

**Exploring the Potential Application of
Brownfield Redevelopment in Dalian, China,
Based on Municipal Experiences in Ontario,
Canada**

by

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Abstract

This study explores the potential of applying Canadian experiences of brownfield redevelopment to Chinese practices by investigating three cases: City of Kitchener, City of Hamilton and City of Dalian. Data collection methods in this research contain interviews, on-site observations and document collection and review.

Both Kitchener and Hamilton have achieved considerable success in redeveloping brownfields largely due to government's persistent commitment, various financial incentives through CIP, effective marketing efforts, and good public-private partnerships. These factors are regarded as successful municipal experiences based on the assumption that all municipal programs/approaches should be considered "successful" if the redevelopment occurs as opposed to the no-action alternative.

Brownfields in Dalian are being formed, purchased and redeveloped in a different way from their Canadian counterparts. Dalian confronts different challenges such as high environmental risks and lacking detailed historic site information and community support. After comparing Canadian and Chinese practices, the study concludes that the successful municipal experiences of Kitchener and Hamilton are meaningful references to Dalian's practice. Especially, public-private partnerships, marketing of brownfield programs and brownfield coordinators can help Dalian to create community support, improve the regulatory environment, and reshape the City's public image. The SSRA approach used in Canada to develop appropriate clean-up criteria for a brownfield site may also be a useful technique for Dalian. Nevertheless, upper levels of Chinese government must take hard efforts in rule-making, regulating and planning in order to maintain economic growth while at the same time ensuring public safety/health in brownfield redevelopment. In addition, the researcher raises several constructive suggestions to China's brownfield practice based on key findings from the field research.

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Chapter 1: Introduction

1.1 Introduction

Rambling around major cities in Canada, have you ever noticed some desolated murky grey buildings, which stand out offensively from elegant neighbors? The buildings have once experienced the gorgeous past of the industrialization in Canada now are abandoned and idled. They are so-called brownfields, the eyesores of cities and in some of the worst cases are also considered as a “cancer” (Greenberg, et al, 1998). Brownfields are abandoned industrial and commercial properties, “the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant” (US EPA, 2002). In the past, residents tended to keep away from brownfields, fearing of their spectre of potentially “cancer-causing toxins” or “heavy-metal time bombs” (Wright, 1997). Investors were reluctant to redevelop brownfields, because of the associated uncertainty and risks of environmental liability, up-front cleanup cost, dim market prospects, community opposition, etc. However, in recent years things have begun to change. Brownfield redevelopment is now hotter than ever, and one of the main reasons is that such redevelopments are considered to be able to clean up blight, increase the tax base, create new jobs, and help curbing sprawl (De Sousa, 2000; NRTEE, 2003). To certain extent, all three government levels in Canada have carried out some types of brownfield incentives/programs to encourage and facilitate the process.

Unlike Canada, brownfield redevelopment in China is a relatively new issue. It was not until late 1980s and early 1990s, ten years after the Reform and Opening-Up policy was adopted that a number of brownfield sites began to emerge in Chinese cities (Zhou and Wang, 2004). To a large extent, brownfields resulted from the process of rapid industrialization and urbanization. The unprecedented economic growth and industrial restructuring have produced many brownfield sites in urban areas (Cao and Guan, 2007). Remnants of abandoned or closed factories, which were the casualties of urban restructuring, were eyesores and would usually be rapidly torn down, redeveloped and converted into other uses (Zhu, 2003; Wu, 1997). This type of redevelopment must likely

tend to encounter some problems and challenges, yet little discussion has been provided in academic literature. In October, 2003, the central government put forward the scientific concept of development as a national development principle in the Third Plenary Session of the 16th CPC National Congress. This concept of development focuses on human-oriented, overall, coordinated and sustainable development, not just economic development. Guided by this concept, the issue of how to maintain economic growth while at the same time ensuring public safety/health in brownfield redevelopment becomes significant in China. This is especially the case in the City of Dalian which aims to be designated as an eco-city and pursues sustainable development. In-depth investigation in terms of how brownfield sites are being redeveloped in current China and the identification of associated challenges become very necessary. The successful brownfield redevelopment experiences learned from developed countries will be very meaningful for China's practice.

1.2 Research Purpose and Objectives

The purpose of the proposed research is to explore the potential application of brownfield redevelopment in Dalian, China, based on municipal experiences in Ontario, Canada. More specifically, this thesis explores how brownfield redevelopment can be improved in the City of Dalian, China, with a particular focus on the application of the successful Canadian brownfield redevelopment experiences as learned from the case studies of Kitchener and Hamilton. The following research objectives have been established:

- To develop a comprehensive understanding of brownfield redevelopment in Canada: challenges and corresponding government policies;
- To develop a comprehensive understanding of brownfield redevelopment in selected municipalities in Ontario --Hamilton and Kitchener, with respect to formation, current situation, challenges, municipal policies and results; in order to summarize “successful” municipal experiences;

- To develop a comprehensive understanding of brownfield redevelopment in Dalian, China: formation, current situation, challenges and corresponding policies;
- To analyze the potential of applying Canadian brownfield redevelopment experiences to the City of Dalian, China.

Underlying the purpose and research objectives of this research, the following research questions will be investigated:

1. What is the current status of brownfield redevelopment in Canada? To what extent are brownfields being redeveloped in Canada? What have been the major barriers to brownfield redevelopment in Canada? What measures have Canadian governments carried out to overcome the barriers in recent years?
2. What is the current status of brownfield redevelopment in the selected municipalities? What are the challenges of brownfield redevelopment in two cities? What approaches have the municipalities adopted to promote brownfield redevelopment? Are these approaches effective? What are the successful experiences in those municipalities that may be used to assist brownfield redevelopment in Dalian?
3. What is the current status of brownfield redevelopment in Dalian? How are brownfields being purchased, sold and redeveloped? What are the problems and challenges of brownfield redevelopment? How has Dalian municipality responded to the challenges?
4. What are the similarities and differences in brownfield redevelopment between two Canadian cities and Dalian? What are the factors leading to those differences?
5. Is it possible to apply the “successful” brownfield redevelopment approaches in Canada to the municipality of Dalian? Do they make sense according to government officials, planners and other stakeholders in Dalian? What are the practical applications of Canadian experiences to Dalian’s practice?

By addressing these research questions, this research is intended to introduce successful Canadian experiences to improve the brownfield redevelopment in Dalian, China. The research is also intended, by extension, to fill a gap in the academic literature on the topic of brownfields in developing countries, especially in a socialist country like China.

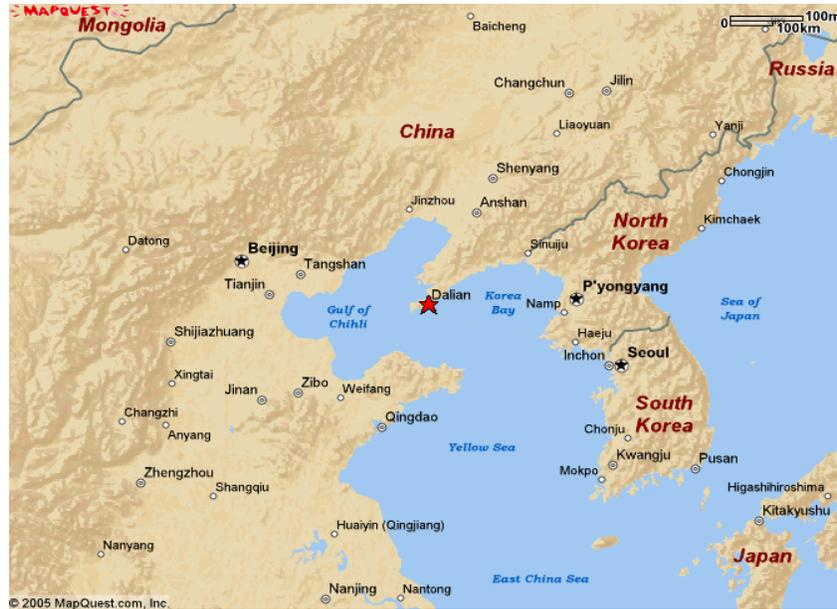
1.3 Research Site Introduction: the City of Dalian, China

The City of Dalian is located on the east coast of Eurasia and the southern tip of Liaoning Province in northeast China, with the Yellow Sea on the east, Bohai Sea on the west, facing the Shandong peninsular across the sea on the south and backed up by the vast Northeast Plain on the north (See Figure 1.1). Dalian covers an area of 12574 square kilometers, consisting of 6 districts (Zhongshan, Xigang, Shahekou, Ganjingzi, Jinzhou and Lüshunkou), three surrounding smaller municipalities (Wa Fangdian City, Pu Landian City and Zhuanghe City) and one county (Changhai County) (See Figure 1.2). The central city of Dalian is made up of 4 districts, namely Zhongshan, Xigang, Shahekou and Ganjingzi (See Figure 1.3). The City of Dalian has a distinctive topology, with its important harbour on Yellow Sea and the Qianshan Mountain range of Chang Baishan Mountain system passing through the whole city from north to south. Dalian, as one of heavy industry cities, is port, trade and tourism base in China. It is one of the most open to outside world, the most vigor and the most developed city in northern part of China (Yu Di, 2003).

According to the Dalian Statistics Yearbook 2006, the City of Dalian has a population of 5.721 million. The GDP of 2006 was 256.97 billion Yuan, 16.5% higher than that of previous year (Dalian Statistics Bureau, 2006). Industry (both manufacturing and service sectors) is a major part of Dalian's economy. In 2006, the secondary industry (including mining, manufacturing and construction) accounted for 47.8% of Dalian's economy, while the tertiary industry (including transport, high-tech industry, insurance & banking, wholesales & retails, real estates and other service sectors) contributed 44.1% of Dalian's economy (Dalian Statistical Bureau, 2006). The total amount of investment in relate to

environment protection is 0.52 billion Yuan, accounting for 3% of the government's total investment in 2006 (Dalian Statistical Bureau, 2006).

Figure 1.1: Location of the City of Dalian, China



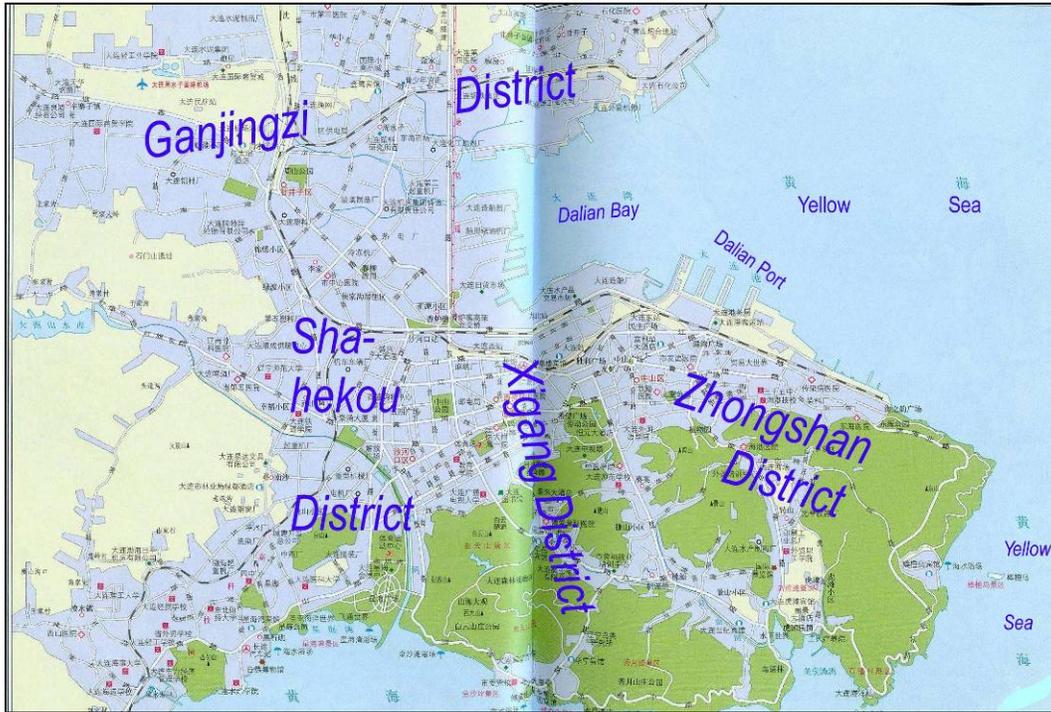
Source: <http://www.mapquest.com/>, 2006

Figure 1.2: Administrative Division of Dalian



Source: http://www.dl.gov.cn/gov/dlgk/dlgk_xzqh.vm, the official website of the City of Dalian, 2006

Figure 1.3: The Central City of Dalian



Source: http://www.io.dalian.gov.cn/intro/7674_10508.htm, Information Office of City of Dalian

1.4 Thesis Organization

This thesis is comprised of six chapters. Chapter 2 provides a literature review on brownfield redevelopment in both Canada and China, and emphasizes the gap of brownfield experiences in developing countries in current academic literature. Chapter 3 describes the research methodology used to accomplish the research purpose and objectives. Chapter 4 reports the research findings in the case studies of Kitchener and Hamilton and summarizes the successful experiences learned from them. Chapter 5 reports findings from the fieldwork conducted in the City of Dalian, China. Finally, Chapter 6 provides a comparative analysis of the case study both in Canada and China; and finally concludes the key research findings and presents future study directions.

Chapter 2: Literature Review

2.1 Introduction

Brownfields are real properties, “the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of hazardous substances, or contaminants” (US EPA, 2002). Brownfields are typically located in urban areas many of which have easy access to transportation facilities and are fully serviced with municipal utilities. It has been widely accepted that brownfield redevelopment helps build sustainable communities by providing a wide range of environmental, social and economic benefits, including cleaning up blight, enhancing environmental quality (land, air, water), curbing sprawl, renewing urban core, and increasing economically viable business opportunities etc (NRTEE, 2003; Abdel-Aziz et al, 2004; Boles, 2003; De Sousa, 2000). However, a large number of brownfields still exist and remain underused without any strong possibility of being redeveloped. Most urban areas face a combination of difficulties in redeveloping brownfields. Investors prefer to develop a greenfield site rather than a brownfield site because of the cost and risk involved. As a result, many municipalities in Canada have enacted some form of brownfield redevelopment approaches, usually an incentive program that encourages the cleanup and redevelopments.

This chapter reviews the literature related to brownfields and their redevelopment, from the definition, the causes and extent of the problems, to the challenges of the redevelopment process, to the government actions underway and the recent academic progress within the past five years. Although brownfield redevelopment is quite a new issue in China and little research has been done on Chinese brownfield sites, this chapter will also review Chinese literature in order to establish a solid theoretical foundation for this thesis research on brownfields in the City of Dalian, China.

2.2 Definition and Formation of Brownfields

2.2.1 Definition of Brownfields

The term “brownfields” was first used in 1992 when a congressional field hearing was hosted by the Northeast Midwest Congressional Coalition in the U.S (Wikipedia, 2006). The recognition of brownfields is relatively new, and experts still can not agree on what a brownfield site is. There are many definitions, while the most widely quoted one is coined by the US Environmental Protection Agency (US EPA) in 1997 as “abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination” (De Sousa, 2003; Alker et al, 2000; Boles, 2003). However, US EPA has revised this definition into “...real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant” in the *Small Business Liability Relief and Brownfields Revitalization Act* in 2002 (US EPA, 2002), because EPA considers that a brownfield should comprise all "real property", including residential property, as well as commercial and industrial properties.

In Canada, the definition adopted by the National Round Table on the Environment and the Economy (NRTEE) is described as “an abandoned, vacant, derelict or underutilized commercial or industrial property where past actions have resulted in actual or perceived contamination and where there is an active potential for redevelopment” (NRTEE, 2003, p A-3). It should be noted that the term of “brownfields” is usually used in Canada and the United States, while other terms such as *derelict land* (used in the United Kingdom) and *former industrial sites* (used in many parts of Europe) have also been used alternatively to define abandoned or underused former industrial sites suspected of being contaminated (Alker et al, 2000).

In China, the term of “brownfields” is neither usually used in the Chinese academic literature nor in government documentation. Although there is a term called *Deserted Land* according to the *Classification of Urban Land Use and Standards of Land Use Planning and Construction Land* (Ministry of Construction P.R. China, 1991), it is not

defined as derelict former industrial or commercial land but “the land which is undeveloped and can not be developed because of various reasons, including bare rocks, gravel land, steep slope land, subsided land, Salinas, sandy land, wetland etc.” As a matter of fact, alternative terms like *old industrial sites* and *contaminated land* are widely used to define former industrial, commercial or residential land, which is considered or suspected contaminated by its past use (Wu, 1997; Zhang et al, 2003; Zhu, 2003; Fu and Jiang, 2005; Zhao and Yang, 2006). However, the usage of these terms is seldom linked to the characteristics of “vacant” or “derelict”. Former old industrial sites usually would be rapidly torn down, redeveloped and converted into other uses once they were vacant (Zhu, 2003; Wu, 1997).

Because our research is based on both Canadian and Chinese experiences, a broader concept of “brownfields” is needed to cover the context in which it is used in both countries, regardless of the physical and site condition differences. “A conceptual definition of brownfields must remain true to the key concerns of the environmental and economic development that gave rise to the term” (Yount, 2003, p32). It may be any property with actual or perceived contamination, no matter whether it is previous industrial, commercial or residential land. It may also be vacant, derelict, or contaminated. Therefore, the definition of “brownfields” coined by the US EPA in 2002 is adopted in this thesis to extend the lens of the research.

Brownfield redevelopment can be better understood if compared with other related terms such as *greenfield* and *contaminated sites*.

Brownfield and Greenfield

“Greenfield” is “a vacant property with no actual or perceived contamination, usually located outside urban centres and without municipal services” (NRTEE, 2003, p A-3). It is used to describe the clean and undeveloped land often on the urban periphery, including agricultural fields, woodlands, metropolitan parks, greenways, ecological corridors, etc (Great Lakes Commission, 2008; De Sousa, 2002; Alker et al, 2000). “Brownfield”, which is a semantic counterpart to “greenfield”, has usually been adopted

to describe lands on which industrial or commercial activities took place in the past. According to MMAH (2000a, p2), a brownfield site

- may include buildings or may be vacant;
- may be underused or abandoned;
- are often located in prime locations where infrastructure, services and facilities already exist.

Brownfields and Contaminated Sites

The Canadian federal government defines a contaminated site as “one at which substances occur at concentrations (1) above background (normally occurring) levels and pose or are likely to pose an immediate or long term hazard to human health or the environment, or (2) exceeding levels specified in policies and regulations” (Government of Canada, 2000). A brownfield site includes not only real contaminated sites but also those perceived of being contaminated due to previous land-use activities such as waste disposal, manufacturing and petroleum-based activities (De Sousa, 2002). In other words, not all brownfields are actually contaminated. Moreover, another important difference between brownfields and contaminated sites is that the former holds excellent potential for being remediated and reused (NRTEE, 2003).

2.2.2 Where Brownfields are Found

Brownfields are found in former industrial, commercial and residential lots that contain functionally obsolete, underused, or abandoned buildings, either in urban areas or in rural communities (Simons, 1998; Greenberg et al, 2001). Usually, a brownfield site is found in established urban areas, which are already serviced with water, sewers, and roads. They are close to transportation facilities and urban amenities (Boles, 2003). They include decommissioned refineries, railway yards, old industrial waterfronts and riverbanks, crumbling warehouses, former retail gas stations, etc (NRTEE, 1998; MMAH, 2000a; Boles, 2003). In small and rural communities, brownfields are also common which arise from chemical uses in agricultural activities and landfills (Boles, 2003). A

recent survey in the *Ontario Rural Brownfield Project*¹ found that 68% of respondents in rural and small urban municipalities in Ontario indicated that there were brownfield sites in their community, many of which were abandoned gasoline stations, landfill sites and former industrial sites (i.e. foundry, paper mill) (MMAH, 2006 Summer).

2.2.3 Historical Formation of Brownfields

Brownfields, as a legacy of industrialization in Canada, by and large can be traced through the lens of economic history and the evolution of industrial locations.

(1) At the Early Age of Industrialization: Industrial Concentration

After the first steam engine whistled in the mid-nineteenth century, rapid industrialization occurred in Canada. At that time industrial establishments were most often located within the core areas of cities, along a major railroads or waterways (Filion and Mock, 1991). There are two main factors attributing to this pattern of location: transportation cost and agglomeration economy (Crafts & Mulatu, 2005).

Transportation cost, including the cost of transporting raw and auxiliary materials as well as finished-products, was a prime force in the industrial location along transportation facilities. It by and large resulted from the characteristics of manufacturing in that era. On the one hand, the manufacturing process was largely dependent on the long distance transportation of heavy weight materials. Factories were powered by the consumption of fuel materials, such as coal and wood, because electricity had not been introduced at that time. Raw and auxiliary materials used by industry were either “localized materials” or “weight-losing materials” (Weber, 1971). On the other hand, the long hauls of coal or other bulk materials and commodities relied on waterwheels and steel rails, since the internal-combustion engine had not come into use and steam engines still dominated the transportation (Borchert, 1967). As a result, factories were located either close to urban markets or to centrally placed shipping nodes such as ports and railway depots, in order to minimize the transportation cost which took up a large proportion of total costs.

¹ The project was conducted by the Ontario Centre for Environmental Technology Advancement (OCETA) and Ministry of Municipal Affairs and Housing (MMAH) in 2006.

Agglomeration economy was another great concern accounting for urban industrial locations. In urban areas, factories enjoyed a wide range of external scale economies, such as the accessibility to a large labour pool, the economies of specialist suppliers, the development of technological knowledge spillover, as well as the sharing of public facilities and services (Bater and Walker, 1977).

As industrial firms centered on urban areas, commercial and residential activities boomed. Millions of people, driven by the entrepreneur values, moved into cities from countryside. Consequently, cities experienced unprecedented expansion and growth. Cities during that period “might be best described as ‘cluttered’: smoky industrial districts, unpaved roads, mean and crowded working-class housing, half-finished suburbs” (Hodge, 2003, p 43).

(2) After World War II, especially in the mid- to late- 1950s: Industrial Decentralization

Industry tended to maintain its urban location until the mid- to late-1950s. After that, industrial firms became attracted to suburban areas or moved to other countries (Filion and Mock, 1991). Two aspects mainly contributed to the change: the impact of automobile and the steady decline of the industrial sector.

Firstly, with the emergence of automobiles, the society had been changed into an auto-dependent society (Boles, 2003; Hodge, 2003). Cars and trucks sharply reduced the transportation costs over rail and water, and lessened the dependence of urban manufacturers on ready access to central rail and harbour facilities (Gorman, 2003). Goods transportation was no longer dependent on waterways and railroads, but highways and expressways (Borchert, 1967). The infrastructures necessary to support automobiles had been established in a large scale since World War II. Downtown corporate interests and power brokers like Robert Moses, lobbied heavily for the governmental programme to bring highways into the heart of cities. New expressways radiating in all direction from central core were expected to bring workers, shoppers, middle-class to downtowns, to

reduce traffic congestion on city streets and to improve speed and accessibility. However, the downtown expressways ironically turned out to be two-way streets. They allowed businesses and residents to leave the city as well. Factory employees were able to drive to work, making it possible to live in the suburbs and to realize the American/Canadian dream of “single house + car”, while keeping a distance from crowded and polluted urban cores. As a result, the advantages of locating in urban areas tended to decline. Industrial firms began to settle in suburban sites close to major highways and expressways, and kept away from residential areas (Filion and Mock, 1991).

Secondly, the steady decline of the industrial sector starting in the mid-twentieth century drove industrial firms to seek overseas markets, leaving a number of idle factories and manufacturing centers (Brachman, 2004). With the impact of rising labour costs and the shrinking domestic demand for durable consumer-goods, the national economy was increasingly driven by the service industry rather than traditional manufacturing (Filion and Mock, 1991). At that time, the labour costs in Canada became much higher than in developing countries because workers’ average annual earnings had been greatly increased. For example, the production workers’ average annual earnings grew from just \$375 in 1905 to \$2,953 only 50 years later (Meltz, 1983). More and more Canadians could afford cars, housing and clothing, etc, as the annual income was increased. People began to spend a growing proportion of dispensable income on education, tourism and health care. Thus, domestic demand for durable consumer-goods shrank.

As industries gradually and steadily migrated from urban centres to the suburbs or overseas, cities were left with vast areas of under-utilized or vacant industrial sites (Gertler, 1995). Meanwhile, many commercial businesses in center cities also suffered. Shopping malls opened in the suburbs, and households moved there to follow jobs. Consequently, a large number of commercial establishments became functionally obsolete properties and were forced to close. Houses were also abandoned by owners. Those abandoned houses were usually demolished by the fiscally stressed cities, with the debris bulldozed into the basements and filled with one or two feet of dirt. This kind of irresponsible treatment brought forth residential brownfields (Simon, 1998, p30).

2.3 Why Bother to Redevelop Brownfields?

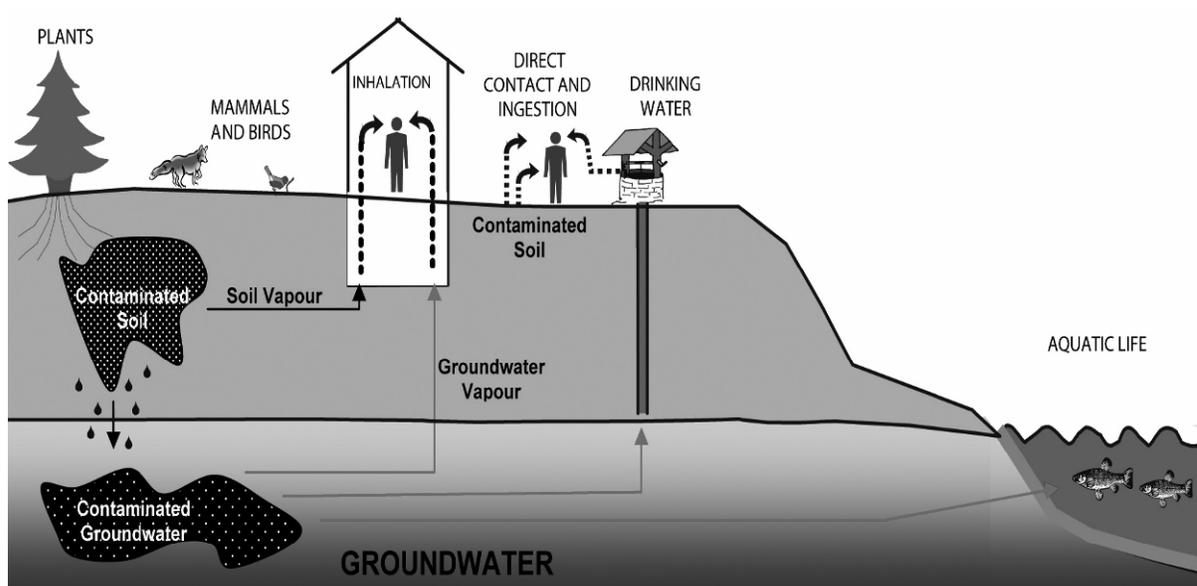
2.3.1 Risks Associated with Contaminated Brownfields

Once upon a time, brownfield sites were not a particular concern for either the public or the government. They were just derelict or shuttered old industrial sites, the eyesores of cities, waiting for new owners. It was not until 1970s when the environmental disasters such as Love Canal, Times Beach and Seveso broke out that governments finally began to be concerned about the remediation and redevelopment of contaminated brownfield sites (De Sousa, 2004; Gorman, 2003; Wright, 1997). Take the Love Canal incident for example. The Love Canal was once a canal that connected to the Niagara River five miles upstream of Niagara Falls. It had been used as a municipal and chemical dump site from 1920 until 1953. In the spring of 1978, residents discovered that the dump site containing 20,000 tons of chemical wastes was leaking into their neighbourhood. What's worse, according to a health study conducted by scientists and community members (Gibbs, 1998), 56 percent of children born between 1974 and 1978 suffered birth defects because of the hazardous-waste dump site nearby. The miscarriage rate increased 300 percent among women who had moved to Love Canal. Urinary-tract disease had also increased 300 percent, with a great number of children being affected. As a reaction to the disaster over the Love Canal in New York, the *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA), commonly known as Superfund, was enacted in the United States in 1980, which authorized US EPA to investigate all the potentially contaminated sites, allocate responsibility for cleanup of soil, surface and groundwater, and force the PRPs (Potential Responsible Parties) to pay for the remediation (US EPA, 2006).

The contaminated soil and groundwater in a brownfield can pose a wide variety of risks to the environment as well as the human being, depending on their contaminants, pathways and receptors (De Sousa, 2004). There are a number of pathways in which people, plants, wildlife and the natural environment can be exposed to a contaminant (MOE, 2007). Figure 2.1 illustrates some of the potential pathways a receptor may be exposed. Rao Kolluru identified the major types of health, environmental and public

welfare risks related to contaminated brownfields, which were categorized in Table 2.1. In 2006, Ellerbusch extended the scope of the overall brownfield-related risk, which was comprised of not only environmental/health aspects but economic, social, and political aspects (Ellerbusch, 2006). He examined the brownfield-related risks from many viewpoints: “that of property owner (loss of value); that of the purchaser (undiscovered contamination, liability for cleanup, latent health impacts); that of the lender (undisclosed liability for cleanup); that of the community (property decay, diminution of value, and redevelopment inconsistent with community wishes); that of local government officials (loss of tax revenue, potential for cleanup liability, and taxpayer reaction); and that of federal and state government officials (equity for citizens, fair assessment of liability)” (Ellerbusch, 2006, p570).

Figure 2.1: Potential Exposure Pathways



Source: MMAH, 2007b, p27.

