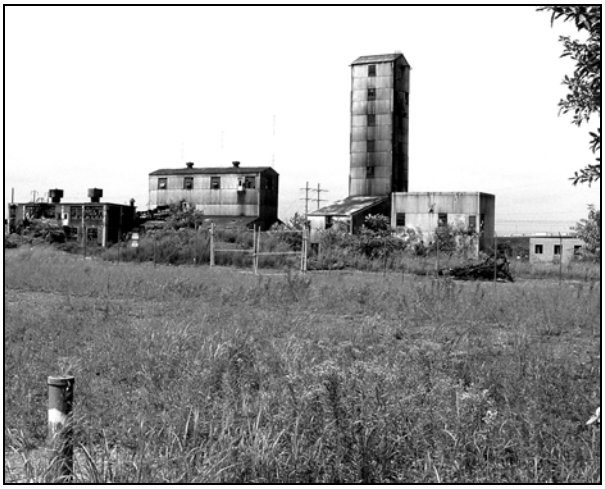
Brownfields to Greenfields



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No document of this size can fully examine the ideas presented. Although this paper attempts to address all relevant points, it is not intended to be an exhaustive treatise on the subject. This paper reflects the policies and programs of 2004-2005 and should be seen as a snapshot in time. It should be considered to be a working, dynamic paper which will evolve as the knowledge expands and policies shift.

Furthermore, it is a position paper of NY/NJ Baykeeper. As such, it is intended to represent the organizational mission of preserving, protecting, and restoring the Hudson-Raritan Estuary.

This publication does not constitute legal advice, nor establish an attorney-client relationship between the reader and NY/NJ Baykeeper.

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EXECUTIVE SUMMARY

The Hudson-Raritan Estuary is one of the most ecologically diverse and biologically important among east coast estuaries. Set in one of the most densely populated areas in the United States, it is the birthplace of America's industrial revolution and has at its core one of the most economically vital and active ports in the world. Consequently the estuary has been subjected to severe development pressure and industrial uses. It has endured staggering damage to its waterways, wetlands, and wildlands due to habitat destruction and chemical pollution. Today, there is little land in the region that is not fully developed, and the public has scarce opportunity for recreation and waterfront access.

Despite the Estuary's long urban history, it is far from being an ecological wasteland. Significant wetlands and other natural areas thrive and continue to provide critical habitat for struggling populations of wildlife, including several state-threatened and endangered species such as yellow and black-crowned night heron, peregrine falcon, cooper's hawk, northern harrier and bald eagle. In fact, these enduring natural areas grow more valuable every day due to their increasing rarity as regional habitat continues to disappear.

Paradoxically, the Estuary's last natural areas have endured precisely *because* of the region's industrial history. They exist due to an industrial-age byproduct: contamination. The decline of manufacturing in the late 20th Century left behind derelict industrial sites, which often contained contaminated soils and groundwater. Known as "brownfields," these sites were long rejected by developers as too expensive for clean up and redevelopment, when compared to development on land not complicated by the stigma of environmental contamination. In this region these sites sometime revert back to nature, becoming the last vestiges of open space in many urbanized areas. Today, these sites are found in formerly industrialized areas along waterfronts and near large wetland complexes.

Now that government is encouraging brownfield redevelopment, these natural resources are at risk. Based on Baykeeper's experience most brownfield redevelopers seek to extend new developments beyond the footprint of the original manufacturing facilities and into surrounding natural areas to maximize profit. In addition, once a municipality or private party remediates a brownfield site, major financial incentives, such as expected revenues and job creation, spur full redevelopment for commercial or residential use. Usually the only way to ensure protection of this vital habitat is through the acquisition and conversion of brownfields into protected open space.

Unfortunately, lack of funding and liability concerns have prevented most non-profit conservation organizations and municipalities from pursuing conservation on these sites or from taking title to the land even after remediation is complete. Because limited financial incentives exist for the conversion of brownfields to greenfields, it has been difficult to strike a balance between brownfields and greenfields redevelopment. However, recently enacted legislation may provide an opportunity for increased redevelopment of brownfields with recreation and conservation components.

This paper offers an overview of brownfield programs in New Jersey, describes the economic, community, and habitat benefits of converting brownfields to greenfields, and makes strong recommendations for developing successful brownfields to greenfields initiatives in the state.

BROWNFIELDS: AN OVERVIEW

The United States Environmental Protection Agency (EPA) defines a brownfield as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant."[1] Brownfields are typically the result of decades of intense industrial activities at a site, followed by the abandonment of the location for those uses – leaving behind derelict buildings, soils and waters contaminated with PCBs, dioxins, petrochemicals, heavy metals, and/or hundreds of other toxins. Brownfield sites occur in urban and rural areas and can range from corner gas stations to former petrochemical manufacturing facilities that cover hundreds of acres.

Current estimates of the number of brownfield sites across America range from 450,000 to 600,000 sites.[2] At any one time, the NJDEP oversees some 13,000 contaminated sites.[3] An estimated 10,000 of these are potential brownfield sites.[4] The majority of New Jersey's brownfield sites are located in the most densely populated portions of the state – the Hudson-Raritan Estuary west of New York City and the Delaware River Watershed opposite Philadelphia.

Until recently, liability and environmental laws have had a chilling effect on real estate transactions that involve potentially contaminated brownfield sites. Real estate developers, prospective site owners, and lenders have been wary of assuming the risks associated with brownfields, especially when the potential costs of cleanup are unknown and when there is no certainty about which cleanup standards are adequate. In fact, a 1994 report by the Conference of Mayors identified brownfields as the number one environmental issue in the nation.[5]

In the past ten years there has been a widespread effort by federal, state, and local governments to encourage brownfield redevelopment. Cleaning up the properties and restoring their economic use increases local tax ratables, creates jobs and can stabilize a neighborhood by increasing property values. These government initiatives speed brownfield redevelopment by providing legal clarification to reduce liability concerns, setting risk-based cleanup standards in order to reduce regulatory uncertainties, subsidizing project financing and/or environmental insurance, and/or providing technical assistance and regulatory guidance to developers.

The federal EPA's Brownfields Program was initiated in 1995, changing the way contaminated properties are managed. The Small Business Liability Relief and Brownfields

[1] Small Business Liability Relief and Brownfields Revitalization Act, Pub. L. No. 107-118 (H.R. 2869) (2002).
[2] Robert A. Simmons, "How Many Brownfield Sites are There?," Journal of Public Works Management and Policy 2:3 (1998).
[3] NJDEP, Known Contaminated Sites in New Jersey, retrieved from http://www.nj.gov/dep/srp/kcs-nj
[4] NJDEP Site Remediation Program Brownfields FAQ, retrieved from www.state.nj.us/dep/srp/brownfields/faq (January 26, 2006).
[5] U.S. Environmental Protection Agency's Brownfields National Partnership Action Agenda Accomplishments Report, November 23, 1999, retrieved from www.epa.gov/swerosps/bf/99aa.htm

Revitalization Act[6] was signed into law by President Bush in January 2002. The law expands funding for assessment and cleanup, enhances roles for State and Tribal response programs, and clarifies Superfund liability.[7] The US EPA estimates that its Brownfields Program has "leveraged more than $6.5 billion in brownfields cleanup and redevelopment funding and generated nearly 30,000 new jobs."[8] The federal government has been active in encouraging brownfield redevelopment by removing some of the less contaminated sites from the National Priorities List (NPL), providing grants and tax incentives to spur cleanup, and issuing closure letters after cleanup is complete to assure developers and owners that the government will not require additional cleanup in the future. According to the EPA its "Brownfields Program 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."[9]

New Jersey's Brownfield and Contaminated Site Remediation Act (BCSRA)[10], signed into law on January 6, 1998, provides for the latest changes in New Jersey's environmental cleanup guidance. The Act adds new provisions that advance brownfield cleanup and reuse as part of a comprehensive program for urban redevelopment. The overall law amends the Spill Compensation and Control Act, Industrial Site Recovery Act, Environmental Opportunity Zone Act and other key statutes. The Act also established a Brownfields Redevelopment Task Force to coordinate state policy on brownfield redevelopment, including marketing sites, regulatory programs, and redevelopment planning assistance to local governments. An additional resource is the Hazardous Discharge Site Remediation Fund, which was created in 1993 and is administered by the NJDEP and the NJ Economic Development Authority.[11] Through this fund, municipalities, businesses and innocent parties may receive grants and loans to conduct investigation and cleanup activities.[12]

Local governments have also encouraged brownfield redevelopment by providing tax abatement programs and issuing general obligation bonds. The City of Elizabeth, New Jersey, with 56 identified brownfield sites, has focused their resources on rehabilitating several of these properties with significant success.[13] Elizabeth has taken advantage of various federal and state redevelopment incentive programs (e.g., Enterprise Community, State Urban Enterprise Zone, Labor Surplus Area) to address its brownfields. A task force that includes city, state and county officials, the developer, and a private planning consultant expedites project permitting. Elizabeth also created new procedures and new legislation that allow the city to issue bonds to finance

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[6] Pub. L. No. 107-118 (H.R. 2869), retrieved from http://www.epa.gov/brownfields/sblrbra.htm.
[7] U.S. Environmental Protection Agency, *The New Brownfields Law*, October 2002, retrieved from http://www.epa.gov/brownfields/about.htm.
[8] U.S. Environmental Protection Agency, *The Brownfields Program: Setting Change in Motion*, September 2004, retrieved from http://www.epa.gov/brownfields/about.htm
[9] *Id.*
[10] N.J.S.A. 58:10B-1 et seq
[11] NJDEP, Hazardous Discharge Site Remediation Fund General Description, retrieve from http://www.state.nj.us/dep/srp/finance/hdsrf/hdsrf_desc.htm
[12] *Id.*
[13] Mayor Christian Bollwage, Keynote address at the National Governor's Association Coastal Brownfields: At the Water's Edge Conference. September 12, 2003.

redevelopment. The bonds will be paid off through franchise fees of up to 3% on businesses within the improvement district.

