The Brownfields Redevelopment Handbook

A Step-by-Step Guide for Municipalities

A Publication of the Monmouth County Planning Board
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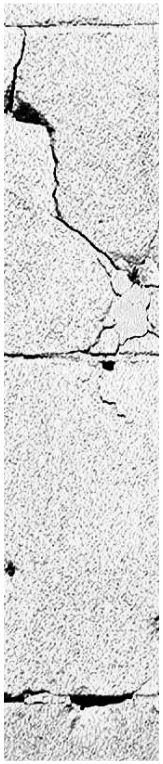


Introduction

RECLAIMING UNDERUSED LAND - THE REDEVELOPMENT OF BROWNFIELDS

As this country enters the twenty-first century, it needs to recognize the importance of "smart growth" land use policies. Land needs to be viewed as a resource that cannot be discarded easily. This is especially true as it applies to the abandonment and underutilization of commercial and industrial properties that have deteriorated since the decline of certain industries in this country. Across the nation, abandoned factories, warehouses, rail yards and mills that were once part of our nation's economic and historic fabric have been abandoned and neglected because of their actual or perceived environmental contamination. Known as **"brownfields,"** these properties lay dormant where they contribute to urban blight and diminish the quality of life for the families and individuals that live and work near them.

The redevelopment of brownfields can do much to revitalize sluggish local economies and restore community pride by transforming these idle brownfield sites into beneficial community assets.

The restoration of brownfields can:

- Reclaim underutilized lands and restore them to productive use.
- Protect public health by improving the environment through the cleanup of contaminated properties.
- Create reuse plans that can help to establish a "sense of place" and restore community pride and unity.
- Preserve historically and architecturally significant structures that were part of our nation's industrial revolution.
- Increase the local property tax base by adding productive ratables.
- Contribute to the local economy through the creation of new businesses and jobs.
- Remove blight from distressed neighborhoods and give residents a sense of hope for the future.
- Once redeveloped, will encourage other surrounding properties to achieve their highest and best use.

As noted above, the redevelopment and restoration of brownfields can lead to the revitalization of the surrounding neighborhood and the community as a whole. One of the main goals of the Monmouth County Growth Management Guide -Goals, Objectives and Policies (adopted December 1995) is the revitalization of older urban areas. Brownfield redevelopment is one tool that can be used to achieve that goal. The New Jersey State Development and Redevelopment Plan (adopted March 1, 2001) also encourages urban revitalization and the reuse and redevelopment of brownfield sites.

Brownfield Policies of the New Jersey State Development and Redevelopment Plan

Priority for Community Brownfield Plans

Give priority for public resources and assistance to communities with brownfield redevelopment strategies consistent with neighborhood and municipal plans.

Redevelopment of Brownfield Sites

Plan, locate and market redevelopment to capitalize on opportunities presented by brownfield sites, including existing infrastructure systems; established communities, businesses and industries; available work force and human resources; and regulatory, statutory and financial incentives.

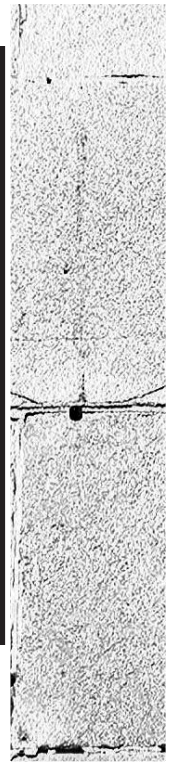
Coordinated Planning for Brownfield Sites

Identify sites and areas for redevelopment consistent with a community-based vision and consensus and prepare brownfield redevelopment strategies that coordinate community planning efforts with all levels of government.

Brownfields Reuse

Base the selection of remedial standards and actions on future use in a manner that ensures protection of public health and the environment.

The Importance of Citizen Participation



VIEWING BROWNFIELDS REDEVELOPMENT AS AN OPPORTUNITY

Before the brownfields redevelopment process can begin, a collaborative, educational, community-visioning process must take place. Local residents must perceive the redevelopment of brownfields as opportunities for neighborhood improvement. From the onset, the residents must become part of the redevelopment process given the magnitude of important community issues. These issues include concerns about contamination, remediation, alternative uses for brownfield sites, jobs and public health.

To help local communities assess whether brownfields redevelopment will be an opportunity, the following list of questions is provided to guide decision making:

- Can the property be redeveloped?
- Who owns the property?
- What benefits can the redevelopment bring to the community?
- How will the redevelopment impact public health and safety?
- Is there contamination on the site?
- What is the level of contamination? (minimal, moderate, severe)
- Who will clean up the site?
- What are the potential reuse alternatives for the site?
- Who will redevelop the site?
- How much will it cost to redevelop the site?
- What role will the various levels of government play in the redevelopment process?
- What is the local government's potential liability?
- What factors should be considered when deciding to reuse or demolish an existing structure?
- Will redevelopment bring new jobs to the community?

The list of questions that can be asked goes on and on. The questions provided are included as an initial step to help communities assess the positive and negative aspects of brownfields redevelopment. These questions should be carefully reviewed in order to achieve community support for brownfields redevelopment. The list can and should be modified to meet specific community needs.

The importance of community involvement cannot be stressed enough. It is imperative that local governments include citizen participation as part of the process - failure to do so will stifle redevelopment efforts. To avoid problems later, an open, collaborative, neighborhood consensus-building process must be developed. By encouraging citizen participation from the start of the redevelopment process, unnecessary delays and disputes will be avoided later on. If citizens do not receive good information early on about the proposed brownfields redevelopment, their perceptions may be misguided by rumors and misinformation. Community perception can often "make or break" a brownfields project because residents can be misled regarding the actual risks and benefits created by the site.

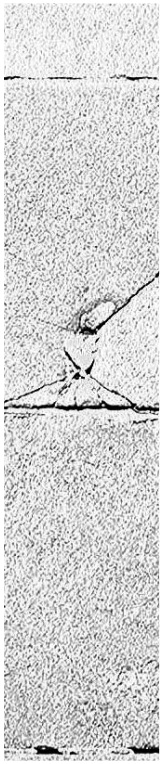
Community residents must become active stakeholders in

the process helping to create a future vision for the redevelopment of their neighborhood. Local residents must be viewed as sources of information not impediments to the process. Often times, residents can help identify brownfields sites and can provide historical information about the activities that may have taken place there in the past. Also, by incorporating citizen participation as part of the redevelopment process, local governments will discover what will truly benefit the community.

The Role Local Government Plays in Brownfields Redevelopment

Local governments play a pivotal role in the brownfields redevelopment process. They are often the facilitators and coordinators, bringing together all the diverse interests involved in a particular brownfields project. Their role as facilitators is often not easy, given the many different groups involved and the complexity of issues. Despite these complexities, local government involvement is critical to the process. Local government involvement ensures that brownfields redevelopment is consistent with other local and regional development priorities. It also ensures that community organizations and citizen groups directly affected by a brownfield project have sufficient access and a voice in the decisions made regarding prospective land use choices that will most benefit the community. Additionally, they act as liaisons coordinating the funding process, working with State and Federal governments. They also collaborate with environmental regulators and other public entities as well as private developers and community groups.

Getting Started



Before the redevelopment process starts, it is important that the community considers what the specific end use will be. The brownfields redevelopment process should be tailored to meet that land use need. For example, if the redevelopment plan calls for the construction of a light industrial facility, it may be appropriate to apply industrial investigation and clean up standards that are less stringent than those applicable to property that is to be redeveloped for residential use. Defining and understanding the ultimate redevelopment goal for the property is crucial in identifying appropriate site investigation and clean up technologies as well as financing mechanisms that will ultimately determine the affordability and profitability of the project.

If the end use is not known at the beginning of the project, the government entity or the individuals involved should at least attempt to identify the general type of development desired for the property, whether commercial, industrial, residential, mixed-use etc. Regardless of what the end-use is, the challenge for any brownfields redevelopment project is to clean up the site in accordance with the redevelopment goals. Such goals may include cost-effectiveness, timeliness, and avoidance of adverse effects on structures on the site and on neighboring properties and communities, as well as redevelopment of the land in a way that benefits communities and local economies.

