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Brownfields:

## Brownfield Redevelopment Strategy Report



Brownfields are prevalent throughout the region, and although they present challenges, they are usually in desirable locations with great potential for redevelopment. Federal, state, and local governments have recognized this, as well as regional non-profit groups and private investors, situating our region at the forefront in creative brownfield redevelopment strategies and

partnerships.

Despite this progress, there is much work to be done to clean-up brownfields region-wide. Therefore, this strategy report attempts to illustrate how many potential sites are in the region, in comparison to what's been cleaned-up thus far. It also includes a review of federal and state policies and programs, as well as a taste of local programs and partnerships. Most importantly, the report attempts to understand the multiple layers of benefits – economic, environment, and social – brownfield redevelopment can offer the region.

If you are interested in brownfields in our region, please read the following CMAP strategy report, and send us your comments.

Key Questions :

- What would be the affect of redeveloping a prominent brownfield site in your community?
- Everyone wants brownfields cleaned-up and redeveloped, but who pays for it? Should this be a federal, state, or local issue? What should CMAP's role be?
- How should sites be prioritized for clean-up?

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### Introduction

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Brownfield redevelopment is both one of the most pervasive challenges as well as one of the largest potential opportunities faced by the region. Over the last two decades, widespread attention has been paid to the ideas of sustainable development in America's towns and cities. Redevelopment of brownfield sites is one approach that has gained significant political support to



achieve these goals. The greater Chicago region has been at the forefront of this movement, with a variety of cutting-edge local and regional programs to facilitate brownfield redevelopment, as well as extensive non-profit involvement and private sector investment. But due to the region's industrial history, and the continued migration of homes and business further out into the undeveloped periphery, there is still a prevalence of brownfield sites throughout the region.

The *GO TO 2040* plan recognizes this and has identified brownfield redevelopment as a potential strategy in the development of growth scenarios for 2040. This paper attempts to paint a picture of how the strategy of remediating and redeveloping brownfields would affect the region in terms of

economic, environmental, and social impacts. In order to understand the existing situation, this paper includes an estimate of the number and distribution of both potential brownfield sites and cleaned-up sites throughout the region, as well as an

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overview of the existing local, state, and federal policies and programs in place.

### ***What's a brownfield?***

The *Small Business Liability Relief and Brownfields Revitalization Act*, passed in 2002 (Public Law 107-118, H.R. 2869), defines brownfields 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” (US EPA 1).

The definition of a brownfield includes the “perception” of contamination as well as the actual existence of it. This perception can be just as damaging as real contamination when it comes to redevelopment, especially when it comes to acquiring financing. This is also a factor in why the term “brownfield” is preferred over other terms often used in the past, which may evoke a negative connotation, such as “contaminated” or “derelict” land. In addition, “brownfield” also constitutes a semantic counterpart to the term “greenfield” which designates agricultural or undeveloped land usually on the urban periphery (DeSousa 2006a).

### ***Why is brownfield redevelopment important to the region?***

Brownfields can exist anywhere – ranging from a small, abandoned gas station in a rural community to a huge former steel mill in the urban core. The Chicago region is no exception. In fact, the region’s rich industrial and manufacturing history, coupled with its fast-paced growth into the undeveloped periphery, most likely makes brownfield sites even more prevalent than other regions. A survey conducted in 2005 by the U.S. Conference of Mayors estimated identified brownfields within the city of Chicago at approximately 325 sites. This is in the top ten percentile of all the cities surveyed, and only includes “identified” sites (The US Conference of Mayors 2006). There is a widespread prevalence of brownfields throughout the rest of the region as well. This is explored further in Section II, Existing Conditions.



The perception or actuality of contamination on these sites often makes them difficult to redevelop due to the possibility of liability, the lack of certainty and finality in the remediation process, and the cost of remediation and site preparation. Until these challenges are adequately addressed, communities and developers will find greater incentives to build on greenfield lands rather than underutilized, previously-developed land. In turn, these brownfield sites sit vacant, often off the tax rolls, posing environmental health and safety risks, and acting like a cancer to their neighborhood.

But it is important to look at brownfields not just as a challenge, but also as an opportunity. If these sites are cleaned up, their redevelopment potential is huge. This is being realized, and translated into policy and programs both here in the region and throughout the county. An overview of these policies and programs are included in Section III, Existing Policies and Programs.

Instead of a brownfield site being viewed as a black eye in the face of the community, it could be viewed as a potential to offer dual benefits: both socio-economic revitalization and management of environmental risk. Generally, the economic benefits include increasing land value and enhancing local tax bases, creating jobs, and promoting economic renewal. The main environmental benefits include mitigating the health and environmental risks posed by contaminated soil and groundwater, restoring natural processes, and reusing urban land to minimize development pressure on greenfield lands. Among the various social and community benefits, brownfield redevelopment can revitalize neighborhoods, improve public health and safety, increase housing availability and mix, and promote equity, especially among minority and low-income groups.

Furthermore, brownfield redevelopment is a key strategy in accomplishing the [GO TO 2040 Regional Vision](#), a set of shared values for the region that were expressed through a comprehensive public participation process and recently adopted.

According to the GO TO 2040 Regional Vision, “We will maximize the competitive advantage of existing physical infrastructure by encouraging reinvestment in our communities through mixed-use, compact development and redevelopment that emphasizes infill. Reinvestment will occur through both public and private means, will focus on both people and places, and will contribute to community prosperity, affordability, and vitality across the region” (CMAP 2008).

The links between brownfield redevelopment and its impacts are explored further in Section IV, Impacts of Brownfield Redevelopment.

Do you think brownfield redevelopment presents an opportunity or a challenge to your community's economic health?

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## Existing Conditions

***What has already been cleaned up?***

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In addition to determining the current distribution and amount of potential brownfields in the region, it is important to determine what has already been done in terms of clean-up thus far.

The Illinois EPA manages the Site Remediation Program (SRP), and its website is an excellent clearinghouse for properties that have had to go through brownfield clean-up. A total of 3,029 sites have been enrolled in the voluntary program between July 1996 and December 2007. Of these, 1,903 have received a No Further Remediation (NFR) letter, a commonly required stamp of approval to receive development financing. Additionally, more than 17,000 acres of land have been remediated and enrolled in the SRP throughout the region. This data has been organized in Table 1 by county and is displayed in Map 1. As to be expected, the majority of SRP sites are in Cook County, with 51% of the sites in the City of Chicago, but all counties in the region have sites listed.



Table 1: Site Remediation Program (SRP) Sites in Region (1996-2007)

Table 1: Site Remediation Program (SRP) Sites in Region (1996-2007)				
County	SRP Sites	Acres	Percent of Sites	Percent of Acres
Cook	2,254	11,126	74.41%	65.10%
DuPage	278	1,086	9.18%	6.35%
Kane	119	846	3.93%	4.95%
Kendall	16	186	0.53%	1.09%
Lake	200	989	6.60%	5.79%
McHenry	75	559	2.48%	3.27%
Will	87	2,299	2.87%	13.45%
<b>Regional Total</b>	<b>3,029</b>	<b>17,091</b>	<b>100.00%</b>	<b>100.00%</b>

#### How is a site determined to be a brownfield?

Any site that requires clean-up or is perceived to require clean-up can be considered a brownfield. Contrary to what many people may think, there is no formal recognition or process required for the term brownfield to be applied. If the land does or potentially requires remediation, which in turn may complicate its reuse, it is a brownfield.

