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Brownfield Redevelopment In Toronto, Ontario: An Examination Of Sustainability And The Toronto Portlands

Michael Hayek
Ryerson University

BROWNFIELD REDEVELOPMENT IN TORONTO, ONTARIO: AN EXAMINATION OF SUSTAINABILITY AND THE TORONTO PORTLANDS

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Michael Hayek,
HBA, University of Toronto, 2007,
MA, University of Western Ontario, 2010

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ABSTRACT

Brownfields are "abandoned, vacant, derelict or underutilized commercial and industrial properties where past actions have resulted in actual or perceived contamination" (NRTEE, 2003, p.1). Brownfield redevelopment, because of its contributions to urban sustainability, intensification and environmental quality, has become a critical issue in urban development literature of late. Through case-study research this paper aims to evaluate the relative sustainability of four Port Lands brownfield redevelopments that involve converting brownfields into green space in the City of Toronto. This study has shown how brownfield redevelopment and more specifically, turning brownfields into green space represent an application of all three pillars of sustainability. However, the exact extent of how this type of redevelopment represents an application of sustainable development cannot be truly measured or quantified. It has also highlighted the need to develop a comprehensive set of sustainability indicators that can be specifically applied to projects that aim to convert brownfields into green space.

Keywords: Brownfield Redevelopment, Sustainability, Green Space, Port Lands

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Chapter 1: Introduction

1.1. Introduction

The deindustrialization process that followed global economic restructuring has reshaped the modern urban landscape in many ways. One important outcome of this process is the emergence of countless underutilized or abandoned potentially contaminated industrial and commercial properties, commonly referred to as brownfield sites. Over recent years, various levels of governments in North America and Europe have placed a strong emphasis on the regeneration of these sites as a way of promoting sustainable urban development. Urban intensification is a critical policy agenda item for the Ontario government, as well as for the government of Canada. Policy-makers view intensification as an efficient use of land to accommodate urban growth and the reduce development of greenfield land. Although governmental support of brownfield redevelopment is strong, a host of obstacles have prevented the successful redevelopment of many of these sites, most notably liability concerns, financial costs, planning approvals and lack of information on the true environmental condition of a site (see also McCarthy 2002, Alberini et al. 2005; De Sousa 2005, Solitare 2005, De Sousa 2006, Herbele and Wernstedt 2006). However, the redevelopment of brownfields has the potential to generate a multitude of environmental, social and economic benefits such as an increase in the tax base, reduction of sprawl, urban renewal and environmental cleanup (De Sousa, 2003). The bulk of the financial investment in brownfield redevelopment has traditionally been the responsibility of the private sector, with governments playing primarily a regulatory role (De Sousa, 2000). Consequently, the cost of remediation (which must necessarily be undertaken at the beginning of a long, uncertain approvals process – thus adding risk) and the stigma associated with brownfields have traditionally deterred the private sector from spearheading redevelopment campaigns.

1.2. The Definition of a Brownfield

In Canada, there is no formal definition of the term brownfield and each level of government tends to construct its own definition. For example, the National Round Table on the Environment and Economy defines it as "abandoned, vacant, derelict or underutilized commercial and industrial properties where past actions have resulted in actual or perceived contamination" (NRTEE, 2003, p.1). In Ontario, brownfields are defined as "lands that are potentially contaminated due to historical, industrial or commercial land use practices, and are underutilized, derelict or vacant" (Ministry of Municipal Affairs and Housing, 2007, p. 6). With these various definitions in mind, a number of commonalities among them can be drawn; the land must have been previously developed, the land must currently be vacant or underutilized, and redevelopment is complicated by the presence of real or potential contamination. However, the City of London considers only land that has been proven to be contaminated as brownfield land. This fact distinguishes London's definition since other definitions incorporate the assumption that even if the land is potentially contaminated, it may be considered brownfield land.

Similar to the policy arena, there are a range of definitions in the academic literature as well. Essentially, brownfields comprise parcels of formerly developed land, mainly in urban settings which contain real or potential contamination. Alker et al. (2000) conducted an international study of brownfield definitions and according to them, 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 available for immediate use without intervention" (Alker et al., 2000, p. 64).

Herbele & Wernstedt (2006) conducted six separate studies that surveyed a large number of brownfields throughout the US. They found that brownfield properties typically lie in economically disadvantaged neighbourhoods of older urban areas, but they also appear in suburban and rural

locations. Former manufacturing and other industrial facilities constitute the majority of brownfield sites, although are not the exclusive prior use. For example, a gas station, which is neither industrial nor a manufacturing site, may result in contamination due to underground storage tanks. Other previous uses include public, military and commercial facilities (Herbele & Wernstedt, 2006). The U.S. cases highlight one of the other barriers to redevelopment, which is the lack of a market – economic feasibility is always the first test to prompt redevelopment so if there is not much economic activity (as in a rural area) then the added cost of decontamination is a deal-breaker.

Taking into consideration the various definitions of the term, for the purposes of this research, a brownfield is: land that has been previously developed; land that may or may not have an existing structure built upon it; land that is currently vacant, abandoned or underutilized; any previous use of the land, at any point in time, that may have resulted in real or perceived contamination today; and land, the redevelopment of which is complicated by potential or real contamination.

1.3. Research Objectives

This research seeks to fill an empirical gap detailing the Canadian experience with brownfield redevelopment. This work also aims to provide a localized and detailed accounting of how brownfield redevelopment occurs in Toronto through an examination of four brownfield to green space conversions located in the Port Lands which is located along the eastern section City of Toronto's waterfront. More specifically, the objective is:

- The literature has shown that in order for a brownfield redevelopment endeavour to be considered sustainable, the entire development process and final development must meet certain conditions that adhere to the principles of sustainability. Therefore, through case-study research, I intend to evaluate the relative sustainability of four Port Lands brownfield redevelopments that involve converting brownfields into green space in the City of Toronto.

1.4. Organization of Thesis

This thesis consists of 6 additional chapters. Chapter 2 provides an overview of brownfield policy regulation in Canada, Ontario and Toronto. Chapter 3 offers a review the literature as it pertains to brownfield redevelopment and policy as on brownfield identification and management. Chapter 4 details the method of inquiry utilized in this work, specifically the case study approach, including the rationale for using case studies as the primary research tool and description of the study area and site is presented. Chapter 5 establishes the theoretical context of the research by situating brownfield redevelopment under the rubrics of smart growth and sustainability. Chapter 6 identifies what principles of sustainable development are incorporated into the Port Lands redevelopment. And Chapter 7 delves deeper in attempt to critically assess the sustainability of the four brownfield greening projects. Finally, I conclude with an identification of the limitations and main contributions of this work in addition to suggestions for future research.

Chapter 2: Institutional Framework

2.1. Introduction

Brownfield redevelopment has received varied and considerable attention at each tier of Canadian government. This chapter will provide an overview of brownfield policy and regulation in Canada. I first discuss the role of the Federal government as it pertains to brownfield sites. Subsequently, the Province of Ontario's regulations regarding brownfield redevelopment are presented. Following this is a summary of Toronto's three brownfield Community Improvement Plans (CIP's).

2.2. Federal Policy and Regulation

The federal government's involvement in brownfield redevelopment has been rather minimal and has not extended beyond the collection of information, consulting and scarce financial support. This financial assistance is reflected by the Green Municipal Fund (GMF), an initiative that provides financial incentives to municipalities to encourage sustainable community development. The GMF provides grants of up to $100,000 for community brownfield feasibility assessments; it does not cover the costs of remediation (Hayek et al, 2010).

Additionally, the federal government has had a role in consulting with a variety of organizations to obtain information on environmental liability and stakeholder perspectives. In 2001, the Canadian Government charged the National Round Table on the Environment and the Economy (NRTEE) to create a strategy for Canada that would promote brownfield redevelopment. The NRTEE established a multi-stakeholder task force which lead to the creation of the 2003 document, "Cleaning up the Past, Building the Future: A National Brownfield Strategy for Canada". The report was based upon a program of extensive consultations with stakeholders and experts in the field. From the outset, the NRTEE has championed the national campaign to promote sustainable development. The report laid out a vision for

converting the nation's brownfields into economically productive, environmentally healthy and socially vibrant centres through the collaborative efforts of all levels of government, the private sector and community organisations. The factors identified in the first NRTEE report were in large part responsible for the creation of the Canadian Brownfields Network (CBN). The CBN is a nation-wide not-for-profit organization whose main objective is to educate and develop solutions to facilitate brownfield redevelopment. The CBN was created by the Ontario Centre for Environmental Technology Advancement (OCETA) and the Canadian Urban Institute (CUI).

2.3. Brownfields Regulation in Ontario

Brownfield redevelopment is consistent with policies set forth by the Provincial Policy Statement (PPS), 2005, which speak to the efficient use of existing infrastructure, intensification and the remediation of contaminated brownfield sites (Provincial Policy Statement, 2005). In addition to the PPS, policies set forth by the Growth Plan for the Greater Golden Horseshoe (GPGHH), 2006, also support the use of existing infrastructure and intensification as evidenced by its mandate which states that 40% of all new development must take place within the already built-up metropolitan areas (Growth Plan for the Greater Golden Horseshoe, 2006).

The administration of brownfield redevelopment in Canada is chiefly the duty of the provincial, territorial and local governments, with local governments bearing most of the responsibility in terms of funding. Governments execute an approach whereby the redevelopment of brownfield sites is held to be the responsibility of the private sector, with governments playing primarily the role of facilitators (De Sousa, 2000). The approach to brownfield redevelopment in Ontario is one where the provincial government sets general policy objectives and leaves it to municipalities to facilitate redevelopment according to their priorities and resources. Ontario's planning and development process shows a strong emphasis on sustainable development principles with the goal of managing growth and development in

a manner that supports economic prosperity, protects the environment, and helps communities achieve a high quality of life. Policy-makers' emphasis on sustainable development is strongly linked to their emphasis on urban intensification which can be achieved through brownfield redevelopment.

The Ontario Provincial government does have guidelines for redevelopment as laid out in the Ontario Ministry of the Environment's (2004) Record of Site Condition, Regulation. This document outlines the conditions that property owners must meet in order to redevelop a brownfield site. The guideline informs all interested parties on the procedures required to evaluate the environmental condition of the property. Records of Site Condition (RSCs) are used to certify that a property meets an appropriate standard for the intended land use, and provide limited regulatory liability closure for property owners. The RSC describes the legislative and regulatory requirements for assessing the environmental condition of a site, the cleanup of brownfield sites and the filing of records of site condition. If an RSA has been filed by a property owner then under the RSA they are protected under the law from future issues of liability. This protection is provided to promote the redevelopment of brownfield sites by removing the uncertainty associated with liability (Ministry of the Environment, 2004). In 2009, the MOE introduced new and much more stringent requirements for the filing of RSCs making the process much more detailed and complicated. In Ontario, the province sets the environmental standards that must be met for remediation, as well as the assessment and processes required to demonstrate that a property is safe for redevelopment. Completing this process is mandatory before redevelopment can proceed (Ministry of the Environment, 2004).