THE FIRST STEP - DEVELOP AN INVENTORY

The first step for any municipality wishing to engage in brownfields redevelopment is to identify the locations of brownfield sites in their town. To do this, the town must establish an inventory of brownfield sites and determine whether the sites are publicly or privately owned.

The New Jersey Department of Environmental Protection is developing a system to identify brownfield sites in municipalities throughout the state. A comprehensive database is being created which will eventually identify all the brownfield sites located in New Jersey, making it easier for public and private developers to locate and build on brownfield sites, eventually returning these properties to productive use. This comprehensive database will be available through the internet.

To speed the brownfields redevelopment process along, since October 2000, the department has created an initial inventory with 56 priority brownfields sites listed. The inventory is known as the New Jersey Brownfield Site Marketing Inventory or (BSMI). It is a searchable, printable report in Adobe Acrobat format. The sites identified in the initial inventory reflect the state's desire to give priority to sites in distressed communities eligible for assistance from the Urban Coordinating Council. It also includes key sites selected by the U.S. Environmental Protection Agency that are supported by the federal government's Brownfield Pilot programs in New Jersey. It is hoped that over time, with the assistance of municipalities and property owners, this inventory will be expanded in both size and features. Eventually, the Brownfields Site Marketing Inventory should be able to assess a site's redevelopment potential using features such as an interactive mapping system that will iden-

tify the availability of infrastructure and transportation facilities using geographic information systems (GIS).

THE SECOND STEP - RISK ASSESSMENT

The purpose of this step is to evaluate the potential for contamination at a particular site by collecting and reviewing existing information. This environmental assessment is an initial investigation usually limited to a search of historical records as well as some preliminary testing. The data also includes information about past and current environmental conditions and historical uses of the site. This initial examination is very important to the process because any further environmental investigations and subsequent clean up will hinge on whether potential environmental concerns are identified during this phase. The initial risk assessment can also provide a preliminary indication of what types of clean up technologies might be available. For example, technologies that detect possible contamination in the air may be applicable at this stage as well as some analytical sampling technologies useful for assessing contamination in soil or groundwater. However, since much of the work at this stage involves a search of paper and electronic records, the use of technologies may be somewhat limited. It is also essential to assess and address the needs and concerns of the community during this initial phase.

Issues To Consider During The Initial Risk Assessment

1. Has a redevelopment plan been prepared or a proposed end use identified? Is the site located in an area targeted for redevelopment? How is the parcel zoned? Will it have to be rezoned to accommodate the proposed end use?

2. What kind of data is needed to support the long-term goals of the project? What level of quality is necessary to meet those goals?

3. What is known about the site? What records exist that indicate potential contamination and past use of the property? Has an environmental audit been conducted? What information is needed to identify the types and extent or the absence of contamination?

4. If the site is located in an area targeted for redevelopment, is the site being considered for clean up under a federal or state Superfund clean up initiative?

5. Will the site be entered into a Voluntary Clean Up Program (VCP)? If not, what agency (federal, state, local) would be responsible for managing oversight of the clean up?

6. What are the special needs and concerns of the community? How can community involvement be encouraged? How will community views be solicited?

7. What environmental conditions will the community find acceptable? What environmental standards should be considered to ensure that community stakeholders are satisfied with the outcome of the clean up, in light of the identified and proposed reuse?

8. If the site shows evidence of contamination, who and what will be affected? Will community members who use the property be exposed directly to the soil or sediment? Who will pay for the clean up?

Activities To Be Conducted During The Initial Risk Assessment Phase

- Establish a diverse technical advisory team. Try to enlist the services of knowledgeable experts including government officials, environmental regulators, citizens, property owners, and technical staff, such as environmental planners, solid waste experts, chemists and toxicologists.
- Identify future goals for reuse and redevelopment of the site and determine what type of data must be collected to support the goals of the site. What is the proposed new use or proposed designated land use (residential, commercial, industrial, etc.) for the brownfield redevelopment site? Who will the intended users be?
- Determine whether contamination is likely through a Phase I-American Society for Testing and Materials (ASTM) Risk-Based Corrective Action (RBCA) environmental site assessment or an equivalent standard. During this phase, the site is visited, but no sampling of soil or groundwater is conducted. This task includes the following activities:

    - Identify past owners and the uses they made of the property by conducting a title search and reviewing tax documents, sewer maps, aerial photographs, and fire, police and health department documentation related to the property.
    - Review and analyze city government and other historical records to identify past use or disposal of hazardous or other waste materials at the site.
    - Review federal and state lists that identify sites that may have environmental contamination; such lists include, but are not limited to: 1) EPA's Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) of potentially contaminated sites, 2) the National Pollutant Discharge Elimination System (NYDES) of permits issued for discharges into surface water, and 3) state records of "emergency removal" actions (for example, the removal of leaking drums or the excavation of explosive waste).
    - Interview property owners, occupants, and others associated with the site, such as previous employees, residents, and local planners.
    - Perform a physical or visual examination of the site, including an examination of existing structures for structural integrity and asbestos-containing material. Conduct an

It should also be noted that of the more than 600,000 brownfields sites across the country, most contain low levels of contamination and are thus* ***not *placed on the National Priorities List (NPL), the federal government's list of the most contaminated Superfund sites. As of December 2000, the U.S. Environmental Protection Agency confined its jurisdiction to 1,500 of the most contaminated sites nationwide.* ***Standard brownfield sites are usually cleaned up under State hazardous waste laws.***

assessment of possible external or outside contaminant
- determine whether these contaminants can get inside. If there are existing buildings on the site, determine whether there is possible internal contamination and how that contamination can be eradicated or contained. Also determine what is under the building
- Does contamination exist? If so, how should it be treated?
- Test for the presence of various contaminants; for example, lead-based paint, asbestos, and radon in structures.

- Review the applicability of government oversight programs:

  - Determine the approach that is required or available to facilitate the clean up of the site. Does the site fall under federal Superfund jurisdiction or a state-initiated Voluntary Clean-up Program ? Is the site targeted for redevelopment? Identify all economic incentives available through federal, state and local programs.

- Determine how to incorporate and encourage community participation.

  - Develop a public involvement plan and identify any public meeting or notice requirements.
  - Assess community interest in the project.
  - Identify community-based organizations.
  - Review any community plans for redevelopment.

- Identify factors that may impede redevelopment and reuse.
- Begin to identify sources for funding site investigation and clean up activities.

- Examine unacceptable environmental conditions in terms of initial costs for site improvement and long-term costs for operation and maintenance, include potential clean up options and constraints that may affect redevelopment, such as project schedules, cost and the potential for achieving the desired reuse.
- Conduct work at the site and collect data as necessary to define site conditions or to resolve uncertainties related to the site.

THE THIRD STEP - SITE INVESTIGATION

Following the initial environmental risk assessment at the site, barring the fact that absolutely no site contamination exists, the next step would be a comprehensive site investigation. During this phase, a confirmation is made regarding whether any contamination exists at the site, locating that contamination and characterizing the nature and extent of the contamination. To ensure that sufficient information is collected during the site investigation, knowing the proposed end use is advisable.

Determining the proposed land use, whether industrial, commercial or residential, will help to target the appropriate site investigation procedures to be employed. When trying to determine the future land use of a brownfield's parcel, it may be useful to compare the potential risks associated with several different land use scenarios, thereby assessing the impacts on human health and the environment.

The site investigation phase may involve the analysis of samples of soil and soil gas, ground water, surface water, and sediment. The migration pathways of contaminants are also examined during this phase and a baseline risk assessment may be needed to calculate the risk to human health and the environment. This assessment can also be used, as a measurement tool, after remediation has occurred to determine whether the necessary clean up levels were achieved.

Issues To Be Considered During The Site Investigation Phase If Perceived Or Actual Site Contamination Is Suspected

1. What level of government will be responsible for the review and oversight of the site investigation phase? Will the site be entered into a state Voluntary Clean Up Program? What federal, state and local regulatory requirements will be applicable to the site investigation?