Table 2.1: Major Types of Health, Environmental and Public Welfare Risks Associated with Contaminated Brownfields

<p>Health Risks: high probability, low consequence, ongoing, chronic effects and consequences leading to</p> <ul style="list-style-type: none"> • incremental cancer rates (all types of cancer) • non-carcinogenic hazards such as respiratory, neurological and reproductive maladies
<p>Ecological/Environmental Risks: subtle changes, complex interactions, long latency periods, and macro-impacts, effects and consequences on</p> <ul style="list-style-type: none"> • species abundance and diversity • habitat and ecosystem quality • natural resource integrity
<p>Public Welfare/Goodwill Risks: perceptions, property-value concerns and aesthetic effects leading to</p> <ul style="list-style-type: none"> • resource use restrictions (e.g., groundwater) • nuisance odors and visual degradation • decreased property values

Source: Rao Kolluru, 1995.

2.3.2 Sustainable Development Benefits of Brownfield Redevelopment

(1) Sustainable Development

Sustainable development is broadly defined in *Our Common Future* (also known as The Brundtland Report) as meeting the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). This concept became known world-wide in 1992 when the United Nations Conference on Environment and Development (UNCED) yielded one important document, *Agenda 21*. This document advocated that nations take specific actions to achieve a core goal of simultaneous consideration of social, economic, and environmental factors in decision-making (Eisen, 1999). Since then, policy makers and planners in North America and Europe have been paying significantly more attention to measures designed to foster sustainable development and improve quality of life in urban areas.

(2) Smart Growth – Rethinking Planning and Development Strategies

Guided by the concept of sustainability, communities are beginning to rethink the common planning method for accommodating growth, which is dominated by what some call “sprawl”. Sprawl is “a low density, single use, strip and leapfrog development” by consuming greenfields (Dieleman and Wegener, 2004, p316). Specifically, it is characterized by four dimensions: “a population that is widely dispersed in low density development; rigidly separated homes, shops, and workplaces; a network of roads marked by huge blocks and poor access; and a lack of well-defined, thriving activity centers, such as downtowns and town centers” (Ewing et al, 2002, p3). Such a resource-consuming growth pattern imposes communities great economic, social and environmental impacts, which include city centre decline, increased reliance on the use of the private car, loss of open space, continuing damage to the natural environment, etc (Dieleman and Wegener, 2004; Ewing et al, 2002). Spurred by such a growing concern, smart growth becomes a critical strategy related to future development in urban planning.

In contrast to sprawled development, “smart growth invests time, attention, and resources in restoring community and vitality to center cities and older suburbs” (Smart Growth Online, 2006). More specifically, the widely accepted smart growth principles are those promulgated by the smart growth network:

- create a range of housing opportunities and choices;
- create walkable neighborhoods;
- encourage community and stakeholder collaboration;
- foster distinctive, attractive places with a strong sense of place;
- make development decisions predictable, fair, and cost-effective;
- mix land uses;
- preserve open space, farmland, natural beauty, and critical environmental areas;
- provide a variety of transportation choices;
- strengthen and direct development towards existing communities; and
- take advantage of compact building design.

(Knaap & Talen, 2005, p108)

There are many development alternatives for smart growth, including brownfield redevelopment, restrictive growth policies, changing transportation patterns, promoting compact development designs on the metropolitan fringe, and so forth. However, brownfield redevelopment appears to be the smartest smart growth policy, when compared with other alternative smart growth policies in the U.S. (Greenberg et al, 2001). Brownfields and infill development are central to smart growth because “smart growth efforts in conjunction with brownfield redevelopment help form *sustainable communities*” (Dorsey, 2003, p74).

(3) Benefits of Brownfield Redevelopment: Helping Build Sustainable Communities

The benefits of brownfield redevelopment have been documented in many reports generated by a number of jurisdictions in Canada and abroad, such as the 1996 Report of the Greater Toronto Area Task Force (known as the Golden Report) and the 1998 NRTEE Report, *State of the Debate: Greening Canada’s Brownfield Sites*. In the academic literature, significant benefits of brownfield redevelopment are consistently identified under the “sustainable development and smart growth theoretical rubrics” shown by Table 2.2 (De Sousa, 2004; Hara, 2004; Boles, 2003; Dorsey, 2003).

Table 2.2: Sustainable Development Benefits from Brownfield Redevelopment

<p>Environmental Benefits</p>	<ul style="list-style-type: none"> ● Reduction of development pressure on Greenfield sites² ● Protection of public health and safety ● Protection of groundwater resources ● Protection and recycling of soil resources ● Improved air quality ● Restoration of former landscapes and creation of new ecological spaces
<p>Social Benefits</p>	<ul style="list-style-type: none"> ● Renewal of urban cores and the quality of life in them ● Elimination of negative social stigmas associated with affected communities

² “Every hectare developed in a brownfield project can save an estimated minimum of 4.5 hectares of Greenfield land from being developed in an outlying area” (NRTEE, 2003, p3)

	<ul style="list-style-type: none"> ● Reduction of the fear of ill health, environmental deterioration and shrinking property values ● Provision of public housing, parks and other public spaces
Economic Benefits	<ul style="list-style-type: none"> ● Attraction of domestic and foreign investment ● Restoration of the tax base, especially at the local level ● Increased utilization of and reinvestment in existing municipal services ● Development of remediation/decontamination technology ● Creation of new jobs or retention of existing employment rates ● Increased competitiveness for cities

Source: De Sousa, 2004, pp 2-11

2.4 Why Most Brownfields are still Brownfields?

2.4.1 Status Quo of Brownfield Redevelopment in Canada

Compared with the abundant scale of brownfield information currently available in the US and Europe, data on Canadian communities is very limited (De Sousa, 2003; Boles, 2003). Although the federal government has introduced the Federal Contaminated Sites and Solid Waste Landfills Inventory Policy in 2000 which requires custodian departments and agencies to establish and maintain a database of contaminated sites for which they are responsible, there still does not exist a formal inventory of all brownfields in Canada because they include not only contaminated sites but also those suspected of being contaminated. Those listed on the government inventory are only federally owned contaminated sites, while many private owned brownfields have not been formally recognized. Therefore it is very difficult to look at the big picture and come up with the precise number, their total acreage and the percent of urban area in brownfields.

According to a recent environmental labour market research conducted by Environmental Careers Organization (ECO) Canada, 64,046 properties were identified as potentially contaminated sites across the provinces and territories, of which nearly 40% were found

in Ontario (ECO Canada, 2007). The sources of potentially contaminated sites data come from gasoline stations, manufacturing industries, recycling industries, abandoned mines, and operating mines and quarries (ECO Canada, 2007). Generally speaking, it is usually estimated that the total number of brownfields across Canada ranges from 30,000 to 100,000 (MMAH, 2007a; NRTEE, 2003). Several thousand brownfields have already been remediated and redeveloped, while many still remain undeveloped under conventional market forces. In order to better understand the status quo of brownfield redevelopment and its challenges, the author made the following table adapted from content from the 2003 NRTEE Report (See Table 2.3).

Table 2.3: Brownfield Tiers and Corresponding Redevelopment Prospects³

	Percentage in total sites	Redevelopment Prospects	Location	Current Status
Top Tier⁴	15 to 20 percent	Very profitable, since the market values greatly exceed the costs of remediation	Urban areas	Many of them are redeveloped under market force
Middle Tier	60 to 70 percent	High clean-up cost but potential for redevelopment, since the market value of the land itself, once cleaned up, may be slightly above or slightly below the combined cost of land and cleanup	Established urban areas and along transportation corridors, where municipal services are readily available	Remain in limbo, with little prospect of remediation or reuse without strategic intervention to address the barriers
Bottom Tier	15 to 20 percent	No market interest, since the cost of cleanup far exceeds the value of the land after remediation	Rural or remote areas or in smaller urban areas	Remained abandoned or idle without any realistic prospects for redevelopment in the foreseeable future

Source: NRTEE, 2003, p5-6

³ It should be noted that the tiers represent a conceptual approach for addressing the different needs of various types of brownfields, and are not strictly separated categories with defining criteria.

⁴ The three general tiers are grouped by their prospects for redevelopment.

2.4.2 Barriers to Brownfield Redevelopment

As Table 2.3 shows, 60 to 70 percent of brownfield in Canada remains in limbo while 15 to 20 percent remains abandoned without prospective future. It reveals that brownfield redevelopment in Canada still has a long way to go. Brownfield redevelopment encountered a variety of legal, financial and community challenges, many of which are interrelated. Although each brownfield site comes up with its own specific set of challenges, the following seven barriers were commonly identified both in the academic literature as well as governmental documentation.

1. Liability of Contamination

The discovery of contamination on a brownfield was once called as “the kiss of death” for a land acquisition or development project (McGregor, 2003). Concern about legal liability for contamination is considered perhaps the greatest impediment and the source of all the roadblocks to redevelopment (Abdel-Aziz et al, 2004; Burnham-Howard, 2004; Brachman, 2004; NRTEE, 2003; McGregor, 2003; McCarthy, 2002). Because brownfields are more or less related to environmental contamination, no matter whether it has been discovered or just being suspected, redeveloping brownfields is inevitably exposed to the liability of contamination, leading to a series of questions: “Who is liable for the clean-up of a site? How should liability be imposed/assigned? Should there be protection against liability after a site has been remediated to the standards of the day (i.e. future clause/prospective liability)?” (De Sousa, 2001, p139). Those questions affect all of the interest groups, including owners of brownfields, developers, lenders, municipalities and end-users.

Abdel-Aziz and Chalifour (2004) find that four features of the liability regime in Canada have made participants engaging in brownfield redevelopment draw back. **First**, it is “no fault”. Liability may go beyond polluters. Any party involved in the redevelopment may be exposed to the liability in spite of fault, no matter whether it is a new owner or developer, **Second**, it is “joint and several”, which means that any party can be responsible for the entire site clean up, regardless of its contribution to the site’s pollution. **Third**, it is perpetual. “There is no effective time limit on liability for damages caused by,

or for regulatory obligations associated with, contamination” (Abdel-Aziz et al, 2004, p3-4). Thus a former brownfield owner may still be exposed to liability once again in the future after the property was sold. **Fourth**, it is not quantifiable, because there does not exist a certain and potentially variable standard for assessing the liability. Without a credible assessment on the site, the potential liability of contamination is uncertain and unpredictable from a business perspective. On account of these features, developers may be reluctant to redevelop brownfield sites, while lenders may be unwilling to finance redevelopment projects.

2. Marketability

The marketability of a brownfield project has always been a great concern for developers and investors. There is usually a market aversion to brownfields (Pryce, 2003). **On the one hand**, the remediation and redevelopment of brownfields can be very expensive when compared with greenfields (Simons, 1998; De Sousa, 2001). Developers will need to spend considerable time and money to assess the site and determine exactly what contaminants, if any, it may contain, and then clean it up. All of this has to happen before development begins. Sometimes, the cost of cleaning, demolishing and preparing a brownfield property for redevelopment may be higher than the value of the land itself, and the subsequent costs of converting the existing buildings to modern needs may be more than new construction. Such upfront expenses make brownfields less attractive than greenfields (NRTEE, 2003). In Brantford, for instance, a fully serviced industrial site in the City’s new industrial parks sells for \$55,000 to \$60,000 an acre, while a typical brownfield site will cost from \$150,000 to \$300,000 per acre to remediate (Brantford Brownfields Committee, 2002). **On the other hand**, the market return in the foreseeable future is uncertain, due to the lengthy predevelopment due diligence period and demand-side factors (Brachman, 2004). Consumers’ preferences to brownfield redevelopment are subject to change, yet “developers simply follow consumers’ preferences” (Pryce, 2003, p566). Taking the two aspects into consideration, developers may tend to prefer a greenfield project to a brownfield project, and they may only be willing to redevelop those sites that have the greatest prospects for profitability (what is called Top Tier in

Table 2.3), while avoiding those less feasible ones (Middle Tier sites) and those seriously contaminated ones (Bottom Tier sites) (Mak, 2000).

3. Lack of Financing

From the lenders' perspective, they are unwilling to finance brownfield redevelopment. Lenders are worried about the lack of liquidity when holding a brownfield as security, and fear the impaired collateral value of the site if it is found to be contaminated (NRTEE, 2003; McCarthy, 2002). Some lenders may also be afraid of being potentially exposed to the liability of contamination when they are vested with a brownfield property through loan default (NRTEE, 2003). In combination with joint and several liability, a lender may potentially become liable for the whole cost of a claim. Property development information asymmetries on the capital market may have also inhibited lenders. In terms of *asymmetric information* (i.e. more information available to one party than another), lenders/investors are usually less well informed than developers about the investment risks, while more risky developers tend to conceal adverse information about a potential development project (Pryce, 2003). As a result, it is found that "brownfield redevelopment is increasingly driven by the availability of development grants and subsidies" (Adams et al, 2000, p135).

4. Uncertain Clean-up Criteria

Brownfield redevelopment usually begins with an environmental assessment to identify contaminants, followed by remediation to meet the requirements of federal and provincial environment laws and regulations. Generic criteria and site-specific risk assessment (SSRA) criteria are the two types of criteria currently being used internationally for evaluating the hazards posed by contaminants and formulating clean-up goals that protect public health and safety (De Sousa, 2001). Generic criteria are namely standardized cleanup criteria developed by governments for soil and groundwater contaminants. They can be arranged into broad categories based on land-use, soil texture, depth of contaminant and groundwater use. Worst-case scenarios for each category are used in order to be protective of all receptors, making the generic criteria to be the most stringent criteria in use (Phimister, 2004). Unlike generic criteria, SSRA criteria are developed

based on the actual conditions at a site (such as the physical characteristics and the anticipated use of the land) instead of a “worst case” set of assumptions, as is the case with generic criteria.

In Canada, most provincial and municipal approval processes require brownfields to be remediated to meet a generic set of criteria (Phimister, 2004; NRTEE, 2003). However, this set of generic criteria may be too costly to be met or does not fit into the specific conditions of the site. Furthermore, each provincial government takes charge of developing their own generic criteria and SSRA approaches (De Sousa, 2001). Therefore, various levels of government in Canada may require different clean-up criteria. Some municipalities may even set up additional requirements for environmental approvals in case of their potential exposure to the legal liability (NRTEE, 2003). For instance, clean-up criteria beyond the provincial standards may be required as the condition for redevelopment grant from municipalities. Thus, potential developers may face inflexible and inconsistent requirements for assessing risks on brownfields.

5. Administrative Burden and Complexity

In Canada, participants in brownfield redevelopment encounter various regulatory requirements and legislated processes established by federal, provincial and municipal governments (NRTEE, 2003). Stakeholders may need to spend substantial time and money in complying with these regulatory requirements for rezoning, administrative reviews, approvals and entitlements of the project. Some of the regulations may still be overlapping or inconsistent to each other, although efforts have been taken out to harmonize the requirements of different levels of governments in some areas (such as environmental assessment) (NRTEE, 2003; De Sousa, 2001).

Besides, brownfield projects may be slowed down because of multiple departments and organizational layers of responsibilities and disciplines within governments (Abdel-Aziz et al, 2004; NRTEE, 2003). For instance, a brownfield project may need review and approval from five or six departments. Some of the responsibilities across departments may be overlapped. If developers go through them one by one, the development might be

prolonged and developers may even miss their best business chance at times. With the red tape and bureaucracy in the regulatory systems, brownfield redevelopment becomes complicated, uncertain and variable.

6. Lack of Information

“The lack of a systematic, nation-wide approach to collecting, storing and disseminating brownfield information in Canada” is also considered to be an obstacle (De Sousa, 2001; Mak, 2000). Information (such as the quantity, distribution, coverage of urban land, the extent/nature of contamination and other related intelligence) is of great value to both the private and public sector. For developers, sufficient brownfield information will reduce the uncertainty in the redevelopment, leading to better investment decision-making, while for governments, it helps establishing better redevelopment policies and strategies (Mak, 2000). However, existing information on brownfields in Canada is scarce. There is no national database keeping track of all the brownfields in Canada. The only nation-wide database covers federal-owned contaminated sites, excluding those privately owned.

7. Market Conditions

According to a USCM (US Conference of Mayors) survey in 2003, market conditions—including site location, site size and configuration, building characteristics, construction cost, and access to a skilled labor force—are discovered to be an important impediment (Wernstedt et al, 2004). Take brownfields located in central city for example. Although they enjoy the proximity to business downtown and to a high concentration of activity, the lack of highway or road access has made their location less attractive and ideal, because a vast majority of highways are in the suburbs (Simons, 1998). In Brantford, brownfields are less competitive than greenfields in attracting new investments. They are usually located in the old urban areas and close to or within residential neighbourhoods which lack access to the highway. This kind of location places brownfields at a disadvantage, since those new industrial parks in greenfields are very close to the Highway 403 (Brantford Brownfield Committee, 2002).

2.5 Removing Barriers to Brownfield Redevelopment

2.5.1 Public Sector Action Underway

In recent year, real progress has been made in Canada through wide-ranging efforts in overcoming the aforementioned barriers.

1. Legislative Amendments Regarding Liability of Contamination

Canadian governments (from provincial to federal level) have been very active in amending legislation to overcome some of the impediments related to the legal liability. In Quebec, legislation amendment to the *Environmental Quality Act* and other legislative provisions was passed in June 2002. These changes clarify the roles and responsibilities of different participants in brownfield projects and provide some protection from regulatory liability⁵.

In Ontario, *Brownfields Statute Law Amendment Act 2001* ("Brownfields Act") which was jointly developed by the Ministry of the Environment (MOE) and the Ministry of Municipal Affairs and Housing (MMAH) received Royal Assent in November 2001. Brownfields Act includes important legislative amendments in terms of Ontario's key environmental statutes, the *Environmental Protection Act* (the "EPA"), the *Ontario Water Resources Act* (the "OWRA"), and the *Pesticide Act* (PA) (Van Rensburg, 2001). "It clarifies the broad reach of the order provisions⁶ in the three Acts, setting out a number of actions municipalities and secured lenders may take in relation to property and providing that just by virtue of taking such action, such persons or their representatives will not be considered an occupant or in charge, management or control of property under the order provisions in the three Acts" (Flagal, 2004, p12-2). Besides, Brownfields Act attempts to resolve the perpetual environmental liability problem by establishing a statutory process to address and resolve historical site contamination issues (Flagal, 2004).

⁵ "Regulatory liability is a legal obligation laid out by a statute that creates a regulatory offence. Regulatory offences are usually considered more minor than criminal offences, since they are only intended to secure the effective regulation of conduct in the interest of the community" (NRTEE, 2003, pA-3)

⁶ Under the Environmental Protection Act, R.S.O. 1990, c.E.19, any person had ever owned, occupied or had charge, management or control of contaminated land, they potentially could be named in an order by the Director the authority.

New protection from environmental liability in the new Part XV.1 of the EPA⁷ and new cleanup standards established in the Records of Site Condition Regulation⁸ (O.Reg.153/04) were brought into force in Ontario as of October 1, 2004. Owners, occupants and others involved in a property (“charge, management or control”) receive limited protection from environmental orders that would require further cleanup of historic contaminants remaining on the site, after a record of site condition (RSC) is filed in the Brownfield Environmental Site Registry⁹ in accordance with section 168.4 in Part XV.1 of the EPA and with other things in the certified statements of the “Qualified Person” and the “Owner”. In order to receive a filed RSC, a brownfield property must have been properly assessed and shown to meet the appropriate soil, groundwater and sediment standards for the anticipated use set in the Records of Site Condition Regulation (O.Reg.153/04).

On May 17, 2007, significant brownfield legislative reforms introduced as part of the 2007 Budget Bill were passed by the Ontario legislature. The new legislation not only protects non-polluting parties from provincial cleanup orders in cases where contamination from a property has moved off-site below relevant standards after the certification date of RSC, but also protects municipalities in Ontario from civil lawsuits arising from inaccuracies in filed cleanup documentation (MMAH, 2007a). Voluntary companies interested in helping the province remediate abandoned mining sites are also protected from provincial cleanup orders provided that they are not the cause of contamination according to the new legislation.

As to the federal government, the Treasury Board issued the *Contaminated Sites Management Policy* and the *Policy accounting for Costs and Liabilities Related to Contaminated Sites* in 2002, both of which requires all federal departments and agencies (with a few exceptions) to account for and report as liabilities of federally owned contaminated sites (Abdel-Aziz et al, 2004).

⁷ http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90e19_e.htm#BK202

⁸ http://www.e-laws.gov.on.ca/html/source/regs/english/2004/elaws_src_regs_r04153_e.htm#BK24

⁹ The primary purpose of the registry is: (1) to allow persons to file RSCs; (2) to facilitate public access to information contained in RSCs. Please refer to <http://www.ene.gov.on.ca/environet/BESR/index.htm> for details.

2. Financial Incentives

In the past, the federal and provincial governments in Canada seldom established funding incentive program for brownfield redevelopment. Quebec was the only province that had a funding incentive program, i.e. the Revi-Sols¹⁰ program which provided grants for communities to cover the study costs leading to rehabilitation, as well as the actual costs of remediation (NRTEE, 2003).

In recent years, especially since the national brownfield redevelopment strategy was developed by NRTEE in 2003, the federal government has begun to take multiple financial tools into consideration so as to promote brownfield redevelopment, including implementing tax system changes, removing liens&tax arrears, and providing mortgage guarantees, loans and grants. For instance, the Government of Canada endowed the Federation of Canadian Municipalities (FCM) with \$125-million to establish and manage the Green Municipal Fund¹¹ (GMF) in 2000. The 2005 federal budget added \$300 million to GMF, half of which was dedicated to brownfield redevelopment. In March 2005, the NRTEE prepared a proposal, *Greening Canada's Brownfields: A National Framework for Encouraging Redevelopment of Qualifying Brownfield through Removal of Crown Liens and Tax Arrears*, to assist the Government of Canada and the provincial/municipal governments interested in redeveloping brownfields.

In addition to the federal government, provincial governments in Canada have also introduced some financial tools and legislation to provide financial support in brownfield redevelopment. In Newfoundland and Labrador¹², the 2006 provincial budget has committed \$1 million for the continued cleanup of selected contaminated sites. In Ontario, there is a commonly known “prohibition against bonusing rule” which prohibits

¹⁰ According to the Union of Municipalities of Quebec, the Quebec government has invested \$75 million into the program Revi-Sols between 1998 and 2006. In 2007, the Revi-Sols program was replaced by “ClimatSol”, a new governmental program to foster and subsidize rehabilitation of contaminated land in Quebec. ClimatSol has a budget of \$50 million over 3 years with a maximum contribution of \$1 million per project. From <http://www.radio-canada.ca/nouvelles/Politique/2007/05/10/010-ClimatSol.shtml>

¹¹ The GMF operates at arms-length from the federal government, and supports municipal governments, and their partners, to improve the quality of air, water and soil, and reduce greenhouse gas emission. Further information regarding to GMF can be found at <http://www.sustainablecommunities.fcm.ca/GMF/>

¹² Newfoundland & Labrador, 2006. Budget Highlights, The Right Choices: Momentum for Growth and Prosperity, from <http://www.budget.gov.nl.ca/budget2006/highlights.htm> (November 24, 2007)

municipalities from directly or indirectly assisting any manufacturing business or other industrial or commercial enterprise through the granting of bonuses under Section 106(1) and (2) of the *Municipal Act* (Piccioni, 2005). The Brownfields Act in 2001 amended the *Municipal Act* and allowed municipalities to offer property owners municipal tax relief where they were attempting to revitalize brownfield areas (Abdel-Aziz et al, 2004). The Ministry of Finance established the Brownfield Financial Tax Incentive Program¹³ (BFTIP) which allowed Ontario municipalities to provide landowners property tax assistance as an incentive for environmental rehabilitation. Also, the Brownfields Act amended the *Planning Act* to allow municipalities more flexibility to offer grants or loans for brownfield redevelopment through community improvement plan¹⁴ (CIP). According to Section 28 of *Planning Act*, the CIP is designated for a community improvement project area¹⁵ and must be approved by MMAH (Piccioni, 2005). The recent Municipal Statute Law Amendment Act 2006 (Bill 130) allows municipalities in Ontario to assume ownership of a property that has failed a tax sale free of provincial Crown liens¹⁶.

Intergovernmental initiatives conducted by both the federal and provincial governments are also being established in recent years. In October 2006, the government of Canada and the government of Ontario announced the Canada-Ontario Affordable Housing Program which involved a commitment of \$301 million each from the federal and provincial governments to build affordable housing for 20,000 households in Ontario especially on cleaned up brownfield sites so as to address the lack of affordable housing in older urban areas in Ontario¹⁷. In 2007 almost 400 units under the Canada-Ontario Affordable Housing Program were allocated on former brownfield sites (MMAH, 2007b).

3. Updating Environmental Standards

¹³ Ministry of Municipal Affairs and Housing started to administer the Brownfield Financial Tax Incentive Program in July 2007 instead of Ministry of Finance.

¹⁴ Section 28(1) of the *Planning Act*, R.S.O. 1990, c.P.13, defines community improvement plan as plan for the community improvement of a community improvement project area.

¹⁵ Section 28(1) of the *Planning Act*, R.S.O. 1990, c.P.13, defines community improvement project area as “a municipality or an area within a municipality, the community improvement of which in the opinion of the council is desirable because of age, dilapidation, overcrowding, faulty arrangement, unsuitability of buildings or for any other environmental, social or community economic development reason”.

¹⁶ From <http://www.mah.gov.on.ca/Page184.aspx> (December. 10, 2007)

¹⁷ Ministry of Municipal Affairs and Housing (MMAH) 2006. Affordable Housing Targeted to Brownfield. From <http://www.mah.gov.on.ca/Page569.aspx> (December 10, 2007)

The Site Condition Standards (Soil, Groundwater) currently being used at brownfields in Ontario is the “Soil and Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act¹⁸” published by MOE on March 9, 2004. Most of these generic standards can be dated back to between 1985 and 1996, and they have not been updated ever since 1996. In consideration of advances in knowledge (including improvements in procedures for developing criteria) and feedback from external stakeholders and internal MOE staff over the past decade, MOE regarded it necessary to review and update the Site Condition Standards with current science (MOE, 2007). In addition, other issues related to current generic criteria are expected to be addressed by virtue of the update, such as inequitable background standards for some land uses, the use of outdated toxicity data and the lack of transparency, etc.

A proposed change to brownfield soil and groundwater standards was released in spring 2006, after concerted effort made by MOE staff and stakeholders. On March 23, 2007, MOE initiated a 60-day public consultation for public review and comments on the proposal¹⁹. An external expert peer review of the methodology used to create the proposed standards was also carried out by MOE. Currently MOE continues to meet with stakeholders and technical experts to discuss individual issues regarding the modifications of the proposal (Leus, 2007).

4. Reforming Planning Approval Process

The government of Ontario has a strong commitment in reforming Ontario’s land-use planning system to make it more accountable, effective and transparent. As part of the OMB/Planning reform initiative, a new land use planning tool Development Permit System (DPS) became available to all municipalities in Ontario through the establishment of Ontario Regulation 608/06 Development Permits²⁰ under the *Planning Act* as of January 2007. The DPS was aimed to “help municipalities promote development, enhance environmental protection and facilitate key priorities of Ontarians such as community building, brownfield redevelopment, greenspace preservation and

¹⁸ <http://www.mah.gov.on.ca/Page1513.aspx>

¹⁹ http://www.ene.gov.on.ca/envision/env_reg/er/documents/2007/TableofStandards.pdf

²⁰ http://www.e-laws.gov.on.ca/html/reg/english/elaws_regs_060608_e.htm#BK1

environmental protection” (MMAH, 2007d). The DPS combines three planning approval processes (the zoning, site plan and minor variance) into one application/approval process. Review timelines for the consideration of applications for development permits are shortened into 45 days. In addition, the DPS enables municipalities to incorporate more flexibility in the planning approval process by enabling municipalities to specify minimum and maximum development standards, to identify permitted and discretionary uses, and by allowing them to impose a range of conditions of planning approvals. Therefore, brownfield developers’ money and time are saved by the DPS which provides more certainty and flexibility in the planning process.

2.5.2 Academic Literature Progress

Up to date, much of the scholarly research on ways to stimulate redevelopment activities has concentrated on community participation, market-based incentives, legislation on environmental contamination, and transportation planning.

1. Community Participation

Community participation, which is also called Public Involvement (Greenberg & Lewis, 2000), was once viewed as an impediment that added time and effort to brownfield reuse in the past (Chess & Purcell, 1999). Community groups have different priorities from local officials, and it is difficult to reach an accommodation (Greenberg & Lewis, 2000). Besides, it may take a great effort to channel neighbour’s energy into supporting brownfield redevelopment projects, owing to inefficient communication (Kaminstein, 1996) and the public’s restricted knowledge towards brownfields (Zarcadoolas, 2001). However, according to McCarthy (2002, p294), “early involvement of the community can help foster understanding and consensus, and prevent protests and litigation.” For example, residents can provide ideas about the future use of brownfields that meet the needs of the community, and help developers and local governments to prevent the democratic process from ignoring, quieting, or suppressing dissent. Moreover, Ellerbusch et al have also identified community involvement as an important factor in successful redevelopment of contaminated land, and they found that “technical support could serve

as a useful framework for developing trustful and long-term relationships with communities” (Ellerbusch et al, 2006, p515-516).

2. Market-based Incentives

In Canada and the US, it is usually considered that government intervention and financial support is a “must” in urban renewal. However, De Sousa (2002, p307) discovered that “allowing market forces to dictate the course and outcome of brownfield redevelopment seems to be a more productive way”. His discovery was based on the success of brownfield redevelopment since mid-1990s in Toronto, where there was no senior government support and brownfield redevelopment was mainly dependent on the invisible hands of pure market forces.

Similar findings occurred in Alberini et al’s survey of real estate developers. They explored 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” (Alberini et al, 2005, p349). Also, Howland (2003, p367) found that public subsidy was needed only “when a project called for a transfer from contaminated industrial to residential use, faced weak market demand for the final project, and contended with a complicated cleanup”.

