

POST-INDUSTRIAL PLACE THEORY:
ADVOCATING FOR HOLISTIC US BROWNFIELD POLICY

by

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(Under the Direction of Douglas Pardue)

ABSTRACT

Post-Industrial site redevelopment is encouraged by the Environmental Protection Agency's brownfield policy which is based on environmental cleanup and the economic costs associated with its redesign. Current policy excludes the inherent historical value of post-industrial sites and their unique social and aesthetic attributes. This thesis explores the viability of incorporating a more holistic approach into existing US brownfield policy. Equal evaluation weight for the ecological, economic, social aesthetic components of redevelopment cumulate in a newly created Matrix that is rooted in theory, interviews and a scholarly literature review. Seven case studies are analyzed for their proximity to the urban core, their varied redevelopment approach and the presence of both structures and contamination on-site. This Matrix offers a new perspective for successful redevelopment and prompts conversations for designers, planners, developers, government entities and local communities about their role in brownfield redevelopment.

INDEX WORDS: Post-Industrial Sites, Sustainability, Brownfields, Urban Revitalization, Aesthetics, Landscape Architecture, Sense of Place, Urban Planning, Temporal Design

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MASTERS OF LANDSCAPE ARCHITECTURE

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DEDICATION

I dedicate this thesis to my family for their unyielding support and love for me throughout this entire process. To Christopher for always making me feel happy, loved and safe. I look forward to all the twists and turns along the road ahead.

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CHAPTER ONE

INTRODUCTION

“Nothing seems so senseless as the neglected industrial plant rundown and abused. Perhaps it is scale. Massive walls and towering stacks, and other paraphernalia of industrialism, speak of technical and organizational sophistication. To see them derelict is to see failed dreams: prosperity gone awry not just for the entrepreneur, but for collective of dependent individuals” (Jackle and Wilson 1992, 86).

Abandoned, neglected industrial sites are commonplace in all major cities throughout the United States. Often these large tracts of derelict land are flanked with suffering neighborhoods that once appeared as thriving social communities. Observers may think, how did this happen? Where did the industry go? If our elders were consulted, they would tell stories of vitality and the road to decline. A common perception of these sites is they are reflections of prosperity and growth for our country that now symbolize a national weakness. Abandoned, post-industrial sites remain icons of another era that can be rewoven back into productive spaces through contemporary planning and creative urban design efforts. Post-industrial sites should be viewed as an opportunity to revitalize and re-energize derelict places. Unfortunately, the issue of redevelopment becomes complicated by contamination from the raw materials produced on them. The sites are often viewed as polluted so the response is intense environmental cleanup while ignoring other culturally significant layers.

The industrial revolutions spawned the environmental movement in the United States. A seminal publication helped spark social change by illustrating the negative affect of chemical activities associated with fertilizers, pesticides, fungicides and herbicides on song bird populations. Rachel Carson published Silent Spring in 1962 challenging agricultural practices regarding the use

of synthetic chemicals. Her work has become one of the most influential books in the 20th century. She courageously sought to remind the public how vulnerable humans are within larger ecosystems and natural environments. Her elegant prose was substantiated by scientific research. Carson testified before Congress in 1963 hoping that new legislation and policies would begin to protect human health and the environment. Although President Nixon was facing an unpopular war and recession, he responded to public concern for environmental issues and established the Environmental Quality Council and the Citizens' Advisory Committee on Environmental Quality. The *National Environmental Policy Act of 1969* (Public Law 91-190) was the first major piece of American environmental legislation and solidified the need for a new government environmental agency. As rising concerns for the environmental crisis continued to intensify, former Senator Gaylord Nelson, a Wisconsin democrat (1959-1963) turned activist, sought to create a national day of observance for the environment now referred to as Earth Day. This nationwide grassroots demonstration was first held on April 22, 1970. The Environmental Protection Agency was established on soon after on December 2, 1970 and its main function was to treat water, air and solid waste (Lewis 1985). Over the next four years Congress responded to their constituents outcry and passed the *Clean Air Act* (Public Law 91-604), *Water Pollution Control Act* (Public Law 92-500), and the *Endangered Species Act* (Public Law 93-205). As public outcry rallied to ban dichlorodiphenyltrichloroethane (DDT), pollution from industrial sites raised awareness for public safety. The Environmental Protection Agency ultimately was given power to address the pollution and hold polluters accountable for their actions.

According to the Environmental Protection Agency, in 2005 there were more than 600,000 abandoned and contaminated waste sites identified within US cities (Berger 2006). The EPA uses the term brownfields to soften negative connotations associated with the word "contaminated." The most recent definition was signed into law in 2002 and states brownfields are "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” (Public Law 107-118, H.R. 2869). Post-Industrial sites are often classified as brownfields because of the actual or perceived presence of contamination. Since the EPA’s enactment in 1970, the agency has been instrumental in defining the problem and adapting its policy to reflect public sentiment. Initially the concern was health related but as an ecological understanding emerged, environmental policy began addressing the economic factors associated with post-industrial sites. The EPA’s more recent role in brownfield redevelopment is to remove the contamination and prepare the site for redevelopment. Unfortunately, the agency is not equipped to directly address the social implications of brownfields on local communities. However, environmental and economic development are intimately interconnected to residents and affected populations. This demonstrates a need for a holistic approach to brownfield redevelopment. Sustainability was the first attempt at a well-defined holistic approach to new development and redevelopment of properties.

Sustainability was first defined in 1987 at the World Commission on Environment and Development and is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (<http://www.arch.wsu.edu/09%20publications/sustain/defnsust.htm>). The three main pillars of sustainability are social justice, economy prosperity and ecological health. Within the last 20 years, landscape architects, planners, engineers, politicians and the general public have gained an understanding of how to effectively engage with these complicated sites. The professionals seized the opportunity to transform contaminated sites into artistic expressions of sensitive design and healthier places. Landscape Architect Elizabeth Meyer has recently argued the aesthetics of design should be an equal component of the sustainability discussion.

Post-industrial sites are icons of another era. The historic preservation movement in this country is an example of a theory and practice that has its roots in sustainability and its similarly timed national legislation, is often viewed negatively. It is seen as an impediment to progress and new growth. However, nothing could be further from the truth. This movement is rooted in public awareness which resulted in successful protective legislation. It is more than “mothballing” brick mansions with grand white columns as house museums. Historic preservation gives us our first glimpse at the multi-factorial issues surrounding the destruction of post-industrial sites. Unfortunately, the cultural significance and unique aesthetic components of industrial sites have not fully been incorporated into redevelopment policy.

Thesis Question and Research Methodology

This thesis explores the viability of incorporating a more inclusive approach into existing EPA brownfield policy. Its primary focus is on post-industrial sites from the second Industrial Revolution era within cities’ urban core. The purpose of this investigation is twofold: One is to establish the inherent historic value for post-industrial sites while demonstrating their social and aesthetic significance. Two is to test if their inclusion in a holistic approach is more successful than the current ecological-economic based approach. Although the term “holistic” has been diluted in the same way “sustainability” has, the definition remains clear. Aristotle summarized the term holism as “the whole is more than the sum” (<http://en.wikipedia.org/wiki/Holistic>). If all contributing factors of brownfield redevelopment are considered, this thesis seeks to see if the whole physical, biological, ecological, social and mental systems benefit struggling communities more than just a compartmentalized perspective. This investigation shows how cities developed due to industry and its impact on the social urban fabric to offer a new critique on our current approach.

Chapter 2 explores the impact of the Industrial Revolutions and the deindustrialization of American cities. The historic location of industries illustrates how industrial sites have become

significant locations for redevelopment. This chapter will explain the Environmental Protection Agency's current brownfield redevelopment process. What follows is an examination of the barriers to EPA policy and how social and aesthetic issues relate to project success.

Chapter 3 moves beyond property lines and explores contextual brownfield redevelopment. The viability of a holistic approach is contingent on communities acknowledging the historic and cultural connections to post-industrial sites. Environmental, historic preservation and the civil rights movements were all grassroot efforts which led to progressive policy changes. There is power when public education teaches the importance of brownfield sites. Effective advocacy is necessary for legislative change. Social and aesthetic qualities of post-industrial sites, once explored lead to the heart of this thesis. A newly created matrix test how successful recent brownfield redevelopment projects are based on developed criteria.

Chapter 4 eliminates previous perceptions of success based solely on environmental and economic-based merits. The new system for analyzing and evaluating post-industrial case studies is through a matrix that grants equal evaluative status in four categories: ecological, economic, social and aesthetics. There are many ways to approach post-industrial sites and a system to strive for a bridging various disciplines is more effective. The purpose of this matrix is to evaluate post-industrial sites' success when a holistic approach is taken in redevelopment scenarios. Gas Works Park in Seattle, Menomonee River Valley in Milwaukee, Sloss Furnace in Birmingham, Bethlehem Steel in Bethlehem, Atlantic Station in Atlanta, Duisburg-Nord Landschaftspark in Duisburg, and Westergasfabriek Cultuurpark in Amsterdam were chosen for their diverse approaches to redevelopment, proximity to urban centers, and the presence of historic structures, cultural significance and contamination. One gleans lessons by studying sites with criteria based in design theory, personal interviews, and applied research. Chapter 5 evaluates each of the case studies and offers detailed descriptions for their ranking. The intent of this process tests the validity of a

proposed holistic approach that resonates with post-industrial site designers, policy makers and both public and private stakeholders.

Based on the results from the matrix, the final chapter seeks to offer suggestions for improving current US brownfield policy through community-based design. The power of communities and how local history can redefine their future growth is explored. This chapter will propose new partnerships and stakeholders to facilitate brownfield revitalization.

CHAPTER TWO

THE ENVIRONMENTAL LEGACY OF POST-INDUSTRIAL SITES:

The Rise, Fall and Rebirth of the Industrial City

“To understand the [creation of large tracts of derelict industrial brownfield lands in the urban core] and the implications it might have on reindustrialization efforts, it is instructive to unravel the historical reasons for the tendency of manufacturing industries to locate initially within the urban cores and then to move out.” (Christopher DeSousa 2008, 216)

Environmental policy is ever-changing depending on the public's needs and opinions. The EPA is the federal agency charged with permitting, regulating and the environmental assessment for post-industrial sites. The EPA operates in tandem with other federal agencies and their state-level counterparts. This chapter offers an understanding of the events that established the EPA's responsibilities. The Industrial Revolutions are credited with the advancement of many things such as medicine, architecture, agriculture, textiles, labor laws, building codes and fire and safety regulations. However in the later part of the 20th century, contamination and environmental degradation became linked to the industrial eras. “Post-World War II sentiment against dirty industries in favor of clean businesses such as offices, banks, and brokerages led to public policy that also catalyzed urban industrial attrition” (Doyle 2002). Opinions against “dirty” industries indicated a shift in the American mindset and sparked a new sentiment for the physical appearance and visual character of our cities. The EPA adapted their policy to combat sprawl and assist in urban revitalization.

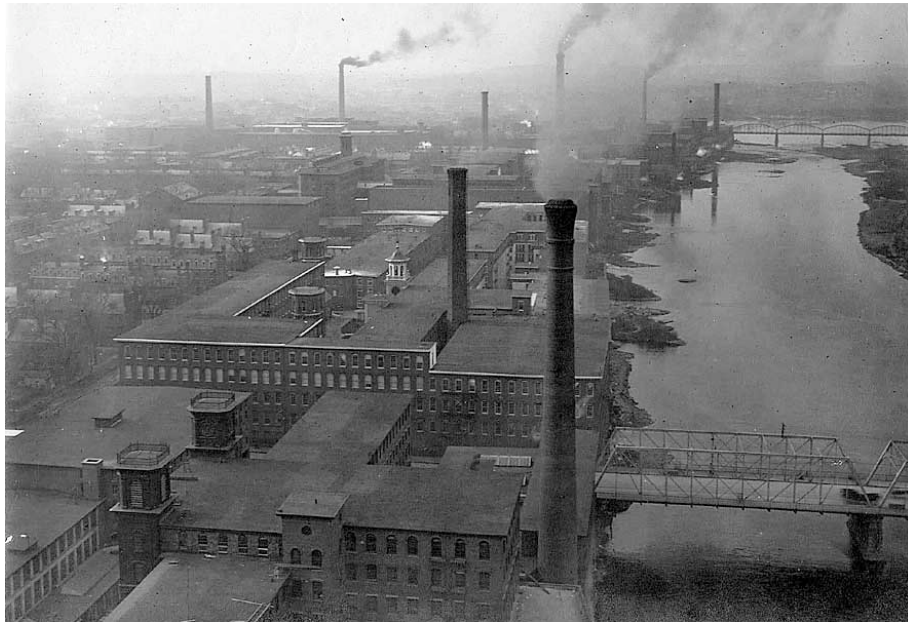


Figure 2.1 Lowell, Massachusetts in 1910. Courtesy of the Locks and Canals Collection, Lowell National Historical Park.
(<http://www.historycooperative.org/journals/sia/31.1/malone.html>)

The Industrial Revolutions

The United States has had two major Industrial Revolutions since 1776; the first occurring between 1820-1870. The trade embargo Great Britain levied on the US in 1807 and the War of 1812 caused America to seek greater economic independence through new discoveries and inventions. Advances such as Eli Whitney's cotton gin and Elias Howe's sewing machine in 1846 revolutionized the textile industry, while the expansion of the railroad and the steam engine enabled goods to be transported throughout the country. By effectively harnessing electricity, manufacturing shifted away from home production to factory-based enterprises. The Industrial Revolutions changed the human relationship with the environment. The earth's resources were viewed as commodities for harvesting and created a materialistic lens used focus an understanding of US capitalistic society. The inventions and advancements of the first Industrial Revolution were primarily focused on agriculture, textiles, and transportation. The building forms of that era did not

vary from previously built structures except for their larger footprints to accommodate the mass production of goods (Figure 2.1). The first Industrial Revolution in the United States was interrupted by the Civil War (1860-1865) and left many of the developing cities, especially in the South, in disrepair and poised for expansion during the next Industrial Revolution.

The second Industrial Revolution is often seen as a continuation of the first, lasting from 1870-1914. The revolution ended at the beginning of World War I, when resources shifted to making military weapons and machinery. None of which would have been possible without advancements in science.

“The first Industrial Revolution -- and most technological developments preceding it -- had little or no scientific base. It created a chemical industry with no chemistry, an iron industry without metallurgy, power machinery without thermodynamics. Engineering, medical technology, and agriculture until 1850 were pragmatic bodies of applied knowledge in which things were know[n] to work, but rarely was it understood why they worked” (Mokyr 1998, 3).

Understanding chemistry enabled new inventions such as rubber, aspirin, and plastic to be introduced into the daily lives of the common man. Development of new processing techniques catapulted steel into the premiere building material for railroads, machinery, and architecture with the slag byproduct being used as agricultural fertilizer. The development of steel framing, industrial grade glass, and curtain wall construction allowed for taller, open structures altering the city skyline and reshaping modern architecture. Curvilinear shapes were no longer theoretical and new architects emerged at this moment with groundbreaking designs. These technological advancements required new machinery and facilities to be invented to support the innovations of the time. The second Industrial Revolution sparked a shift in aesthetics and created the industrial landscape. Unlike anything seen before, the results were sublime, larger than life, and dangerous. In search of a new life and employment in factories, people began to relocate from rural towns to emerging cities. Bethlehem, Pennsylvania and Birmingham, Alabama were cities that were constructed around the steel industry and those businesses influenced all aspects of life.

During the Industrial Revolutions, practicality and common sense led industries to choose parcels for their proximity to transportation corridors, waterfronts, and highly populated urban centers. In Christopher DeSousa's book Brownfields Redevelopment and the Quest for Sustainability, he describes *normative industrial theory* as one based on rational decision-making on the executive level. Economic theorist Max Weber stated, "the best location for a firm is one where the cost of transporting raw materials and manufactured products in and out of the location are minimal" (De Sousa 2008, 222). Policy and land-use planning gave priority to industries, granting them access to waterfronts and railway infrastructure, allowing them to import new supplies and raw materials. Industry was able to transport their products out to the marketplace cheaply and efficiently, while providing employment for city dwellers.

Atlanta: An Example of Normative Industrial Theory

The City of Atlanta, Georgia is an example of *normative industrial theory* and explains why a majority of local brownfields are located within the urban core and along rail infrastructure. The fall line is a 20 mile wide geographical boundary running from Columbus to Augusta (The New Georgia Encyclopedia) that hindered early commerce upstream throughout the Piedmont region. The fall line's waterfalls created economic clusters along the line for each of the major rivers; Columbus on the Chattahoochee River, Macon on the Ocmulgee River, Milledgeville at the Oconee River, and Augusta on the Savannah River. Once materials left the waterways, they could easily be transported via railroad. Originally, Atlanta was named Terminus because it was the last stop on a rail line from Chattanooga, Tennessee. By 1846, additional lines converged on Atlanta, spurring industrial growth. After the Civil War the lines were rebuilt and by the turn of the century, more than 150 trains passed through Atlanta daily. Railroads were Atlanta's local economic lifeblood. The city's population grew and the rail lines connected Atlanta to distant markets, shaped its physical layout, and supported Atlanta's grandiose claims to being the "Gate City" to the region and the "Chicago of the South" (New Georgia Encyclopedia).

The industrialization processes in Atlanta are similar to cities throughout the United States. They occur at a regional level with communities joining together for the extraction and exchange of resources to build stronger economies. This created a source of pride and identity for locals. Over time the historic location of industry began to shift and extensive migration from the urban core to the suburban periphery occurred. After World War II there was a noticeable shift as industries began to migrate away from the highly populated industrial city causing deindustrialization and disinvestment in once thriving cities. For Atlanta, the significance of the railroad and the industries along their corridor have now become the majority of the city's brownfields as shown in Figure 2.2. The light brown line is historic rail lines in Atlanta currently being redeveloped through the Beltline Initiative.



Figure 2.2 Atlanta Brownfields. (Created by the author on <http://gis.atlantaga.gov/gishome/>, 2010).

Deindustrialization

The causes of deindustrialization in the United States are a heavily debated issue in academia and policymaking. It was a process that occurred incrementally while working within the constraints of our capitalist economic structure (Bluestone & Harrison 1982). The term

deindustrialization was originally coined to mark the transition from manufacturing to more service-oriented industries and the systematic disinvestment of the nation's productive capacity. There is still industry in the United States but our new industries aren't producing the same forms of legacies as the Industrial Revolutions. The popularity of the automobile increased and the new highway infrastructure enabled company executives to expand the search beyond the more expensive and limited space of the urban core. "Our 'post-Fordist' industries are poorly constructed, contribute to further sprawl or horizontal development via highway development" (Berger 2006, 47).

Historically there was not a shortage of cheap labor in the urban center and as skilled workers began to unionize, companies sought other means to increase their profits. Industries began to relocate to the less congested, suburban land closer to where their executives lived. Industries were shifting away from mass production requiring more mental labor force as opposed to the previous physical-based labor. Smaller, more specialized value-added companies required less production space and fewer, more skilled workers. This enabled them to remain clustered together in the urban core. However, larger, more capital-incentive companies were attracted to the peripheral areas where standardized products could be constructed cheaply and parts were easily and quickly distributed. The result has been the gradual replacement of human labor with technological processes reducing the need for industry to remain located in the urban areas. America's quest for "new" and our predisposition for valuing development as progress, pushed industry further away from its initial, historic location. As a consequence to plant shutdowns, extensive areas of underutilized or vacant industrial land and buildings (Jackle & Wilson 1992) were left as artifacts serving as a link to our historical industrial past.

EPA: An Environmental Response

Although science enabled new technologies and inventions to be produced during the Industrial Revolutions from raw materials, little to no advancements were made to appropriately

manage the byproducts. Policy makers and the public had no comprehension of the long-lasting impacts this production would have on the environment. The environmental catastrophe of industrial sites was made public when health concerns were raised in the mid-late 20th century. The Love Canal incident in the late 1970s in New York brought industrial practices to the forefront of public awareness. Over 21,000 tons of toxic chemicals were dumped into a canal by the Hooker Chemical Company 30 years before the substances began to seep into the basements of local homes and schools. The public outcry surrounding this issue prompted the federal government to pass new legislation known as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This granted the EPA the authority to cleanup contaminated sites posing a risk to human health and the environment (Greenstein & Sungu-Eryilmaz 2004).

Early EPA policy often required sites be restored to natural levels of predevelopment standards, which further drove private-led development on greenfields or undeveloped properties outside the urban core. There was no incentive to build on the centrally located contaminated sites. The problem is post-industrial sites do not occupy a block or street but square miles of often contaminated land. This prompted the EPA to change its approach to post-industrial sites as they realized the physical locale of the industries was of the utmost significance. Initially, the EPA responded only to the environmental aspects, but now its approach included both environmental and economic.

EPA: An Environmental and Economic Response

The shift in relocating industry outside the urban core paralleled the increase in suburban living during the 1960s and 1970s. This trend led to additional sprawl and impeded early revitalization efforts due to the negative perception of urban areas. As more people started living in suburbia, brownfield redevelopment became inextricably linked to future land use policy and a

way to combat sprawl issues. In 1995, the EPA established Brownfield Pilot program to assess the viability of reusing contaminated industrial sites.

The EPA adjusted its legislation to entice more redevelopment by requiring sites be cleaned to heavy industrial standards. Developers may complete additional remediation if their plan calls for commercial or residential components. The EPA's mission is to cleanup contaminated sites and prepare them for redevelopment. Policy has shifted to educate lenders, developers, and the public about the benefits of brownfield redevelopment such as increased property values, job creation, higher tax revenue, preserved greenspace, and pollution remediation (Brachman 2004).