2. What technologies are available to facilitate site investigation and to support data collection relevant to the goals of the project? Has the full range of technologies been explored to produce the highest quality of acceptable

data necessary for the specific site clean up?

3. What issues has the community raised that may affect the site investigation?

4. Who or what could be affected by the contamination or the efforts to clean up the contamination?

5. What steps will be taken if significant contamination is found, posing a threat to local residents?

6. What steps will be taken if the contamination is found to have originated from an adjacent or off-site source? What happens if sampling tests indicate that the contamination originated from a naturally occurring source?

7. Are infrastructure systems (roads, sewers, drainage facilities and other structures) contaminated? Could existing infrastructure be affected by efforts to clean up the contamination?

Activities To Be Conducted During The Site Investigation Phase

- Identify the proper mix of technologies including field measurement technologies that characterize the physical and chemical aspects of the site as well as fixed laboratory sampling methods to facilitate site investigations and meet the required level of data quality.
- Determine the environmental conditions at the site and whether infrastructure systems are or will be affected by the contamination through the performance of a Phase II Environmental Audit. This audit includes a series of tests performed at the site to confirm the locations and identities of the environmental hazards. This audit includes a report that interprets the results of the analysis and characterizes the level of contamination found at the site.
- Assess the risk the site may pose to human health and the environment. Consider the exposure pathways for soil, dust, water and air.
- Evaluate site contamination in terms of initial clean up costs and in terms of long term costs for annual operation and maintenance. Include potential clean up options and constraints that may affect the redevelopment process such as project schedules, costs and the potential for achieving the desired reuse.
- Revise assumptions about site contamination based on data collected at the site.
- Begin to investigate funding sources for site clean up activities (federal, state and local programs)
- Continue to coordinate site investigation procedures with appropriate regulatory agencies to ensure that regulatory requirements are being properly addressed.
- Continue to provide an on-going dialogue with community members. Educate them about the site investigation procedures and actively involve them in the redevelopment decision-making process.

Innovative Technologies Available To Conduct Site Investigations

The technologies used to conduct site investigation can be divided into two primary categories:

These categories include field analytic technologies and mobile laboratory technologies.

Field Analytical Technologies - are those technologies that are used on-site without the absolute need for a mobile laboratory. Some field analytical technologies are very sophisticated and can yield quantitative results that are comparable to those obtained by analysis in mobile or off-site laboratories. Some field analytical measurements can be made quickly, allowing a high rate of sampling. Under certain conditions, data can be collected in short periods of time. Field analytical technologies are implemented through the use of hand-field instruments, such as portable gas chromatography and mass spectrometry and the x-ray fluorescence analyzer, as well as the use of bench procedures, such as colorimetric and immunoassay tests.

Mobile Laboratories - A variety of technologies can be used in a mobile laboratory. Such technologies differ from field analytical technologies because they may require more controlled conditions (such as temperature, humidity, and source of electricity) or complex sample preparation that uses solvents or reagents that require special handling or protective equipment that require the handling and storage of chemical standards. Technologies adaptable to mobile laboratories include those used to analyze soil and water samples for inorganic analytes (such as anodic stripping voltammetry) and organic compounds (such as gas chromatography with a variety of detectors). When operated properly and with adequate QA/QC, the technologies can achieve quantitative results equal to those achieved by off-site laboratories.

For an explanation of field analytical and mobile laboratories technologies, see Appendix A.

Contaminants Monitored Examples of Field Analytical Technologies

Benzene, Toluene, Ethylbenzeneand Xylene (BTEX) - Colorimetric Test Kits; Immunoassay Test Kits; Laser-Induced Fluorescence/Cone Penetrometer; Portable Gas Chromatography/Mass Spectrometry

Buried Objects - Ground Penetrating Radar (GPR), Infrared Monitors, High-Frequency Electromagnetic (EM) Sounding; Subsurface EM; Subsurface Magnetrometry, Transient EM Geophysical Instruments

Dioxins and Furans - Gas Chromatography/Mass Spectrometry

Explosives - Colorimetric Test Kits; Immunoassay Test Kits; Gas Chromatography/Mass Spectrometry

Geophysical Characteristics of Soil and Bedrock - In Situ Geophysics; Borehole Technologies; Downhole Sensors; Seismic Reflection/Refraction; GPR; Electromagnetic Sounding

Mercury - Immunoassay Test Kits

Metals - X-ray Analyzers; Electrochemical Detector Kits; Graphite Furnace Atomic Absorption Spectroscope

Pentachlorophenol (PCP) - Immunoassay Test Kits; Portable Gas Chromatography/Mass Spectrometry

Pesticides - Colorimetric Test Kits; Immunoassay Test Kits; Gas

Chromatography/Mass Spectrometry

PCB's - Colorimetric Test Kits; Immunoassay Test Kits Polynuclear Aromatic Hydrocarbons (PAH) Colorimetric Test Kits; Immunoassay Test Kits; Gas Chromatography/Mass Spectrometry

Total Petroleum Hydrocarbons (TPH) - Colorimetric Test Kits; Immunoassay Test Kits; Laser-Induced Fluorescence/Cone Penetrometer; Infrared Monitors, Gas Chromatography/Mass Spectrometry

VOC's, Semi-Volatile Organic Compounds (SVOC's) - Portable Gas Chromatography/Mass Spectrometry Colorimetric Test Kits; Immunoassay Test Kits; Infrared Monitors

THE FOURTH STEP - Evaluating Site Remediation Alternatives

The review and analysis of site remediation alternatives relies on the data collected during the site assessment and investigation phases. The purpose of evaluating various remediation alternatives is to identify those technologies that best meet the specific clean up and redevelopment goals for the site.

Issues to be Considered During the Evaluation of Site Remediation Alternatives

1. What is the appropriate and feasible level of remediation for the site? Are there federal, state/local requirements for remediation?
2. What issues are associated with the implementation of the various remediation options? Will the remediation alternatives employed hinder the planned redevelopment? How long will the remediation take? What are the costs of the various remediation alternatives?
3. How will climate affect site remediation activities? Determine the impacts of hot weather, cold weather and seasonal changes on the remediation options being evaluated.
4. Are the remediation options compatible with regional and local planning and development goals and requirements?
5. Can redevelopment activities such as demolition, construction or renovation of buildings be conducted simultaneously while remediation activities are being conducted?
6. How can the community participate in the review and selection of remediation alternatives? What environmental standards should be considered to ensure that community stakeholders are satisfied with the outcome and remediation process given the intended use?
7. What short and long-term options are available to monitor the effectiveness of the remediation actions? Has an operations and maintenance plan been developed? Will personnel be hired and trained to monitor, record and maintain the effectiveness of the remediation actions?

Activities To Be Conducted During The Site Remediation Phase

- Establish goals for remediation that consider the end land use and

determine the appropriate level of clean up, use either state or federal requirements, risk-based corrective actions, or site-specific risk assessment procedures.

- Educate the public about the site remediation process and actively involve them in decision-making.
- Review information about remediation technologies and become familiar with those that may be applicable to a particular site. Narrow the list of potential technologies that are most appropriate for addressing the contamination identified at the site and that are compatible with the specific conditions of the site and the proposed reuse of the site.

    - Evaluate the options against a number of factors, including toxicity levels, exposure pathways, associated risk, future land use and economic considerations.
    - Determine what can and must be removed from the site; what can be repaired than cannot be immediately removed and what contaminants can be enclosed, creating airtight enclosures until funds become available for hazard removal.
    - Analyze the applicability of a particular technology to the contamination identified at a site.
    - Determine the effects of various technology alternatives on redevelopment objectives. Identify potential constraints as they apply to time schedules, costs, and risk factors.