#### Where is contaminated land?

To identify the land that could potentially be classified as brownfields throughout the seven county northeastern Illinois region, several data sources were used. The US EPA and the Illinois EPA provide a wealth of information and data online on their programs. The US EPA manages a site called the Envirofacts Data Warehouse where users can access information on environmental activity including information on: Superfunds, hazardous waste, toxic releases, facilities subject to environmental regulations, air releases, and brownfield grant recipients (US EPA 2). Additionally, the IEPA requires buildings and sites with activities or conditions of "environmental interest" to report to the appropriate division within the Bureau of Land, and IEPA makes much of this reported information publicly available on its website (IEPA).

Several types of environmental conditions and reporting are of particular value when identifying potential brownfields. The most useful and relevant data to this research include: sites registered in the Toxic Release Inventory (TRI), the Local Incident Tracking system (LIT), and Hazardous Waste Handlers (maintained in the RCRAInfo database).

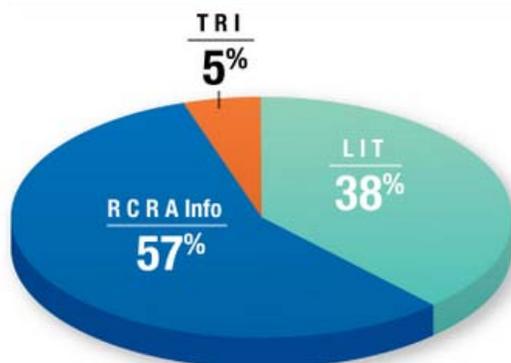
Map 2 shows the location of each site throughout the region with a record in the LIT, TRI, and RCRAInfo databases. Table 2 reveals the number of each type of contamination record by county, as well as the totals for each county. There are a total of 38,051 combined records in the northeastern Illinois region, 65% of which are in Cook County. The most common data type are on sites and facilities reporting to the EPA on activities related to hazardous material handling, contained in the RCRAInfo database (see Chart 1). The map clearly shows the extent of the data, and that several sites have more than one type of contamination. Overall, the location of the data appears to be logical with concentration in areas that are developed, along transportation corridors, and clusters of similar land use. This conformed with much of what was repeatedly communicated in interviews with the region's key brownfields professionals: brownfields are everywhere.



Table 2: EPA Contamination Identification by County in Region

County	TRI	LIT	RCRAInfo	Total	Percent of Total
Cook	1,127	9,358	14,143	24,628	64.7%
DuPage	207	1,759	3,030	4,996	13.1%
Kane	127	782	1,144	2,053	5.4%
Kendall	8	75	123	206	0.5%
Lake	104	1,410	1,635	3,149	8.3%
McHenry	80	350	674	1,104	2.9%
Will	101	605	1,209	1,915	5.0%
<b>Regional Total</b>	<b>1,754</b>	<b>14,339</b>	<b>21,958</b>	<b>38,051</b>	<b>100.0%</b>

### Frequency of EPA contamination type in region



Source: Chicago Metropolitan Agency for Planning

#### Which sites are not in operation?

Mapping all the contamination data does not reveal potential brownfield sites, however. Businesses and sites that are currently in operation are included in these US EPA records, and therefore should be distinct from the sites that are not in operation and are available for redevelopment. Unfortunately, the data sets do not specify the sites that are no longer operating. In order to locate these sites where redevelopment may be hindered by its potential brownfield status, the data sets were layered with 2006 county assessor data to select the US EPA records on vacant and selected exempt land. This identified sites that are probably not in active use, which when compared with contaminated sites, could be used as an approximation of potential brownfields that are available for redevelopment. CMAP's Regional Snapshot on Infill, available at <http://www.cmap.illinois.gov/snapshot.aspx>, explains the methodology for identifying vacant land. The selection of exempt land is detailed in the appendix.

#### Where are the possible brownfield sites? (Map 3)

Identifying the sites that are required to report to the US EPA, such as storage of hazardous waste, shows where land is at risk of contamination. Layering this information with vacant and selected exempt land more accurately reveals potential brownfield sites. Map 3 portrays this estimation of potential brownfield sites throughout the region – it includes all the records in the TRI, LIT, or RCRAInfo in the region, filtered by vacant and exempt land. It estimates a total of approximately 8,195 sites throughout the region. Many of these sites have more than one type of contaminant, and Table 3 shows the number of parcels with one, two, and three types of contamination (parcels listed in more than one of the three databases evaluated—TRI, LIT, and RCRAInfo). It is logical to assume that a parcel with multiple records in the evaluated EPA databases is likely to have a higher risk of contamination than a parcel with a single record.

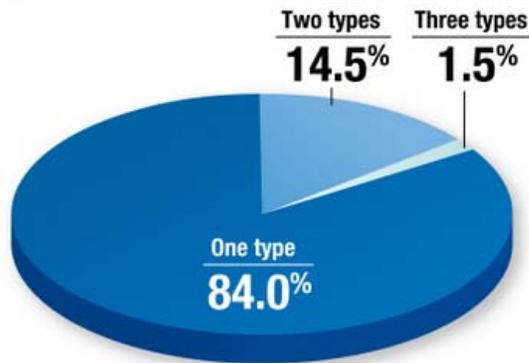


Table 3: Potential Brownfield Sites in Region

Table 3: Potential Brownfield Sites in Region

County	Number of Contaminant Types			Parcels	Acres
	1	2	3		
Cook	4,838	845	97	5,780	20,991
DuPage	340	69	2	411	2,652
Kane	273	49	2	324	738
Kendall	45	5	0	50	159
Lake	781	135	15	931	3,350
McHenry	133	21	2	156	1,335
Will	481	60	2	543	5,685
<b>Regional Total</b>	<b>6,892</b>	<b>1,186</b>	<b>123</b>	<b>8,195</b>	<b>36,030</b>

### Percentages of sites with one, two and three EPA contamination types



Source: Chicago Metropolitan Agency for Planning

#### How do these potential brownfield sites compare with known brownfield sites?

This data selection method has limitations (see Appendix for detailed description of methodology and assumptions), and undoubtedly some land is displayed that is inaccurately being defined as a potential brownfield. In order to measure the closeness between the identified potential brownfields and confirmed brownfields in the SRP, the land uses of each were compared. Additionally, the SRP sites were mapped with the potential sites to assess the location similarities and differences in remediated sites and potential brownfield sites. The correlation between the two data sets was evaluated, calculating a correlation coefficient of .78, a strong match.



Does the location and extent of brownfields surprise you in any way?