The investigation and remediation of a property is largely driven by property owners. If a property proposed for redevelopment is suspected to be contaminated based on past historical activities, a property owner should have an Environmental Site Assessment (ESA) completed. An ESA in the context of brownfield sites means the assessment of the environmental condition of the land including soil, ground water and sediment. (Ministry of the Environment, 2004).

The Ministry of Municipal Affairs and Housing also developed a guide for redeveloping brownfields in Ontario: A Practical Guide to Brownfield Redevelopment in Ontario. This document was developed, largely, to help those interested in brownfield redevelopment by providing a summary of the entire redevelopment process (Ministry of Municipal Affairs and Housing, 2007).

In addition to the aforementioned, The Brownfields Statute Law Amendment Act, 2001, provides the provincial legislation that facilitates the redevelopment of brownfield sites in Ontario. Under the Act, clear rules were established which require mandatory filing of Records of Site Condition, certification standards for site clean-up professionals and limits on environmental liability for owners who follow prescribed procedures. The Act also provides municipalities with greater flexibility in designating community improvement areas for the clean-up and redevelopment of brownfield sites (Government of Ontario, 2001).

Ontario does not currently have a permanent funding program for assisting developers remediate brownfield sites, nor does it make available any formal financial incentives for attracting private investment to brownfields. This is the sole responsibility of the municipality. Municipal financial incentive packages can help offset these costs and encourage property owners to engage in brownfield redevelopment.

In Ontario, many municipalities provide financial assistance to the private sector through a Community Improvement Plan (CIP). A CIP is an expression of a city's intention to facilitate revitalization, and may include financial incentives to help stimulate investment and offset redevelopment costs. Financial incentives in the form of grants, loans or tax assistance are the most common forms of incentives available in any CIP. Tax assistance and grants are the most commonly offered incentives for remediation and redevelopment. It is the responsibility of each municipality to find the right mix of incentives that meet local needs. Ideally, any incentive program should be in place before interest arises from the private sector. Programs should be adequately funded, easy to understand, well-marketed and

targeted to areas of greatest need. As interest in brownfields redevelopment grows in a community, it is important for a municipality to monitor the impact of their incentive programs. This can help ensure the incentives offered remain effective in encouraging redevelopment and help provide the rationale for continued support of the program.

The Planning Act provides the statutory framework for the development of community improvement plans in the Province of Ontario. Specific provisions in Section 28 of the Act provide that for the purpose of carrying out a community improvement plan municipalities may acquire, hold and sell land; and construct, repair, rehabilitate and dispose of buildings. They may also provide grants or loans to registered owners of lands and buildings within the community improvement project area, to pay for the whole or for any part of the cost of rehabilitating such lands and buildings in conformity with the community improvement plan (Government of Ontario, 1990).

2.4. Review of Toronto's Three Brownfield CIPs

The purpose of the Brownfield Incentives CIP is to remove or reduce the obstacles that hinder brownfield redevelopment in the City of Toronto and promote economic development. CIPs for brownfield redevelopment have been initiated by several municipalities across the Province (City of Guelph, 2002; Hamilton Economic Development Office 2007; City of Kingston 2006; The Corporation of the City of Brantford 2005, City of London). That said the incentives in the Toronto CIP are not as comprehensive as incentives offered by other cities. Typically, brownfield incentives include some combination of tax assistance programs, reductions in development charges, and the allocation of grants. Table 3 outlines Toronto's suite of incentives compared to other select cities in Ontario. Note how Toronto, Ontario's largest city, only offers two incentives while smaller cities, with a much smaller supply of brownfield sites offer many more. This is reflective of the fact that there is a larger market potential for sites in Toronto.

The City of Toronto currently has three CIPs aimed at promoting the redevelopment of brownfield sites. By Law No. 516-2008 applies to all sites located within the City of Toronto with the exception of the Waterfront and the South of Eastern Employee District. By-Law 517-2008 applies to all sites located within the South of Eastern Community Improvement Area. By Law 518-2008 applies to all sites located within the East Bayfront, West Don Lands and Port Lands Community Improvement Area. Each CIP provides the same two financial incentives aimed at reducing the cost of redevelopment: Brownfield Remediation Tax Assistance and; Development Grants. The programs included in the three CIPs provide financial incentives that are funded by all or a portion of the Municipal Tax Increment (By-Law No. 516-2008, 2008, By-Law No. 517-2008, 2008 By-Law No. 518-2008, 2008). Next I proceed to summarize the main characteristics of the Brownfield Remediation Tax Assistance and Development Grants programs.

Table 2.1. Incentives offered by Toronto and other Selected Cities in Ontario

	London	Guelph	Brantford	Kingston	Hamilton	Toronto
ESA Grant	●	●	●	●	●	
Tax Increment	●	●	●	●		
Development Charge Rebate	●	●	●	●	●	
Property Tax Assistance	●	●	●	●	●	
Tax Arrears Cancellation		●				●
Green Municipal Fund	●					
Municipal Acquisitions					●	
Redevelopment Grants					●	●

Source: By-Law No. 516-2008, 2008; By-Law No. 517-2008, 2008; By-Law No. 518-2008, 2008; City of Guelph, 2002; Hamilton Economic Development Office 2007; City of Kingston 2006; City of London, 2006; The Corporation of the City of Brantford 2005.

2.4.1. Brownfields Remediation Tax Assistance Program

This program is designed to provide assistance to brownfield properties where contamination has rendered the property vacant, under-utilized, or abandoned. Properties will only qualify for assistance where brownfields remediation is undertaken in combination with development of employment uses. Owners are only eligible for Brownfields Remediation Tax Assistance where contaminants exceeding acceptable Ministry of Environment standards have been identified (By-Law No. 516-2008, 2008, By-Law No. 517-2008, 2008 By-Law No. 518-2008, 2008)

The Brownfields Remediation Tax Assistance will be provided in the form of a cancellation of all or a portion of the Municipal Tax Increment. The Brownfield Remediation Tax Assistance will be available for a 'Development Period' which will commence upon development and end either two years after the date that Municipal Property Assessment Corporation (MPAC) reassesses the property to reflect the fully improved value of the developed property or three years after the date that MPAC reassesses the property to reflect the fully improved value of the developed property, if the property is also receiving development grants offered in the CIP. Finally, only the following costs will be eligible for Brownfields Remediation Tax Assistance: Environmental studies; remediation; and environmental insurance premiums (By-Law No. 516-2008, 2008, By-Law No. 517-2008, 2008 By-Law No. 518-2008, 2008).,

2.4.2. Development Grants

The Development Grant program is designed to provide assistance in the form of a series of annual grants to eligible owners who undertake development for specific employment uses (By-Law No. 516-2008, 2008, By-Law No. 517-2008, 2008 By-Law No. 518-2008, 2008).

The total grant for a development may not exceed 60% of the cumulative Municipal Tax Increment over a 10-year period. Developments qualifying for Brownfield Remediation Tax Assistance and Development Grants may be eligible for a maximum of 12 years combined assistance. Finally Development Grants will only be available for buildings and facilities that are occupied by one of the following uses:

-Biomedical
-Computer Systems Design and Services
-Convergence Centres for eligible uses as listed in this section
-Corporate Headquarters, in Downtown or on Sites in Subway Corridors
-Creative Industries, excluding Film Studio Complexes
-Food and Beverage Wholesaling
-Information Services and Data Processing
-Manufacturing
-Scientific Research and Development
-Software Development
-Tourism Attractions (By-Law No. 516-2008, 2008, By-Law No. 517-2008, 2008 By-Law No. 518-2008, 2008).

The 3 CIPs all reflect the notion that the City of Toronto has made a clear link between brownfield redevelopment and economic development. This point is further exemplified by the fact that the CIPs only apply to developments that intend to promote economic development and provide employment.

2.5. Conclusion

This chapter has identified the Federal government's role in brownfield redevelopment, it has also outlined brownfield regulation Ontario. Finally, it also summarized brownfield regulation in Toronto by presenting an explanation of the specific financial incentives provided in Toronto's three CIPs. The following chapter offers a review of the academic literature as it pertains to brownfield policy and site identification.

Chapter 3 Literature Review

3.1. Introduction

In the next section, I review the literature as it pertains to brownfield redevelopment and policy. The remainder of the chapter provides a brief overview of literature on brownfield identification and management.

3.2. Brownfields and Policy

Studies analyzing the role of policy and regulation in brownfield redevelopment represent the bulk of the academic research conducted in the brownfield literature. Most of these studies have focused on site specific case studies that involve a particular locale's experience with various economic incentives aimed at promoting successful redevelopment, barriers to private-sector barrier remediation, and issues of liability (Adams et al., 2000; Alberini, et al., 2005; De Sousa, 2000; McCarthy, 2002; Wernstedt et al, 2006). These types of studies examine the progress of policy (McCarthy, 2002), effectiveness of fiscal measures (Adams et al., 2000; Alberini et al., 2005; Wernstedt et al, 2006), the nature of economic costs and risks involved in brownfield redevelopment (De Sousa, 2000), and the role of government intervention (De Sousa, 2005). The information derived from these papers comes from case studies, interviews, surveys and policy analyses.

Some researchers assert that brownfield redevelopment is the best smart growth option available to planners and policy makers (Greenberg et al., 2001 b; Franz et al., 2008). Their argument is that brownfield redevelopment can take advantage of existing infrastructure and help to reduce development pressure on greenfield land. Areas such as parks, trails and other recreational spaces can strengthen the character of neighbourhoods, increase the value of surrounding properties, and make it a more attractive place to live (De Sousa, 2003; Franz et al., 2008).

From McCarthy's (2002) analysis, concern about legal liability for contamination is considered the greatest impediment to brownfield reuse. Alberini et al. (2005) and Herbele & Werstedt (2006) are in agreement and found that developers place a high premium on liability relief. De Sousa (2005) discovered that the relatively slow procedural process involved is a major hurdle to redevelopment. McCarthy (2002) adds that this is a result of a lack of clear guidelines regarding site assessment costs and that extended development periods that arise from this deter redevelopment prospects. It can be said that most sites remain idle because the municipalities traditionally focus their attention on the most contaminated sites and so redevelopment of the less polluted ones is stalled (McCarthy, 2002).

However, Adams et al (2000) disagree and claim that because redevelopment costs are in excess of the predicted value of the completed brownfield site, such places can remain idle for considerable periods of time. De Sousa (2000) found that brownfield redevelopment is indeed perceived as being less cost- effective and entailing greater risks than greenfield development by developers. With these hindrances to redevelopment in mind, Herbele & Wersntadt (2006) note that many basic real estate fundamentals such as site location, size, building characteristics, construction costs and access to a skilled labour force are often a more important set of obstacles to redevelopment than any of those previously mentioned.