3. Legislation on Environmental Contamination

Environmental contamination has always been a great concern in brownfield redevelopment, and governments have taken out various efforts to pass brownfield legislation to limit the liability of innocent property redevelopers. However, recent works has identified that there is not a systematical relationship between pollution and the vacancy and underuse of browfields, suggesting that environmental contamination may not be as significant a constraint to brownfield redevelopment as the prevailing sentiment assumed before (Schoenbaum, 2002; Wernstedt et al, 2004). Environmental remediation should not be the focus of brownfield redevelopment, and “the successful redevelopment cannot be accomplished by simply addressing the environmental issues” (Lange et al, 2004, p101).

4. Transportation Planning

It was not until recently that people began to realize the importance of integrating brownfield redevelopment with transportation planning, because people tended to neglect market conditions as an important impediment to redevelopment. However, Johnson et al (2002) discovered that successful redevelopment of brownfields partly depended upon the successful integration of land use and transportation planning, based on a case study in the Philadelphia region. Furthermore, Amekudzi et al (2004) has also explored that the transportation infrastructure situation on a brownfield site could either block or spur the redevelopment. Their research suggested that governments could proactively use transportation to encourage the redevelopment of brownfields “by locating regional or corridor scale improvements and renewing obsolete transportation infrastructure to improve the accessibility of brownfield corridors to major centers of economic activity...” (Amekudzi et al, 2004, p211).

2.6 Brownfield Redevelopment in China

2.6.1 Formation of Chinese Brownfields

The question of how the brownfields emerged in China can also be similarly considered through the evolution of industrial location.

(1) From 1950s to 1980s: Industrial Concentration

Like the early age of industrialization in most developed countries, industry in China also most often concentrated on urban cores, close to major transportation facilities, since 1949 when the People’s Republic of China (P.R.C) was proclaimed. Aside from the two factors listed in Section 2.2.3 – transportation cost and agglomeration economy, two additional factors have accelerated the process of industrial concentration in urban areas: the misconception in urban planning about building the “new socialist city” (Wu, 1997), and the free land use system (Zhou and Wang, 2004).

At the early days of P.R. C's establishment, people held a very simple idea about building the "new socialist city" in pursuit of socialism. The new socialist cities should be cities of production, rather than the "capitalist" cities in other industrializing countries – that is, "cities geared to consumption" (Friedmann, 2005, p15). The tall factory-built metal chimneys towering over the city and the sirens from the factories sounding to wake the workers to come to work were the ideal picture of the "new socialist city" in the minds of many people who had just won the liberation and freedom (Yao and Shuai, 1995). This kind of simple idea had dominated planning in most cities, and was strengthened during the Big Leap Forward Campaign in 1950's and the ten-year Cultural Revolution. When the municipality drafted the five-year plan, a high priority was put in the industrial development (Wu, 1997). Plans were designed to facilitate "socialist development and industrialization" (Friedmann, 2005). Consequently, a large number of factories were constructed within the urban area, and cities were transformed into engines of production.

The free land use system during 1954 and 1988 was another important factor accounting for the industrial concentration in urban areas (Zhou and Wang, 2004). According to the Constitution at that time, all the land in China was declared to be the property of the State, and the land use right of any given parcel was transferred by the local government through administrative approvals. Once the land had been transferred legally, individual entity was not required to pay the rent (Cong, 2001). In other words, all the land in China was free to use unless it had not been approved by the government. According to Yu (1990), the free land use system was an "imbalanced mechanism of interests", and it resulted in a trend of micro-entities (such as persons or enterprises) migrating to the urban areas consistently because the migration cost was far less than the benefit they obtained from the new location. In fact, many industrial firms had chosen to locate in the central city during the period since they not only enjoyed the benefits from transportation cost and agglomeration economy, but also the free urban land use.

Due to the four factors (transportation cost, agglomeration economy, the misconception in planning about building the "new socialist city" and the free land use system), a lot of industrial firms were located in urban areas, along rivers and trails. For instance, in the

Yangtze Delta, in some cases, people might find “Layer Cake” cities with “chemical industries surrounding the urban edge, electroplating factories everywhere, printing and dyeing firms blossoming in the urban cores” (Yao and Shuai, 1995, p147).

(2) From 1990s onward, especially in the mid-1990s: Industrial Relocation and Decentralization

Since 1990s, ten years after the Reform and Opening-Up policy was adopted in China, many industrial firms originally located in urban cores are being relocated to the new industrial parks in the suburb or being compelled to shut down because of their failure to meet national environmental standards. There are two main aspects contributing to the large scale of industrial relocation across China: economic and environmental concerns.

Firstly, industries can improve their economic performance through the relocation (Wu, 1997). They can enlarge their production scale by building a larger factory in the suburb. Additionally, industries can take advantage of the proceeds they obtain from the transfer of land use right to bring in innovative technology and equipments, which is quite an advisable choice for many state-owned enterprises with poor economic performance. It should be noted that the National People’s Congress has amended the constitutional provision with respect to urban land use in April, 1988. This provision has reformed the free land use right system into the system of compensated use of land, and allows the transaction of land use right in the market, while the state ownership of all the land in China remains unchanged (Wang, 2005). Thereafter, industries can get a certain amount of money when they sell the land use right of a given parcel where the factories are formerly located. Sometimes the proceeds not only cover the relocation cost in the suburb but allow for further expansion and renovation (Shin, 2004).

Secondly, industries’ migration to the new industrial parks outside the urban center helps control the environmental pollution and improves the quality of life within the urban areas (Zhou and Wang, 2004; Wu, 1997). As mentioned earlier, many industrial enterprises were established very early in the 1950’s, and most of them were industries consuming a large amount of energy and resources, such as textile mills, chemical plants,

machinery factories, and printing & dyeing firms. They generated a lot of pollution in cities, including wastewater, exhaust air and noise. Little attention was paid to the pollution control during the period of planned-economy (Zhou and Wang, 2004; Wu, 1997; Edmonds, 1998). Since 1990s when the “socialist market economy” was already mature, the objectives of urban planning broke significantly with the earlier rhetoric of facilitating industrialization ex parte (Friedmann, 2005). The planning goals of cities have been converted into providing “adequate public facilities, improving the living environment, and promoting a sustainable development” (Friedmann, 2005, p113). Chinese governments are paying more and more attention to environmental pollution and fostering sustainable cities. The industrial relocation has thus been carried out extensively to control the pollution in cities.

As the old industrial enterprises gradually moved out of the urban cores or shut down because of failure to meet national environmental standards or failure in the market competition, those former industrial sites began to emerge as “brownfields” in China.

2.6.2 Current Situation of Brownfield Redevelopment in China

Brownfields, called “old industrial sites” or “contaminated land” in Chinese documentation and academic literature, is relatively a new concept. In fact, there is no up to date research recording the exact number of brownfields in China and where they are located, by virtue of the lack of recognition of the term. Literature focusing on the old industrial sites or contaminated land also fails to provide credible estimates of the number and their distribution. Therefore it is impossible here to sort out the big picture of brownfields in China. A recent preliminary survey²¹ of contaminated rural land in China by the State Environmental Protection Administration of China (SEPAC) revealed that one tenth of the arable land in China had been contaminated, of which two million mu²² were landfills. However, this information is incomplete, as the survey only focused on contaminated land in rural and agricultural sites while overlooking contaminated

²¹ The result of this preliminary survey was revealed by Mr. Zhou Shengxian, the director of the State Environmental Protection Administration of China, in a national video conference about the current condition of contaminated land in China on July 18th, 2006, available at http://news.xinhuanet.com/environment/2006-07/18/content_4849642.htm

²² Mu, a Chinese unit of area, one *mu* equals to one fifteenth of a *hectare*.

brownfields in the urban area. A more formal and comprehensive survey on all the land (both rural and urban) with respect to its current condition of contamination was carried out from July, 2006 to December, 2007, which was a part of the one billion-Yuan three-year (2005-2008) national project, *The Survey on the Current Condition of National Land and the Protection & Remediation of Its Contamination*, conducted by SEPAC and the Ministry of Land and Resources P.R.C.. Results from this survey are still under investigation by the SEPAC in 2008.

According to Wu (1997), the redevelopment of old industrial sites in Chinese cities presented three main features. **First**, the old industrial sites were usually redeveloped into the land uses for the service industry, including commercial/residential use, as well as green space and infrastructure. This type of transformation was designated to improve the urban environment and enhance the quality of life. **Second**, the redevelopment modes usually adopted ways of demolishing the old industrial buildings and starting over with new high-rises, while preserving the old property and converting it into other uses in situ was not commonly adopted. Although the former development mode provided a relatively higher floor area ratio and allowed more covered areas to meet the soaring demand for urban space, it might ignore the intangible value in the historic qualities of the old industrial buildings which could not be easily replicated with a new construction, such as “unique dimension and features, evidence of work and a sense of industrial history” (Wu, 1997, p53). As to the **third** feature, Wu (1997) indicated that the transfer of land use right in the old industrial sites appeared some sort of disorder and blindness, owing to the immature land market. According to the new land use policy amended in 1988, any entity which wanted to sell the land use right on a particular parcel of land should acquire the approval from the local municipality. Without approval, the land use right was not allowed to be transacted in the market. However, there were always some companies selling the land use right illegally without the approval from the local government. As well, the lack of an adequate monitoring system of the land market partly results in the disorder and blindness. It is a pity that Wu (1997) has not intensively discussed the challenges in the redevelopment of old industrial sites in his article. In-

depth details about how the Chinese brownfields are being redeveloped and how the contamination is being remediated at present still require further research.

2.7 Deficiency of Current Study in Brownfield Redevelopment

By and large, the literature examining the redevelopment of brownfields can be grouped into two categories:

1. General overview of brownfield redevelopment, including discussion of definition, formation, benefits, barriers and future trends (Simons, 1998; Eisen, 1999; McCarthy, 2002; De Sousa, 2001; Greenberg et al, 2001; NRTEE 2003; Dorsey, 2003; Gorman, 2003; Yount, 2003; Wernstedt et al, 2004; De Sousa, 2004);
2. Discussion on a specific aspect of brownfield redevelopment, including environmental assessment (Harrison and Davies, 2002; Nijkamp et al, 2002; Tam & Byer, 2004; Lesage et al, 2007; Maurice et al, 2007), risk management (Tedd et al, 2001), community and public involvement (Kaminstein, 1996; Greenberg & Lewis, 2000; Zarcadoolas, 2001; Ellerbusch et al, 2006), financial and insurance aspects (Adams et al, 2000; Singer, 2002; Pryce, 2003; Howland, 2003), regulatory incentives (Swickard, 2008), governmental policies (Schoenbaum, 2002; Boles, 2003; Amekudzi et al, 2004; De Sousa, 2006), lessons from the field (Meyer and Lyons, 2000; Wernstedt et al, 2003; Alberini et al, 2005; Levi and Kocher, 2006), etc.

Within the literature, articles examining the redevelopment of contaminated lands in Canada are extremely limited. Much of the most recent literature is focused on experiences in USA or UK (Gute and Taylor, 2006; Levi and Kocher, 2006; Howland, 2007; Maurice et al, 2007; Watson, 2007; Dixon, 2008). In addition, the academic literature related to Canadian brownfields in recent years concentrates on governmental policies, while literature on private sectors' experiences is rather scant. Scholarly research discussing and comparing redevelopment experiences at the municipal level is limited while much has been focused on policy and planning implications in the federal or provincial scope (De Sousa, 2006). Sufficient studies have not been undertaken to

demonstrate how to integrate market forces and municipal policies and provide successful incentives for the private sector to participate in the redevelopment. Such a research field is important to Canada where there is an increasing need for urban spaces to accommodate growth within the urban boundaries.

Almost all the literature on brownfield redevelopment is based on a case study approach, while those cases are usually from North America or Europe. Cases from developing countries are still remaining blank. For example, China is in a rapid industrialization process accompanied by a massive emergence of brownfields. Research in China will possibly provide precious lessons and experiences on brownfield redevelopment in developing countries.

Study is needed in Chinese academic literature with respect to Chinese brownfields. Up to date, most of the Chinese academic literature on brownfields has been concentrated on the introduction of brownfield experiences in developed countries (Fu and Jiang, 2005; Wang et al, 2006; Zhang, 2004; Luo, 2002; Jiang, 2005; Zhao and Yang, 2006) and discussed on converting the old industrial buildings into other uses without demolishing them from an urban landscape's perspective (Zhang et al, 2003; Wang and Ren, 2003; Wang, 2004; Chen and Bao, 2003). However, in-depth research is required to develop the recognition of brownfields in Chinese literature, to explore how the current brownfields in China are being redeveloped, and to discover the challenges and problems accompanying the redevelopment process.

In summary, it is the above deficiency in current literature in both Canada and China that has intrigued the researcher to conduct this cross-nation research, with a particular focus on the City of Dalian, China, in order to fill the academic gap of Chinese brownfield redevelopment.

Chapter 3: Research Methodology

3.1 Introduction

The purpose of this research is to explore the potential application of brownfield redevelopment in Dalian, China, based on municipal experiences in Ontario, Canada. In order to realize the purpose, a suitable methodology is required and sheds light on brownfield redevelopment in the City of Dalian. A case study research strategy was adopted to develop an in-depth understanding of successful Ontario brownfield experiences from two selected municipalities: Kitchener and Hamilton. Currently there is no systematic indicator framework that is known to exist or be in use for measuring the success of brownfield redevelopment in a standardized way (Wedding and Crawford-Brown, 2007). Therefore, a common-sense assumption of measuring whether the municipal experiences are successful in this research is that: all municipal programs/approaches are considered “successful” if the redevelopment occurs as opposed to the corresponding option of not being redeveloped at all.

Also, a case study was conducted in the City of Dalian in order to develop a comprehensive understanding of brownfield redevelopment: formation, current situation, challenges and corresponding policies. Face-to-face interviews were carried out to understand the associated stakeholders’ perception/concerns on brownfield redevelopment both in two selected Ontario cities and Dalian. These stakeholders included planners, government officials, consultants, developers, as well as experts in the field of environmental management. Direct personal observation was chosen to collect additional information in terms of brownfields’ current situation, how they were being redeveloped and their appearance when the project was completed. Documents collected from government, private sector, public libraries and research institutes were reviewed as supplementary sources of data in order to triangulate information from interviews and personal observation and increase the reliability and validity of the case study.

3.2 Case Study Approach

3.2.1 Why Case Study Approach?

A case study was chosen as the principal research strategy for three primary reasons: the nature of the research topic, research purpose, and the constraints of funding and time. Brownfield redevelopment is a complicated economic, social and environmental phenomenon which requires a close and in-depth study. Research on brownfields is not a simple topic which can be examined by cause and effect similar to the natural science framework. According to Verschuren (2003) and Ragin (1989), a case study is especially suitable for studying phenomena that are highly complex and/or embedded in their cultural context. A case study permits a comprehensive understanding of a complex instance, through “extensive description and analysis of that instance taken as a whole” and “in natural settings studied at close hand” (U.S. GAO 1990, p79; Orum et al, 1991, p6).

Secondly, a case study fits well with the research purpose of exploring the potential application of brownfield redevelopment in Dalian, China, based on municipal experiences in Ontario, Canada. On the one hand, the foundation of this research is the municipal experiences of brownfield redevelopment in Ontario, Canada. What are the municipal experiences that might be of help to the City of Dalian? Only through case studies of selected Ontario cities can such a question be answered. According to Feagin et al (1991), the detailed data offered by a case study allows the researcher to develop a solid empirical understanding for a specific concept and generalizations. By means of the information gathered from solid research methods – interviews, on-site observation, collection and review of the related documents, the researcher could closely study the examples of Ontario municipalities and come up with reasonable summaries of successful municipal experiences in Ontario, Canada. With these experiences, the researcher was able to further analyze the potential of applying Canadian experiences to the City of Dalian. On the other hand, the prerequisite of the research purpose is a comprehensive understanding of brownfield redevelopment in Dalian, including the formation, current situation, challenges and corresponding municipal policies. Without a

comprehensive understanding of the situation in Dalian, it is impossible to explore the potential of applying Canadian experiences to Dalian and analyze how they can help to improve Dalian's brownfield practice. A case study approach seems to be appropriate here, as it provides a rational framework to define how the case of Dalian can be studied.

Thirdly, a case study is a pragmatic choice for the researcher, given the short research time of this project (only three months) and the limited research funding required to cover the expenses both for the field trips in Canada and in China. It was the limited scale and manageability of the case study that had further led the researcher to choose it as a research strategy. "A case study can be carried out on a small-scale, albeit detailed, basis" (Payne, 2004, p32). By focusing on a few cases, it is possible for the researcher to complete the research work more quickly, and in a much greater depth and detail, than if the researcher were to examine many cases.

It should be noted that the old debate of a case study over reliability and validity has been recognized in this research. For one thing, people might challenge the reliability of research findings discovered from a case study because of the small-scale cases and the dependence on empirical data. It is sometimes said that a case study can be best descriptive and can not generate general principles. However, it is not reasonable that ideas derived from a case study are less scientific although dealing with only a limited number of cases and are descriptive (Payne, 2004; Feagin et al, 1991; Verschuren, 2003). "No one has accused great scientists like Charles Darwin of being less than scientific because of their naturalistic descriptive data" (Orum et al, 1991, p20). Payne (2004, p32) considered that the test of a good case study was dependent on "how well its data sustain its theoretical statements". In addition, on the matter of the validity of a case study, people might consider that a case study is vulnerable to the idiosyncratic biases of the investigator. However, this notion has ignored the fact that a case study does permit the investigator to assemble complementary and overlapping measures (Feagin et al, 1991). According to Stake (2005), the triangulation of sources can help ensure the validity of a case study analysis. That is, the researcher can take advantage of multiple data sources, such as newspaper reports and personal interviews, in order to cross-check and thereby to

validate the case study (Yin, 2003). Such a strategy was adopted in this research for the case study of Kitchener, Hamilton and Dalian.

3.2.2 Case Selection in Canada

Two municipalities are chosen in Canada: Hamilton and Kitchener. There are four main reasons for this case selection. Firstly, Hamilton and Kitchener are among the very few municipalities that have relevant experience with their brownfield community improvement plans, considering that brownfield redevelopment is a relatively new area of municipal interest in Canadian municipalities (Piccioni, 2005). In fact, the city of Hamilton is the only municipality in Ontario that has actually fully implemented a dedicated comprehensive brownfield incentive program, while the city of Kitchener has also offered several downtown revitalization programs that can be applied to brownfields.

Secondly, both cities have been identified by the Ministry of Municipal Affairs and Housing as having leading edge incentive programs in brownfield redevelopment (MMAH, 2000b). These incentive and public investment strategies have proved to be successful in encouraging and facilitating the private sector to remediate and redevelop brownfields that have been left underused and abandoned for many years (MMAH, 2007b).

Thirdly, both Hamilton and Kitchener are old industrial cities with many brownfield sites to be redeveloped, similar to the city of Dalian, China. The City of Hamilton, as an important harbour on Lake of Ontario, can provide valuable experiences in redeveloping brownfields in port land areas. These experiences are applicable to the City of Dalian, an important harbour in North China. As of early 2006, the Dalian High-tech Industrial Zone began to conduct the Lingshui Bay Area Redevelopment program to redevelop the contaminated sites in the bay area, and tried to learn from the experiences in Hamilton.

Fourthly, due to the limited research funding and time, only two municipalities were chosen in Canada. This number was selected because it permitted the researcher to

complete the research work in much greater depth and detail within the time and funding constraints. Also, considering Kitchener and Hamilton are within the driving distance of the researcher, investigation in the two cities was feasible.

3.3 Data Collection

3.3.1 Interviews

Face-to-face interviews were conducted in order to understand the current situation and barriers/challenges to brownfield redevelopment in three cities, by obtaining associated stakeholders' perception/concerns towards brownfield redevelopment in the city, identifying their brownfield experiences and understanding their comments/expectations towards the municipality. Stakeholders' perceptions on applying Canadian municipal experiences to the City of Dalian were particularly addressed in the interviews undertaken in Dalian.

In face-to-face interviews, "the interviewer is in a good position to be able to judge the quality of the response of the subjects, to notice if the question has not been properly understood", and thereby to carry out appropriate methods to encourage the interviewees' full participation in the interview (Walliman, 2005, p284). In other words, face-to-face interviews can allow the researcher "control" over the line of questioning, and get in-depth understanding and insight about interviewees' opinions and feelings, as well as organizational and personal goals (Creswell, 2003). Therefore, in order to further understand the stakeholders' perceptions/concerns on brownfield, face-to-face interviews are suitable for the research.

In terms of the interview structure, all the face-to-face interviews in this research were unstructured, open-ended. According to Walliman (2005), a very open and unstructured form of interview is appropriate when the researcher needs to explore a situation and wishes to get information which the researcher cannot predict. In this research, the researcher needs to discover the current situation of brownfield redevelopment in selected

Canadian cities and the City of Dalian, and to understand the stakeholders' perceptions on brownfield redevelopment and the subjective "logic" by which the stakeholders come to make their choices. This kind of information relates to beliefs, value and subjective rationality. Open-ended interviews permit the penetration into the interviewees' cognitive world. What's more, open-ended interviews allow interviewees to compose their answers in their own words and diverge from the subject, possibly offering additional facts that may be important for the study in the future (Palys, 1997). Considering the different economic and socio-cultural contexts in two countries – Canada and China, open-ended interviews allowed more spontaneity and flexibility than structured interviews and thereby enriched the research findings. In fact, the researcher found that much interesting and useful information came from the open-ended interviews. Some of the early interviews in the City of Dalian provided very important information which helped to indicate the next step of research direction and the priority issues of brownfield redevelopment in Dalian. Before each interview, a set of different interview questions was designed according to different interviewees' profession and experiences on brownfields, but interviewees with the same profession were asked primarily the same set of questions. Appendix I to VII provide a list of questions in different interviews.

In total, twenty-four face-to-face interviews were conducted with the stakeholders involved in brownfield redevelopment, among which seven interviews were conducted in Kitchener and Hamilton while seventeen interviews were in the City of Dalian, China. These stakeholders participating in the interviews included planners, government officials, consultants, developers and experts in the field of brownfield redevelopment and environmental management. Participation of all these face-to-face interviews was voluntary. Interviewees were informed at the very beginning of the interview that they could refuse to answer any questions, and stop at any point during the interview. Besides, the researcher called the interviewees in advance to reconfirm their willingness of participation before the appointed date of interview. Table 3.1 and table 3.2 are lists of interviewees in the face-to-face interviews conducted in Canada and China.

Table 3.1: List of Interviewees in Face-to-face interviews in Canada, 2006

Places	Department	Position	Number of Interviewees
Kitchener	City of Kitchener	Senior Planner	1
	Consulting Firms	Planning Consultant; Engineering Consultant	2
	Real Estate Company	President	1
Hamilton	City of Hamilton	Brownfield Coordinator; Planner	2
	Canada Centre for Inland Waters	RAP Coordinator	1
Total Number of Interviewees			7

Table 3.2: List of Interviewees in Face-to-face Interviews in City of Dalian, China, 2006

Department/Position	Number of Interviewees
Dalian University of Technology	4
Dalian High-Tech Industrial Zone Construction Bureau	2
Lingshui Bay Area Redevelopment Office	2
Dalian Environmental Protection Bureau	2
Dalian Economic Committee	3
Dalian Urban Planning & Design Institute ²³	3
Dalian Land Reserve and Transaction Center	1
Total Number of Interviewees	17

All in all, the face-to-face interviews in Kitchener, Hamilton and Dalian went well, yet some difficulties were met in the process. The language barrier was the first major challenge to holding interviews in Canada, since English was not the researcher's first-language. In order to accurately grasp all the information provided by the interviewees while at the same time presenting the interview smoothly, the researcher had tape-recorded every interview conducted in Canada with the interviewees' permission; meanwhile, additional notes were taken by the researcher during the interview. It was

²³ Dalian Urban Planning & Design Institute is a subordinate body of Dalian Urban Planning Bureau.

fortunate for the researcher to meet those nice and kind interviewees in Kitchener and Hamilton who had been considerate of this linguistic difficulty and expressed their opinions slowly, clearly and tenderly.

Government officials' reluctance to provide comprehensive data related to environmental contamination and remediation on former industrial sites posed a challenge to the interviews held in Dalian, China. The officials tended to consider that this type of information was sensitive data which might result in negative impact on the issue of environmental pollution among the population if released to the public. Even though findings of this thesis research would only be kept in the library's database in another country and the public could not easily have access to them, government officials in Dalian still tended to treat the researcher with reservations when it came to the issue of contamination and remediation. In consideration of the research ethics, the researcher respected their response in the interview.

The third challenge encountered in the interviews was the difficulty to increase the number of individuals to interview. The researcher was only acquainted with one or two interviewees in each city at the early stage of the research. This limited number of interviewees would inevitably make the research prone to bias. In order to avoid such bias and ensure the reliability of the research, a "snow-ball" technique was adopted to increase the number of individuals to interview. The researcher asked the early interviewees whether there was anyone else they were acquainted with and involved in the brownfield project or in the city that might be of help for the research. With the interviewees' recommendation, the number of interviewees gradually increased to twenty-four.

Finally, how to encourage the interviewees' full participation in the interview also emerged as a challenge in face-to-face interviews. In order to promote interviewees' complete responses, the researcher took advantage of the valuable tools learned from Morton-Williams (1993): good appearance and visual signs to show the researcher's

confidence and friendliness, such as nods, smiles etc. Frankly speaking, these tools had turned out to be quite successful and most of the interviews went on very well.

3.3.2 On-site Observation

On-site observation was chosen as a complementary data resource to record additional information on brownfields which had been mentioned by the interviewees during the interview. These brownfield sites being observed include those that have not been redeveloped, those being redeveloped, as well as those that have been redeveloped successfully (See Figure 3.1 and Figure 3.2). According to Walliman (2005), observations can be adopted for “recording the nature or conditions of objects”, and “the observations of objects can be a quick and efficient method of gaining preliminary knowledge or making a preliminary assessment of its state or condition” (Walliman, 2005, p288). On-site observations of brownfields in Kitchener, Hamilton and Dalian allowed the researcher to further understand some of the brownfield sites’ current status, how they were being redeveloped and their appearance when the redevelopment was completed. All the on-site observations were recorded with the use of a digital camera that was capable of photography and video. A number of pictures were taken to record the on-site observations, and they were stored electronically and categorized by subject, events and context.

Figure 3.1: Observations of Kaufmann Lofts in the City of Kitchener, Canada



The Facade



Loft that has not been redeveloped



Loft being furnished



Loft Model that has been redeveloped

Figure 3.2: Observations of Bayfront Park, West Harbour, Hamilton, Canada



People jogging on the waterfront trail



People canoeing in the Bayfront Park

3.3.3 Documents Collection and Review

Documents from government departments, commercial/professional bodies, public libraries, collections and the internet were collected and reviewed as an additional data source, which helped to ensure the reliability and validity of the research. As aforementioned, one of the disadvantages of case study is the potential idiosyncratic biases of the investigator. Face-to-face interviews might be also vulnerable to be biased mainly due to the limited number of interviewees. In that case, reviewing various documents, as a method of triangulation, can provide the researcher with complementary and thoughtful information helping to minimize those biases and ensure the accuracy of the research.

Collected documents included government reports on the general situation of brownfield redevelopment in the city, official plans (called comprehensive plan in the City of Dalian), brochures of municipal incentive programs, policy statements on environmental protection, related environmental regulations, and consulting reports. Secondary data from these documents was carefully studied and interpreted. Through collecting and reviewing related documents, the researcher was able to systematically understand government policies and plans on brownfield redevelopment, but also gained an in-depth and holistic understanding about some specific brownfield projects.

3.5 Ethical Considerations

Since human participants were involved in this research, research ethics in relation to other people were considered. First of all, each face-to-face interview had received the interviewees' consent and the courtesy to the interviewees had also been paid after the interview. Specifically, all the interviewees were recruited by email or telephone. They were aware that their participation was voluntary. Interviewees could choose to decline the interview or decline to answer any of the interview questions. All participants were verbally thanked for their participation in the research. Some of them were given a small token of appreciation, such as a Chinese handkerchief made of silk or a small bottle of maple syrup, while some of them were sent a beautiful *Thankyou* card to show the researcher's appreciation.

All the interviewees were guaranteed confidentiality in their responses. Individual names will not appear in this thesis unless the participants permitted the researcher to do so. Anonymous quotations were used with interviewees' permission. Besides, all the interviews were taken to fill a gap on brownfield redevelopment in existing academic literature which was not easy to be traced by individuals.

Several electronic devices for recording data were used with the participants' awareness and permission. An Mp3 player with a recording function was used during the interviews in English. All the participants were informed of its use and they could decline the use of the Mp3 player at any time. A digital camera was used to collect visual images in the

forms of photograph and video. These visual images were collected during the interviews and the on-site observations. Verbal consent was received whenever the human participants and their private property was the direct subject of the visual images. Furthermore, all the pictures appearing in this thesis were approved by related individuals or organizations.

3.6 Limitations

Three limitations affecting this research have been identified. Firstly, the research was restricted to the limited research time and funding. Given the short research time (only three months) and the limited research funding required to cover the field trip expenses both in Canada and in China, the number of research sites being studied in case study was relatively small. Moreover, the number of individuals to interview was also limited, considering that it usually required more time to find appropriate interviewees and get in touch with them when conducting the research in Dalian.