[Comments \(2\)](#)

## Existing Policies and Programs

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Redeveloping a brownfield is usually a balancing act between the public and private sector, often necessitating creative partnerships to acquire land, funding, clean-up, and construction. It is a process that is often regulated through several levels of government, which only recently has become streamlined. Private practitioners have found niche markets within the process, and non-profit agencies have supported efforts when the government could not. This section aims to overview the various levels of government policy and programs in play in our region, the perspective of the private practitioner, and the roles of the regional non-profits. Several local programs are also described.

### Overview of Brownfield Policy

In 1980, the Federal government passed the *Comprehensive Environmental Response and Liabilities Act* (CERCLA, 42 U.S.C. §§ 9601-9675), also known as *Superfund*. (US Code) In addition to providing funds for clean-up, CERCLA essentially gave governments the power to require clean-up costs from whoever they deemed responsible for the environmental contamination. In response, investors and banks, afraid of being held liable for costly environmental clean-ups, halted their support of redevelopment efforts that had a perception, however slight, of being a brownfield.

All levels of government soon realized that CERCLA, and the risk of liability that it created, was preventing redevelopment. In 1995, the US EPA introduced the *Brownfields Action Agenda* to help clarify the government's role, to make funds available for pilot projects to test redevelopment approaches, and to provide direct assistance to those interested in redeveloping high-risk sites (DeSousa, 2006b).

Around the same time, Illinois and the US EPA Region 5 were at the cutting-edge of a group of state and local governments who began implementing strategies for encouraging remediation and redevelopment. Section 128(a) of CERCLA authorizes a grant program to establish state response programs, and allowed Illinois to create the [Site Remediation Program](#) (SRP), a voluntary clean-up program which provides participants the opportunity to receive IEPA review, technical assistance, and "No Further Remediation" (NFR) letters. The NFR letters guarantee that the participant has successfully demonstrated that environmental conditions at their remediation site do not present a significant risk to human health or the environment. Due to a memorandum of agreement with the US EPA, the NFR letter from IEPA serves as a release from liability and/or further responsibilities under the Illinois Environmental Protection Act (IEPA).

In addition, Illinois has adopted a unique [Tiered-Approach to Corrective Action Objectives](#) (TACO), which allows for flexibility in site remediation objectives. Rather than demand a one-size-fits-all remediation requirement for all brownfield sites, TACO allows site owners and developers to clean up the site to the appropriate tier based on risk (e.g., a site redeveloped to a daycare center would have to meet higher standards than a site redeveloped to a parking lot). Baseline objectives exist, but time and remediation cost can be saved by cleaning up the site to an appropriate level.

These efforts were bolstered by the 2002 passing of the federal *Small Business Liability Relief and Brownfields Revitalization Act*, referred to as the Brownfields Law, which expanded US EPA's assistance. With the Brownfields Law, US EPA currently utilizes four grant programs targeted towards brownfield redevelopment:

- [Brownfields Assessment Grants](#) – funding for brownfield inventories, planning, environmental assessments, and community outreach;
- [Brownfields Revolving Loan Fund Grants](#) – funding to capitalize loans that are used to clean-up brownfields;
- [Brownfields Job Training Grants](#) – environmental training for residents of brownfields communities; and
- [Brownfields Clean-up Grants](#) – direct funding for clean-up activities at certain properties with planned green space, recreational, or other nonprofit uses.

In addition, US EPA also administers the Targeted Brownfields Assessment (TBA) program, which is designed to give technical assistance to municipalities dealing with brownfields, but haven't received US EPA grant funding. The program is focused on minimizing the uncertainties of brownfield remediation. It offers assistance with (Phase 1) screening, including a background and historical investigation and preliminary site inspection, and (Phase 2) environmental assessment, including sampling the site, determining clean-up and redevelopment options, and estimating costs.

Other federal agencies also support brownfields redevelopment, especially the Department of Housing and Urban Development (HUD), through the [Brownfields Economic Development Initiative](#) (BEDI). This competitive grant program targets its funding to brownfield redevelopment projects that provide economic stimulus through job and business creation/retention and increases in the local tax base.

In addition to its successful SRP, Illinois has other brownfields programs and clean-up programs which can be utilized for remediation efforts. IEPA administers:

- [Municipal Brownfields Redevelopment Grant Program](#) – provides financial assistance to municipalities for brownfields clean-up and redevelopment activities (Note: this has not been funded since 2006);
- [Illinois Brownfields Redevelopment Loan Program](#) – offers low interest loans to support efforts by local governments and private parties to clean up brownfield sites that have already been assessed for contamination;
- [Leaking Underground Storage Tanks \(LUST\) Program](#) – provides support and funding to tank owners and operators for site investigations, clean-up costs, and other services; and
- [State Response Action Program](#) – provides financial and administrative resources for clean-up of environmental contamination which presents a threat and isn't addressed by other federal or state clean-up programs.

All of these programs can all be used in concert with several other traditional economic development tools such as CDBG funds or TIF districts. In fact, most successful projects rely upon a mixture of funding sources and government assistance. The federal [Brownfields Tax Incentive](#) allows for environmental cleanup costs at properties in targeted areas to be fully deducted in the year incurred, rather than having to be capitalized, as long as they were not responsible for the contamination. The [Illinois Environmental Remediation Tax Credit](#) allows a company or an individual to obtain an income tax credit for certain environmental clean-up costs. Municipalities throughout the region may also grant property tax relief to entice developers to redevelop specific brownfield sites. Furthermore, some local governments operate their own grant programs. Lake County is an example of this, as it operates a county-wide [Brownfield Fund](#), established in 2000, which provides another source of grant

funds to communities within the county.

The challenges of brownfield redevelopment include the risk of liability, uncertainty of cost and time-frame for environmental testing and clean-up, and the uncertainty of cost and time-frame for government intervention. Several government policies and programs have creatively managed these hurdles, limiting liability with NFR letters, providing a variety of grant and loan options and tax breaks to reduce costs, providing technical assistance and streamlining involvement with government agencies as much as possible to save time. However, each brownfield site is unique, and presents unique challenges. In addition, government efforts are focused on remediation, whereas redevelopment usually falls to the private sector or non-profits. Therefore, the following explores the roles of the private sector and non-profit groups, and how several local governments have established their own brownfields initiatives and pilot programs.

Has your community utilized any of these brownfield redevelopment programs? How successful was it?

[Comments \(0\)](#)

## The Role of the Private Sector

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Redeveloping a brownfield site is like any development project, in that it has the potential to turn a profit. Many brownfields occupy very valuable land and have great potential of economic return on investment. Private sector businesses have recognized this, especially as brownfield policies have become more well-defined, and have entered into the brownfield redevelopment market. Typically, the private sector's role involves conducting the Phase I and Phase II environmental assessments, creating and implementing a remediation plan, and then developing the site.



But before taking on a brownfield redevelopment project, its feasibility is determined by an economic assessment. There must be sufficient market demand and the project must provide a sufficient return on investment. An estimate of market potential is necessary in order to determine the scale of economic activity that the area can support and the anticipated rent income. Generally, developers will assess a project by comparing returns to a minimal rate of return acceptable to the developer.