Advancements in Brownfield Legislation

Congress enacted the Community Reinvestment Act (CRA) in 1977 to boost national efforts in the stabilization of declining urban areas by requiring lenders to make capital available to low to moderate income neighborhoods. This enabled more localized reinvestment by alleviating potential liability concerns from financial lenders and developers. In 1995, the Brownfields Action Agenda further expanded CRA legislation by creating community development loan credits as incentives for redeveloping within urban areas. As the EPA progressed in understanding how to manage hazardous materials associated with industrial processes, pro-active legislation was created to prevent more sites from becoming potential brownfields. Although, the Resource Conservation and Recovery Act (RCRA) does not address historic abandoned sites, it is an important step in brownfield legislation. As industrial sites are no longer needed for their current operations, the EPA, state and local partners are collaborating to find new approaches to the cleanup and development processes for sites with underground hazardous waste storage tanks. For certain larger sites, their location along waterfronts or transportation corridors provide special reuse opportunities such as recreation and innovative water treatment solutions. These parcels are more likely to have concentrated areas of contamination versus the entire site being polluted. In

these situations, the industries can continue operations while uncontaminated portions can be redeveloped (Brachman 2004). This allows for new technologies to be developed and lessens the immediate costs of cleanup.

Prior to the 2002 Small Business Liability Relief and Brownfields Revitalization Act, Federal funds could only be allocated for the assessment of brownfields. However House bill 2869, enabled Federal funds to be used for site assessment and provided liability relief “for minimally polluting small businesses, contiguous property owners, prospective purchasers and innocent landowners that demonstrate due diligence” (Lehigh 2004, 123). The EPA has been helping communities clean up their contaminated sites while stimulating their economies through redevelopment. Until recently, the constraints of their mission statement have prohibited the organization from achieving true revitalization of communities. The EPA, the Department of Transportation (DOT), and the Department of Housing and Urban Development (HUD) are partnering together in the Sustainable Communities Initiative which combines the resources of each separate entity to provide a holistic approach to redevelopment issues. EPA Administrator, Lisa P. Jackson, stated at the June 16, 2009 press conference, “It’s important that the separate agencies working to improve livability in our neighborhoods are all pointed in the same direction. We’re leading the way towards communities that are cleaner, healthier, more affordable, and great destinations for businesses and jobs.” Although this initiative is new and has yet to be implemented, the commitment of the new Administration is hopeful and will bring about long term viability of struggling communities. The EPA’s continued quest to improve the brownfield transformation process illustrates their policy is constantly evolving and is open to new interpretations.

Current Brownfield Redevelopment Process

Brownfield redevelopment seeks to transform contaminated sites into community assets. While there is no prescribed reuse, the process remains the same whether the site’s future use is a

park, housing or mixed use development. The brownfield process as described in EPA publication, *Anatomy of Brownfield Redevelopment*. Understanding this process, although tedious will serve as the basis for new recommendations for incorporating a more holistic approach to brownfield policy in Chapter 6.

There are four steps in the process: Pre-Development, Securing the Deal, Cleanup and Development and Property Management. Every project has a developer whether it private-led, public-private, and public-led. In a private-led scenario, the private developer takes responsibility for the entire redevelopment process while in a public-private scenario there is generally an agreement between at least one public and private sector entity. This is the most common scenario used because successful redevelopment requires collaboration between various stakeholders to achieve the design objectives. Public-led Redevelopment occurs when a local municipality owns the property and is responsible for cleanup and determining the redevelopment strategy. No matter which developer scenario is used, the process remains consistent as shown in Figure 2.3.

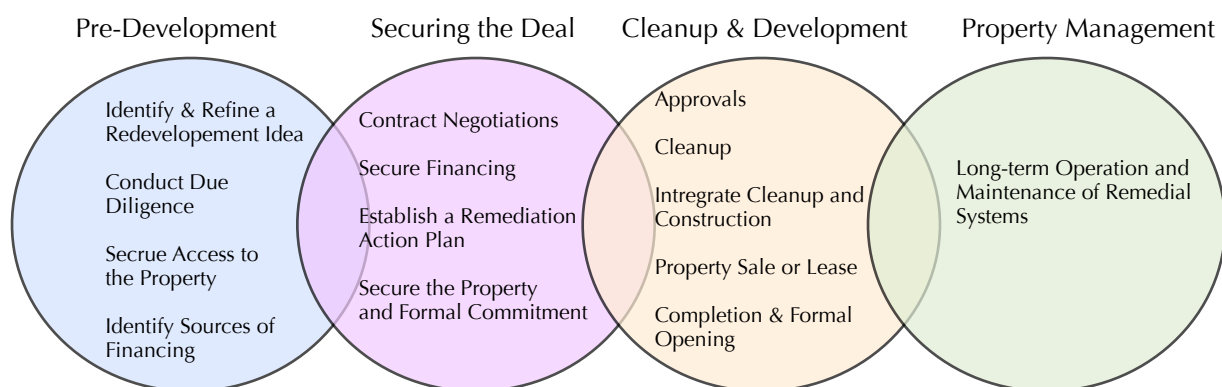


Figure 2.3 Typical Steps in Brownfield Redevelopment Process

Pre-Development

Pre-Development is the foundation for the Redevelopment Process. Establishing who the developer will be in the process is vital. In private-led situations, the developer will generate and

refine various strategies for how to address the site. Whereas in public-led scenarios, community input drives the redesign process. Deciding the site's potential future land use impacts how the site will be remediated. If the site will contain a residential component, more stringent remediation is necessary than an industrial reuse. The primary difference is due to extended interaction with the soil and water by humans. Conducting Due Diligence of the site involves extensive research and analysis before the property can be purchased. The Phase I Environmental Assessment (EA) process researches and documents the site's historic use and details the current physical conditions. If Phase II EA is necessary, soil samples and testing are conducted to determine the location and extent of contamination. These findings may directly impact the site's design, for example capped land would serve as parking in lieu of open space. Phase II also establishes a remediation plan which dictates the development timeline. If the current owner is not an active participant, proper access to the site is necessary for assessment.

Securing the Deal

Securing the deal focuses on legitimizing the pre-development process by drafting contracts and finalizing funding sources. Contract Negotiation identifies the responsibilities of the buyer and seller through the remediation process and any environmental liability issues. If there are multiple entities involved, responsibility for the specific portions of the remediation action plan and the management of liability after redevelopment. If buildings remain on the property, clear financial responsibility for repairs and remodeling costs is detailed. Often a nonprofit or trust is established to oversee the finances of the project. Financial institutions can use debt financing, which are loans and bonds to fund a project, or private investors may back developers through equity financing for an ownership stake in the process. A formal commitment of the property requires that all documents and contracts be signed. The transfer of property ownership may require rezoning and variances to be implemented, which is the last phase of the Securing the Deal.

Cleanup and Development

All development projects require proper permits and construction approvals and brownfields are no different. During the Cleanup and Development stage, the remedial action plan begins any remediation of the soil, ground, or surface water. The length of this step will vary depending on the type, quantity, and level of toxicity found. A No Further Action Letter is issued once local, state and federal government agencies agree the cleanup is complete. Often the construction and remediation occur simultaneously because any delays increase the associated costs. Coordination between the engineers, construction, and cleanup crews is important to maintain a smooth redevelopment timeline. Once construction is well underway, securing new tenants for the site can begin. A redevelopment is considered successful once construction is completed and ownership and leasing of the property has been secured. To signify the achievement, large-scale projects generally have a formal opening for all the invested stakeholders and community members.

Property Management

Although the redevelopment is considered complete there is one last step; the management of the property. The remediation process often requires long-term monitoring of the implemented systems to ensure their effectiveness in protecting the public's health. Management will need to oversee regulatory reports for the monitoring systems as well as any remaining financial aspects. The community may still be weary of the success, so continued public relations is necessary. If the property is sold, the new owner will have to be educated about deed restrictions or easements.

The Industrial Revolutions negatively altered our country's landscape and billions of dollars have been spent healing the damage done during the first hundred years of development. Despite the contamination, liability and financial complications surrounding brownfield redevelopment, the EPA has proven it can participate in the process. America's system for evaluating contaminated sites is based on ecological merits and the economic costs associated with redevelopment. Although environmental concerns are valid and public health concerns should always be upheld,

the social implications and aesthetic qualities of the Industrial Revolutions are rarely honored in our environmental policy. The next chapter builds upon Chapter 2 and explores the existing missing links of post-industrial sites and offers a new lens to view their historical legacy.

CHAPTER THREE

THE EXISTING MISSING LINKS:

The Evolution Towards Holistic Post-Industrial Place Theory

“The longer I look at landscapes and seek to understand them, the more convinced I am that their beauty is not simply an aspect but their very essence and that that beauty derives from the human presence. ... The beauty that we see in the vernacular landscape is the image of our common humanity: hard work, stubborn hope, and mutual forbearance striving to be loved” (JB Jackson 1994).

This thesis is proposing a holistic approach to brownfield redevelopment. This chapter expands the brownfield redevelopment discussion by addressing the existing barriers in policy and illustrates how excluding the social and aesthetic links are impeding the advancement towards a holistic approach. Current EPA redevelopment policy focuses on the site itself and neglects to look beyond the property lines at the larger social context. Through education, the public has acquired an understanding about the ecological and economic potential for post-industrial sites but are not acknowledging their historic and cultural connections. If an appreciation can be forged at the community level, the public can become more prominent in the redevelopment process.

Current Barriers in Brownfield Redevelopment

Author Lavea Brachman effectively identifies the common barriers in current brownfield redevelopment policy into three main categories; legal, economic and institutional.

1. Legal

Liability issues surrounding brownfields are complicated by legislation that struggles between holding the parties accountable for their acts of polluting the site, all the while promoting

the redevelopment to future users. Initially, imposing liability was the government's way of addressing public health and welfare concerns to ensure disasters like Love Canal did not happen again. However, it is the stigma of the "perceived" contamination which deters developers from getting involved. Once the location and the extent of the contamination are determined, many of the concerns are alleviated. Post-industrial sites most often will require extensive testing given the raw materials handled on site. Large Fortune 500 companies will often maintain ownership of their facilities, fence them off if they are no longer in use, while deciding how and whether to dispose of them. If these companies perceive they may run into liability enforcement from the EPA, it is more cost-effective to let the properties sit vacant or begin remediation on the company's terms. Larger properties remaining unable to be redeveloped, perpetuates negative associations with the industry further impacting struggling communities. Communities should have more of a voice in their economic futures. New situational policies should be crafted based on local input and encourage redevelopment based on property size, owner and previous land use.

2. Economic

As a society, we ultimately bear the cost of industries' past mistakes. Current policy seeks to shift the cost back to the private sector but the question of when the externalized expenses should enter into the redevelopment process remains unanswered. A lengthy due diligence period inevitably increases the total cost of redevelopment. The initial informational gathering sessions of Phase I and II EAs identify the location and the severity of contamination. The severity of contamination and the intended site's future use, directly impact the cost as well. On average, remediation - including assessment and demolition - accounts for at least 50 percent of total project costs (Brachman 2004). Redevelopment is not just about the site itself but the surrounding context. Unfortunately, brownfield redevelopment funds cannot be directly allocated to address poverty, racism, and disinvestment from the urban communities. State funding can only achieve so much, non-profit partnerships are becoming more popular and help lessen the burden on tax

payers and enable more redevelopment projects to come to fruition. The federal Community Reinvestment Act offers tax credits for properties in low-to moderate-income areas which distributes the legal and financial liabilities between all invested parties. Newer policy changes and partnerships with the other government agencies and other non-profits are a valuable step in creating a more holistic approach to brownfield redevelopment.

3. Institutional

Successful brownfield redevelopment requires collaboration between federal and state government agencies, financial institutions, and local communities. Because brownfields involve both economic development and environmental protection issues, in most states two agencies that commonly are not aligned need to coordinate their programs (Brachman 2004). If individual organizations are unfamiliar with their role in the redevelopment process or have differing missions, their inability to work together efficiently may cause bureaucratic delays. Through continued collaboration between agencies, these seemingly different agencies are finding solutions and partnerships alleviating some of the confusion. Many states have initiated new, voluntary cleanup programs which offer legal protection to new owners for any additional cleanup. As technologies have improved and more reuse of these sites has occurred, lenders are more comfortable with funding brownfield redevelopment. Another potential barrier lies with inexperience and lack of long-term commitment from local politicians or community leaders.

The redevelopment process is lengthy and in weak economies coalescing support for redevelopment can be challenging. Demonstrating how the redevelopment can benefit residents can help mollify confusion and distrust from outside agencies. Depending on the location of these sites, new zoning and permits are necessary and may require policy changes. Community buy-in is essential or elected officials supporting a project may lose their political appointment based on their position regarding the issue. Community hearings to educate the public on the process will assist in gaining that vital support.

The Fourth Dimension of Sustainability: Aesthetics

Since sustainability was first introduced at the World Commission in 1987, the word has elevated beyond a pipe dream environmentalist theory into a common phrase associated with ecological design and development that has infiltrated environmental policy. Although it is a commendable educational tool helping raise public awareness, the basis of the movement has been diluted and lost over the years. Education of how to be more “green” by using technological components such as solar panels and rain gardens have fixated the public on the “how” tactics. This is ultimately detracting from the “why” of the sustainability movement. Now it is time to look beyond the ecological lens and the traditional economic cost associated in brownfield redevelopment to tell the “whole” story. This story includes acknowledging the inherent value of post-industrial sites and fighting against common practices of redevelopment. Lawrence Buell, an eco-critic, argues in his book, Writing for an Endangered World that American environmental policy is lacking “a coherent vision for the common environmental good that is sufficiently compelling to generate sustained public support” (2001, 11). He argues that technologies and policies are plentiful but new attitudes, feelings, and images are the necessary component to true success. Aesthetics and design can create or emphasize the coherent vision for the public at large. Landscape Architect, Elizabeth Meyer, argues the fourth dimension of sustainability is aesthetics and its inclusion is essential to having a significant cultural impact on society. She states, “Design is a cultural act, a product of culture made with materials of nature and embedded with and inflected by a particular social formation...It translates cultural values into memorable landscape forms and spaces that often challenge, expand, and alter our conceptions of beauty” (Meyer 2008). Shifting the negative perception of the appearance of post-industrial sites and educating the public on why these sites are significant will enable a more holistic approach for brownfield redevelopment to be achieved.

Post-industrial sites are sublime in their appearance because of the “superhuman scale of the plant, buildings, products, and geographic range dramatizes the insignificance of any one individual; and second, that the story of the place, how it was built, sustained, and destroyed is irreducibly a story of people” (Mid-Atlantic Regional Center for the Humanities 2007). Movements and change always come back to the people. Citizens have the power to preserve this country's history but are failing to act. Sustainability is important but one must be careful to not become so fixated and lose the larger picture of a holistic approach. James Corner argues ecological expertise is timely and relevant but “the culturally innovative aspects of landscape architecture are often overlooked or even suppressed as emphasis is placed on more technical procedures aimed at the restoration of an essentially cultureless natural world” (Corner 1999).

Current redevelopment policy erases our history and connection to our industrial past as demonstrated in Figures 3.1 and 3.2. Homestead, Pennsylvania was home to Homestead Works, a steel mill outside of Pittsburgh. The plant closed in 1984, the mill was demolished and replaced by The Waterfront Shopping Mall in 1999. This development negatively impacted the local downtown economy compounding the problems associated with the plant closing.



Figure 3.1 Homestead, PA circa 1950
Collection of William J. Gaughan, Archives
Service Center, University of Pittsburgh
Accessed at [http://explorepahistory.com/
displayimage.php?imgId=2950](http://explorepahistory.com/displayimage.php?imgId=2950)



Figure 3.2 Homestead, PA after demolition in
preparation for a new mall and entertainment
complex. Accessed at
<http://www.atlasservices.com/projects.html>

Telling the Whole Story

As local communities and government agencies decide how to reuse abandoned post-industrial sites, it is important to observe and incorporate these industrial relics back into the lives of the community. David Lowenthal describes the presence of the past as offering a “sense of completion, of stability, of permanence in resistance to the rapid pace of contemporary life” (Corner 1999, 9). By not tapping into this cultural uniqueness, local communities are missing the mark. Everything in the built environment carries social meaning but this fact is overlooked or devalued when addressing post-industrial sites. The historic legacy of a site is about the physical locale but more importantly, it is about the community established because of the industry itself.

Authors Jackle and Wilson’s book, Derelict Landscapes: The Wasting of America’s Built Environment, “if we look only to the derelict-free zones of America in explaining and justifying ourselves as a nation, we will tell a story filled with illusions. Confronting derelict zones forces us to more substantially comprehend what it means to be American” (1992, 295). Brownfields or derelict zones tell a human story and the community has attached memories to these landscapes. “Beyond the historical significance stemming from their original economic function, factory buildings, coal mines, steel production plants and various sites have generated new meaning related to the change they themselves represent” (Kagel & Hemmings 2010, 3). It is important to shift the public’s perception of brownfields away from being considered “blight” and forge a new respect for their connection to these distinctive places. These mental connections are nearly impossible to attach financial figures to, making it easier to focus on the environmental implications of the sustainability movement. The incorporation of historic preservation, industrial archeology, and vernacular cultural landscape theory have begun to address and include the common man’s story in their efforts. Incorporating the social and aesthetic qualities of post-industrial sites and acknowledging these unique sites as landscapes themselves, worthy of preservation, is a starting point for bringing a more holistic policy to the forefront.

Historic Preservation in the United States

The preservation movement in the United States evolved slowly with one of the first structures saved from demolition being Philadelphia's Independence Hall in 1816. The preservation of this structure was not based on aesthetics but instead as an important component of this country's history - the location of the signing of the Declaration of Independence. At this point, preservation was focused on patriotic accomplishments and individual buildings were often turned into museums. By the early twentieth century there was a shift in the preservation movement as "people began to see the importance of architectural significance and uniqueness and the need to preserve buildings illustrating earlier periods of history" (Whitehill 1966, 41). In Europe, William Morris and John Ruskin were leading preservation efforts with their "anit-scape" philosophy which argued "the preservation of every scrap of the old that can possibly be preserved [should be] and they viewed old buildings as ancient monuments of art due to the glory of its age" (McDonald 2009, 6). Each building has historical significance and the "patina of a building should be maintained and all of the changes of a building throughout its life contribute to its artistic and architectural value" (ibid). The preservation movement then began to view preservation as more than one building and its patina but the inclusion of its context as significant.

According to the National Park Service's website, The *Antiquities Act of 1906* (16 USC 431-433) granted the President the authority to "designate landmarks, structures and objects of historic or scientific interest located on federal lands as well as establishing penalties for destroying federally-owned sites." The National Park Service (NPS) was created within the Department of Interior in 1916 and is the key office for managing federal preservation efforts. The responsibilities for NPS were handed down through the adoption of the 1935 *Historic Sites and Buildings Act* (16 USC sections 461-467). The act was signed into law to create "a national policy to preserve for

public use historic sites, buildings and objects of national significance for the inspiration and benefit of the people of the United States.”

There was a shift within the movement as more historic buildings were beginning to be demolished for the sake of urban renewal projects. The District of Columbia Redevelopment Act of 1945 created an agency to evaluate blighted areas in the city and make recommendations for improvement. The Supreme Court case *Berman vs. Parker* (1954) set the precedent for eminent domain regulation and stated “redevelopment of an entire area under a balanced integrated plan to include not only new homes but also schools, churches, parks, streets and shopping centers.” (348 U.S. 26, 1954). Surprisingly it was this same court case that proposed regulatory controls for local governments to establish historic districts which allowed the removal of entire neighborhoods that today would be eligible for designation.

“ From the middle of the nineteenth century forward, as the changes in cities escalated in speed and breadth, as more and more historic urban fabric was lost, and modern architecture became increasingly universal as a cultural expression and further departed from traditional building aesthetics, inhabitants in many of the most beautiful historic cities of the world became alarmed. Particularly in Europe and America, where the effects of industrialization were felt first, a belief began to emerge that old buildings and old urban fabric were a precious resource that ought to be conserved” (Tung 2001, 27).

The *National Historic Preservation Act of 1966* or NHPA (Public Law 89-665) provides the current preservation framework for federal, state and local governments. The federal government provides funding and incentives while the state serves as the liaison between federal and local governments offering advise and assistance. However, it is on the local level that preservation and protection occurs through regulations and legal ordinances. This act created the National Register of Historic Places which is the accumulation of early preservation theory and practice. More recent preservation theory has argued that, preservation is not only about reusing an existing structure, it also places a value on history and architecture so that future generations may capture

and experience a bit of an earlier generation's culture (Throsby 1995). It has even evolved to say that, "through architecture and style, buildings and structures reflect our ethnic and cultural heritage and foster an appreciation of the distinctive architecture and even the open landscapes as magnificent art forms" (Stipes 2003). This shift in language signifies the preservation movement as one not just about architecture. It has evolved to include art and landscapes. The important step is to communicate on the local level that post-industrial sites and industrial landscapes are intrinsically linked to our country's history, fostering a greater understanding as to why they need to be preserved.

If communities acknowledge the industrial landscape, then the sites could be eligible for the National Register and have to comply with Section 106 also established under NHPA. This act set a precedence that all other federal agencies must *consider* the effects of their undertaking. According to Section 106, all agencies must determine if buildings, districts or sites are eligible for the National Register and if any eligible resources would be negatively impacted by redevelopment. If there is an adverse effect, the agency must consider alternatives to avoid or minimize that effect but if no viable alternative is found, the agency must mitigate the effect. The EPA is directly responsible for remediation therefore may not be always in compliance with NHPA (Quivick 2001).

The National Environmental Policy Act (NEPA) is similar to NHPA by requiring federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions (<http://www.epa.gov/compliance/nepa/>). When new projects are being assessed, agencies are required to prepare an Environmental Impact Statement (EIS). These reports look carefully at impacted natural resources, noise, air quality, social and economic implications. Cultural landscapes should be considered at this time but are often overlooked when environmental concerns appear more relevant (Quivick 2001). The EPA and all other federal agencies are

obligated to contact local state historic preservation offices (SHPOs) when addressing culturally sensitive sites. The SHPO makes sure agencies are in compliance and serves as a liaison between the federal agencies and local communities. For the EPA to properly comply with NHPA or NEPA, the organization would need a Cultural Resource Manager to properly assess the cultural significance of post-industrial sites. Compliance can only be properly enforced if the local and state participants are advocating for industrial sites if they acknowledge their importance in their community.