One example in the Hudson-Raritan Estuary is a 175-acre site immediately adjacent to the Raritan River. The site was used for the manufacture of various chemical and physical products until 1985. The northern one-third of the property contains the footprint of the previous manufacturing facility. The southern two-thirds of the property consist of tidal and freshwater wetlands. The extensive contamination occurring throughout the property poses significant threats to both the public and the wildlife that access the site. Two proposed clean up and redevelopment plans show the divergence of views when it comes to redeveloping brownfields. The first proposed plan involves clean up through engineering and institutional controls and filling the wetlands to create enough buildable acreage to ensure the economic viability of remediation. The greener proposal calls for hot spot soil removal, limited engineering controls and bioremediation of the wetlands with redevelopment sited only within the footprint of the former facility and valuable habitat placed into public ownership.

Because most brownfields are found in densely populated urban areas, these properties have significant potential for redevelopment and for greenfields purposes. But so long as they continue to be contaminated, they remain a threat to public health and the environment and are a serious encumbrance on the economic growth of neighborhoods. The redevelopment of brownfields and their conversion to greenfields offer the best hope for the enhancement of human communities and wildlife communities in the highly urbanized Hudson-Raritan Estuary.

Many states have created new incentives for redevelopment or revised their existing brownfield legislation. These incentives range from grants for environmental assessments, funds for job training and employment, tax abatements, deferral of increased property taxes, cancellation of back taxes and tax credits to offset the costs of site assessment, among many others. Some examples include the following:

- Michigan Natural Resources and Environmental Protection Act's Amendment to Part 201, signed into law in 1995, created BEAs (baseline environmental assessments) to allow a new, innocent owner or operator of a contaminated property to be protected from liability for existing contamination.[14]
- Massachusetts Brownfield Redevelopment Access to Capital (BRAC) program supports private financing for the remediation and redevelopment of contaminated property. The BRAC provides state sponsored and subsidized environmental insurance for the developer and secured creditor coverage for the lender. The insurance covers cleanups and cost overruns and liability arising from newly discovered, pre-existing environmental contamination.
- Florida offers regulatory incentives for clean ups including exemptions from and lessening of state and local review requirements, waiver of transportation impact and permit fees, flexibility in parking and buffer zone standards, and a streamlined development and permitting process.[15]

[14] Center for Best Practices, *Profiles of State Brownfield Programs*, January 2001, retrieved from www.nga.org/files/pdf/MABFIELD PROFILE.pdf.

[15] The Growth Policy Act. Florida State Law Chapter 99-378

DEFINING THE GREENFIELDS SOLUTION

The International City/County Management Association (ICMA) defines greenfields as "outdoor amenities that may be used for recreation, such as neighborhood parks or golf courses; as undeveloped natural space, such as wetlands or forests; or as greenways, such as hiking or bicycle trails."[16] Brownfields to greenfields conversion puts once dormant industrially contaminated real estate back into uses that benefit the public and the environment.

In New Jersey, an example of a brownfields to greenfields success story is found at the Magnesite Property in Cape May. From 1941 to 1983, Dresser Industries operated the Harbison Walker – Cape May Works, also known as the Northwest Magnesite Plant. Operations at the plant consisted of reacting softened, clarified seawater from Delaware Bay with limestone to produce a magnesium hydroxide solution that was used to produce magnesite refractory brick.[17] The factory closed in 1983 and was demolished. Environmental contamination was cleaned up by Dresser Industries pursuant to the Environmental Cleanup Responsibility Act (ECRA). The only remains of the plant are a chain link fence surrounding the plant site, a water tower, and residual contaminated areas including a "landfill" of process waste primarily consisting of waste magnesite and limestone. A plan to restore native vegetation to the scarred industrial portion of the property is in progress. On September 17, 1999, the land known locally as the "Magnesite Property," comprising approximately 125 acres of undeveloped beachfront, dune, coastal wetlands and disturbed, former industrial area, came into the public domain through the efforts of New Jersey's Green Acres Program.[18] This property represents a significant addition to the existing Higbee Beach Wildlife Management Area and to Cape May Point State Park.

In November of 2003, the NJDEP, through a Policy Directive, announced the acceleration of brownfield cleanup and reuse, which included expanding potential reuses of brownfield sites to incorporate "Brownfields to Greenfields."[19] The Directive also established the Office of Brownfields Reuse (OBR) within the Site Remediation Program.

According to the Directive, the OBR "shall focus particularly on identifying brownfield sites that may be used for…local and regional parks, for recreation areas…and for natural resources restoration. Where bona fide conservation groups have an interest in stewardship at sites being restored for these purposes, DEP shall develop appropriate prospective purchaser agreements to address potential liability arising from ownership. The Office of Brownfield Reuse shall identify at least two 'brownfield to greenfield' pilots over the next 12 months."[20]

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[16] International City/County Management Association, *Growing Greener: Revitalizing Brownfields into Greenspace*, Fall 2002, ICMA Publication No 03-136.
[17] NJDEP Green Acres Featured State Acquisition Sites Archive, retrieved from www.state.nj.us/dep/greenacres/higbee.htm.
[18] Id.
[19] NJDEP 2002-003 Policy Directive, *Acceleration of Brownfield Clean-up and Reuse* (November 25, 2002).
[20] *Id.*

The Department of Community Affairs through its Office of Smart Growth administers the "Smart Future" grant program.[21] These grants provide financial assistance to municipalities, counties and non-profit organizations to support long-range land-use planning.

Unfortunately, despite these initial efforts, regulations and incentives are still lacking for New Jersey's greenfields program.

The Benefits of Greenfields

The benefits of greenfields are many, particularly in densely populated areas. Greenfields can play a critical role in the human and environmental health of cities. Urban areas traditionally have a dire lack of open space, while shouldering a disproportionate share of industrial pollution. One of the poorest cities in the nation, Newark, New Jersey, suffers from an acute lack of recreational open space; just 5.3% of its land base is open space, which equates to 2.9 acres per 1,000 residents.[22] Balanced Land Use Guidelines suggest that 10 acres per 1,000 people is the minimal amount of developable land that should be set aside as public open space.[23]

The majority of remaining open space in urban areas is frequently contaminated. Redeveloping these sites into greenfields, thereby eliminating a primary health threat while creating new benefits for local neighborhoods, is a creative way to provide needed recreational opportunities in underserved communities.

Conversion of brownfields to greenfields, particularly in older suburban and urban centers, should be an essential component to all Smart Growth and Environmental Justice initiatives. Remediation and reuse of these properties for greenfields reduces exposure of potentially harmful contaminants to the public and makes these properties available for new uses that contribute to a strong and livable community.

Neighborhood Revitalization

In urban brownfield areas, greenspace creation can take place in the form of stream corridors, wildlife preserves, parks and recreational areas. Restoring degraded greenspaces can trigger a community renaissance by integrating environmental quality, neighborhood revitalization and community participation. An example can be found in the Ironbound section of Newark's South Ward. Weequahic Park is the second largest developed park in Essex County with 311.33 acres and an 80-acre lake. A grassroots effort by a small group of joggers from Weequahic Park grew into an unprecedented park restoration project, including a $3 million lake restoration to Weequahic Lake, and the development of a master plan with help from Prudential Foundation to execute the proposed $100 million improvements to the park. All of this has

[21] Dept. of Community Affairs, Smart Future Grants, retrieved from http://www.state.nj.us/dca/grantoverview.shtml
[22] Trust for Public Land, *The Economic Benefits of Parks and Open Space: How Land Conservation Helps Communities Grow Smart and Protect the Bottom Line* (1999), retrieved from: http://www.tpl.org/tpl/newsroom/reports/econbenz/main.html
[23] NJDEP Green Acres Program Statewide Comprehensive Outdoor Recreation Plan 2003-2007, retrieved from http://www.state.nj.us/dep/greenacres/scorp.pdf

engendered a sense of ownership and pride in Weequahic Park by the surrounding community, while nearly eliminating vandalism in the restored areas.[24]

Such greenfield programs are particularly vital when the brownfields being converted are located along a waterfront, as is often the case in New Jersey. In many urban communities, waterfronts are largely inaccessible to the public because they are fenced off or occupied by abandoned industrial complexes. Transforming these brownfields into greenfields not only increases open space, but also helps control flooding, aids in aquifer recharge and carries the additional benefit of opening local waterways to the public for recreation. The NJDEP includes among its goals the development of greenways along the state's waterways, many of which flow through urban areas. An active brownfields to greenfields program is an invaluable tool for creating such greenways.

Community Health

Health problems, including asthma, learning disabilities, birth defects, and increased cancer rates are some of the known consequences of living near contaminated land. Cleaning these sites and converting them to open space provides a tremendous health benefit by reducing exposure to hazardous chemicals and providing recreation for local citizens. Urban parks along waterways serve a vital community health function, vastly improving both water and air quality. Decontaminating waterfront brownfields often prevents the leaching of dangerous contaminants into waterways aiding in the overall revitalization of surrounding waterways.

Asthma is a particularly serious problem in our urban centers. It is estimated that asthma kills about 4,000 people a year in the U.S.[25] Health care and lost productivity cost our nation $14 billion in 2002.[26] A 1998 report by the Centers for Disease Control and Prevention warned, "the rate of asthma increases as communities adopt Western lifestyles and become urbanized".[27] Greenspaces improve air quality because they contain trees that cool surrounding air to reduce ozone pollution and absorb a variety of other toxic air pollutants. Cleaner air helps to reduce urban health threats like asthma. Additionally, the opportunities for physical activity that open space provides increase the health, well-being and physical fitness of residents.