- Continue to work with appropriate regulatory agencies to ensure that regulatory requirements are addressed properly.
- Investigate environmental insurance policies, such as protection against cost overruns, undiscovered contamination and third-party litigation and integrate their cost into the project financial package.
- Select an acceptable remedy that not only addresses the risk of contamination, but also best meets the objectives for redevelopment and reuse of the property and is compatible with the needs of the community.
- Communicate information about the proposed remediation choice to all affected stakeholders.

Innovative Site Remediation Technologies

Continued improvements and advances in site assessment, investigation and remediation technologies, over the years, have made brownfields redevelopment a much more viable process. As new and improved innovative technologies are introduced, the cost of site remediation has decreased, making the brownfields redevelopment process more economically feasible. In addition to be more cost effective, many of the new technologies are often faster and more thorough than conventional methods. Some of these innovative remediation technologies include the following:

- Bioremediation
- Chemical Dehalogenation
- In situ soil flushing
- Natural attenuation
- Phytoremediation
- Presumptive remedies
- Soil Vapor Extraction (SVE)
- Soil washing
- Solvent extraction
- Thermal desorption

- Treatment walls

For an explanation of the site remediation technologies, see Appendix B.

THE FIFTH STEP - IMPLEMENTING SITE REMEDIATION ACTIVITIES

Implementation is the last phase of the remediation process. During this phase the remediation plan is put into action and the property is prepared for redevelopment and reuse.

Issues to be Considered During the Implementation of Site Remediation Activities

1. Are there federal, state/local requirements for the implementation and monitoring of site remediation activities?

2. How will site remediation activities be monitored? Which level of levels of government will be responsible for monitoring and maintaining site remediation activities? How will redevelopment projects that contain repaired or encapsulated contaminants be monitored and maintained?

3. How can the community participate in the implementation and monitoring of the site remediation plan?

4. What actions can be taken to protect community public health and the health and welfare of surrounding and adjacent communities during the implementation of site remediation activities?

5. Can redevelopment activities, such as the renovation of existing buildings or the construction of new facilities or infrastructure, be conducted simultaneously while remediation activities are underway?

6. What are the long-term effects of the remediation on the liability and future use of the site?

7. Will long-range maintenance and monitoring be required? If so, how will it be managed?

Activities To Be Conducted During Site Remediation Implementation

- Continue to work with the appropriate regulatory agencies to ensure that regulatory requirements are being properly addressed.
- Establish an operations and maintenance plan that details how remediation actions will be maintained and monitored over time.
- Establish contingency plans to address the discovery of additional contamination during remediation, including tools such as environmental insurance policies.
- Develop procedures for community participation, for example, by working with community advisory boards or local redevelopment authorities.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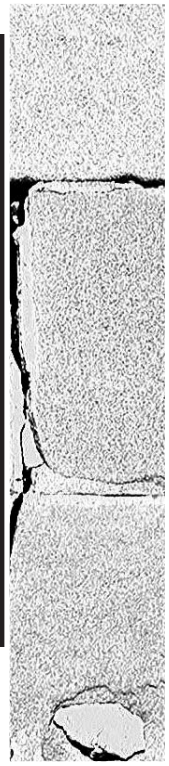
Laws Governing Brownfields Redevelopment



Federal Laws

At the Federal level there are essentially four pieces of legislation that affect the brownfields redevelopment process. These include the **Resource Conservation and Recovery Act** of 1976; the **Community Reinvestment Act** (CRA) enacted in 1977; the **Comprehensive Environmental Response, Compensation and Liability Act** of 1980 (CERCLA) amended in 1986 as the **Superfund Amendment Reauthorization Act** and the **Brownfields Tax Incentive**, or **Taxpayer Relief Act** of 1997.

The Resource Conservation and Recovery Act (RCRA), administered by the United States Environmental Protection Agency (EPA), was established in 1976 as a regulatory system to track hazardous substances from their generation to their disposal. The law requires the use of safe and secure procedures in treating, transporting, storing and disposing of hazardous substances. RCRA is designed to prevent the creation of new, uncontrolled hazardous waste sites.

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) was enacted by Congress in 1980 to protect the public and the environment from the release of hazardous substances by developing a statute that ensures that the polluter pays for environmental cleanups. Enforcement of this legislation was designated to the Environmental Protection Agency. CERCLA has been instrumental in improving waste disposal methods and protecting our environment. However, CERCLA has also been cited as the largest stumbling block to brownfields redevelopment.

A component of CERCLA is the Superfund Trust Fund established to finance the government's clean up of hazardous waste sites in the absence of agreements by private parties, as well as a liability plan to identify and assign liability to parties responsible for the contamination at a site. Under CERCLA, the Federal Environmental Protection Agency (EPA) can either pay for site clean up when the responsible parties cannot be found or are unwilling or unable to perform the work, or take legal action to force the parties responsible for the site contamination to clean up or pay back the government for the cost of the clean up. As defined by the legislation, a responsible party, whether a public or private entity, is liable for the clean up costs if that person owned or operated the site or facility at the time of the disposal of hazardous substances or if the person generated material on or transported material to the property. In addition, CERCLA assesses liability on the current owner or operator of the site or facility regardless of whether that current owner or operator had any responsibility for the contamination. The liability in effect remains with the land, in conjunction with any past owner or operator, even if they sell the property. The liability for the property is strict, joint and retroactive, meaning that any party that owned the property, whether in the past or at the present time, can be held liable. The EPA does not have to prove intent or negligence regarding the cause or perpetrator of the contamination. Therefore, a present owner who recently purchased the property could be held liable for all clean up costs at the site even if that party did nothing to contribute

to its contamination. As a result of the potential legal liability regarding clean up costs, many prospective buyers have been discouraged from pursuing redevelopment activities.

EPA Brownfields Liability and Regulatory Reforms

Recognizing that the CERCLA legislation had created many barriers to brownfields redevelopment, Congress and the EPA reformed CERCLA to provide a greater incentive for public and private investment in brownfields redevelopment. To mitigate brownfields redevelopment liability, the federal government implemented several administrative liability reforms and liability exemptions. The liability exemptions fall under two legal defense categories. These defense categories include the "Innocent Land Owner" exemption or the "Secured Lender" exemption

The Innocent Land Owner Defense - provides a defense to liability if an owner acquired the property after the disposal or release of hazardous substances and establishes by a preponderance of the evidence that one of the following conditions is met:

- The owner acquired the property without reason to know that a hazardous substance or substances were disposed of on the property.
- The owner is a government entity that acquired the property by escheat, involuntary transfer and acquisition or through eminent domain by purchase or condemnation.
- The owner inherited the property.

The Secured Lender Defense - provides a defense to liability to a lender or financial institution (bank) if it is determined that the lender who holds ownership of the property primarily to protect its security interest, does not manage the facility or have influence on decisions regarding the disposal and management of hazardous waste.

In addition to these two legal defense exemptions, the EPA also reformed some of the programs and policies regarding brownfields clean up, thereby mitigating liability.

Some of EPA's liability-related reforms include the following:

- Policy towards owners of property containing contaminated aquifers

- Guidance on agreements with prospective purchasers of contaminated property
- Issuance of comfort/status letter to provide guidance to prospective purchasers, assessing the probability of incurring liability under CERCLA or Superfund liability.
- Policy on CERCLA enforcement against lenders and government entities that acquire property involuntarily.

Policy Toward Owners of Property Containing Contaminated Aquifers

This policy was enacted by EPA to clarify its position on contaminated groundwater aquifers located on an owner's property where hazardous substances have migrated onto or into the property via groundwater aquifers, which were contaminated by a source located off the property. EPA will **not** hold the owner liable for the remediation of the contaminated aquifer provided the following criteria is met:

- The owner did not cause, contribute or aggravate the release of contaminants into the ground water supply.
- The owner did not employ the perpetrator or perpetrators of the caused release.
- The owner cooperates with the appropriate parties (e.g., the federal EPA as well as state regulators in the clean up process.

