will occur (or new information may be developed) that impact the process and that could not have been known at the time the process was begun. The openness of the Brownfields process may create complications as these externalities (economic, ecological and social), are imported through trade or connection with other local economies, ecosystems, or the national and international economy. Sustainability is therefore contingent, not only on how the development process is carried out, but on the extent to which the local community and the direct project participants are successful in anticipating future needs and trends. From this perspective, the process of ensuring sustainability and avoiding the formation of future Brownfields sites must be seen as extending beyond final completion of the specific project to continuing maintenance, monitoring, and adaptation of the project to future community needs and endeavors.

Sustainability of the redevelopment process also assumes that political certainty can be established. Any degree of uncertainty jeopardizes the potential for continuity and consistency in the process. There must be agreement among all competing parties so that the process continues with similar goals, objectives, and an assured level of support from public officials and competing interest groups.

6.2 Recommendations

During the course of conducting this study, the following recommendations were identified that would further refine this model framework and contribute to the ability to better predict and promote sustainable Brownfields redevelopment projects in the future:

- Brownfields projects should clearly delineate and incorporate factors for sustainability. These factors should include quantitative measures and be formally incorporated into periodic reporting requirements so that a set of comparable data can be established to support ongoing qualitative and quantitative analysis and evaluation.
- A review of all 227 current EPA Brownfields Assessment Demonstration Pilot Projects should be conducted so that a comprehensive data set of significant events, activities, milestones, elements, and characteristics can be compiled, recorded, and evaluated that would benefit the refinement of this model framework and contribute to developing a comprehensive set of indicators associated with sustainable Brownfields projects.
- Additional case studies of privately funded, Brownfields type projects need to be developed in order to document variations in the approach used for these projects which may differ from those employed in the EPA Demonstration Pilot Projects.
- Brownfields projects should be re-evaluated every few years over the next 20 or more years in order to demonstrate the actual contribution that the elements and characteristics of sustainable Brownfields redevelopment are able to make to multiple generations, as required by the definition of sustainability.

These recommendations are offered in order to further the efforts of EPA and the Brownfields National Partnership Action Agenda.

CHAPTER SIX
CONCLUSION AND RECOMMENDATIONS

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REFERENCES

Appendix A - List of Acronyms

A List of Standard Acronyms Used in This Document

ASTM	American Society for Testing and Materials
BERI	Brownfields Economic Development Initiative
BRAC	Base Realignment and Closure
CAP	Corrective Action Plan
CDBG	Community Development Block Grant
CDC	Community Development Corporation
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act (Superfund)
CERCLIS	Comprehensive Environmental Response, Compensation & Liability Information System
CESD	Center of Excellence for Sustainable Development
CPC	Cuyahoga County Planning Commission
CRA	Community Reinvestment Act
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOJ	U.S. Department of Justice
EC	Enterprise Community
EDZ	Economic Development Zone
EJ	Environmental Justice
EPA	U.S. Environmental Protection Agency
ESA	Ecological Society of America
EO	Executive Order
EZ	Enterprise Zone
EZ/EC	Empowerment Zone/Enterprise Community
FUSRAP	Formerly Utilized Sites Remedial Action Program
GAO	U.S. General Accounting Office
GC/MS	Gas Chromatography/Mass Spectrometry
GIS	Geographic Information System
GPS	Global Positioning Satellite
HUD	U.S. Department of Housing and Urban Development
ICMA	International City/County Management Association
IDA	Industrial Development Authority
IDB	Industrial Development Bond
IEMTF	Interagency Ecosystem Management Task Force
IRM	Institute for Responsible Management
ISTEA	Intermodal Surface Transportation Efficiency Act
ITI	Intelligent Transportation Infrastructure
ITS	Intelligent Transportation System
LAC	Local Action Committee