The literature also poses methods aimed at reducing the various barriers. Government efforts to diminish obstacles to private brownfield redevelopment have focused on making redevelopment easier for the private sector through legislation and policy changes (McCarthy, 2002). Adams et al (2000) assert that fiscal measures such as grants and subsidies are effective means of mobilizing redevelopment schemes. However, De Sousa (2000) states that not enough is being done by policy makers to stimulate redevelopment through the implementation of cost and risk reduction measures (De Sousa, 2000). Wernstedt et al. (2006) agree and suggest that liability relief in the form of environmental insurance may heighten investment as developers will be more willing to invest. Nevertheless, Alberini et al.

(2005) found that developers are not deterred by prior contamination, once it has been cleaned up, and appreciate the speedy review of development and remediation plans, direct financial incentives and flexible cleanup standards. This suggests that these are acceptable policy tools that can be used to influence land use. Another solution for the brownfield problem would be to make it easier to rezone industrial sites to more profitable land uses such as residential or commercial (De Sousa, 2000). Alberini et al. (2005) found that developers with no experience in brownfield redevelopment are reluctant to invest in such projects and so attracting a wider range of new, inexperienced developers will require campaigns aimed at education and marketability. On a more general level, assertions and misunderstandings associated with brownfield redevelopment need to be reassessed for policymakers to succeed in increasing reuse (Wernstedt et al., 2006).

Adams et al., (2000), claim that private brownfield redevelopment is dependent on the political agendas of the public sector and without public sector support redevelopment would simply not take place. However, government regulation may actually impede redevelopment because complying with government procedures may limit the opportunities for profit (McCarthy, 2002). Because the financial input comes mostly from the private sector, De Sousa (2005) asks whether the government should remove itself completely from the picture. Successful brownfield redevelopments often require financial assistance from public agencies. The risks of redeveloping contaminated sites and the extraordinary costs associated with investigating and cleaning up such sites make public financial assistance essential for moving many brownfield redevelopments forward. Alberini et al. (2005) claim that developers with experience in redeveloping brownfield sites are more likely to take advantage of subsidies than those with no experience, which suggests that subsidies may be a relatively inefficient way of soliciting cleanup and redevelopment at locales where virtually all prospective developers have not engaged in brownfield projects before. The public and private sector claim that the most effective form of government intervention for encouraging brownfield redevelopment are policies related to the

provision of project grants and other financial incentives. One final and important theme identified from the literature is that most of the interviewees in De Sousa's (2005) study indicated that local governments were the most important level of government in facilitating redevelopment.

Efforts to promote brownfield redevelopment transcend the boundaries of different jurisdictions within a metropolitan region. Consequently, an integrated, contextual and collaborative approach is necessary for successful brownfield redevelopment because it touches on a number of issues involving the social costs and benefits of brownfield redevelopment that relate to community concerns, environmental justice and regional land use and environmental quality (McCarthy, 2002). Solving the brownfield problem requires a concerted effort among developers, landowners, environmentalists, governmental players and the public (De Sousa, 2000). However, Herbele & Wernstedt (2006) caution against the involvement of the public in that it can be particularly problematic, since the public's opinion can severely restrict development due to such phenomena as NIMBYism. To combat this, the establishment of local brownfield redevelopment authorities could be organized. A single point of authority that acts as a mediator between all stakeholders involved could prove to be an invaluable resource (McCarthy, 2002). However, the successful redevelopment and acceptance of brownfields may require that practitioners move beyond a property-by-property approach and place brownfields into a large scale endeavour that seeks to revitalize multiple properties across entire regions (Herbele & Wernstedt, 2006).

3.3. An Overview of Research on Brownfield Site Identification

Various levels of government in Canada lack knowledge about the extent of brownfield sites within their jurisdictions (NRTEE, 1997). Some sites are easily identifiable, but others become masked by layers of redevelopment. However, it is critical for planners and policy makers to know the extent of a city's brownfield supply for them to be able to create effective policies and legislation for redeveloping

them and before developers and municipalities make large monetary investments. Thus, former, current, and future sites need to be identified.

Guidelines for identifying a brownfield will help identify and assess both contaminated and non-contaminated sites. There is no unified and universally applicable method to identify brownfield sites (see also Herbele & Wernstadt, 2006). Relatively little research has been conducted on creating an efficient and effective method to identify and manage brownfield sites. In Canada and the US, land-related brownfield information is somewhat limited and existing databases of sites use varying standards and criteria for collecting and cataloguing information and, thus, are inconsistent (Frickel & Elliot, 2008; Herberle & Wernstedt, 2006; NRTEE, Page & Berger, 2006).

Hayek et al (2010) contend that before a brownfield redevelopment project can be connected to broader community goals, or before planners and policy makers introduce mechanisms to encourage redevelopment, the number, location, and extent of potential sites in any one place must be known. Policy and economic incentives cannot be fully realized until planners, policy makers, private investors know how to assess brownfield sites on a city-wide basis. Frickel & Elliot (2008) have also outlined the need to identify these sites and present a method to identify current and past hazardous sites. The authors begin by listing polluting industries and then cross reference this list with manufacturing directories of a particular city. Using this approach, they are able to identify businesses operating in the polluting industries. While this method is useful, Frickel & Elliot (2008) did not present a comprehensive identification method that considers smaller industries or sites not engaged in manufacturing, such as gas stations, warehouses, auto-machine shops, or chemical facilities.

Presently, no unified set of guidelines for identifying individual brownfield sites exists. Page & Berger (2006) attempted to survey and catalogue a variety of sites across the United States. They studied and analyzed 1,415 types of sites. Nevertheless, the objective of their study was not to discover sites or to detail methods for identifying potential sites; indeed, the sites they studied were already

listed in a state-operated database of sites in some phase of remediation. Instead, Page & Berger (2006) attempted to identify commonalities in lot size, past use, current use, and location. They analyzed the characteristics of the sites to determine whether their results were consistent with commonly held assumptions about brownfield sites, particularly industrial history.

The most comprehensive set of instructional guidelines for identifying the scale of the brownfield problem at a national level was produced in Canada by the National Round Table on the Environment and the Economy (NRTEE), a federal government-affiliated agency which produced a report titled "Improving Site-Specific Data in the Environmental Condition of Land." The NRTEE recommended using a variety of sources and databases to identify brownfield sites in Canada; however, a number of the sources cited by the NRTEE are inaccessible to the general public. Furthermore, the sources they recommend vary from city to city and province to province. NRTEE does describe the usefulness of fire insurance plans and city business directories.

De Sousa (2006a) attempted to compile inventories of brownfields and determine the extent of the brownfields problem in Canada by distributing a mail survey to 55 Canadian cities. Respondents were asked to estimate the quantity of brownfields in their municipalities. Only 24 cities responded. Two were in possession of formal brownfield inventories, 9 were in the process of developing an inventory, and 13 had no inventory. Twelve cities provided only estimates. The number of brownfield sites ranged from zero to 1,000. Based on survey results, municipalities do not have a standard approach for developing brownfield inventories, which is consistent with provinces and the federal government in Canada.

In an earlier paper, De Sousa (2005) attempted to examine the scale of the brownfield problem in Milwaukee, Wisconsin (U.S.). The author based his study on various government and municipal sources, which tended to focus on tracking financial assistance. Therefore, the data De Sousa (2005) gathered reflected projects that received financial assistance from government and did not include

those that may have been assisted in other ways. The author attempted to ensure standardization of the data, but outlined several problems inherent in this approach. Municipalities did not collect data for equal periods of time, and they employed diverse definitions of what constitutes a brownfield.

3.4. Conclusion

This chapter has provided a review of the academic literature is pertains to brownfield redevelopment. More specifically, it has offered a discussion of the issues associated with brownfield policy and management, financial incentives aimed at promoting redevelopment and the need to identify brownfield sites in a given locality.

Chapter 4: Methods and Case Study

4.1. Introduction

This research utilized a qualitative case study approach drawing on events that led to the redevelopment and remediation of the Toronto Port Lands. The remainder of this section presents an overview of the case study approach, including the rationale for using case studies as the primary research tool. Following this, a description of the study area and site is presented.

4.2. Case Study Approach

Case Study research is an in-depth examination of a substantial amount of information regarding very few cases. Case-study research intensively investigates a small set of cases and focuses on the details within each case and their context in order to understand and identify overarching processes. Case-studies enable us to link micro-level processes to large-scale social structures. They allow us to connect abstract theory to concrete, ground-level cases. The information ascertained through ground-level cases in turn informs theory ultimately working towards the development of generalized theories which can then be applied to multiple cases (Neuman, 2007).

A case study approach was utilized as the main research strategy to address the research objectives outlined in Chapter 1. Case studies are an appropriate framework of analysis when the underlying research focus is primarily to answer “how” and “why” questions (Yin, 2009). Yin (1984) formulated a definition of the approach in which the case study is defined as a method of inquiry that: “investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used” (p. 23). Case studies allow the researcher to explore individuals or organizations, interventions, relationships, communities, or programs and support the deconstruction and the subsequent

reconstruction of various phenomena (Baxter & Jack, 2008). Case study inquiries allow the researcher to gain a deeper insight into a case. It enables the (Baxter & Jack, 2008).

The case study approach to research has been the target of much criticism. Critics have faulted this method based on its lack of representation due to its use of a single observation point to study a social issue, phenomenon, or event (Hamel, 1993). Although a multiple-case study would have provided a wider range of information on brownfield redevelopment across Canada, the focus on the Port Lands has limited the scope of the research to Toronto. This was purposeful since it allowed for a more intensive investigation, warranting a higher degree of description and analysis of the issues surrounding brownfield redevelopment in the City.

4.3. Data Sources

The data sources consulted for this study primarily consist of secondary sources in the form of planning reports, site and secondary plans, public forum transcripts and a variety of other official documentation. Waterfront Toronto is committed to of accountability and transparency, therefore, the main bulk of information was accessed via Waterfront's website which keeps an extensive archive of reports and documentation relating to the planning of the Port Lands redevelopment.

4.4. Toronto Context

Brownfields can be found in practically every city with a history of industrial activity. However, the true extent of the issue is unknown. Toronto is Canada's largest, most dense and built-up city; it has a rich industrial legacy. Thus, it provides an appropriate setting for the study of brownfield redevelopment in an urban context. According to De Sousa (2002), the best estimate for the City of Toronto is from a study by Hemson (1998), which estimated that there are 865 acres in Toronto. Since the prevalence of brownfield sites have become a common characteristic of deindustrialized cities,

explanations of redevelopment process such as the work proposed in this thesis will add to the urban redevelopment literature. Furthermore brownfield studies have mostly been focused on American and European examples in the literature, the results yielded from the Port Lands case study will add to the limited body of work that details the Canadian experience with brownfield redevelopment.