Guidance on Agreements with Prospective Purchasers of Contaminated Property

This guidance expands the criteria EPA uses when it considers whether to enter into a **Covenant Not to Sue Agreement** with prospective purchasers (also known as Prospective Purchaser Agreements or PPA's). In the past, EPA could only enter into such agreements if the agency received a direct benefit in the form of privately funded site remediation or reimbursement for remediation costs. Under the revised criteria, EPA has expanded its view on PPA's by also considering the benefits the community will derive from the brownfields redevelopment including the following:

- Job creation
- Productive use of abandoned property
- Revitalization of a distressed urban community.

As a general rule, the federal EPA will only enter into a PPA where there is a likely federal interest. Additionally, if an owner enters into a PPA, assurances must be provided that they will not contribute further to the contamination of the site, that the site will not pose a health risk, and that they are financially secure.

It should also be noted that of the more than 600,000 brownfields sites across the country, most contain low levels of contamination and are thus **not** placed on the National Priorities List (NPL), the federal government's list of the most contaminated Superfund sites. As of December 2000, the U.S. Environmental Protection Agency confined its jurisdiction to 1,500 of the most contaminated sites nationwide. Standard brownfield sites are usually cleaned up under State hazardous waste laws.

Understanding the role of the federal government is important because the State hazardous waste clean up laws are modeled after the federal CERCLA and include similar joint liability provisions. While the federal EPA can technically require an owner that has secured a State cleanup or "no further action certification" to take

further remediation steps, it is highly unlikely. However, on rare occasions, EPA will review a State action and may require the owner to take additional remediation actions.

Issuance Of Comfort/Status Letter To Provide Guidance To Prospective Purchasers

To further encourage brownfields redevelopment, the EPA reformed its policies to provide Comfort/Status Letters. These letters explain the purpose of CERCLA and may be sent when the property described is **not** located in an active or proposed Superfund site. The purpose of the letter is to inform the owner that to the best of EPA's knowledge, the property described in the request has never been addressed under EPA's Superfund program, nor is there any current plan to do so. Because EPA does not have any information about the property, the letter does not express any opinion as to possible contamination at the property or appropriate usage of the property. It is further recommended that the prospective owner contact the appropriate State agency for further information regarding the state's intention toward the property.

In addition, if a property is in the Superfund program, the most important information EPA can provide the prospective owner is information about current Superfund activities. A regional office may issue a **Federal Interest Letter** to explain what actions have been taken by EPA to remediate the site. The letter may also indicate whether the federal government anticipates further action at the site and the type of action anticipated.

The last type of letter that EPA may issue is a **State Action Letter**. A State Action Letter advises the prospective owner that EPA does not intend to take federal action under CERCLA when the State has the primary role of overseeing clean ups pursuant to either state or federal requirements, and where appropriate, the owners performing the clean up are working cooperatively under state direction. EPA, however may consider taking action at a site if it receives new information about site conditions requiring federal action or the prospective owner and the state are unwilling or unable to ensure compliance with the negotiated agreement between the state and prospective owner or the state and EPA.

Policy On CERCLA Enforcement Against Lenders And Government Entities That Acquire Property Involuntarily

To counter financial institutions reluctance to lend money to owners, buyers and developers of contaminated properties for fear of being caught within Superfund's broad scope of strict and joint liability, two policies were created to provide lenders and governments with significant protections from CERCLA liability. These policies include the Lender Liability and Deposit Insurance Protection Act of 1996 and the CERCLA Provisions Addressing Lenders and Involuntary Acquisitions by Government Entities (1997). These two policies clarify EPA's position regarding enforcement actions against governments and lenders who become associated with contaminated properties as a result of involuntary acquisitions such as foreclosures, tax delinquency, bankruptcy or abandonment. The policies state that the federal EPA and the Department of Justice will **not** pursue either entity for reimbursement of remediation costs provided that these entities have not contributed to or aggra-

vated the on-site contamination.

The Community Reinvestment Act (CRA) was enacted in 1977 by Congress to require banks and other lenders to make capital available in low-and moderate-income urban neighborhoods to stabilize these declining areas, many of which have brownfield sites. However, concern over potential environmental and financial liability for cleaning up these sites made lenders, developers, and property owners reluctant to finance the redevelopment of these properties. To stimulate investment in brownfields redevelopment, in 1995, the EPA created the Brownfields Action Agenda. Coordinated with the Office of the Comptroller of the Currency, the agenda revised the Community Reinvestment Act providing incentives within the regulations for brownfields redevelopment. Under the proposed revisions, lenders subject to the CRA could claim community development loan credits for loans made to help finance the environmental cleanup or redevelopment of an industrial site when it was part of an effort to revitalize the low- and moderate-income community in which the site was located.

The Brownfields Tax Incentive, or Taxpayer Relief Act was enacted by President Clinton on August 5, 1997. The act was designed to spur the clean up and redevelopment of brownfields in distressed urban and rural areas. Under the act, environmental clean up costs for properties in targeted areas are fully deductible in the year in which they are incurred, rather than having to be capitalized. The tax incentive is available to properties that meet certain land use, geographic and contamination requirements. These requirements include the following:

- The property must be held by the taxpayer incurring the eligible expenses for use in a trade or business or for the production of income, or the property must be properly included in the taxpayer's inventory.
- Hazardous substances must be present or potentially present on the property.
- The property must be located in one of the following area:
  - EPA Brownfields Pilot areas designated prior to February 1997;
  - Census tracts where 20% or more of the population is below the poverty level;
  - Census tract that have a population under 2,000, have 75% or more of their land zoned for industrial or commercial use, and are adjacent to one or more census tracts with a poverty rate of 20% or more; and
  - Any Empowerment Zone or Enterprise Community (and any supplemental zone designated on December 21, 1994).

The Community Development Block Grant Program (CDBG) - Although not designed specifically for brownfields redevelopment, in 1994 the Department of Housing and Urban Development was authorized to use CDBG funds for a full range of community development activities that may be relevant to brownfields redevelopment as long as the project satisfies one of the three national objectives:

- To benefit low-and moderate-income persons
- To prevent or eliminate slums or blight
- To meet an urgent need.
- Specific eligible activities affecting brownfields include:

- Plans for redevelopment or revitalization of brownfields sites, including:
- Site acquisition
- Environmental Site Assessment
- Clearance
- Demolition and Removal of Building
- Rehabilitation of building
- Removal or remediation of contamination from sites and/or buildings
- Construction of real estate improvements.

State Law - Brownfields Redevelopment In New Jersey

As mentioned earlier in this report, of the 600,000 brownfields sites found nationwide, most do not fall under federal jurisdiction. To address the renewal and re-use of those less contaminated sites, (those not found on the National Priorities List), forty-one states have enacted **Voluntary Clean-Up Programs (VCP's)**.

New Jersey was among the first states to enact such a program along with the states of Pennsylvania and Florida. These three states created VCP's to encourage the redevelopment of brownfields sites that were not on the National Priorities List. In the past, under the Superfund law, any owner of a brownfield site was held liable for the contamination found on the site, even if they had nothing to do with its origin. Furthermore, anyone whose name appeared at any time on the title to the property could be ordered to clean up the site or could be sent a huge bill by the government after it cleaned up the site.

The unintended result was that no one would touch an abandoned or underutilized property in New Jersey or anywhere else in the country if there were even a hint that it might be contaminated. To remedy the situation in New Jersey, the state created a series of statutes to encourage the clean up and redevelopment of brownfield sites.

These statutes included the following regulatory framework: the **Spill Compensation and Control Act**, the **Industrial Site Remediation Act**, and the **Brownfields and Contamination Site Remediation Act.**

The Spill Compensation and Control Act - was enacted in 1976 to control the transfer and storage of hazardous substances, to clean up sites contaminated by the discharge of such substances, and to provide adequate compensation for those damaged as a result.

The Industrial Site Remediation Act (ISRA) - was enacted to make the clean up process more flexible. One of ISRA's most important features is the concept of use-based clean up criteria. Under this statute, remediation standards are permitted to vary based upon the type of planned land use. In addition, ISRA created the **Hazardous Discharge Site Remediation Fund (HDSRF)** that provides grants and low interest loans to municipalities and private parties.