Environmental Justice

Greenfield conversion speaks to the heart of the Environmental Justice movement now taking shape in many urban communities across the nation. Throughout the United States, brownfields are overwhelmingly concentrated in ethnic, low-income, and otherwise marginalized communities. By their very nature, brownfield issues are inseparable from issues of social

[24]Conversation with Wilbur McNeil, President of Weequahic Park Association, Inc., on February 26, 2002.
[25]U.S. Environmental Protection Agency, Asthma *and Indoor Environments* (June 2003), retrieved from http://www.epa.gov/iaq/asthma/about.html
[26] *Id.*
[27] GINA Global Initiative for Asthma. *The Global Burden of Asthma Report* (2004), retrieved from http://www.ginasthma.com

inequity, racial discrimination and urban decay. Minorities are 47% more likely than whites to live near a toxic waste facility and 170% more likely to live in areas with multiple toxins.[28]

In 2004, then Governor James McGreevey issued an executive order on February 18th calling for state agencies to consider the health and environmental impacts of their decision-making on communities of color and low-income communities.[29] Noting that childhood asthma is increasing and that such communities often face multiple environmental hazards, McGreevey pledged to address environmental health and quality of life issues to make older urban and suburban centers more attractive and vital.

Brownfields revitalization presents an opportunity to achieve environmental justice through community involvement in cleanup and reuse decisions and through the leveraging of new investment and jobs or it can contribute to environmental harm that further erodes a community's quality of life. For example, a site whose remediation occurs without community input and is converted to another industrial reuse, such as a smelting plant, perpetuates the community's environmental injustices. On the other hand, if the community is involved from the beginning to the end of the redevelopment process and is integrally involved in the decision making process, and the reuse includes an open space component, the community improves.

Environmental/Ecosystem Health

An additional benefit of greenfields is their positive impact on wildlife and environmentally sensitive areas. With many brownfields located in wetlands and uplands along waterfronts, they contain both terrestrial and aquatic ecosystems. Therefore, a high diversity of species, including federally threatened and endangered species, utilize the ecologically damaged sites that make up brownfields. These habitats are often the only natural habitats remaining in heavily urbanized districts and, as such, support many species that otherwise would not be found in an urban region. For example, the 19,500-acre Hackensack Meadowlands contains almost 6,000 acres of wetlands and varying amounts of different upland habitat types. Because of the long history of industrial use in the Meadowlands, many of these urban natural areas are found on contaminated sites and therefore qualify as brownfields. Despite the presence of contaminants in many locations throughout the Meadowlands, the area supports an incredible diversity of animal and plant species including at least 270 species of birds, 34 species of fish, and 1,000 species of vascular plants.[30]

Throughout the highly urbanized Hudson-Raritan Estuary, migratory birds find few natural habitats aside from those located on brownfields in which to replenish themselves on

[28] Kellye Kratch et al,. "Special Report on Environmental Justice: Grassroots Reach the White House Lawn," Environmental Solutions 8:5 (1995), 68-77.
[29] Governor James E. McGreevey, Executive Order No. 96 (Feb. 18, 2004) available at http://www.nj.gov/infobank/circular/eom96.htm.
[30] Kiviat, E. & K. MacDonald. Hudsonia Ltd. *Hackensack Meadowlands, New Jersey, biodiversity: A review and synthesis.* (2002).

their long journey between hemispheres. Thus, these areas often support large congregations of migrant birds during spring and fall. Furthermore, urban natural areas such as wetlands and woodlands provide "ecosystem services" that benefit the public including recreational opportunities, flood control, and cleaner air and water. Transforming such places into uncontaminated open space can have a major impact on the recovery of wildlife and have direct benefits to human health and well being in urban areas.

Economic Benefits

Because brownfields that are put into economic reuse generate taxes for the municipality while greenfields often have ongoing maintenance costs, many towns are reluctant to pursue greenfield projects. There is a perception that greenspace/greenfields is the least economically productive use of a site. However, open space improves quality of life, property values, and economic viability of communities.

Greenspaces such as urban parks and playgrounds serve as economic assets since they make neighborhoods more attractive and increase property values, enticing potential residents and businesses to invest in neighborhoods. New businesses bring additional jobs and increased tax revenue, according to the National Governor's Association's (NGA) Center for Best Practices.

The International Economic Development Council's report, entitled "Converting Brownfields to Green Space," found that projects that provide greenspace more than double the value of surrounding properties.[31] In addition, the increase in property values adjacent to greenspace was more than four times the increase in citywide property values. Other values to the taxpayers can be quantified in terms of improvements to water quality and community health, in the generation of tourism and recreation, and in improved quality of life. Another study found that municipalities in which quality of life issues are ignored or are a low priority attract and retain fewer businesses and realize lower rates of economic growth.[32]

The EPA has recently recognized that converting contaminated sites to parks is a viable reuse of brownfields. Its website states, "While redevelopment of brownfields for commercial, residential and industrial uses can be essential to a community's economic revitalization, redevelopment into greenspace can provide aesthetic, recreational, and quality-of-life advantages that surpass economic benefits."[33] With this new understanding, the EPA allows an additional $50,000 for assessment activities relating specifically to greenspace such as site investigation, site characterization, reuse planning, and community involvement.

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[31] International Economic Development Council, *Converting Brownfields to Green Space* (2001). Washington, DC: International Economic Development Council

[32] National Governor's Association Center for Best Practices, Where *Do We Grow From Here?*(2001). Washington, DC: National Governor's Association, retrieved from www.nga.org/Files/pdf/REPORT200010BROWNFIELDS.pdf

[33]U.S. Environmental Protection Agency, *Choosing "Greenspace" as a Brownfields Reuse* (2003) Washington, DC: United States Environmental Protection Agency, Office of Solid Waste and Emergency Response. (EPA 500-F-03-248).

Cost Savings

Cleaning up existing environmental contamination in the United States could cost as much as $1 *trillion* dollars. John Hired wrote in his book on the Superfund program: "Even if the federal government financed only a quarter of the cleanups [on the National Priorities List] and contributed only $10 million to each (a conservative estimate), the cost would exceed $1 trillion, or approximately 160 times EPA's annual budget."[34] Incorporating a greenfield component or using alternative restoration techniques can help contain costs in the following ways:

- Treat contamination in place
  Most of the cost associated with traditional cleanup technologies is associated with physically removing and disposing of contaminated soils. Because engineered bioremediation and other innovative treatment options can be carried out in place by delivering nutrients to contaminated soils, greenfields conversion does not incur removal-disposal costs.
- Harness natural processes
  At some sites, natural microbial processes can remove or contain contaminants without human intervention. This is particularly evident in wetland systems, where intrinsic bioremediation (natural attenuation) can result in substantial cost savings.
- Reduce environmental stress/disturbance
  Because bioremediation methods minimize site disturbance compared with conventional cleanup technologies, post-cleanup costs can be substantially reduced.
- Reduce Operation and Maintenance Cost
  Treating contaminants through ecological enhancements such as phytoremediation and bioremediation reduces the need for costly maintenance of caps, and pump and treat systems. For example, the utilization of vegetative caps offers a cost savings by eliminating the need to construct a traditional RCRA cap to close a site.

[34] John A Hired, as quoted in Sheldon D. Pollack, "Tax Treatment of Environmental Transactions" *The Tax Lawyer,*52:1(Fall 1998*), in* "Superfund: The Political Economy of Environmental Risk*"* The Johns Hopkins, University Press; Baltimore, Maryland *(1994)*

The Wildlife Habitat Council lists the following as environmental benefits of implementing ecological enhancements both during the remedial process and as a final end use.[35]

Attracts Wildlife – Both natural remediation technologies and end use planting are attractive to wildlife, potentially providing significant habitat.

Hydraulically Controls Landfill Leachate – Natural remediation technologies can help draw down leachate head buildup in closed landfills, thereby eliminating side seepage.

Biodegrades Environmental Contaminants – Natural remediation technologies enhance both aerobic and anaerobic biochemical degradation of various contaminants, including volatile organic compounds, polynuclear aromatics, and various other hydrocarbons, as well as some pesticides.

Enhances Natural Attenuation/ Biodegradation Remedies – As a component of some more complex remedies, natural remediation technologies can serve to facilitate attainment of specified remediation goals via final polishing.

Controls Dust - Both natural remediation technologies and end use plantings, once established, reduce sediment transport and soil erosion from storm events due to soil stabilization from plant roots and increased evapotranspiration.

Stream Bank Buffers – Plantings can be sued along stream banks to filter storm water runoff which results in reduced contaminant loading to surface waters.

Uses Atmospheric Carbon Dioxide – Both natural remediation technologies and end use plantings utilize atmospheric carbon dioxide and produce oxygen, which reduced greenhouse gases and mitigates global warming

Improves Ground Water Recharge - Both natural remediation technologies and end use plantings improve groundwater recharge as compared with mowed grass or paved areas.

Minimizes Environmental Exposure – In situ natural remediation technologies reduce the need to excavate and haul impacted soil. Excavation and hauling potentially creates additional exposure pathways during the movement of the soil, thereby increasing environmental risk.

Improves Environmental Stability – In situ natural remediation technologies avoid disrupting the soil, as in excavation, thereby improving the stability of the local ecosystem.

Provides Harvestable Resource – Metals can sometimes be recovered for reuse by harvesting natural remediation technologies biomass, thereby reducing resource mining elsewhere.

Improves Aesthetics – Both natural remediation technologies and end use plantings are often more aesthetically pleasing than mowed grass or paved areas.

Provides Educational Opportunity - Both natural remediation technologies plantings can provide an educational opportunity for students wishing to learn about natural remediation technologies and environmental processes.

Provides Recreational Areas – End use plantings can provide an area for community or employee recreation.

Provides Migratory Bird Pathways - Both natural remediation technologies and end use plantings can provide needed landscape ecology for migratory birds, depending on the size and location of the site.

Table 2

[35] The Interstate Technology &Regulatory Council; Alternative Landfill Covers, Constructed Treatment Wetland and Phytotechnology Teams; and the Wildlife Habitat Council's White Paper and Case Study, *Making the Case for Ecological Enhancements*. January 2004

THE CHALLENGE OF CONVERTING BROWNFIELDS TO GREENFIELDS

One of the most prominent benefits of brownfield programs is that their redevelopment puts idle sites back into productive use, thus contributing to tax revenues and local economic development. State and federal legislation, regulations and funding opportunities facilitate the cleanup of brownfield sites for adaptive reuse. These incentives have proven attractive. Municipalities or private parties who decide to remediate a brownfield site receive major financial incentives – namely, grants, tax breaks and expected revenues – for redeveloping brownfields into new commercial or residential properties.