There are roughly three scenarios in which brownfields become redeveloped, based on the current market conditions and amount of uncertainty within the site.

- The conditions and market permit the private sector to redevelop the land independent of the public sector;
- The conditions and market create an interest of the private sector but require public sector gap financing; or
- The conditions and market require the public sector to invest in cleanup before turning the land into an economic opportunity.

According to a local environmental assessment consultant, there are a large number of sites which fall into that first category – sites with revealed contamination that are not classified as a brownfields. Because the market for redevelopment is strong, these sites are cleaned up privately, without any need for US EPA, IEPA, or municipal involvement (Deigan conversation, 2008). It is debatable whether it is appropriate to classify land as a brownfield if it requires environmental remediation as part of the development process. The types of brownfields identified in this analysis are likely to require public sector involvement.

The SRP program and most IEPA and US EPA brownfield grant and loan programs are heavily reliant on private sector involvement (Colantino conversation, 2008). Although targeted to municipalities, these programs and their funding are usually insufficient for complete redevelopment, but serve instead as seed money to promote further investment from the private sector. In addition, private sector businesses offer technical expertise needed by municipalities when it comes to complicated remediation issues.

Have you found a high level of private sector involvement needed in brownfield redevelopment in your community?

[Comments \(0\)](#)

## The Role of Non-Profits

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Because of the potential of brownfield redevelopment to bring about change in a neighborhood or community, several non-profit organizations are dedicated to clean-up and revitalization efforts in the region. They serve as connections between under-staffed, high-need communities and the available government programs and interested private investment. They fill the role of “deal-maker,” working to get the players to the table, and thinking creatively to find solutions (Greenwood conversation, March 2008). In addition, non-profits can provide valuable technical expertise, needed to navigate through complex regulatory and financing scenarios, and to sufficiently promote and market an available site.

Furthermore, these groups have the opportunity to think beyond the immediate issues of a redevelopment project and work

towards loftier goals. The South Suburban Mayors and Managers Association (SSMMA), for example, is working to prevent brownfields from returning in the future. They are developing energy and environmental design guidelines for industries going into redeveloped sites (Greenwood conversation, March 2008). Bethel New Life, Inc., a faith-based non-profit in the region, has gotten involved in brownfield redevelopment as an opportunity to create affordable housing, and advocates for more residential redevelopment in areas of highest need, which are largely ignored by the private sector because of the lower returns on investment.



#### ***The Delta Institute – An Active Non-Profit Brownfield Redeveloper in the Region***

Delta Institute, a non-profit organization formed in 1998, has a mission to integrate economic development and environmental protection that will benefit disadvantaged communities. Brownfield redevelopment is one key area where they provide expertise. Approximately 50% of their service provision falls into the category of technical assistance, which is usually funded by grants, and includes activities such as training, advisory, and programming. The other 50% of their services are between Delta Redevelopment Funds (~20%), which is a separate Community Development Financial Institute (CDFI) that makes loans to businesses and communities, and as a development partner (~30%), which means that they own a few development sites, and anchor real estate deals by managing the assessment and clean-up process, as well as finding new users for the properties after clean-up.

Delta has had projects in the region that include the communities of Blue Island, North Lawndale, South Chicago Avenue, and Waukegan, all areas where issues such as disinvestment, poverty, and home ownership are compounded with the impact of existing brownfields. Delta Institute reaches out to help these communities. Their clients are usually local governments, community organizations, as well as private property owners and potential buyers of property.

Similar to many other non-profits, the biggest limitation that the Delta Institute faces is consistent funding, this fuels community reinvestment and development in areas that would otherwise be de-prioritized. Additionally, in 2008, Delta Institute was given the leadership role as a member of the National Brownfield Nonprofit Network Initiative, to build a network for other organizations like themselves around the country to share information and promote federal changes to brownfield programming.

#### ***Some Local Programs in the Region***

In addition to the state and nation-wide efforts to redevelop brownfields, our region boasts several local programs. Municipalities and their local brownfields programs play a critical role in the process of redevelopment. Local governments can work to make sites more attractive to private investment by assessing the property and determining the level of clean-up necessary, or actually cleaning up the property. They might need to step in and condemn and take a property to do this. Or municipalities can rezone a property, or create a TIF district or other economic incentive to redevelop. Oftentimes, municipalities will assemble properties to make them more attractive for redevelopment. These types of strategies often require technical expertise, funding, and staff support. But they can be extremely beneficial, helping create an environment where brownfield redevelopment is just as viable an option as other types of development. The following describes some local efforts in the region.

#### ***City of Chicago***

The City of Chicago has had overwhelming success with its brownfields redevelopment efforts, initiated in 1990 with a \$2 million investment of General Obligation Bonds to create a "Brownfields Pilot." The pilot project was a resounding success, which was leveraged into a larger initiative through a combination of Section 108 loan guarantees from HUD, Showcase Community funds from US EPA, and other sources. The Brownfields Initiative tackled the environmental assessment of more than 30 sites, and worked to acquire them through negotiated purchase, lien foreclosure, or tax reactivation on delinquent property. The city enrolls nearly all its sites in the SRP. The program is coordinated through the City's Departments of Planning and Development, Environment, Law, and Office of Management and Budget, as well as coordination with the Departments of Buildings, Housing, Transportation, Chicago Park District, and others. The program works to make brownfields redevelopment as attractive as developing any other property, and has been extremely successful in marketing its sites. Furthermore, any city-funded site must meet additional "Chicago standards" – additional environmental criteria. If certain levels of sustainability elements are included, the site can receive expedited permit review. Because of this additional emphasis on redeveloping brownfields to create open space, housing, and other amenities, Chicago is often referred to as a model nationwide.

#### ***Village of Riverdale***

The Village of Riverdale is a small community in southern Cook County with an estimated population of less than 20,000 residents which has suffered from a lack of new investment since the decline of the region's industrial base. Unemployment hovers at 20%, and the village has seen a decline in population. However, Riverdale has a very critical point of interest: the Metra Electric line stop at 144th Street. Since this is a prime location for both pedestrian and vehicle traffic, it has attracted potential development for the area. Additionally, Riverdale is near the Midway Airport and The Dan Ryan (I-94), Tri-State Tollway (I-294), and I-57, offering substantial transportation opportunities. There has been a strong interest in redeveloping Riverdale to stimulate economic and community benefits for the City and its neighboring suburbs.

However, like many other industrial suburbs of Illinois, Riverdale has numerous brownfield locations – over 200 sites were evaluated by the US EPA in May 2000. The US EPA selected Riverdale to administer grant funds on behalf of itself, South

Chicago Heights, Lansing, Posen, Chicago Heights, and the SSMMA. SSMMA managed the project, which included brownfield assessments and inventories for all partners. This project led to over \$1.4 million in US EPA funding to SSMMA for similar work in Riverdale and the area. Additional funding has come from community grants from private companies.