Secondly, the selection of limited number of research sites in case study could lead to the difficulty to generalize the municipal experiences in brownfield redevelopment in Ontario which might be helpful for the City of Dalian, China. However, the researcher had made an effort to select appropriate municipalities in Ontario with years' experiences in successfully facilitating brownfield redevelopment under the constraint of research time and research funding. This was accomplished by carefully reviewing related literature on brownfield redevelopment in each city and their potential help to the City of Dalian. Furthermore, the purpose of the case study was not intended to generalize the municipal brownfield redevelopment experiences across a large population, but to summarize the experiences learned from in-depth study about specific sites which may have the successful experiences to be applied by Dalian. These selected cities were “examples” of Ontario cities which had been relatively successful in encouraging brownfield redevelopment, not “samples” of all Ontario cities.

The third potential limitation of this research has already been addressed before, namely the potential idiosyncratic biases, which might either attribute to the limited number of interviewees in face-to-face interviews or result from the researcher in case study. This kind of limitation is inevitably encountered in any qualitative research. In order to ensure the trustworthiness, authenticity and credibility of the research, the researcher had carried out two types of methods to minimize the potential biases. On the one hand, the researcher had tried hard to include all key persons in brownfield redevelopment in three cities in the interviews. This was started from the initial key people, followed by a “snow-ball” technique. The researcher considered that the total twenty-four open-ended interviews were suitable to represent the stakeholders’ perceptions/concerns on brownfield redevelopment in all three cities in Canada and China. On the other hand, the researcher had triangulated different data sources of information by examining evidence from various sources, including face-to-face interviews and supplementary documents from both public and private sectors, and cross-checking them to validate both the first-hand data and secondary data.

Chapter 4: Case Studies in Canada

4.1 Introduction

People say you can't make a silk purse out of a sow's ear. But the City of Kitchener and the City of Hamilton have been doing so by promoting brownfield redevelopment for years. In this chapter, the author assesses brownfield redevelopment in both cities and summarizes the successful municipal experiences. Each of the case studies consists of the following components: introducing the city's history of industrialization and relevant background information of brownfield formation; describing the geography of brownfields in the city, including brownfield definition, location, quantities, distribution and characteristics; understanding the municipal impetus to promote brownfield redevelopment; identifying barriers to brownfield redevelopment from the municipal perspective; introducing corresponding approaches to overcome the barriers; and summarizing the achievements resulting from the municipal efforts. In addition, the author showcases one brownfield redevelopment project for each city. At the end of this Chapter, successful municipal experiences learned from Kitchener and Hamilton will be summarized under an overarching assumption: all municipal programs/approaches are considered "successful" if the redevelopment occurs as opposed to the corresponding option of not being redeveloped at all.

4.2 Brownfield Redevelopment in the City of Kitchener, Ontario

4.2.1 Introduction of Kitchener

At first glance, Kitchener does not seem to be distinctive than any of its southern Ontario neighbours. Block after block of bright facades mix with late nineteenth-century (or even older) structures clad in dark brick or the traditional brick red paint. Familiar brand names, fancy or funky, wave to both city residents and out-of-towners. However, Kitchener has a unique history.

In 1790s when the first wave of German Mennonites settled in Kitchener from Pennsylvania, moving north for inexpensive land, freedom of worship and beliefs that Upper Canada had promised, Kitchener began to be imprinted with a German identity in its history (City of Kitchener, 2006a). Soon afterward, many German speaking immigrants from Europe moved here and named this city Berlin. “These Germans brought with them special skills and knowledge as well as their own cultural traditions”, and they contributed greatly to Berlin’s industrialization (English and McLaughlin, 1996, p11). By the end of the 19th century, Berlin had established itself as a major industrial centre and led all others in Canada in the manufacture of tires, rubber footwear, shirts & collars, furniture, buttons and leather (City of Kitchener, 2006a). “Busy Berlin”, coined as a catchphrase at the time, described perfectly the industrious, bustling city and its economic prosperity (See Figure 4.1). As a consequence of the extensive industrialization, many industrial buildings based on the progressive factory architecture of the time were built along the railroad during late 19th century and early 20th century. Figure 4.2 presents a classic view of Berlin’s factory district developed along the railway line.

The city’s name was changed to Kitchener in 1916, mainly due to anti-German sentiment in the First World War. It was its diversification of industry that enabled Kitchener to survive the great depression and recover economic growth quickly in the post-war years. “By 1965, Kitchener had become Canada’s fastest growing city and one of the country’s leading industrial, financial and distribution centers” (City of Kitchener, 2006a). However, this city suffered a recession during 1980s when the labour-intensive traditional industries encountered enormous pressures from international competition and slackening domestic demand (English and McLaughlin, 1996). As a result, many old industries gradually collapsed, leaving empty factories standing as relics of a bygone age. These old mills, foundries, textiles, and tanneries turned into brownfields.

At present, Kitchener, as an incorporated city of the Waterloo Region, is a vibrant cosmopolitan community with an estimated population of 209,872 (as of July 1, 2006, FP Markets-Canadian Demographics 2006). Although it experienced hard times during the 1980s and 1990s, new industries especially the “high tech” industries allow this

community to outperform most other cities in Canada as to economic growth. The presence of two universities (University of Waterloo and Wilfrid Laurier University) and Kitchener's very successful Conestoga College provide Kitchener with abundant resources, skilled workers, access to information and technology. Being part of the "Canada's Technology Triangle (CTT)"¹, Kitchener contributed to an annual Gross Domestic Product (GDP) of \$17.81 billion (2004) within CTT (City of Kitchener, 2006b).

Figure 4.1: The Popular Slogan²

1912



(Courtesy English and McLaughlin Collection)

Figure 4.2: Berlin's Factory District in 1880-1912



(Courtesy English and McLaughlin Collection)

4.2.2 Brownfields in Kitchener

The stirring Industrial Revolution dated back to the 1890s left a number of brownfields throughout Kitchener. These sites are the remnants of Kitchener's gorgeous past when smoke belching from industrial chimneys was a sign of business success. In Kitchener's

¹ The name "Canada's Technology Triangle" is founded on the longstanding reputation for innovation established by businesses in Cambridge, Kitchener, Waterloo and Guelph. CTT came to be widely applied in the 1980s. More information related to CTT can be found at <http://www.techtriangle.com/>.

² "Busy Berlin" was coined as the slogan of the Board of Trade, which referred not only to the rush of Berlin's factories, but also the intelligent and industrious German workmen in Berlin (English and McLaughlin, 1996, p80)

brownfield remediation Community Improvement Plan (CIP), a brownfield site is defined as “a property which contains environmental contamination either in the ground or building due to the operational activities of a previous land use, where the extent of the contamination renders the property vacant, under-utilized, unsafe, unproductive or abandoned” (City of Kitchener, 2006c). According to this definition contamination is a necessary condition for Kitchener’s brownfields.

The precise number of contaminated properties in Kitchener is unknown. In fact, the City of Kitchener does not have an inventory of brownfield sites even though the municipality has fully understood the benefits of such a list. What the municipality does have is an inventory of what the municipality believes are under-utilized sites¹, among which some are contaminated lands. A senior planner in the City of Kitchener told the researcher: “property owners don’t have to share their contamination information with the City of Kitchener as this information will potentially affect their property value”. The city can not use the list of under-utilized land as an inventory of brownfields since this list was prepared based on suspicion other than solid evidence. The municipality may wind up in a civil liability by keeping a comprehensive list of brownfield sites if a clean site is included in the inventory by mistake, or vice versa, a contaminated site is missed (Kitchener Senior Planner; RCI Consulting and Regional Analytics Inc, 2004).

According to Kitchener’s Brownfield Remediation Community Improvement Plan (City of Kitchener, 2006c), some brownfield properties within Kitchener are former industrial sites which were abandoned or vacant in downtown or inner city lands. Many of them are located along major streets that are fully serviced and they often come with architecturally and historically significant buildings on the sites. As well, former gas station and industrial/commercial/public activities situated in both urban and suburban areas are regarded as brownfields in the city.

¹ They include the sites that are vacant; sites get either vacant buildings or vacant land or both; lands which are simply not performing their maximum land use potential (Kitchener Senior Planner)

4.2.3. The Impetus for Brownfield Redevelopment

The Brownfield Remediation Community Improvement Plan (City of Kitchener, 2006c) has identified a number of negative community impacts caused by brownfields, which:

- visually degrade the community by the presence of empty building shells and vacant lands;
 - negatively affect surrounding property values, residents and businesses;
 - present community Public Health risks due to the potential of chemical contamination in both structures and soils;
 - can create community safety problems due to the lack of people, and “normal” activity taking place on site;
 - increase municipal operating costs through additional Policing, Fire/Building & Property Standards inspections & enforcement;
 - provide only a minimum contribution to community costs due to a low level of assessment;
 - are an inefficient use of prime urban land as typically, these vacant sites are fully supplied with previously paid for urban infrastructure with prime access and exposure;
 - promote urban sprawl by forcing the City’s growth to be shifted to the periphery of the City on greenfield lands which require the extension of urban infrastructure and community services; and
 - are an ongoing threat to the community’s ground water supply.
- (City of Kitchener, 2006c, p4)

Aside from these negative impacts, the potential benefits brought by the redevelopment of brownfields are also recognized in Kitchener’s brownfield remediation CIP:

- increased assessment base as a source of tax revenue;
 - job creation (both construction and permanent);
 - more efficient and effective use of existing municipal infrastructure;
 - reduced expansion of infrastructure and municipal services for greenfield development and the related on-going upkeep costs;
 - reducing the potential threat to our community’s water supply;
 - increased attractiveness and community safety; and
 - reduced Police, Fire & Bylaw Enforcement Costs
- (City of Kitchener, 2006c, p5)

A senior planner of Kitchener regarded five of the above perspectives as the primary reasons for the City to stimulate redevelopments. First, the City can increase the assessment base as a source of tax revenue by encouraging brownfield redevelopment.

Like most other municipalities across Canada over the past 10 years, Kitchener's revenues have not grown with the economy and demands on the services and infrastructure have grown dramatically (City of Kitchener, 2006d). Therefore, there is a strategic corporate focus that the municipality wants to increase the amount of assessment and taxation, while redeveloping brownfields fits with the City's need. Take the Kaufman Lofts project for example. It is estimated that once the Kaufman building is redeveloped it will produce about \$1.2 million in property taxes per year; up from the \$660,000 in taxes the vacant building generates (Pender, 2004, December 29). "...The more the empty industrial land laid vacant, the more the bound of residence has to pick up the share in terms of contributions to taxes." (Kitchener Senior Planner)

Secondly, it is reasonable for the City to encourage brownfield redevelopment as a way of efficiently using land (Kitchener Senior Planner). Most brownfield sites are located in downtown Kitchener or inner city lands. They are already serviced with roads, sidewalks, sewers, sanitary, storm facilities, water mains etc. Most of these infrastructures are still in good condition. "...The more we redevelop these sites, the less we have to extend services onto the periphery of municipality." (Kitchener Senior Planner)

Thirdly, it is too costly to leave brownfield sites vacant (Kitchener Senior Planner). Vacant/abandoned sites do not generate taxes. There may be tax arrears in some of the brownfields. It costs the money when the City has to send continuous building enforcement officials, fire department officials up to the sites to guarantee public safety. There may be graffiti or vandalism. Sometimes the brownfields become venues for arson or drug activities. When brownfield properties are redeveloped, it will help the municipality to reduce the Police, Fire & Bylaw Enforcement costs.

Fourthly, brownfields depress surrounding neighbourhood land values (Kitchener Senior Planner). It has been found that in the period when the hazardous waste site was identified and remediation occurred, "residential property owners in close proximity to the hazardous waste site experienced lower housing appreciation rates" (McCluskey et al, 2003, p166). Kitchener's senior planner also confirmed the statement that "one vacant

land leads to depressed eight adjacent sites” since nobody wanted to live next to a contaminated site. Depressed land value around brownfield sites leads to depressed assessment of property values, which ultimately affects the total revenue in the City of Kitchener.

Finally, brownfield redevelopment reduces the risks to public health and safety, especially ground water (Kitchener Senior Planner). Approximately 75% of water used by the Regional Municipality of Waterloo (including Cambridge, Kitchener, Waterloo, Elmira and St. Jacobs) is groundwater (Bellamy and Boyd, 2005). Brownfield sites are regarded as an ongoing threat to the Region’s groundwater supply (Grand River Conservation Authority, 2005). Old industrial buildings and lands may contain toxic materials, which may leak into the ground water through various pathways and seriously threat groundwater quality. For example in Brantford, two former factories were once identified as sources of chemicals which had polluted the groundwater (Grand River Conservation Authority, 2005). Therefore, as one of the communities in the Grand River Watershed which use groundwater for drinking, the City of Kitchener has paid special attention to the redevelopment of brownfields in order to protect public health and safety.

4.2.4 Barriers to Brownfield Redevelopment in the City

The researcher found three main obstacles to brownfield redevelopment, which are consistent with the literature review.

The primary barrier confronting the private sector is financial (Kitchener Senior Planner, Kitchener Planning Consultant and Engineering Consultant). There are two interrelated factors to this issue. On one hand, *Guideline for Use at Contaminated Sites in Ontario* (Ministry of Environment, 1997) requires that site restoration work should be completed before any development is carried out on the contaminated sites. The upfront remediation costs can be very expensive, and can easily outweigh the assessed land value. For example, the *Intown 90 Woodside Avenue*, a former foundry in Kitchener, has a total assessment value of \$1.25 million dollars in 2005 while the cost of remediation is

estimated to be \$1.99 million dollars (Kitchener Senior Planner). In fact, Kitchener is adopting the most stringent cleanup criteria in Ontario because groundwater is used for drinking in this city. The surface soil and groundwater criteria for a potable ground water condition are adopted in Kitchener according to *Guideline for Use at Contaminated Sites in Ontario*. This usually involves a more technically difficult cleanup and associated higher costs than the remediation criteria for a nonpotable ground water condition (Kitchener Engineering Consultant). On the other hand, the questions of how to overcome the expensive remediation cost and who should pay for it have really set back developers. The wide-spread “polluter-pays” principle established to address contamination in current industrial activity may have negative effects on brownfield redevelopment. Many of the original “polluters” no longer exist. The cost is then born on the shoulders of any party that is associated with the brownfield sites, including the subsequent land owners or potential developers. As a result, financial institutions are unwilling to finance brownfield projects. Even though there are developers who do want to redevelop brownfields, very few of them can overcome the expensive remediation cost solely by themselves. “We all have the obligation now to pay for the remediation of brownfield sites”, says Kitchener Senior Planner, “...and I suggest all four levels of government, the city, the region, the province and the federal government, should make a contribution to the remediation since we all have benefited from the pollution in the industrialization ...not just polluter pays...”

The second significant barrier is liability. Two types of liability were identified by this research: regulatory liability and civil liability. The property owner of a contaminated site is subject to regulatory liability imposed by the Environmental or Administrative Orders, under the authority of Ontario’s three key environmental statutes: the “EPA”, the “OWRA”, and the “PA”. When an order is issued on a contaminated site, any activity beyond the property should be stopped until the site is cleaned up according to the requirement of the Ministry of Environment. As to civil liability, “the property owner is fully open to lawsuits from any party which believes they have been negatively affected by the environmental condition of the site” (City of Kitchener, 2006c, p6). These two types of liability are uncertain factors associated with any brownfield redevelopment

project, leading to more risks than a greenfield project (Kitchener Planning Consultant). One developer who held a brownfield project in downtown Kitchener also showed his concern about the liability during the interview. He told the researcher that he might have looked at one hundred brownfield sites in a year, only to discover one brownfield site that might be profitable to be redeveloped. Sometimes none of them turned out to be economically viable. One of the reasons is the liability which can not be avoided when making an investment decision. The case of Lynnview Ridge¹ in Calgary has been an alarm for both the private sector and the municipality about liability (Kitchener Senior Planner).

Another main obstacle in Kitchener is the planning approval process occurring at two levels of government (Kitchener Senior Planner and Kitchener Planning Consultant). Unlike many other municipalities in Canada, Kitchener has two levels of government since it is part of Waterloo Region. Typically, a brownfield project in Kitchener may need all kinds of planning variances from both the region and the city, including the official plans, secondary plans, zoning by-laws, etc. For instance, the Kaufman Lofts in downtown Kitchener experienced five zone changes with an official plan amendment (Kitchener Planning Consultant). With an upper regional level of government in Kitchener that governs issues of land use planning and the environment, additional time and expense in obtaining planning approvals are needed, especially when there is an inconsistency of requirement between two levels of government in the planning review process.

4.2.5 Municipal Approaches to Promote Brownfield Redevelopment

The City of Kitchener has been very progressive in addressing brownfield issues. As early as 1992, a committee led by former Kitchener councilor Mike Wagner had already begun to recognize brownfield problems and explored appropriate incentives to entice

¹ Lynnview Ridge is a former oil refinery owned by Imperial Oil. The site was remediated and redeveloped into a residential subdivision in 1970s. In 2001, it was discovered that the subdivision was not compliant with the new changed 2001 lead standard in Alberta and Imperial was issued Environmental Protection Orders to remediate the site again. Civil claims also followed with the orders. Further information regarding to the case can be found at <http://www.cbc.ca/consumers/market/files/environ/brownfield/index.html>

developers to clean up and reuse former industrial sites for new housing and businesses (Pender, 2005, June 23). In 1996, Kitchener's Adaptive Re-use Program was developed in order to resolve the associated environmental, social and financial problems generated by former industrial/commercial sites around the downtown areas (MMAH, 2004). Today, many of the incentives developed previously in the Re-use program have been incorporated into Kitchener's comprehensive package of Incentive Programs called *The Kitchener EDGE (Encouraging and Directing Growth for Efficiency) Strategy*. The EDGE Strategy, including both of the Downtown Incentives Program and the Brownfield Remediation Program (a.k.a. brownfield remediation CIP), provides financial incentives to the private sector to redevelop brownfield sites in the city. Sometimes, the municipal government has to directly intervene to promote redevelopment. Efforts in research and marketing financial incentive programs have also been made by the City of Kitchener to attract investment. In addition, the City has streamlined the planning process for proposals and improved the regulatory environment by providing professional assistance to investors. As to the barrier of liability, there is no municipal method to deal with it in Kitchener because it is beyond the city's power to mitigate liability barriers created by current environmental laws and regulations (Kitchener Senior Planner). Also, in Kitchener's recent *Economic Development Strategy 2007-2010*, the City decided to continually work with other levels of government (Regional, Provincial and Federal) to attract more resources to the redevelopment of brownfields (City of Kitchener, 2007b). Detailed municipal approaches carried out to overcome the barriers in Kitchener are presented as follows:

1. Financial Incentives

The Kitchener EDGE Growth Strategy, which follows the smart growth principles, aims to encourage the re-urbanization of developed areas in the downtown and inner city lands (City of Kitchener, 2006e). There are five City and Regional Incentive Programs integrated in the EDGE Strategy, which together are intended to stimulate investment in Kitchener's key functional areas:

- continued investment in Kitchener Downtown;
- the restoration and re-use of our City Heritage resources;

- increased affordable multiple unit housing throughout our community.
- remediation and redevelopment of Kitchener’s Brownfield lands; and
- more intensive use of under-utilized Inner City lands;
(City of Kitchener, 2006e, p10)

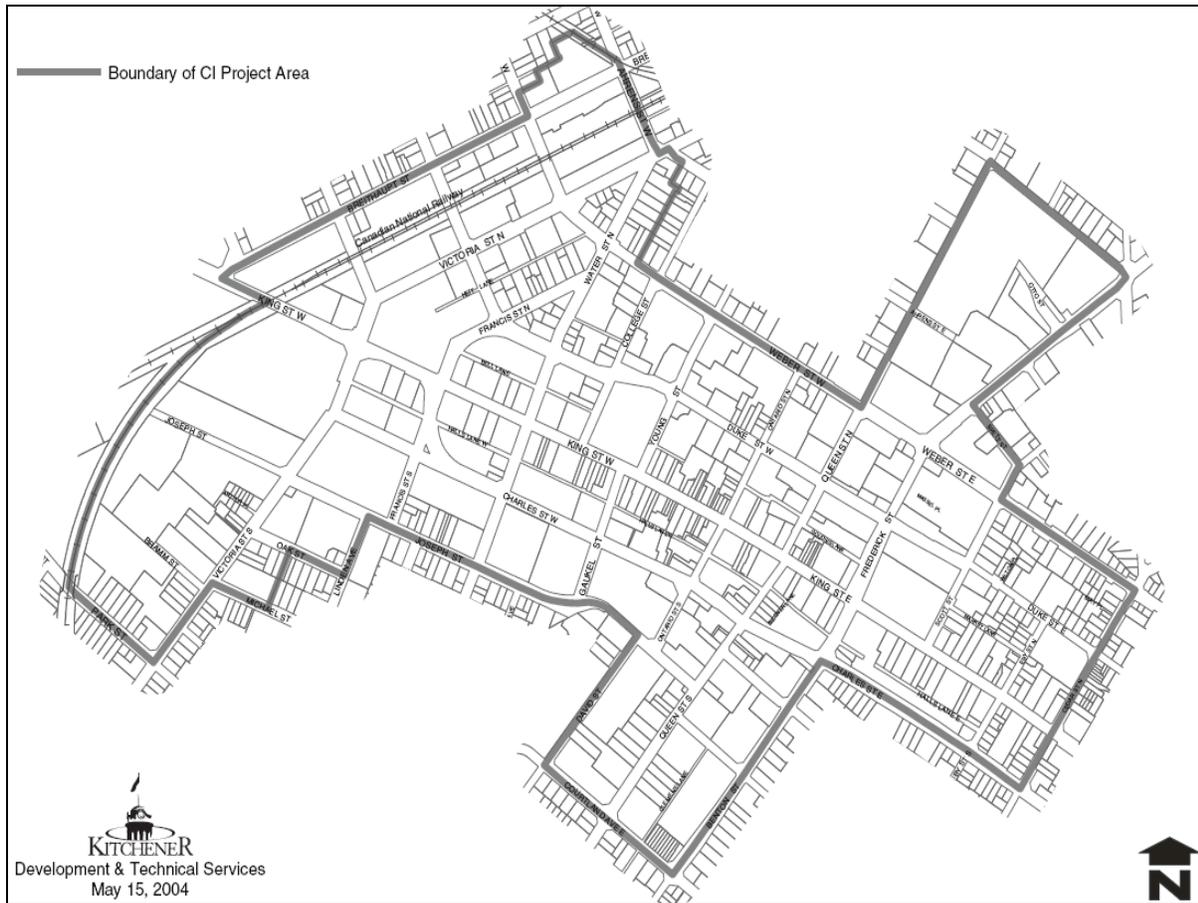
Of the five programs, the Downtown Incentives Program and the Brownfield Remediation Program play important roles in encouraging the private sector to redevelop brownfields in Kitchener.

(1) Downtown Incentives Program

The Downtown Incentives Program, also known as the Downtown Community Improvement Plan, was initiated to attract investment in Kitchener’s Downtown in order to create a vibrant and sustainable environment within the urban centre of Kitchener. Many of the financial incentives developed in the early 1990s are parts of this program. It focuses on downtown areas, and brings benefits to many brownfield projects. Before the Brownfield Remediation Program was initiated in November 2003, this program played a key role in assisting developers in redeveloping brownfield sites in downtown, including the Kaufman Lofts Project — the 2005 Brownie Award for “Best Overall Small to Medium Project”. The City of Kitchener has offered grants, loans and other types of assistance to downtown property owners, investors, developers and business owners within the project area of the Downtown Kitchener Community Improvement Plan (see Figure 4.3),.

The Façade/Interior Loan Incentive Program was first established in 1989 and it has provided financial assistance to owners of downtown commercial properties for exterior/interior building improvements (City of Kitchener, 2006e). Under this program, a loan from \$2,000 to \$15,000 at a fixed rate of interest is provided to the owner to cover the costs of materials, labour and equipment necessary to complete improvements to the exterior and interior of their building. Especially for the loans approved in 2005 and 2006, the interest rate will be zero. Besides, a Feasibility Study Grant with a maximum of \$5,000 is provided to the property owner to identify major structural issues so that they can decide whether to proceed with renovations.

Figure 4.3: Downtown Kitchener Community Improvement Plan Project Area



Source: City of Kitchener (2006e), p6.

The Upper Storey Renovation Program is part of the City's five-year residential intensification initiative which is intended to help investors cover the costs of refurbishing and converting former factories and derelict buildings into residential housing (City of Kitchener, 2006e). The City of Kitchener will provide up to \$100,000 for building/renovation/upgrade/conversion per municipal address based on 50 percent of the project renovation cost. Eligible projects should have vacant upper storey or underutilized space that is situated above commercial use space (City of Kitchener, 2006e). As well, the proposed project should result in an increase in the property owner's assessment and create new residential units with a minimum of 650 square feet (60 square meters) in size.

Rebates for Planning and Building Permit Fees are provided to the property owners who develop or renovate downtown properties. Property owners can get fees refunded on demolition and building permits, site plan approvals, occupancy certificates and sign permits, and all the other planning related application, upon the final completion of the project and the satisfactory final inspection of the work (City of Kitchener, 2006e).

The Elimination of City and Regional Development Charges is provided for any project within the Downtown Community Improvement Plan Area. Both the municipal and regional development charges for the project will not be collected. The **Park Dedication Fee** is waived for all residential developments.

The City of Kitchener Tax Rebate is a tax incentive for rehabilitation and redevelopment of institutional, residential, commercial and industrial sites within Downtown Community Improvement Plan area. The tax rebate lasts three years starting from the year when the work is completed. The rebate is equal to 50% of the city's portion of the property tax increase resulted from the improvements (City of Kitchener, 2006e). "The increase is calculated as the difference between the taxes levied in the year of receiving the building permit and the taxes levied during the first assessment following the completion of the project." (City of Kitchener, 2006e, p14) It is required that improvements to buildings should be made in accordance with a Building Permit, the Ontario Building Code, as well as all the other applicable zoning requirements and planning approvals (City of Kitchener, 2006e).

Among the above incentives, the rebates for planning and building permit fees, elimination of City and Regional development charges and Park Dedication Fee Waiver are automatically eligible for any development within the designated area shown in Figure 4.3. In other words, they are automatically included when the developer applies for a building permit at the Building Division in the City of Kitchener.

(2) Brownfield Remediation Program

The Brownfield Remediation Program, also called the Brownfield Remediation Community Improvement Plan, was prepared and approved by the Council of the Corporation of the City of Kitchener on July 2, 2003. With modifications, it was further approved by the Ministry of Municipal Affairs and Housing on November 27, 2003. This program is the very first brownfield-oriented financial incentive in Kitchener which helps brownfield investors reduce or eliminate the expense of removing the contaminants. The *Brownfields Statute Law Amendment Act 2001* (“Brownfields Act”) amends Section 28 of the *Planning Act* by authorizing Ontario municipalities to offer grants or loans for the redevelopment of brownfields in a designated community improvement project area through a community improvement plan (CIP). The City of Kitchener utilized this amendment and established the Brownfield Remediation CIP in order to “increase the development attractiveness of existing Brownfield lands to a level equal with similar greenfield lands, and thereby stimulate remediation and redevelopment of the community’s contaminated lands” (City of Kitchener, 2006c, p10-11). The strategy of this CIP is to assist property owners to overcome all or part of the site remediation costs. The brownfield remediation CIP project area includes all lands within the limits of the City of Kitchener.

According to Kitchener Brownfield Remediation CIP (City of Kitchener, 2006c), Tax Incremental Financing (TIF) is provided to property owners of brownfields:

“In exchange for a completed and filed Record of Site Condition or approved Site Specific Risk Assessment, the City of Kitchener will provide a grant in the form of an annual rebate on City taxes in an amount equal to 100% of the *City Tax Increment*. The annual grant will continue for a maximum period of 10 years or until the total *Eligible Remediation Cost* has been reached, whichever comes first, where:

a) The *City Tax Increment* is defined as ‘the difference between the City portion of real property taxes as determined on the date of Application to this Program, and the new City portion of real property taxes levied as a result of a new assessment by the Municipal Property Assessment Corporation (MPAC) following project completion’; and

b) *Eligible Remediation Costs* include the cost of conducting Phase 1 & 2

environmental studies, environmental remediation project costs, associated consultant fees, and costs of complying with a Certificate of Property Use (CPU) under 168.6 of the Environmental Protection Act, as necessary, incurred from November 6, 2003, (i.e. The date of the approval of this CIP by the Minister of Municipal Affairs & Housing) and the date of issuance of the first Building Permit (excluding demolition permits) for the proposed project.”
 (City of Kitchener, 2006c, p11)

The 100% TIF under the brownfield remediation CIP can be combined with other financial incentives under Kitchener EDGE Growth Strategy, such as the Downtown CIP, on the condition that the total value of the grant from the financial incentives does not exceed the value of the work done (City of Kitchener, 2006c). In order to understand the rationale of the 100% TIF in a straightforward way, a hypothesized brownfield redevelopment project in Kitchener is illustrated in Table 4.1.