Preserving Our Industrial Heritage

The National Park Service, the American Society of Civil Engineers and the Library of Congress established the Historic American Engineering Record (HAER) directly relating to engineering and industry. HAERS was less concerned with building fabric but the engineering technologies such as bridges, ships or railroads and canals. If the NPS has established these technologies as significant, shouldn't the industrial landscapes which created them also have historic value and be preserved?

The Society of Industrial Archeology is an international organization dedicated to the "encourage[ment of] the study, interpretation and preservation of historically significant industrial sites, structures, artifacts, and technology. By providing a forum for the discussion and exchange of information, the Society advances an awareness and appreciation of the value of preserving our industrial heritage" (<http://www.siahq.org/about/aboutthesia.html>). The profession of industrial archaeology was developed during the 1960s when practitioners felt it pertinent to record and preserve industrial remains in the landscape as an important part of America's national identity. "Like the preservation movement before it, industrial redevelopment becomes easier to implement when its merits are understood by the public...The intell[i]gent reuse of industrial sites can provide a genuine sense of place, one that celebrates both a rich history and an off-beat aesthetic" (Hardy 2005). Memory is a social process that is continuously being negotiated and altered depending on

who is telling the story. Virginus Island is a former industrial community located in Harpers Ferry National Historical Park in West Virginia. Initially, this site was only valued for its role in the Civil War and all the park interpretations were based around that era of significance.

“Virginus Island is a unique place because the history and archaeology encompasses an era when industrialization changed the fabric of Americans’ daily lives. Entrepreneurs, craftsmen, and laborers were all affected by the social, political and economic forces introduced by industry” (Shackel and Palus 2006, 66).

In the 1830s, artisans and craftsmen were deskilling so they could work in mass-production flour and cotton factories, the island’s primary employers. As a consequence, they became a more transient population, increasingly landless and devoid of their artisan roots.

Virginus Island revitalized after the Civil War and remained a small industrial town and tourist destination until the 1920s. It was not until the 1980s that the park’s interpretative program shifted to include this social history of working class residents. Unfortunately by this point, a majority of the working class houses and industrial structures had been destroyed by previous interpretations or floods. There were dwellings uncovered during archeological explorations, but due to lack of documentation it is unclear if these households were directly connected to the major industry of the island. Today, the cotton/flour mill ruins are the focal point of the industrial heritage of this site. Although visitors may not fully grasp the significance of the ruins, the National Park Service efforts to incorporate the previously untold portion of Virginus Island’s history is commendable.

Advances in the field of industrial archeology have led to the creation of national and regional museums for former industrial sites. However, the focus of the museum is commonly the economic glories and the social progress resulting from the industry often at the expense of the worker’s story. Often Americans want to overlook the struggles of the common man but those hardships are what made this country stronger. Incorporating the “whole” history of this country

is difficult due to a lack of documentation but instrumental if the historic legacy of post-industrial sites is to be obtained. As demonstrated in Lawrence, Massachusetts “telling the story of labor’s struggle can make the preservation of the industrial complexes more acceptable to a greater portion of the working class community” (Shackel & Palus 2006, 66). The Bread and Roses Strike of 1912 closed most of the Northeast’s mills as a group of women and immigrants from over 30 nationalities fought for better wages and improved working conditions. Today the city honors the memory of the labor strife in the Lawrence History Center: Immigrant City Archives and Museum where a collection of over “700 oral histories with eye witness accounts as far back as 1910, and an array of family and individual records that document the diverse and intellectually challenging nature of Lawrence. LHC employs those materials through exhibits, educational programs and research services to foster understanding of the interaction of the built community and the lives of ordinary people” (http://www.essexheritage.org/sites/immigrant_city.shtml).

Acknowledging the Negative Social Implications of Deindustrialization

Menomonee Valley in Milwaukee, Wisconsin was marshland chosen as the prime location for industry in 1869 because of its accessibility to the railways. Industries ranging from tanneries, breweries and stockyards quickly located in the region. By the late 1800s, residential neighborhoods began developing into some of the most densely populated communities in the state. This region flourished until industry began to flee for cheaper labor, less environmental regulations and more space. The Valley witnessed an employment drop from 50,000 in the 1920s to approximately 20,000 in the mid 1970s to barely 7,095 jobs by 1997 (DeSousa 2008). Although the Valley neighborhoods are extremely diverse, the majority of those living there live in relative poverty with incomes less than one-third the city average. “Workers and their families suffer serious physical and emotional health problems when their employers suddenly shut down operations, and the community as a whole experiences a loss of revenue needed for supporting police and fire protection, schools and parks” (Bluestone & Harrison 1982, 11). The social

problems extend well beyond the property lines of the post-industrial sites into the larger social context of the urban environment. “Place needs to be at the heart of urban landscape history, not on the margins, because the aesthetic qualities of the built environment, positive and negative, need to be understood as inseparable from those of the natural environment” (Wilson 1992). Given the severity of the psychological impact of industry leaving, maintaining a community’s sense of place and pride for their previous employer can alleviate the negative impacts.

It is understandable how previous workers may view their former places of employment negatively and their removal from the landscape may grant them a needed sense of closure. However, there is power within the abandoned walls and fences of post-industrial sites. Author and Landscape Architect, Alan Berger, argues that using the term “post-industrial” has an associated value system and should be avoided given its negative connotation. He explains that our country is in fact still industrial but the goods produced are *different*. The term post-industrial is used in this thesis to signify Industrial Revolution industries and the historical legacy they possess. Workers and town residents were proud of their work and the industry served as an identity for them based on the products they constructed. If not careful, our society will perpetuate a sense of placelessness as by demolishing industrial relics until,

“the economy and the entire society surrounding [post-industrial sites] will stagnate and eventually crumble. In essence, burgeoning modern industries, such as those that produce sophisticated mini-computers or fast-food chains that annually spew out billions of identical cheeseburgers, arise from the remains of presumably obsolete textile, steel and automobile plants” (Bluestone & Harrison 1982, 9).

This homogenized sense of placelessness detracts from the historical legacy of the industry that was once there. Michael Kammen in *Mystic Chords of Memory* reminds us that, “societies in fact reconstruct their pasts rather than faithfully record them, and that they do so with the needs of contemporary culture clearly in mind—manipulating the past in order to mold the present” (1991,

3). It is important as we continue to develop theories and approaches for redeveloping post-industrial sites, that the inclusion of how industry has shaped this country is remembered and serves a way to fight the negative implications of deindustrialization. Although the historic legacy of post-industrial sites is about the industry, it is more about the life, survival, and retelling of the workers' stories.

Seeking a Renewed Sense of Place

The Cultural Landscape Foundation (CLF) website states "cultural landscapes provide a sense of place and identity; they map our relationship with the land over time; and they are part of our national heritage and each of our lives." This organization classifies post-industrial sites as vernacular landscapes because they are "cultural landscapes that evolved through use by the people whose activities or occupancy shaped that landscape. Through social or cultural attitudes of an individual, family or a community, the landscape reflects the physical, biological, and cultural character of those everyday lives" (<http://tclf.org/content/vernacular-landscape>). Often rural vernacular landscapes are highly sought after because they appear intact, frozen in time, and picturesque symbols of life. However, the urban post-industrial site deserves recognition as well. "Industrialists needed to compete and turn out new products, and therefore adopt[ed] new technologies and processes. Plants had to be reconfigured, new machines erected, buildings retrofitted, and some facilities demolished and replaced" (Muller 2004). Industrial landscapes are heritage landscapes "associated with recognized patterns of activity in place and time...They are manifestations of human activity in space...the essence of what gives character to and defines place" (ibid). These historic landscapes have cultural value that,

"should not be removed from the urban grid, but integrated to revitalize their spirit giving them also a new symbolic language while preserving their historical content. Because of the value acquired through time, man has related himself to this type of landscape, depositing feeling, interacting with it and integrating its value" (Marques 2009).

Pennsylvania is synonymous with steel production and the small town of Bethlehem was no exception. The Bethlehem Steel Plant began construction in 1857 and started operations in 1863 producing rails for the railroad industry. The town was centered around the industry and the plant sent billowing smoke out its stacks 24 hours a day. It affectionately became known as “the Steel” to its diverse employee base of 30-40 different ethnicities. Bethlehem Steel was known for its superior quality and expanded its products to become a leading supplier for construction materials. The workers understood their hard work was meaningful and they were making an impact on their country. During WWII, the company committed to building a ship a day for the war which expanded operations and employees, including women, to assist in the efforts. The plant quickly constructed new storage and production facilities to accommodate its commitment. The 1600 acre site is still intact for the most part, and represents the industrial history and innovation of the plant over a period of a hundred years. The town of Bethlehem was defined by the plant and its closing devastated the community. However, former employees were instrumental in saving the plant from demolition and have been the driving force for the preservation and interpretation of the site throughout the redevelopment process. History creates a “sense of place” for communities which refers to the aesthetics of a place but often is defined as the personality of the place. It’s emotional - it involves all five senses.

“Places make memories cohere in complex ways. People’s experiences in the urban landscape intertwine the sense of place and the politics of space. If people’s attachment to places are material, social, and imaginative, then these are necessary dimensions of new projects to extend public history in the urban landscape, as well as new histories of American cultural landscapes and the buildings within them” (Hayden 1995, 43).

Dolores Hayden is somewhat controversial when she writes, “cultural landscapes [including industrial ones] tells us who we are, as Americans, far more effectively than most architecture or exhibits in museums ever can” (Muller 2004). Some purist within the preservation

community may feel threatened by this statement but there is validity in her claim. Not everyone values the industrial heritage the way previous workers or industrial archeologists might. However, if a re-value can be established for the industrial landscape it can empower a community and help regain lost self esteem. The environmental legacy of post-industrial sites is focused on the contamination and cleanup of the property. The historic legacy for these sites is grounded in their social and aesthetic qualities which possess great potential for struggling communities to reinvent themselves. If local communities appreciate and honor their past, that enthusiasm will be contagious. Ultimately, the historical legacy of their industrial past sets them apart from other places and maintaining that connection can drive future planning and legislation. The perception of brownfields has shifted in recent years, but US brownfield policy has not acknowledged the historical legacy of post-industrial sites in its redevelopment strategies. The next chapter introduces seven case studies and a new evaluation matrix which seeks to test if the incorporation of the social and aesthetic components can lead to more successful comprehensive policy.

CHAPTER FOUR

CASE STUDIES:

An Overview and the Holistic Assessment of Post-Industrial Sites Matrix

"I began with the site. I haunted the buildings and let the spirit of the place enjoin mine. I began seeing what I liked and then I liked what I saw - new eyes for old. Permanent oil slicks became plains with outcroppings of concrete, industrial middens were drumlins, the towers were ferro-forests and their brooding presence became the most sacred of symbols" (Peter Reed quoting Richard Haag 2005, 25).

There is no single utilitarian approach on how to address urban post-industrial sites. Each site is different as are the solutions individual communities choose to address the site's future. The two previous chapters have laid the foundation for understanding current brownfield redevelopment policy and the missing links towards a more holistic approach. The purpose of this chapter is to introduce seven case studies and provide an overview of the history and redesign for each one. Gasworks Park, Menomonee Valley, Sloss Furnace, Bethlehem Steel, Atlantic Station, Duisburg Nord and Westergasfabriek Culture Park were chosen for their complexities and varied redevelopment strategies. This chapter also introduces a matrix and details the four components for evaluation: ecological, economic, social and aesthetics. Each section's criteria and all supporting theory will explain this newly created system proposing an alternative way to view "success." This matrix strives for equal representation of the theories and approaches outlined in the two previous chapters. By bridging the various disciplines, the following chapter will analyze how holistic each case study was in their redevelopment approach. By addressing the larger, more complicated urban sites in this thesis, the goal is to more easily evaluate less contaminated, more rural sites in the future. The next section introduces each of the case studies beginning with Gas Works Park and a comprehensive chart of key facts is located on page 56 in Table 4.1.

Case Study: Gas Works Park

Location: Seattle, Washington, US

Type of Industry: Coal and crude oil gas production

Time of Operation: 1906 - 1956

Form of Contamination: Tar, benzene, mercury, lead, arsenic

Property Size: 19.1 Acres

Context: On Lake Union at the south end of the Wallingford neighborhood and approximately 3 miles from downtown Seattle

Who Owns the Property: City of Seattle

Current Use: Park

Who Led the Design Process: Public-led

Designer: Richard Haag

Redevelopment timeline: 1971-1975

Design Intent: An adaptive reuse honoring the historic and aesthetic qualities while extracting the contaminants through bioremediation



Figure 4.1: Gas Works in 1965.
Accessed at http://www.seattle.gov/parks/_images/olmsted/gasworks1965.gift



Figure 4.2: Gas Works - present day. Accessed at <http://www.flickr.com/photos/anaxila/353791908/page2/>

Overview

Coal was once Seattle's most lucrative export and had great influence over the expansion and growth of the city. The Olmsted Brothers found Lake Union to be an ideal location for recreation in 1903 but the site was slated for industrial use based on its location along the waterways. According to the Preservation Seattle website, Gas Works is a coal gasification plant formally known as the Lake Station and was the largest private utility in Seattle. Production ended in 1956 when the city converted to natural gas. The city acquired the property in 1962 for

conversion to parkland and local landscape architect, Richard Haag, was selected for the redesign. City councilwoman, Myrtle Edwards, spearheaded the purchase of the property and the transition into a park. Haag's design was controversial given his desire to retain the existing structures. He developed a strategy for cleaning the soil that added oil-degrading enzymes and organic matter to stimulate the natural breakdown of toxic contaminants. A selection of existing structures were preserved and reused in a creative manner unlike anything seen before in the United States. Richard Haag was awarded the President's Award for Design Excellence given by the American Society of Landscape Architects (ASLA) in 1981 for this project.

Case Study: Menomonee River Valley

Location: Milwaukee, Wisconsin, US

Type of Industry: Varied, industrial complexes, tanneries, breweries and rail yards.

Time of Operation: 1879-1985

Form of Contamination: Methane, petroleum and lead

Property Size: 140 Acres of 1,400 acres

Context: Heart of urban core with residential surrounding property

Who Owns the Property: City of Milwaukee

Current Use: Light Industrial and Parkland

Who Led the Design Process: Public-led

Designer: William Wenk of Wenk Associates Inc

Redevelopment timeline: 2002- 2012

Design Intent: Curb the impacts of deindustrialization with job creation and recreation



Figure 4.3:
Canal Street in 1999. Accessed from the A Decade of Transformation presentation from the Menomonee Valley Partnership website, <http://www.renewthevalley.org>.

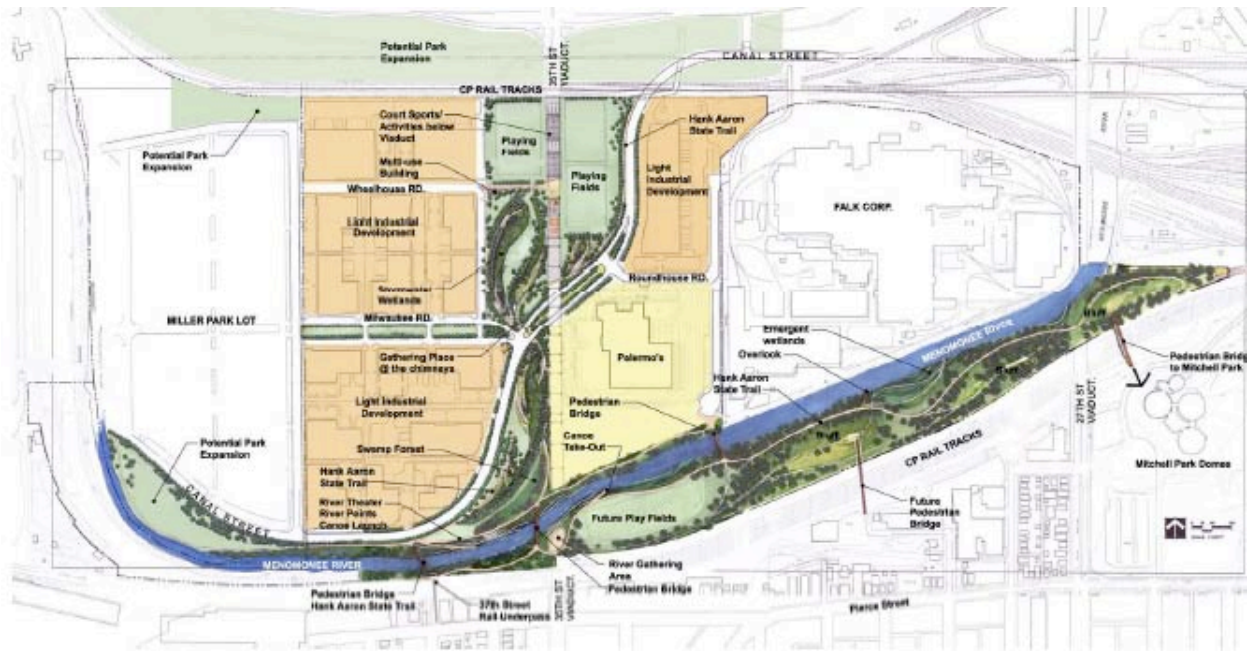


Figure 4.4: Menomonee Valley Redevelopment Master Plan, Accessed from the Menomonee Valley Industrial Center and Community Park Report. The City of Milwaukee's Redevelopment Authority, March 2006.

Overview:

The Menomonee Valley was the central industrial hub for the city of Milwaukee constructed along the Menomonee River. The Valley itself consists of 1,400 acres, the largest brownfield in Wisconsin, but the portion being analyzed in the matrix is only 140 acres. This was to ensure a balanced analysis between the other case studies. From 1879 to 1985, this parcel was home to a rail car and locomotive repair shop. In 1922, the site was the third largest railroad and car complex in the United States. However, with the decline of rail use the complex was closed in 1985. The City of Milwaukee acquired the property in 1998 and the site was deemed as a high priority for redevelopment. In 1999, a charrette of a various stakeholders was conducted resulting in the guiding principles and vision for revitalization efforts. In 2002, the 16th Street Community Center received a grant to host a national design competition. Wenk Associates from Denver, CO won and his design is affectionately known as the "Wenk Plan." The design is comprised of 60 acres of light industrial, 60 acres for parkland and trails, with the remaining 20 acres to be used for

utilities and infrastructure. The portion of the land connects to the Hank Aaron State Trail along the river and serves 400,000 residents within a 3-mile radius. This plan applied the principles of sustainability to ensure longevity of the project and health of the overall community. Benchmarks were established to monitor the efforts as the design will continue to be implemented over the next few years. The project received the 2009 Phoenix Award for their Environmental Stewardship efforts.

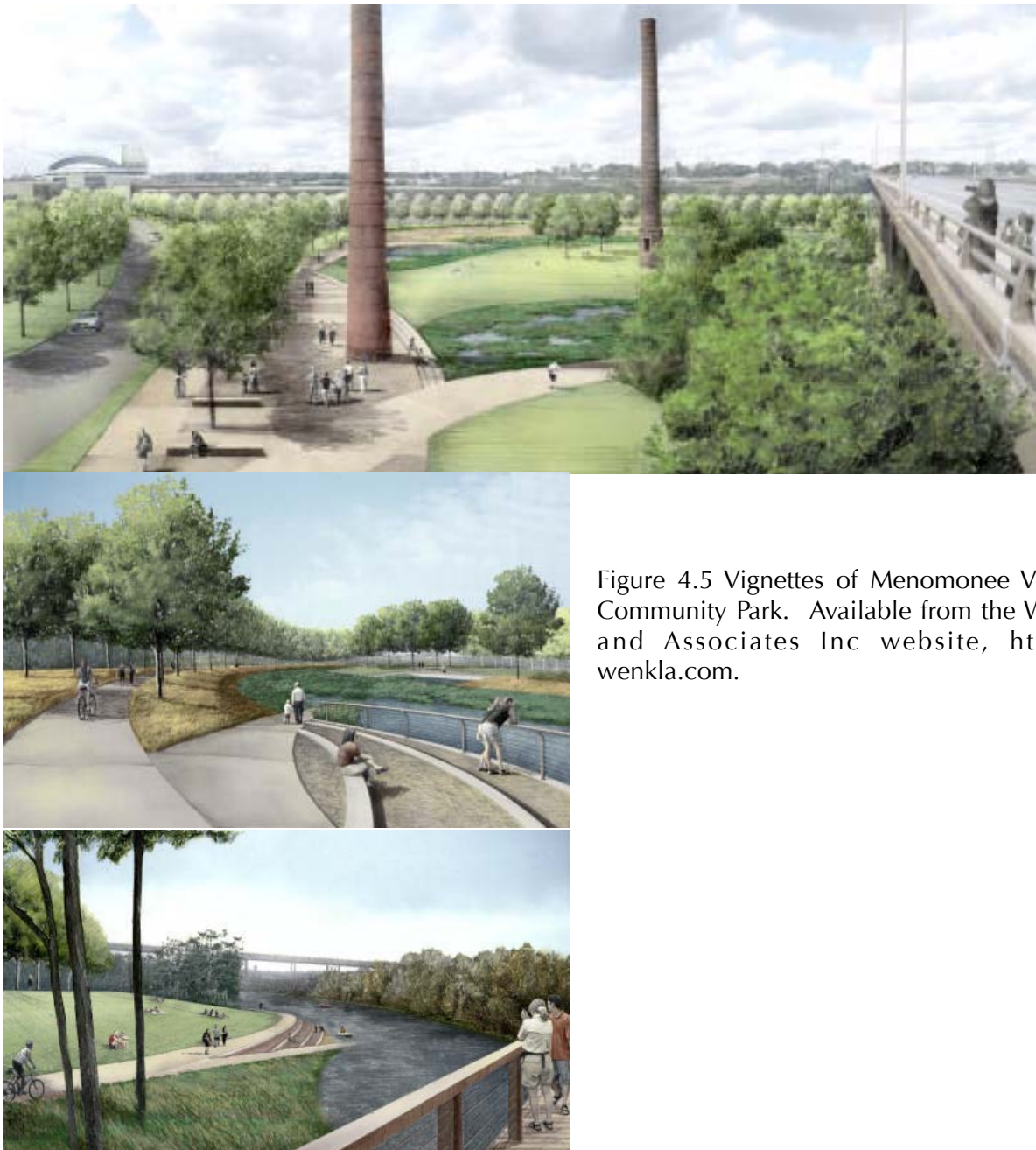


Figure 4.5 Vignettes of Menomonee Valley Community Park. Available from the Wenk and Associates Inc website, <http://wenkla.com>.