APPENDIX A
LIST OF ACRONYMS

LCLT	Lopez Community Land Trust
LNWY	“Live Near Your Work” Program
LUSTs	Leaking Underground Storage Tanks
MOU	Memorandum of Understanding
NEJAC	National Environmental Justice Advisory Council
NIMBY	“Not in My Backyard”
NPS	National Park Service
NYSEDZ	New York State’s Economic Development Zone
OEA	Office of Environmental Affairs (U.S.E.P.A.)
OSWER	Office of Solid Waste and Emergency Response (U.S.E.P.A.)
PCB	Polychlorinated Biphenyl’s
PECS	Parameters, Elements, and Characteristics of Sustainable Brownfields Redevelopment
PPA	Prospective Purchase Agreement
RBCA	Risk-Based Corrective Action
RBDM	Risk-Based Decision Making
RCED	Rural Economic and Community Development
RCRA	Resource Conservation and Recovery Act
RFP	Request for Proposal
RIDEM	Rhode Island Department of Environmental Management
SARA	Superfund Amendments and Reauthorization Act of 1986
SEP	Supplemental Environmental Project
STIP	Sustainable Technologies Industrial Park
SUNY	State University of New York
TDR	Transfer of Development Rights
TQM	Total Quality Management
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage and Disposal
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UVA	University of Virginia
VCP	Voluntary Cleanup Program
WCMC	West Central Municipal Conference

Appendix B – Glossary of Terms

ASTM	The American Society for Testing and Materials. An organization that establishes standards for industrial and other services, including methods of testing and sampling of hazardous waste and contaminated media.
Brownfields	Brownfields sites are abandoned, idled, or underutilized industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination.
Brownfields Program	The U.S. Environmental Protection Agency's Brownfields Economic Redevelopment Initiative is organized to help communities revitalize Brownfields properties (both environmentally and economically), mitigate potential health risks, and restore economic vitality to areas where Brownfields exist. It is designed to empower States, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse Brownfields. Efforts under the Brownfields Initiative are grouped into four broad and overlapping categories: 1) Providing grants for Brownfields pilot projects; 2) Clarifying liability and cleanup issues; 3) Building partnerships and outreach among federal agencies, states, tribes, municipalities, and communities; and 4) Fostering local job development and training initiatives.
Brownfields Pilot	The Brownfields pilots are designed to support creative explorations and demonstrations of Brownfields solutions. The Pilots, each funded at up to \$200,000 over two years, test redevelopment models; direct special efforts toward removing regulatory barriers without sacrificing protectiveness; and facilitate coordinated site assessment, environmental cleanup and redevelopment efforts at the federal, state, and local levels. These grants are used to generate interest by bringing together community groups, investors, lenders, developers, and other affected parties to address the issues of cleaning up sites contaminated with hazardous substances and returning them to appropriate, productive use. The pilots are intended to provide EPA, States, Tribes, municipalities, and communities with useful information and strategies as they continue to seek new methods to promote a unified approach to site assessment, environmental cleanup, and redevelopment.
Brownfields Site	A Brownfields site is a property, or portion thereof, that has actual or perceived contamination and an active potential for redevelopment or reuse.
CERCLA	The Comprehensive Environmental Response, Compensation, and Liability Act authorizes the federal government to create a special trust fund (the Superfund) to be used for the assessment and cleanup of spills and other releases of hazardous substances, as well as abandoned or uncontrolled hazardous waste sites. It establishes the requirements and procedures for the cleanup of sites that have been contaminated by releases of hazardous substances, and requires that a deed for federally owned property being transferred outside the government contain a covenant that all remedial action necessary to protect human health and the environment has been taken, and that the U.S. shall conduct any additional remedial action necessary after transfer.
CERCLIS	The Comprehensive Environmental Response, Compensation, and Liability Information System is a database that serves as the official federal inventory of CERCLA hazardous waste sites, and includes information about the sites, planned and actual site activity, and financial information.