Financial Disincentives

New Jersey municipalities are currently eligible for State grants of up to $3 million a year for preliminary assessments, site investigations, and remedial investigations for sites designated for open space and recreation within a redevelopment area. Until recently, nonprofits were not eligible for either the grants or the loans, and it is nonprofit conservation or grassroots community groups who can often lead the way to successful brownfields to greenfields revitalizations. Thus the transformation of brownfields into productive commercial, industrial and residential uses has overshadowed the equally important transformation of these properties into greenfields.

Recently enacted legislation, municipalities, counties, or redevelopment entities may be eligible for matching grants up to 75% of the costs of the remedial action for projects involving the redevelopment of contaminated property for recreation and conservation purposes.[36] The legislation also creates a pilot program for awarding grants to nonprofit organizations for the preliminary assessment, site investigation, and remedial investigation of real property that has been contaminated or is suspected of being contaminated by the discharge of a hazardous substance.[37] This law is a step in the right direction toward providing leadership opportunities for nonprofit conservation or grass roots groups to spearhead brownfields to greenfields projects. The next iteration of the rules should consider the role of non-governmental organizations in the implementation of such projects, and funding for such NGO led projects.

Liability Issues

Liability provides another significant challenge to brownfields to greenfields conversion. Liability protection is offered by New Jersey law and by the NJDEP's Prospective Purchaser Agreements. Local government entities that acquire property through foreclosure, condemnation or similar means are not liable for past contamination under the New Jersey Spill Compensation and Control Act. However, liability remains for newly discovered contamination that can occur

[36] C.58:10B-1, et seq.
[37] C.28:10B-25.3

after a cleanup has been completed, off-site contamination, conditions exacerbated or created during remediation or redevelopment, and private third party lawsuits.

Because of the uncertainty of liability associated with holding title to these parcels, land trusts or other non-governmental organizations in New Jersey (except the Meadowlands Conservation Trust) are extremely reluctant to acquire these properties. Although funding, and the will to apply it towards conserving contaminated open space, exists within the state, even Green Acres will not acquire these parcels until they are clean. However, Green Acres will make exceptions and fund prior to actual cleanup.

National Lead Site, 2003

The National Lead site in Sayreville, Middlesex County, New Jersey exemplifies the potential loss of habitat associated with brownfield redevelopment projects that extend past the industrial footprint. This property totals 400 acres and has been vacant for nearly 20 years, since National Lead closed its paint manufacturing plant in 1983. The property consists of a significant wetland area impacted by dredge spoils, several ponds, a large wastewater lagoon and a 100-acre industrial footprint. Based on the Waterfront Redevelopment Plan for the Borough (Jan. 1999), the site is targeted for extensive redevelopment consisting of a mix of commercial and light industrial land uses. Despite the fact that the site has been documented as habitat for a variety of threatened and endangered species, including bald eagles, the entire site is designated for development with a public walkway as the only open space component. As it stands today, this redevelopment will result in the loss of approximately 300 acres of open space, unless there is a change in the design.

Valuing Urban Nature

A perception that nature in urban areas is degraded and of low value sometimes exists among regulators, scientists, conservation practitioners, and environmental consultants. Some of the common characteristics contributing toward this negative view of urban habitats are the presence of contaminants, their relative size to other ecosystems, their context within a heavily urbanized landscape, the presence of invasive species, and high levels of human disturbance. Unfortunately, this can lead to the downgrading of the level and standards of protection afforded to urban natural areas. This was no more apparent then during the passage of the Smart Growth Bill (the "Fast Track" Bill) through the New Jersey Legislature in the summer of 2004. This Law provides for the streamlining and automatic approval of a broad range of State permits and approvals in designated smart growth areas of the State which contain critical urban habitats.[38] The Law is currently being held in abeyance by Acting Governor Richard Codey's Executive Order No. 45.[39]

Our lack of knowledge, coupled with existing societal values, has resulted in our poor ability to classify/prioritize the value of natural areas, including brownfields, within urban

[38] P.L. 2004, c.89
[39] Acting Governor Richard Codey, Executive Order No. 45 (July 13, 2005)

landscapes. The fledgling discipline of urban ecology is beginning to provide more information about the way in which species, biological communities, and their ecosystems function in urbanized areas and how these might be different compared to similar ecosystems in less human-impacted areas. The prioritization of sites for preservation must incorporate a broader sense of what constitutes habitat, elevate urban open space because it is so rare, and acknowledges that urban habitats often contain a high diversity of species.

Land Use Permits

The State provides for a regulatory scheme that allows for the filling of wetland areas within brownfields sites without appropriate mitigation and limitations. For example, under the Freshwater Wetlands Protection Act Rules,[40] General Permit 4 (GP4)[41] allows the disturbance and filling of up to one acre of freshwater wetlands within brownfield sites for hazardous site investigation and remediation. If the disturbance is less than one-half acre, no mitigation is required. In addition, there is no acreage limit on activities under this permit.

General Permit 27 (GP27)[42] allows the disturbance of up to one acre of freshwater wetlands, transition areas and/or State open water at previously disturbed areas. No mitigation is required if the disturbance is less than one-half acre. GP 27 authorizes an extra acre of disturbance (in addition to other GP disturbances) as an incentive to encourage redevelopment.

The purpose of these general permits is to allow for the remediation and redevelopment of old industrial sites while limiting environmental harm. Unfortunately, they have been misused. The state policy regarding contaminated lands results in the filling and capping of these important resources without adequate mitigation or review.

Technical Regulations & Remediation Standards

The Technical Requirements for Site Remediation define how to conduct remedial actions by establishing the minimum criteria for performing Preliminary Assessment, Site Investigation, Remedial Investigation and Remedial Assessment at New Jersey sites.

In an effort to streamline and expedite brownfield redevelopment, NJDEP developed presumptive remedies that may be implemented without prior NJDEP approval. The encapsulation of sites with contaminated historic fill is an example of this initiative.

Despite the fact that soil removal is often the most permanent remedy, NJDEP will allow the use of engineering or institutional controls as a means of "cleanup" to limit exposure to contamination and as protection of human health and the environment. This condition within the technical regulations that allows contamination to remain on site through the use of fences or capping not only can result in unacceptable long term liability and water supply concerns, but also increases impervious cover and eliminates the possibility of ecosystem restoration.

[40] N.J.A.C. 7:7A-1 et al.
[41] N.J.A.C. 7:7A-5.4.
[42] N.J.A.C. 7:7A-5.27.

The simple reality is that land use activities often have greater adverse consequences to wildlife than do chemicals. Traditional brownfield programs may result in a lower risk of exposure to humans and the environment, but often result in the continued destruction of natural resources and habitat. For example, the Site Remediation and Land Use Regulation policy regarding remediation of contaminated wetlands continues to promote the capping and filling of important natural resources. Brownfield remediation should not include the filling of any wetlands, whether contaminated or not. Wetlands, including disturbed systems, absorb, bind and break down contaminants. Filling wetlands not only eliminates a natural process that remediates many toxins, but also destroying one of the most productive ecosystems left in urban areas. Changing current remediation policies so that decisions are based on preserving the integrity of the landscape would go a long way toward ensuring that brownfield redevelopment not only protects human health, but also prevents further habitat degradation and loss.

Upland Impact

The destruction of upland habitats can have the largest impact on wildlife in urban areas, where so few wild areas exist. The primary reason for the loss of rare species is the elimination, alteration, and fragmentation of critical habitat. The continued destruction of suitable foraging, resting, and breeding grounds makes it nearly impossible for threatened and endangered species to recover. Exacerbating the situation is the redevelopment of brownfield sites that have, over time, reverted to habitat areas. Government incentives that encourage the development of brownfields beyond the border of the original structures into upland areas foster these devastating habitat losses.

The state must now use the opportunity provided by the recently enacted legislation (P.L.2005, c.223) to implement a robust brownfields to greenfields program. Greenfield components of redevelopments must include more that just a small playground or a six-foot waterfront walkway. These components do little to meet the greater need for large-scale urban recreation and wildlife and ecological conservation.

RECOMMENDATIONS FOR BUILDING A SUCCESSFUL GREENFIELDS PROGRAM

Regulatory and policy changes are required to advance the conversion of brownfields to greenfields in New Jersey. Brownfields are often the last remaining open space in inner cities and frequently occupy ecologically sensitive sites located along waterways. Unless the following changes are implemented in some form, we risk losing an extraordinary opportunity to convert a significant number of brownfields to greenfields. This would be a tremendous loss to the public and to the future of recreation and wildlife conservation in our state's urban areas.

Require that Brownfield projects incorporate greenfield components.

To facilitate this objective, any brownfield project containing a greenfield component should be scored higher than other brownfield redevelopment projects for funding or tax benefits. Among brownfields to greenfields projects, the value ranking should be as follows (beginning with the most valuable):

1. Conservation and Wildlife Habitat Restoration
2. Public Access **with** Conservation and Wildlife Habitat Restoration
3. Recreation Component **with** Conservation and Wildlife Habitat Restoration
4. Recreation Component only

Greening of a brownfield site should result in true habitat preservation, not just cosmetic landscaping.

Develop methods for evaluating the ecological value of brownfields sites.

Potential criteria include the following:

- Potential or actual use of the site for foraging or breeding by threatened, endangered, and/or rare species
- Diversity of plant and animal species
- Presence of wetlands
- Extensive contiguous forested/vegetative cover
- Proximity to water body
- Size of parcel
- Proximity/connectivity to protected open space areas (or potential to connect)
- Diversity of habitat
- Potential for scientific research or public education

Require that Site remediation plans preserve landscape and ecological integrity. Contaminants should be carefully removed, not buried. No wetlands should be filled.