Case Study: Sloss Furnace

Location: Birmingham, Alabama, US

Type of Industry: Pig iron and cast iron pipe production

Time of Operation: 1882 - 1971

Form of Contamination: No contamination found

Property Size: 50 acres

Context: Eastern edge of downtown approximately 2 miles from the urban core and remains located in an industrial area.

Who Owns the Property: City of Birmingham

Current Use: Museum and Arts Center

Who Led the Design Process: Public-led

Designer: HKW Associates

Redevelopment timeline: 2005, breaking ground May 2010

Design Intent: Maintain existing museum and design a new visitor's center with educational and exhibition space



Figure 4.6: Sloss Furnace - Historic. Unknown photography. Accessed from www.bhamrails.info/SlossFurnace.html.

Overview:

North-central Alabama was rich in the mineral resources needed to make steel within a 30 mile radius of what is now known as Birmingham. In 1871 prominent businessmen decided to exploit what they could to expand the state's economy. This economical push established the city mainly because of the proximity to the railroad. James Withers Sloss was in the railroad business and responsible for convincing L&N Railroad to complete the line linking the resources together. In June 1881, he began construction of Sloss Furnace which at the time was once dubbed "City Furnace." "As pig iron production in Alabama grew from 68,995 to 706,629 gross tons, no fewer than nineteen blast furnaces would be built in Jefferson County alone" (<http://www.squidoo.com/sloss-furnace>) making Birmingham the pre-eminent industrial force of the South. The South was desperately trying to reinvent itself and was able to compete on a national level because it was able to produce pig iron at \$10-11 per ton whereas it was over \$18 per ton in the North. Birmingham became known as the "Magic City." Although Sloss retired in 1886, the furnace continued to expand and became one of the largest producers of pig iron in the world. The furnace was in operation for 89 years but as environmental regulations became more stringent, the furnace was unable to comply with new air pollution standards.

When Sloss Furnace closed its doors in 1971, owner Jim Walter Company donated the property to the Alabama State Fair Authority for a museum. The State Fair Authority decided that the preservation of the furnace was infeasible and announced its demolition. The community was outraged and former workers established the Sloss Furnace Association which funded a survey with the Historic American Engineering Record to document the site's significance. In 1977, the city gained control of the property and the city passed a 3.3 million dollar bond to rehabilitate the plant. Concurrently, Mayor David Vann hired David McMullin to submit a redevelopment plan where:

“He expresses his belief that he can develop a unique industry attraction in the S.E. U.S. quite unlike other “theme parks.” The plan calls for a German cafe, theaters, music and dance, bands, sound and light shows, fire eaters, jugglers, and a host of other attractions designed to instruct and entertain visitors” (Society for Industrial Archeology 1979).

In the end, the community referred back to their initial plan of a museum and Sloss Furnace was designated a National Historic Landmark. According to Sloss’s website, “this site mark[s] the beginning of industrialization in Alabama, and it provides Americans from every state with a place in which to visualize the process of iron-making that has been vital to our nation’s economy for over a century.” Today Sloss is the only publicly owned industrial site in the world and the community’s unwavering pride and support have continued its success. It offers a variety of foundry, artistry classes, and sculptural residencies that relate directly to the site’s past. The site is frequently rented out for weddings and special events. Sloss has been featured on Fox’s Scariest Places on Earth and the stories of paranormal activities make the site intriguing and ghost tours are available. The museum offers a variety of historical exhibits and tours while the on-site music venue encourages interaction with the site in a unique way. In 2005 HKW Associates, a local architectural firm, completed a master plan for the expansion of Sloss Furnace. The new 30,000 square foot facility shown in Figure 4.7 will now house administrative offices, educational, and exhibition space which is set to break ground in May 2010.



Figure 4.7: Night Vignette
HKW Associates, 2009.
Used Courtesy of Robert
Rathburn, Executive
Director of Sloss Furnace.



Figure 4.8: Sloss Furnace - Present Day. Zeigler 2010.

Case Study: Bethlehem Steel

Location: Bethlehem, Pennsylvania US

Type of Industry: Steel and Iron

Time of Operation: 1863 - 1995

Form of Contamination: Arsenic, Lead, Polycyclic aromatic hydrocarbons (PAHs) and Trichloroethylene (TCE)

Property Size: 600 acres of 1600 acres of industrial land

Context: Along the Lehigh River on the Southside of Bethlehem

Who Owns the Property: BethWorks Now, Las Vegas Sands Company

Current Use: Mixed Use, Museum and Casino

Who Led the Design Process: Public-Private led

Designer: Unknown

Redevelopment timeline: 2007 - present day

Design Intent: Boost the local economy while respecting the steel industry heritage with a museum and entertainment complex



Figure 4.9: Bethlehem Steel 1992. Photographer was Harold Finster. Accessed on <http://novaonline.nvcc.edu/eli/evans/his112/Weeks/6.html>

Overview:

The town of Bethlehem is located along the Lehigh River and along a rail line allowing for products to be easily transported. Initially the company focused on rail products but quickly Bethlehem Steel became known for its superior quality and expanded their products to become a leading supplier for construction materials. Most of the great bridges constructed in the 20th century, such as The Golden Gate Bridge and George Washington, were built using

Bethlehem Steel beams. According to

the 2008 PBS documentary “The People Who Built America” Bethlehem Steel provided the materials for 85% of New York City’s skyscrapers. Over time, ownership of Bethlehem changed and there began to be tension amongst workers and management. The United Steelworkers Union was instrumental in establishing pension and health benefits for workers. Eventually, strikes and employees’ demands were equated with the increase in the cost of steel. Bethlehem only received a partial contract for the World Trade Center which was a devastating blow to the company. As globalization continued, cheaper materials from a new continuous casting system flooded the American market making it harder for them to compete. Bethlehem Steel began to phase out certain components of production to preserve the company as a whole but the main Bethlehem

plant was closed in 1995. Although the plant closed, Bethlehem Steel was concerned about the impact on the town and hired consultants to assist in the redevelopment.

Due to the sheer scale of the site multiple solutions were proposed for how to reuse Bethlehem Steel. A casino, museum, cultural entertainment center and some residential are planned. A large portion remains dedicated to industrial functions with a natural gas plant. The former workers and industrial enthusiasts are actively involved in the redevelopment process and the interpretation of the site is of the utmost importance. The Lehigh Valley Industrial Heritage Coalition believe by, “attracting regional, national, and global audiences, the Bethlehem Steel site can become both a cultural and economic anchor for the Lehigh Valley and an innovative international model of preservation-based community revitalization” (Mid-Atlantic Regional Center for the Humanities). Progress has been slow moving but remediation is complete and the casino opened in 2009 indicating redevelopment is underway to revitalizing this once thriving community.

The matrix is not evaluating the portion of Bethlehem Steel owned by the Lehigh Valley Industrial Park (LVIP). Now known as The Bethlehem Commerce Center, this portion will be maintained as heavy industrial land with no residential components because the groundwater has been deemed unsafe for drinking. Despite water concerns, the EPA awarded the LVIP the Phoenix Award in 1996 for its innovative remediation and redevelopment efforts on the Bethlehem Commerce Center. Federal, state and Bethlehem Steel are collaborating to devise a plan increasing airflow in the soils attempting to speed up the degradation of the organic contaminants. The “passive bio-venting” strategy uses standard technologies in an innovative way. The system will consume very little energy and has low maintenance requirements, lending itself well to the facility’s redevelopment vision.



Figure 4.10: Bethlehem Steel Art Center Model. Accessed from <http://www.saveoursteel.org/gallery.htm>



Figure 4.11: Sands Casino and Hotel Model. Accessed from <http://www.saveoursteel.org/gallery.htm>

Case Study: Atlantic Station

Location: Atlanta, Georgia US

Type of Industry: Steel Mill

Time of Operation: 1901 - 1998

Form of Contamination: PCBs, Lead and Sulfates

Property Size: 138 Acres

Context: Heart of Midtown Atlanta with residential, small business and transportation infrastructure surrounding the site

Who Owns the Property: Atlantic Station LLC, Atlantic Town Center LLC, AIG Global Real Estate, and Jacoby Development

Current Use: Mixed use complex

Who Led the Design Process: Public-Private

Designer: Unknown

Redevelopment timeline: 1999 - 2005

Design Intent: Apply "Smart Growth" principles to improve air quality

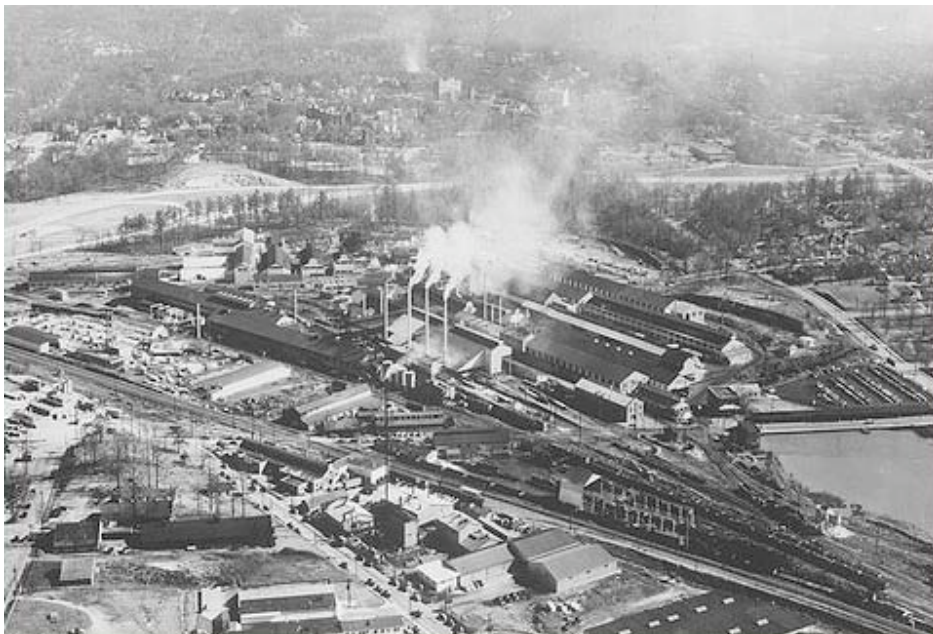


Figure 4.12: Historic Atlanta Steel. Unknown Photographer. Accessed on <http://www.flickr.com/photos/11035256@N05/galleries/>

Overview:

At the turn of the 20th century, agriculture was the main industry in the state of Georgia and by 1850, 95% was cleared for cotton production. Atlanta was expanding its local economy because of the railroad, so the Atlanta Steel Hoop Company was established to make cotton bale ties and barrel hoops needed to transport cotton. Within the first year the company employed 120 workers and manufactured 2,300 bundles of cotton ties a day. The company continued to grow

and in May 1906 the company produced Georgia's first steel which enabled the company to broaden its products. In 1915 Atlanta Hoop became Atlanta Steel and began producing nails, barbed wire, plough shears and galvanized steel for the South. Over the years, the company struggled through the Great Depression and coal strikes but strong leadership kept the company afloat.

War World II was a time of great change for the company. Women began to work in the facility to compensate for drafted workers and the plant expanded to accommodate military construction needs. Workers bought war bonds and built victory gardens on adjacent vacant lots and their sacrifice was honored by the US War Department. At the height of production in the 1950s, Atlanta Steel employed 2300 and produced 750,000 tons of steel annually. It opened a new plant in Cartersville, GA to meet the growing demand. In 1979 a Canadian steel maker, Ivaco, purchased both Atlantic Steel locations and over time the Atlanta plant declined. Atlantic Steel was once on the outskirts of town, but the construction of the Downtown Connector enabled Atlanta to expand around it. In 1998, the Atlantic Steel Mill closed. Jacoby Development Incorporated purchased the property in 1997 with the intent of creating a mixed-use complex. The cleanup of the property was extensive and involved the EPA, GAEPD, and the city of Atlanta. Over 180,000 square yards of contaminated soil was extracted and a groundwater extraction system was installed to prevent contaminated groundwater from leaching off the property. A majority of the buildings were recycled and redevelopment quickly continued. In 1999, Jacoby partnered with AIG Global Real Estate to begin construction on hotels, residential units, and commercial shopping. Although the Georgia Aquarium decided not to build in Atlantic Station, Ikea was convinced to build its first Southeastern store in its place, anchoring the project. Atlantic Station was the first silver LEED (Leadership in Energy and Environmental Design) certified campus development in the country and developers received the Phoenix Award for their work in one of the largest brownfield redevelopments in the country.

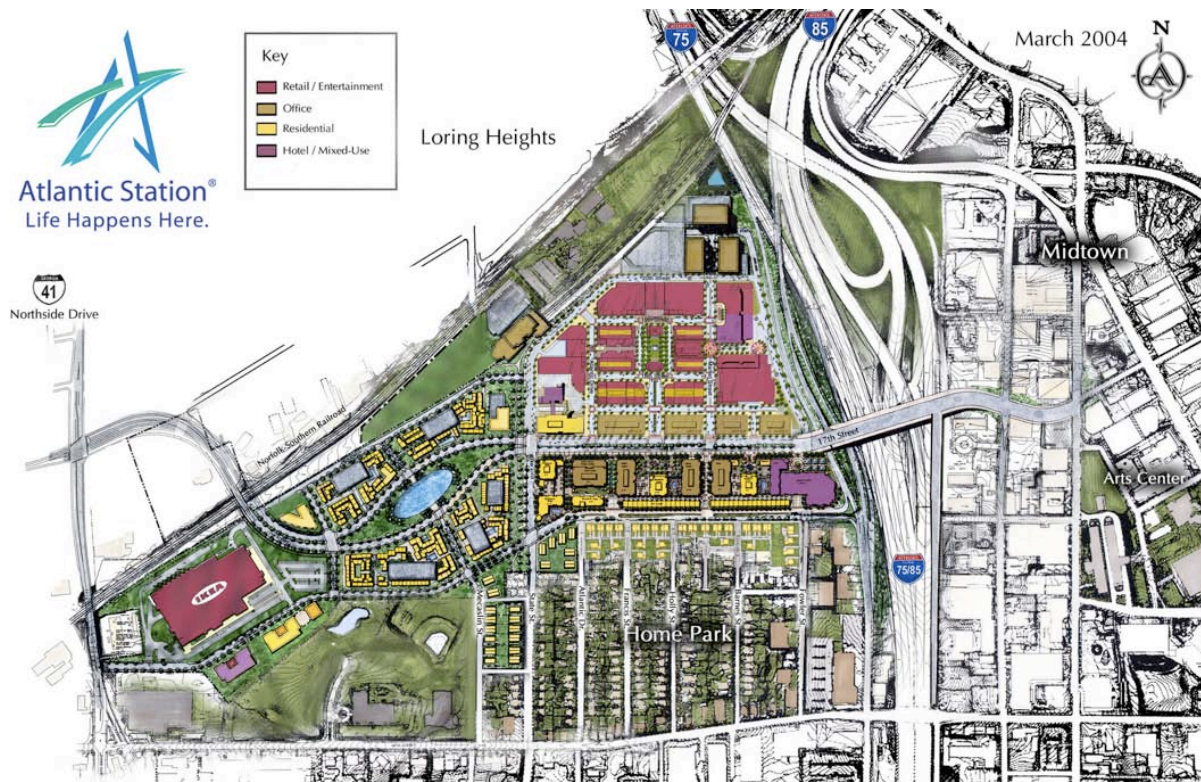


Figure 4.12: Atlanta Station Master Plan. http://www.atlanticstation.com/images/SitePlan_large.jpg



Figure 4.13: Atlanta Station - Present Day. Accessed on <http://www.smartgrowthamerica.org/images/atlanticstation.jpg>



Figure 4.14: Atlanta Station - Present Day. Accessed on <http://www.dixierooftops.com/atlanticstation.html>

Case Study: Duisburg-Nord

Location: Duisburg, Germany

Type of Industry: Steel and Coal

Time of Operation: 1903-1985

Form of Contamination: Polycyclic aromatic hydrocarbons (PAHs)

Property Size: 230 Hectares (568 Acres)

Context: North of Duisburg between the urban districts of Hamborn and Meiderich

Who Owns the Property: International Building Exhibition Emscher Park (IBA)

Current Use: Public park

Who Led the Design Process: Public-Private led

Designer: Peter Latz of Latz + Partners

Redevelopment timeline: 1991-1999

Design Intent: Disrupt the site minimally while conveying the industrial significance of the region

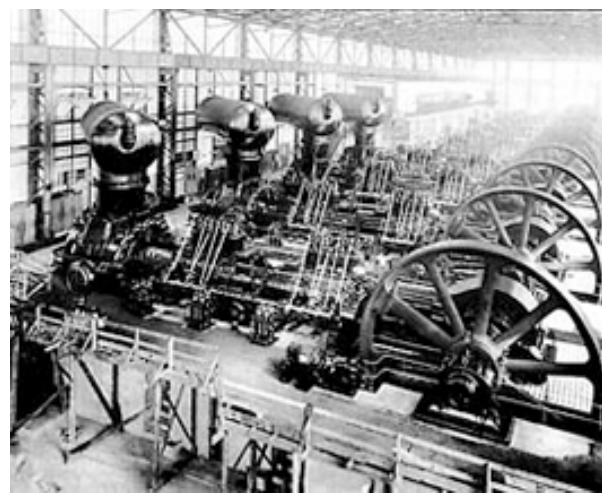


Figure 4.16: Historic Photographs of Duisburg-Nord. Accessed from <http://www.landschaftspark.de/en/derpark/industriegeschichte/anlagen/magazin/index.html#>

Overview:

The Ruhr Valley of Northwest Germany is 4,500 square kilometers and is comprised of 53 communities along the Emscher River, a small tributary to the Rhine. There is no major city hub but the region has a population of 5.2 million. This region was fertile, arable land that contributed to the rural character of the region. Metallurgy and coal mining expanded industrial development and the use of coke blast furnaces increased iron production between 1800-1860. At the turn of the 20th century, the Ruhr Valley produced nearly 30% of Germany's iron exceeding both France and Belgium. By 1913, 60% of coal and 42% of the country's pig iron came from this region

(Jackson 1997). It was one of Europe's major industrial and manufacturing centers leading to its being one of the hardest hit areas after the collapse of the iron industry. Duisburg is positioned between the Ruhr and Rhine Rivers which provided navigation for the region and flourished as a working class town. It was comprised of pragmatic architecture and strived for self-sufficiency in the local economy. As cheaper iron was being imported, the region began a slow decline and in 1985 an abundance of highly contaminated blast furnaces, cooling towers, turbines, and factories were left behind. Germany decided to take a regional approach in combating the deindustrialization of the Ruhr Valley and sought innovative solutions to its high unemployment and environmental pollution.

The Emscher Park International Building Exhibition (IBA) was established as a 10 year initiative in 1989 "to revitalize a 20-by-50 mile industrial rustbelt in the heart of the still industrialized region with more than 5,000 acres of brownfields" (Kunzmann 2004). IBA is linked the abandoned industrial sites to combat the social and environmental issues surrounding what happens after industry leaves. The Thyssen steelworks in Duisburg employed over 10,000 workers and was one of the chosen projects involved in the NorthRhine Westphalia project. The Duisburg-Nord Landscape Park was the only fully public-funded Emscher project. The objective was to slowly reverse the impact of heavy industry through a series of environmental experimentation solutions: Demolished buildings and toxins were buried in old ore bunkers with roof gardens on top. High dams of slag with high pH values were created to immobilize the heavy metals. Water was diverted away from contaminated areas and purified canals systems run through the park and birches are used to aid in the cleanup in the coal washing areas. Key features include a climbing wall, diving center, walking and biking trails. The central power station holds 8,000 people and is used for exhibitions and performances. Peter Latz tried to have minimal interference with the context of the site and performed "cultural recycling" to help convey the importance industry had

on this region. This park has received numerous awards and honors and is commonly viewed as the park for the 21st century.



Figure 4.17: Duisburg-Nord Landscape Park. Zeigler 2009.

Case Study: Westergasfabriek

Location: Amsterdam, Netherlands

Type of Industry: Coal gas

Time of Operation: 1883 - 1967

Form of Contamination: Tar, mineral oil, cyanide, and benzene

Property Size: 14.5 hectares (35 acres)

Context: It is about 1.5 miles from the center of Amsterdam. It has densely populated neighborhoods in the Spaarndammer and Staatsliden districts.