4.5. Case Study: The Redevelopment of the Toronto Port lands

The Toronto Port Lands is a 1000 acre district bounded by the Keating Channel/Don River and Lake Shore Boulevard in the north, the Toronto Inner Harbour in the west, Ashbridges Bay in the east and Lake Ontario and Tommy Thompson Park in the south (See Map 1) (Waterfront Toronto a, n.d.). The Port Lands were created by eras of infilling; beginning in the 1880s, the area was steadily filled in to create more land for industrial purposes (Waterfront Toronto a, n.d.). However, global economic restructuring in 1970s resulted in a deindustrialization process that saw the abandonment and relocation of industry out of the Port Lands to the periphery of the GTA. Because the Port Lands were primarily utilized for industrial purposes the area currently lacks servicing for other uses. Therefore, in order to bring the district back into the productive use, massive investments in infrastructure are required (Waterfront Toronto a, n.d.)

The revitalization of the Port Lands is part of massive collaborative effort to redevelop Toronto's waterfront. The area covered in the Toronto's waterfront revitalization includes a 46-kilometre area of underutilized land (Environment Canada, 2008). The revitalization is a collaborative effort between the City of Toronto, the provincial and federal governments as well as various other governmental agencies, non-governmental organizations and private sector stakeholders. The revitalization of the Port Lands mainly falls under the responsibility of Waterfront Toronto (formerly Toronto Waterfront Revitalization Corporation).To oversee the planning and implementation of the revitalization of Toronto's waterfront, the Federal, Provincial and Municipal governments created Waterfront Toronto. The corporation has its

own provincial legislation, the Toronto Waterfront Revitalization Corporation Act, 2002, which defines the role of the corporation, including its objects, structure, and limitations. The Act states that the corporation is not an agent of any level of government, is governed by a board of directors and each order of government appoints four board members to the board (Environment Canada, 2008). In 2007, the TWRC was renamed Waterfront Toronto in 2007 (Environment Canada, 2008). Waterfront Toronto in concert with the Provincial and Federal governments have since conducted a number of studies, created planning reports, secondary plans, precinct plans, and held a series of public consultation meetings to guide the revitalization of Toronto's Port Lands. Historically, a major obstacle to revitalization of the Toronto waterfront area has been the lack of coordinated vision and effort on the part of all stakeholders, including the Federal, Provincial and Municipal governments. The Port Lands is a particularly difficult site to develop because it lies within a flood zone, requires extensive remediation, is situated atop decades of infill and therefore the land is inadequate to support buildings, severely lacks development-enabling infrastructure, the existing roads and services are inadequate to support more intense development, and is poorly linked into the City's road, transit and wastewater collection networks. Finally, the successful revitalization of the Port Lands has been hampered by fragmented land control and ownership (Waterfront Toronto a. n.d.).

4.6. A History of Port Lands Governance

Since the late 1800s, the development of the Port Lands has been the focus of intense public debate (Desfor, 1993). Not only has the physical structure of Port Lands been radically transformed since then, but its governing structure has also seen drastic changes as well. What follows is a brief history of Port Lands governance. Toronto's waterfront experienced several layers of (re)development during the nineteenth and twentieth centuries. This development continues on today and will continue well into the future. The most dramatic phase of development occurred from about 1912 to the 1950s.

The current arrangement of the Port Lands is largely a result of this period. The agency responsible for this was the former Toronto Harbour Commission (Desfor et al, 1989).

The Harbour Commission was legislated into existence in 1911 by the Government of Canada as a hybrid corporation (Desfor, 1993). This newly formed Commission signified a major restructuring of the previous port authority, Harbour Trust (Desfor, 1993). The ownership and control of the entire waterfront were concentrated in the hands of this new Commission, which was endowed to develop it, not solely as a port but for industrial and commercial functions as well. The Commission had the authority to develop, regulate and control the use of land and property on the waterfront, it was also allowed to borrow directly from banks, and to acquire, expropriate, sell and lease real estate (Desfor, 1993).

In 1988, Prime Minister Brian Mulroney proclaimed the establishment of the Royal Commission on the Future of the Toronto Waterfront. The Royal Commission was tasked to inquire into and make recommendations concerning the future of the waterfront. In 1989, the Province of Ontario created Provincial Royal Commission in conjunction with the federal one. The Commission concluded that the Harbour Commission's Properties be reassigned to a municipal development corporation. The Royal Commission nominated the Toronto Economic Development Corporation (TEDCO) (now Toronto Port Lands Company) as the suitable municipal agency to develop the lands for job creation (Desfor, 1993). In anticipation of attracting the 2008 Summer Olympic Games, the federal, provincial and municipal governments proclaimed the formation of a Toronto Waterfront Revitalization Task Force begin investigating ways to revitalize Toronto's waterfront (Keil, 2006). The Task Force's concluded that the vital initial step in waterfront revitalization must be the creation of an effective and small action oriented organization that would have administrative jurisdiction over the existing government agencies on the revitalization of the waterfront. In 2002 the Province of Ontario legislated this corporation into existence and it has since become Waterfront Toronto (Keil, 2006).

4.7. Conclusion

This chapter has offered the justification for the case study approach as well as provided a description of the Port Lands case study. In the next chapter the theoretical context of this thesis is established.

Chapter 5: Reconciling Brownfields Redevelopment with Sustainability and Smart Growth

5.1. Introduction

This chapter aims to establish the theoretical context of the research. It aims to situate brownfields under the rubrics of smart growth and sustainability. It will also show that brownfield redevelopment represents an application of the principles of sustainable development and smart growth.

5.2. Situating Brownfields within the context of Sustainability and Smart Growth

In recent years, land use changes and issues of sustainability have become a focal point of policy analysis. Reasons for this renewed interest are mainly environmental threats imposed by climate change, deforestation, desertification, biodiversity loss, agricultural production, and soil pollution. Since land use is directly related to various types of environmental externalities, it is thus at the centre of the sustainability debate. Today's cities, as currently planned and developed, are not sustainable in a global environmental sense (Roseland, 2000). Today, over half the world lives in cities; in the developed world over eighty percent of the population reside in urban areas; in the developing world, growth and urbanization are occurring at accelerating and unprecedented rates (Bugliarello, 2006). The rate and scale of current urban growth are unparalleled in history and so, any discussion of sustainability must consider the sustainability of cities and their effect on the stock of resources in the ecological, social and economic environments.

It is within this context that the redevelopment of brownfield sites is situated. Under the rubrics of smart growth and sustainable development, this section will attempt to provide the theoretical context of brownfield redevelopment. Another objective is to show that brownfield redevelopment represents an application of the principles of sustainable development and smart growth. To achieve

this goal, I will begin by a discussion of the definition of sustainable development. Following this will be a section focusing sustainable development in the context of urban issues. Next, a section outlining the issues associated with smart growth will be offered. After this, a section detailing the major issues of brownfield redevelopment in urban areas as it relates to the sustainability debate will be given.

Sustainable development is commonly defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Bugliarello, 2006; Geisinger, 1999; Jabareen, 2008; Roseland, 2000). This is the term's most basic definition but the concept is fraught with contradictions and differing interpretations of what is actually means. It can be argued that a comprehensive theoretical framework for understanding sustainable development is lacking from the theory. Moreover, there are no clear guidelines stipulating how theoretical constructs of sustainable development can be practically applied (Jabareen, 2008). According to Jabareen (2008) the multiple interpretations and applications of sustainable development is a result of competing interest groups redefining its meaning to suit their own agendas. Nonetheless, Geisinger (1999) asserts that all interpretations of sustainable development consider the principle as a compromise between economic development and environmental protection. Further, economy, environment and social equity are three of the most central components of the sustainability concept and that maintaining a balance between the three is the overarching goal (Geisinger, 1999). Bugliarello (2006) stresses the environmental component and asserts that a sustainable society is one where, equity, welfare, and economic stability are dictated by environmental limits. Williams & Dair (2007) consider the time factor and state that sustainability requires the integration of social, environmental and economic development in a way that is equitable and enduring. Advocates of sustainable development accept that applying it involves a fundamental change in global systems of production but that this change has to allow for continued economic prosperity yet not at the expense of the planet's ecosystems (Roseland, 2000). The debate about definitions of sustainable development has been ongoing for over 20 years but

most are of the view that economic growth is necessary for sustainability as it provides the financial resources for technical advances required to solve problems of environmental exploitation (Williams & Dair, 2007). At this point, the discussion will now shift its focus to a discussion of urban sustainability.

With the unparalleled growth of urbanization now comprising over half of the world population, global sustainability is now an issue of urban sustainability (Bugliarello, 2006). Alkar & McDonald (2003) add that planning and development over the last few decades in industrialized cities has resulted in circumstances that are environmentally unsustainable. Current urban systems of growth have caused a number of environmental impacts which are at odds with the tenets of sustainable development (Roseland, 2000). According to Alkar & McDonald (2003), the only way to halt the progression of this type of unsustainable development is to adopt the principles of sustainable development in the planning process. Carter & Fortune (2007) agree and support the view that if policy makers wish to improve the quality of life in urban areas, they must incorporate elements of sustainability into urban planning. It has already been stated that sustainable development is a contentious concept and so it follows that urban sustainability is an equally contentious subject. Bugliarello (2006) defines urban sustainability as a city's ability to survive without compromising the cities and environments in the rest of the world. Like the concept of sustainability, urban sustainability also gives equal weight to the environment, economy and society (Carter & Fortune, 2007).

Sustainable urban development implies the need to maintain a higher quality of urban life without endangering the likelihood of continued advancement for further development of future generations (de Shiller, 2004). Bugliarello (2006) claims that if cities are to be sustainable, they must reduce their external footprints and become more liveable in terms of transportation, housing, water and power conservation, employment, congestion management and reduction of noise and air pollution. Sustainable urban development suggests the need to improve existing conditions and involves the concentration of new development in existing urban areas thus efficiently utilizing the current built-

up area (Alkar & McDonald, 2003; Bugliarello, 2006; Carter & Fortune, 2007; de Shiller, 2007, Roseland, 2000). To assure the sustainability of cities, attention to the various needs of current and future populations is necessary in the urban planning process (Chan & Lee, 2008). Alkar & McDonald (2003) state that the sustainability of cities is dependent upon the reduction of automobile dependency and an increase in the provision and conservation of green spaces. Carter & Fortune (2007) add that the reduction of automobile dependency can be achieved by investment in sustainable forms of public transport and the creation of walkable and pedestrian-friendly environments. To a large extent, the principal ideals of sustainable urban development correspond to the tenets of the compact city (Roseland, 2000).

Ultimately, urban sustainability points in the direction of dense patterns of development (Bugliarello, 2006). A high population density implies shorter distances between functions and accommodates the use of public and environmentally-friendly means of transport which contribute to lower energy use, protection of biodiversity and the prevention of sprawl (Alker & McDonald, 2003). Urban sustainability incorporates community involvement in planning decisions and advocates integrated strategies for managing resources and infrastructure. Therefore, creating a detailed planning policy and an integrated framework for achieving economic development is instrumental to urban sustainability (de Shiller, 2004). Urban renewal in the form of infill development is commonly adopted to manage a degrading urban environment, to rejuvenate decaying urban areas and meet various socio-economic objectives.