As things stand today in the State of New Jersey and at the federal level, site remediation is aimed at limiting contaminant exposure to humans and the environment. However, this often means using engineering controls (i.e., capping and/or fencing), institutional controls (i.e., deed restrictions) or wholesale soil removal that often are more destructive to the resource than the original contaminants. The Site Remediation Program should focus on removal, not burial of contaminants or institutional controls, particularly on sites near waterways. The current policy of allowing highly contaminated wastes to remain in the ground presents, on a cumulative and in some cases site-specific basis, unacceptable long term liability and negative impacts on economic redevelopment, ecosystem health and water supply concerns.

Brownfield remediation should not include the filling of any wetlands, whether contaminated or not. Wetlands -- including disturbed, fragmities dominated systems -- absorb, bind, and break down contaminants removing them from the water. Filling contaminated wetlands not only eliminates a natural process that remediates many toxins, but also destroys one of the most productive ecosystems left in urban areas. Changing current remediation policies so that decisions are based on preserving the integrity of the landscape (e.g., using natural remediation technologies) would go a long way toward ensuring that brownfield redevelopment not only protects human health, but also prevents further habitat degradation and loss.

Restoration of contaminated lands using wildlife habitat enhancements where possible should be a priority for the State. Natural remediation technologies include phytoremediation (the use of plants to extract contaminants from the soil or water), as well as bioremediation (a clean-up technology that uses naturally occurring microorganisms to degrade hazardous substances into less toxic or nontoxic compounds). Using a natural based approach to remediation, a brownfield can often decrease the cost of clean-up and improve the environmental quality of the site, thereby returning the resource to a productive capacity. Although these alternative natural technologies may increase the length of time for remediation compared with other more traditional measures, the natural approach increases/improves habitat for plants and animals while protecting human health and the environment.

Establish financial incentives to convince developers and allow nonprofits to take a brownfield to greenfield approach to redevelopment.

Grants or loans to non-liable parties should be available to cover the cost of remediation of property for conversion to greenfields. Until recently, municipalities were only eligible for loans for the remedial actions on these sites. A positive step in the right direction is the recently enacted legislation the municipalities, counties, or redevelopment entities may be eligible for matching grants up to 75% of the costs of the remedial action for projects involving the redevelopment of contaminated property for recreation and conservation

purposes.[43] In the future, this program should be reviewed to determine opportunities to increase the amount of funding for land that is remediated and preserved.

The new legislation also creates a pilot program for awarding grants to nonprofit organizations for the preliminary assessment, site investigation, and remedial investigation of real property that has been contaminated or is suspected of being contaminated by the discharge of a hazardous substance.[44] A recommended addition to the new pilot program is to provide grants to non-profits for the remediation of brownfield sites. As noted in this paper, there are currently no funding mechanisms, aside from loans, for non-profit entities for remedial actions. One of the most crucial components of a viable brownfields to greenfields program is the creation of a grant program for non-profits to remediate potential habitat sites. Therefore, it is recommended that there be a rule change to the State Hazardous Discharge Remediation Fund to re-structure the program to allow grants to nonprofits for not only conducting preliminary assessments, site investigations, and remedial investigations, but for the actual cleanup of the property for conservation and recreation purposes.

Mandate a public participation element in the brownfield redevelopment process so that communities have a voice in their future. Additionally, all documents should be made available in a local repository for review by interested parties.

Under the current site remediation program, there are no formal public hearing or public notification requirements for any phase of the cleanup process, including selection and NJDEP review and approval of sampling plans, remedial investigations, remedial designs, or remedial action work plans. The only obligation is that the responsible party notifies the municipal clerk 45 days prior to commencing construction of a remedy. The public has literally been shut out of the remedial process. However, it should be noted that NJDEP is currently reviewing its public participation policy in the site remediation program and it is hoped they will implement many of the suggested changes.

More specifically, recommended changes include:

1. Application Process**:** Develop a public "contact list" either on a municipality or regional basis and establish a document repository; publish a "notice" of applicant's application in a local newspaper and the NJDEP Bulletin, and provide it to those on the contact list.
2. Remedial Investigation Work Plan**:** Provide notice and fact sheet to contact list describing the plan; implement a 30-day public comment period prior to the NJDEP approval of work plan.
3. Remedial Investigation Report**:** Provide notice and fact sheet to contact list describing this report prior to the NJDEP review.
4. Remedial Action Work Plan**:** Provide notice and fact sheet to contact list describing the plan; implement a 45-day public comment period and public meeting, if requested.
5. Pre-Construction**:** Provide notice to contact list announcing the start of construction.

[43] C.58:10B-1, et seq.
[44] C.28:10B-25.3

6. Construction End**:** Provide notice and fact sheet to contact list describing engineering report (which includes institutional or engineering controls included in the remedy) prior to the NJDEP approval.
7. Post Release**:** Provide No Further Action Letter notice and fact sheets to contact list describing institutional or engineering controls and maintenance requirement prior to issuance of NFA.

Launch a significant and sustained educational program to inform the public and government officials of the tangible value of converting brownfields to greenfields.

A greenfields education component would inform and encourage officials at all levels of government, and the public, about the importance of open space, public recreational areas, and wildlife habitat. It would focus on the ways in which brownfields to greenfields projects enhance community health, improve public use, and ultimately, increase neighboring property values for investors attracted by the increased quality of life.

Additional Recommendations:

- Create regulations that permit nonprofits to tap federal grant funding for conversion of brownfields to greenfields.
- Amend the existing law enabling county and local referenda for establishing a stable source of funding for open space to permit purchase of contaminated lands.
- Amend rules or pass legislation to allow Green Acres funds to be used for purchase and remediation of contaminated lands for recreation and conservation purposes.
- Create a revised redevelopment law that requires a "set aside" for open space and/or parkland with every municipally-approved redevelopment plan. The rate of park creation should rely upon an accepted national standard of 6 to 10 acres for every 1,000 residents.
- Direct the Department of Community Affair's Office of Smart Growth to permit nonprofits to receive Smart Growth grants for park and/or open space planning.
- Advocate for changes to the NJ Redevelopment Agency's Urban Site Acquisition program allowing remediation funding to be used for open-space and greenfields reuse, not just for redevelopment for industrial, commercial or residential reuse.
- Eliminate the fear of future liability from EPA by having it sign off on NJDEP's No Further Action letters.
- Provide liability protection to nonprofit organizations for third party costs (as well as EPA liability) if they did not cause the past contamination and if they have cleaned up the site in accordance with NJDEP regulations.
- Advocate for an amendment to the BCSRA to incorporate non-profit organizations, not just municipalities, into the liability exemption. (Because municipalities are exempt from liability if they follow the NJDEP Technical Rules, the State should assist a municipality with the acquisition and remediation of a brownfield for open space. This would allow for the permanent protection of ecologically critical parcels while removing liability.)
- Create and provide funding for a non-profit land trust or land bank that will take title to and manage contaminated habitat areas.

CASE STUDIES

Examples of the Challenges in New Jersey

Port Reading site in Woodbridge

This 292-acre parcel originally owned by PSE&G and the Beazer Corporation along the shores of the Arthur Kill in Woodbridge is severely polluted by a former coal transfer station and rubber factory. The land has remained fallow since the 1950's, allowing meadows, forest, and scrub/shrub habitat to emerge. In October of 2004 Catellus Development Corporation, now ProLogis, acquired the site and was granted approvals to build up to 3.25 million square feet of industrial space over the next 5 to 7 years for a project called the Port Reading Business Park.[45] The project became part of the government-sponsored Portfield Initiative, a program designed to create more warehouse development near the NY/NJ port area. Under the Portfield Initiative, developers get help with project planning and marketing, and can receive some financing from the State's Economic Development Authority.[46]

The majority of the site is designated for warehouses and the remediation plan calls for capping, as opposed to bioremediation and any wildlife enhancements beyond those required by State wetland laws. Although contaminated, the land supports a variety of wildlife. The sheer size of the parcel, location within a highly urbanized county, and proximity to the Arthur Kill – a waterway with few public access points – made the site ideal as a public park and wildlife preserve. Yet as current plans proceed, only pockets of habitat around State protected wetlands will be preserved, whereas the warehouses will be sited on upland habitats such as meadows, forests, and scrub/shrub. Brownfield redevelopments are seen as a means of bringing idle wastelands back into beneficial reuse. However, framing brownfields entirely in this light discounts the potential value of these sites as wildlife habitat.

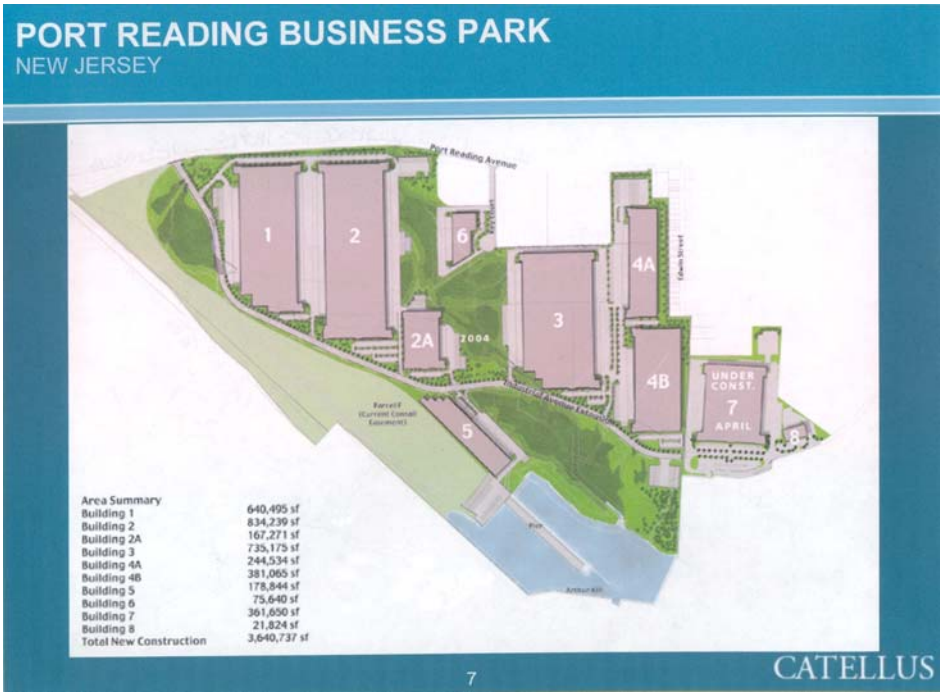
Furthermore, this particular brownfield project demonstrates how statutory agencies influence whether developers are dissuaded from making efforts to preserve habitat areas within contaminated sites. The NJDEP regulations gave greater priority to economic reuse of the property and capping the pollutants than to environmental and conservation concerns.