Who Owns the Property: County

Current Use: Museum, Arts Center and Park

Who Led the Design Process: Public-led

Designer: Kathryn Gustafson of Gustafson Porter

Redevelopment Timeline: 1997 - 2003

Design Intent: Provide a multi-functional recreation and culture park for local residents while ensuring ecological quality for visitors and tenants

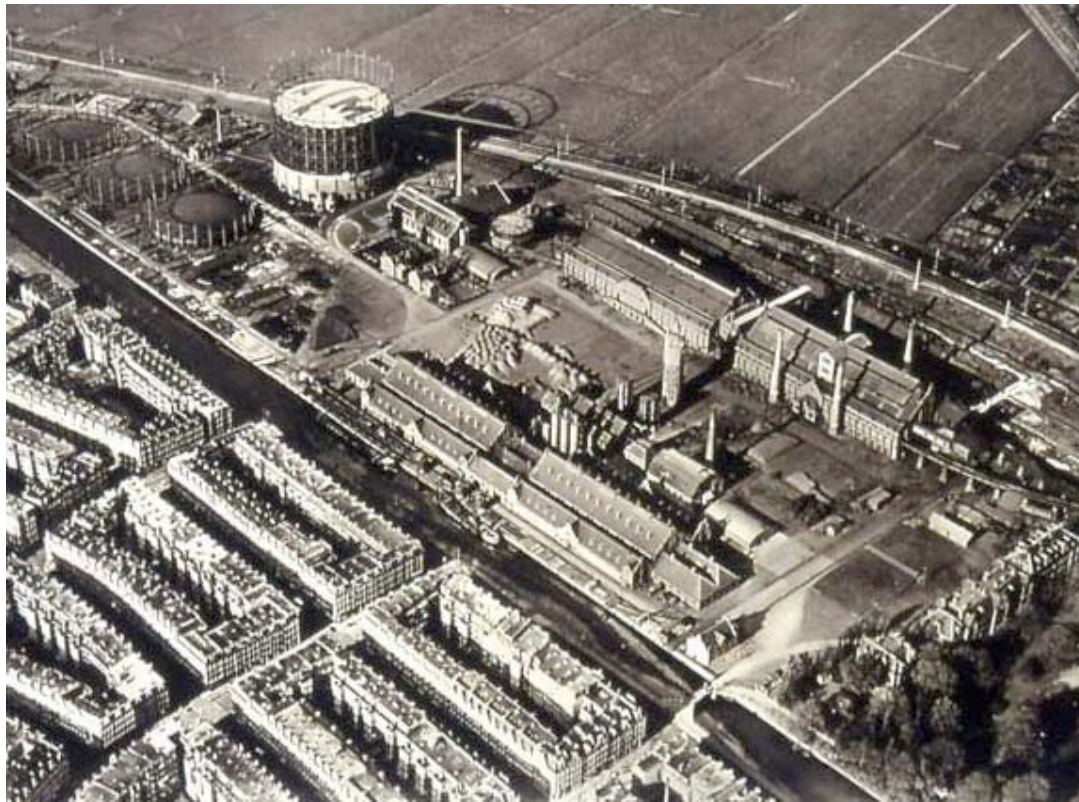


Figure 4.18: Westergasfabriek Aerial 1927 taken by KLM. AVIODROME AERIAL PHOTOGRAPHY, LELYSTAD. Accessed from <http://www.project-westergasfabriek.nl/english>

Overview:

A 1881 Master Plan for Amsterdam slated this property for parkland but instead Westergasfabriek was constructed to provide gas for street lighting. In 1898 the city took control of the plant and as the municipality's demand increased, the plant expanded making it the largest plant in Amsterdam. The scarcity of coal from WWI decreased production and the city converted to electric street lights. Coal gas production ceased in 1960 and in 1963 the city transitioned to natural gas. The facility served as a storage facility until 1992. Although the 1881 intent for the site was not met, in 1890 a portion dubbed Westerpark was constructed to provide greenspace for the adjacent neighborhoods. A century later, the district council decided Westergasfabriek should be converted into a park as originally intended. The redevelopment team met frequently with neighborhood associations to address any major concerns and to generate ideas for key features and to be included in the park. Twelve landscape architects were invited to give presentations with five being selected to develop designs. Kathryn Gustafson's design was selected for her emphasis on the evolution of man's relationship with nature. She wove the historic Westerpark through a formal city garden into active recreation fields and then created ecological awareness through reuse of the Overbraker polder and water gardens. The site was unique because great care was given to the layout regarding both functionality and aesthetics. Strong symmetry from key buildings was maintained and now serves as a communal hub for markets and offices. A majority of the buildings were protected by the Historic Building Department and their renovation was of the utmost importance. In 1998, the US Environmental Protection Agency called Westergasfabriek a model project for reuse of polluted sites. It has been awarded numerous honors including The Golden Pyramid in 2004, the Landscape Institute Award 2007 and was selected the best park over 5 hectares by the British Landscape Institute.



Figure 4.19: Westergasfabriek Master Plan. <http://www.gustafson-porter.com/intro.htm>



Figure 4.20: Westergasfabriek from the canal. Ronald Matthijs. Accessed from <http://locativelab.wordpress.com/work-overview/Ronald>



Figure 4.21: Westergasfabriek plaza. Photographer Unknown. Accessed from <http://www.holland.com/global/destinations/amsterdam/architecture/westergasfabriek.jsp>

CASE STUDY:	GAS WORKS	MENOMONEE VALLEY	SLOSS FURNACE	BETHLEHEM STEEL	ATLANTIC STATION	DUISBURG NORD	WESTERGASFABRIEK
LOCATION	Seattle, WA, USA	Milwaukee, Wisconsin, US	Birmingham, Alabama, US	Bethlehem, Pennsylvania US	Atlanta, Georgia US	Duisburg, Germany	Amsterdam, Netherlands
TYPE OF INDUSTRY	Coal and crude oil gas production	Varied, industrial complexes, tanneries, breweries and rail yards	Pig iron and cast iron pipe production	Steel and Iron	Steel Mill	Steel and coal	Coal gas
TIME OF OPERATION	1906 - 1956	1879 - 1985	1882 - 1971	1863 - 1995	1901 - 1998	1903-1985	1883 - 1967
FORM OF CONTAMINATION	Tar, benzene, mercury, lead, arsenic	Methane, Petroleum and Lead	No contamination found	Arsenic, Lead, PAHs and TCE	PCBs, Lead and Sulfates	Polycyclic aromatic hydrocarbons (PAHs)	Tar, mineral oil, cyanide, and benzene
PROPERTY SIZE	19.1 Acres	140 of 1,400 acres	50 acres	600 of 1600 acres	138 Acres	230 Hectares (568 Acres)	14.5 hectares (3.5 acres)
CONTEXT	On Lake Union at the south end of the Wallingford neighborhood and approximately 3 miles from downtown Seattle	Heart of urban core with residential surrounding property	Eastern edge of downtown approximately 2 miles from the urban core and remains located in an industrial area.	Along the Lehigh River on the Southside of Bethlehem	Heart of Midtown Atlanta with residential, small business and transportation infrastructure surrounding the site	North of Duisburg between the urban districts of Hamborn and Meiderich	It is about 1.5 miles from the center of Amsterdam. It has densely populated neighborhoods in the Spaarndammer and Staatsliden districts flanking the park.
WHO OWNS THE PROPERTY	City of Seattle	City of Milwaukee	City of Birmingham	Lehigh Valley Industrial Park, BethWorks Now, Las Vegas Sands Company	Atlantic Station LLC, Atlantic Town Center LLC, AIG Global Real Estate, and Jacoby Development	International Building Exhibition Enscher Park (IBA)	County
CURRENT USE	Park	Light Industrial and Park	Museum and Arts Center	Mixed Use, Museum and Casino	Mixed use complex	Public park	Museum, Arts Center and Park
WHO LED THE REDESIGN	Public-led	Public-led	Public-led	Public-Private	Public-Private	Public-Private	Public-led
DESIGNER	Richard Haag	William Wenk of Wenk Associates Inc	HKW Associates	Unknown	Unknown	Peter Latz of Latz + Partners	Kathryn Gustafson of Gustafson Porter
REDEVELOPMENT TIMELINE	1971-1975	2002-2012	2005, breaking ground May 2010	2007 -present day	1999 - 2005	1991-1999	1997 - 2003
DESIGN INTENT	An adaptive reuse that honoring the historic and aesthetic qualities while extracting contaminants through bioremediation	Curb the impacts of deindustrialization with job creation and recreation	Maintain existing museum and design a new visitors center with educational and exhibition space	Boost the local economy with the while respecting the steel industry heritage.	Applying “Smart Growth” principles to improve air quality	Disrupt the site as minimally while conveying the industrial significance of the region	Provide a multi-functional recreation and culture park for local residents while ensuring ecological quality for visitors and tenants.

Table 4.1 - Case Study Key Facts

HAPIS: An Overview

A new matrix named Holistic Assessment of Post-Industrial Sites or HAPIS was created to evaluate seven case studies. Each case study is of the Industrial Revolution era and located within the urban center. The case studies were specifically chosen for the presence of structures, contamination and varied approach to redevelopment. By addressing the most complicated urban sites, the goal was to more easily translate HAPIS to less contaminated, more rural sites with ease.

The seven sites were assessed on their approach to the following key components: ecological, economical, social and aesthetics. The evaluation criteria for each component is outlined and supported by specific theory and research pertaining to each section. Each component has 3-4 subcategories with an available point system ranging from 0 to 5 points. An average for each section will be tallied with the overall average for each case study calculated. This evaluation sought to develop a more comprehensive method for studying current post-industrial sites and gauge a site's success based on the newly created criteria. The goal was to expand current incomplete models and propose a new way of defining "success" beyond just its economic and environmental factors.

LEED is one of the most popular and referenced rating systems in the United States and served as a starting point for creating HAPIS. The LEED rating system is primarily focused on new construction but in more recent years has expanded to be more inclusive with larger neighborhood designs and interior spaces. LEED was a starting point that began an intelligent conversation about improving our current construction practices and push developers to rethink conventional methods but has received criticism. One of the main arguments against the US Green Building Council (USGBC), from historic preservationists, is the existing rating system does not advocate strongly enough for the reuse of buildings. For many preservationists, rehabbing existing structures is the ultimate form of sustainability. LEED focuses on energy efficiency and pays minimal attention to the site itself. The American Society of Landscape Architects (ASLA) created a Sustainable Sites

Initiative to compensate for LEED limitations and encourages more forethought into the development for the outside of the building. The social and community components of both LEED and the Sustainable Sites Initiative were considered in the evaluation system, as were the principles of historic preservation, access to recreation, local economy initiatives, and aesthetics. The objective of this proposed matrix is to incorporate successful components of various theories and approaches to remediation, revitalization, economic development and preservation into a cohesive tool. It is an exploration that suggests a new ideas and strives to encourage dialogue between concerned citizens, government agencies, developers, ecologists and invested stakeholders in brownfield redevelopment.

HAPIS: Ecological Criteria

When addressing the ecological aspects of post-industrial sites, it is important to remember that “contamination and abandonment may also bring favorable ecological surprises. Ecologists often find much more diverse ecological environments in brownfield sites than in the native landscapes that surround them.” (Berger 2006, 71).

“Because of their contamination, industrial contexts, and the secured perimeters, brownfield sites offer a viable platform from which to study urban ecology while performing reclamation techniques. These sites have the potential to accommodate new landscape design practices that concurrently clean up contamination during redevelopment, or more notably where reclamation becomes integral to the final design process and form” (Berger 2006, 72).

Designs should seek to restore habitat, improve water and air quality, assist in the regeneration of natural systems and facilitate stewardship to the natural world as innovatively as possible. The Society of Ecological Restoration website defines ecological restoration as, “the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.” Using the Sustainable Sites Initiative as the guiding principles (<http://www.sustainablesites.org>), the attributes were developed to rate each case study according to their approach to soil, vegetation, water and

habitat. Inventory of the existing plant communities, soil, water quality, and existing habitat easily coincide with EPA Phase I and II EA assessments so the redesign can incorporate the findings. The inclusion of native plants can strengthen the notion of local place while avoiding non-native and invasive plants should be encouraged. When addressing post-industrial sites there needs to be an understanding that the site is not natural and therefore, adaptable plants are acceptable. The restored ecosystem consists of using indigenous species to the greatest practicable extent. In restored cultural ecosystems, allowances can be made for exotic domesticated species and for non-invasive ruderal and segetal species that presumably co-evolved with them. “Ruderals” are plants that colonize disturbed sites, whereas “segetals” typically grow intermixed with crop species.

In evaluating soil contamination, more points are granted for addressing contamination on-site versus its removal off-site or to a landfill. The rationale is more about accountability and educating communities to deal with their problems instead of relocating the issue to another community. Innovation is an important tool in the ecological section and if new techniques are being explored and tested, the project receives a higher score. Habitat is fragmented by the industry itself and the infrastructure adjacent to the property, but the redevelopment of the site is an opportunity to re-link and increase available acreage for wildlife. The breakdown for the point system for the ecological component is listed in Table 4.2.

Table 4.2 Ecological Criteria

	Soil	Vegetation	Water	Habitat
0)	No treatment	Maintained monoculture of non-ecologically functional plants (regularly mown lawn)	No treatment	Destruction of all existing habitat; provide less than 25% of total acreage for habitat
1)	Removal off site	Establishment of low-ecologically functioning, ornamental plants	Manage only surface on site. Direct to retention pond, etc.	Do nothing and allow for natural succession; maintain existing habitat at 25% of total habitat
2)	Only capped	Do nothing and allow for natural succession	Treat groundwater only on site	Increase habitat by 25% of total acreage
3)	Combination of cap/remediation	Allow for natural succession and introduce native and adapted plant species	Treat surface and groundwater on site	Increase habitat by 50% of total acreage
4)	Innovative remediation techniques	Allow for the inclusion of ruderals and the restorative ecosystem that has established on-site.	Treat surface and groundwater on site using innovation biological systems	Increase habitat by 75% of total acreage
5)	Complete removal of pollutants from soil	Restore native plant communities to pre-industrial standards (based on reference ecosystems)	Complete removal of pollutants from surface and groundwater	Fully protected wildlife preserve (100%)

HAPIS: Economic Criteria

The objective in the economic category was to redefine our traditional profit-driven capitalistic approach to economics by focusing on the acceleration of the local economy. The Business Alliance for Local Living Economies (BALLE) is a growing organization demonstrating how successful local economies are more sustainable than large corporate interests. The organization defines living economies as one “that ensures economic power resides locally to the greatest extent possible, sustaining vibrant, livable communities and healthy ecosystems in the

process” (<http://liveingeconomies.org/aboutus/mission-and-principles>). In Austin, TX one study found that for every \$100 spent at a national chain bookstore only \$13 stayed within the local economy, but \$45 remained when the same amount was spent at a locally based store. This assessment rates a higher success on redevelopments that are primarily local or regional operations offering a diversity in jobs, and replenishes the tax base lost when the industry left. Historically, these sites employed thousands and it is highly unlikely any new industry can provide that level of employment. However it is imperative to argue that new industry provides a diverse range of employment opportunities and advocates for a living wage for employees. A living wage is defined as the wage that a full-year, full-time worker would need to earn to support a family of four at the poverty line. Cities and counties with a higher cost of living tend to have higher living wage levels (<http://www.communitybenefits.org>).

One component of this section is public safety which rates how the site is remediated. The Environmental Protection Agency (EPA) has cleanup standards based on the intended land use of the site once it is redeveloped. These standards have defined acceptable levels of contaminant in the soil and water for daily interaction from the general public. Its placement within the economic component is due to the cost associated with cleaning the soil and water. All case studies were evaluated on how quickly the site was able to pay back the initial financial funding from the local or state institutions for the cleanup and infrastructure improvements only. Private development, rehabilitation and new construction costs were not a consideration in this Matrix given not all sites encountered this cost.

During the assessment phases, the EPA will recycle as much on-site material as they can before sending the remainder to the landfill. In March of 2007, Donovan D Rypkema explained the concept of embodied energy at the Traditional Building Exhibition and Conference in Boston, “as the total expenditure of energy involved in the creation of the building and its constituent

materials. Much of the “green building” movement focuses on the annual energy use of a building, but the energy consumed in the construction of a new building is 15 to 30 times the annual energy use.” Rypkema’s argument is similar to ecologists’ need to associate quantifiable cost to biological functions in order to preserve ecosystems. Incorporating the historical legacy of post-industrial sites by preserving the structures has economic weight that should be factored into the demolition costs potentially preserving more historic buildings. The EPA has noted on their website, that building-construction debris constitutes around a third of all waste generated in this country and has projected that more than 27% of existing buildings will be replaced between 2000 and 2030. By rehabilitating the existing structures, material is diverted from the landfill extending the life of the system. The breakdown for the point system for the economic component is listed in Table 4.3

Table 4.3 Economic Criteria

	Job Diversity	Job Creation	Tax Base	Public Safety
0)	Provide no jobs	No new jobs	Not self-sufficient	Restores the site based on the minimal federal and state levels
1)	National/international corporation providing low-paying jobs (\$8-12/hour)	Less than 200	Self sufficient	Restores the site for heavy industrial
2)	Local/regional companies providing low-paying jobs (\$8-12/hour)	201-400	20 year ROI	Restores the site for light industrial
3)	National/international companies providing diverse-pay grade jobs (Living wage)	401-600	15 year ROI	Restores the site for commercial use
4)	Local/regional and national/international companies providing diverse pay grade jobs, more than 50% local.	601-800	10 year ROI	Restores the site for residential use
5)	All local/regional companies providing jobs for diversified skilled labor force. Strong living economy.	801-1000+	5 year ROI or less	Restores the site to pre industry standards; "pristine"

HAPIS: Social Criteria

The social category evaluates how well the redevelopment project strengthened community connection and promoted equality and opportunity for local populations. Access to recreation and greenspace are important indicators for the well being of a community. In 2007 Mayor Bloomberg and New York City initiated plaNYC 2030, a campaign for each city dweller to have a 5 minute walk to a park and openspace. More than 300 acres of parks have been acquired in the last five years, and the initiative continues to expand its efforts. This commitment illustrates the value associated with recreational opportunities and residents' access to them. Sites will be assessed on their inclusion of recreation on site, whether passive or active, accessibility, and programming potential.

In the previous chapter, emphasis was placed on the power of community. Each case study will be evaluated on the level of community involvement throughout the design process. There is a difference between community announcements and direct collaboration with community organizations and residents. Announcements about new developments are required by law so more points were awarded to the projects that promoted public awareness and outreach throughout the design, implementation and rehabilitation of the site. Within the Sustainable Sites Initiative, they advocate for a community benefits agreement (CBAs) to be developed between the developer and the impacted community. This is a productive way to acknowledge the community's needs and allow for its voices to be heard. The Partnership for Working Families state on their website that CBAs allow for "meaningful, up-front communication between the developer and a broad community coalition decreasing the developers' risk while maximizing the positive impact of development on local residents" (<http://www.communitybenefits.org>).

The context beyond the property boundaries of the former industrial site is an important component to incorporate into the redesign but can be overlooked depending on the invested parties. If the existing community's needs are taken into account, the project should allow access to the site and provide new opportunities for interaction. More successful designs in this section will be ones that sought to improve the existing neighborhoods and surroundings while safeguarding the displacement of local residents and small businesses.

The final subcategory is community infrastructure drawn directly from the Community Connectivity credit for LEED (<http://www.greenexamacademy.com/ss2/>). Access to affordable housing, public transportation, basic community services such as banks, grocery stores, religious institutions are essential components of social well-being. Each site is evaluated based on whether these indicators are available on-site or within a quarter mile radius. Government agencies such as the Federal Highway Administration and the Center for Disease Control are investing in walkability studies because it can combat transportation woes, air pollution, obesity and diabetes.

According to results of the 1999-2000 National Health and Nutrition Examination Survey (NHANES), an estimated 64% of US adults aged 20 years and older are classified as overweight or obese (<http://www.cdc.gov/healthyplaces/healthtopics/physactivity.htm>). The same report states that obesity rates of US adults have increased from 15% to 31% since 1980. The rate has also doubled for the percentage of obese children and adolescents since the 1970s. Encouraging the accessibility to daily points of interest is an effective tool to promote proper health and well being for residents. The breakdown for the point system for the social component is listed in Table 4.4.

Table 4.4 Social Criteria

	Recreation	Community Involvement	Integration with Social Fabric	Community Infrastructure
0)	No recreation	No community involvement	No access to surrounding neighborhood (gated)	None
1)	Private only	Community input disregarded	Physical access only (infrastructure)	Offer 1 of 3 within ½ mile radius of center of site
2)	Passive recreation - limited availability	Community input initially	Physical access and centers for interaction	Offer 2 of 3 within ½ mile radius of center of site
3)	Passive recreation - 24 hour availability	Community input throughout design process	Physical access, hubs, and community programming activities	Offer 3 of 3 within ½ mile radius of center of site
4)	Passive and active recreation - limited availability/potential for programming	Community Involvement with decision making power	Integration of 'new' community	Offer 2 of 3 on site
5)	Passive and active recreation - 24 hour availability/great potential for programming	Community led designs	Complete integration and improvement of existing neighborhoods and surroundings	Offer 3 of 3 on site

HAPIS: Aesthetics Criteria

The final component for evaluation is the design itself and how effectively it honors the historical legacy of the site. HAPIS advocates for more innovative and creative re-use of the

structures themselves. Design can enrich user experience and re-knit the culture that has been lost through demolition. It has the ability to “emphasize the need for direct engagement with [post-industrial] sites, experiencing places intuitively and privileging phenomena that are unique to that place” (Corner 1999, 7). People are drawn to older buildings. There is a nostalgic attachment to these places through their rustic patina and scale. They feel right and transport us to a place of familiarity. This is the most subjective of all the categories but the basis for including it is justified in order to debate the merits of a holistic approach to revitalization. The sites will be analyzed on how well they maintained the authenticity of the site, interpreted the history, and encouraged unique experiences in the designed spaces.

Awareness of things past can excite pleasure, especially in landscapes that display temporal depth. Age, whether rendered in surface patina or reflected in total ruin, takes on aesthetic value. Moreover, since old things cannot be created anew but only spared, pastness in the built environment is always a limited resource” (Jakle and Wilson 1992, 87)

Aesthetics are the link. The National Park Service (NPS) has created evaluation standards and guidelines for the four treatment options of historic sites: Preservation, Rehabilitation, Restoration and Reconstruction. HAPIS does not establish if one treatment is superior over another but it was important to acknowledge there are specific guidelines available to guide the redesign process.