Table 4.1: Example of 100% TIF in Kitchener

<p>Hypothesis:</p> <ol style="list-style-type: none"> 1. There is a brownfield project converting a former industrial building into an apartment building; 2. Project begins in 2005 and will be completed and re-assessed in 2007; 3. It will cost the property owner \$900,000 to remediate the site; 4. The municipal property taxes in 2005 for the site is \$10,000; 5. The projected municipal property taxes in 2007 will be \$110,000. <p>Mechanism:</p> $\begin{aligned} \text{Tax Increment} &= \text{Municipal Taxes in 2007} - \text{Municipal Taxes in 2005} \\ &= \$110,000 - \$10,000 \\ &= \$100,000 \end{aligned}$ <p>Outcomes:</p> <ol style="list-style-type: none"> 1. The property owner pay for the remediation costs of \$900,000; 2. The City issues a rebate on the property tax increment up to \$100,000 to the property owner for 9 years beginning in 2008; 3. In total, the property owner will receive a tax refund of \$900,000 from the City, which can re-coup all the costs for the clean-up.
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2. Direct Intervention by the Municipality

Basically, the municipal approach to encourage the renewal of brownfields in Kitchener is to offer the property owner the financial incentives as outlined above. However, there are cases where direct municipal intervention is necessary due to physical, financial, public health, legal or other circumstances (City of Kitchener, 2006c). That is, with the powers granted under Section 28 of the *Planning Act*, the City may acquire, hold the land, and clear, grade or prepare the land for improvement. In addition, direct assistance such as giving or lending any property of the municipality including money is permitted in accordance with the conditions set up in Section 28 of *Planning Act* upon the approval of the brownfield remediation CIP by MMAH (City of Kitchener, 2006c). Take the former Epton factory at the corner of Victoria & King Streets in Downtown Kitchener for instance. This site was once a major car parts manufacturer. The buildings were demolished and the site became vacant in the 1990's. Today the site is being developed as the University of Waterloo's new School of Pharmacy as well as a new Centre for Family Medicine. The City of Kitchener acquired the 3.35 ha. Epton property and donated it to University of Waterloo for the initial development of the new campus. Underground contaminants were removed through an inground collection system (University of Waterloo and City of Kitchener, 2004). In addition, the City of Kitchener is investing \$30 million from its \$110 million Economic Development Investment Fund for the construction of a 120,000 square feet (111 square meters) new building on the site, including site preparation and site works (University of Waterloo and City of Kitchener, 2004). The bold strategy of building an education and knowledge creation cluster in downtown Kitchener is one of the major motivations for the City to directly intervene in the UW School of Pharmacy Project (City of Kitchener, 2005).

3. Research and Marketing

A successful brownfield strategy or program is based on a comprehensive understanding about the nature and extent of the brownfield sites within the city. The City of Kitchener has spent considerable time and effort in collecting and filing the information on brownfield properties. The City has also conducted a program of environmental site assessments on properties in an area of its downtown (Piccioni, 2004). All RSCs filed with MOE and those being presently remediated have been recorded by the City

(Kitchener Senior Planner). Besides, a Brownfield Working Group in Kitchener was formed in 2002 as a forum for the discussion of brownfields. The Group included stakeholders from the development industry, environmental consulting, banking and financing, city planning, legal and real estate, generating comprehensive perspectives on brownfield issues (City of Kitchener, 2006c).

The City also has undertaken marketing efforts for the brownfield incentive programs to attract investment. It is fully aware of the importance of marketing for a successful financial incentive program. Brochures of the Kitchener EDGE Growth Strategy are available in City hall. The website of City of Kitchener provides detailed publications on all the available incentives and brownfield redevelopment opportunities. By hosting the fourth annual CUI (Canadian Urban Institute) Brownfield Conference¹ in 2003 at the Kaufman Building and sponsoring the 2005 Re-urbanization Conference², brownfield redevelopment in Kitchener is widely known across Canada. The City also has been very active in presenting its programs in various brownfield conferences and workshops³ organized by CUI or Canadian Brownfield Network (CBN).

4. Professional Assistance from Municipal Staff

The complexity of planning approvals is also an important barrier to investors. In order to overcome this barrier, the City of Kitchener assigns special municipal staff to work directly with the investors through the administrative procedures. The Kitchener Senior Planner, who was the city representative in three brownfield projects, showed great enthusiasm and commitment about his work, "...I work hand-in-glove with the developer and the planning consultant. Any time they have a problem, they called me and I would find a solution for them...It is a client relationship between the investors and municipal staff. Sometimes they don't understand the government and get frustrated or angry, and think the end of the world has come...It's just to have a single point of contact. Somebody understands how the municipality runs and can be a bit of help to investors..." By directing a dedicated staff to work with investors and solve any of their problems, the

¹ For further information regarding to this conference, please refer to http://www.aboutremediation.com/Events/EventDetails.asp?Event_ID=230.

² <http://www.region.waterloo.on.ca/rrr2005>

³ <http://www.canadianbrownfieldnetwork.ca/workshops.asp>

City of Kitchener has shifted the municipal attitude from regulators to partners. Proactive and pre-investment advice and planning consultation from municipal staff are offered to brownfield investors. "...Kitchener is one of the most enjoyable cities to work in. The City has really been willing to assist us to make this a success" (Developer in Kitchener). In addition, the City of Kitchener has also designated a full-time brownfield coordinator and appointed members from Finance and Legal Departments to evaluate the applications of brownfield remediation program and to prepare a suggestion for the consideration of the City's Finance and Corporate Services Committee and City Council. Therefore brownfield investors can successfully get approval of TIF granting. The coordinator works as a bridge between the government and the stakeholders, providing leadership and advancing collaboration needed in the partnership between the private and public sectors.

4.2.6 Results

Sound financial incentives, effective marketing, and a strong staff-client partnerships result in successful brownfield redevelopment projects (City of Kitchener, 2007b). According to the *2005 and 2006 Downtown Monitoring Report* (City of Kitchener, 2006f; City of Kitchener, 2007a), the Downtown Incentives Program has continually facilitated renovations and intrigued private sector support for downtown redevelopment. Table 4.2 summarizes the annual activity of all Downtown Financial Incentives from 2003 to 2006. Although this program is not especially designated to help investors clean up brownfield sites, several brownfield projects in downtown Kitchener have taken advantage of the Downtown Financial Incentives which help cover costs for building improvements and waive various planning and permit fees. These projects include the Kaufman Lofts in the old rubber boot factory, the Eaton's Lofts in the former Eaton's department store and the Mansion Lofts in a 103-year-old J.C. Snyder furniture factory. As a rule of thumb, the economic benefits generated by these three projects are shown in Table 4.3.

Table 4.2: Summary of Downtown Financial Incentives

	2003	2004	2005	2006
Total incentives and loans issued	5 rebates 2 loans	3 rebates 4 loans	4 rebates 4 loans	8 rebates 10 loans
Total value of Façade/Interior loans	\$90,000	\$130,000	\$75,585	\$255,000
Total value of upper storey loans	-	-	-	\$265,000
Total value of Façade/Interior improvements ³¹	\$500,00	\$605,000	\$171,881	\$1M
Total value of upper storey improvements	-	-	-	\$568,000
Total value of downtown rebates	\$200,000	\$21,230	\$40,784	\$61,500

Sources: Financial Service Department, City of Kitchener (2006f), p12; City of Kitchener (2007a), p13.

Table 4.3: Economic Benefits from Three Brownfield Projects in Downtown Kitchener

Projects	Kaufman Lofts ³²	Eaton's Lofts ³³	Mansion Lofts ³⁴
Opened Year	Opened 2007	Opened 2005	Opened 2005
Site Area	1.7 ha.	-	0.46 ha.
# of New Units	270	32	58
Range of Price	Phase I: \$115,990 to \$221,990 Phase II: \$149,990 to \$188,990	\$99,000 to \$299,990	one-bedrooms starting at \$169,900
Annual Property Taxes Before Redevelopment	\$660,000	-	\$27,000
Annual Projected Property Taxes After Redevelopment	About \$1.2 million	-	at least \$100,000

Sources: Bow (2005); Pender (December 29, 2004); Pender (January 31, 2005).

³¹ According to the 2005 *Downtown Monitoring Report*, estimated improvements are based solely on loans issued through the downtown Façade/Interior loans program (City of Kitchener, 2006f, p12)

³² <http://www.kaufmanlofts.com/>

³³ <http://www.eatonslofts.com/>

³⁴ <http://www.theloftsonmansion.com/home.html>

The Brownfield Remediation Program has been active since the approval by MMAH in November 2003. “The program has been successful. Four developments are underway, and they would not make without municipal support” (Kitchener Senior Planner). “Kitchener has done a very good job in terms of coming up with an incentive package to facilitate brownfield redevelopment” (Kitchener Planning Consultant). Tax Incremental Financing in the Brownfield Remediation CIP has allowed the investors in the four projects to recover some or all of the cleanup cost, while in return the city gets increased tax assessment, reduced environmental threats, and new high-density housing units. Table 4.4 is a summary of the four projects using the Brownfield Remediation Program. The table was made based on information collected from interviews, local newspaper, and staff reports in the City of Kitchener.

In addition, with the City’s direct assistance of donating the property and contributing the money, the St. Jerome’s building has become the new Wilfrid Laurier’s Lyle S. Hallman Faculty of Social Work, while the Epton factory is becoming the University of Waterloo’s School of Pharmacy rather than a vacant parking lot. A \$6.5 million investment of the Economic Development Investment Fund (EDIF) from the City of Kitchener has made it possible for Wilfrid Laurier University to move its School of Social Work to the former St. Jerome’s High School. It is estimated that the new campus will annually generate economic spin-offs of \$1.48 million (City of Kitchener, 2006f). As well, the new School of Pharmacy at the University of Waterloo on the former Epton Factory becomes possible through a \$30 million EDIF and a donation of the property from the City (University of Waterloo and City of Kitchener, 2004). One hundred and twenty pharmacists are expected to graduate from the new school annually. It is estimated that “the project will add \$31 million to the region’s economy; create approximately 358 full-time equivalent jobs and some \$21 million in wages and salaries” (City of Kitchener, 2006f, p6).

Table 4.4: Summary of Projects Using the Brownfield Remediation Program (2004-2006)

Project	1420 King St. E.	537 Frederick St.	The Intowns, 90 Woodside Ave.	Arrow Lofts, 112 Benton St.
Site Area	0.3 ha	-	3.38 ha	0.89 ha
Former Use	-	a range of automotive uses including gas station, transport company, truck repair, and used car lot	A succession of Buffalo Forge Company, Canadian Blower & Forge Ltd., Canadian Blower/Canada Pumps and Howden Fan Company	Former Arrow Shirt Factory
Intended Property Use	50 new affordable senior's rental units	Medical building	128 condominium townhouses	Phase I: 150-unit rental loft apartments in the old building Phase II: 180 units in a new high-rise apartment
TIF	A break of \$183,000 to cover the total eligible remediation cost	A break of \$34,631.13 to cover the total eligible remediation cost	A break of \$1,215,260 over a 10-year period to cover part of the cleanup cost of \$1.9 million	A break of 1.1 million in 10 years to cover part of the clean up cost of 2.3 million
Projected Construction Value	\$5.8 million	\$2.5 million	\$40 million	\$29 million
Annual Property Taxes Before Redevelopment	-	-	\$55,533	\$73,727
Annual Projected Property Taxes After Redevelopment	-	-	\$417,614	\$393,531

Sources: Pender (October 13, 2006); Pender (November 20, 2004); City of Kitchener Reports (2006g, 2006h, and 2006i)

4.2.7 A Showcase: Kaufman Lofts

The Kaufman building on King Street East at Victoria once housed one of the world's most famous footwear manufacturers, the Kaufman Rubber Company plant. The 22-year-old entrepreneur A.R. Kaufman started the footwear company in 1907 with financing from his father who owned a lumber business. By 1912 it had grown to be one of three largest rubber factories in Berlin³⁵, and one of Berlin's largest employers as well (English and McLaughlin, 1996). Kaufman Rubber had produced many famous footwear brands during its long period of operation, such as Life-Buoy, Foamtreads, Sorel and Funtreads (Mills, 2002). However, the pre-eminence of the old footwear factory ebbed away in July 2000 when Kaufman declared bankruptcy. Kimshaw Holdings and its Toronto-area partner, Andrin Ltd., bought the Kaufman building in 2002 from Ernst & Young, the family-owned factory's receiver. The new owners showed great respect to the history of the building, and planned to maintain the architectural integrity of the old building. They invested nearly \$20 million to convert the 200,000 square feet (18581 square meters), five-storey historic building into a loft that can house up to 270 residential apartment units together with 350 surface parking lots. Also, the historic machine of the steam engine named "Hazel", which had provided power for Kaufman Rubber with a huge 16-foot flywheel right up until the factory's closure, was donated by the developers to the City of Kitchener's Industrial Artifacts Project. Figure 4.4 presents photographs of the Kaufman building in the past and pictures taken from on-site observation in July 2006.

This site was contaminated with four phases of naphtha: (1) free product, (2) residual naphtha adsorbed on soil particles, (3) dissolved-phase naphtha (including BTEX), and (4) vapour-phase naphtha (Kitchener Engineering Consultant). The contaminants were concentrated in a hot spot under the back corner of the main building, which is a former underground storage tank that held naphthalene, a component of glue used to produce footwear. The original building itself was contaminated with lead-based paint, which could be readily removed.

³⁵ The other two rubber factories are Dominion Tire and Merchants.

Figure 4.4: The Kaufman Building



Upper Left: An early sketch of the Kaufman Rubber Co (Mills, 2002, p44).

Upper Right: The building still remains a very commanding presence on King Street East at Victoria. It is impossible to pass by it without notice.

Lower Left: A.R. Kaufman (fourth from the left) pauses during a game of shinny with other employees in the inner courtyard area (Courtesy Kaufman Collection, UW in Mills, 2002, p44).

Lower Right: The architectural integrity of the old building was restored in the development.

The developers of the Kaufman Lofts Project came up with the idea to sever the property into several parcels. The main building as a plot according to the severance was cleaned up to a generic set of standards and got a Record of Site Condition from MOE and finance from a financing company. But for the hot spot which took a relatively longer time for underground soil remediation and had the liability of contamination, a Site-Specific Risk Assessment (SSRA) approach was used. There was a Multi-Phase Extraction (MPE) system installed in situ to lift free product, soil vapours and

groundwater to the surface for treatment. An oil-water separator was used to remove free product while an air stripper was used to remove contaminants from groundwater. As of the on-site observation date of July 11th, 2006, the work to remove the naphthalene contamination detected in the hot spot was in progress, while the southern half of the original building (i.e. Phase I) was being furnished and the northern half of the building (i.e. Phase II) was undergoing new window and structural construction. Figure 4.5 illustrates a series of construction underway in Kaufman Lofts on July 11th, 2006 from on-site observation. The occupancy of the building was opened in April 2007.

Figure 4.5: A Series of Construction underway in Kaufman Lofts as of July 11th, 2006



Upper Left: Hot Spot that is undergoing remediation

Upper Right: Loft in Phase I that is being furnished with interior features

Left: New windows being installed in Phase II

The Kaufman Lofts project turned out to be quite successful in terms of its sale record. The market success of the Kaufman Lofts was greater than the developers' original expectation. The Phase II was totally sold out by October 2006 while the project's first phase of 114 units in the southern half of the building was sold out rapidly in six weeks in

2005. In 2005, the Kaufman Lofts Project was named best small/medium scale project at the Canadian Urban Institute's (CUI) Brownie Awards ceremony, in a competitive category with 60 nominations from all over Canada. The Kaufman Lofts project was also included in the brochure *Brownfield Showcase II* produced by MMAH in summer 2004. The final product of the project came out in April 2007.

“The financial incentives and the municipal attitude about redeveloping downtown are essential attributes that draw us to the site” one of the co-developers in the project at Kimshaw Holdings stated in the interview. First of all, the Kaufman Lofts project has benefited from financial incentives contained in the Downtown Community Improvement Plan³⁶. The City of Kitchener waived fees and development charges (both Regional and Municipal) worth about \$1.4 million for the project. “If you don't have the break on the development charges and those sorts of things, you just can't afford it, unless they are luxury projects the margin isn't there to develop downtown residential. It just isn't” The project manager for Andrin Ltd. told the newspaper staff of *The Record* (Pender, 2004, December 29). “It was a huge amount of money for the cleanup of the contamination. If there were no such a financial incentive, the project wouldn't be viable.” The developer at Kimshaw Holdings also confirmed the importance of financial incentives in the interview. Secondly, the City showed a very proactive attitude towards the project by assigning a city staff to work closely with the developers and to facilitate all the related planning approvals and variances. For instance, the developers changed the development plan for several times before they came to a final decision of converting the building into all apartments. This decision encountered a great challenge of re-zoning application. The City of Kitchener had a prohibition against ground floor residential on King Street while the Kaufman building was right on the end of King Street, the end of downtown. Fortunately, the project finally received the re-zoning approval thanks to the cooperative efforts from the developer, the local government and the planning consulting firm serving in the project. The city staff and the brownfield coordinator are especially helpful to the developer during the planning approval process “...he is really great, with clear

³⁶ The Kaufman Lofts project has not applied for TIF in the Brownfield Remediation Program because the project commenced prior to the development of the program.

commitment and patience...” The developer in Kimshaw Holdings praised the brownfield coordinator.

4.3 Brownfield Redevelopment in City of Hamilton, Ontario

4.3.1 Introduction of Hamilton

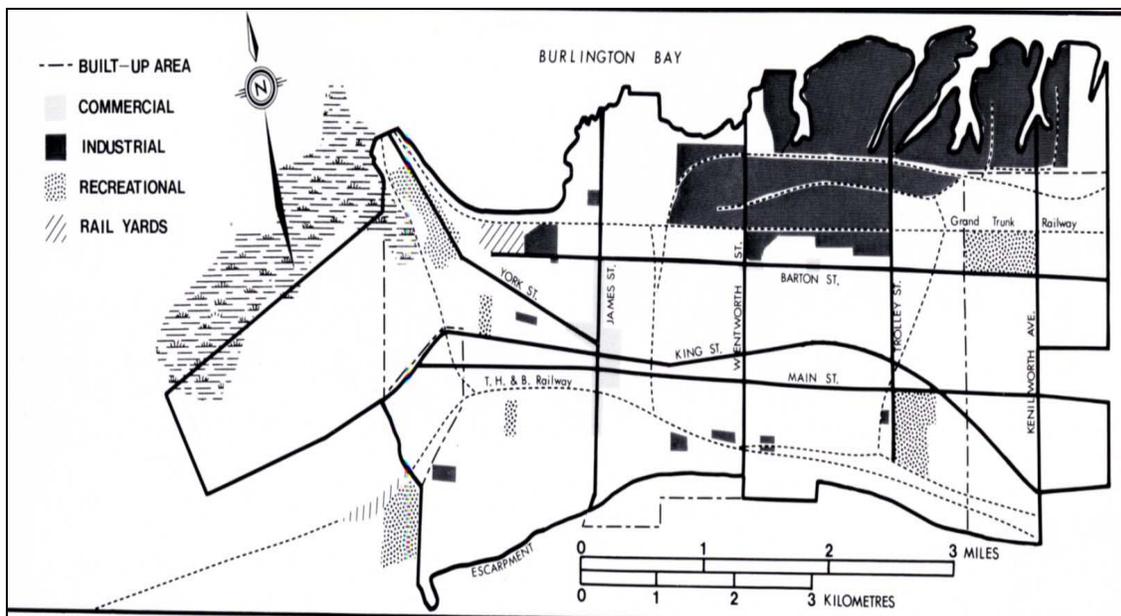
The City of Hamilton (formerly the Hamilton-Wentworth Region) has always been a fascinating city situated on the southwestern shore of Lake Ontario. It is unique not only in its physical features but also in its fame as a centre of Canadian industry since the mid-nineteenth century. To the North is the crystal-clear water of Hamilton Harbour; to the West is a spectacular bird’s eye view of Dundas Valley; while the world-famous limestone ridge, the Niagara Escarpment locally known as “the mountain”, running across the middle of the city, has long been a joy to the residents of the city. Canada’s two largest steel factories are located here. McMaster University, one of the finest Canadian universities, is also located in this city.

In 1813 when George Hamilton laid out his farm land into lots, little did he know that he had established the foundation of what would be, almost two hundred years after, a city called *Hamilton* with a population of more than half a million people (Lister, 1913; Freeman, 2001). At that time Hamilton was no more than a self-contained village with small workshops. The first impetus to the industrial life of Hamilton can be traced back to the year 1823 when the Burlington Canal was constructed to connect the Burlington Bay³⁷ with Lake Ontario (Lister, 1913). With its opening in 1834, Hamilton soon became the entranceway for goods and people heading further west and an important port for the export of agricultural products (Freeman, 2001). Twenty years after, the Great Western Railway which went from Niagara Falls through Hamilton to London and Windsor was in operation. Manufacturing industries that took advantage of water and rail transportation gradually concentrated along the bayshore in Hamilton. This kind of expansion was especially the case during Hamilton’s Second Industrial Revolution

³⁷ The historic name of Burlington Bay was changed officially to Hamilton Harbour in 1919 (Weaver, 1982)

(Weaver, 1982). Figure 4.6 provides a map of land use and railways in Hamilton in 1914. In early 1910s, Canada's two largest steel producers, Stelco and Dofasco were established along the waterfront in the east end of the city. With massive investment in the manufacturing industries, workers flocked into Hamilton. Many British immigrants from the rapidly developing industrial centers of Britain came to Hamilton with valuable skills. Hamilton thus progressed to a manufacturing center at the beginning of the twentieth century and got its nicknames such as the Ambitious City, the Birmingham of Canada and Steel Town (Freeman, 2001).

Figure 4.6: Land Use and Railways in Hamilton (1914)

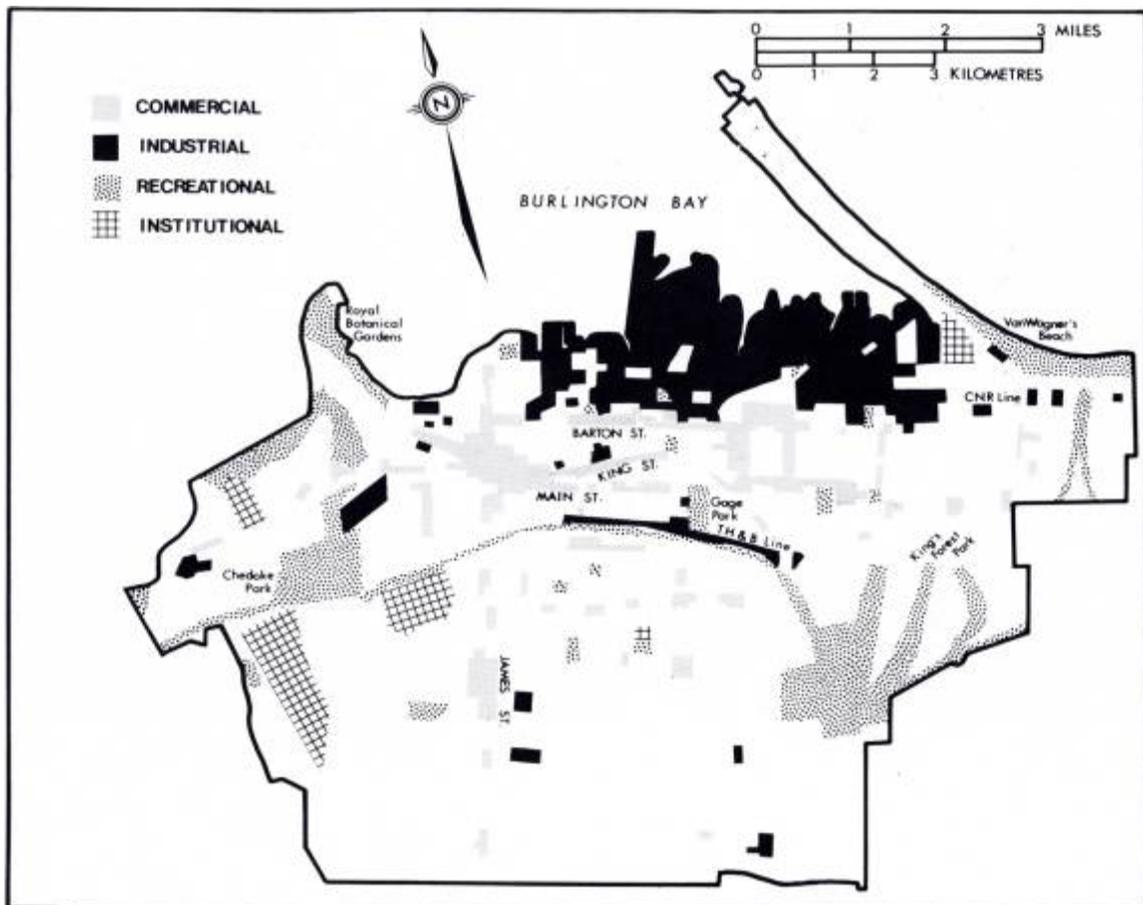


Source: Weaver, 1982, p97

Hamilton suffered greatly from the 1930s Great Depression because of its dependence on heavy industry. Companies like National Steel Car and the steel companies were operating at 40 to 50 percent capacity (Freeman, 2001). Blue-collar people who earned their living by the honest sweat of their labours experienced hard times. Fortunately, boom times came back during the postwar period (1946-1980). Steel mills as well as hundreds of secondary industries dependent on steel expanded at an unprecedented pace (Weaver, 1982). In order to guarantee the expansion of plants and docking facilities, large-scale landfill projects in the east end of Hamilton Harbour were approved by the

Harbour Commissioners and new employment land was created (Freeman, 2001). Figure 4.7 shows the industrial concentration on the harbour in 1968. Industrial land expanded a lot towards the Burlington Bay James N. Allan Skyway Bridge with landfill strips when compared with Figure 4.6. Hamilton had “one of the highest growth rates and per capita incomes in Canada during the 1960’s and 1970’s” (City of Hamilton, 2005a, p20).

Figure 4.7: Land Use in Hamilton (1968)



Source: Weaver, 1982, p180.

The dominance of manufacturing in Hamilton’s economy has dwindled ever since the 1980’s (City of Hamilton, 2005a). After the creation of NAFTA (North American Free Trade Agreement) in the 1980s, many Canadian companies encountered fierce competition from American companies. Companies were reformed into “smaller, more economical units” and they stopped operations in large manufacturing centres like Hamilton (Freeman, 2001). These closed-up factories in the past twenty years, as well as

the old textile and auto industries which disappeared in the 1950's and 1960's, form the so-called brownfields in Hamilton. However, the shrinkage of the manufacturing industry and economic change have not created as much of a panic as in the Depression. Instead, Hamilton has evolved from a one industry "Steel Town" into a more diversified city today at the hub of Ontario's Golden Horseshoe. Fuelled by innovative R&D at McMaster University, smaller and medium-sized technologically advanced manufacturing firms are springing up along the major transportation corridors while the service sector has grown (City of Hamilton, 2005a). Hamilton Health Sciences Corp is the largest employer in the city now with over 9,000 employees (City of Hamilton, 2006a). The unemployment rate has remained between 5.5 and 6.8 percent in the past five years, approximately the same rate as Toronto and other centers in the Greater Toronto Area (GTA) (City of Hamilton, 2006b).

4.3.2 Brownfields in Hamilton

In both Hamilton's Environmental Remediation and Site Enhancement (ERASE) Community Improvement Plan and Hamilton's Economic Development Strategy, "brownfields" are defined as "abandoned, idled or underused industrial or commercial properties in built-up urban areas where expansion or redevelopment is complicated by real or perceived environmental contamination, building deterioration/obsolescence, and/or inadequate infrastructure" (City of Hamilton, 2005a, p87; City of Hamilton, 2005b, p2). This definition has limited the physical boundary of Hamilton's brownfields within built-up urban areas while at the same time extended the concept to a broader scope which is not just focused on contamination but also building deterioration.

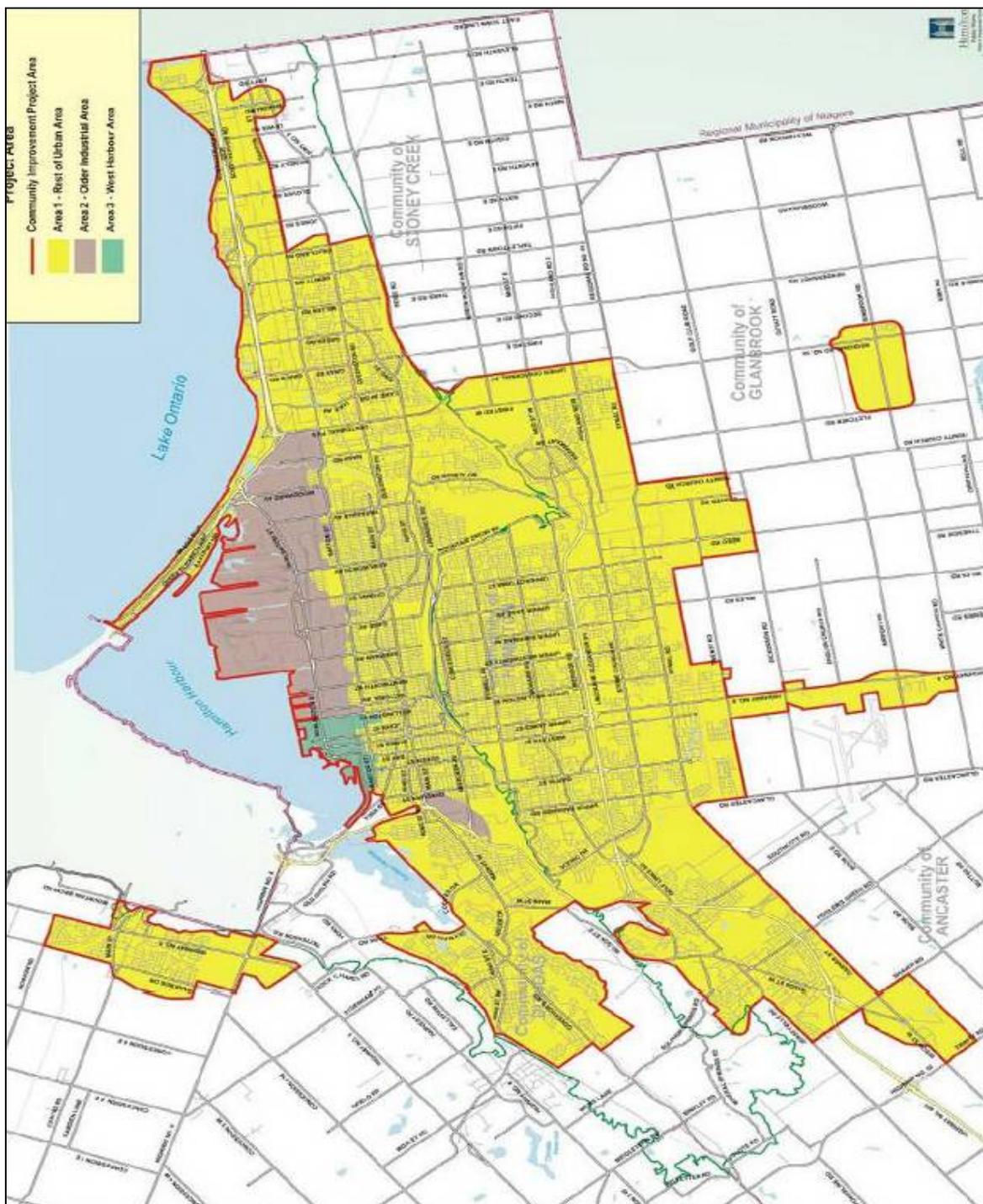
Similar to many other municipalities in Ontario, the City of Hamilton does not have an inventory of brownfields at present. What the City does have are fragmented databases, such as the listing of gas stations and former landfill sites inventory. According to the Hamilton Brownfield Coordinator, the City has received funds from FCM (Federation of Canadian Municipalities) for historic land use studies, which will help to establish a complete list of brownfields over the entire city. It should be noted here that all those

documents are restricted for internal use only and will not be released to the public, considering the negative impact on property value and the potential civil liability incurred by incorrectly labelling a brownfield site (Hamilton Brownfield Coordinator). It is estimated that there are approximately 150-200 brownfield sites within the 2001 ERASE CIP program boundaries (Boles, 2003). However, based on the updated Hamilton ERASE CIP approved by MMAH in November 2005, the number of brownfield properties in the entire area of Hamilton has increased to 300-400 (City of Hamilton, 2005b). The main reason for the difference lies in the boundaries of the Community Improvement Project Area in the two versions of ERASE CIP. The original 2001 ERASE CIP applies to the Old Industrial Area, while the recent 2005 version has taken into account two additional areas where brownfields also exist. They are West Harbour Area and the Rest of Urban Area (See Figure 4.8).