The HDSRF provides the following:

- Grants to municipalities for Preliminary Assessments and Site Investigations.
- Loans for site remediation
- Innocent Party Grants for up to 50% of the cost of remediation.

The New Jersey Brownfield and Contaminated Site Remediation Act (BCSRA)- was enacted in 1998, to further advance the clean up and redevelopment of underused or abandoned commercial and industrial sites located in urban and suburban areas. This law amended the Hazardous Discharge Site Remediation Act, the Spill Compensation Act, ISRA and other key statutes. The New Jersey Department of Environmental Protection was granted the authority to administer this program. Under the program, NJDEP is directed to encourage and aid in coordinating state, regional and local plans and programs concerning the remediation and reuse of brownfields. The agency is also responsible for the facilitation and coordination of activities and functions designed to clean-up contaminated sites. A Brownfields Redevelopment Task Force was also created, comprised of five members from state agencies including: the Office of State Planning, Department of Community Affairs, the NJ Commerce & Economic Growth Commission, the New Jersey Redevelopment Authority, the Department of Transportation and the Department of Environmental Protection/Site Remediation Program. The task force also includes six public members representing, to the extent possible, commercial or residential development interests, the financial community, a public interest environmental organization, a labor or trade organization and a regional planning entity. The Task Force receives staff support from Office of State Planning to conduct the following tasks:

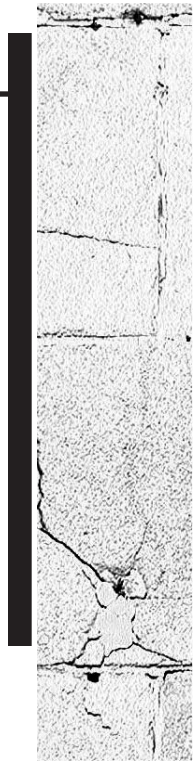
- Preparation of an updated inventory of all brownfield sites, including an assessment of the contaminants, which shall be made available to the public
- Coordination of state policy on brownfield redevelopment
- Prioritization of sites
- Preparation of redevelopment plans for these sites
- Marketing of sites
- Coordination with the Pinelands Commission
- Evaluation of the performance of current public incentives
- Advise the Governor and Legislature on ways to promote brownfield redevelopment.

Under this program, the party that is conducting the clean up enters into a non-binding agreement called a Memorandum of Agreement (MOA) with the NJDEP to establish the scope and schedule of remediation activities, ranging from a Preliminary Assessment to a Remedial Action. The MOA is not an enforcement document and does not require financial assurances or penalties, therefore, volunteers or prospective owners my exit the program without fear of DEP action.

Potentially responsible parties may also withdraw from the MOA without fear of enforcement actions provided the site is a low priority for DEP. If the site becomes a priority while it is being remediated under the Voluntary Clean Up Program, the prospective owner may be required to produce a schedule of compliance and to amend the MOA to include the whole site if it is not already included. Failure to demonstrate cooperation with the DEP can trigger termination of the Memorandum.

Once a developer or government entity enters into a Memorandum of Agreement with the State of New Jersey, they may apply for any of the various financial incentives provided to encourage the redevelopment of the contaminated site.

Financial Incentives To Encourage Brownfields Redevelopment In New Jersey



The Hazardous Discharge Site Remediation Fund (HDSRF) - Mentioned earlier, this funding program provides grants and low-interest loans to municipalities and/or private entities for environmental investigation and remediation of contaminated properties under two programs:

Municipal Program - A municipality may be eligible for a grant of up to $2 million per year to conduct an environmental assessment of the brownfield site. The HDSRF municipal grant funding program provides a 100% grant for preliminary assessment and site investigation for qualifying brownfield parcels, enabling municipalities to evaluate the level of contamination and the potential for liability without incurring the initial financial burden. The municipality cannot be the party responsible for the contamination of the site. To be eligible for this grant, the municipality must adopt a development or redevelopment plan or be able to demonstrate a realistic opportunity for redevelopment of the subject site. At a minimum, the municipality must hold a tax sale certificate for initial investigation of the site to occur. And, the municipality must own the property to be eligible to perform further investigation or remediation. In addition, loans for remediation are available at 2 points below the federal discount rate with a 3% floor. Additionally, municipalities may qualify for low-interest loans for remedial investigation and remedial action under this program.

Private Program - Private developers or individuals who acquire brownfield properties are eligible for 50% Innocent Party Grants for up to $1 million per year provided that the properties were acquired before December 31, 1983 and that there has been a discharge of a hazardous substance that was not used by the person acquiring the site or any person with permission from the applicant to use the site. In addition, 25% Matching Grants are available for up to $100,000 to businesses or individuals with a net worth of less than $2 million who voluntarily commit to the remediation of a brownfield site using approved innovative technology or who implement an unrestricted or limited restricted remedial action. Private entities that fail to meet the grant requirements, may qualify for a loan if the property to be remediated is in a "qualifying municipality as defined by the Municipal Aid Act. Loans are available at the federal discount rate with a 5% floor.

The Environmental Opportunity Zone Act - This act enables municipalities to adopt ordinances, which provide property tax exemptions to owners of contaminated sites provided that they are located in designated Environmental Opportunity Zones. The tax abatement ends when it equals the total remediation cost or after 15 years. Under the act, the owner must enter into a Memorandum of Understanding that once remediated, the site will be used for a commercial, industrial, residential or other productive use during the time period of the tax exemption.

The Redevelopment Agreement and the Brownfield Site Reimbursement Fund - This fund was created to reimburse liable owners of brownfield site up to 75% of the costs of remediation of contaminated sites. The owner must enter into a redevelopment agreement with the State Treasurer and the Secretary of the Commerce and Economic Growth Commission. To be eligible a project must be an integral component of a local redevelopment strategy. The redevelopment agreement may only be entered into if the State Treasurer and the Secretary of the Commerce and Economic Growth Commission find that the state tax revenues to be generated from the proposed redevelopment will be in excess of the amount necessary to reimburse the owner for clean up costs. Taxes include corporate business tax, sales and use tax, and business, partnership or S corporation income tax. The owner is also required to enter into a memorandum of understanding with the New Jersey Department of Environmental Protection to ensure that the remediation is conducted according to NJDEP regulations.

The New Jersey Urban Redevelopment Act - This legislation contains several provisions directly relevant to brownfields. The act encourages redevelopment projects on abandoned properties and authorizes the use of payments in lieu of taxes as a financing method. The act also created the New Jersey Redevelopment Authority, which assists in the revitalization of New Jersey's urban areas. It also:

- Expands the use of Hazardous Discharge Site Remediation Fund (HDSRF) to grants available for remedial investigations;
- Reduces interest rates on HDSRF loans for site remediation;
- Establishes an Urban Site Remediation Coordinator in NJDEP, responsible for oversight and approval of site remediation in certain designated areas; and
- Shields prospective purchasers of contaminated property in "urban aid" communities from liability provided they commit to an approved remedial work plan for site clean up. The prospective purchasers are also protected against future

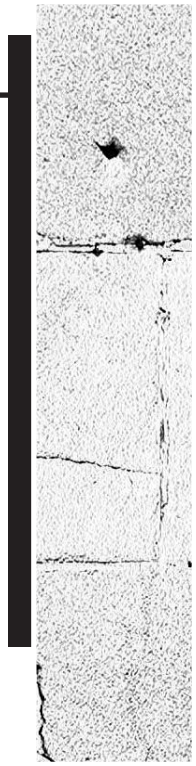
changes in clean up standards or findings of new contamination.

The Urban Site Acquisition Program (USA) - provides low-interest, short-term loans to facilitate acquisition and site assembly of properties within the 68 Urban Coordinating Council municipalities, which have been designated to implement neighborhood-based revitalization strategies. Municipalities must have a viable redevelopment plan for the site. Pre-development costs, such as plan development, are eligible. Municipalities must leverage funds from other public and private sources. Loans are repaid once the developer has permanent financing in place. In addition, grants of up to $1 million may be available under certain circumstances for acquisition and/or remediation.