The interpretation of the site’s history is evaluated based on how effective the previous land use and cultural significance of the site was referenced in the redevelopment. A rural neighborhood, a city, a trash dump, [industrial site] or a garden all have a history, a complex relationship between parts, that we can come to appreciate” (Thompson 1995). The case studies exhibiting interpretative signage will be rated higher than sites where the name is the only clue about the site’s past. Innovative reuse of the contextual elements such as rail lines or water channels are encouraged. Programming and educational opportunities that promote public interaction and foster an appreciation for the site’s heritage is an important step towards creating a sense of pride for the community. The ultimate objective is to rate if the design can allow for literal

and experiential interpretation. If individuals visit the site for a specific reason but crave more time, then that is a successful redesign.

The authenticity of the site is subjective and there will be a detailed explanation of each case study. The subcategory will be reviewing the scale, materiality, density, and how the site contrasts or blends into its surroundings. It is a slippery slope because what if the new construction is “ugly” but with the right materials and scale but lacks proper execution. In the same vain, the contrast of a modern glass building with no reference to the original materials may offer a unique juxtaposition and compliment the sublime aesthetics of the site more. The breakdown for the point system for the aesthetic component is listed in Table 4.4.

Table 4.5 Aesthetic Criteria

	Preservation	History and Interpretation	Authenticity
0)	Remove all structures	No reference	No relation to original site
1)	Demolish structures but reserve material for future use	Reference by name only	Scale not proportionate Poor materiality No interaction
2)	Keep key features as focal points only	Signs only	Low interaction New construction uses appropriate materials ineffectively
3)	Removal of non-period significant structures and reuse historic only	Signs and site design for key components (RR lines, waterways)	Medium interaction New construction uses appropriate materials properly Scale is appropriate
4)	Leave all structures intact	Signs + Site + Programming	High interaction New construction proportionate or juxtaposes nicely
5)	Maintain everything and integrate into use. Reuse all structures	Experiential interpretation	Captures the essence of the place and offers a unique experience

The following chapter will evaluate each of the case studies and give a detailed explanation for the points they received. This will test if certain sites were more successful when a more holistic approach was taken.

CASE STUDY:	GAS WORKS	MENOMONEE VALLEY	SLOSS FURNACE	BETHLEHEM STEEL	ATLANTIC STATION	DUISBURG NORD	WESTERGASFABRIEK
ECOLOGICAL							
SOIL							
VEGETATION							
WATER							
HABITAT							
TOTAL							
ECONOMIC							
DIVERSITY OF JOBS							
JOB CREATION							
TAX BASE							
PUBLIC HEALTH							
TOTAL							
SOCIAL							
RECREATION							
COMMUNITY INVOLVEMENT							
INTEGRATION							
COMMUNITY INFRASTRUCTURE							
TOTAL							
AESTHETICS							
PRESERVATION							
HISTORY/INTERPRETATION							
AUTHENTICITY							
TOTAL							
OVERALL SCORE							

Table 4.6 The Matrix

CHAPTER FIVE

CASE STUDIES:

Evaluation of Current Post-Industrial Site Redevelopments

"It's critical. We strain to listen to the ghosts and echoes of our inexpressibly wise past, and we have an obligation to maintain these places, to provide these sanctuaries, so that people may be in the presence of forces larger than those of the moment" (Ken Burns 2005).

The purpose of the HAPIS matrix was to evaluate if the post-industrial sites whose approach was more holistic scored higher according to the outlined criteria in the previous chapter. This is a qualitative experiment represented in a quasi-quantitative manner. At first glance a .04 difference may seem insignificant but after closer examination, it represents a missed opportunity in the site's redevelopment. This chapter analyzes how each case study ranked in the four different components of the matrix: ecological, economic, social and aesthetics. The HAPIS has attempted to provide an objective and theory based evaluation criteria but this is its first attempt at testing current brownfield projects. No system is perfect but the intent is to investigate these post-industrial sites from a different perspective and see if any valuable lessons can be gleaned from this process.

Ecological Component Evaluation

The Ecological Component of the HAPIS is broken down into four subcategories: soil, vegetation, water and habitat. The findings of this section are found in Table 5.1.

CASE STUDY:	GAS WORKS	MENOMONEE VALLEY	SLOSS FURNACE	BETHLEHEM STEEL	ATLANTIC STATION	DUISBURG NORD	WESTERGASFABRIEK
ECOLOGICAL							
SOIL	4	1	5	1	2	4	4
VEGETATION	0	3	1	0	1	4	3
WATER	1	4	5	0	2	4	4
HABITAT	0	2	1	0	0	3	0
TOTAL	1.25	2.5	3	0.25	1.25	3.75	2.75

Table 5.1: Ecological Component Analysis

Soil

As stated in the previous chapter, any case study that removed contaminated soil off-site would score low in the soil subcategory. Menomonee Valley and Bethlehem Steel both prescribed to this soil remediation tactic, scoring them a 1. Atlantic Station consolidated the contaminated soil and a centralized area, capped it and built an underground parking garage. There are more innovative methods to combat polluted soil which is why Gas Works, Duisburg and Westergasfabriek all received a 4. Bioremediation was an experimental technique when Haag first attempted this method in 1975. Although the park has been closed occasionally for tar and benzene leaching from the soil, his technique has been successful in removing soil contaminants. During a tour at Duisburg-Nord, the guide explained how a chemical company extracted the hazardous material from the soil to be reused. As explained in the previous chapter, some materials were buried on-site while other portions of the park used phytoremediation to remediate contaminated soil.

Westergasfabriek chose a function-oriented cleanup which accounted for the site's future use and devised a remediation plan accordingly. The main objective was to prevent contact with pollution and prohibit its spread. Initially the contaminated soil was to be removed but this proved to be too expensive. Isolating the pollution required capping where asphalt could then be used as parking was opposed by the city. Finally a new plan was introduced combining a living layer of soil and a geo-textile fabric for areas with no plantings or where pavers could cover the soil. Years

of industrial waste were stored in buildings basements and cellars which posed a health risk. An extensive removal of contaminants was performed in compliance with Dutch law and ‘vapor-proof’ concrete floors were used to seal any additional vapors from penetrating from the soil.

Ecologically, Sloss Furnaces is an anomaly because the site is devoid of soil and water contamination. Limestone was one of the local resources harvested for steel production and according to Sloss’s Executive Director, Bob Rathburn, the site is situated on limestone. No in-depth testing has been done to determine if this material is responsible for cleaning the soil but extensive tests of soil both on and off site were conducted by the University of Alabama Birmingham in the early 2000s. UAB established a phytoremediation demonstration garden but it serves only as an education tool.

Vegetation

In this subcategory, case studies were evaluated on their encouragement of the site’s ecosystem. Gas Works is primarily a monoculture of maintained grass knolls with occasional ornamental plantings while Bethlehem Steel’s plan is laden with hardscaping with minimal plantings scoring them both a 0. At Atlantic Station over 2,800 new trees were planted but the majority are street trees or ornamentals. Beyond Sloss’s phytoremediation demonstration gardens, the remainder of the site is mown grass not contributing to a diverse plant ecology. Sloss has partnered with the local Botanical Gardens to identify the various species found on the property and a majority of them are of South American origin. These plants presented a problem for preservationists because they pull apart the brick of the structures.

Menomonee Valley actively sought to fight the devastation of industrialization. The initial grant that funded the design competition also established an urban forestry strategic plan to increase the remaining 3.7% urban tree canopy identified in a 1996 analysis. The vegetation plan allows for natural succession by actively reintroducing natives to repair Menomonee River’s riparian zone. Westergasfabriek does have maintained lawns but they are flanked with a series of

natural gardens that serve as more than just ornamentals. At Duisburg, the active rail lines established an assortment of new plant species and created a diverse new ecosystem. This new ecosystem has been allowed to flourish and is being studied by botanists and ecologists.

Water

This subcategory evaluated how innovative the redesign's approach was to remediating water on the site. Case studies that treated both groundwater and managed stormwater runoff, scored higher. Although the Lehigh River borders Bethlehem Steel, no treatment is planned scoring the site a 0 whereas at Gas Works only the surface water is being mitigated. Atlantic Station is treating both groundwater and surface runoff on-site. A groundwater extraction system was installed preventing contaminated water to migrate off the property. The water is regularly tested before entering the municipal sewage system. Runoff is redirected to a detention pond serving as a prominent landscape feature. The Menomonee Valley "Wenk Plan" proposed an integral management system between the wetlands, ponds, and turf areas to accommodate a 100-year storm event, treat surface runoff and remove groundwater pollutants.



.Figure 5.1:Duisburg Water Channels. Zeigler, 2009.

The polluted water at Duisburg-Nord was an environmental concern resulting in a purifying design feature. The industrialization of the Ruhr Valley converted tributaries into disposal channels. One such channel flows through Duisburg-Nord but the waste water is now piped running parallel to its historic location as shown in Figure 5.1. Rainwater collects and travels through a series of clarification ponds and channels throughout the park contributing to a pleasant user experience. A windmill helps oxygenate the water and irrigate the bunker gardens during extended dry periods

A separate closed water system was installed at Westergasfabriek to circulate the water with monitoring mechanisms to track pollution levels. A series of purification ponds were constructed in the foundations of demolished gas holders similar to Duisburg-Nord. Water is an integral part of Sloss Furnace and again contamination of the groundwater has never been found on or leaving the site. The water is naturally being filtered through the limestone in a series of skip pit ponds containing both catfish and crape. A floater pump drains the water into the city's system once the ponds reach a certain level. Sloss was the only case study claiming to be "clean."

Habitat

Industrialization and urbanization led to habitat fragmentation and most of the case studies are not progressively attempting to eradicate this problem within the redesign. Most of the case studies scored low in the habitat subcategory because the majority of the vegetated areas were maintained lawns not contributing to habitat or they did not meet the increase in acreage quota. Menomonee Valley is encouraging new habitat with the repairing of the river and upon completion of the community park, the total acreage will be increased by 25%. Duisburg-Nord was the highest ranking case study in this subcategory with a 3. A portion of the park dubbed, the Wilderness, was initially slated for mill expansion that never occurred. Since the land sat undisturbed for an extended period of time, the land has advanced successionaly. It remains closed to the public because of its significant contribution to wildlife habitat. Overall, Duisburg was the highest rated case study in the Ecological component because of the numerous innovative techniques the designer and stakeholders chose to incorporate.

Economic Component Evaluation

The Economic Component of the matrix are broken down into four subcategories: Job Diversity, Job creation, Tax Base and Public Health. The findings of this section are found in Table 5.2.

CASE STUDY:	GAS WORKS	MENOMONEE VALLEY	SLOSS FURNACE	BETHLEHEM STEEL	ATLANTIC STATION	DUISBURG NORD	WESTERGASFABRIEK
ECONOMIC							
JOB DIVERSITY	0	4	2	2	3	2	2
JOB CREATION	0	5	1	2	5	1	2
TAX BASE	0	2	0	2	5	0	1
PUBLIC HEALTH	1	2	4	4	4	4	3
TOTAL	0.25	3.25	1.75	2.5	4.25	1.75	2

Table 5.2 Economic Component Analysis

Job Diversity

This subcategory advocates for a stronger local economy offering a variety of jobs with a living wage of \$12/hour (15.50 euro/hour). Gas Works is a park managed by the City of Seattle's Park and Recreation Department with no dedicated full-time employees. Sloss Furnaces, Bethlehem Steel, Duisburg-Nord and Westerfgasfabriek received a 2 because these sites offer local/regional low paying jobs that are generally retail or entertainment based. The commercial district of Atlantic Station is comprised of large national chain stores. The financial institutions and corporations offer more diverse salaries than the retail based economy raising their score to a 3.

Menomonee's rating of 4 for job diversity is due to the collaboration between federal, state, local governments and area non-profits to support the Valley's economic development. Key features such as the community park and stormwater facility are proving to be amenities for potential employers. The incoming companies are encouraged to provide a living wage of \$12/hour and health benefits for employees. A detailed evaluation process was created to track property values, job creation and wages in the Valley. Menomonee Valley is the only case study that implemented a long term monitoring system on this level.

Job Creation

This subcategory's evaluation is based on the jobs created by the redevelopment on the post -industrial sites. Both Gas Works and Duisburg-Nord are parks while Sloss Furnace serves as a museum all requiring a small support staff. Initially their redevelopment created new jobs but since construction has been completed, employment has leveled off. At Duisburg, the park has a

visitors center, restaurants, hostel, farm and performance spaces offering employment for under 200 workers. Currently Sloss employs ten full-time and three part-time employees and once the new center is completed, the number of employees will double. Westergasfabriek has a broader use with markets, offices, restaurants, and a cinema to increase the number of employees therefore it receives a 2 in this subcategory.



Figure 5.2: Vignette of the new casino in Bethlehem. Accessed from <http://onearthtravel.com/blog/travel-usa/travel-las-vegas/sands-casino-resort-bethlehem-open-this-may/>.

Although gambling was a controversial issue for Bethlehem, the construction of the Sands Casino proceeded and now employs over 200 people to run the casino, hotel, and supporting restaurants. Once the other components are completed, this figure will need to be adjusted. Menomonee is considered a Federal Renewal Community granting tax incentives for hiring residents from the renewal community. The new diverse companies offer a variety of jobs ranging from manufacturing to management. Most recently, 8.1 acres were sold for a wind turbine manufacturing project that will employ 275 people totaling 1,569 new jobs in the industrial park. Atlantic Station has the potential to employ 15,000 well exceeding the matrix's baseline of 1,000 awarding them a 5.

Tax Base

This subcategory rated how quickly the redevelopment can replenish the initial funding from local or state entities for the remediation and infrastructural improvements. Gas Works is completely dependent on the city budget for maintenance to the structures and grounds. Duisburg is also not self sufficient but is managed by a small partnership of local and state governments and supplemented by non-governmental agencies. Sloss's budget is split between the city and its foundation. All three of these case studies received a 0. Westergasfabriek's has a number of commercial rentals which allows the park to be self-sufficient and offer discounted rates for neighborhood functions. This contributes to the park's cultural identity because the profit stays within the organization.

Currently, the public has contributed \$449 million for remediation and infrastructure improvements in Bethlehem and have a Return on Investment (ROI) of approximately 22 years. Milwaukee created a tax increment financing district to pay for the remediation and new infrastructural improvements within 27 years, but the site's success has moved up the ROI to 23 years. According to Corey Zetts of Menomonee Valley Partnership, the property sales are now higher than initially anticipated. In 2002, an acre sold for \$30,000. However, the going rate for remediated industrial land is now \$120,000 per acre. Both these sites received a 2 for their return on investment. Atlantic Station was an economically driven redevelopment project that paid back the 250 million in infrastructure improvements and remediation costs in under five years.

Public Health

This subcategory correlates directly to the site's intended future land use and the cost associated with cleanup. Gas Works has been restored to heavy industrial levels. Menomonee is slated for light industrial whereas both Bethlehem and Westergasfabriek received a 3 because of the commercial components of their redesign. In Bethlehem, a residential component is indicated on the SteelStack Master Plan, Duisburg has a hostel on the premises, and Atlantic Station offers a variety of housing opportunities granting these case studies a 4. Given the lack of contamination

on-site at Sloss Furnaces, residential could be incorporated, if deemed appropriate. By far Atlantic Station was the highest rated case study in the Economic Component of the Matrix.

Social Component Evaluation

The Social Component of HAPIS is broken down into four subcategories: Recreation, Community Involvement, Integration with Social Fabric, and Community Infrastructure. The findings of this section are found in Table 5.3.

CASE STUDY:	GAS WORKS	MENOMONEE VALLEY	SLOSS FURNACE	BETHLEHEM STEEL	ATLANTIC STATION	DUISBURG NORD	WESTERGASFABRIEK
SOCIAL							
RECREATION	4	4	2	2	3	5	5
COMMUNITY INVOLVEMENT	2	4	4	5	2	1	4
INTEGRATION	2	5	2	2	2	3	5
COMMUNITY INFRASTRUCTURE	2	3	2	3	5	2	3
TOTAL	2.5	4	2.5	3	3	2.75	4.25

Table 5.3: Social Component Analysis

Recreation

The recreation subcategory evaluated each case study on the recreation opportunities provided, whether active or passive, with programming potential and availability to the public. Sloss Furnace and Bethlehem Steel scored the lowest with a 2. At Sloss, the overflow parking area serves as greenspace where people can walk their dogs, play frisbee, or relax offering minimal recreation opportunities. The site is completely fenced with only one entrance limiting access to when the museum is open (Tues-Sat 10AM - 4PM, Sun 12 PM - 4 PM). The redesign for Bethlehem focused on the site's history and its potential as a cultural center. Unfortunately, this plan does not utilize the site's recreation opportunities because there is no active recreation planned as shown in Figure 5.3. Atlantic Station has received numerous awards for its walkability but beyond running and cycling along the streets, there is no active recreation available. The main park space is situated between six lanes of traffic offering little reprieve from the hustle of urban living.

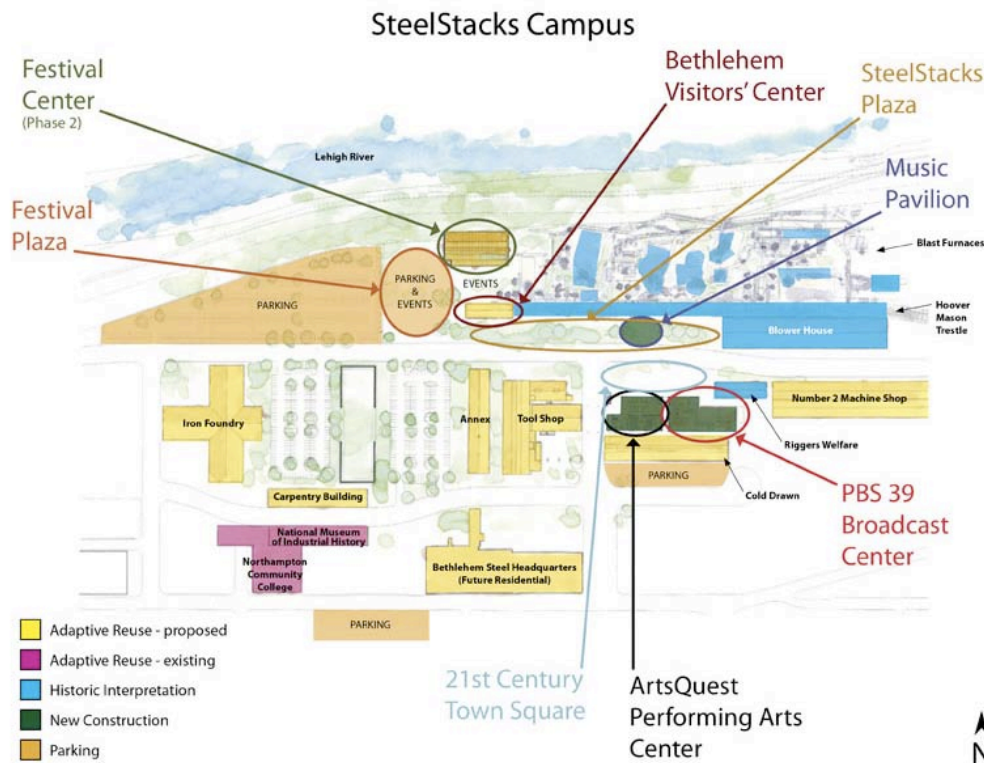


Figure 5.3: Bethlehem SteelStack Master Plan. Accessed from <http://www.steelstacks.org/campus/default.asp>.

Gas Works and Menomonee both received a 4 for offering both active and passive recreation with limited availability. Gas Works offers kite flying, walking paths, and picnic shelters available for use. The park is open from 6 AM to 10 PM. “Wen’s Plan” at Menomonee provides paths and meadows for passive recreation with numerous active recreation fields with programming potential however there was no indication the park would be open 24 hours a day unlike Duisburg and Westergasfabriek.

Both Duisburg-Nord and Westergasfabriek are open to the public 24 hours a day seven days a week giving both these case studies a 5 for this subcategory. Duisburg-Nord honors the region’s industrial heritage while providing a multitude of recreational possibilities. Playgrounds, rock climbing facilities, scuba driving and vast fields are available for lounging, barbecuing, or

playing soccer. Multiple trails circle through the park to accommodate cyclists and pedestrian traffic. According to the park's official website over 500,000 people visit Duisburg annually for its imaginative design. Westergasfabriek has playgrounds, a dog park, active recreation fields, and trails for cyclists and runners. The Events Field is a flexible space for soccer or neighborhood events with reinforced Netlon grass to ensure durability during large events.

Community Involvement

In the Community Involvement subcategory the extent of public involvement in the redevelopment process was evaluated. The sites that were more inclusive of the community's opinions will score higher. From the literary research conducted, there was little information regarding community involvement at Duisburg-Nord beyond completion of the design competition. Gas Works and Atlantic Station both received a 2 for initial community input. Gas Works was a preservation effort with heightened initial community involvement which tapered once the redesign was underway. Although multiple stakeholders were involved in the redevelopment process at Atlantic Station, there was no active community presence mentioned beyond the rezoning process.

In Menomonee Valley, public outreach was important to organizers. In the summer of 2003, two separate community meetings were held to discuss the park design and participants voted on components they wanted included. These ideas became the framework for development and a portion of the park is being installed by community groups. As stated in the overview, Sloss Furnaces is the only US publicly owned industrial site and its preservation was initiated from public outrage when the site was slated for demolition. The community voted for tax funds to be allocated for Sloss and has remained an active participant for the new visitor's center. According to Mr. Rathburn there were over 100 community members involved in the Master Plan process set to break ground on construction this summer. At critical points throughout the Westergasfabriek redevelopment process, meetings and presentations were scheduled for community input.

Residents and neighborhood associations submitted ideas and voted upon key features for the park. Westergasfabriek's project team listened to the locals' concerns, improved access to the site which in turn, strengthened community pride. The Natural Gardens are maintained by local school groups and other volunteers. Menomonee, Sloss and Westergasfabriek all received a 4 in this subcategory.