Ecosystem	Described in its simplest terms, an ecosystem is an interconnected community of living things (including humans), and the physical environment (non-living substances) within which they interact.
EZ/EC	Empowerment Zone/Enterprise Community. A geographic area that has been targeted to receive special federal treatment and incentives in an effort to spur private investment and job creation. The program is a Presidential initiative designed to afford communities real opportunities for growth and revitalization through economic opportunity, sustainable community development, community-based partnerships, and a strategic vision for change. Designated communities receive technical assistance, grants, employer tax credits, tax-free facility bonds, tax deductions, and increased coordination with federal programs. The urban portion of the program is administered through HUD; the rural portion through USDA Rural Development.
Enterprise Zone	A targeted area that has been designated as blighted or economically depressed by a governmental entity in an effort to stimulate economic activity through tax reduction, changes in zoning restrictions, and other governmental regulations on private enterprise. Implemented through state legislation, these economic incentives for investment and/or job creation are expected to stimulate market forces to respond in the designated areas.
Environmental Justice	Established by Executive Order No. 12898, environmental justice asserts the fair treatment of people in the development of environmental laws, regulations, and policies; irrespective of race, culture or socioeconomic status.
Fringe	The contiguous area on the periphery of existing development and infrastructure that is connected to the urban core.
Greenways	Linear areas containing protected lands that connect important natural, cultural, and recreational resources. A Greenway provides human access to a resource through trails or other recreational resources. It can also be set aside as a means of protecting sensitive resources.
Hazardous Substance	As defined under CERCLA, any chemical or radiological material that poses a threat to public health or the environment; also any such wastes as defined under RCRA. Examples include materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.
Human-made Capital	All of the tools, machines, equipment, technologies, structures, factories, and infrastructure that are the output product of economic production, or are consumed in the process of economic production.
Industrial Ecology	The study of engineering principles and processes based on the concept that society must balance its accounts of materials and energy with the ultimate goal of minimizing harmful wastes and reusing, to the greatest extent possible, both the wastes and the industrial products themselves.
Institutional Controls	A legal or institutional measure that subjects a property owner (or tenant) to limitations on access or activity at a particular site in order to protect human health or the environment. Institutional controls normally allow a contaminated property to be returned to use more quickly.
Infill Redevelopment	Construction of new projects on undeveloped parcels of land that are interspersed among existing, developed parcels with supporting infrastructure in place; or reintroducing development and adaptive reuse to a previously developed, abandoned, demolished, or vacated site with supporting infrastructure in place.
Leakage	That portion of income to a community that is not spent or reinvested locally, but leaves the area as payment for imported goods and services, outside investment, or as tax payments to government.

Natural Capital	The natural environment and its living systems, defined in terms of a stock of environmentally provided assets (soil, atmosphere, forests, minerals, water, fauna, wetlands), that provide the useful materials that represent the raw input or consumable products of human production.
Open Space	Designated areas of a site, development, community, or region set aside to be maintained in a natural state, or restricted to only very sparse development.
PECs	The parameters, elements and characteristics of sustainable Brownfields redevelopment, defined so that parameters represent the three major systems of social structure; economic, social, and ecological. Within these three parameters, specific elements are defined in terms of their association with sustainable development and the associated characteristics of those elements are documented.
Phase I Audit	An ASTM Phase I Environmental Audit is an initial environmental investigation that is limited to a historical records search to determine ownership of a site and to identify the kinds of chemical processes that were carried out at the site. A Phase I audit may include a site visit, but does not involve any environmental sampling.
Phase II Audit	An ASTM Phase II Environmental Audit is an investigation that includes tests performed at the site in order to confirm the location and identity of environmental hazards and recommend cleanup alternatives.
Phase III Audit	A Phase III Environmental Audit includes the comprehensive characterization, evaluation, and removal of contaminated materials from a site, and their legal disposal.
PRP	A potentially responsible party is any individual, or organizational entity (e.g. owners, operators, transporters, managers, or generators of hazardous wastes) that is potentially responsible for, or contributing to, the contamination problems at a CERCLA (Superfund) site.
Public Capital	Funds that are spent by government entities for products, facilities, or services that are designated for the benefit of the public.
RBCA	Risk-Based Corrective Action is a streamlined approach, defined by the ASTM, in which exposure and risk assessment practices are integrated with traditional components of the corrective action process to ensure that appropriate and cost-effective remedies are selected, and that limited resources are properly allocated.
RCRA	The Resource Conservation and Recovery Act (1976) establishes the federal regulatory program to track solid and hazardous waste management from generation to disposal. The Act defines solid and hazardous waste, authorizes EPA to set standards for facilities that generate or manage hazardous waste, and establishes a permit program for hazardous waste treatment, storage, and disposal facilities.
Removal Action	A removal action is usually a short-term effort designed to stabilize or cleanup a hazardous waste site that poses an immediate threat to human health, or the environment.
Revolving Loan Fund	A loan program, usually sponsored by a government entity, in which a specific amount of public funds is set aside to make loans for delineated purposes. As the loans are repaid, the funding pool is reallocated and loaned out again.
Risk Assessment	The process of identifying and documenting actual and perceived risks to human health or the environment, to allow further evaluation and appropriate responses.