Riverdale has partnered with the South Suburban Chicago Brownfields Coalition in their efforts as well as a non-profit group named Greater Riverdale Industrial Partnership (GRIP). GRIP was formed for the purpose of brownfield redevelopment in Riverdale and is a partner of the Delta Institute.

### ***City of Blue Island***

The City of Blue Island, in southern Cook County, has a rich history of industry, an extensive transportation infrastructure, and many inherent quality of life assets. In 2005, the City of Blue Island began a collaborative effort with the Center for Neighborhood Technology (CNT) to create a redevelopment plan for the downtown and surrounding area. A major focus of the redevelopment plan is to implement transit-oriented development to better utilize the infrastructure and available opportunities. However, like many communities in the region, much of the land that can be more beneficially utilized in Blue Island requires environmental remediation in order to be redeveloped. Blue Island's experience with redevelopment of brownfields was very limited prior to the development of this plan, and municipal staff recognized this and applied for assistance from US EPA. In 2007, Blue Island was awarded \$200,000, and in 2008, another \$400,000 in funds to complete approximately over 50 assessments. These funds will help target transit-oriented development (2007 award) and cargo-oriented development (2008 award) on identified sites. Further research will help identify which sites should then be selected for a Phase II assessment and redevelopment plans. This effort is a collaboration with multiple external entities, including the non-profit, Delta Institute, and the private environmental consultant firm, V3. The City recognizes that coordination and expertise are necessary to help make the project a success.

### ***City of Waukegan***

The City of Waukegan is a large municipality in Lake County. Much of its growth is being spurred by an increasing Hispanic population, which was estimated at 45% of the total population of Waukegan in 2005. Waukegan is located about 40 miles north of Chicago and is along the shore of Lake Michigan. One of its key attractions is the city's deep-water harbor which provides shipping access to the St. Lawrence Seaway for a number of large corporations, and is the base for a vibrant fishing and sailing industry.

As an older industrial port, Waukegan has many abandoned properties dispersed throughout the city area, and some are brownfields. In the particular areas where these underused properties are located there is a noticeable deterioration in these neighborhoods, which has been a factor in attracting redevelopment. The US EPA saw the opportunity for economic, environmental and community redevelopment in Waukegan and selected the city for a \$200,000 brownfield pilot in 1998. In 1999, two more sites were assessed by the IEPA using US EPA section 128(a) funds.

In addition to the EPA Brownfields grant, in June 2002 Waukegan also received EPA USTfields funding through the State of Illinois/EPA. USTfields funds are used for assessing and cleaning up petroleum contamination from federally-regulated underground storage tanks (USTs) at idle or abandoned commercial properties. Petroleum contamination has historically been excluded from funding under Superfund, but these pilots receive up to \$100,000. For this pilot, the City of Waukegan is required to work directly with the State.

In addition, the City shares a \$3.5 million clean-up grant under EPA's Brownfields Cleanup Revolving Loan Fund program with the Illinois Coalition, which includes the State of Illinois and the cities of Canton, East Moline, Freeport, Galva, and Lacon.

Do you have an example of a brownfield redevelopment project in your community?

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## Impacts of Brownfield Redevelopment

### Economic Impacts

The benefits of brownfield remediation and redevelopment extend beyond removal of contaminants, in that it brings a site back to active use – returning it to the tax rolls, leveraging private investment, and creating businesses and jobs.

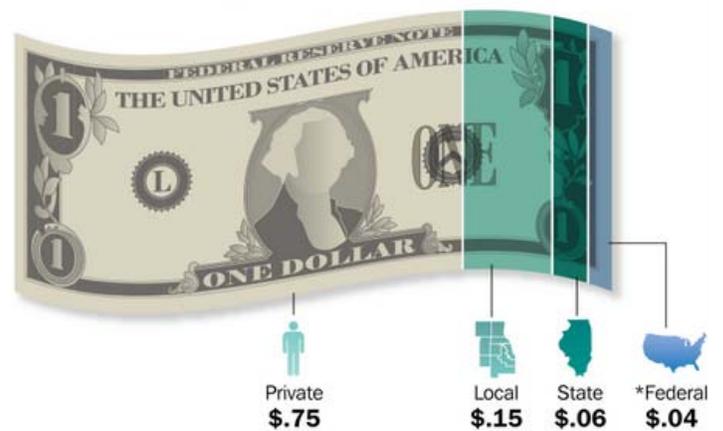
### ***Funds Leveraged***

State and local governments have joined the private sector in paying much more attention to outcomes and outputs of public investment, and efforts have been taken to measure the economic impacts of brownfield redevelopment. Some economic impact performance measures for brownfields redevelopment include the number of jobs created, the number of businesses created, the amount of private sector funding leveraged, or the tax revenues added. In a study focused on the state of Illinois, a detailed analysis of 37 brownfield redevelopment projects was done, attempting to quantify all of these measures. It investigated how projects were funded, and how various public (federal, state, or local) funds were leveraged to entice private investment (IIRA 2005).

The graphic portrays how, according to

## Investment breakdown for brownfield redevelopment in Illinois

Median amounts per every \$1.00 invested



\*Median calculated from the seven projects reporting federal investment.  
Source: Adapted from IIRA Brownfield Investment and Outcomes Survey, 2004-2005

the IIRA study, most investment in brownfield projects is from the private sector (\$.75 of every dollar). However, it is important to note that many projects are initially funded through public investment, which is often used to leverage this private investment. The study found median private investments upwards of eight times the initial public investment, depending on whether it was federal, state, or locally funded (IIRA 2005).

It is important to quantify how public funding leverages private funding, because brownfield redevelopment is essentially a private sector project, and communities may question its appropriateness. Furthermore, it is important to note how the ratio of public to private funding is highly dependant on the stage of the project. "For example, state investment often involves assessment costs early in a project and may represent a relatively high investment compared with the overall project cost. This is especially true in projects with serious contamination" (IIRA 2005). Initial public investment, although seemingly expensive at the time, can trigger major private investments in the long-term, thereby creating an economically viable opportunity. These ratios, and how they change over the life the project, are affected by how much is known about the contamination, whether the municipality purchased the property, and whether it tried to recover the initial investment in property.

The study found, that in Illinois, the investments by the public sector brought substantial returns, especially at the state level—a median return of \$16 in total investment per \$1 of state investment in the brownfield program. "While state investment does not necessarily cause private investment, the external funding can help the local government provide a productive economic environment suitable for business investment, thus representing a successful public-private partnership" (IIRA 2005).

### Job Creation

In addition to the amount of private and total investment, many brownfield projects also serve to create new businesses and jobs. IIRA's survey found that an average of 66 full-time equivalent jobs was created per brownfield redevelopment project (IIRA 2005). In addition, a national survey found that of the 72 cities that responded, approximately 83,171 jobs were created due to brownfield redevelopment (21,977 pre-development/construction jobs; 61,194 post-development/permanent jobs) (US Conference of Mayors, 2006). According to the City of Chicago, their Brownfields Initiative has resulted in more than 3,000 new jobs (Graham conversation, 2008).