Business Employment Incentive Program - This program was designed to encourage employment growth in New Jersey by offering grants to companies with projects creating new jobs. To be eligible, the project must create a minimum of 25 jobs in qualified urban-aid municipalities and 75 jobs elsewhere. Grant awards range from 10% to 80% of newly created State income tax for up to 10 years. Awards are based on various criteria including location on a brownfield site.

Finally, as the State of New Jersey promotes smart growth planning, brownfield redevelopment is encouraged to promote economic redevelopment. Additional state funding may become available in the future to assist municipalities and counties in brownfield redevelopment efforts.

Putting It All Together



THE ENDLESS POSSIBILITIES OF BROWNFIELDS REDEVELOPMENT

Brownfields redevelopment offers counties, municipalities and private developers opportunities not only to revitalize decaying urban areas and underutilized and abandoned contaminated sites, but also enables communities across the nation to halt sprawling development. As a result of this land recycling process, the need to confiscate undeveloped forestlands, farmlands and open spaces is being diverted. This diversion is reducing the need for sprawling new development and the associated construction of added infrastructure. From old, abandoned industrial sites to rural villages built around mines and timber mills, a resurrection is occurring. Properties that were once idle are again being put back into productive use, generating jobs and income.

Another positive outcome of this process is the improvement to our physical environment brought about by removing or containing the contamination. Remediating brownfields sites provides long-term pubic health benefits to residents who live in close proximity to brownfields sites. In addition to these benefits, reusing brownfields can directly benefit the finances of local governments. When these sites are put back into productive use, they serve as sources of revenue whether directly through taxes paid by owners or indirectly through property, sales, and other taxes paid by workers. Idle brownfields sites in contrast are fiscal wastelands, generating economic decay, crime, and blight. Redeveloping brownfields can increase the local tax base, generate sales taxes through commercial development, provide jobs for local residents, strengthening the overall economy, and create public amenities like parks and recreation areas. Furthermore, for communities that are densely developed, redevelopment of brownfield sites may represent one of the few available alternatives to bolster revenues.

As this handbook indicates, brownfields redevelopment can be a realistic development alternative for many communities. Through responsible site assessment, remediation and redevelopment, communities can resurrect abandoned properties. The possibilities for redevelopment are endless, limited only by one's imagination. Here are but a few New Jersey brownfield success stories, two of which are located in Monmouth County.

BROWNFIELD REDEVELOPMENT SUCCESS STORIES IN NEW JERSEY

LILY TULIP PLANT - The Lily Tulip Plant located in Holmdel, New Jersey was a one million square foot facility that for nearly 40 years manufactured Dixie cups and other paper products. Following the closing of the plant in 1990, the building stood vacant for nearly ten years. The site of the

former plant had been contaminated with asbestos, underground storage tanks, oil solvents, and ash piles and was in need of major remediation. A public-private partnership was created to transform this obsolete eyesore into a mixed-use development project that will eventually contain 235,000 square feet of retail space, 44,000 square feet of office space, a nursing home facility and an assisted living center as well as 158 single-family homes for people over the age of 55.

To facilitate this redevelopment project, the factory was demolished. It is estimated that the developers will spend approximately $2 million to remediate the entire site and have invested an additional $3 million in road improvements. This project would not have been economically feasible without the aid of the state's Brownfields Redevelopment Incentive Program. Under the program, the developer will be reimbursed by the state for 75% of its remediation costs once the project generates tax revenues that exceed the cost of the clean up.

THE RUG MILL NEIGHBORHOOD REVITALIZATION PROJECT - The Rug Mill redevelopment project, located in Freehold Borough at the intersection of Center and Jackson Streets, is a residential, mixed-use, adaptive re-use of the former A& M Karagheusian Rug Mill. The Rug Mill was in operation between 1904 and 1962 and had often been referred to as the "heart and soul" of the borough. For more than half a century, the Rug Mill served as a major Monmouth County employment center, employing over 1500 workers.

A fire eventually destroyed the mill and the building was left to deteriorate for several decades. This once vibrant, community asset had become a neighborhood eyesore in need of new life. Like so many other older industrial structures, this historically significant building contained lead and asbestos contamination. With a little ingenuity and a high degree of public-private cooperation, the former neighborhood mill was remediated. Today, the Rug Mill is a mixed-use project containing 104 low-income rental family units, 98 senior citizen units and 28,000 square feet of office and retail space. This adaptive reuse project serves as a model for other communities faced with the decision of saving and reusing historic, industrial buildings. The preservation of this brownfields structure has not only provided the local community with much needed affordable rental housing and additional retail and office space, but it has also created a sense of neighborhood pride. The dedication of both the developer and numerous government entities has created a place where people can live and work, strengthening community character and restoring economic vitality.

JERSEY GARDENS MALL - Jersey Gardens Mall is located in Elizabeth, New Jersey. This is a densely developed region, in close proximity to New York City. This project represents the successful collaboration of public and private interests working together to return a brownfields site to productive use. In 1993, city official began eyeing a 166-acre municipal landfill that had closed two decades earlier. The site had the problems of many old landfills everywhere. It was unlined, and had accepted a wide variety of waste, making it a clean up nightmare. However, the property was salvageable. The site was eventually capped with impermeable material and then paved to prevent water from percolating through the trash heap. A system for collecting and venting methane was also installed.

To redevelop the site, the OENJ Cherokee Corporation, a Danish company that owned the site began to talk about a

retail development. The firm had previous experience with redevelopment projects in Europe and was ready to tackle the New Jersey site. The developer worked closely with the local, state and federal government, non-profit organizations and community groups, setting up task forces for the permitting process and infrastructure needs. This allowed the company to complete the permitting process in one year instead of the usual three and to secure funding from the New Jersey Department of Transportation for a new road interchange, which offers direct access to the property from the New Jersey Turnpike Exit 13A. The City of Elizabeth also became an integral partner in the process, spending $10 million in bond funds to build a road to the landfill area. Eventually the site became a regional demonstration project. Public entities, including the New Jersey Economic Development Authority raised $118 million for infrastructure through the sale of bonds that were guaranteed by the developer. Finally development went forward and in October 1999 the largest factory outlet center on the East Coast opened on the old landfill site.

Today the mall has more than 200 stores and its opening has spurred the development of a 22-screen multiplex theater next door, as well as plans for two upscale hotels and a 20-acre office complex nearby. The company also plans to build a marina for recreational vessels and a ferry terminal which will offer shoppers and commuters from Manhattan access to the mall and office complex. The mall generated $2.5 million in tax revenues for the city in its first eight months and the developer has guaranteed the city $6.5 million a year by the fourth year.

Glossary of Site Investigation Technologies -

Appendix "A"

Borehole Technologies - *Are nuclear or electrical geophysical processes whereby a borehole is cut into the ground by means of a drilling rig to identify the physical characteristics of geologic formations that are intersected by a borehole.*

Colorimetric Test Kits - A*re used to detect and quantify contaminants. Colorimetric refers to chemical reaction-based indicators, such as visible color changes, that are used to produce reactions to individual, or classes of compounds.*

Electrochemical Detector Kits - *Are test kits that use the electrical charges of ions that make up the target to be analyzed to identify and quantify the chemical compounds in the sample. Typically, the ions are attracted to a positive or negative electrode or both, depending on their charge, resulting in the generation of an electrical current that is measured and converted into a sample concentration by the unit's display or electronics. A compound specific catalyst can be used to aid in the reaction.*

Graphic Furnace Atomic Absorption (GFAA) Spectroscopy - *Is a highly sensitive optical instrument used to determine the index of refraction (the bending of a ray of light). This technique provides excellent detection limits for measuring concentrations of metals in liquid sample media. Water samples may be analyzed directly, while soil samples first must undergo an extraction process to draw the contaminants into a solution for analysis. The sample is vaporized in the graphite furnace, and light of a specific wavelength then is passed through the atomic vapor of an element of interest. The thinning or weakening of the intensity of the light as a result of absorption is measured; the amount of the thinning is then converted into an estimate of the contaminant metal's concentration.*