However, achieving the goals stated above requires all stakeholders to consider development within the context of the locality but still paying significant attention to regional and interregional demands. This involves the evaluation of social, economic and environmental aspects of development that contributes to the overall concept of sustainable development (Carter & Fortune, 2007). Furthermore, in order to achieve sustainable urban development, planning decisions are of paramount

important, as they directly impact the quality of life in cities by altering environmental conditions over time (de Shiller, 2004). Planning for sustainable urban development must be developed in a way that incorporates long-term goals and considers the environmental, social and economic consequences of various developments (Naess, 2001).

A problem with the application of urban sustainability is that some perceive it to be opposed to economic development (de Shiller 2004). However, Alkar & McDonald (2003) note, that when principles of sustainability are taken into account in the planning process the result is an increase in the value of the newly (re)developed land. Another challenge of urban sustainability is translating policy into practice; this requires a common understanding of the individual features of sustainable development and Carter & Fortune (2007) believe this common understanding is absent. The collection of principles, definitions and initiatives relating to sustainability is considerable. They range from the overly broad to the extremely complex and detailed. As a result, there is a lack of a common framework for understanding and applying principles of sustainability in the urban design process (Carter & Fortune, 2007). Integrally related to the ideals of sustainability and urban sustainability is the concept of smart growth. All three concepts are united through their goals of improving the current state of our communities and ensuring positive outcomes for the future.

In addition to adopting principles of sustainable development, over the past few decades, planners, politicians and communities have relied upon various strategies motivated by the smart growth movement to provide an alternative to existing urban structure exemplified by low density, segregated and automobile-dependent forms of development (Talen, 2003). Smart growth proposes an urban form characterized by high density development, streetscapes conducive to walking and interlinked regional transportation heavily based on public transit. Moreover, smart growth aims to promote a sense of community and improve the quality of life in urban areas (Bunce, 2004; Filion & McSpurren, 2007; Mayer et al., 2002). The cultivation of compact and mixed-use forms of development

and the support of infill and brownfield redevelopment are also considered to be applications of smart growth (Greenberg et al., 2001b). With these goals in mind, it is commonly understood that smart growth's main objective is to tackle sprawl, which is considered to be a major cause of current urban forms' inability to be sustainable (Filion, 2003). Nonetheless, the ideals of smart growth converge on the notion of the compact city, which is based on ideas of increased population density, the reuse of existing urban infrastructure, and intensified residential and commercial streets. This model is increasingly considered to be a stronger form of urban development than current design (Bunce, 2004). Highly implicit in such policies is the supposition that a meaningful portion of development needs can be met by redeveloping or reusing underutilized, abandoned sites in urban areas (Mayer et al., 2002). Most smart growth policies recommend developers to adhere to these principles, while at the same time allowing expected growth to occur at a sustainable rate (Mayer et al., 2002).

A major challenge facing smart growth is how much current growth patterns can be transformed in an atmosphere where administrations, consumers, developers and economic systems favour sprawl (Filion, 2003). The literature on smart growth praises its potential, however critics of the concept claim that these achievements have failed to reach the scale needed to realign urban development trends (Mayer et al., 2002). It has been observed by Filion & McSpurren (2007) that smart growth strategies tend to be locally produced and applied rather than regional in nature. Without strategies that are implemented with regularity over extended periods of time over entire metropolitan regions, the success of smart growth campaigns will be compromised.

Bunce (2004) cautions that those wishing to adopt principles of smart growth must be weary of the hidden agendas in policies anchored in smart growth. In some instances claiming to adhere to smart growth is merely a policy aimed at economic revitalization. Bunce (2004) explains that addressing issues of urban sprawl is used as a means of gathering public support for increased development in existing urbanized areas. In this way the environmental externalities of regional sprawl serve as a public

rationale for enhancing economic development mostly through private-sector funding and the attraction of skilled labour (Bunce, 2004). Implicit in this argument is the assumption that if residents do not approve of intensification, then they can be thought of as being opposed to environmental conservation. In spite of the motivations behind the adoption of urban sustainability and smart growth, the redevelopment of already existing infrastructures seems to be a common strategy to combat sprawl and environmental degradation.

It is within this context that brownfield development has arisen as a major feature in initiatives to revitalize urban areas (Raco & Henderson, 2006). Brownfield redevelopment is considered to have a number of positive outcomes such as the reduction of development pressure on greenfield sites, the restoration of former landscapes, the establishment of new areas of ecological value, the enhancement of environmental quality, the renewal of urban cores, the restoration of the tax base, and the utilization of existing infrastructures (De Sousa, 2003). Given the strong emphasis placed on sustainable development in the current political environment it comes as no surprise that brownfield redevelopment is now heavily stressed in urban policy (Dixon, 2006). The redevelopment of brownfield sites can be considered an effective method in tackling the structural problems facing cities today (Raco & Henderson, 2006). The redevelopment of brownfield sites is employed as a strategy to prevent urban sprawl, deliver more compact cities, reduce out-migration and the need to travel, divert investment from overly congested areas, and reduce greenfield development (Dixon, 2006; Raco & Henderson, 2006; Williams & Dair, 2007). However, even though brownfield redevelopment can be considered an exercise in sustainability and smart growth, it is only one of many methods of achieving urban sustainability and alone will not be successful in achieving sustainability for an entire region. Only through an application of a coordinated, comprehensive and holistic approach to urban sustainability over the long-term can we expect to experience sustainable outcomes.

5.4. Conclusion

This chapter has situated the issue of brownfield redevelopment in the broader theoretical frameworks of sustainability and smart growth. In the next chapter I proceed to identify the major stakeholders involved in the Port Lands redevelopment project.

Chapter 6: Sustainability Characteristics of Case Studies

6.1. Introduction

This chapter sets out to outline the sustainable development components incorporated into the specific projects in the Port Lands redevelopment. Evaluating the sustainability of a brownfield redevelopment can be prove to be a difficult task since translating theoretical constructs of sustainability into actual practice is equally difficult. However, if the specific elements of a brownfield redevelopment are unpacked into smaller more identifiable characteristics, one can then proceed to determine how the tenets of sustainability are incorporated into the redevelopment.

The redevelopment of the Port Lands consists of five separate projects: 1) Lake Ontario Park; 2) Tommy Thompson Park; 3) Port Lands Greening; 4) Pilot Soil Recycling Facility; and 5) Cherry Beach Sports field. What follows is a discussion of the specific elements of each project and how the tenets of sustainable development have been incorporated into them. These projects represent the transformation of brownfield land into green space; otherwise known as greening of brownfields. Greening is understood generally to mean the creation of open spaces within a city's built-up areas. It includes the production of parks, public spaces and gardens, outdoor sports facilities, natural habitats, so-called green corridors, and children's playgrounds through redevelopment (De Sousa, 2004).

6.2. Lake Ontario Park: In development

The rehabilitation of Lake Ontario Park, according to the site's Master Plan, is being steered by the principles of sustainability (Lake Ontario Park Master Plan, 2008). The land that comprises the Park is owned solely by public organizations, these include the City of Toronto, the Toronto Port Authority, Toronto and Region Conservation and the Toronto Port Lands Company (TPLC) (Waterfront Toronto c, n.d.). The Park is presently comprised of a series of disjointed places. The Master Plan seeks to organize

these places into one coherent, naturally flowing park that conserves natural habitats, provides recreational opportunities and celebrates local culture (Lake Ontario Park Master Plan, 2008).

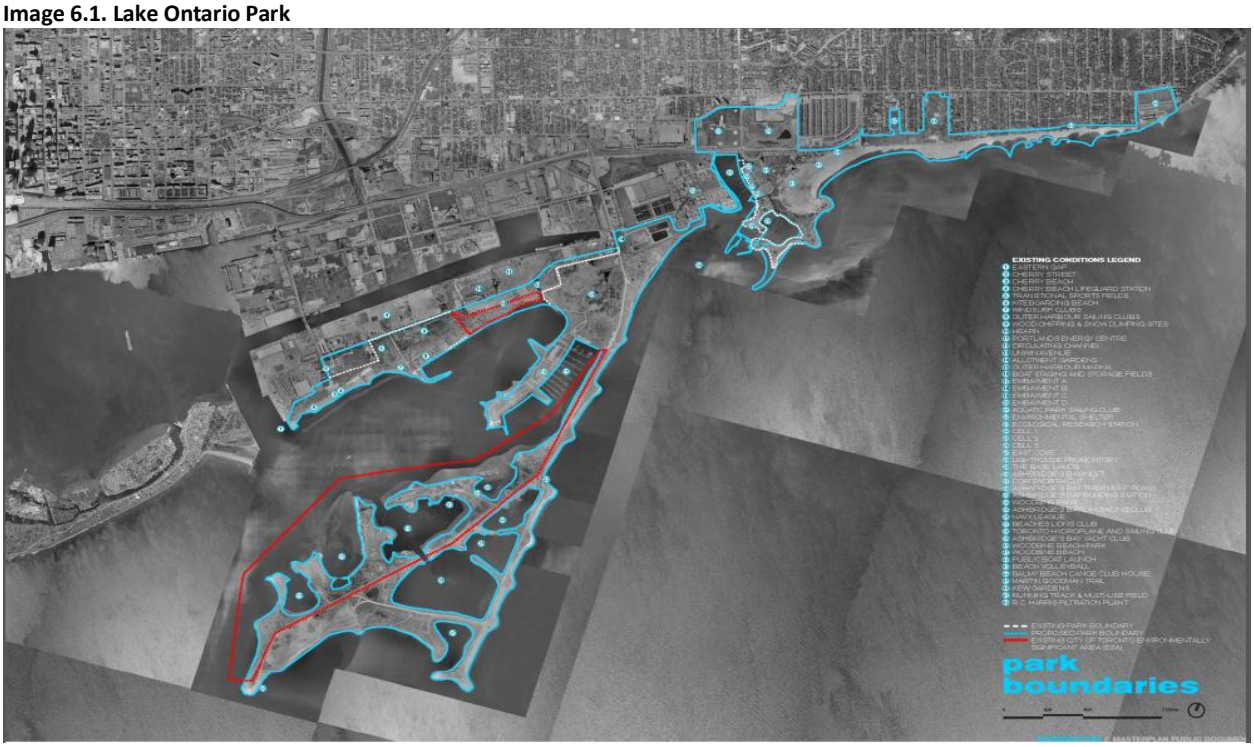
Economic sustainability: Is a key consideration operation and maintenance of Lake Ontario Park. This involves the protection of the capital investments in park infrastructure with sufficient funding to ensure that appropriate ongoing maintenance can be provided. Prolonged upkeep of Lake Ontario Park will require funding from a combination of public resources augmented by revenue generating on-site uses and private sector investment opportunities. Publically, funding is to be provided by project partners such as TRCA, Toronto Parks Forestry and Recreation, Toronto Water, and the Toronto Port Authority. Revenue from cafés, concessions and other commercial enterprises and events will allow the long-term maintenance of the park. Furthermore, The Master Plan proposes the creation of a revenue generating Adventure Centre, which will operate all year round, 12 and offer a variety of resources and amenities to park visitors (Lake Ontario Master Plan, 2008).