In the past, as shown by Figure 4.6 and 4.7, Hamilton's industrial activities were mainly clustered in the Bayfront Industrial Area (1214 ha. in size), the North Hamilton Industrial Area (28 ha.), the West Hamilton Industrial Area (101 ha.) and part of the East Hamilton Industrial Area (26 ha.), all of which constitute the approximately 1376 hectares of the Old Industrial Area in Hamilton (City of Hamilton, 2005b). By and large, due to the extensive contamination resulting from past industrial uses and the vast quantities of contaminated soil placed as fill, the Old Industrial Area now is the location of 150-200 of Hamilton's brownfields (City of Hamilton, 2005b). In addition, the industrial uses in the West Harbour Area also form part of brownfields in Hamilton, because the West Harbour Area is designated to be redeveloped for non-industrial uses according to the City's long term planning project *Setting Sail*³⁸ under collaboration between the City of Hamilton and Hamilton Port Authority (City of Hamilton, 2005b). The Port Authority transferred the land ownership of Piers 1, 2 and 5 through 8 in West Harbour Area to the City of Hamilton for recreational uses in the future. In fact, some of the industrial sites in the West Harbour Area have already been converted into recreational use in recent years, such as Pier 4, Bayfront Park and the Waterfront Trail. The few remaining industrial uses

³⁸<http://www.myhamilton.ca/myhamilton/CityandGovernment/CityDepartments/PlanningEcDev/Development/CommunityPlanning/SecondaryPlans/setting-sail.htm>

Figure 4.8: 2005 ERASE CIP Project Area



Source: City of Hamilton, 2005b, p20.

in this area will also be relocated and converted in the future. It is estimated that there are also more than 200 brownfields spread throughout the rest of the urban area in Hamilton, including the downtown (City of Hamilton, 2005b). These sites were abandoned or deteriorated as a physical legacy of suburbanization and industrialization in the past and they were potentially contaminated in soil and groundwater. These sites include former waste disposal sites, asphalt plants, automobile wrecking yards, textile mills, blacksmiths and dry cleaners (City of Hamilton, 2005b). Hamilton's brownfields are spread in the Old Industrial Areas, the West Harbour Area and throughout the entire urbanized area.

4.3.3 The Impetus for Brownfield Redevelopment

The Hamilton 2005 ERASE CIP comprehensively identified the economic, social and environmental benefits from brownfield redevelopment (See Figure 4.9). Among all these benefits, the solid “public good” rationale is regarded as a main reason for government involvement in promoting brownfield development. These public goods include:

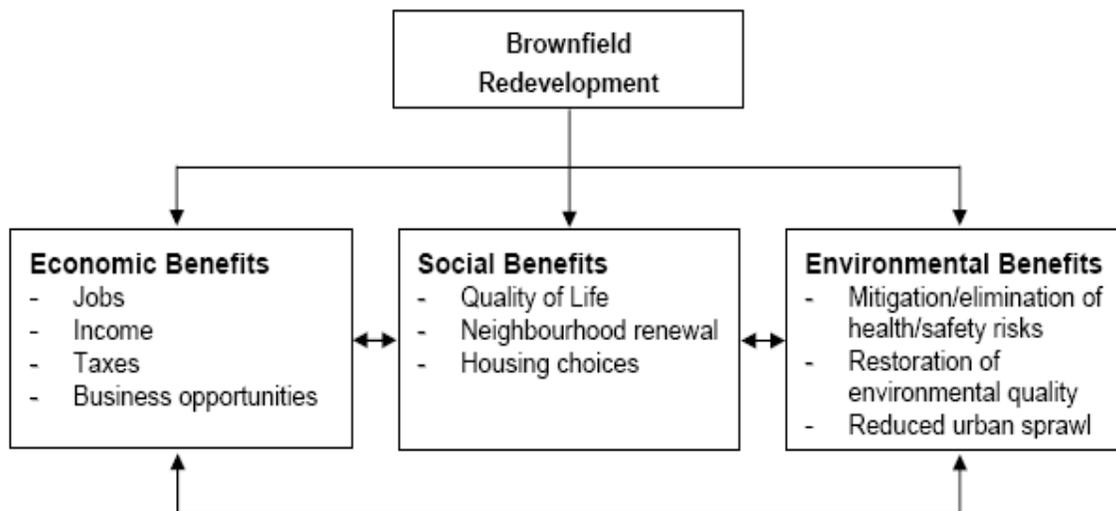
- increased tax assessment for the municipality and the Province;
- creation and retention of employment opportunities;
- utilization of existing infrastructure resulting in a reduction of urban sprawl and its related costs (hard and soft services).;
- contribution toward the revitalization of particular areas and neighbourhoods; and,
- environmental restoration which can remove threats to the health of workers and residents.

(City of Hamilton, 2005b, p4)

Two aspects of the above “public good” were also emphasized by the Hamilton Brownfield Coordinator during an interview: economic benefit on tax assessment and the environmental impact on public health/safety. According to the Hamilton Brownfield Coordinator, the economic benefit on tax assessment is twofold. On one hand, a brownfield site usually incurs mounting tax arrears, which is an “ever-increasing problem” in many Canadian cities (Piccioni, 2003). It is estimated that for abandoned industrial properties in Hamilton's Old Industrial Area, the amount of property tax arrears is over \$10 million (Piccioni, 2003). Redeveloping those abandoned brownfield sites not only stops the potential tax arrears but also generates new property tax. On the other hand,

redeveloping brownfields can increase the value of adjacent properties. A 1998 Environment Canada study compared property sale prices for houses within 3,500 feet of Hamilton West Harbour’s Bayfront Park³⁹ with sale prices for houses farther than 3,500 feet away from the park during 1983 and 1996. The study revealed that for houses in the study group, approximately 18.5% of the aggregate 1996 property values were brought by the development of Bayfront Park and improvements in water quality (City of Hamilton, 2005b). The increased property tax resulting from the Bayfront Park could have contributed more than \$560,000 to the City’s property tax revenues at the time (City of Hamilton, 2005b). Brownfield redevelopment presents a far-reaching economic opportunity to the City of Hamilton.

Figure 4.9: Benefits of Brownfield Redevelopment and their Interrelationships



Source: Regional Analytics, 2002, in Hamilton 2005 ERASE CIP, p4

Another obvious concern drawing the City’s attention are environmental problems associated with brownfield sites (Hamilton Brownfield Coordinator). Most of Hamilton’s brownfield sites are former industrial buildings which are abandoned, derelict and in a state of disrepair. Various industrial uses in the past could have caused soil and groundwater contamination, such as automobile wrecker yards and petroleum storage. In addition, some brownfield sites are subject to trespassing, vandalism, fire, crime, etc,

³⁹ Bayfront Park was once a 16-hectare former landfill site on Hamilton West Harbour.

causing great public concern for safety (City of Hamilton, 2005b). Almost no Hamiltonian would have forgotten the 1997 conflagration at a plastics recycling facility known as Plastimet, a former metal smelting facility in the period of 1950 to 1990. A black toxic cloud had hung over the City for four days and the fire was the worst in Hamilton's history. The fire aroused the City's great concern on public safety, because the brownfield site was close to a residential area.

Thirdly, the continuing demand for heavy industry and manufacturing types of land in the Hamilton area is considered as a significant motivation by Hamilton 2005 ERASE CIP as well as the academic literature (City of Hamilton, 2005b; Boles, 2003). In Ontario, it becomes more and more difficult for manufacturing industry to locate in an appropriately sized land parcel because most Ontario municipalities no longer zone land for such a kind of industrial use. In that case, the Old Industrial Area in Hamilton can best meet the growing demand because of its current inventory of heavy industrial uses and the restrictive zoning in greenfields (City of Hamilton, 2005b). Promoting the redevelopment of abandoned, underused industrial land in the Old Industrial Area for new industrial uses will generate new job opportunities and economic benefits for Hamiltonians.

4.3.4 Barriers to Brownfield Redevelopment in the City

In the Brownfield Coordinator's opinion, the biggest barrier to brownfield redevelopment in the City of Hamilton is the upfront financing which is twofold: 1) the expensive upfront cost; 2) banks' unwillingness to finance brownfield projects. In the Hamilton 2005 ERASE CIP, this issue has been addressed. For one thing, it usually requires a large amount of money for developers to cover the upfront cost of remediating brownfield sites. These upfront costs are additional costs of a brownfield rather than a greenfield project. They are mainly associated with the four sequential Phases of Environmental Site Assessment (ESA) required by Ontario EPA. Phase II (sampling and analysis) ESA can be very expensive, especially for large environmentally complex brownfield properties, needless to say remediating the site to meet the regulation standards. In addition, other upfront costs associated with building demolition and infrastructure upgrading may

sometimes exceed the costs of environmental remediation. This is a common occurrence on brownfield sites located in the Old Industrial Area, since Hamilton is an old city with a rich history of industrialization (City of Hamilton, 2005b). Unless financial assistance is provided to offset the expensive upfront costs, brownfield sites may remain less financially competitive than greenfield sites. For another thing, as part of the financing equation, banks fear of exposing themselves to the liability of contamination and are unwilling to finance brownfield sites unless the contaminated land has been cleaned up and a Record of Site Condition is filed in the Brownfield Environmental Site Registry (Hamilton Brownfield Coordinator). As a result, "...from the time developers buy the brownfield site, and decide to redevelop the site, to the time they get it clean and they can construct a new property, that's a lot of money and it could be, who knows how long, 4, 6, 8 years... it depends on how quickly the remediation goes...developers are financing themselves", said the Hamilton Brownfield Coordinator.

The second biggest barrier to brownfield redevelopment is the contamination liability (Hamilton Brownfield Coordinator). All participants in a brownfield project may be exposed to liability arising from the contamination caused by the original "polluter" (Hamilton Brownfield Coordinator). There is no definite time length of exposure to this liability as well as no fixed amount of the potential liability. In Hamilton, many large landowners are unwilling to sell their properties mainly because of the potential exposure to contamination liability (Boles, 2003). If they do sell their properties, they only sell them to those buyers with "deep pockets" who can reduce the risk of future problems (Boles, 2003). Imperial Oil has 4-8 hectare property down the industrial core in Hamilton which has been vacant for at least 25 years. Imperial Oil has been paying taxes on the property while doing nothing with the site. "My impression is that they feel they can not get the site cleaned up to the standard...and if they can clean it up to today's standard, the standard will probably get higher in 2 or 3 years and when the liability stems back to them, they don't feel they can be exempted from the problem", said the Hamilton Brownfield Coordinator.

The third key barrier was identified as the lack of detailed information on brownfield sites in the City (City of Hamilton, 2005b). Traditional databases involving a map of potential brownfield sites over a large urban area, a listing of certain types of brownfields such as former landfill sites, and/or Phase I ESA, are not enough to attract developers to redevelop brownfields. In addition to the locations, detailed information on the existence, type, and extent of contamination, and the estimated cleanup cost all play an important role in developers' decision-making (City of Hamilton, 2005b). Such detailed information is generally produced by a Phase II ESA. Due to the expensive study cost, few property owners are willing to carry out a Phase II ESA. Sometimes even though the property owners do have the detailed environmental information for the brownfield site, they do not tend to reveal their Phase II ESAs for the fear of undesirable consequences such as decreasing property value or being forced to clean up the property. Therefore, developers who are interested in brownfield sites usually have to educate themselves and collect all the related information.

Fourthly, the complicated planning process and the lengthy time required to obtain planning approvals are also regarded as a key stumbling block by the municipality (Boles, 2003; Piccioni, 2004). Before the City of Hamilton responded to this barrier and carried out any counter-measure as will be discussed following, it was common for developers to visit several different divisions for one brownfield project. At times, when different divisions reviewed and approved the same proposed redevelopment project, their responses might be overlapping and even inconsistent with each other, leading to the complexity and uncertainty.

4.3.5 Municipal Approaches to Promote Brownfield Redevelopment

The City of Hamilton is among the rare municipalities in Ontario which has been very proactive in addressing brownfield issue at a very early time dating back to the 1980s. At that time, the concept of brownfields was not recognized in Canada, yet contaminated land had drawn Hamilton's attention. The City reclaimed 16.2 hectares of contaminated land on the City's Bayfront in 1985 and converted the land into Bayfront Park

(CMHC&SCHL, 2005). However, it was not until 1997 that the City of Hamilton began seriously addressing the issue of brownfields (Piccioni, 2003). The City established a public/private sector task force known as *Industrial Redevelopment Task Force* in 1997, which consisted of 20 handpicked stakeholders, in order to identify the barriers to brownfield redevelopment and formulate an action plan. In June of 1999, the City of Hamilton Council authorized staff to prepare the City of Hamilton Environmental Remediation and Site Enhancement (ERASE) Community Improvement Plan (CIP). As suggested by its name, the CIP was aimed to “erase” brownfield sites by means of providing incentives to remediate and redevelop them into productive land uses (Piccioni, 2003; Boles, 2003). The Plan was the first one in Canada which utilized a community improvement plan to provide financial assistance to brownfield redevelopment under Section 28 of *Planning Act* (City of Hamilton, 2005). The Plan was adopted by City Council in April of 2001 and subsequently approved by MMAH in August 2001. In 2005, the ERASE CIP expanded its project area from the original Old Industrial Area in 2001 to the entire urban area of the City (See Figure 4.8). Besides, programs provided in both the 2001 and 2005 ERASE CIP are not limited to financial initiatives, but also include other initiatives such as Municipal Acquisition and Partnership Program, Marketing and Opportunity Program. As a whole, all these programs were adopted by the City in the past to overcome the barriers and promote brownfield redevelopment.

1. Financial Incentives

There are four types of programs particularly directed at the private sector and designated to provide financial assistance to overcome the major impediment in brownfield redevelopment in the City of Hamilton:

- ERASE Study Grant Program (SGP);
 - ERASE Redevelopment Grant Program (RGP);
 - ERASE Tax Assistance Program (TAP); and
 - ERASE Development Charge Reduction Program (DCRP).
- (City of Hamilton, 2005b, p26)

(1) ERASE Study Grant Program (SGP)

It has been identified that one of the key barriers to brownfield redevelopment in the City of Hamilton is the lack of detailed information on the existence, type, and extent of contamination, and the estimated cost of remediation. Few property owners will be willing to carry out Phase II ESA due to the expensive study cost. Therefore the purpose of SGP is to “promote the undertaking of environmental studies so that more and better information is available with respect to the type of contamination and potential remediation costs on brownfield properties” (City of Hamilton, 2005b, p28). The program is eligible for Phase II ESA and/or Phase III ESA – Remedial Work Plan within the Project Area shown in Figure 4.8. The SGP provides a matching grant equal to 50% of the total cost of the environmental study to a maximum of:

- \$15,000 per study;
 - two studies per property/project;
 - \$20,000 per property/project.
- (City of Hamilton, 2005b, p28)

(2) ERASE Redevelopment Grant Program (RGP)

The program is considered as the “cornerstone” of the EARSE CIP and takes advantage of tax-increment financing (Piccioni, 2003). The purpose of RGP is “to remove a serious financial impediment to brownfield redevelopment efforts, namely the large tax increase that can result when a brownfield property is redeveloped” (City of Hamilton, 2005b, p31). Annual grants for up to 10 years to those brownfield redevelopment projects that will result in an increase in property assessment and taxes are provided in this program. These grants are equivalent to 80% of the municipal portion of the increase in property taxes that result from the redevelopment. The RGP applies to the costs of environmental remediation, demolition, and site preparation including improvement of sewers and water services.

The grants from RGP are paid on a “pay-as-you-go” basis. Specifically, the property owner or developer at first pays for the total cost of the environmental remediation and redevelops the site into a new property. When the project is completed and the property is

re-assessed, the property owner or developer pays the property tax in full each year and the municipality reimburses the approved applicant with an annual grant. All grants in RGP stop when the payment equals to the total value of the work done, or after 10 years, whichever comes first (City of Hamilton, 2005b). The RGP is essentially a win-win situation both for the municipality and the private sector (Boles, 2003). Without this grant program, a brownfield project would never get started and the property taxes on the site would remain the same as the pre-project assessment, and then there is no increase on the tax base.

(3) ERASE Tax Assistance Program (TAP)

This program is quite similar to the RGP, and is also designated to overcome the biggest barrier of financing in brownfield redevelopment by providing assistance matching with 80% TIF (Tax Incremental Financing) (City of Hamilton, 2005b). The major differences between TAP and RGP are that (1) the TAP applies only to the costs of environmental remediation; (2) the tax increment includes both the increase in the municipal portion of the property taxes and the education portion of taxes resulted from the remediation and rehabilitation of the property. Specifically, in TAP, taxes will be frozen at first. The developer pays the entire upfront cost of the remediation at the time of development, and then the City may cancel 80% of the increase in City taxes on an annual basis for up to 3 years, after the incremental property taxes have been paid to the municipality (City of Hamilton, 2005b). Approval for the 80% of the increase in education portion of taxes under TAP may be provided by the Minister of Finance. It should be noted here that the brownfield project proposed for industrial uses in the West Harbour Area (See Figure 4.8) and proposals for residential uses in Old Industrial Area are not eligible for both of RGP and TAP according to 2005 ERASE CIP.

(4) ERASE Development Charge Reduction Program (DCRP)

This program provides a reduction of development charges for the developer to cover the costs of environmental remediation approved under the ERASE RGP. In other words, the approved applicants in RGP have the alternative to apply the remediation costs against development charges payable for the brownfield site (City of Hamilton, 2005b). For

example, if the remediation cost is greater than the payable development charges, the development charges will be reduced to zero, and the RGP will be reduced by the amount of remediation costs against the payable development charges (City of Hamilton, 2005b). Eligible costs include the remediation costs and Phase II and Phase III ESA/SSRA not covered by the SGP.

2. Municipal Leadership and Partnership

In Hamilton, there are brownfield properties owned by the municipality and sites with which the City may potentially be vested because of property tax defaults and a failed tax sale. In order to promote the economic renaissance and the redevelopment of brownfield sites over the entire city, the City of Hamilton has been taking a very proactive role in redeveloping those key brownfield sites ever since the early 1980s through municipal acquisition and/or participation in public/private partnerships, regardless of potential exposure to the liability of contamination.

In 2001, the ERASE Municipal Acquisition and Partnership Program (MAPP) was initiated for the City to “create awareness of brownfield redevelopment opportunities and funding through municipal leadership in property acquisition, investment and municipal financial involvement in pilot projects to clean up and redevelop brownfield sites in the Project Area” (City of Hamilton, 2005b, p41). MMAP is funded through the 20% of TIF or RGP kept by the City, money from the City Council as well as the Green Municipal Enabling Fund (GMEF)⁴⁰ from the Federation of Canadian Municipalities. The City uses these funds to redevelop City owned brownfield sites, purchase and redevelop key strategic parcels, or participate in public/private partnerships in pilot projects (City of Hamilton, 2005b). These pilot projects involve innovative cleanup technologies, community consultation techniques, and use of other tools such as environmental insurance.

⁴⁰ GMEF is a five-year, \$25 million fund that provides grants to support feasibility studies that assess the technical, environmental and/or economic feasibility of innovative municipal or municipally sponsored projects. GMEF and the Green Municipal Investment Fund (GMIF) constitute the Green Municipal Funds (GMFs). <http://www.fcm.ca/pcp/gmefcrit-e.html>

3. Marketing and Education

A program called ERASE Marketing and Opportunities Program (MOP) was initiated because the City has fully realized that the success of financial incentive programs in ERASE is closely related to the aggressive and appropriate marketing of these programs, particularly when it comes to brownfield redevelopment given the high level of risks (Piccioni, 2003). The financial incentive programs mentioned before would not be effective if the brownfield stakeholders are not aware of them (City of Hamilton, 2005b). According to the ERASE CIP, the MOP is composed of information, education and marketing, which takes the following form of:

- revisions to the marketing brochure and City web site;
- application forms and guides on CD ROM;
- presentations to property owners, the development industry, real estate professionals, environmental consultants, planning consultants, lawyers, accountants and other support professionals; and
- targeted mailings to property owners within the Project Area to inform them of the ERASE Programs and other activities.
(City of Hamilton, 2005b, p43)

4. Planning Policy and Standardized Procedure

In order to reduce the administrative burden and complexity in the planning approval process, the City of Hamilton established a formal policy to standardize the planning procedures of brownfield applications under the *Planning Act* in 1997 (Boles, 2003; Piccioni, 2004). The standardized procedure clarified the City's site assessment and cleanup requirement, providing clarity and certainty to the property owners and developers (Piccioni, 2004). It also helped ensure that brownfield developers consistently received fair and efficient treatment in the applications (Boles, 2003).

In addition, in the fall of 1999 when the ERASE CIP was being created, the City of Hamilton hired a Brownfield Coordinator to lead the development of the ERASE CIP. Henceforth, the position of Brownfield Coordinator has been kept until today. The Brownfield Coordinator works as a bridge connecting the municipality with the private sector in the brownfield projects. "...as much as a policy maker, the municipality really need to have an appointed person who can work with developers, understand what they

need and convey it to the City. We are trying to give a customer focus and we are right here on the ground”, said the Hamilton Brownfield Coordinator, “... my role is pretty much a role of the facilitation. Sometimes I might hold the developers’ hands and have them get in touch with the right person in the Building Division, Planning, Public Works whatever, who can help to solve their problems”. The City of Hamilton has also created the role of facilitator in other departments in the City, such as Engineering and Planning, in order to ensure all the brownfield applications are handled more efficiently and the process is streamlined and fast tracked (Hamilton Brownfield Coordinator).

4.3.6 Results

I. Before the Introduction of the City’s ERASE Community Improvement Plan in 2001

Because of the City’s ongoing commitment to brownfield development and participation in public/private partnerships, a number of brownfield sites in the City of Hamilton have been redeveloped before the introduction of the City’s ERASE CIP in 2001. These sites include the 1985-1993 development of Bayfront Park on a former landfill site, the 1992-1993 development of Pier 4 Park, the LIUNA Station and LIUNA Nursing Home (City of Hamilton, 2000). Pier 4 Park and Bayfront Park were redeveloped by the City as part of the municipality’s initiative to revitalize the waterfront. “They have received local, provincial, national and international recognition and Hamiltonians are indeed proud of their revitalized waterfront” (City of Hamilton, 2006c). The LIUNA Station was a former CN train station and was vacant and abandoned for almost 10 years before it was redeveloped. The City provided an annual tax grant to the Labourers’ International Union of North America (LIUNA) for the \$7 million conversion of the CN Station (City of Hamilton, 2003a). The site is now a beautiful conference-banquet centre as well as an office centre. The LIUNA Nursing Home was once a former Greening & Donald wire manufacturing plant. The building was demolished and converted into a parking lot. The City purchased the parking lot in early 1970s and the site became surplus in mid-1990s. In 1999, the City sold the site for only \$1 to the developer LIUNA and a 50/50 partnership on the cleanup cost of \$1.2 million was established between the City and

LIUNA (City of Hamilton, 2003c). Right now the site has been redeveloped into LIUNA Nursing Home which houses 95 long-term care beds on Queen Street North in the downtown core. The City recouped its share of the clean-up cost by future tax revenues on the site.

II. Results of 2001 ERASE CIP

The City of Hamilton remained committed to brownfield redevelopment and began to seriously address the issue in 1997 by launching the *Industrial Redevelopment Task Force*. A formal brownfield redevelopment program, *2001 ERASE CIP*, was adopted by the City Council in April 2001 and was later approved by MMAH in August 2001.

From 2001 to 2002, 4.6 hectares of the industrial property was cleaned up and redeveloped (City of Hamilton, 2002). Around 228,000 square feet (21182 square meters) of building space was constructed or refurbished (City of Hamilton, 2002). The long-term property tax increase on properties taking advantage of the ERASE program was estimated to be \$400,000, while the City's investment of approximately \$1 million leveraged almost \$15 million investment from private sector (Piccioni, 2003). Six major redevelopment projects (three industrial, two residential and one commercial) were approved for the programs under the ERASE CIP, including *JNE Consulting*, *Queens Garden Nursing Home*, *McCallum Sather Architects*, *425 Parkdale Avenue North*, *Barton & Crooks Streets* and *667 Parkdale Avenue North* (City of Hamilton, 2001; City of Hamilton, 2002).

In 2003, several major brownfield projects were also approved for grants in ERASE. It was estimated that these projects could result in the "remediation and redevelopment of 7.6 ha. of the brownfield property for 48,000 square feet (4459 square meters) of industrial space, 51,000 square feet (4738 square meters) of commercial space, a major \$45-60 million edible oil processing facility, and 93 new residential units" (City of Hamilton, 2003b, p10). The new industrial/commercial uses created approximately 90 new jobs to the city (City of Hamilton, 2003b).

III. Results of 2005 ERASE CIP

In 2005, the City revised the 2001 ERASE CIP so that a more comprehensive framework for the financial incentives in the ERASE CIP was provided. The revised ERASE CIP expanded the Project Area to cover the entire urban area of the City of Hamilton, and the new program *ERASE TAP* was adopted. Interests in the revised ERASE CIP have turned out to be outstanding (City of Hamilton, 2005c). According to Hamilton's Economic Development Review 2005, six approved projects were awarded approximately \$2.5 million in ERASE Redevelopment Grant funding, which were supposed to leverage:

- total construction expenditures in excess of \$63 million;
- remediation and redevelopment of 10.9 ha. of formally vacant and under-utilized brownfields;
- construction and refurbishment of over 300,000 square feet (27871 square meters) of industrial/commercial space;
- construction of 93 new residential units;
- 100 new full time jobs;
- An increase in long-term annual property tax revenues of approximately \$1,000,000.
(City of Hamilton, 2005c, p9)

As of the interview date of June 23, 2006, the City had received 8-10 brownfield redevelopment applications for financial assistance provided in 2005 ERASE CIP and additional 5-10 developments were anticipated (Hamilton Brownfield Coordinator).

4.3.7 A Showcase: Bayfront Park

The Bayfront Park, firstly called the Harbourfront Park, is the first major brownfield project which the City of Hamilton has done so far (Hamilton Planner). It is located in the western portion of the Hamilton Harbour at the western end of Lake Ontario. The land on which the Bayfront Park was built is not a natural land formation, but actually the result of years of harbour infill. In 1957, the Hamilton Harbour Commissioners (now the Hamilton Port Authority) sold the water lots in the northwest end of Hamilton to a Philadelphia-based company for a scrap metal yard. Later, this parcel of land and water lots were given to the Lax Brothers who were Hamilton scrap metal dealers (Freeman and Hewitt, 1979). In 1968, the Lax Brothers decided to build a multi-million dollar

residential complex known as “Bayshore Village” and began filling water lots in the west end of the Harbour (Freeman, 2001). Then, the controversy came. For Hamiltonians, especially for those people who had lived and played on the shores of Hamilton Harbour, the west harbour was clearly believed to be preserved as a place for recreation regardless of all the changes happening in the harbour (Bouchier and Cruikshank, 2006). In 1973, the Lax land filling was stopped because of mounting opposition from environment officials and Hamilton citizens (Freeman and Hewitt, 1979). However, over 20.2 hectares of harbour had been filled with reclaimed land at the time, and the land remained vacant and contaminated, slicing across the west end of the harbour (See Figure 4.10). The 16-hectare Lax landfill site is now where the Bayfront Park is located.

After over a decade of legal debate, the City Council ultimately acquired the landfill site from the Lax Brothers and decided to build a public recreational park on the waterfront. Environmental studies carried out by the Ministry of Environment (MOE) had found that various types of hazardous materials were found in the landfill site and the levels of toxic wastes exceeded standards in Regulation 309 of the Environmental Protection Act for lead and cadmium in leachate (City of Hamilton, 1993). Almost 20,000 tones of industrial waste and contaminated soil were removed from the park site, and then the landfill site was sealed with a 20 centimeter cap of clay which was proposed to stop toxins from infiltrating the water table and from leaching into the topsoil (Hamilton Planner). Finally, 6-8 inches of topsoil was seeded on the clay layer to establish a grass cover. In total, the remediation work had cost over 9 millions dollars to transform the 16-hectare contaminated land into public green space, opened in 1993 (Hamilton Planner).