To prevent future losses of biodiversity and ensure the quality of life for urban residents, a new approach by regulators is required. Fast tracking brownfield projects with economic potential can no longer remain the standard practice. Each project must be looked at through both economic and ecological lenses.

[45] Catellus Press Release, "Catellus Acquires Land Entitled for 3.25mil S.F. in New Jersey" October 1, 2004, retrieved from http://www.catellus.com

[46] New Jersey Economic Development Authority and the Port Authority of New York/New Jersey. *The Portfields Initiative*, retrieved from http://www.njeda.com/pdfs/portfields_initiatives.pdf

Aerial of Port Reading site prior to redevelopment (NJDEP i-MapNJ)



Conceptual plans for redevelopment of the Port Reading site showing warehouses and mitigation and planted areas (green).

iPort 12 Redevelopment in Carteret, New Jersey

Over 250 acres of land within Carteret Borough are currently part of a project aimed at converting numerous partially contaminated lots into a warehouse distribution center called iPort 12. The redevelopment area is split into two distinct projects/phases. The first consists of former landfills on 135 acres. The second part of the project will be built on a 125-acre impoundment site.

The Phase I project area consists of three solid waste landfills; the Carteret Landfill, the Cranbrook Landfill, and the Middlesex Landfill. All of these have been closed since the 1980's, but only the Cranbrook Landfill was closed in accordance with NJDEP requirements. Conceptual designs for the closure of the remaining two landfills include capping the site with asphalt, creating a leachate collection and treatment system, relocating two creeks, and filling in wetlands.

Phase II is proposed on the Cytec Industries Impoundment property. In the 1930's American Cyanamid Company (now Cytec Industries) bermed approximately 125 acres of salt marsh along the Rahway River in Carteret to create six impoundments (ponds) to manage residual wastes from the production of alum and yellow prussiate of soda. The redeveloper for the site plans to fill the present footprint of impoundments to make the area suitable for future warehouses.

The success of both redevelopment projects has been linked with proposed improvements to the nearby New Jersey Turnpike Interchange 12 and a proposed Turnpike Connector Road. This new Connector Road would be built across tidal marshes of the Rahway River, providing direct access from Interchange 12 to a complex of industrial sites along Tremley Point in Linden, New Jersey. Phase I alone is estimated to yield approximately $2 million in annual taxes and provide employment to residents in the surrounding counties.[47]

Snowy egret in pond on Cytec property

The iPort 12 redevelopment area and proposed Turnpike Connector Road is within a critical wetland complex along the Rahway River. Both sites were originally tidal marsh. The remaining salt marsh, mudflats, freshwater wetlands, small tributaries and open water ponds are heavily used by migratory shorebirds, herons, and egrets from the Arthur Kill island rookeries.

The cumulative impact of these proposed projects could be significant. The approved landfill

[47] North Jersey Transportation Planning Authority and the New Jersey Institute of Technology, *Brownfield Economic Development: Preparing Modern Intermodal Freight Infrastructure to Support Brownfield Economic Redevelopment* (January 2003), retrieved from http://transportation.njit.edu/nctip/final_report/brownfieldsreport.pdf

closure and redevelopment plan for Phase I already allows impacts to tidal creeks and endangered and threatened species habitat. While some mitigation for these impacts occurs on-site, the majority is slated to take place on the Phase II property. It is crucial that this mitigation occurs in the immediate area of the impact and that the development on the Phase II property does not require additional mitigation. The proposed Turnpike Connector Road should be examined not only for its direct impacts, but also the secondary impacts likely to occur by building an access road through wetlands and endangered and threatened species habitat.

There is no guarantee that reconstruction of tidal creeks proposed as mitigation for the filling as part of the landfill closure will replace the function of the natural creek. This area has been valuable for wildlife because few people venture into these marshes. Developing the area reduces the value of adjacent wetlands in several ways, including decreasing the overall habitat area and diversity of habitat types, degrading the habitat via influx of nutrients and pollutants, and altering plant and animal communities by introducing subsidized predators, invasive or exotic species, and increased exposure to human activities.

Successful Brownfields to Greenfields Cases in New Jersey

The Meadowlands Redevelopment Project

The largest brownfields to greenfields initiative in New Jersey is the Meadowlands Redevelopment Project, which will transform 950 acres of landfills into golf courses and 45 acres into parks, along with a major commercial and residential center. Over 1,250 acres of open space will be permanently preserved in Lyndhurst, North Arlington, Kearny, and Rutherford.

Assunpink Greenway, Trenton

This brownfield project focuses on the industrial brownfield sites along Assunpink Creek. With NJDEP and EPA assistance, the city plans a mixed-use redevelopment that would incorporate public access to the Creek along a trail that will link to the Delaware River Walk and other regional trails, reduce pollutant runoff into the Creek and Delaware River and provide economic development opportunities. Part of the restoration effort includes the creation of a 99-acre urban park and greenway that will include active recreation fields, playgrounds, and picnic areas. The project will help restore the Creek's natural floodplain by remediating the brownfields along the water's edge and removing impermeable surfaces within the floodplain. Some of the partners include the EPA, US Army Corp of Engineers, NJDEP, NJED, NJ Institute of Technology, engineering firms, and community groups.

Elizabeth Brownfield Development Area (BDA)

The American Chrome & Iron Oxide site in Elizabeth is part of the Elizabeth Port Brownfield Development Area. This area includes seven brownfield sites that represent more than 200 acres of land, that when remediated, could meet housing, education, community, commercial and open space/recreation needs in Elizabeth. Of the 200-acre site, approximately, 70 acres are wetlands. The current proposal includes creating residential and commercial development on the uplands while restoring and preserving the wetland areas.

Successful Brownfields to Greenfields cases in other regions of the U.S.

Chelsea Creek Brownfield Restoration Projects

Chelsea, Massachusetts, north of Boston, is surrounded by three rivers: Mill Creek, Chelsea Creek, and the Island End River. Chelsea Creek connects East Boston, Chelsea, and Revere and flows into Boston Harbor. Historically, the Creek was bordered by extensive salt marshes. Today, like most urban areas, the salt marshes are nearly gone, replaced by heavy industrial use including 52 state-designated hazardous waste sites, four major oil tank farms, and a tannery. Despite the fact that the area is nearly surrounded by water, there is almost no community access to the waterfront.

The Chelsea Creek Restoration Project (CCRP) is a partnership of the Chelsea Creek Action Group and the Urban Ecology Institute. The mission of the CCRP is to "build public awareness; promote public access; seek environmental justice; and transform the neglected, polluted Chelsea Creek into an environmental, recreational, educational, and economic resource for East Boston, Chelsea, and the region."[48] The planning process engaged more than 200 residents, public officials and business owners and resulted in the Chelsea Creek Master Plan which calls for the conversion of contaminated sites into new, "clean" business, development of a recreational network along the creek, the restoration of degraded salt marshes, and public access points along Chelsea Creek. In 2003, the Environmental Protection Agency selected the CCRP as one of 15 projects nationwide to demonstrate how communities can be successful in their efforts to restore urban natural resources, like Chelsea Creek, and bring about environmental justice.

Chevron Refinery Wetland Recreation Project, Richmond, California[49]

In 1963, a lagoon was built from a tidal salt marsh by berming 90 acres within a 200-acre area as part of an effluent treatment system for the adjacent oil refinery. The lagoon was drained in 1985 and remained dry with no vegetation until the modifications were made later that decade. In 1989, the dry lagoon was planted and converted to freshwater wetland, which is now considered to be a treatment unit within the effluent treatment system. Because contaminants in the soil included nickel, chromium, selenium, and zinc, the site was divided into two zones to reduce wildlife exposure. Thirty acres were used as a treatment zone, while the remaining sixty acres were designed as habitat for shorebirds and waterfowl with open areas for resting, short grass for nesting, and mud flats. In the habitat zone, exposure to the contaminated zones was reduced by controlling water levels, limiting open land and water areas to discourage feeding and resting, and creating conditions within the water and sediments to remove selenium for the water phase in the treatment zone. The project cost approximately $1 million to complete, including studies to demonstrate that the wetland would not harm the birds utilizing the areas. Although there was no mandated clean up of the site, the action demonstrates possible beneficial habitat reuses of effluent treatment lagoons.

[48] Neighborhood of Affordable Housing, Chelsea Creek Restoration Project Overview retrieved from http://www.noahcdc.org/chelsea_creek_overview.html

[49] West Coast Refinery Case Study retrieved from http://www.wildlifehc.org/ewebeditpro/items/O57F3054.pdf

APPENDIX A: RELEVANT BROWNFIELD LEGISLATION, PROGRAMS, AND FUNDING

Federal Legislation

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) (42 U.S.C. §9601 - 9675)

CERCLA provides a basis to establish financial responsibility for cleanup of hazardous waste sites. It also established the Superfund program, designed to be a fund available to pay for EPA cleanups pending cost recovery from responsible parties, and for cleanups where the responsible party cannot be identified or is insolvent. Unfortunately, the Superfund is essentially broke at this time. CERCLA authorizes EPA to respond to environmental emergencies involving hazardous pollutants, initiate investigations and cleanups, and take enforcement action against responsible parties. If the EPA conducts a cleanup under the protocols of the Superfund program, the government can take legal action against responsible parties to recover up to three times the cleanup cost.