Risk Communication	The exchange of information about human health or environmental risks among public and private individuals to accurately inform and promote mutual understanding.
Rural	Areas of land constituting various land uses at a low density which are suitable for sparse settlement, farms; or areas with little or no public services not suitable, necessary, or intended for urban use; separated from other jurisdictions by farms, forest, or open space; and usually dependent on agriculture or some other singular industry. Defined by population, the US Census Bureau considers rural to be all territory, population, and housing units in places of less than 2,500 including outside incorporated areas and census designated places, and the rural portions of extended cities.
Site Assessment	The process of determining whether there is contamination present at a site, the source and extent of that contamination, and the potential pathways of exposure to the public and the environment.
Social Capital	People, their capacity levels, institutions, cultural cohesion, education, information, skills, and knowledge.
Suburban	Areas adjacent to the urban core with various land uses at various densities having discretionary zoning that implements a separation of uses, and with a focus on residential spacing.
Sustainability	The ongoing process of achieving development or redevelopment that does not undermine its physical or social systems of support.
Sustainable Development	A process of change in which the resources consumed (both social and ecological) are not depleted to the extent that they cannot be replicated. The concept also emphasizes that the creation of wealth within the community considers the well-being of both the human and natural environments, and is focused on the more complex processes of development rather than on simple growth or accumulation.
Sustainable Brownfields	A project defined as one in which redevelopment and growth are maintained over the long-term and occur within the limits of the environment so that the current needs of the citizens are met without compromising the ability of future generations to meet their needs.
Tax Increment Financing	A method of financing infrastructure and other public costs of preparing and providing useable lands for development or redevelopment by enabling a city to specifically allocate the property tax revenue generated from a new development to the debt incurred as a part of the initial improvements required for that development. The taxable value on the developable land is frozen before development occurs. Upon the completion of development, the ensuing increased tax revenues realized as a result of an increase in taxable valuation above the frozen value is reallocated to pay for the improvements to the property. The developer still pays all taxes due on the increased value. The amount up to the frozen valuation is distributed to all governmental taxing jurisdictions (city, county, school district, public utility, etc.). However, the increased increment above the frozen value is reallocated away from the various taxing jurisdictions and governmental purposes and applied to the initial project improvement costs. Once these debts are recovered, the full taxable valuation is again distributed among the various taxing jurisdictions.
Urban	Areas of large land mass and population nucleus constituting various land uses at high density with supporting infrastructure and public services, and a high degree of economic and social integration. Defined by population, the US Census Bureau considers urban to be all territory, population, and housing units in urbanized areas and in places of 2,500 or more persons outside urbanized areas.
Urban Sprawl	The decentralization of the urban core through the unlimited outward extension of dispersed development beyond the urban fringe where low density residential and commercial development exacerbates fragmentation

of powers over land use; also, the consumption of resources and land in excess of what is necessary where development is costly and underutilizes existing infrastructure.

Voluntary Cleanup

A formal means established by many States to facilitate assessment, cleanup, and Program (VCP) redevelopment of Brownfields Sites. Under VCP, owners or developers of a site are encouraged to approach the State voluntarily to work out a process by which the site can be readied for redevelopment.

Zoning

The local governmental control over land use by stipulating what can be constructed in certain areas and how structures may be used. A community is classified by various zones, with differing land use controls imposed on each zone, specifying the allowable uses of land and buildings, the intensity or density of such uses, and the size and placement restrictions of buildings.

- **Disclusionary Zoning** - The separation of uses by strict delineation of what can be included in certain zoning classifications and buffering the different uses and their intensities.
- **Inclusionary Zoning** - The prerequisite of including low- to moderate-income households in a development that exceeds a certain specified number of housing units.