Oftentimes, these jobs are created in neighborhoods where they are most needed. The US EPA has recognized the import of job creation in brownfield redevelopment and has initiated a grant program to support job training for environmental remediation and redevelopment in communities with numerous brownfields.

### Tax Revenues

Brownfield sites are often abandoned and vacant and therefore not producing tax revenues for the municipalities and other taxing jurisdictions. This loss of earnings potential is in addition to the other strains on the economic health of the neighborhood outlined below, making brownfields even more detrimental to a community. According to a national survey, 79% of respondents stated that increasing the municipality's tax base was a primary benefit of brownfield redevelopment. From the survey, 64 respondent communities determined that local tax revenues generated from redeveloped brownfield sites totaled \$233 million (US Conference of Mayors, 2006). The City of Chicago estimates that their Brownfields Initiative has increased the City's tax base by more than \$1 million annually (Graham conversation, 2008). Returning these abandoned sites to active use not only creates jobs and investment, but increases a community's tax revenue.

### Ripple Effect

When done well, a redevelopment project can prompt a series of investments in nearby properties and therefore extend the benefits to a wider area (Chilton 1998; Meyer 1998). The jobs and investments created because of brownfield redevelopment include only those that were direct effects, but these investments also cause a ripple effect throughout the local economy. One recent example found that the effects of brownfield redevelopment had a total output multiplier of 3.8, meaning that an additional \$1 generated because of the brownfield project is likely to lead to \$3.80 in total investment (NRTEE 2003).

### Other Benefits

In addition to quantifiable measures like tax revenues, job creation, and funding leveraged, anecdotal evidence points to the economic impacts of brownfields as well. For example, a frequent goal of brownfields programs is to bring new resources and previously unavailable products and services to the communities in which they are located – such as a needed grocery store,

drug store, health clinic or other amenity. Expansion of existing businesses or investment by new businesses, the slowing or reversing of economic decline, the increased earnings of surrounding businesses are also all indicators of success (ICMA 2002).

Do you think local communities should shoulder more of the costs of brownfield redevelopment? Or do you think the state or federal government needs to play a larger role?

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## Environmental Impacts

Much of the impetus behind redeveloping brownfields originated from the environmental sector. Superfund legislation, the precursor to current brownfield policy, was a response taken by the federal government to clean up hazardous, extremely contaminated sites after highly-publicized environmental incidents such as Love Canal and Valley of the Drums (DeSousa, 2006b). New regulations and technology to clean up brownfields have advanced significantly since then, resulting in more effective remediation, and eliminating or mitigating the effects of environmental hazards. In addition, with the increasing interest in sustainability, brownfields redevelopment has also begun to be seen as more than just a tool for cleaning up contamination, but also as a tool to reduce greenfield development and green the urban fabric.

### **Mitigating Environmental Hazards**

By meeting SRP guidelines for clean-up, the IEPA (and thereby, the US EPA) assures that the contamination is either removed or mitigated to safe exposure levels. But the environmental benefits of a cleaned-up brownfield site depend significantly on what contaminants were on the site, the site's location, and what is constructed on the newly cleaned site.

Many brownfield redevelopment programs, driven by economic benefits, have been focused on returning sites back to industrial and manufacturing uses. Sites are capped, physical barriers such as pavement are put in place to prevent exposure, steps are taken to prevent usage of groundwater, and the site is returned to active use. The encapsulation of contamination is an environmental benefit – not only does it prevent exposure to humans, it can also reduce the runoff of toxics into nearby water bodies, and therefore lead to improvements in overall water quality and habitat (US EPA, 2001).

But there has been new recognition that brownfield redevelopment also presents an opportunity for “greening” some of the most dirty industrial areas. Rather than returning a site to active use, some communities are using these sites to create opportunities for additional environmental benefits (DeSousa, 2006a). Municipalities like Chicago have started requiring energy-saving and recycling practices during demolition and construction, green building efforts, and open space set-asides on redeveloped sites; in return, the city assists with assessment, cleaning, or acquisition, or taking on the liability issues until the site is ready for redevelopment (Graham conversation, 2008).

Furthermore, some research has begun to quantify the social and environmental effects of transforming brownfields into parks. These “brownfield to green space” projects have the most potential for environmental benefits. Their benefits are comparable to any urban park, except that these sites tend to be located in areas woefully short of green space, and can have even greater impact. They can provide significant stormwater quality benefits, offering opportunities to create detention/retention ponds, constructed wetlands, or simply increasing infiltration within a very impervious urban area. The trees and vegetation growing on these sites work to reduce heat island effect, cooling neighborhoods during summer months, and cleaning the air, thereby resulting in improved air quality (US Conference of Mayors, 2001). These green spaces can also provide habitat opportunities, especially in urban areas, devoid of natural habitat. There is also an argument that these sites are “cleaner” because of the natural processes occurring on them, working to filter the contaminated soil and groundwater, rather than capping them with physical, man-made barriers (DeSousa, 2006b).



### **Increase in Infill Development**

Perhaps the most significant environmental benefit of brownfield redevelopment is the associated decrease in greenfield development. Brownfield redevelopment is sometimes called “recycling” of land because it provides an opportunity to utilize land within developed urban areas (US Conference of Mayors, 2006). This not only preserves the greenfield land at the periphery, but has subsequent additional environmental benefits associated with compact growth. Therefore, redeveloping a brownfield site is considered an infill project because it adapts developed but underutilized land and infrastructure for a new use.

Research has shown that, for every one acre of brownfield redeveloped, up to 5.6 acres of greenfield land can be prevented from development, depending on land use. Industrial land is at the low end of that range (every one acre of brownfield would require 1.5 acres greenfield land), whereas residential land is at the high end of that range (every one acre of brownfield

would require 5.6 acres of greenfield land) (DeSousa, 2002, 2006a; Deason, et al., 2001). According to this analysis, there are an estimated 36,000 acres of brownfields throughout the region. The region's brownfields have the potential to absorb significant amounts of development (Simons, 1996).

Staving off the consumption of greenfield land can result in preservation of open space, which has many environmental benefits. For example, water quality is intimately linked to infiltration and impervious surface, so limiting development in these greenfield lands could prevent water quality degradation. A study done in Chicago found that placing a hypothetical low-density development on the urban fringe would produce ten times more runoff than high-density development in the urban core (Hagler Bailly, 1999). Water quality and open space preservation are closely tied to habitat and biodiversity, which would also benefit from decreased land consumption for development.

In addition to the environmental benefits of reducing the consumption of greenfield land, there are environmental benefits of promoting compact, [infill development](#). Compact development affects travel activity, which translates to improved air quality. Dense, compact development promotes walkability and allows more access to transit, which can reduce automobile use and vehicle miles traveled (Harbor et al, 2000). In comparison to low-density development at the urban periphery, compact, infill development causes trip lengths to be shortened. Furthermore, compact development also reduces the need for people to own vehicles, translating in reduced parking needs and consequently less impervious surface. Research quantifying the costs of brownfields redevelopment in comparison to greenfield development estimates that this reduction in travel and its externalities (congestion, noise, parking, emissions) is the most significant public benefit of brownfields redevelopment for both industrial and residential development (DeSousa, 2002).