Superfund Amendments and Reauthorization Act (SARA) (42 U.S.C.9601 et seq. (1986))

In 1986, CERCLA was reauthorized and amended by SARA. Important changes and additions to the program include the following:

- Stressed the importance of permanent remedies and innovative treatment technologies in cleaning up hazardous waste sites.
- Required Superfund actions to consider the standards and requirements found in other State and Federal environmental laws and regulations.
- Provided new enforcement authorities and settlement tools (i.e., assured that federal facilities are subject to the same CERCLA requirements as private industry).
- Increased State involvement in every phase of the Superfund program.
- Increased the focus on human health problems posed by hazardous waste sites.
- Encouraged greater citizen participation in making decisions on how sites should be cleaned up.
- Increased the size of the trust fund to $8.5 billion.

Liability: EPA has developed a number of tools to address the liability concerns of lending institutions, municipalities, property owners, developers, prospective purchasers, and others.

- EPA may enter into agreements with prospective purchasers of property, providing a "covenant not to sue" for existing contamination. However, this "covenant not to sue" is typically accompanied by a "reopener clause" that allows further governmental action if new information is discovered that demonstrates a threat to human health or the environment.
- EPA also issues comfort letters to parties clarifying, among other things, the Agency's involvement at a particular site.

- No legal mechanism exists at present (at either the federal or state level) to totally insulate the redeveloper, its financial backers, or other major participants in a brownfield redevelopment from possible liability to a third party who claims to be injured by contaminants that originate on the brownfield site. Such an injured third party may exercise legal rights under CERCLA or applicable State law to seek damages or another remedy against the property owner or redeveloper.

Funding**:** EPA's Brownfields Initiative funding includes:

- Brownfields Assessment Demonstration Pilot Program: This program funds initiatives up to $200,000 over two years to assess brownfield sites and to test cleanup and redevelopment models. To date, EPA has awarded more than 360 Brownfields Assessment Demonstration Pilots. EPA also awarded up to $50,000 to 43 pilots for assessments supporting greenspace projects.
- Cleanup Revolving Loan Fund Program: This program funds initiatives up to $500,000 over five years, to capitalize loan funds to make loans for the environmental cleanup of brownfields.

The Small Business Liability Relief and Brownfields Revitalization Act (Public Law 107-118 (H.R. 2869))

This act amended CERCLA and codified and expanded EPA's current brownfields program by authorizing funding for assessment and cleanup of brownfield properties. The amendment exempted from Superfund liability contiguous property owners, prospective purchasers, and clarified appropriate inquiry for innocent landowners. It also authorized funding for State response programs and limited EPA's Superfund enforcement authority at sites cleaned up under a state response program. It also exempts *de micromis* (small) contributors of hazardous substances and household, small business, and nonprofit generators of municipal solid waste from liability for Superfund response costs at National Priority List sites. Additionally, the bill provides for expedited settlements with certain persons based on a limited ability to pay.

Liability:

- The Act exempts certain small volume contributors and certain contributors of municipal solid waste from Superfund liability and extends Superfund liability protection to bona fide prospective purchasers of contaminated property, innocent landowners and contiguous property owners. Under the amended statute, as long as these landowners take certain steps including performing "all appropriate inquiry" into former uses of the land, taking "reasonable steps" to eliminate or limit exposure to potential or actual hazardous releases, and complying with any institutional controls placed on the land, they are protected from liability.
- Unfortunately, EPA has not defined or developed standards for what constitutes "appropriate inquiry" (although it has been following the American Society for Testing Materials 2000 Standards for Preliminary Assessments) or "reasonable steps." Until these terms are defined, potential liability continues to remain ambiguous.

Funding:

- Authorizes up to $200 million per year for brownfield assessment and cleanup to carry out new section 104(k), including $50 million per year or 25% of amount appropriated for brownfields with petroleum contamination. Brownfield site characterization and assessment authorizes grants of up to $200,000 per sites to eligible entities to inventory, characterize, assess and conduct planning at brownfield sites. Brownfield remediation authorizes grants of up to $1 million to eligible entities to capitalize revolving loan funds to clean up brownfields. Authorizes grants of up to $200,000 per site to eligible entities or non-profit organizations to clean up brownfields owned by the grant recipient, which generally require a 20% match.
- The EPA allows an additional $50,000 for assessment of activities relating specifically to greenspace such as site investigation, site characterization, reuse planning, and community involvement.

The Resource Conservation and Recovery Act (RCRA) (42 U.S.C. §6901 et seq.)

Enacted in 1976, RCRA's regulatory system tracks hazardous substances from their generation to their disposal. Whereas CERCLA provides for the cleanup of hazardous substances already disposed of, RCRA regulates the ongoing or active treatment, storage, disposal, and management of hazardous waste. RCRA is designed to prevent the creation of new, uncontrolled hazardous waste sites.

Liability:

- Under RCRA, EPA can require a Corrective Action (i.e., cleanup) by parties who are liable for the release of hazardous waste from facilities that are required to have RCRA permits.
- Any citizen can commence a civil action suit against a party who causes an imminent and substantial endangerment to health and the environment.

Funding:

RCRA requires owners and operators to:

- Establish a separate, secure financial assurance mechanism (e.g., trust fund, security bonds) to pay for completion of all closure and post-closure costs.
- Establish financial preparation for 30 years of ground-water monitoring and security measures after the facility closes.
- Demonstrate financial assurance for third-party liability to cover any accidents that result in the release of hazardous waste.

New Jersey State Law

The Brownfield and Contaminated Site Remediation Act (BCSRA) (N.J.S.A. 58:10B-1 et seq.)

BSCRA was signed in to law in 1998. The law amends the Spill Compensation and Control Act, ISRA, the Environmental Opportunity Zone Act, and several key statutes to advance brownfield reuse. The legislation's intent is to assist both municipalities and private developers to identify brownfield sites, assess the degree of environmental cleanup required, and encourage State cooperation to facilitate an easier cleanup process and to offer a variety of incentives through grants, low-interest loans, and tax incentives to encourage brownfields redevelopment.

Liability:

- Purchasers who investigate and remedy property according to NJDEP requirements are exempt from Spill Act liability.
- Developers who remediate the property according to NJDEP requirements are granted a Covenant Not to Sue letter from NJDEP.
- Lenders are exempt from liability for underground storage tanks provided action is taken to empty and close the tanks.

Funding:

- Reimburses 75% of the cost of remediation of sites from revenues generated by the redevelopment.
- A developer is eligible for 25% matching funds, through grants up to $100,000, if it has less than $2 million in assets and if it performs an unrestricted or limited use remedial action.
- Removes the requirement to post a funding source and provides a 5% grant to those using innovative technologies.

Spill Compensation and Control Act (N.J.S.A. 58:10-23.11 to 23.24)

The Spill Compensation and Control Act protects the citizens of New Jersey from the adverse effects that may result from spills of petroleum products or other hazardous substances. The Act authorizes the state to levy the Spill Compensation and Control Tax that is imposed on the transfer of petroleum products and other hazardous substances within New Jersey. The monies generated by the tax are credited to the New Jersey Spill Compensation Fund. Compensation for cleanup costs and damages to individuals, businesses, and government units that have suffered direct or indirect damages from the discharge of petroleum products or other hazardous substances are covered by the Fund.

Environmental Cleanup Responsibility Act (ECRA) (N.J.A.C. 13:1K-6 et seq.)

The Environmental Cleanup Responsibility Act (ECRA) requires owners and/or operators of industrial establishments to have an approved cleanup plan before their property can

be transferred or closed. The Act also requires the owners to set aside a funding source for cleanups. ECRA is triggered when owners or operators seek to sell the business or property, cease operations or become bankrupt. Once NJDEP is notified of the triggering event, the owner/operator must conduct a remediation in accordance with specified technical requirements including:

1. Preliminary Assessment (PA) which identifies potential Areas of Concern (AOC)
2. Site Investigation (SI) to determine if any contaminants are present above any applicable standards

If contamination is found during the Site Investigation, the owner/operator must:

1. Conduct a Remedial Investigation (RI) to determine the nature and extent of the contamination
2. Propose a Remedial Action Workplan (RAW) detailing the measures necessary to remediate the contaminated property to an applicable standard
3. Conduct the Remedial Action (RA) as set forth in the RAW

The NJDEP issues a No Further Action Letter/Covenant Not to Sue Letter when the discharges have been cleaned up to the satisfaction of NJDEP or if no hazardous wastes have been found on the property.

Industrial Site Remediation Act (ISRA) (N.J.A.C. 7:26E-1 et seq.)

ECRA was amended by the Industrial Sites Recovery Act (ISRA) in 1993. ISRA offered increased flexibility in the State's environmental cleanup procedures. ISRA introduced the concept of use-based cleanup criteria whereby remediation standards vary depending on the planned re-use of the property.

Liability:

- ISRA amended the Spill Compensation and Control Act, exempting municipalities that acquired property through foreclosure and condemnation from liability for past contamination.

Funding:

ISRA created the Hazardous Discharge Site Remediation Fund (HDSRF) which provides grants and low-interest loans to municipalities and private parties for site assessment and cleanup. HDSRF is administered by the NJ Department of Environmental Protection and the NJ Economic Development Authority.

- HDSRF provides grants up to $2 million to municipalities for preliminary assessments and site investigations on properties in which they own the tax lien. Grants for remedial investigations are available throughout this fund if the municipality holds title to the land. Private parties are eligible for grants up to $1 million to cover the cost of preliminary assessments and site investigations.

- Low-interest loans are available to municipalities and private parties for remedial investigations and cleanup.

Environmental Joint Insurance Fund

Cities around New Jersey joined together to create the Environmental Joint Insurance Fund (EJIF) to proceed themselves with coverage for a range of environmental liability exposures and related costs, some of which contribute to facilitation of urban redevelopment. EJIF covers a population of about 2 million people and includes municipalities with as many as 60,000 residents.