APPENDIX B
GLOSSARY OF TERMS

Appendix C: Models of Sustainable Development

Model:	Eco-village (Eco-city)
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Scope: Sustainable community development.

Context: Community-wide (urban and rural settings).

Approach: The model is both conceptual (in terms of key parameters and principles, and the treatment of the relationship between component elements), and process oriented (in the actual development of the eco-village itself).

Objective: Although there is no generally agreed upon definition of the eco-village, the model incorporates the concept of a human scale community in which all of the major functions necessary to support normal human activity are present, in balanced proportions, integrated into the natural environment, and supportive of healthy human development in a manner that is sustainable (i.e. can be continued into the indefinite future). The objective of the model is to provide a framework for solutions that meet human needs while protecting the environment and providing an enhanced quality of life.

Key Characteristics: The framework is based on the concepts of economic viability and ecological sustainability. The primary focus includes: the relationship between the level of human activity and the sustainability of current land uses; maintenance of the character of the immediate neighborhood; and maintenance of a strong community identity. Economic viability is considered critical to a continuing sense of community. Viability allows residents to live and work in the same community; thus, contributing to an overall sense of community identity and stewardship.

Specific enterprises within the community are evaluated on the basis of their ability to: promote the vitality of the natural resource base; increase the biological diversity; address the needs of the system as a whole; and strengthen the aesthetics and values of the community. In this framework, the conscious awareness of the interrelationships between ecological and economic systems and the cyclical nature of sustainable systems are emphasized. Also important is the adoption of viable new techniques and technologies that do not further harm the ecological systems.

Key principles of the framework include:

- A recognition that community development is a process that requires some time to unfold and may never be fully completed, therefore, an over emphasis on the long-term as opposed to concentrating on the process of development may result in short-term frustration and disappointments.
- The requirement for a clear, shared community vision as one of the most important elements in holding the community together, especially where each member develops a positive response to the intellectual content of the vision.
- The importance of solid relationships and mutual understanding in the development process.
- An emphasis on community self-reliance as opposed to heavy reliance on outside expertise. Also important is the process of group education about how to manage tasks, build group processes and implement plans. This is based on the recognition that lack of management or process skills is a prime failure component for community development efforts.

Eco-village (Eco-city)

Key Characteristics:
(continued)

- The maintenance of sustainability and a balance between differing component elements of the process.
- The maintenance of a human scale, i.e. limited to a size in which each member of the community is able to know and be known by others and to feel that they can influence the community's decision.
- The maintenance of sustainability and a balance between differing component elements of the process.
- The maintenance of a human scale, i.e. limited to a size in which each member of the community is able to know and be known by others and to feel that they can influence the community's decision.

Benefits:

The principal value of the model is that it is applicable across a broad spectrum of contemporary communities and is appropriate to both rural and urban environments. The model combines preservation of the sense of place and of community that already exists with an ongoing development process for the transformation of the community to a more sustainable relationship between economic processes and the ecological systems that support these processes. The eco-village concept recognizes that no single model is sufficient to address all circumstances and is therefore flexible and able to respond to the particular circumstances (e.g. ecosystems, mix of local natural resources, mix of human personality, intelligence and creativity) of each individual community.

Other Features:

The eco-village process is often presented in terms of the different systems to be addressed from a sustainable perspective.

- The Bio-system – requiring mechanisms to preserve habitat and produce necessary raw material without damaging the environment.
- The Built Environment – requiring construction with environmentally friendly materials and use of renewable energy sources.
- The economic system – requiring sustainable activity both in social and ecological terms and defining the appropriate forms of business organization.
- Governance – addressing questions of fairness and non-exploitation, how decisions are to be made, conflict resolution, regulation and enforcement.

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Model: **Ecosystem Approach: Healthy Ecosystems *and* Sustainable Economies**

Scope: Conceptual planning model framework to protect, restore, and sustain ecological resources and the communities and economies that they support.

Context: A comprehensive regional or geographic framework defined primarily by ecological boundaries. The approach is tailored to specific project area boundaries based on the key issue(s) to be addressed (i.e., maintaining a viable economic development, ensuring pristine ecological conditions, or addressing natural resource impacts from socioeconomic developments). The size of the project area is tentatively defined to allow effective action by stakeholders. It should be small enough to maintain focus on desired objectives, yet broad enough to meaningfully include key ecological components, processes, and functions.