Do you think brownfields are a key environmental concern facing our region?

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## Impact on Community Development

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In addition to the environmental and economic benefits of redeveloping brownfields, perhaps an undervalued benefit is the impact on the community. Brownfields can transform a neighborhood problem into a source of community pride and value, translating into higher property values, more housing options, increased public health, and decreased crime.

### ***Increased Property Values***

There is evidence that redeveloping a brownfield site can result in higher property values, not just on the site itself, but also on neighboring properties. Like any neighborhood improvement, redevelopment of a brownfield site has the potential to transform an eyesore and a liability into a community asset, reflected in the neighbor's property values. This hypothesis has been evaluated in other communities throughout the country, and the results seem to point to its validity.

For example, in Woburn, MA, a study and statistical model measured the impact of two brownfield redevelopment projects on house values and prices, as well as "willingness to pay" values on externalities like air quality. Using data on single-family home sales in Woburn from 1975 to 1992, the house prices were measured in the phases of discovery, pre-cleanup, clean-up, and post cleanup, all of which were factors in the statistical model. The total benefits of redevelopment were calculated by evaluating the average house prices in relation to the distance from the brownfield.

The results revealed that the increase in home prices outweighed the costs of redevelopment. Housing prices were found to have increased in increments based on distance, after announcements of action toward redevelopment. After calculating benefits by census tract and totaling all census tracts, the gross benefits were calculated to be \$122 million near one site and \$72 million near the other. Total costs were estimated at over \$70 million for both sites, but when the costs were spread out over a ten year period and discounted, they decreased to approximately \$47 million. Thus, according to this statistical model and research, the total benefits outweighed the cost of clean-up in Woburn (Kiel and Zabel, 2001).

### ***Affordable Housing and Housing Mix***

Brownfield redevelopment is viewed by both private and public investors as an opportunity to revitalize communities. This includes creating more residential options and affordable housing, especially in areas with existing amenities or infrastructure. However, "while a significant amount of consideration has gone into policies and programs to encourage [brownfield] redevelopment that creates jobs and new taxable activities, little has been done to take full advantage of the potential socio-economic and environmental opportunities that residential redevelopment on these sites can bring about" (DeSousa, 2006a).

One reason for this may be the challenge of obtaining Federal Housing Authority (FHA) insurance for brownfield sites. The current laws on brownfield redevelopment housing require that the developer completely clean-up the site before obtaining insurance from FHA. (Schopp, 2003) Furthermore, HUD has different sets of standards and guidance regarding cleanup than states. HUD uses the Multifamily Accelerated Processing (MAP) for residential standards which will not allow engineering or institutional controls or caps over contaminated sites, but the majority of states in the country allow engineering and institutional controls under certain circumstances (Schopp, 2003). In Illinois, the IEPA determines cleanup standards for redevelopment, and it differs significantly from HUD's MAP standards. IEPA requires "removal of contamination and replacement of just three feet of soil versus twelve feet mandated by HUD..." (Schopp, 2003). Thus the costs for a HUD multifamily project on a brownfield site could potentially be 10-15 times more expensive (Schopp, 2003). Aligning standards

and acquiring federal dollars toward a redevelopment project makes the project more affordable to developers, ensures nationwide consistency, and allows cost-savings to be passed along to the potential home owners.

### ***Affordable Housing and Brownfields in Houston***

Houston, Texas has an example of a success story for a brownfield redeveloped into affordable housing called Washington Courtyards. A survey was conducted which found affordable housing to be a critical need in the neighborhood. In August 1989, five underground storage tanks were found on a potential site. The tanks were removed and contaminated soil was excavated with LUST funds from the US EPA. In 1998, the soil was tested again and the levels of contamination were low enough to receive approval by the State of Texas for residential reuse of the land. The city partnered with nonprofit groups as well as private consultant firms to gain the most benefit. Currently, there are 74-units of mixed-income housing built on this former brownfield (Schopp, 2003).

Although residential housing is a priority of brownfield redevelopment, there are instances where development has led to the displacement of residents, when property values increased significantly and housing became unaffordable for many families. In Pittsburgh, brownfield redevelopment of an island that was once an industrial center is now a seven-acre residential development with close to 100 townhomes. "Homes on the island originally sold for \$50,000 and now are being sold for \$650,000" (Schopp, 2003), a 1200% increase. It is important to consider affordability with any residential brownfield redevelopment projects.

Despite these barriers and challenges, the region has pursued residential redevelopment of brownfields and affordability. In a study focused on Chicago, 52 residential brownfield redevelopment projects were completed or in the latter stages of planning and development from 1997 to 2004, generating 7,362 units. Almost 36% of the units (2,653) were affordable. Furthermore, many of the projects mixed market rate and affordable housing, and were scattered throughout the City. These mixed projects generated about a third of the overall affordable housing units studied (DeSousa, 2006a). This is a much greater percentage of affordable housing than the majority of cities throughout the country.

### ***Impact on Public Health***

Public health is a major concern of idle brownfields. Oftentimes at brownfield sites, health hazards, in the form of leaking gas or contaminated water, are not detectable by residents and thus even more ominous, especially with long term exposure. As brownfields continue to capture interest and funding for redevelopment, the health impact on surrounding communities is being investigated. This is often viewed through the framework of "environmental justice," which is based on the principle that all people should be protected from environmental pollution and they have the right to a clean and healthy environment (US EPA 3). It is commonly found that many neighborhoods already facing isolation and disinvestment also face the challenge of brownfield redevelopment.

Under the 2002 Brownfields Law, public health and health monitoring were included as activities to promote cleanup and redevelopment. The law allows the local governments to spend up to 10% of brownfield grants for "(i) monitoring the health of populations exposed to one or more hazardous substances from a brownfield site; and (ii) monitoring and enforcement of any institutional control used to prevent human exposure to any hazardous substance from a brownfield site" (US Code, Section 104(k) of CERCLA).

Additionally, examples of proposed activities for US EPA brownfield grant use include:

- Blood lead testing in the target community in collaboration with the city and state lead programs and asthma tracking in school children;
- Examining vital statistics in areas near brownfield sites;
- Testing of air and water with health agencies based on assessment results; and,
- Assessing community progress in meeting Healthy People 2010 objectives, national health goals of the Department of Health and Human Services that serve as the basis for state and community health plans, as they relate to brownfields communities (US EPA 2006).