The current program covers four major classes of risk:
1 Environmental liabilities related to current municipal operations
2 Liabilities related to hazardous materials accident Reponses that damage potable drinking systems and runoffs from stormwater systems.
3 Site-specific coverage for illegal dumping by unknown parties on municipal property including costs for emergency cleanups if needed, municipal contributions to abandoned waste disposal facilities that have been classified as Superfund sites and
4 Public officials' liability for actions excluded from standard municipal liability coverage.

The fund also includes engineering consultations to assure compliance with state and federal regulatory requirements for covered operations.

New Jersey Urban Redevelopment Act (N.J.S.A. 55:19-20 et seq.)

In 1996, the Act was created to assist in the revitalization of New Jersey's urban area. The Act encourages redevelopment projects on abandoned properties and authorizes the use of payments in lieu of taxes as a financing method. The Act recognizes that there is a need for a redevelopment agency whose focus is developing and implementing strategic revitalization plans and neighborhood empowerment plans for urban neighborhoods to serve as the State's primary community development agency with particular focus on technical assistance, grants, low and no interest loans, loan guarantees, and capacity building for community development organizations. The New Jersey Redevelopment Authority is an independent Authority that was created through the New Jersey Urban Redevelopment Act in July 1996. The NJRA became fully operational in March 1997.

Liability:

- Shields perspective purchasers in Urban Aid Municipalities (those municipalities qualifying under N.J.S.A. 52:27D-178) from liability, provided they commit to a NJDEP-approved Remedial Action Work Plan. Purchasers are also protected against future changes in cleanup standards or findings of new contamination.

Funding:

- Reduces interest rates on Hazardous Discharge Site Remediation Fund loans for site remediation
- Expands the use of Hazardous Discharge Site Remediation Fund monies to Urban Aid Municipalities for grants for Remedial Investigations

Municipal Landfill Site Closure, Remediation and Redevelopment Act (N.J.S.A. 13:1E-116.1 et seq.)

The Act was designed to encourage the closure, remediation and redevelopment of municipal solid waste landfills. The Act provides for the remediation and redevelopment of municipal solid waste landfill sites under the terms and conditions of a Redevelopment Agreement negotiated between the developer and the State.

Funding:

Under this law, a redeveloper who closes and remediates a landfill in accordance with State requirements is eligible for up to 75% of the costs of the closure and remediation. Developers receive reimbursement from the generation of tax and sale revenues generated by the redevelopment, as well as the Municipal Landfill Closure and Remediation Fund. The law gives Municipalities eligibility for loans through the Sanitary Landfill Facility Contingency Fund to redevelop solid waste landfills.

New Jersey Redevelopment Law (N.J.S.A. 55:19-60)

State law enables a municipal governing body to create a "redevelopment area" by ordinance with standards, design guidelines, permitted uses, and bulk requirements that are unique to that area/zone. A redevelopment ordinance need not be consistent with the current master plan. In fact, the master plan is amended to include the new redevelopment area/zone. The use of this Law has generated considerable controversy in New Jersey, with one side stating that it is an abuse of local power designed to benefit well-connected developers and the other side stating that the Law is needed to revitalize municipalities.

New Jersey Programs

NJDEP's Brownfields Development Area (BDA) Initiative

The BDA Initiative is aimed at remediating and revitalizing communities and neighborhoods affected by multiple brownfields. Its goal is to implement coordinated remediation and re-use plans for these properties simultaneously. A complete description of the BDA Initiative can be found at www.nj.gov/dep/srp/brownfields/bda/.

New Jersey Brownfields Redevelopment Task Force

The Task Force was created under the New Jersey Brownfield and Contaminated Site Remediation Act to coordinate efforts to redevelop brownfield sites statewide. The 13-member

Task Force, consisting of seven representatives from State agencies and six public members, assists municipalities and counties in using brownfield redevelopment to help implement Smart Growth strategies in their plans.

For more information on the New Jersey Brownfields Redevelopment Task Force: http://www.nj.gov/dca/osg/commissions/brownfields/taskforce.shtml

The Task Force also works with the EDA to inventory marketable brownfield sites for prospective developers. This work is reflected in the Brownfields Site Mart, which is designed to make it easier for developers to locate and build on land in cities and towns, while preserving the state's dwindling inventory of open space. The properties identified in the Brownfields Site Mart reflect the efforts thus far of the NJ Brownfields Redevelopment Task Force to attempt to give priority to properties in communities eligible for assistance from the New Jersey Redevelopment Authority.

For more information on the Brownfields Site Mart: http://www.njsitemart.com/

New Jersey Brownfields Redevelopment Interagency Team (BRIT)

BRIT is a resource group within the Department of Community Affairs (DCA) Office of Smart Growth through which many department and agencies cooperate to expedite brownfields redevelopment efforts. The DCA coordinates BRIT's proceedings and facilitates brownfields redevelopment within a Smart Growth context.

For more information on the New Jersey Brownfields Redevelopment Interagency Team: http://www.nj.gov/dca/osg/commissions/brownfields/interagencyteam.shtml

New Jersey Brownfield Roundtables

The New Jersey Brownfield Roundtables are a forum for communities to share lessons learned as well as facilitate the exchange of information among New Jersey's municipalities. Also, the Roundtables serve to help communities addressing brownfield cleanup and redevelopment.

For more information on Brownfields Roundtables: http://www.state.nj.us/dep/srp/brownfields/roundtables/

New Jersey Redevelopment Authority

The New Jersey Redevelopment Authority (NJRA) is a state financing authority committed to the redevelopment of urban New Jersey. The NJRA has defined itself as a comprehensive resource center that customizes project financing for redevelopment projects that enhance New Jersey's cities.

For more information on the New Jersey Redevelopment Authority: http://www.njra.us/njra/site/default.asp

- *New Jersey Urban Site Acquisition (USA) Program*

  The USA program is a revolving land fund that facilitates acquisition, site preparation and redevelopment, which are components of an urban redevelopment plan for an Urban Coordinating Council municipality. The fiscal 2001 budget appropriated $15 million in grants to urban municipalities that wish to acquire and remediate contaminated properties and return them to productive use. Grants up to $1 million are available under certain circumstances, for acquisition and/or remediation for the purposes of industrial, commercial, or residential redevelopment.

Cleanup Star Program

Under this program, NJDEP pre-qualifies environmental consultants meeting rigorous education, experience, and professional requirements, as "Cleanup Stars." These Cleanup Stars will be permitted to investigate and remediate certain low-priority sites and areas of concern with limited NJDEP oversight. NJDEP will strictly audit cleanup Star's work to ensure regulation compliance and protection of public health and the environment.

For more information on the Cleanup star Program http://www.state.nj.us/dep/srp/clenupstar/

New Jersey Economic Development Authority

This Authority manages the Hazardous Discharge Site Remediation Fund (HDSRF). It provides grants and loans to eligible redevelopers or municipalities for site assessments, remedial investigation and remediation.

Municipalities, counties and redevelopment agencies may apply for grants up to $3 million per year for investigation and remediation activities on properties they own or for which they hold a tax sale certificate. Private parties required to perform remediation activities and individuals who want to voluntarily conduct such actions may qualify for low-interest loans of up to $1 million per year if they are unable to obtain private funding.

Developers who have signed a Brownfield Reimbursement Agreement with the Commerce, Economic Growth and Tourism Commission may borrow up to $750,000 at below-market interest rates for up to three years for upfront, interim remediation funding. Additionally, the New Jersey Brownfields Revolving Loan Fund provides low-interest loans to municipalities and developers for remediating brownfields for commercial and industrial purposes.

For more information on NJ Economic Development Authority: http://www.njeda.com/

APPENDIX B: BROWNFIELDS TO GREENFIELDS RESOURCES

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New Jersey Department of Community Affairs. *New Jersey Brownfields Redevelopment Resource Kit* http://www.state.nj.us/dca/osg/docs/brownfieldsresourcekit.pdf.

NJ Department of Community Affairs Brownfields Remediation Task Force Website http://www.nj.gov/dca/osg/commissions/brownfields

NJDEP Site Remediation and Waste Management, Brownfields resources http://www.state.nj.us/dep/srp/brownfields/

The Interstate Technology &Regulatory Council; Alternative Landfill Covers, Constructed Treatment Wetland and Phytotechnology Teams; and the Wildlife Habitat Council's White Paper and Case Study, *Making the Case for Ecological Enhancements.* January 2004.

http://www.wildlifehc.org/ewebeditpro/items/O57F4305.pdf

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U.S. Conference of Mayors. (2003). *Recycling America's Land: A National Report on Brownfields Redevelopment (Volume 4)*. Washington, DC.

U.S. Environmental Protection Agency. (2003). *Choosing "Greenspace" as a Brownfields Reuse*. (EPA 500-F-03-248). Washington, DC: United States Environmental Protection Agency, Office of Solid Waste and Emergency Response.

U.S. Environmental Protection Agency Brownfields Cleanup and Redevelopment Website http://www.epa.gov/brownfields/

U.S. Environmental Protection Agency Region 2, Resources relating to New Jersey's Brownfields Program http://www.epa.gov/region02/superfund/brownfields/njdep.htm

Phytoremediation Resources

American Society of Plant Biologists
http://www.aspb.org/

Missouri BotanicalGarden Phytoremediation Web Site
http://www.mobot.org/jwcross/phytoremediation/

Phytoremediation Action Team
http://www.rtdf.org/public/phyto/default.htm
The U.S. Environmental Protection Agency (EPA) created the RTDF in 1992 to foster collaboration between the public and private sectors in developing innovative solutions to mutual hazardous waste problems.

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The Baykeeper's mission is to protect, preserve, and restore the ecological integrity and productivity of the Hudson-Raritan Estuary - the most urban estuary on the planet. Since 1989, we have served as citizen advocate for the Estuary's bays, streams, and shores. Baykeeper stops polluters, champions public access, influences land use decisions, and restores habitat - benefiting the natural and human communities of our watershed.