Ground Penetrating Radar (GPR) - *Is a technology that emits pulses of electromagnetic energy into the ground to measure its reflection and refraction by subsurface layers and other features, such as buried debris.*

High-Frequency Electromagnetic (EM) Sounding - *Is a technology used for non-intrusive geophysical exploration, projects high-frequency electro magnetic radiation into subsurface layers to detect the reflection and refraction of the radiation by various layers of soil. Unlike ground-penetrating radar, which uses pulses, the technology uses continuous waves of radiation.*

Immunoassay Test Kits - *Are field-portable test kits used to measure compound-specific reactions (generally colorimetric) to individual compounds or classes of compounds. The reactions are used to detect and quantify contaminants.*

Infrared Monitor - *A device used to monitor the heat signature of an object, as well as to sample air. It may be used to detect buried objects in soil.*

In Situ Geophysics - *Refers to the treatment of contaminated sites without digging up or removing the contaminants. In situ means unexcavated and unmoved. In situ soil flushing and natural attenuation are examples of in situ treatments.*

Laser-Induced Fluorescence/Cone Penetrometer- *Is a field screening method used for investigating and assessing soil and water contamination. It couples a fiber optic-based chemical sensor system to a cone penetrometer which is a device mounted on a truck that rapidly penetrates the ground to collect samples.*

Portable Gas Chromatography/Mass Spectrometry - *Is a process that investigates and assesses soil, water and soil gas contamination at a site using portable, weatherproof units that have self-contained power supplies. During this process, the substance is heated and placed in a vacuum to conduct a chemical analysis of a substance. The resulting vapor is exposed to a beam of electrons that cause ionization to occur, either of the molecules or their fragments. The ionized atoms are separated according to their mass and can be identified on that basis. This process is used in the analysis of Volatile Organic Compounds (VOC's) and Semi-Volatile Organic Compounds (SVOC's). VOC's are one group of carbon-containing compounds that evaporate readily at room temperature. Examples of VOC's include trichloroethane; trichloroethylene; and BTEX. These contaminants typically are generated from metal degreasing, printed circuit board cleaning, gasoline, and wood preserving processes. SVOC's are composed primarily of carbon and hydrogen atoms, having boiling points greater than 200 degrees Celsius. Common SVOC's include PCBs and phenol.*

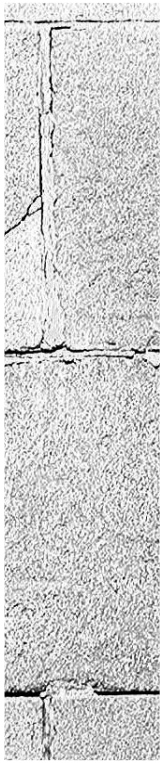
Seismic Reflection and Refraction - *Is a technology used to examine the geophysical features of soil and bedrock, such as debris, buried channels, and other features.*

Stripping Voltammetry - *Is a field-portable technology that uses electrochemistry to detect and quantify metals in environmental samples. Specific metals can be targeted for detection and quantification by the technology, which is generally applied to water samples.*

Subsurface Magnetrometry - *Is a geophysical technology, conducted beneath the surface, to detect disruptions that metal objects cause in the earth's localized magnetic field.*

Glossary of Site Remediation Technologies -

Appendix "B"



Bioremediation - *Refers to the treatment processes that use microorganisms (usually naturally occurring) such as bacteria, yeast, or fungi to break down hazardous substances into less toxic or nontoxic hazardous substances. Bioremediation can be used to clean up contaminated soil and water.*

Chemical Dehalogenation - *Is a chemical process that removes halogens (usually chlorine) from a chemical contaminant, rendering the contaminant less hazardous. The chemical dehalogenation process can be applied to common halogenated contaminants such as PCB's and dioxins, which may be present in soil and oils. Dehalogenation can be effective in removing halogens from hazardous organic compounds, such as dioxins, PCB's and certain chlorinated pesticides. The treatment time is short, energy requirements are moderate, and operation and maintenance costs are relatively low. This technology can be brought to the site, eliminating the need to transport hazardous wastes.*

In situ soil flushing - *Is a treatment that floods contaminated soils beneath the ground surface with a solution that moves the contaminants to an area from which they can be removed. The technology requires the drilling of injection and extraction wells on site and reduces the need for excavation, handling, or transportation of hazardous substances. Contaminants considered for treatment by in situ soil flushing include heavy metals (such as lead, copper, and zinc), halogenated organic compounds, aromatics, and PCB's.*

Natural attenuation - *Is an approach to remediation that uses natural processes to contain the spread of contamination from chemical spills and reduce the concentrations and amounts of pollutants in contaminated soil and groundwater.*

Phytoremediation - *Is an innovative treatment that uses plants and trees to remediate contaminated soil and water. Plants can break down or degrade organic pollutants or stabilize metal contaminants by acting as filters or traps. Phytoremediation can be used to clean up metals, pesticides, solvents, explosives, crude oil, polyaromatic carbons, and landfill leachates. Its use is generally limited to sites at which concentrations of contaminants are relatively low and contamination is found in shallow soils, streams, and groundwater.*

Presumptive remedies - *Are preferred technologies for common categories of Superfund sites that have been identified through historical patterns of remedy selection and EPA's scientific and engineering evaluation of performance data on technology implementation.*

Soil Vapor Extraction (SVE) - *Is a process that physically separates contaminants from soil in a vapor form by exerting a vacuum through he soil formation. This is the most frequently used treatment at Superfund sites. It sue is responsible for*

removing volatile organic compounds and semi-volatile organic compounds from soil beneath the ground surface.

Soil washing - *Is a technology that uses liquids (usually water, sometimes combined with chemical additives) and a mechanical process to scrub soils, removes hazardous contaminants, and concentrates the contaminants into a smaller volume. This technology is used to treat a wide range of contaminants, such as metals, gasoline, fuel oils, and pesticides. Soil washing is a relatively low-cost alternative for separating waste and minimizing volume as necessary to facilitate subsequent treatment. It is often used in combination with other treatment technologies. The technology can be brought to the site, thereby eliminating the need to transport hazardous wastes.*

Solvent extraction - *Is a treatment process that uses a solvent to separate or remove hazardous organic contaminants from oily-type wastes, soils, sludges, and sediments. The technology does not destroy contaminants, but concentrates them so they can be recycled or destroyed more easily by another technology. Solvent extraction has been shown to be effective in treating sediments, sludges, and soils that contain primarily organic contaminants, such as PCB's, VOC's halogenated organic compounds, and petroleum wastes. The contaminants mentioned above are typically generated from metal degreasing, printed circuit board cleaning, gasoline, and wood preserving processes. Solvent extraction is a transportable technology that can be brought to the site.*

Thermal desorption - *Is a treatment that heats soils contaminated with hazardous wastes to temperatures from 200 to 1,000 degrees Fahrenheit so that contaminants that have low boiling will vaporize and separate from the soil. The vaporized contaminants are then collected for further treatment or destruction, typically by an air emissions treatment system. The technology is most effective at treating VOC's, SOV's and other organic contaminants such as PCB's, PAH's and pesticides. It is effective in separating organics from refining wastes, coal tar wastes, waste from wood treatment, and paint wastes. It also can separate solvents, pesticides, PCB's, dioxins, and fuel oils from contaminated soil.*

Treatment walls - *Are walls installed underground to treat contaminated groundwater found at hazardous waste sites. Treatment walls are put in place by constructing a giant trench across the flow path of contaminated groundwater and filling the trench with one of a variety of materials carefully selected for the ability to clean up specific types of contaminants. As the contaminated ground water passes through the treatment wall, the contaminants are trapped by the treatment wall or transformed into harmless substances that flow out of the wall. Treatment walls are useful at some sites contaminated with chlorinated solvents, metals, or radioactive contaminants.*

New Jersey Department of Environmental Protection, Bureau of Site Assessment
300 Horizon Center


LP GAS STORAGE
DANGER
HAZARDOUS AREA
AUTHORIZED
PERSONNEL ONLY

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