The community has been outspoken and involved in the future of Bethlehem Steel. Numerous interest groups such as Steelworkers' Archives, Friends of Steel, Historic Bethlehem Partnership, and the six area universities have been actively contributing to the process. The magnitude of involved stakeholders may impede consensus but hopefully the end result will be a well received beneficial plan. This was the only case study to receive a 5 for their inclusion of the impacted community.

Integration with Social Fabric

This subcategory evaluated how well the redevelopment blended into the larger social context beyond the post-industrial sites' boundaries. Sites that improved the physical access, as well as created new interaction hubs and encouraged community programming will score higher. Gas Works, Sloss Furnaces, Bethlehem and Atlantic Station all received a 2 in this subcategory. Gas Works maintained physical access, offered points of interaction for the community but provided no formal programming. The area beyond Sloss's property is industrial with active railroad lines on two sides of the site, limiting integration with the urban context. Sloss has made a valiant effort to encourage more social interaction with the site through concerts, foundry demonstrations, artistry classes, and an abundance of festivals. In Atlantic Station, beyond providing new retail opportunities and a grocery store, it is unclear how the existing neighborhoods were improved from this development. When traveling on State Street towards

Atlantic Station, there is a disconnect between the historic residential fabric and the new high rise condos as shown in Figure 5.4.



Figure 5.4: State Street, Atlanta GA. Zeigler 2009.

Atlantic Station provides improved physical access, creating new areas for interaction amongst those who live and work there. However, there is no community programming or clubs promoting a sense of place. Duisburg scored a 3 for their integration with the existing social fabric. Greenways reconnect the neighborhoods to the park encouraging daily interaction with the site. Concerts, art shows, conferences, and markets all converge to serve the communities' needs.

Menomonee Valley is a diverse population that was becoming segregated. Re-knitting the surrounding neighborhoods was important and the MVP is constantly monitoring housing prices, crime, and other social indicators related to revitalization. The redesign introduced a new grid pattern for the industrial park which reflected the scale of the adjacent neighborhoods. This case study was the only one to receive a 5 for its approach to extending beyond the property lines.

Community Infrastructure

This subcategory evaluated how walkable the site is based on its accessible public transportation, affordable housing and community services with a 1/2 mile radius. All the case studies are located in urban areas, so the lowest score was a 2 for have two of the three requirements within the designated radius. Gas Works lacked affordable housing, Sloss public

transportation and Duisburg-Nord access to community services. Menomonee, Bethlehem, and Westergasfabriek offer all three within the specified radius. Atlantic Station is a Live Work Play community and was the only case study to receive a 5. Marta has train and bus lines on-site, 25 percent of housing allocated for affordable housing and a dentist, grocery, daycare and banks are available within walking distance.

Aesthetics Component Evaluation

The Aesthetic Component of the Matrix is broken down into three subcategories: Preservation, History and Interpretation, and Authenticity. The findings of this section are found in Table 5.4.

CASE STUDY:	GAS WORKS	MENOMONEE VALLEY	SLOSS FURNACE	BETHLEHEM STEEL	ATLANTIC STATION	DUISBURG NORD	WESTERGASFABRIEK
AESTHETICS							
PRESERVATION	3	2	5	3	2	5	3
HISTORY/ INTERPRETATION	3	3	5	4	2	5	5
AUTHENTICITY	2	1	4	2	1	5	5
TOTAL	2.67	2.00	4.67	3.00	1.67	5.00	4.33

Table 5.4: Aesthetic Component Analysis

Preservation

This subcategory focused on the sites' physical structures and how they were integrated into the redesign. The case studies that kept buildings intact and found creative reuses received a higher rating. Menomonee Valley and Atlantic Station scored the lowest in this subcategory with a 2. Menomonee Valley was constrained by inadequate fill of the wetlands causing unstable building foundations deemed unfit for reuse. The buildings' asbestos-debris was managed on-site and local highway fill was used to elevate the site out of the flood plain. Glass, stockyard beams, and "Cream City" brick to be reused in the landscape and two preserved smoke stacks serve as the only link to the site's industrial past. The river is a prominent feature in the redesign and Wenk drew cues from the context beyond the property boundaries.

Historic Preservation was not considered in the redevelopment strategy for Atlantic Station given the site was leveled. Although building materials were recycled and reused in constructing new buildings, only two relics were kept as a reminder of the site's historic legacy. One smoke stack was relocated to a side street with interpretative signage around it explaining the history and redevelopment process. It was replaced by an Arc de Triumph that has no connection to Atlantic Steel. A steel press being showcased in the original photographs of site, was relocated to a gravel parking serving as landscape material storage.



Figure 5.5: The Preserved Artifacts of Atlantic Station. Zeigler 2009.

Gas Works, Bethlehem Steel and Westergasfabriek all received a 3 for their approach to preservation. Haag intended for the industrial structures to serve as relics at Gas Works with key buildings retrofitted for reuse while the remainder of the site was left under-planned. Bethlehem was advocating for a preservation based approach for the former steel mill. In 2004, the site was listed as one of America's 11 Most Endangered Historic Places by the National Trust for Historic Preservation. The community's commitment to having the industrial past drive its future is not

common practice. The public has fought diligently to preserve all its structures but have continued to lose its historic fabric. Sands Casino promised to respect the city's heritage with its new construction and safeguarded other buildings from demolition. The inclusion of the city's industrial roots was crucial for community buy-in of the project. Industrial relics are included throughout the facility educating visitors in an unexpected location. A majority of existing structures are being rehabilitated.

Unlike most modern industrial complexes, the buildings of Westergasfabriek were laid out along a strong axis with intricate architectural details. Inevitably, over time the carefully planned design suffered as new electric demands were placed on the site. In 1989, 13 of the original structures were given protection, safeguarding them from demolition. Deterioration of the gas holders led to the structures removal from the landscape but their intact foundations are used as ponds. Once the redesign began in 1997, restoring the buildings was a top priority for the team and a private developer was hired to fund and oversee the process. The strong central axis flows from the formal market squares through the park to the gasholder ponds with multiple “reading rooms” to retreat from the hustle of crowds.



Figure 5.6: Sloss Quarters remaining structure being used as a rain harvesting tool. Zeigler 2010.



The community understands the significance of Sloss and saved the site through preservation. Former employees still recall their stories and the UAB is conducting oral histories. Nothing remains of the original furnace complex because of the substantial renovations the site underwent between 1927 and 1931. Changes in mechanization called for retrofitting, expanding, or rebuilding existing structures and components necessary for coke production. Prior to Sloss being added to the Historic Register, major demolition of the employee housing, known as the Sloss Quarters occurred. One intact house remains and its roof is currently serving as a source for rain water harvesting (Figure 5.6). Rehabbing this structure would offer another dimension for the users experience if the house is incorporated more into the site. Duisburg was the only site where some of the site's structures were preserved or rehabilitated while others were left as decaying relics in the landscape. Buildings were only rehabilitated once their intended use and funding was secured. This incremental approach takes longer to implement but allowed for more selective solutions. Both Sloss and Duisburg-Nord received a 5 in this subcategory.

History and Interpretation

This subcategory evaluated how the site's previous use and history was interpreted. Signage is one way to convey important historical information but more points were granted to sites that explored more experiential tactics as well. Although Gas Works rely on the industrial relics to communicate the site's previous use, there is no current education associated with Gas Works in power production or the growth of Seattle. The new organization, Friends of Gas Works Park's mission is to "celebrate our industrial past, ... give new life to the totemic artifacts ... of Seattle's past and to utilize one of the generator towers for the installation of a camera obscura" (<http://www.fogwp.org/>). In collaboration with the Wallingford Solar Initiative, they are seeking to add an interpretative center focusing on the history of the site's power production and showcase newer alternative methods such as solar panels and wind turbines. A vignette of the proposed improvements to the play barn is shown in Figure 5.7.



Figure 5.7: Proposed Alternative Energy Interpretation Components for Gas Works Park. Accessed from <http://www.wallingfordsolarinitiative.org/projects/gas-works-park#TOC-Gas-Works-Site-Buildings-And-Their->]

The organization's continued interest in the park reflects its significance and value within the community. Interpretative signage is planned for the industrial and ecological history of the Menomonee and tours are given on a regular basis to convey the significance of the Valley and the redevelopment process. Both Gas Works and Menomonee received a 3 for this subcategory.

Bethlehem was an ideal location for the National Museum of Industrial Heritage and the site has a dedicated exhibit for the legacy of Bethlehem Steel. The museum is under construction and set to open in 2011. It is unclear at this time if additional interpretation will occur so the site was given a 4 which may change in future. Duisburg and Westergasfabriek allow for more experiential interpretation to occur but also have traditional signage too. At Duisburg, self-guided or personal tours educate visitors about steel making but were limited in the environmental aspects of the redesign. Signs and illustrations throughout the park explained ecological features and an interactive kid's water feature demonstrated the site's rail and water channels (Figure 5.8).



Figure 5.8: Interactive Kid Water Feature at Duisburg Nord. Zeigler 2009.

The interpretative signage at Sloss was an interesting component because it explained both the industrial process and the workers' history. The definite hierarchy for Sloss's workers was detailed as were the working conditions for the described task. Throughout the site, there are nine stations where visitors can access more information via their cell phones. This wiki-esque interactive system allows visitors to leave comments about their experience and the process being explained.

Authenticity

Authenticity describes the relative integrity of a site's redevelopment in relation to its original creation. Sites were evaluated regarding their materiality, scale and how well the redesign created an unique user experience. Although a majority of this subcategory is subjective, it sought to comment on how well the redesign "fits" or juxtaposes with its surroundings.

For authenticity, Atlantic Station scored a 1. Although the project has received numerous LEED certifications, the space feels like a large outdoor mall with disconnected retail and residential components. At some point, all development is new and time is the only way to acquire patina and emotional attachment to a place. Although they are energy efficient and "green", the new construction excludes variety in the style of the buildings. Menomonee also

received a 1 for its minimal reference to the site's past. Their approach was linked to sustainable development but excluded the fourth dimension of aesthetics as defined in this thesis. Despite the historic context of Gas Works, the site only received a 2 in this subcategory. The machine follies are powerful but fenced off, prohibiting visitors from interacting with the site. Gas Works remains an important piece of landscape that influenced and shifted the negative perception associated with the reuse of post-industrial sites. Although the blast furnaces and some historic structures of Bethlehem Steel are incorporated into the redesign, it is unclear how multi-dimensional the user's experience will be. Once more construction and implementation has occurred, the score could change but at this time a 2 seemed appropriate.

Sloss Furnaces is open for extensive exploration through a variety of buildings and corridors so people can experience what it would have felt like to work on the site. The sublime qualities of the site dwarf a single person and give a sense of insignificance by the sheer size of the machines. The Westergasfabriek Culture Park appeals to a variety of user groups that can experience the site in a multitude of ways. The site is on European Route of Industrial Heritage (ERIH), the European network of industrial monuments and as a Route Point on the ERIH Holland Route. The arts and culture events appeals to a completely different user sect diversifying visitors. The retention of the buildings reflect the evolution of Dutch architectural styles while the four-seasonal planting scheme encourages plant enthusiasts to explore the site throughout the year.

Duisburg offers the most diverse and impressive user experience. Visitors could wander for hours and still find obscure hiding places or activities to watch or try. The historic rail infrastructure was converted to elevated paths overlooking formal garden spaces which juxtaposes other meadow areas. The minimal interruption of the design enhances the sublime qualities of the site without seeming contrived or forced. The park is well constructed, innovative, and relevant 20 years after completion. The United States is more fearful of liability and would never allow visitors to climb up the blast furnace without supervision. At Duisburg, this is not the case. It is a

surreal experience to imagine workers climbing the tower under such extreme conditions. The aerial view of the park and Ruhr Valley convey the magnitude of the industrial past of the site and



Figure 5.9: Aerial View from Duisburg Nord's blast furnace. Zeigler 2009.

Cleaning Lessons

Thus far in this chapter, each of the case studies have been discussed in their scoring in the four individual components. The importance of creating HAPIS was to gauge if the case studies that took a more holistic approach, would score higher. The overall scores are shown in Table 5.5. By incorporating the historical legacy of post-industrial sites and acknowledging their social and aesthetic qualities, the more holistic approaches scored higher. A series of composite images was created to visually represent how holistic each of the case studies were in its approach. Each of the four components was given a symbol and the scale of each symbolizes how the case studies rated. Each of the case studies will be discussed according to its overall matrix score from lowest to highest and if any discernible lessons can be extracted from the process.

CASE STUDY:	GAS WORKS	MENOMONEE VALLEY	SLOSS FURNACE	BETHLEHEM STEEL	ATLANTIC STATION	DUISBURG NORD	WESTERGASFABRIEK
ECOLOGICAL							
SOIL	4	1	5	1	2	4	4
VEGETATION	0	3	1	0	1	4	3
WATER	1	4	5	0	2	4	4
HABITAT	0	2	1	0	0	3	0
TOTAL	1.25	2.5	3.00	0.25	1.25	3.75	2.75
ECONOMIC							
JOB DIVERSITY	0	4	2	2	3	2	2
JOB CREATION	0	5	1	2	5	1	2
TAX BASE	0	2	0	2	5	0	1
PUBLIC HEALTH	1	2	4	4	4	4	3
TOTAL	0.25	3.25	1.75	2.5	4.25	1.75	2.00
SOCIAL							
RECREATION	4	4	2	2	3	5	5
COMMUNITY INVOLVEMENT	2	4	4	5	2	1	4
INTEGRATION	2	5	2	2	2	3	5
COMMUNITY INFRASTRUCTURE	2	3	2	3	5	2	3
TOTAL	2.5	4.00	2.50	3.00	3.00	2.75	4.25
AESTHETICS							
PRESERVATION	3	2	5	3	2	5	3
HISTORY/ INTERPRETATION	3	3	5	4	2	5	5
AUTHENTICITY	2	1	4	2	1	5	5
TOTAL	2.67	2.00	4.67	3.00	1.67	5.00	4.33
OVERALL SCORE	1.67	2.94	2.98	2.19	2.54	3.31	3.33

Table 5.5: The Matrix scored



Figure 5.10: Gas Works Composite

Gas Works

Gas Works was a revolutionary design for its time. Haag's intention was to create an adaptive reuse for the oil refinery that maintained its historic aesthetic and utilitarian value. Gas Works Park has the lowest overall score of all the case studies given it was the predecessor for this form of revitalization. This design never sought to be holistic so its low scoring was anticipated.

Since Gas Works was completed in 1975, numerous

environmental advancements have been made but it is unclear they would have impacted Haag's design.

Bethlehem Steel



Figure 5.11: Bethlehem Steel Composite

The City of Bethlehem was devastated when the plant closed in 1995; it was its main employer and 20 percent of the city's taxable land. Bethlehem is an active community that is concerned with the overall health of its city. Citizens have observed how redevelopments such as the Homestead Site outside of Pittsburgh devastated their local economy and refuse to compromise their legacy. However, their commitment to preserving their heritage is overshadowing the ecological potential for the site. This missed opportunity inhibits their approach from being holistic.



Figure 5.12: Atlantic Station Composite

Atlantic Station

Atlanta is known for its auto dependence and air pollution. The redesign for Atlantic Station was based on Smart Growth principles and became a premiere live, work, play community. The project's density reduced emissions and allowed for compliance with Clean Air environmental requirements. This project was economically driven but its overall result lacked innovation in truly creating something new for the city.



Figure 5. 13: Menomonee Valley Composite

Menomonee Valley

Menomonee Valley has been amidst revitalization efforts for over twenty years. To oversee the latest redevelopment efforts, the Sixteenth Street's Department of Environmental Health helped establish the Menomonee Valley Partnership in 1999. This non-profit has been instrumental in coordinating redevelopment efforts and monitoring the sustainability benchmarks.

The Menomonee Valley Benchmarking Initiative (MVBI) is a partnership between the Sixteenth Street Community Health Center, the Center for Urban Initiatives and Research, and the University of Wisconsin at Milwaukee to track the changes in the valley and the surrounding neighborhoods. It systematically evaluates how successful the redevelopment efforts are according to 57 established indicators. Their initial report was released in 2003, updated in 2005 and based on 2010 census data, a new report is expected this year. The partnership with the University lends research assistance for the city that otherwise would be too expensive to monitor. Menomonee scored well in all the components except Aesthetics because of its inability to reuse the existing buildings.

Sloss Furnaces

Traveling along I-20 through Birmingham, Sloss Furnace is a striking component of the city's skyline serving as a sense of pride for the community. Sloss is the only case study listed on the National Register being evaluated through the matrix. Sloss is successful as a museum and its unique aesthetic and lack of contamination were the only reasons this case study fared as well as it did. The creative reuse of the site for artists honors Sloss's legacy however, the grounds do not showcase the work produced on-site. Revolving exhibits may encourage frequent revisits



Figure 5. 14: Sloss Furnace Composite

integrating the site more into the community's lives. After the expansion is complete, the Matrix may need to be reevaluated to reflect additional changes to the site.



Figure 5. 15: Duisburg-Nord Composite

Duisburg-Nord

Peter Latz revolutionized how designers approach brownfield sites with Duisburg-Nord. Once dubbed the Anti-Olmsted because he broke free from the naturalistic style dominating the profession of landscape architecture at the time. Latz seeks to create innovative ways to link users to a space without removing the site's inherent layers of information. This park was the largest site evaluated in the HAPIS which may allowed more freedom regarding ecological features. Though it never advertised itself as taking a holistic approach, the site scores very high.

Duisburg-Nord is a highly successful park that is innovative and historically relevant. It is free to the public which maintains its dependency on subsidies from the government. This one subcategory score was the reason this case study was not the highest rated in the matrix. Westergasfabriek outscored Duisburg-Nord by a mere .02 difference.



Figure 5. 16: Westergasfabriek Composite

Westergasfabriek

Westergasfabriek was the highest scoring site in the HAPIS because of the project's flexibility and willingness to adapt to new situations as problems arose. The revitalization efforts never sought directly to be holistic but the overall results were well-balanced. The uniqueness of this redesign was the inclusion of temporary users while funding was secured and design solutions were being generated for long term use. The temporary users deterred squatting in the abandoned buildings and their presence slowed the rate of deterioration. It was important to the District Council

that Westergasfabriek become a cultural hub for Amsterdam and "between 1993 and 2001 hundreds of events took place at the site and there were over one hundred temporary tenants. The possibilities were endless: from rehearsal space to studio, from opera to house party and from circus to congress. The creative energy had such a power of attraction that the temporary users became permanent" (<http://www.project-westergasfabriek.nl/english>). Also, Evert Verhagen was established as a project manager for the Westergasfabriek project in 1992 and remained a constant despite the rotation of council members involved in the process. His role alleviates the political will problem mentioned in the beginning of Chapter 3 because he was the main person of contact working independently but under the political authority of the district council.

No redesign is perfect but valuable lessons can be extracted from the creation and testing of the Matrix. The European case studies were the two highest rated and are listed on the EPA's website praising their approach and success. But why are these principles not being applied to United States brownfield policy?

CHAPTER SIX

UNITED STATES BROWNFIELD POLICY:

Incorporating Holistic Post-Industrial Place Theory

“Social capacity is the attitudinal, behavioral, and communal glue that holds society together through relationships among individuals, families, and organizations. Without social capital . . . efforts to address specific problems will make little progress” (Committee for Economic Development 1995)

The HAPIS and its evaluation of the case studies illustrated that redevelopment of post-industrial sites can be more successful when a holistic approach is taken. The previous chapter demonstrated that incorporating the historical legacy of these sites is a valuable component for evaluation that should be included in US brownfield policy. This chapter seeks to propose new ideas and further the discussion of a holistic approach to brownfield redevelopment. It offers suggestions for how to achieve this expanded evolution through exploring new partnerships and a community-based approach to redesign. In Chapter 3, the historic preservation movement was explained as was the role of the local, state and federal governments. The federal government’s role is to provide funding and legislative incentives whereas the state government offers advise, some funding and acts as a liaison between the federal and local entities. It is on the local level that, *real* protection occurs. This chapter takes a similar stance for the role of government on how to redevelop post-industrial sites.

Role of the Federal Government

The federal government’s role in this scenario is to provide funding, protective legislation and oversight for brownfields for state or local stakeholders who fully understand the nuances of a particular community. The federal government established the current definition for brownfields and redefining them holistically could facilitate new potential partnerships and redevelopment

possibilities. The 2002 brownfield definition states that brownfields are, “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.” This definition’s wording reiterates brownfields as development opportunities with environmental factors complicating their reuse. It perpetuates a sentiment that once the contamination is dealt with, the nexus of problems will dissipate. Removing contamination off site and all the remnants of its previous use negate the site’s social and aesthetic significance. “All too often brownfield[s] are located in weak markets, so that even remediated sites may not be particularly marketable... Multiple solutions are needed from the private and nonprofit sectors, as well as an approach that involves multiple government entities” (Brachman 2004, 70). In *Drosscapes*, Alan Berger referenced an alternative definition for brownfields introduced in the *Journal of Environmental Planning and Management* in 2000 (237) which stated

“A brownfield site is any land or premises which has previously been used or developed and is not currently fully in use, although it may be partially occupied or utilized. It may also be vacant, derelict or contaminated. Therefore a Brownfield site is not necessarily available for immediate use without intervention”

This definition acknowledges necessary rehabilitation but the tone reflects a temporal and evolving potential for the site. Determining the best solution for a post-industrial site requires creativity and proper community engagement which was why Westergasfabriek was the highest rated case study in the HAPIS matrix. The stakeholders adhered to the philosophy, necessity breeds creativity and the final result was successful. “Communities often have a particular interest in these properties because of the site history and concern about a safe reuse, potential adverse health impacts and declining property values of nearby properties” (Brachman 2004, 71). The most successful case studies, excluding Duisburg, all had a strong level of community involvement demonstrating their vitality in the process. People choose to live and businesses choose to invest in attractive communities that have a high quality of life. They want [safe] neighborhoods...abound in cultural

amenities,...that celebrate the past, [and] nurture creativity,...in a pleasant local environment (DeSousa 2008). If the community is proud of its surroundings, the essence of the place is more appealing to potential developers and tourists.