Social Sustainability: The new Lake Ontario Park seeks to accommodate a range of cultural and recreational activities including: performance venues, astronomical observatories, public art and gallery spaces, community gardens, outdoor interactive seminars, picnic areas, playgrounds, restaurants, a vibrant waterfront esplanade. Moreover, the Master Plan has identified a potential location for a First Nations Heritage site (Lake Ontario Master Plan, 2008). The formulation of the Master Plan involved extensive public engagement and participation in its design (Lake Ontario Park Master Plan, 2008). Waterfront Toronto, the agency charged with playing the lead role in the formulation and implementation of the plan, is committed to two-way public engagement and participation as well as accountability and transparency (Waterfront Toronto g., n.d.). The public engagement process began on 2006 with a series of stakeholder interviews. Following this, formal stakeholder involvement took place through a Stakeholder Advisory Committee, supplemented by many small group meetings. General

public input was gathered through three Public Forums in 2006, 2007 and 2008 (Lake Ontario Master Plan, 2008).

Environmental Sustainability: The redevelopment of Lake Ontario Park has is committed to environmental sustainability as evidenced by the Master Plans commitment to environmental cleanup. The Master Plan makes it clear that exhaustive environmental site management will be necessary for lands within Park site where environmental concerns may exceed provincial standards for park use. The Master Plan was developed acknowledging that there may be polluted soil conditions and environmental issues in some areas of the park. For areas within Lake Ontario Park that are planned for significant redevelopment, Environmental Site Assessments will be required to determine any potential contamination that may complicate the redevelopment process so that such contamination may be remediated (Lake Ontario Master Plan, 2008). Much of the land at Lake Ontario Park has been reclaimed from Lake Ontario by historic infilling, resulting in potentially hazardous environmental conditions throughout the park. The reclaimed land was subsequently used for a variety of industrial activities. Therefore, it comes as no surprise that past site assessments have indicated that soil and groundwater is affected by residues from both the lake fill and from past industrial activities that occurred prior to current environmental standards. Even though past industrial and infill activity have resulted in current contamination, it is anticipated that the risks to public health from typical park use will be minimal. Still, environmental site management plans will need to be developed and implemented in collaboration with the Ontario Ministry of Environment, Toronto Public Health and Health Canada (Lake Ontario Park Master Plan, 2008).

Image 6.1. Lake Ontario Park



Source: http://www.waterfrontoronto.ca/explore_projects2/port_lands/lake_ontario_park

6.3. Tommy Thompson Park: In development

Tommy Thompson Park (TTP) located on a man-made peninsula, known as the Leslie Street Spit, which extends five kilometres into Lake Ontario it is also one of the largest natural habitats in Toronto's waterfront. TRCA has been in charge of managing the park since the early 1970s (TRCA, 2005). The Leslie Street Spit was constructed in the late 1950s has since been a dumping ground for infill material from development sites within the City (Waterfront Toronto f., n.d.). The lakefill consisted of consisted of earth, brick, asphalt, concrete and rubble. Furthermore, the site has been used to dispose of cells containing thousands of litres of dredge spoil. In 1989, the City and TRCA conducted an environmental assessment and began a planning process which resulted in the creation of TTP Master Plan. Then, in 1995, TRCA received authorization from the Ministry of the Environment to begin implementation of the plan (Tommy Thompson Park a., n.d.). The main goals of the Plan were to conserve important local

species, safeguard environmentally significant areas; enhance preserve habitats; and improve public recreational opportunities (Tommy Thompson Park a., n.d).

Economic Sustainability: Until recently, limited funds have been available to implement the Master Plan with the City of Toronto contributing funding for interim management. A funding partnership between TRCA and the Waterfront Toronto for the sum $8 million has been established to bring to fruition key objectives of the Plan between 2005 and 2010. These key objectives of the include: the creation of a park gateway; nature viewing and park facilities; an environmental shelter; an ecological research station; proposed washroom upgrades; and a trails master plan (Tommy Thompson Park, a., n.d.)

Social Sustainability: The objectives of the plan were developed through extensive consultation with numerous federal, provincial, municipal agencies and relevant stakeholder groups. Public participation continues today through the Tommy Thompson Park Advisory Committee. Furthermore a Peer Review Committee has been formed to provide direction on process and design of key elements of the Plan. Additionally an Agency Stakeholder Group has also provided input and direction on specific components of the Plan (Tommy Thompson Park a., n.d.). TTP provides an abundance of ecological recreation opportunities such as hiking, cycling, rollerblading and fishing (Waterfront Toronto. f. n.d.). Moreover, located within the park are two educational facilities: An ecological research station and an Environmental shelter

Environmental Sustainability: Since its creation, TTP has grown into an intricate ecosystem of habitats, which support a diverse community of birds, flora and fauna species. The complex array of plant life in the park are a result of the highly variable soil found in the Park. Due to the parks origins as dumping ground of construction residues, soil fertility and composition can vary dramatically within very small areas (Tommy Thompson Park, b., n.d.). Adding to the environmental sustainability of the park is the fact that the Ecological Research Station provides Off-grid power designed to maximize energy

efficiency (TRCA, 2009). During the redevelopment of the park, the type of waste produced is expected to include: construction materials; dioxide fumes from machinery. However, it is planed that all waste will be taken to an approved disposal facility and where possible, recyclables will be taken to a recycling facility (TRCA, b., 2005). It is anticipated that the implementation of the Project will require extensive resources and materials. Fill volumes will be imported from clean earth and rubble that will be delivered from nearby construction sites. The natural stone material will be purchased from approved quarries. The quality of all earth fill imported to the site will be monitored in accordance with guidelines set forth by the Ministry of Environment for Lakefilling in Ontario. Any lumber used in the construction of any of the project components will be free of dioxins or creosote. The selection materials used in the implementation of the Project will adhere to TRCAs commitment to resource conservation and recycling, and will follow recommendations provided by Environment Canada (TRCA, b., 2005).

Image 6.2. Tommy Thompson Park

Source: http://www.waterfrontoronto.ca/image_galleries/tommy_thompson_park/?2137#2137

6.4. Greening the Port Lands: Completed

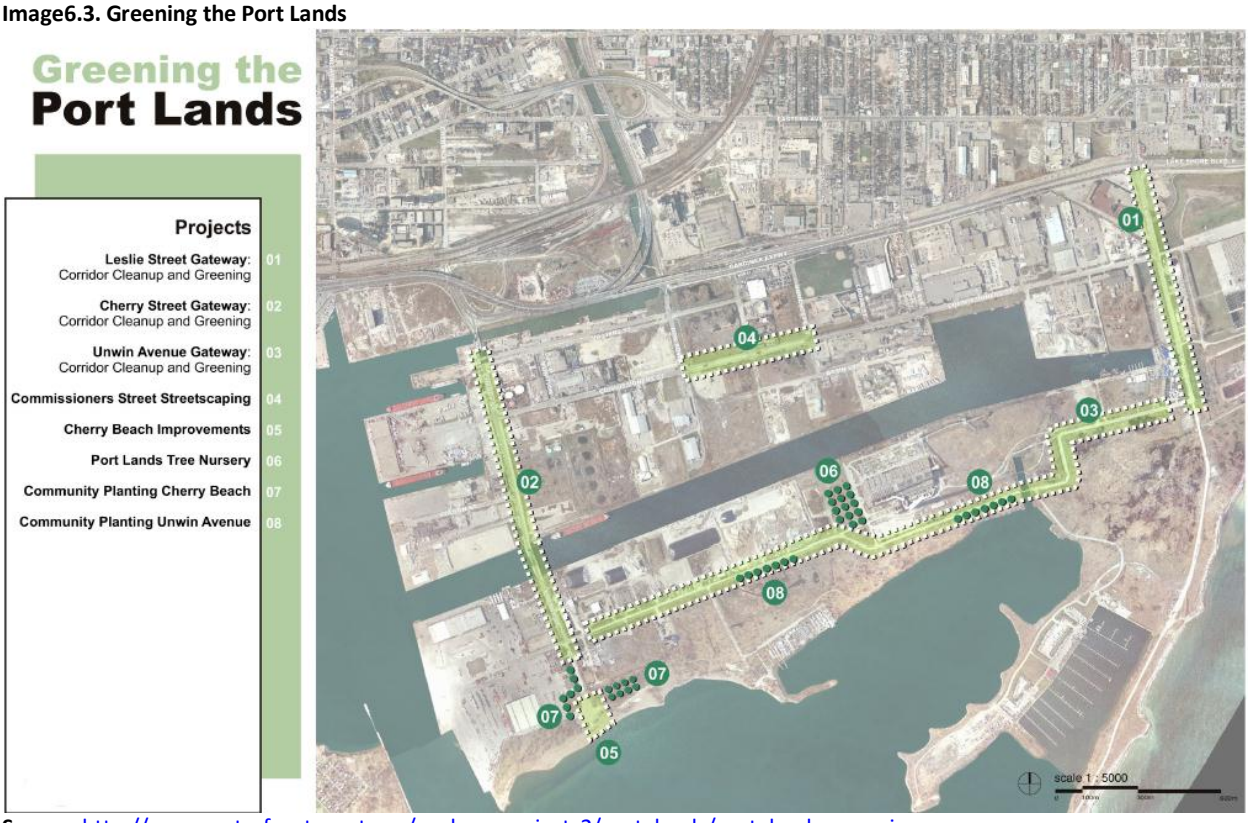
In 2005, Waterfront Toronto in concert with the Federal, Provincial and Municipal governments, publicized plans to for greening the Port Lands and improving public access to the area's lakefront. This project consisted of improvements to key gateway streets such as Unwin Avenue, Leslie, Cherry and Commissioners streets, all of which are the major arterial roads that connect the city with the Port Lands and the principal paths that lead to the future Lake Ontario Park (Waterfront Toronto e., n.d.).

Economic Sustainability: The financial investment in the project totalled $10.5 million. It is expected that these types of investments in green infrastructure will eventually enhance the overall value of the area thus making it a more viable area for future financial investment (Waterfront Toronto e., n.d.).

Social Sustainability: The greening of the Port Lands has led to a more visually attractive, walkable and pedestrian/cyclist oriented street network, where the network can stand as an independent destination (Waterfront Toronto e., n.d.).