Approach: The model framework is descriptive based on typical steps in an ecosystem management approach to address a specific issue, or evolving issues. The steps are not necessarily sequential. The order in which they are applied may vary and not all are applicable in every project. The issue(s) that entail ecosystem factors may be very specific but should always be viewed in the broader ecosystem context. How the issue is framed determines which stakeholders are involved. The level and nature of stakeholder involvement will vary depending upon many factors.

Objective: The fundamental goal is to restore and sustain the health, productivity, and biological diversity of ecosystems and the overall quality of life through a natural resource management approach that is fully integrated with the social and economic goals of the community. The ecosystem approach is a method for sustaining or restoring natural systems and their functions and values. It is driven by project-specific goals that are based on a collaboratively developed vision of desired future conditions that integrates ecological, economic and social factors.

Key Characteristics: The model framework involves eight steps:

1. Define the area of concern/interest;
2. Involve stakeholders;
3. Develop a shared vision of the ecosystem's desired future condition;
4. Characterize the historical ecosystem and the present economic, ecological, and social conditions and trends;
5. Establish ecosystem-based goals;
6. Develop and implement an action plan to achieve the goals;
7. Monitor conditions and evaluate results; and,
8. Adapt project management according to new information.

Benefits: The ecosystem approach contributes to the community development process by providing clear economic and social benefits, that result from protecting, restoring, and sustaining ecosystems, critical to the local economies of the region. These benefits include:

- Consensus-building orientation – an open government decision-making process with greater public involvement early in the process helps to ensure the community is more likely to get what it wants;
- Prompt action – continuous monitoring of ecosystem conditions and progress towards goals ensures issues are identified and addressed before they become problems;
- Reduced uncertainty – to the extent that ecosystem issues can be addressed simultaneously or comprehensively, the approach tends to help clarify government programs, goals, and compliance requirements, thereby offering economic opportunities to the private sector;

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Page 2.

Benefits:
(continued)

- Consideration of all important interests – collaboration among all stakeholders helps to ensure open communication to identify and address interests and key factors, and to ensure local input that addresses local community concerns;
- Investment in economic equity – protecting the environment ensures long-term sustainability of natural resources, and thereby balances and sustains the economies that rely on those resources;
- Managerial and budget efficiency – stakeholder collaboration reduces duplication and increases efficiency by realizing savings from economies of scale in the long term;
- Reduced burden on small landowners – achieved because issues are addressed comprehensively at a scale large enough to reduce the individual burden on small landowners;
- Reduced disruptive changes – emphasizes long term goals on broad ecological and economic sustainability terms thereby reducing probability, and impacts, of “boom and bust” cycles on individuals and communities; and,
- Balances economic development goals with natural resource conservation – avoids framing issues around the “either/or” argument by assuming long-term economic prosperity depends upon sustaining ecosystem functions.

Other Features:

Key principles of the ecosystem approach that contribute to sustainability are:

- Develop a shared vision that considers all relevant and identifiable ecological and economic consequences (both long term and short term);
- Develop continuous, coordinated, collaborative approaches among all stakeholders;
- Use ecological approaches that restore or maintain biological diversity and sustainability of the ecosystem;
- Support and incorporate sustained economic, sociocultural, and community goals;
- Respect and ensure private property rights;
- Recognize that ecosystems and institutions are complex, dynamic, heterogeneous over time and space, and constantly changing;
- Use an adaptive management approach;
- Integrate best science into the decision-making process and continue to improve the knowledge base; and,
- Establish baseline conditions and indicators by which change can be measured, monitored, and evaluated to determine progress towards achieving the desired goals and outcomes.

References:

The Ecosystem Approach: Healthy Ecosystems and Sustainable Economies. A Report of the Interagency Ecosystem Management Task Force, Volume I-III, June 1995.

Model: **New Urbanism (Neo-traditional Design)**

Scope: Urban planning and design practice.

Context: Urban centers and towns within coherent metropolitan regions.

Approach: Community development planning with emphasis on the design of the supportive physical framework.