According to the Hamilton Planner who was in charge of the Bayfront Park project in 1990s, there were three aspects attributing to its success. Firstly, the City Council had a strong commitment to transform the landfill site into an open park to bring people back to the harbour. “...because it was the first major brownfield project the City had done, we have to be very careful with the first one and make it a success, like a pilot project...brownfields were really just becoming known to us in the 1980s. We knew they existed and they were going to be a problem to the community” (Hamilton Planner). In

addition, "...this is the only area we have the opportunity to put in trails and parks on the harbour and give the waterfront back to the people of Hamilton. That's a goal in our Council...people hadn't felt the waterfront was a part of their community for a long time" (Hamilton Planner). The prosperity and industrial expansion during the postwar period had dramatically reduced the size of the Hamilton Harbour and seriously polluted the water in the harbour. It was once called by scientists as an "11-square-mile sewer" (28,490,000 square meters) and "Canada's biggest septic tank" in the mid-sixties (Wilson, 1999, December 16). The public had been denied access to the western shoreline of the harbour and it had been fenced off for decades. Therefore, the City shifted the focus of harbourfront development from industrial to recreational schemes, "that's why we determined to build a public recreational park" (Hamilton Planner).

Figure 4.10: the Lax Landfill Site



The Lax landfill site slicing through the water in the centre of the picture.
Source: Freeman and Hewitt (1979), p156.

Secondly, the community supported the plan of the project (Hamilton Planner). As shown in Figure 4.11, the project hosts a variety of public considerations as well as environmental amenities. The grass amphitheatre was created to provide the needed structure for festival seating while at the same time meets the needs of the natural environment (Vallentin, 1994). The upper plateau as a flat manicured area is ideal for

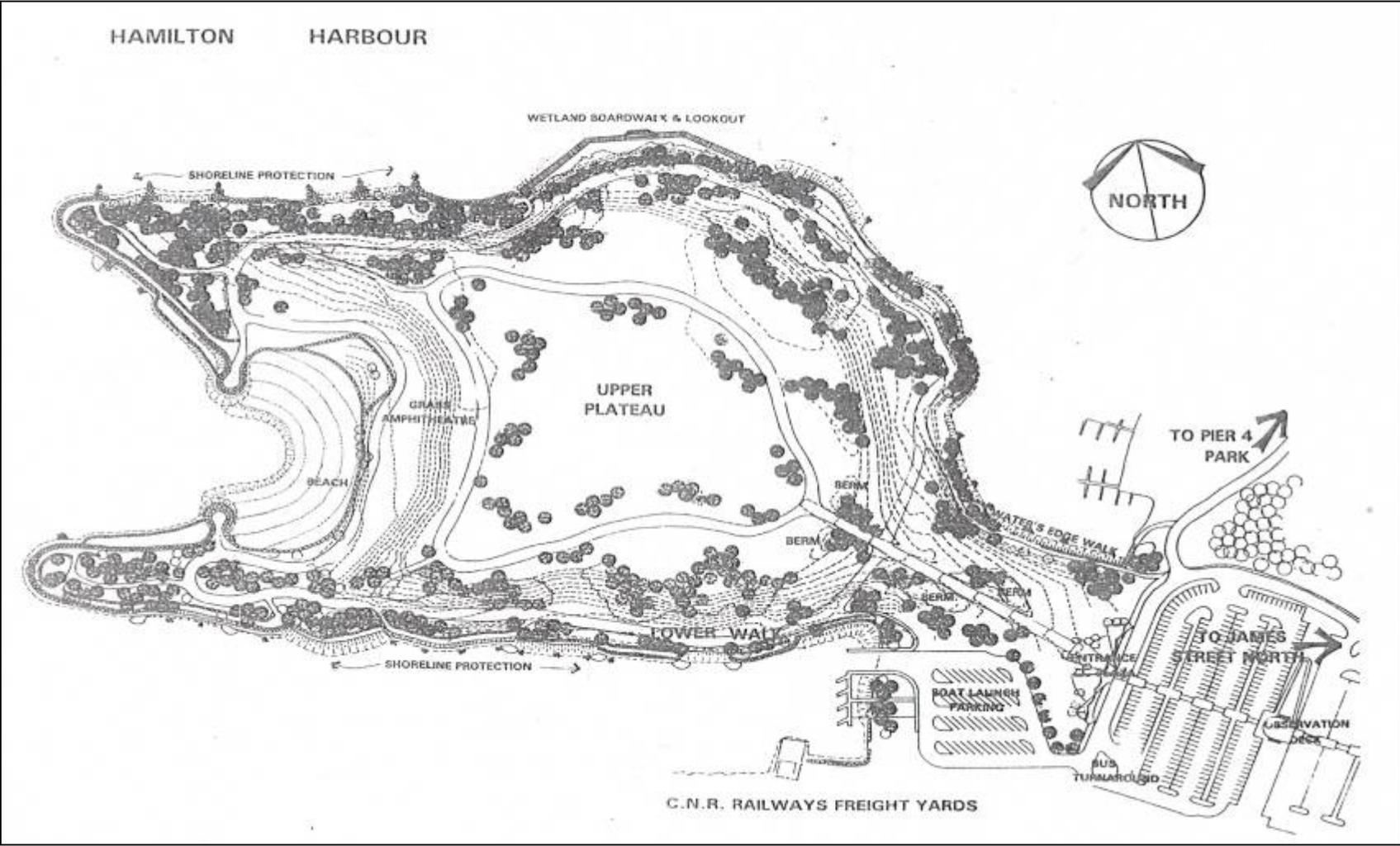
seasonal festivals while the beach area provides public access to the water's edge. Furthermore, walking & cycling trails and a new boat launch are created for people relax on the park. All these features represent deep human meanings for the people of Hamilton, especially for those who have grown up on the shores of the harbour.

Thirdly, the municipality has established solid partnerships with community stakeholders and the senior level of government (Hamilton Planner). "For this very first brownfield project in really early days, you have to have the scientific technology available to know what's going on that site, because it very dictates what you can do and how you manage the contamination. And you have to set aside enough money to do it right. You can't do it halfway because there're health issues, water quality issues...especially for our particular case on the harbour" (Hamilton Planner). The City of Hamilton had worked closely with experts and professionals from the Hamilton Harbour R.A.P (Remedial Action Plan)⁴¹ who had provided the scientific technology and methods required in the project in terms of contamination remediation, shore protection, fish habitat enhancement as well as wetland creation. In addition, the project had luckily received political support from a senior level of government - the provincial government, especially area New Democratic MPPs, who came through in difficult times with almost \$9 million investment in the cleanup of the land.

Today, Bayfront Park has become one of Hamilton's most popular parks and is considered as a jewel on the waterfront (See Figure 4.12). Ongoing improvements are being carried out on the park. In 2005, the City initiated a monitoring program for some of the high priority parks in Hamilton including the Bayfront Park, in order to make sure the remediation was put in place and worked in the way the City expected them (Hamilton Planner). Besides, more amenities such as seasonal cafés and equipment rental facilities as well as more shade will be provided in the Park in the future according to the *Setting Sail Secondary Plan for West Harbour* (City of Hamilton, 2006d).

⁴¹ In the early 1970s, the International Joint Commission identified the Hamilton Harbour as one of the 43 Areas of Concern (AOC) in the Great Lake's region. In order to improve the environmental conditions in Hamilton Harbour, a Remedial Action Plan (RAP) for Hamilton Harbour was developed (http://www.on.ec.gc.ca/water/raps/hamilton/intro_e.html)

Figure 4.11: Harbourfront Park Master Plan Concept



Source: City of Hamilton (1993).

Figure 4.12: A Jewel on the Waterfront



The Boat Launch



The Upper Plateau



People Having Fun on the Beach Area



The Grass Amphitheatre



People Starting a Boating Cruise



Geese Flocking on the Park

(Photographed by the researcher on July 13th, 2006)

4.4 Successful Experiences Learned from Kitchener and Hamilton

What are the successful experiences in Kitchener and Hamilton that may be used to assist in brownfield redevelopment in the City of Dalian? Before summarizing the successful municipal experiences, the researcher needs to emphasize the overarching assumption for measuring the success: all municipal programs/approaches are considered “successful” if the redevelopment occurs as opposed to the corresponding option of not being redeveloped at all. Two main reasons account for this assumption. First, there is currently no systematic indicator framework that is known to exist or be in wide use for measuring the success of brownfield redevelopment in a standardized way (Wedding and Crawford-Brown, 2007). The definitions of successful municipal brownfield policy and the associated levels of success are thus very subjective. Although Bacot and O’Dell (2006) have suggested useful indicators for analyzing local government brownfield programs, these indicators are incomplete and limited in addressing the environmental and economic impacts of brownfield redevelopment (e.g., no discussion of green buildings). Second, neither Kitchener nor Hamilton has established any environmental, economic or social criteria to measure and track the performance of their brownfield programs over time (Kitchener Senior Planner and Hamilton Brownfield Coordinator). Seven interviews in Kitchener and Hamilton showed that the stakeholders considered the brownfield programs in their cities were “successful” at present because they had led to increased redevelopments that would have never happen if there were no such programs. As a result, the researcher uses the above assumption for measuring the success of municipal experiences in Kitchener and Hamilton.

In order to better summarize the successful municipal experiences learned from the case study, it is meaningful here to develop an overview of brownfield redevelopment in both cities (See Table 4.5). Despite the variety of specific case experiences, there are some commonalities between Kitchener and Hamilton. According to seven interviews with stakeholders in two cities and the case study, the researcher found that a municipality’s persistent commitment, various financial incentives through CIP, leadership & partnerships (public/private and inter-government), marketing of the brownfield incentive

Table 4.5: Overview of Brownfield Redevelopment Experiences in Kitchener and Hamilton

	Kitchener	Hamilton
Historic Formation of Brownfields	Berlin's Industrialization; Booming in late 19 th century; Recession of the postwar period in 1980s	Steel Town at early 20 th century; the Great Depression; boom times during the postwar period (large-scale landfill projects in east harbor); shrinkage of manufacturing industry in 1980s;
Definition of Brownfields	a property which contains environmental contamination either in the ground or building due to the operational activities of a previous land use, where the extent of the contamination renders the property vacant, under-utilized, unsafe, unproductive or abandoned	abandoned, idled or underused industrial or commercial properties in built-up urban areas where expansion or redevelopment is complicated by real or perceived environmental contamination, building deterioration/obsolescence, and/or inadequate infrastructure
Number of Brownfields	Unknown	300-400
Distribution of Brownfields	Most located on major streets in Downtown or Inner City lands	The Old Industrial Area; West Harbour Area and throughout the entire urbanized area
Primary Impetus for Brownfield Redevelopment	Increase assessment base; municipal efficiency; help municipality reduce Police, Fire & Bylaw Enforcement costs; depressed land value around brownfield; public health and safety	Economic benefit on tax assessment (tax arrear and nearby property value); environmental impact on public health/safety; continuing land demand for heavy industry and manufacturing.
Identified Barriers	<ol style="list-style-type: none"> 1. Financial issue (upfront remediation cost and whose willingness & ability to pay); 2. Liability of contamination (including regulatory liability and civil liability); 3. Planning approvals (two levels of government) 	<ol style="list-style-type: none"> 1. Upfront financing (expensive upfront cost and bank's unwillingness to finance brownfield projects); 2. Liability of contamination; 3. Lack of detailed information on brownfield in the City; 4. Complicated planning process and lengthy time for planning approvals
Municipal Approaches	<ol style="list-style-type: none"> 1. Financial Incentives (the EDGE Growth Strategy), including Downtown CIP and Brownfield Remediation CIP (100% TIF); 2. Direct Intervention by the municipality (acquire, hold, clear, grade the land or direct assistance); 3. Research and marketing (inventory of vacant land, record of all RSCs in the City, brownfield Working Group, brownfield conference and workshops) 4. Professional assistance from municipal staffs, especially the brownfield coordinator. 	<ol style="list-style-type: none"> 1. Financial Incentives (the ERASE CIP), including Study Grant, Redevelopment Grant, Tax Assistance (80%TIF), Development Charge Reduction Program; 2. Municipal leadership and partnership (ERASE Municipal Acquisition and Partnership Program); 3. Marketing and education (ERASE Marketing and Opportunities Program); 4. Planning policy and standardized procedure; brownfield coordinator.
Showcase	Kaufman Lofts ---the best small/medium scale project at CUI Brownie Awards ceremony in 2005.	Bayfront Park --- the first major brownfield project City of Hamilton had done

programs and brownfield coordinator all play a role in causing the brownfield outcomes addressed in Section 4.2.6 and Section 4.3.6.

Municipality's Persistent Commitment

A municipality's persistent commitment to pursue brownfield redevelopment is the first and foremost factor driving local government's actions on brownfield redevelopment. With a persistent commitment, the City of Kitchener has been making brownfield policies to encourage cleanup and adaptation of old industrial sites since 1992. It launched a follow-up Adaptive Re-use Program in 1996. The City keeps its persistent commitment today and is implementing the comprehensive package of Incentive Programs, *the Kitchener EDGE Growth Strategy*. The City will continue to work with other levels of government to attract more resources in brownfield renewal according to the recent *Economic Development Strategy 2007-2010* (City of Kitchener, 2007b). The same persistent commitment could also be observed for the City of Hamilton, another pioneer city for brownfield redevelopment. Hamilton converted 16.2 hectares of contaminated land on the City's Bayfront into Bayfront Park as early as 1985 at a time when "brownfield" was even not coined as a concept in North America. Hamilton began to implement the Industrial Redevelopment Task Force in 1997, followed by the 2001 and 2005 ERASE CIP. Both cities have many experiences with brownfield redevelopment and both have been continuously making proactive efforts in developing brownfield policies. It should be noted that fundamental motivations driving the two cities' commitment to brownfield redevelopment are environmental concerns over public health/safety, as well as the social and economic benefits associated with the redevelopment.

Various Financial Incentives through CIP

Developers and property owners of a brownfield site face significant financial challenges. They are reluctant to fund brownfield redevelopments unless there is a strong public sector funding commitment to enhance the financial viability of the project. Case studies in Kitchener and Hamilton show that the upfront financing of a brownfield site are the foremost barrier to brownfield redevelopment in two cities. The financial issue has also

been frequently cited in a great deal of academic literature and government documents (Alberini et al, 2005; McCarthy, 2002; Pryce, 2003; Adams et al, 2000; NRTEE, 1997; NRTEE, 2003; MMAH, 2007a).

In order to help developers overcome the financial challenge encountered in the redevelopment process, Kitchener and Hamilton established various financial incentive programs through CIP. In the Section 28 of the *Planning Act*, a community improvement plan gives Ontario municipalities the authority to implement grant programs and other incentives to registered or assessed owners, tenants or assignees in designated community improvement areas in need of improvement of the physical or built environment, in spite of the statutory “prohibition against bonusing rule” contained in Section 106 of the *Municipal Act*. The extent of a Community Improvement Project Area can include the whole municipality, or a specifically defined area of the City. Through CIP, both Kitchener and Hamilton provide various financial incentives in the form of grants, municipal fee exemptions or tax assistance to brownfield owners in a specific area or city-wide area. Feasibility study grants are also available in the City of Hamilton through ERASE SGP for developers to cover the costs associated with Phase II ESA and/or Remediation Action Plan. Kitchener provides developers with Façade/Interior Loans for the improvement of downtown properties. In addition, Kitchener provides developers with a tax increment equivalent grant in the form of Brownfield Remediation CIP to pay for the cost of ESA and remediation, which is equivalent to 100% of the incremental increase in the municipal portion of the property taxes resulting from the redevelopment. Similar 80% tax incremental financial relief programs are also provided in Hamilton ERASE RGP and ERASE TAP. Moreover, both cities provide otherwise incentives through CIP to exempt or reduce municipal fees associated with development charges, building permits and/or parkland dedication fees for brownfields.

Table 4.6 summarizes all the municipal brownfield redevelopment incentive programs in two cities. These financial incentives are also widely used across other municipalities in Ontario (MMAH, 2007c). Grants and tax assistance have turned out to be the most commonly offered financial incentives among Ontario municipalities for the remediation

and redevelopment of brownfields according to the 2007 survey “Evaluating the Impact of Municipal Brownfield Incentives” by MMAH (MMAH, 2007b). Overall, these actions are considered by MMAH as a valuable role in encouraging developers and property owners to engage in brownfield redevelopment as well as being a signal showing that “a municipality is a ready and willing host for brownfield redevelopment” (MMAH, 2007b, p17-18).

Table 4.6: Summary of Municipal Brownfield Incentives in Two Cities

Type of Financial Incentive	Kitchener (DowntownCIP ⁴² and Brownfield Remediation CIP)	Hamilton (ERASE CIP)
Grants	<ul style="list-style-type: none"> ▪ Façade/Interior Loan; ▪ Upper Storey Renovation Program; 	<ul style="list-style-type: none"> ▪ ERASE Study Grant Program (SGP);
Tax Incremental Financing	<ul style="list-style-type: none"> ▪ City of Kitchener Tax Rebate (equal to 50%TIF); ▪ Brownfield Remediation CIP (100%TIF); 	<ul style="list-style-type: none"> ▪ ERASE Redevelopment Grant Program (RGP) (80%TIF in municipal portion of property taxes); ▪ ERASE Tax Assistance Program (TAP) (equal to 80%TIF, with education portion of taxes included);
Fee Exemptions and Reductions	<ul style="list-style-type: none"> ▪ Rebates for planning and building permit fees; ▪ Elimination of City and Regional development charges; ▪ Elimination of park dedication fees 	<ul style="list-style-type: none"> ▪ ERASE Development Charge Reduction Program (DCRP)

Leadership & Partnerships (Public/Private and Inter-government)

The private sector is targeted as a key player by various financial incentive programs provided in CIP, in which the municipal government acts as a facilitator. There are cases that municipal governments take leadership & partnerships (public/private and inter-government) and directly carry out the redevelopment. These brownfield sites include properties owned by the municipality, sites of which the municipality may assume the

⁴² It should be noted here that even though the financial incentive programs provided in Downtown CIP are not originally brownfields-oriented, they have benefited several brownfield projects in Downtown Kitchener and thus should not be ignored in our research.

ownership because of property tax arrears and a failed tax sale, and sites that require direct intervention for the consideration of public health/safety or other economic, social motivations. For those brownfield sites, it is “in the best interests” of a municipality to acquire and hold the land, and to assess, clean up and prepare these sites for redevelopment (City of Hamilton, 2005b, p41). Both Kitchener and Hamilton have been very proactive in directing and participating in the redevelopment of such brownfields. In Hamilton, the ERASE Municipal Acquisition and Partnership Program (MAPP) was established for the municipality to invest and participate in pilot brownfield projects with the private sector and showcase the use of new environmental remediation technologies, community consultation techniques, and/or the use of other innovative tools such as environmental insurance. It is because of the City of Kitchener’s acquisition, donation and direct financial assistance that the 3.35-hectare former Epton property is now becoming the new campus of University of Waterloo for School of Pharmacy.

The 50/50 public/private partnership on the cleanup cost of \$1.2 million made it possible for the City of Hamilton to successfully develop the city-owned brownfield site into today’s LIUNA Nursing Home, which provides the community with much needed nursing home beds in the downtown core. Hamilton’s very first brownfield project, the 16-hectare Lax landfill site, would not have become the Bayfront Park, the jewel on the waterfront in Hamilton, if such a partnership was absent. It involved experts and professionals from the Hamilton Harbour R.A.P. and the financial support from the provincial government. With the collaborative relationship between the City and Hamilton Port Authority, an ongoing long term planning project called *Setting Sail* was established. According to the project, the older industrial lands in Hamilton West Harbour Area will be redeveloped and revitalized in the future.

Marketing Brownfield Incentive Programs

Marketing plays an important role in promoting brownfields. Many of the brownfield incentive programs are relatively new since they are only available through municipalities’ CIP within the past few years. Many property owners and potential developers are not aware of such programs. If they are not known, the incentive programs

would not be effectively utilized. As a result, efforts are needed to inform potential investors and make the financial opportunities more attractive to related professionals. Both cities have fully recognized the importance of marketing to successful financial incentive programs on brownfield redevelopment. The two municipalities have been aggressively and consistently advertising and marketing their financial incentive programs available for the market. Through active hosting and sponsoring the national conferences associated with brownfields and/or re-urbanization as well as participation in the variety of brownfield workshops, the City of Kitchener has made its brownfield incentive programs and its brownfield achievement widely known across Canada. The City of Hamilton has initiated a Marketing and Opportunity Program (MOP) in its ERASE CIP in order to communicate and explain the ERASE programs to the brownfield redevelopment market.

Brownfield Coordinator

Case studies in Kitchener and Hamilton reveal that brownfield property owners and developers in both cities have encountered the challenge of complicated planning process and lengthy time for multiple planning approvals. Much academic literature has also addressed this challenge (De Sousa, 2001; Boles, 2003; Abdel-Aziz et al, 2004). Property owners, developers, lenders as well as other related stakeholders in brownfield redevelopment may need to spend considerable amount of time and money in complying with planning legislation and regulations for rezoning, administrative reviews, approvals and entitlements of the redevelopment. Effective communication between the municipality and the private sector becomes very necessary.

Both Kitchener and Hamilton have established the position of brownfield coordinator who served as an advocate and liaison between the City and the private sector. Through the interviews in two cities, the researcher found that the coordinator acted as a constant point-of-contact who provided brownfield information of the City, guidance on the application of various brownfield incentive programs, and access information of the regulatory and planning contacts. A brownfield coordinator also provides useful suggestions and planning consultations to developers and property owners throughout the

redevelopment process in case they encounter any questions or concerns with regard to the planning approval process and municipal incentives. In addition, feedbacks from the private sector regarding the municipal incentives and policies can be conveyed to the City timely through the brownfield coordinator. In this case, the municipality can adjust and update government policies appropriately. To some extent, the establishment of Brownfield Coordinator has signalled the shift of municipalities' attitude towards brownfield redevelopment from regulators to partners, showing a city's proactive willingness to assist developers. Even the provincial government in Ontario has also recognized the importance of brownfield coordinator. In December 2005, MMAH announced the Office of Brownfield Coordinator. In the showcase of Kaufman Lofts in Downtown Kitchener, it was found that the success of the project was partly attributed to the municipal attitude through the brownfield coordinator's help (The Developer in Kitchener).

Summary

Case studies of Kitchener and Hamilton demonstrate that a municipality's persistent commitment, various financial incentives through CIP, municipal leadership & partnership (public/private and inter-government), marketing of the incentive programs and brownfield coordinator all play an important role in overcoming the barriers in two cities. Without a persistent commitment to brownfield redevelopment, there would not be the drive for the establishment of the ongoing variety of financial initiatives in the CIP. Without the incentive programs to overcome the financial barrier, there would not be so many brownfield sites being redeveloped by the private sector. Without the municipal leadership & partnerships, those brownfield sites that are already owned or will be potentially owned by the City would continue to sit idle. Municipal efforts in marketing the financial incentive, and efforts of the brownfield coordinator provide indispensable stimulant and lubricant for the redevelopments. These four aspects of municipal approaches are interdependent and work together as a whole.

In summary, many brownfield sites in Kitchener and Hamilton are entering a new chapter of history with assistance from the municipal approaches and initiatives (See Section

4.2.6 and Section 4.3.6). These brownfield projects may require a long time-frame to be completed and currently there is no systematic approach to evaluating the performance of brownfield programs. Therefore, it is hard to say how successful these programs/approaches will be. However, at this point of time, they may be considered effective and workable, since all the brownfield projects that are undergoing redevelopment would never have been launched if there were no such help and assistance from aforementioned municipal approaches provided by the City of Kitchener and the City of Hamilton. As brownfield redevelopment brings many benefits, the above four aspects of municipal approaches can be considered as successful experiences.

Chapter 5: Case Study in the City of Dalian, China

5.1 Introduction

The case study in Chapter 4 has developed a comprehensive understanding of brownfield redevelopment in Kitchener and Hamilton, followed by the summary of successful municipal experiences. This chapter focuses on the brownfield redevelopment in the City of Dalian, China. Similar to the case studies in Canada, this chapter will also introduce Dalian's experiences with regard to its historic formation of brownfields, current situation, challenges and corresponding municipal policies. An example of brownfield projects in Dalian will also be introduced. Perceptions of stakeholders on applying the successful municipal experiences in Ontario to the City of Dalian will be presented at the end of this chapter.

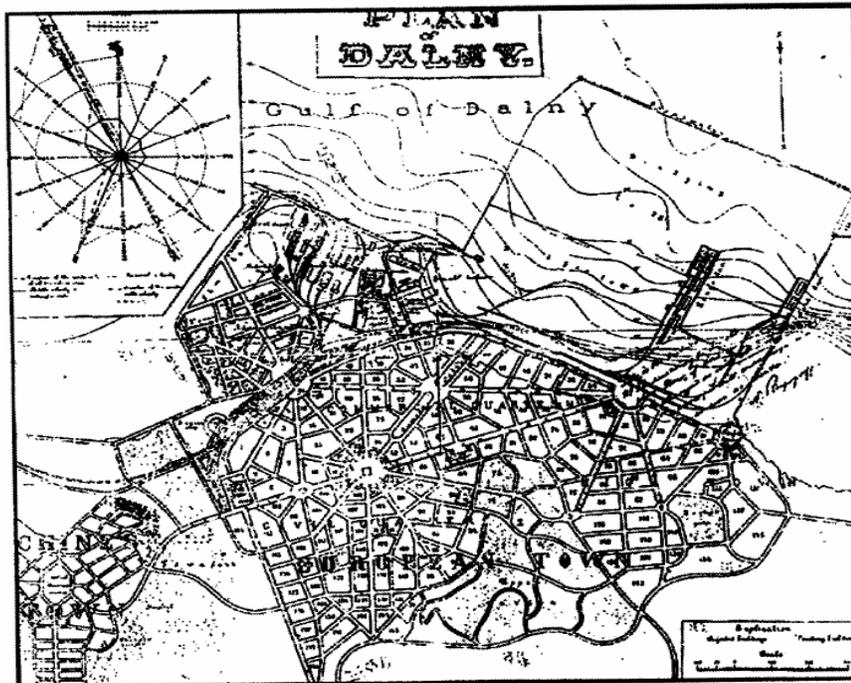
5.2 Historic Formation of Brownfields in Dalian

Unlike most Chinese metropolises which have evolved over thousands of years of history, the City of Dalian is a relatively new city of just over 100 years. With its Russian and Japanese architectural heritage standing in the urban center, one could tell that the city's development had been more or less associated with colonial occupation. At the very beginning, Dalian was not a city but no more than a fishing village with several small-scale fishing households, formerly named Sanshanpu in China (Dong, 2001). In 1898, the Russian Empire leased the Liaodong Peninsula from the Qing Dynasty, and laid out plans to build a free port named Dalny (today's Dalian) at the southern tip of the Liaodong Peninsula (Dong, 2001). As per the Plan of Dalny shown in Figure 5.1, public works constructions and boulevards radiating from a central square (today's Zhongshan Square) were laid out along the Gulf of Dalny (now called Dalian Bay). Little land was planned for industrial uses because Dalny was designated as a commercial sea port city for shipping resources and goods rather than industrial manufacturing (Dong, 2001). With Dalny's unique location⁴³ bordering inland China, the Korean Peninsula and the Japanese Archipelago, Dalny had become an important port-city as well as a military base in the

⁴³ See Figure 1.1 on Page 5

eastern Russian Empire with a middle-scale population of nearly 40,000 in the seven years of the Russia Empire's occupation (City of Dalian, 1982).

Figure 5.1: Plan of Dalny, 1901



Source: Dong (2001), p23

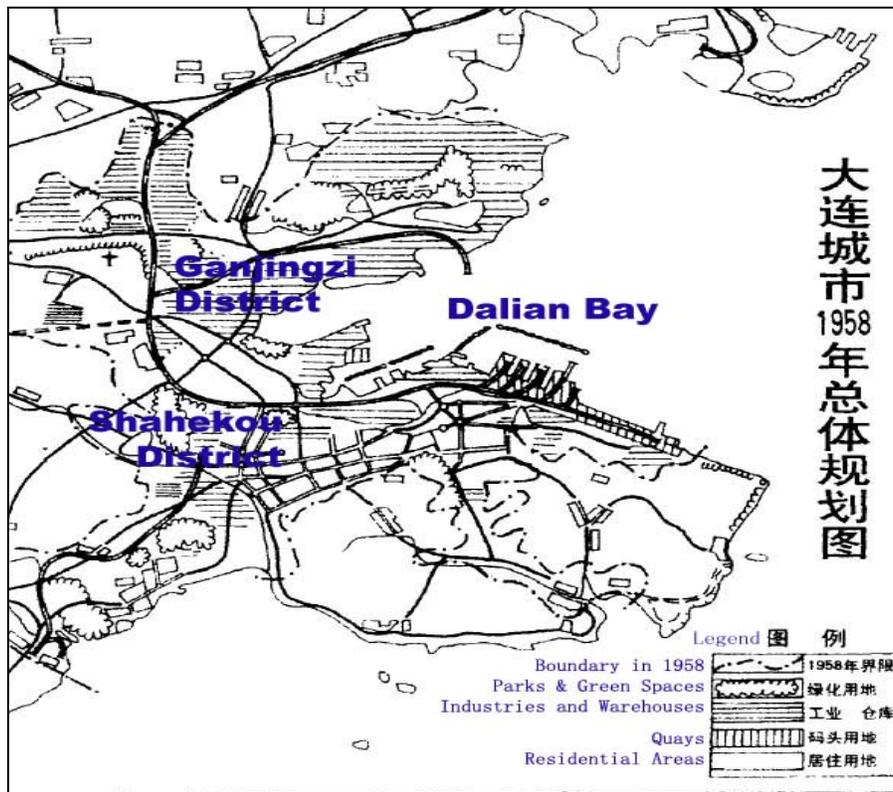
In 1905, Dalny was transferred to Japanese control and was renamed Dairen (Dalian). During the forty years of Japanese control (1905-1945), the City of Dalian expanded rapidly. Tens of thousands of Japanese immigrated to Dalian and the population of Dalian had grown to 700,000 by the time when Japan unconditionally surrendered in 1945 (City of Dalian, 2000a). Docks and factories were built in eastern Dalian along the coastline of Dalian Bay and the South Manchuria Railway⁴⁴ (City of Dalian, 1982). In order to meet the needs of a growing colonial economy, new industrial districts had been developed outside the urban centre of Dalian, stretching towards the northern and western parts of Dalian, namely today's Ganjingzi District and Shahekou District (Dong, 2001). In total, over one hundred factories existed in the City of Dalian in 1945 when Dalian acquired its liberation (City of Dalian, 1982).