Environmental Sustainability: It is believed that these improvements will improve air quality and reduce noise from local industry. Furthermore, underutilized and derelict representing an urban blight have been demolished and potentially contaminated surface and underground storage tanks have been removed from the area. Also, a large tree planting campaign and landscaping was conducted. The improvements also include bio-swales - landscape elements designed to remove sediment and pollution from surface runoff water for the drainage of the roadway. The bio-swale is designed to maximize the time water spends in the swale, which aids the trapping of pollutants and silt. (Waterfront Toronto e., n.d.).

Image6.3. Greening the Port Lands



Source: http://www.waterfrontoronto.ca/explore_projects2/port_lands/port_lands_greening

6.5. Cherry Beach Sports Field: completed

Economic Sustainability: Instead of traditional grass, the surface of the fields is made of synthetic artificial turf. Synthetic turfs provide fields that can be used with more frequency than grass and are less prone to weather and general wear-and-tear. They are also less expensive to operate maintain since grass requires much higher level labour intensity (Waterfront Toronto b., n.d.).

Social Sustainability: One of Waterfront Toronto's objectives is to provide an abundance of additional recreational activities in the Port Lands. As a result, and to address the demand for new regulation sized playing fields, the corporation in collaboration with the City, planned to build two state-of-the-art, sports fields to help. In 2008, the Cherry Beach Sports Fields were officially opened to the public. Since the fields can be modified in size, they can accommodate a variety of r recreational

activities and sports. The project also included a new children's playground (Waterfront Toronto b., n.d.).

Environmental Sustainability: The construction of the fields involved a planting program that introduced a plant community of native species with an enhancement of the existing natural grove areas. Also, 554 trees were removed and replaced with thousands of shrubs and trees. Furthermore, approximately 30,000 cubic metres of contaminated soil was removed from the site and replaced by 100,000 cubic metres of remediated soil. Safe lighting designed to not disrupt migratory birds flying overhead were installed at the site and the synthetic turf was constructed from recycled rubber (Waterfront Toronto b., n.d.).

Image 6.4. Cherry Beach Sports Field

Source: http://www.dolturf.com/projects/cherrybeach01/projectcherrybeach01.html

6.6. Conclusion

This chapter has identified the principles of sustainability that have been incorporated into the five projects that comprise the Port Lands redevelopment. In the next chapter, a more in-depth discussion of sustainable brownfield redevelopment is offered. This will be followed by some policy recommendations. The thesis will conclude with limitations to this study and the contributions it has made as well as some suggestions for future research.

Chapter 7 Assessing the Sustainability of Case Studies

7.1. Introduction

Chapter 6 provided description of the four specific greening brownfields projects currently underway or completed in the Port Lands. This chapter aims to delve deeper and provide a more critical assessment of the sustainability of brownfield redevelopment and the greening of brownfields.

7.2. Sustainable Brownfield Redevelopment

According to Nijkamp et al. (2002), to achieve sustainable brownfield redevelopment and improve the conditions of urban decay, policy must pay attention to environmental concerns, but in most cases total regeneration for the whole city in a time span of one generation is an unrealistic goal. Redeveloping brownfields is frequently presented as having broader economic, environmental and social benefits. However, Raco & Henderson (2006) suggest that too much is expected from brownfield redevelopment projects and that wider benefits will only be gained if redevelopment schemes are incorporated within a wider and more inclusive set of policy initiatives.

Raco & Henderson (2006) contend that redevelopment needs to be conceptualized in relation to broader patterns of development. Only by adopting a coordinated approach that looks at individual brownfield sites as they relate to the entire urban region will redevelopment be successfully sustainable. In addition, Williams & Dair (2007) point out that the redevelopment process is complex and the implementation of a project requires involvement by numerous stakeholders, none of which have overall authority or power to enforce sustainability. Nijkamp et al. (2002) agree and state that redevelopments are based on conflict between various interests, including developers and community, local and regional stakeholders, and different government agencies and only through a balanced and coordinated planning process will redevelopment schemes be successful.

Both the academic literature and the professional arena have sought to establish indicators to assess the sustainability of brownfield redevelopments. These indicators primarily consist of checklists that incorporate elements of economic, social and environmental sustainability. And determining the sustainability of particular redevelopment involves applying the points on the checklist to the completed brownfield redevelopment.

A sustainable brownfield development is one that has been produced in a sustainable way and which provides a physical environment that enables end users to undertake their activities more sustainably (Williams and & Dair, 2007 a). Dixon (2006) maintains that sustainable brownfield regeneration involves the rehabilitation and return to productive use of brownfields in such a way as to guarantee the achievement of human needs for present and future generations in environmentally sensitive, economically viable, and socially acceptable ways (Dixon, 2006). Furthermore, sustainable outcomes refer to both the process, meaning the planning and construction phase, and the end product (Williams and Dair, 2007 a). The aforementioned principles seem simple enough yet without proper indicators to measure the outcomes and their sustainability, evaluating sustainability will be impossible. Dixon (2006) claims that there is a lack of clarity in the definition of sustainable development and the need to develop indicators to assess and measure the sustainability of brownfield redevelopment projects is paramount to successful outcomes (Dixon, 2006). As a result of this obscurity in the definitions and interpretations of sustainable brownfield redevelopment, translating policy objectives into practice at a site level can be difficult (Dixon, 2006).

In response to this obscurity and through a series of studies, authors have attempted to establish frameworks to evaluate the sustainability of brownfield redevelopments (See Dair and Williams 2004; Williams and Dair, 2007 a; and Williams and Dair, 2007 b). Williams & Dair (2007 a) outline that for a brownfield redevelopment project to considered be sustainable, it must enable businesses to be competitive, support local economic diversity and provide employment opportunities,

it must adhere to ethical standards during the development process, provide adequate local services, provide housing to meet local needs, integrate the development within the locality, provide high quality, liveable developments and conserve local culture and heritage, minimise the use of resources, minimise pollution and protect biodiversity and the natural environment (Williams & Dair, 2007 a). To further assure the sustainability of brownfield redevelopment, the provision of adequate local services and facilities, including open space, shops, schools and healthcare facilities, as well as integrating the development within the locality, in terms of transport and related infrastructure is necessary. Finally, providing high quality liveable developments that promote liveability and community participation, and conserve local culture and heritage are also important (Williams & Dair, 2007 a). These are presented in tables 7.1., 7.2. and 7.3. The list is comprehensive and quite detailed; however employing these indicators to a particular redevelopment requires a deep and meticulous knowledge of the redevelopment process. Furthermore, most of the indicators are not applicable to cases presented in this study as they primarily consist of green space and parklands. 25 of the 46 indicators were not applicable to the cases because they were only pertinent to redevelopment buildings: Of the 15 economic indicators, only 3 were applicable; 8 of the 17 social indicators were applicable; and 10 of the 14 environmental indicators were applicable to the cases.

Table 7.1: Economic Sustainability Indicators

Economic Sustainability Objective 1. To enable businesses to be efficient and competitive				
	Lake Ontario Park	Tommy Thompson Park	Greening the Port Lands	Cherry Beach Sports field
Reduce energy consumption in construction	Not applicable	Not applicable	Not applicable	Not applicable
Reduce waste in construction e.g. recycling of materials	✓	✓	✓	✓
Provide infrastructure and buildings that enable businesses to keep energy and water consumption to a minimum.	Not applicable	Not applicable	Not applicable	Not applicable
Provide developments with renewable energy power sources.	Not applicable	Not applicable	Not applicable	Not applicable
Provide high quality urban design, including secure premises.	✓	✓	✓	✓
Provide high quality buildings that are flexible and can be adapted	Not	Not	Not	Not

with minimum costs.	applicable	applicable	applicable	applicable
Provide transport infrastructure to meet business needs	Not applicable	Not applicable	Not applicable	Not applicable
Economic Sustainability Objective 2. To support local economic diversity				
Provide higher densities to enhance commercial viability	Not applicable	Not applicable	Not applicable	Not applicable
Provide a mix of uses to increase viability and vitality of commercial areas	Not applicable	Not applicable	Not applicable	Not applicable
Enable a supply of properly serviced land and business premises.	Not applicable	Not applicable	Not applicable	Not applicable
Use locally produced goods and materials in construction.	✓	✓	✓	✓
Economic Sustainability Objective 3. To provide employment opportunities				
Provide a mix of uses to give choice of employment.	Not applicable	Not applicable	Not applicable	Not applicable
Develop high quality buildings for manufacturing and commercial activities	Not applicable	Not applicable	Not applicable	Not applicable
Provide a mix of uses to give choice of employment.	Not applicable	Not applicable	Not applicable	Not applicable
Increase the recruitment of local unemployed people.	Not applicable	Not applicable	Not applicable	Not applicable

Source: Williams & Dair (2007).

Table 7.2: Social Sustainability Indicators

Social Sustainability Objective 1. To adhere to ethical standards during the development process				
	Lake Ontario Park	Tommy Thompson Park	Greening the Port Lands	Cherry Beach Sports Field
Ensure ethical trading throughout the supply chain of a development.	✓	✓	✓	✓
Provide a safe and healthy work environment.	✓	✓	✓	✓
Comply with labour conventions e.g. non-discrimination at work and reasonable hours.	✓	✓	✓	✓
Social Sustainability Objective 2. To provide adequate local services and facilities to serve the development				
Provide space for training.	Not applicable	Not applicable	Not applicable	Not applicable
Provide open space for community benefit.	✓	✓	✓	✓
Develop good quality energy efficient buildings for community activities.	Not applicable	Not applicable	Not applicable	Not applicable
Offer a mix of retail spaces.	Not applicable	Not applicable	Not applicable	Not applicable
Social Sustainability Objective 3. To provide housing to meet local needs				
Develop a mix of housing tenure and type.	Not	Not	Not	Not

	applicable	applicable	applicable	applicable
Provide affordable housing	Not applicable	Not applicable	Not applicable	Not applicable
Provide high quality and flexible buildings that minimise the use of resources.	Not applicable	Not applicable	Not applicable	Not applicable
Social Sustainability Objective 4. To integrate the development within the locality				
Provide secure dwellings with the layout of buildings and spaces arranged to deter crime	Not applicable	Not applicable	Not applicable	Not applicable
Provide multiple links to adjacent neighbourhoods.	✓	✓	✓	✓
Reject or discourage gated developments.	✓	✓	✓	✓
Create a mix of transport provision with a variety of modal links to services, work, leisure and homes.	Not applicable	Not applicable	Not applicable	Not applicable
Provide good access for people with disabilities.	✓	✓	✓	✓
Social Sustainability Objective 5. To conserve local culture and heritage if appropriate				
Reuse locally-valued buildings	Not applicable	Not applicable	Not applicable	Not applicable
Design developments to reflect local heritage	✓	✓	✓	

Source: Williams & Dair (2007).