Objective: Based on pre-World War II design concepts, this approach seeks to reverse the patterns of urban sprawl, disinvestment in central cities, environmental deterioration, segregation of socioeconomic and cultural communities, loss of open spaces, and erosion of the built environment that is characteristic of more contemporary communities. The preferred strategy is to reintegrate the components of modern life into compact, cohesive, mixed use neighborhoods that are linked by public transit and established in the context of a larger, regional, open space framework. Two primary emphases of this approach are that new development should be pedestrian oriented and incorporate more traditional urban design concepts (including clearly defined boundaries or growth limits), and that increasing suburban sprawl development should be avoided through increased emphasis and investment in infill development. The goal is a community ecology where the city, suburb, and the natural environment coalesce.

Key Characteristics: The basis for this approach is the reconfiguration and restructuring of urban centers and towns with a focus on mixed use; diverse population base; pedestrian orientation; physically defined and universally accessible public spaces and community institutions; the conservation of natural environments; and the creation of urban spaces that celebrate local history, climate, ecology, architecture and landscape design.

Key principles of this model include:

- The metropolitan region defined as a finite place derived from topography, watersheds, coastlines, farmlands, regional parks, and river basins.
- A necessary and fragile relationship between the metropolitan region and its agrarian hinterland and natural landscapes.
- A unified coherent strategy that combines infill development in the cities and inner suburbs with planned new development of open land to ensure protection of agricultural uses and environmentally sensitive areas.
- Planning at every level that is infused with considerations of cultural diversity and environmental sustainability.
- Within neighborhoods, a broad range of housing types and price levels that brings people of diverse cultural and socioeconomic background and generational stature into daily interaction, increasing community cohesion and strengthening community bonds.
- Development and redevelopment of towns and cities that respects historical patterns, precedents and boundaries
- Buildings that respond to their context and are designed and sited to define the character of streets and open spaces.
- Infill development within existing urban areas that conserves environmental resources, economic investment, and social fabric while reclaiming marginal and abandoned areas.
- Revenues and resources shared more cooperatively among the municipalities and centers within the region to avoid destructive competition for tax base and to promote rational coordination of transportation, infrastructure, recreation, and community institutions.

New Urbanism (Neo-traditional Design)

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Key Characteristics:
(continued)

- Preservation and renewal of historic buildings, districts and landscapes to affirm the continuity and evolution of urban society
- Cities and towns that bring together a broad spectrum of public and private uses to support a regional economy that benefits people of all incomes. Affordable housing distributed throughout the region to match job opportunities and to avoid concentrations of poverty.

Benefits:

This approach enables a community's growth to be channeled into a physical form that is more compatible with the scale of existing neighborhoods, improves air quality through the discouragement of auto use, is less costly to service, and preserves existing greenspaces through decreased consumption of land and resources. The approach is especially attractive to regions experiencing conflicts related to growth. The focus on infill development is important to the prevention of neighborhood degeneration and includes an emphasis on inclusive participation in the planning process as a mechanism for promoting life-long investment of residents in the community. Emphasis is placed on all levels including the region, the neighborhood, and the block, including the physical definition of streets, open spaces and individual units of the built environment.

Other Features:

Certain additional premises of the model emphasize economic and development characteristics that may also contribute indirectly.

- The metropolitan region is a fundamental economic unit of the contemporary world. Public policy, urban planning and community economic development strategies should be adapted to this new role.
- The basic building blocks of communities should be neighborhoods with defined, but not exclusionary) boundaries, individual characteristics, and centers offering public facilities and amenities.
- There should be a network of streets and sidewalks with streets conceived as "outdoor public rooms" defined by building fronts and other elements such as trees, hedges and fences.
- Communities should avoid regulations requiring large lots and large houses, moderate to high density neighborhoods are much more amenable to public transit, increasing access to residents without automobiles.
- The physical organization of the region should be supported by a framework of transportation alternatives. A multi-tier transportation system, from regional public transit to small vehicles for movement between neighborhood centers, in addition to pedestrian and bicycle systems should maximize access and mobility throughout the region while reducing dependence on the automobile.
- Where appropriate, new development contiguous to urban boundaries should be organized as neighborhoods and districts and should be integrated with the existing urban pattern. Noncontiguous development should be organized as towns and villages with their own urban edges and should be planned to include an employment-housing balance to avoid bedroom suburbs.