### ***Impact on Safety and Crime***

### ***Brownfields as a Public Health Threat and Environmental Justice Concern in Baltimore***

A study based in southeast Baltimore found 182 vacant industrial sites, many of which had historical uses of recycling and manufacturing, making them likely candidates for brownfields. After thorough examination of city health records (population of 45 years or older between 1990-1996), it was found that the leading causes for mortality in the area were heart disease, total cancers, diabetes, COPD, influenza, pneumonia, and liver disease. Additionally the records of the departments of waste management, water management, air and radiation, and real estate tax assessments were also examined during this study to further assess the sites. Although a claim cannot be made that the existence of brownfields caused any deaths, it was found that in communities living in the worst (?) brownfield zones, when compared with those living in lower zones, there were statistically higher mortality rates due to cancer and respiratory diseases, and other major causes such as liver disease, diabetes, and stroke were also in excess (Litt, Tran, Burke, 2002). These illnesses corresponded with the effects of substances found at brownfield sites during a chemical inventory. Some of the more dangerous chemical substances included lead, nickel, chromium and polychlorinated biphenyls. Overall, of the 105 substances found and examined, 68% had indications of respiratory effects, and 66% had indications of neurological effects (Litt, Tran, Burke, 2002).

These findings were even more interesting because Southeast Baltimore is also highly populated by minorities and lower-income residents, as compared to surrounding areas (Litt, Tran, Burke, 2002). This raised concerns of an environmental injustice to area residents, demonstrating that public health risks of brownfields may more commonly afflict minority and low-income groups.

Another aspect of brownfield redevelopment is the opportunity to improve a sense of community, increase safety and decrease crime. In many cases, especially in urbanized and low-income areas, brownfields take away from the “livability” of a neighborhood. “A livable place is safe, clean, beautiful, economically vital, affordable to a diverse population, and efficiently administered” (Balsas, 2004). When brownfields are left unmanaged and undeveloped, this can lead to negative results in a community. Vacant properties in general are often tied to crime, and the costs of responding to and addressing crime can be significant for municipalities.

In addition, there is the necessity of public maintenance on these abandoned properties, involving cleaning up trash and other illegal dumping. These costs can add up to millions of dollars invested by the city or state to keep these grounds manageable. For example, Detroit has spent \$800,000 each year to clean up vacant lots (National Vacant Properties Campaign, 2005). The response by some states and cities has been to encourage volunteerism around clean-up programs and increase opportunities to rehabilitate housing structures that are vacant. Programming also includes the push for redevelopment and clean-up of brownfields by both private and public organizations.

What health or safety concerns do you have regarding brownfields? Who is responsible for ensuring these sites are clean and safe?

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## Conclusion

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Brownfield redevelopment is a prime example of sustainable development. It can result in economic, environmental, and social benefits, all of which are equally important for a successful project. The region recognizes this, and several local, state, and federal programs have been extremely successful in working to redevelop brownfields. However, as the maps portray, the problem is pervasive. Furthermore, although federal funding is steady, state funding, a critical component in initiating assessments and leveraging funding, is drying up. There is a challenge in prioritizing communities or projects.

Do you think the federal, state, and local programs are working well?

Do you think that brownfield redevelopment should be funded primarily by federal, state, or local dollars?

Is prioritization of communities or projects necessary? Or should it be “first come, first serve”? What factors should be used in prioritization (health impacts, economic potential, market support, others)?

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## Appendix

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### **Methodology**

The relevance of three chosen data sets (TRI, LIT, and RCRA) has been substantiated by previous research and interviews with professionals in the field. Other data on the environmental condition of land is available and would be useful to identifying potential brownfields, however due to the format and accessibility, it was not possible to utilize much of this data for a regional analysis. For example, the Facility Compliance Tracking System (F.A.C.T.S.) is a database managed by the IEPA that tracks facilities in noncompliance of certain environmental regulations and codes. Additionally, the IEPA manages a comprehensive database, known as the Inventory, that lists all sites in the IEPA data management system with some activity or status that requires them to report to the IEPA. Both these datasets have potential to be useful in identifying potential brownfield sites, however acquiring the data in a format for a regional analysis was not feasible for this research, and so other more useable relevant data was selected, further described:

#### *Toxic Release Inventory (TRI)*

The Toxics Release Inventory (TRI) is a publicly available U.S. EPA database that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities. The database fulfills the legal right of residents to have access to information on toxic chemicals being released in the environment, as required by the federal law: Emergency Planning and Community Right to Know Act. The inventory of sites includes information on the release of nearly 650 chemicals and chemical categories from manufacturers, metal and coal mining facilities, electric utilities, commercial hazardous waste treatment, and other industries with activities that warrant environmental concern. A facility must report to TRI if the following conditions are met:

- Has 10 or more full-time employees, and
- Manufactures or processes over 25,000 pounds of the approximately 600 designated chemicals or 28 chemical categories specified in the regulations, or uses more than 10,000 pounds of any designated chemical or category, and
- Engages in certain manufacturing operations in the industry groups specified in the U.S. Government Standard Industrial Classification Codes (SIC) 20 through 39.

The TRI data used in this research is current as of January 2008.

#### *Hazard Waste Handlers (RCRAInfo)*

The information in the hazard waste handlers database comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities. This data on hazard waste handlers is released by the U.S. EPA, managed in the Resource Conservation and Recovery Act Information (RCRAInfo) inventory. In general, all facilities that generate, transport, treat, store, or dispose hazard waste must provide information about their activities to state environmental agencies. The U.S. EPA collects and manages all records in an online database which can be queried by facility name, geography, NAICS code, and type of processes reported. The IEPA administers a clean-up program specifically for sites that have contamination under the RCRA corrective action program. The RCRAInfo data is current as of January 2008.

#### *Local Incident Tracking (LIT)*

The Illinois EPA manages a funding program and database for records of Leaking Underground Storage Tanks (LUST). The Leaking Underground Storage Tank Incident Tracking (LIT) database identifies the status of all Illinois LUST incidents reported to the Illinois Emergency Management Agency (IEMA) and to the Illinois Environmental Protection Agency. An Illinois EPA staff person explained that when an underground storage tank is being removed or an investigation of the land is undertaken and it is discovered the tank has been leaking, the incident must be reported to the IEPA. The LUST is recorded in the LIT database and remains in the database until it has been resolved. Once it has been remediated, it would be removed from the LIT database, and if appropriate, be moved into the Site Remediation Program database. The LIT data is current as of January 2008.

#### **Assumptions and Land Type**

In order to implement such a typology on a regional scale, several assumptions needed to be made. To identify the sites where contamination may exist and the site is not in current use and thus are assumed to be in need of redevelopment, i.e., vacant or tax-exempt publicly owned vacant land and vacant buildings, tax assessment data for each of the seven counties was used. A parcel was identified as vacant if the improvement value on the parcel was zero or if the assessor's data included a vacant class description. A parcel was considered exempt if the class description included exempt status, otherwise parcels that had a land value of zero were considered exempt. Many functional sites are tax exempt, including schools, hospitals, parks, municipal buildings, and forest preserves. To increase the accuracy of identification of land that may be in need of redevelopment, NIPC's 2001 land use inventory was used to screen out such functional tax exempt sites.

#### **GIS Functionality**

In order to analyze and evaluate the data used in this research, GIS was used extensively. Each layer of information required organization and filtering to create a valuable dataset. The data could then be mapped to provide a spatial analysis and recognize any trends and patterns in the location of potential brownfields and the location where land remediation has occurred.

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