Table 7.3: Environmental Sustainability Indicators:

Environmental Sustainability Objective 1. To minimise the use of resources				
	Lake Ontario Park	Tommy Thompson Park	Greening the Port Lands	Cherry Beach Sports Field
Use renewable materials	✓	✓	✓	✓
Use recycled materials	✓	✓	✓	✓
Use renewable energy sources	Not applicable	Not applicable	Not applicable	Not applicable
Design developments for minimum waste	✓	✓	✓	✓
Use materials with low energy inputs.	Not applicable	Not applicable	Not applicable	Not applicable
Environmental Sustainability Objective 2. To minimize pollution				
Remediate contaminated land.	✓	✓	✓	✓
Reduce air pollution including dust during construction.	✓	✓	✓	✓
Mitigate noise pollution both during and after construction.	✓	✓	✓	✓
Provide infrastructure for public transport, walking, cycling.	✓	✓	✓	✓
Raise densities on sites.	Not applicable	Not applicable	Not applicable	Not applicable

Design buildings for minimum energy consumption in use.	Not applicable	Not applicable	Not applicable	Not applicable
Environmental Sustainability Objective 3. To protect biodiversity and the natural environment				
Conserve flora, wildlife and habitats on site.	✓	✓	✓	✓
Provide wildlife refuges, such as ponds and wild areas.	✓	✓	✓	✓
Use sustainable urban drainage systems to protect rivers and water courses from pollution and flooding	✓	✓	✓	✓

7.3. Economic Sustainability of Greening Brownfields

Indeed brownfield redevelopments provide opportunities to generate economic growth in numerous ways. A building put back into a city's building stock will generate revenues through rent and will increase a city's tax base. Furthermore, the act of redevelopment, remediation and construction will generate employment. Yet the whether or not the moneys generated by these activities will cover the cost of remediation remain uncertain. Perhaps in the short term they do not but given enough time they may. However, this is assuming the site stays in productive use throughout the long term. That said, the longer a building stands the more maintenance and upkeep it will require. This line of thinking brings into question the notion of brownfields being financially sustainable. Furthermore, economic sustainability of brownfield sites that involve buildings is entirely different than the economic sustainability of redeveloping brownfields into green space. The primary difference is most green space projects are designed to serve the general public and thus do not generate private revenue. Funding for the greening of brownfields remains a major threat to economic sustainability of these types of projects. Consequently, the public sector typically assumes the majority of the costs involved (De Sousa, 2003). This was certainly the case in all the projects presented in Chapter 6. With the exception of Lake Ontario Park which is expected to generate some revenue from onsite concessions and user fees. Because these sites do not generate revenues, funding for all stages of the redevelopment process, well as for long-

term maintenance of the green spaces, must be actively, continually and aggressively pursued from both the private and public sectors (De Sousa, 2006).

Nonetheless, greening projects do have positive financial outcomes. It is generally accepted that the provision of parkland enhances a city's quality of life, create a sense of place and provide opportunities for ecotourism and recreation (Ghent, 2012 and De Sousa, 2006). Cities with a high quality of life spur additional economic activity to an area through investments and expenditures (De Sousa, 2006). The extent and type of investment are varied in both; for example investment can come in the form of residential and commercial development, infrastructural upgrades or from the daily expenditures of people visiting the parks. Determining if the cases presented in this study have spurred additional investments is problematic. Tommy Thompson Park and Lake Ontario Park are ongoing large scale projects that will likely take up to 20 years for completion. Furthermore, Waterfront Toronto estimates that the Port Lands will absorb up 8,000 residential units, up to 4 million square feet of office space and 400,000 square feet of retail space over the next 20 years (Williams and Kusterin, 2012). However it is unlikely that this is a result of the greening projects. De Sousa (2003; 2004; 2006) found that once redeveloped the value of adjacent properties went up over time as a result of greening endeavours. However, this cannot be tested again this is difficult to determine from the parks but certainly the Cherry Beach Sports Field and Greening of the Port Lands projects could be tested.

7.4. Social Sustainability of Greening Brownfields

Brownfield redevelopments can be said to contribute to social sustainability if they provide or promote public health, shelter, educational opportunities, mobility and equality. Greening brownfields creates a number of social benefits that include the provision of recreational places, the connection of green space to the city; the creation of new trails; access to water (De Sousa, 2006). All of the projects discussed in this project were specifically initiated to create those social benefits. For example, the

Greening of the Port Lands project was initiated to precisely beautify the area and improve public access to the waterfront. Ecological and educational research stations will be located in both Lake Ontario Park and Tommy Thompson Park.

In addition a greening of a brownfield can be considered an exercise in social sustainability if the redevelopment process or final project generated social capital. Social capital is produced when social relations enable collaborative action. Social capital is derived from the collective experiences and behaviour of individuals and is developed when people come together to collectively achieve social benefits (Johnston et al, 2000). Stakeholder interaction and capacity building are considered critical to the process of building social capital (De Sousa, 2003 and 2006). Table 7.4. outlines the numerous stakeholders that were involved in the planning, development and construction of the greening projects. The literature has shown that the success of any brownfield redevelopment hinges upon the reconciliation of sometimes conflicting and collaborative interests (Nijkamp, 2002; Dair & Williams, 2006; Williams & Dair, 2007 a; Williams & Dair, 2007 b; and De Sousa, 2003; 2004; and 2006).
The planning and implementation processes utilized for greening projects are complex and require the interaction of various levels of government, private-sector participants, non-governmental organizations and community-based groups (De Sousa, 2004). While the involvement of stakeholders has to potential to generate social capital it also has the ability impede successful redevelopments since it requires a level of consensus among the various, and often adversarial, stakeholders (De Sousa, 2004).

Table 7.4. Port Lands Redevelopment Stakeholders

Stakeholder Groups	**Type of Stakeholder within each group**
Stakeholders involved in land-use planning and regulation	
Group 1: Planning & Regulation	• Ministry of the Environment • Waterfront Toronto • City of Toronto Planning Department • Toronto Port Authority • Toronto and Region Conservation (TRCA) • Toronto Waterfront Secretariat • Toronto Parks, Forestry and Recreation • Toronto Water • TORONTO WARD COUNCILLORS • Sandra Bussin

	• Paula Fletcher • Toronto Transit Commission • Toronto Heritage Preservation Services
Group 2: Non-statutory consultants and interest groups	• Ashbridge's Bay Sewage Treatment Plant Neighbourhood Liaison Committee • Aquatic Park Sailing Club • Friends of the Spit • Public member / Local Resident • Toronto Entomology Association • Toronto Field Naturalists • Toronto Ornithological Club • Tommy Thompson Park Advisory Committee • Lake Ontario Park Executive Steering Committee • Lake Ontario Park Steering Committee • Lake Ontario Park Stakeholder Advisory Committee • West Don Lands Committee • Beaches Lions Club • Toronto Cycling Committee • Portlands Action Committee • Ashbridge's Bay Yacht Club • Margaret Kelch Toronto Ornithological Club • Cathryn MacFarlane Aquatic Park Sailing Club • R.C. Harris Filtration Plant Public Advisory Committee • Toronto Field Naturalists • Navy League • ABTP Neighbourhood Committee • Outer Harbour Sailing Federation (OHSF) • Balmy Beach Canoe Club (BBCC) • South Riverdale Health Centre • Council of Commodores • Toronto Hydroplane & Sailing Club
Stakeholders involved in development and construction	
Group 3. Property developers and Land Owners	• Coffey Geotechnics • City of Toronto • Province of Ontario • Government of Canada • Toronto Port Lands Company (TPLC) • Tetra Tech/Stuyvesant Environmental Contracting • Toronto Port Lands Company • BUILD (successor to TEDCO) • Canada Post • TTC • Canadian Tire • Dufferin Materials • Showline • Buchman Lumber • Parliament Building Supplies • Houndsmoor Investments • Boralex Inc. • Cascades Boxboard Inc. • Addison Automotive Inc. • Grayhound Canada • Chai Kosher Poultry • Jennifer Developments

	• Cooper Iron and Metal • Aquatech Blue • Quantex Technologies • Lafarge Canada • The Docks
Group 4. Professional advisors	• Field Operations· landscape architecture . urban design and • schollen & company · landscape architecture with • Kidd Consulting · public engagement • North-South Environmental • Hamilton, Rabinovitz & Alschuler · economic strategy • CCL/IBI · civil and marine engineering • Poulos & Chung-transportation engineering • Archaeological Services- archaeological assessment • Unterman McPhail Associates-built and natural heritage • Waterfront Design Review Panel
Stakeholders involved in end use	
Group 5. End users	• General Public • Local residents

Source: Williams & Dair (2007).

7.5. Environmental Sustainability

Perhaps the easiest pillar of sustainability to define and outline in a brownfield redevelopment is environmental. The act of environmental cleanup, remediation and decontamination create a healthier environment. Brownfield redevelopment ventures present opportunities for the attainment of environmental sustainability throughout the life cycle of a development. There are environmentally sustainable methods of land remediation, construction, planning and design. Environmental sustainability requires the prudent use of natural resources and the protection of ecosystems and biodiversity. That said, there are other ways that brownfield redevelopment, and more specifically, greening brownfields, can contribute towards environmental sustainability. Turning brownfields into green space creates, restores and preserves ecological habitats, enhances biodiversity, and re-introduces and regenerates plants and trees (De Sousa, 2004; 2006). This was particularly so in all the projects discussed outlined in this study.

7.6. Conclusion

This study has shown how brownfield redevelopment and more specifically, turning brownfields into green space represent an application of all three pillars of sustainability. However, the true extent of how this type of redevelopment represents an application of sustainable development cannot be truly measured or quantified. This is due to the fact that a truly comprehensive set of indicators to evaluate the sustainability of brownfield redevelopment does not exist. Moreover, a set of indicators to evaluate the sustainability of turning brownfields into green space also does not exist. In any case, Standardized frameworks are problematic since most brownfield redevelopments are unique and scale and scope of each development range from massive sites such as the entire Port Lands to smaller sites such as the Cherry Beach Sports field. The relative impacts each redevelopment on sustainability cannot be compared due to the differing scales of the projects.

This research examined Toronto's experience with turning brownfields into green space. Furthermore, it has linked the greening of brownfields with economic, social and environmental sustainability. Research on the Canadian experience with brownfields is rather limited. This study adds to the growing body of work detailing the Canadian experience with brownfields. More specifically, it contributes to a large body of work that seeks to assess and evaluate the role of sustainability in brownfield redevelopment.

That being said, there are some limitations to this study that should be addressed. The main limitation was that this study relied on secondary sources and previously written literature. No primary data sources were utilized. Therefore, this paper represents what can be considered a comprehensive review of brownfield redevelopment and sustainability.

In spite of the contributions of this study, the results indicate that there are many opportunities for future research in the field of brownfield redevelopment in Toronto. More information is required in order to ascertain the impacts that such greening projects have on economic, social and environmental

sustainability. To this end, effective monitoring systems, benchmarks, and indicators need to be development to evaluate the sustainability of these projects over the long term.

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