References:

- Canty, Donald. 1995. "Defining the New Urbanism." *Builder*: vol. 18, no. 1. (May).
- Congress for the New urbanism, 1996. "New Urbanism Basics." Charleston, SC. May
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Model: **Smart Growth Approach to Brownfields Redevelopment**

Scope: Sustainable development

Context: Community-wide

Approach: Procedural

Objective: The emphasis of this approach is to make development within the community more sustainable, and minimize the overall impact of development on the community and its environment. This is done by directing growth to particular designated places and protecting sensitive land, while avoiding increased sprawl development. Emphasis is also placed on the need to preserve or improve quality of life and maintain cohesion and identity in neighborhoods and communities. New growth is more town-centered and pedestrian oriented.

Key Characteristics The Smart Growth approach to redevelopment provides a framework that integrates economic factors (involving the generation and growth of businesses, public revenues, and employment), social factors (associated with socioeconomically disadvantaged and minority populations), and environmental factors (related to human health and ecological benefits).

The redevelopment framework identifies site, neighborhood and land-use factors that may be incorporated into a six step process of evaluating the overall marketability and potential community benefits associated with a site redevelopment. These include:

- Definition of broad geographic areas where redevelopment is most likely to be successful, as a means of addressing problems associated with limitations on resource availability.
- Creation of a comprehensive listing of sites where redevelopment opportunities exist to ensure that sites with a potential benefit for the community are not overlooked and to serve as a decision tool to be used by planners and developers as a means to reduce associated costs. Sources of information include: local knowledge and land use surveys, aerial maps, local community development organizations and economic development offices, GIS systems, Federal and State environmental databases, and other urban planning products.
- Site characterization based on marketability in order to develop an understanding of the level of public investment necessary to successfully redevelop the site (tax incentives, funds for remediation, and technical support). Screening criteria include both site and neighborhood characteristics.
- Site characterization based on the potential benefit to the community from redevelopment so that the community can concentrate its efforts on those sites most likely to contribute to neighborhood or community well-being, and identify any potential impediments to the community's ability to take advantage of the associated benefits.
- Impact assessment of redevelopment alternatives to serve as a tool for establishing priorities to assist in identifying characteristics that qualify projects for alternative funding sources and developing the rationale for applying those sources. Factors included in the impact assessment are related to health and environmental risk, environmental restoration, environmental justice, pollution prevention, creation of green spaces, job creation, increased tax revenues, secondary economic effects, increased utilization of infrastructure, social benefits, and social, economic and environmental costs of remediation.
- An integrated strategy for development that is specific to the site under consideration and that addresses the needs of individual participants in the development process. This plan can be expected to result in more efficient use and leveraging of resources, improved coordination among the variety of participants, and establishment of partnerships between participants who have complementary objectives.

Smart Growth Approach to Brownfields Redevelopment

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- Benefits:** The smart growth approach focuses the development effort away from the pro or anti-growth debate and concentrates on the role that development plays in the maintenance and enhancement of the quality of life in each community. Benefits that are considered common features of Smart Growth communities include: an enhanced sense of community, protection of investment in existing neighborhoods, environmental protection, decreased traffic congestion, more effective deployment of public capital, and increased certainty and flexibility in the development process itself.
- Other Features:** The approach emphasizes the role of alternative transportation models in the reduction of air quality and traffic congestion issues. The connection between existing development patterns and increases in the number and length of automobile trips is emphasized. Alternatives to “sprawl” development (e.g. mixed use, more compact, higher density) and increased investment in rail transit and forms of public transportation, other than the automobile, are encouraged as a mechanism to improve air quality, accessibility, and the quality of life in communities.
- References:** Froehlich, Maryann. 1998. “Smart Growth: Why Local Governments are Taking a New Approach to Managing Growth in Their Communities. *Public Management*. May 1998, vol. 80, no. 5 (May).
- Smart Growth Network, 1998. “What is Smart Growth.” Washington, DC. International City/County Management Association. [Online] available: www.smartgrowth.org.html. July 30, 1998.
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