In Chapter 2, the Typical Steps in the Redevelopment Process established a baseline of understanding the EPA's approach to brownfields which begins with establishing the redevelopment idea. The EPA attempts a community driven process with its Vision to Action sessions through a partnership with the Army Corps of Engineers. During the 3 hour session, residents draw and express their ideas for improving their community. Each person is given a poster for their original drawing and then select from a collection of pre-drawn images to further explain their vision. Potential images included community gardens, solar panels, restaurants and gathering space. All attendees present their vision and overlapping ideas begin to emerge. A professional artist collects the community's posters to produce formal illustrations serving as their vision for change. Although this process initiates conversation regarding the community's future it is ill equipped to offer solutions on HOW to get to the ultimate future. This Vision to Action paints an unrealistic future for struggling communities directly impacted by the brownfields.

The Importance of Strong Local Leadership

Strong community based initiatives require strong leadership on a local level. This role could be a mayor, non-profit, faith based organization or socially conscious developer. Local governments are accustomed to collaborating with different departments (i.e.housing, public works, planning and economic development) regularly to complete a project. Local government will be able to allocate funds, acquire land and drum up support more efficiently than state and federal governments. State and Federal government offer extensive funding for policy investigation, tax breaks and program implementation assistance for individual projects. Local communities having a strong, coordinated vision are more likely to obtain funding from state and

federal sources. Strong leadership requires acknowledging what the strengths and weaknesses are within your community and knowing when to ask for help. Obtaining that vision may not be in the local governments' repartee but this is where designers are an invaluable resource. Designers are well equipped to assist local communities in obtaining a vision reflective all the community's needs. The more successful case studies evaluated in HAPIS designed by landscape architects and designers.

Creating the Long Term Vision

More in-depth charrettes can be a better solution for developing long-term solutions and implementation phasing. Charrettes are a collaboration session between community members and a group of designers. The sessions can last for multiple days depending on the complexities of the problem. Facilitators listen to the community's needs, quickly produce design solutions, present to the group and incorporate feedback. Stakeholders can see their ideas being represented in the solutions building trust in the process often lacking in public meetings. Charrettes are a way to educate the public, dispel misinformation and encourage interaction between residents, developers, and government officials. The National Charrette Institute offers a diagram (Figure 6.1) that illustrates the Charrette Process and a potential timeline.

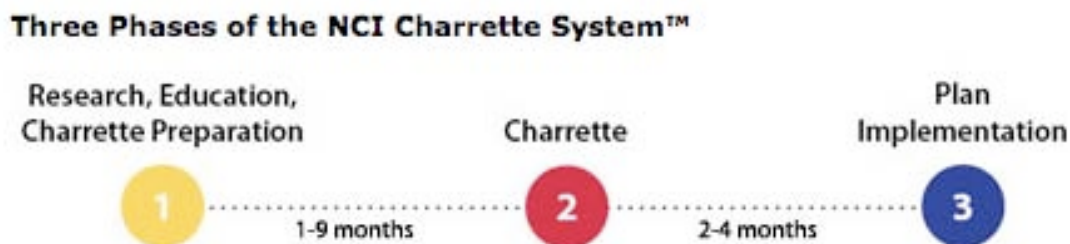


Figure 6.1 Charrette Timeline accessed from <http://www.charretteinstitute.org/charrette.html>.

“Charrettes provide a way of designing major or controversial projects and plans so they are more likely to be approved and implemented” (http://pcj.typepad.com/planning_commissioners_jo/charrettes.html) because the community is involved throughout the process.

Exploring New Partnerships

Community Design Organizations

The Association for Community Design (ACD) “is a network of individuals, organizations, and institutions committed to increasing the capacity of planning and design professions to better serve communities. ACD serves and supports practitioners, educators, and organizations engaged in community-based design and planning (<http://www.communitydesign.org/About.htm>). Its website lists non-profits or university based groups across the country dedicated to community-led design processes such as charrettes. These organizations understand the complex issues such as crime, lack of affordable housing or unemployment that can stem beyond the presence or perception of contamination. Brownfields are often coined “blight” but that term does not describe WHAT the problem is. It is a blanket term detracting from the root issues inhibiting proactive solutions. Is the problem empty store fronts, dilapidated houses, contaminated soil, lack of community services or inadequate public transportation? Properly identifying these issues and developing solutions centered around the community’s current needs may secure buy-in and support. Community Design organizations are well versed in maneuvering through conflict promoting consensus. Bethlehem has multiple dedicated organizations but lack leadership impeding the advancement of redevelopment efforts. Another potential partnership in the brownfield redevelopment process is academia.

Academia

Academia is based on innovation, research and creative thinking. Universities have diverse programs such as landscape architecture, business, economics, planning, historic preservation, architecture, engineering, ecology, social work etc. all with skill sets appropriate for addressing

brownfield redevelopment. They are an affordable option for local communities interested in exploring multiple, viable options for how to proceed. Tenured faculty are encouraged to do research on a variety of topics and are current on evolving trends and possible funding opportunities. Student engagement raises public awareness and stewardship while encouraging communication skills with diverse populations. Sloss Furnace and Menomonee Valley partnered with local universities for conducting research and long term monitoring. Chris De Sousa is with the University of Wisconsin at Milwaukee's Geography Department has been actively researching brownfield redevelopment in the US and Canada from a variety of angles ranging from greenspace, housing, and reindustrialization. His findings have impacted policy in Milwaukee, Chicago and Toronto. Both Harvard and the University of Virginia have published books challenging approaches and technologies surrounding brownfield and superfund sites.

The University of Georgia's Fanning Institute is an economic development entity partnering with the EPA and the Georgia Environmental Protection Division (EPD) to develop brownfields across the state. Fanning links communities with UGA's Law Land Use Clinic for legal expertise and the College of Environment and Design which houses landscape architecture, historic preservation and environmental planning for design ideas and vision. These collaboration offers real solutions to struggling communities and explains the federal and state incentives available for redevelopment.

Involving universities during the Due Diligence phase would allow for a more comprehensive analysis of the site to occur. While the EPA conducts Phase I and II investigations into possible contamination and its location, historic preservationists can conduct Historic Structure Reports (HSRs) for remaining structures and assess their eligibility for the National Register. Ecologists can document existing species of plants and animals searching for anomalies. Research has shown brownfields offer unique ecological conditions that may have other benefits similar to the phenomenon recently discovered at Chernobyl. The Albert Einstein College of

Medicine discovered a fungi, *Cryptococcus neoformans* that is extracting radiation from the nuclear ruins and converting it into fuel via photosynthesis (http://www.scienceagogo.com/news/20070422222547data_trunc_sys.shtml). This advancement indicates an environmental potential on devastated sites whose benefits were obtained through detailed research. Geography could begin mapping all the layers of information that will be helpful in the redevelopment process. Applying for EPA Demonstration Pilots and Grants can fund further research and determine the viability of the charrette's findings.

Securing the Site Through Land Banks

The next step in the Pre-Development Phase of brownfield redevelopment is securing access to the site. If the local or state government own the property, they are going to have the greatest capacity to offer incentives for developers. Cities are combating vacancy and dilapidated structures with land banks. According to the US Department of Housing and Urban Development, "land banks are governmental or nongovernmental nonprofit entities that focus on the conversion of vacant, abandoned properties into productive use." The priority of land banks is to develop properties historically impossible due to complicated liens and confusing ownership records so they can benefit the community at large (www.hud.gov/offices/cpd/about/conplan/foreclosure/landbanks.cfm). The land bank acquires properties that are tax delinquent and resale or redevelop them so they are actively contributing to the city's tax base again. Although land banks are primarily focused on residential properties why not apply this same strategy to post-industrial sites that sit vacant, went bankrupt or own back taxes?

The function of land banks may vary depending on the volume of vacant properties. "Optimistically, it could be argued that as deindustrialization proliferates and as industry relocates from central cities to peripheral areas, America's cities will enjoy a net gain in the total landscapes (and buildings) available for other uses" (Berger 2001, 51). Local governments are often

responsible for the maintenance and security of all the abandoned properties and can even manage the occupied sites. They can also serve as a “bank” holding certain properties for future public purpose development. Land banks can generate revenue from the rehabilitation of properties and generally transfer property for no cost or below market values as an incentive or subsidy for future development. State statutes or interlocal agreements can set the priorities of future use of the land bank properties such as parks, commercial or housing.

In 1971 the St. Louis Land Reutilization Authority was established as the first major land bank. The city was experiencing a sharp population decline of 27 percent between 1950 and 1970. By 1972, 9 percent of the 2,600 abandoned buildings were tax delinquent. Tax delinquency is when the taxes levied and assessed are partially or wholly unpaid on the due date. The city was experiencing vast numbers of abandoned properties that were contributing to an unhealthy quality of life. Over the next thirty years, multiple cities including Louisville, KY, Atlanta, GA and Flint, MI have adapted land bank models to address vacant and abandoned properties. With each new creation, previous policies and structures are evaluated and perfected.

Land Bank Case Study: The Atlanta Land Bank

The Atlanta Land Bank was created in 1991 in conjunction with Fulton County by authorizing a interlocal cooperation agreement with an independent legal corporation. The organization has an independent Board of Directors and a full-time staff but its funding remains from local governments. When first established Fulton County and the City of Atlanta were equally funding the land bank. However, given the recent economic situation, Fulton County is the primary funding source. It accepts all types of properties and transfers from non-profits. It does not automatically receive title on unsold foreclosed properties but does have the option to bid on them. Generally they exercise this option when an immediate reconveyance is anticipated by a developer. The disposition pricing is set by the Land Bank Authority with an incentivizing emphasis on immediate transfers. One of its primarily priorities is the creation of affordable

housing, new industry and jobs for residents. One unique power of the Atlanta Land Bank Authority is its ability to extinguish all delinquent property taxes on properties they acquire including school district taxes.

Local governments can also employ eminent domain but recent uses of this law have been ill received and not focused on the best interest for the community. However, if the community initiates redevelopment strategies, the use of eminent domain is warranted. The Roxbury neighborhood in Boston, Massachusetts, was a true success story for the use of eminent domain. The Dudley Street Neighborhood Initiative lobbied local officials to be given the use of eminent domain to revive their long depressed community. By acquiring the vacant lots for new housing in the neighborhood, it increased vitality and strengthened the community. Eminent domain is a powerful tool for communities to use and including local communities into the decision making process is a step in the right direction for successful redevelopment. By acquiring the land, cities have more control over the revitalization efforts and can utilize a more incremental design approach.

Incremental Place Making

“Imperatively, deindustrialized sites are all transitional places. They await some form of reclamation prior to reprogramming and reuse. Another characteristic they have in common is their pedigree: they were previously active industrial sites, located in close proximity to densely populated urban areas” (Berger 2001, 51). Incremental Place Making allows for the community to use the space temporarily, decide what works over time then make it more permanent. Permaculture principles suggest before constructing a path, observe how people walk through the space and determine their route. The worn down path can then be formalized ensuring its usability. Rebar is an interdisciplinary studio in San Francisco motivated by public art, design and activism. Its projects encompass a temporal approach to ordinary features in the urban environment while proposing creative reuses for the spaces. One of the firm’s recent installations was Showplace

Triangle as part of the city's Pavement to Park Program. The program is retrofitting the city's right-of-ways into plazas and park space for a 6 month period, and determining if their closure should become a long term community investment. This is a small scale solution to what Westergasfabriek did with the inclusion of temporary users.

The City of Amsterdam acknowledges Westergasfabriek's success was based on a combination of temporary users and long term development strategies. The matrix solidified this approach. The design team maintained communication, flexibility and creativity throughout the redevelopment of the site. The team's process was not always linear but the overall result kept the public engaged with the site as its use evolved. Taking a slower more incremental pace requires less initial funding allowing for the community to afford and support projects. If small victories are won and the community can see their vision being implemented, the benefit of working together will maintain support. When Sloss Furnace was first trying to save the furnaces from demolition, the residents of Birmingham approved a tax to fund the effort. They believed in its preservation, felt a connection to the site and voted to use tax funds accordingly. Community buy-in may allow for Special-purpose local-option sales tax (SPLOST) funds to be dedicated to an aspect of the redevelopment.

Incremental place making allows for remediation of the site to proceed while solidifying the long term design goals and key stakeholders role in the process. On most brownfields it is rare the entire site is unsafe; generally it is localized hot spots. Isolating the public health concerns, educating the impacted community and remediation is overall the top concern. However, all viable options for remediating the contamination on-site should be evaluated first. Straight removal of the contamination off site is a passive solution shouldering the responsibility onto an innocent community. As a country, innovation and accountability need to be leading our policy decisions.

It is during the Securing the Deal step of brownfield policy that negotiations, liability issues and contracts are established. Generally these revolve around remediation and accountability

between invested stakeholders. This thesis suggests there is more to redeveloping post-industrial sites than removing contamination and economic development. The process should always address the social implications of redevelopment. In Chapter 4, Community Benefit Agreements (CBAs) were mentioned as a development strategy between developers and the community. They are legally binding and ensure the community's concerns and needs are maintained throughout the revitalization efforts. Existing residents should be safeguarded against gentrification while advocating for employment opportunities as new development occurs. By creating new partnerships, the funding possibilities are diversified and increase paperwork. Establishing one point of contact for managing the redevelopment process will streamline coordination with contractors and will be more cost effective. Atlantic Station had a designated person from the developer's firm, Menomonee Valley has a non-profit organization and Westergasfabriek had a city appointed position maintaining consistency throughout the process. This approach proved to be a contributing factor to these case studies' success. If the community lacks leadership, incorporating Community Development Corporations (CDCs) as a developer may be a viable option for communities.

The Role of Community Development Corporations

"At their root, CDC development activities should counter the harmful effects of capitalism and promote financial, social and physical neighborhood revitalization" (Dewar and Deitrick, 2004). Although many of these organizations are new in redeveloping brownfields specifically, they are well versed in "ensuring that residents have the capacity to act as full partners guiding investment in their neighborhoods" (ibid). These organizations are the voice of the underprivileged and unrepresented. CDCs can enter the redevelopment process during initial community organizing, serve in the predevelopment or intermediary process or as the developer. Since they can serve as developers, they can acquire land if a city is unable to explore the post-industrial land bank scenario. Ultimately, the decision of who is best to lead the process is dependent of who the

community trust and has their best interests at heart. Often CDCs have non-profit status which enables them to qualify for additional funding opportunities unavailable to city governments. CDCs have been overseeing brownfield redevelopment projects in Detroit and Pittsburgh and their role has been instrumental as shown in Table 6.1 from the chapter, *The Role of Community Development Corporations in the Brownfield Redevelopment* from the book, *Recycling the City*.

Case Study	CDC Role	Outcome
<i>Pittsburgh</i>		
Bathhouse and Stable (Marino 2001)	Developer	Redevelopment
Lectromelt facility (Kivuva 2001b)	Facilitator	Redevelopment
Armstrong Cork (Kivuva 2001a)	No role	No change
Washington's Landing (Deitrick and Farber 2004)	Outreach and education	Redevelopment
South Side Works (City of Pittsburgh 1998)	Facilitator, intermediary	Redevelopment
Gulf Station (Capstone Seminar 1998)	Intermediary (Phase I)	No change
<i>Detroit</i>		
Presbyterian Village Senior Housing (Furr 2000)	Codeveloper	Redevelopment
Renaissance Global Logistics (Whiteman and Sims 2001)	Outreach and education	Redevelopment
Recycling Corporation of America (Jackson et al. 1997)	Facilitator	Partial cleanup
Wolverine Tube (Brooks et al. 2000a and 2000b)	Facilitator	No change
Empowerment Zone Contaminated Sites Task Force and Southwest Detroit Environmental Vision (Kelly and Whiteman 2000; Casadei et al. 2003)	Facilitator; outreach and education	Several sites cleaned; two sites redeveloped; no change in others
CitiPort In-Place Industrial Park (Aliberti et al. 2000)	Facilitator; outreach and education	No change

Table 6.1: Case Studies of CDC's Roles in Brownfield Redevelopment (Dewar and Deitrick 2004).

Endless Possibilities

During the Cleanup and Development phase is when the physical rehabilitation and construction of new buildings are done. Hopefully, during the Due Diligence historic properties were assessed and proven to be viable rehabilitation opportunities. The sublime qualities of these sites are links to the community's industrial past. If harnessed correctly can spur economic

redevelopment opportunities. Sloss, Duisburg-Nord, Bethlehem Steel and Westergasfabriek all have a museum or industrial heritage component. Although, the matrix proved this function alone is not a strong enough economic stimulator, this aspect should be exemplified in the redevelopment.

Reindustrialization of former industrial sites is not considered as often as it should. Incorporating green industry or eco-industrial parks will combat unemployment and the negative social implications. Eco-industrial parks are a community of businesses collaborating with one another to effectively manage environmental resources including water, energy, and materials. By working together the community of business seek a collective benefit that is greater than its individual contribution. Encouraging new technologies and clean industries on a local level will further a sense of pride. City and local governments are focusing on attracting large “big-box” retailers into urban areas. Give tax breaks to developers and local businesses. They can pay for infrastructural improvements in lieu of property tax in adjacent areas which is called Tax Increment Financing (TIF). Redeveloping brownfields require thinking outside the box and not being afraid to try new techniques or approaches. By expanding the possibilities for partnerships and new interpretations, more funding and potential invested stakeholders are able to get involved in the redevelopment process.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND FURTHER RESEARCH

“A good question is never answered. It is not a bolt to be tightened into place but a seed to be planted and to bear more seed toward the hope of greening the landscape of idea” (John Ciardi).

Summary

This thesis was an exploration into current approaches and methodologies for redeveloping urban post-industrial sites, often considered brownfields. The objective was to establish their historic legacy and demonstrate how their inclusion in the redevelopment process created a more holistic approach. This thesis examined current US Environmental Policy, created an evaluation matrix and offered suggestions on how to modify policy to create a more holistic approach.

Chapter 2 explored how the Industrial Revolutions established our cities and the impacts of deindustrialization. In this chapter, brownfield policy was introduced as well as how urban brownfields have evolved into prime real estate opportunities. The Environmental Protection Agency is the main governing body of brownfield redevelopment and this chapter laid the groundwork for further critique and analysis later in the thesis. Given public health concerns, the EPA's initial role was public health but later added economic development to their repertoire.

Chapter 3 identified the common barriers to brownfield redevelopment and how the Sustainability movement has initiated a holistic approach to revitalization. This chapter then introduced the fourth leg of sustainability, aesthetics. As environmentalists and designers reflect on the potential of post-industrial sites, the social qualities of the space began to emerge. The sublime qualities of these unique sites tell a story and relates a history of the working class being excluded from redevelopment process.

Seven post-industrial sites were selected as case studies for their varied approaches to brownfield redevelopment. In Chapter 4, each of the sites are introduced as well as the Holistic Assessment of Post-Industrial Sites matrix. HAPIS sought to give equal evaluation status between four categories: ecological, economic, social and aesthetics. Each category had an established set criteria rooted in theory and current practices used to test if holistic approaches led to more successful, higher scoring case studies. Chapter 5 expanded upon the previous chapter and gave in depth analysis for how each case study scored. Extrapolating lessons and key effective strategies from the Matrix enabled innovative solutions to be suggested in Chapter 6.

The Environmental Protection Agency has continually proven to evolve based on trends and public opinion. The Matrix proved holistic approaches work but current brownfield policy has not yet incorporated these philosophies into practices. However, they will if the community demands it. As more brownfields are being redeveloped the process is being perfected, it is clear there is no one solution. Local community members are more attuned to the underlying issues plaguing their community and including them in the process will ensure long term success.

Future Research

This thesis was based on qualitative research represented in a quasi-quantitative manner. This project is on-going well beyond this paper's completion. The evaluations for Atlantic Station, Sloss Furnace and Duisburg Nord were based on personal experience and interaction with the space. No readings or photographs can effectively convey the power and awe these post-industrial sites have. Visiting the remaining four case studies will gauge if they were accurately scored through the HAPIS. Testing more case studies through the matrix will identify any flaws and improvements in how sites are evaluated. The selected case studies were chosen for very specific reasons and expanding the "type" of brownfield would test its adaptability to various sites. Would the same approach still be appropriate for mine sites, mill sites or more rural brownfields?

Developing and conducting surveys for nearby residents and businesses to see how the revitalization efforts have impacted their community should be conducted. Initially, this thesis intended to have an application component for Pullman Yards in Atlanta, Georgia. Applying the thesis to that site or another undeveloped brownfield would be interesting. This thesis ultimately comments on our values and perceptions of brownfields and offers ways to rethink their hidden potential within communities. Submitting portions of this thesis to non-profits, city governments and government environmental agencies may reiterate the WHY of sustainability and the importance of holistic design.

The Role of Landscape Architecture

It is a misconstrued opinion that Central Park in New York City is indeed natural. More surprisingly another unknown fact about the park's conception was that it was not initially supported by many of the wealthy residents. Prior to this design, open space was a luxury and not available to all. This park changed the perception of a society and gave birth to a new profession - Landscape Architecture. Fredrick Law Olmsted's design focused on psychology and how it could respond to the modernization and urbanization of our cities. His naturalistic approach used the sensory qualities of the place to counteract the negative social implications of city life. Central Park was a place to escape the crowded, polluted daily lives of urban dwellers and offer reprise to the daily hardships.

This profession was once rooted in social justice but has shifted away from the social implications of design. Landscape Architecture is a broad profession with no shared value system which allows for diverse opinions but can impede progressive theory. As a profession, designers have fallen into the current trend of eco-focused work. It is time to reestablish landscape architecture as a social conscious profession. Brownfield redevelopment is a complicated canvas for designers to explore and enhance local communities. It is time for advocacy and change!

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