⁴⁴ Information about the railway can be found at http://en.wikipedia.org/wiki/South_Manchuria_Railway

After the founding of the People's Republic of China in 1949, the City of Dalian entered a peaceful period of urban development and industrialization under a centrally-planned economy. At that time, the municipality faced the tasks of recovering a backward economy which had been created by a series of events – the Second World War, the Chinese Civil War and the Korean War (Dong, 2001). Like all the other cities across China, the City of Dalian adopted the Soviet model of industrial-oriented economic development, insisting that urban development should concentrate on the construction of new industries, especially heavy industries. A sequence of five-year plans for the social-economic development in the City of Dalian was established and followed since 1953, so as to transform Dalian from a “consumer city” into a “production city” (City of Dalian, 1982). The first master plan of Dalian called the *Five-Eight Plan* was brought forth in 1958. It was designed to stimulate industrial growth and subservience to economic planning, namely the five-year plans (Dong, 2001). As per the first master plan, the City of Dalian was designated to be a big industrial city based on the mechanical manufacturing industry and the chemical industry (City of Dalian, 1982). A number of large-scale state-owned manufacturing enterprises and plants were built on the old urban centre, spreading in a shape of “C” along the coastline of Dalian Bay and the Changda railways (former South Manchuria Railway) (Pan, 1998). New industrial land was planned to be developed in Shahekou District and Ganjingzi District for massive industrialization (see Figure 5.2).

Unfortunately, during the ten-year political turmoil of the Cultural Revolution (1966-1976) in China, Dalian experienced turbulent urban planning and the *Five-Eight Plan* was totally discarded. Industrial factories were allowed to be constructed on any available vacant site in the city, leading to an irregular industrial layout in the urban areas (Dong, 2001). By 1980, after thirty years of socialist modernization, Dalian had become one of the important industrial bases in China and a major industrial centre in northern China, a leading edge in the mechanism, metallurgy, shipbuilding, petroleum, chemical and textile industries (City of Dalian, 1982).

Figure 5.2: Urban Planning Map of Dalian, 1958

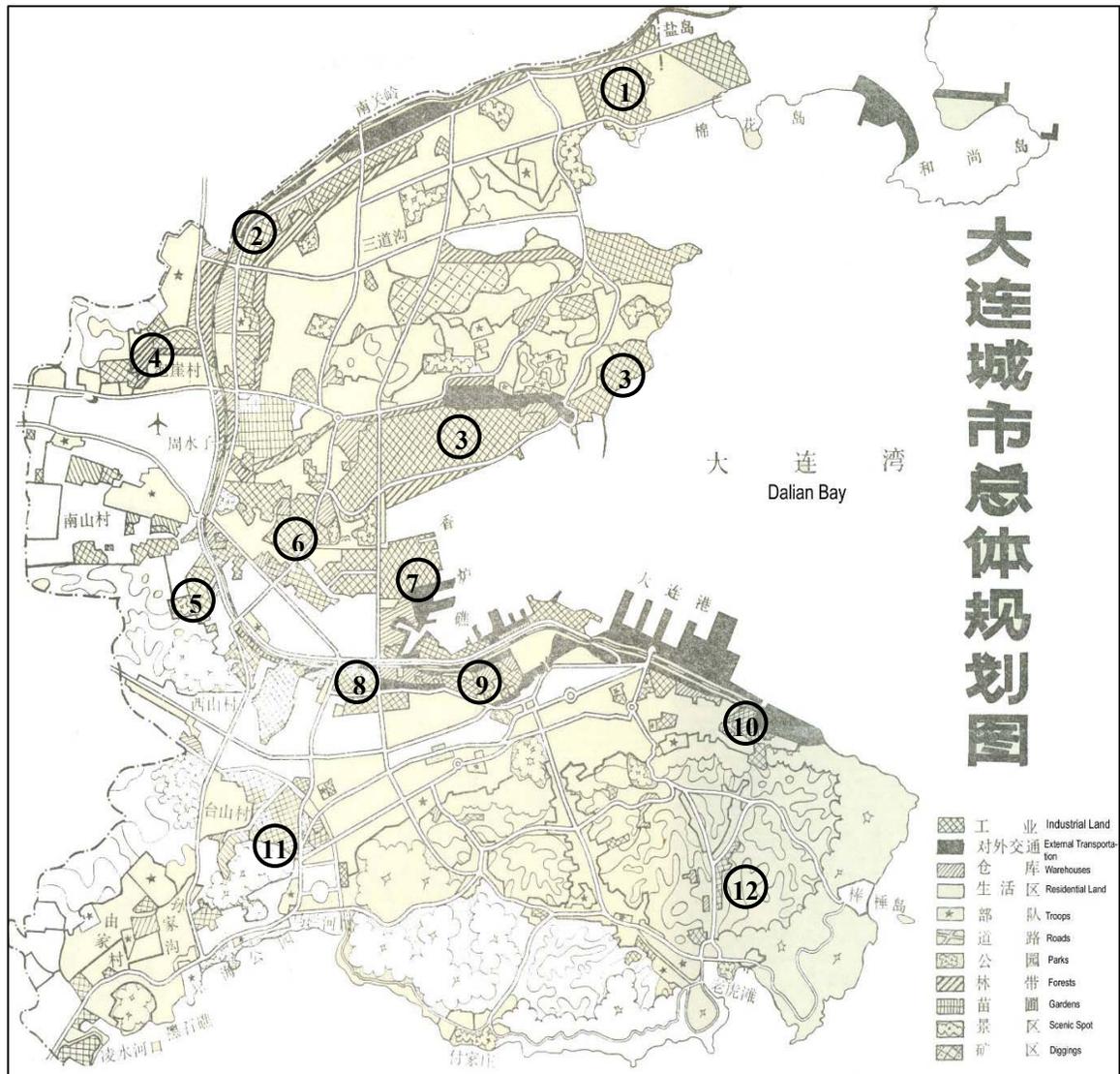


Source: Dong (2001), p57.

Urban planning in the City of Dalian was restored and re-established after the economic reform in China in 1978. In 1982, the *Master Plan of Dalian for Urban-Rural Construction* was prepared by the Dalian Urban Planning & Design Institute, and was approved by the State Council in 1985 (City of Dalian, 2004). According to the master plan in 1982, the City of Dalian was designated to be first a port city, then an industrial and tourist city (City of Dalian, 1982). Twelve industrial zones were established in the central city⁴⁵ of Dalian so as to adjust the irregular industrial layout in the Central City resulting from the chaos in the Cultural Revolution (See Figure 5.3). New industries expanded within the twelve industrial zones, while factories scattered in the urban centre outside the industrial zones were required to relocate. In addition, no large industrial project was allowed to be built in the Central City in consideration of environmental protection (City of Dalian, 1982).

⁴⁵ The Central City of Dalian includes four districts: Zhongshan, Xigang, Shahekou and Ganjingzi.

Figure 5.3: Twelve Industrial Zones in City of Dalian, 1982



Source: City of Dalian (1982), Appendix One

Notes: ①Yandao Chemical Industrial Zone; ②Youyi Road North Light Industrial Zone; ③Ganjingzi Industrial Zone; ④Paoya Zone; ⑤Wangjiagou Zone; ⑥Shadong Zone; ⑦Heizuizi Zone; ⑧Wuyi Square Zone; ⑨Ronghua Beigang Zone; ⑩Siergou Zone; ⑪ South Shahekou Zone; ⑫ Zhuanshantun Zone.

In 1995, the last year of the Eighth Five-Year Plan period, the City Council made an important decision for Dalian's urban development and decided to relocate and transform the industrial enterprises in the central city into the newly built industrial parks or

development zone far outside the urban center (City of Dalian, 1995a). These enterprises were mainly state-owned or collective-owned. They were heavy industries which consumed large amounts of energy and resources, caused serious pollution, but yielded poor economic returns. The decision was made mainly based on three aspects of concerns according to the City Council (City of Dalian, 1995a).

First, the City wanted to enhance state-owned enterprises' (SOEs) technology, competitiveness and economic returns by means of industrial relocation so as to adjust and optimise the industrial structure in Dalian. Some of the SOEs were inefficient in their production and business operations because of dated products, obsolete equipment and low efficiency (City of Dalian, 1995a). Without restructuring and innovation, these SOEs could not be competitive in the market. However, they lacked sufficient finances to restructure. Through industrial relocation, these SOEs could make use of the money from the transfer of land use rights to bring in updated technology and equipment and further get rid of plight.

Second, the City wanted to improve the urban environment in Dalian and make it a more pleasant city for people to visit and inhabit (City of Dalian, 1995a). Urban development in Dalian had been plagued and restrained by pollution which resulted from the inappropriate industrial layout in history (City of Dalian, 1995a). Heavy industries were scattered within residential and commercial areas, causing many pollution problems and affecting neighbourhoods as well as the natural environment. Relocating the industries in the Central City became necessary to enhance the quality of life in Dalian and to curb environmental pollution (City of Dalian, 1995a).

Third, the Dalian municipal government wanted to rationalize and maximize the efficiency of urban land use. Many industrial enterprises with poor economic performance were located in areas which would bring in much higher economic benefits such as commercial or residential land. Therefore, the City wanted to relocate the industrial enterprises and change the use of urban land into high-value industry, mainly tertiary, so

as to strengthen Dalian's urban function in port, transportation, trade and tourism (City of Dalian, 1995a).

As the industrial enterprises causing serious pollution, high energy consumption and low economic returns have gradually been removed and relocated out of the central city of Dalian since 1995, pieces of former industrial land became brownfields, whereas at the same time, the urban environmental quality in Dalian has been increasingly improved. In 2001, Dalian was honored as "Global 500" by the United Nations Environment Program (UNEP) for Dalian's outstanding environment achievements.

5.3 Current Situation of Brownfield Redevelopment in Dalian

How many brownfields are there in Dalian? Are they just a few parcels scattering here and there, or do they concentrate on certain areas of the City? Government documents collected from the municipality provide little clarification since the term *brownfields* has not been recognized by the City yet. However, there does exist a planning terminology *old industrial sites* which was widely accepted and discussed by government officials, planners and environmental experts in Dalian. From the seventeen interviews in Dalian, two common facts associated with the old industrial sites were found. First, the old industrial sites in the City of Dalian were spontaneously emptied as a result of the large scale industrial relocation in the central city since 1995. Second, certain money and time on demolition or decontamination were required to redevelop any old industrial sites for the concerns of contamination resulted from past industrial uses. Since the common usage of old industrial sites matches the broad context of brownfields in this thesis, here in the case study of Dalian, the old industrial sites in the central city should be considered as the brownfields in Dalian.

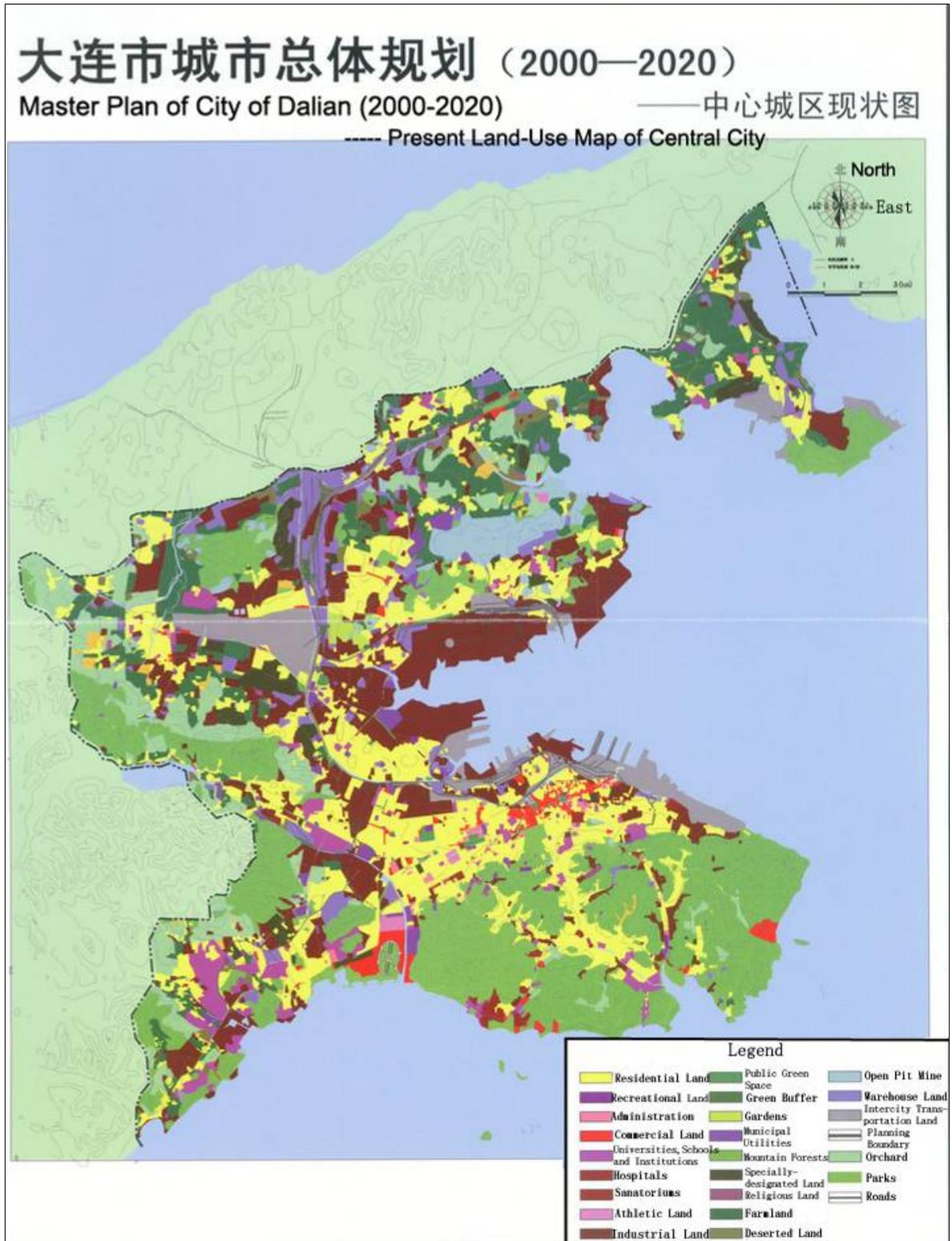
The old industrial sites include not only former industrial enterprises which have already been relocated, but also those which are being relocated or are expected to be relocated soon according to the City's Master Plan of Dalian from 2000 to 2020. In the period 1995-1999, ninety six industrial enterprises in the central city were relocated, and old

industrial sites in total area of 2.93 square kilometer had been redeveloped into urban open spaces, residential or commercial areas (City of Dalian, 2000a). Four old industrial zones began to be relocated and redeveloped during this period, including Siergou Zone, Zhuanshantun Zone, Wuyi Square Zone and Ronghua Beigang Zone (City of Dalian, 2000a). The dark reddish brown areas in Figure 5.4 show all the contemporary industrial land in the Central City of Dalian in the year of 2000. However, more industrial enterprises located in the Central City will be relocated from 2000 to 2020. The City decided to remove, relocate and transform the twelve industrial zones in the City in twenty years (2000-2020). Only four industrial zones will remain in the Central City, namely Youyi Road North Light Industrial Zone, Ganjingzi Petrochemical Industrial Zone, Heizuizi Shipbuilding Industrial Zone and the High-Tech Industrial Zone (City of Dalian, 2000a). As shown in the planning map in Figure 5.5, the industrial land in the Central City of Dalian colored in dark reddish brown will shrink greatly into the four circled plots. In fact, from 2000 to 2005, up to 100 additional industrial enterprises were relocated and nearly 3.67 square kilometers of old industrial sites were redeveloped in the Central City of Dalian⁴⁶. These sites include former chemical plants, paint factories, textile mills, heavy machinery plants and smelteries. At present, three large-scale highly polluting SOEs, which are very influential in China, are being relocated outside the central city starting in 2006 (City of Dalian, 2006a). They are the Dalian Cement Plant, the Dalian Steel Company and the Dahua Group Dalian Chemical Industry Company, which in total cover a total area of 4.74 square kilometers⁴⁷. Their relocation will be completed in 2009 when these old industrial sites become future brownfields. In a word, nearly 200 brownfields were formed and redeveloped in the City of Dalian from 1995 to 2005, which spread over the old industrial zones in the central city as a result of industrial relocation and transformation.

⁴⁶ This information was learned from the interview with Mr. Mingchen Tong, Vice-Director of the Department of Economic Operation, Dalian Economic Committee, on August 2nd, 2006.

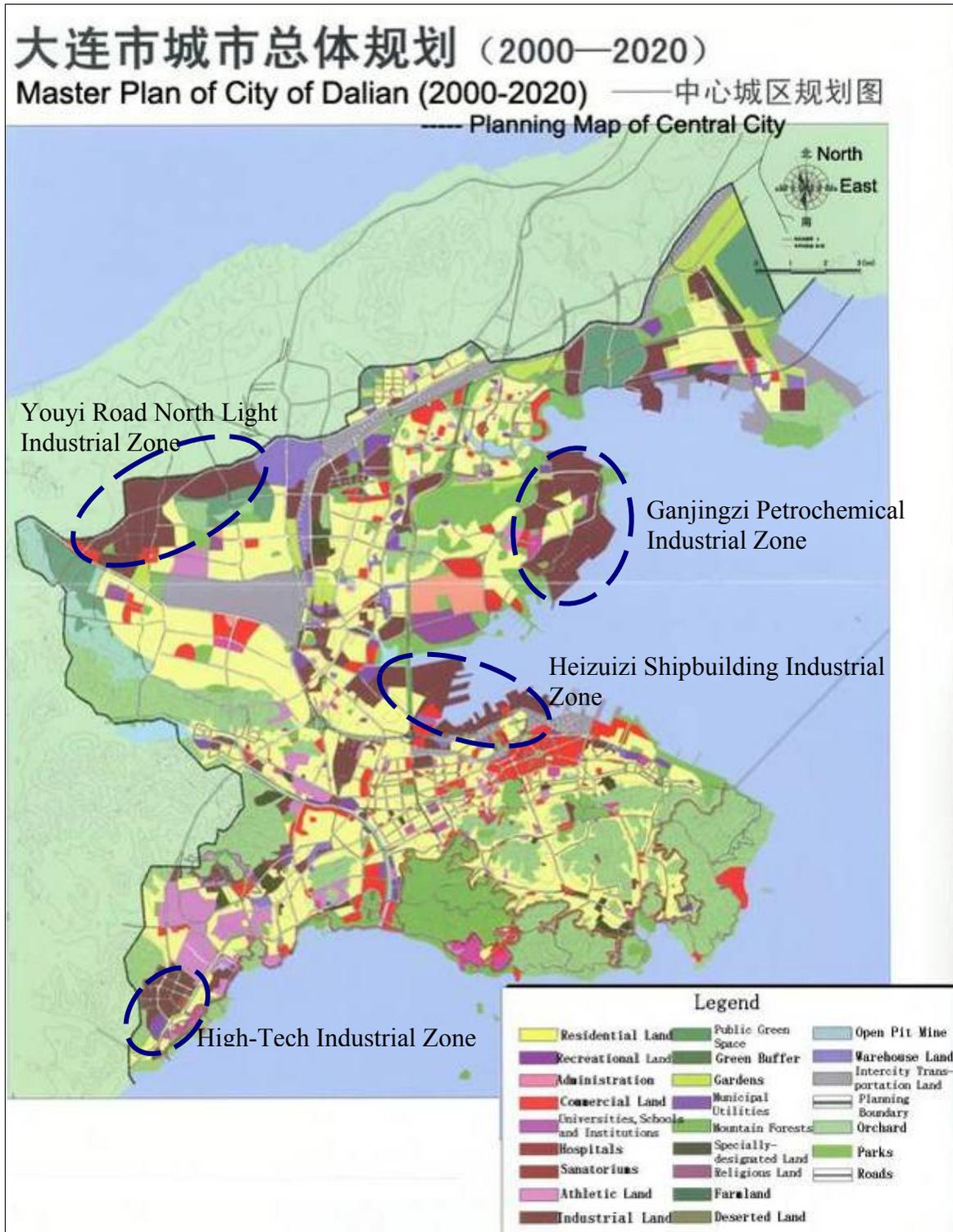
⁴⁷ From the Interview with Mr. Desheng Liu, Director of the Department of Enterprises, Dalian Economic Committee, on August 4th, 2006.

Figure 5.4: Current Land Use Map of the Central City of Dalian, 2000



Source: City of Dalian (2000b), p5.

Figure 5.5: Planning Map of the Central City of Dalian, 2000-2020



Source: City of Dalian (2000b), p6.

What are the brownfield sites in the City of Dalian usually redeveloped into once the old industrial enterprises were ultimately relocated? According to the City's *Master Plan of Dalian from 2000 to 2020*, these vacant old industrial sites are designated to serve the development of service industries, residential housing developments and urban afforestation & greening, so as to enforce the City's urban function in port, transportation, trade and tourism (City of Dalian, 2000a).

Mr. Haibo Zhou, the senior planner and Director of the Institute of Urban Planning in Dalian Urban Planning & Design Institute, said

“...New industrial enterprises will not be arranged on the old industrial sites within the Central City except for the four remaining industrial zones in consideration of the environment. The old industrial sites were usually redeveloped into commercial, residential, recreational land or green spaces. For example, the former Dalian Lipid Chemical Plant was redeveloped into Dalian Navy Square in September 2000, which is the first square in China named after navy. The beautiful residential quarter *Xinghai Renjia* in 2002 was once the former Dalian Paint Factory located in South Shahekou Zone. Similarly, many other projects such as the Xiwang Square and Xingfu e-Home are all developed on the old industrial sites.”

Figure 5.6 includes pictures taken from on-site observation on the redeveloped old industrial sites mentioned by Mr. Zhou. Little evidence from the pictures shows that they were built over former industrial sites since the old industrial buildings had been totally demolished.

Figure 5.6: The Redeveloped Old Industrial Sites



Dalian Navy Square
(Former Dalian Oil&Fat Chemical Plant)



Residential Quarter *Xinghai Renjia*
(Former Dalian Paint Factory)

Mr. Xiaoguang Xu, a senior planner in Dalian Urban Planning & Design Institute, told the researcher:

“In the City of Dalian, similar to many other large cities in China, it is very common to knock down the old industrial building and substitute it with a whole new high-rise commercial or residential building... It is not just because new high-rises allow for more spaces, but also because the old industrial facilities pose their own physical or environmental problems for efficient commercial or residential use. Some of them were so dilapidated and contaminated that it did not make any economic sense for the developers to clean them up and redevelop them in situ...However, we do have begun to realize the intangible value in the architectural and historic context of the old industrial heritage which new high-rises are missing. That’s why we are considering learning from the North American experiences, i.e. to convert old industrial properties into lofts. Actually, this idea has been incorporated into the first draft of the redevelopment plan of former Dalian Steel Company and Dahua Group Dalian Chemical Industry Company.”

It should be noted here that in addition to the old factories and plants, the buildings within the old industrial sites may include some dilapidated residential apartments and commercial establishments which may also be considered as brownfields in Dalian. These residential buildings were usually built by the adjacent state-owned industrial enterprises in 1950s when a work unit (known as *danwei* in China) was required to provide housing and basic social services (such as health care and child care, etc) for its employees. Shops and outdoor farmers’ markets were spontaneously established to serve nearby residents. At that time, many of these residential and commercial buildings were constructed without being properly planned. Some of them lacked sanitation networks, while some were usually serviced by antiquated sewers and water lines over 50 years old. Many of these services have not been replaced and some of them caused sewage leakage in the past. Therefore, there is often a need to deal with the potential sewage contamination beneath the buildings and the debris & wastes once they are emptied and torn down, along with the large-scale industrial relocation.

5.4 The Process of Brownfield Redevelopment

The redevelopment of brownfields in the City of Dalian is a complicated process which is closely related with industrial relocation and involves a variety of public and private

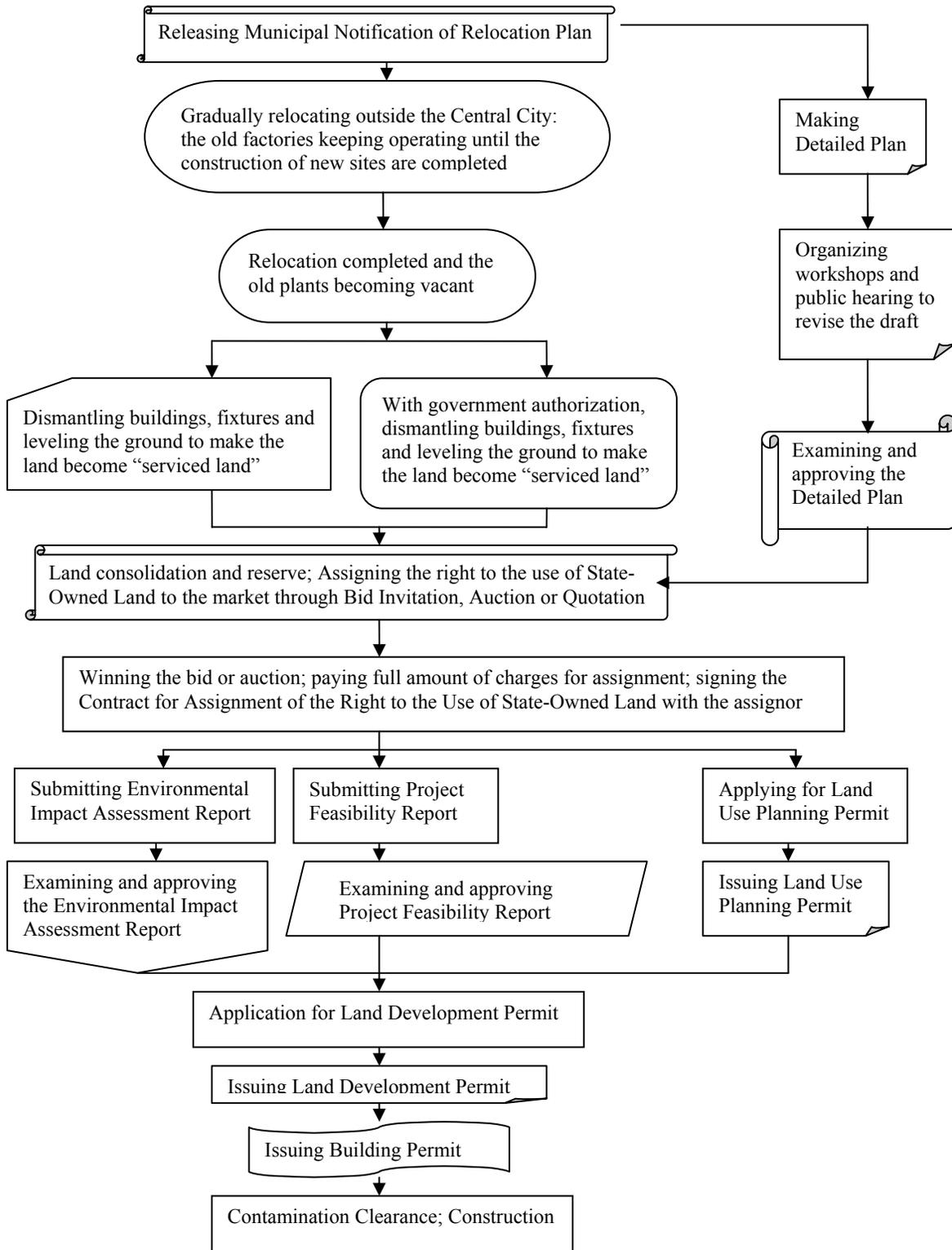
sectors. Figure 5.7 illustrates a conventional planning process of brownfield redevelopment in the city, as well as the interactions, behaviours and functions of different public and private sectors.

Typically, the whole redevelopment process is initiated by the release of municipal notification of the relocation plan, which states the project outline and timetable for relocation and resettlement. The Dalian Land Reserve and Transaction Center (DLRTC) will take charge of the notification release on behalf of the municipal government. Then, the State-Owned Enterprises (SOEs) which are involved in the relocation plan will obtain financing from financial institutions to purchase new lands outside the City and establish new plants, while at the same time, the old factories will still be kept in operation until the construction of new ones is completed. The municipal government will allocate the new land in the suburb to the SOEs for the construction of new industrial plants in accordance with the overarching master plan. The SOEs obtain the allocated land use right of the new land without paying any rent and they can maintain the allocated land use right without time limitation⁴⁸. What the SOEs do need to pay is the resettlement compensation to farmers, since the allocated new land in the suburb is mainly farmland and it is expropriated from farmers by the municipal government. Due to the resettlement compensation and the construction cost of new plants, the SOEs need to obtain financing for the relocation. It usually takes the SOEs one or two years, sometimes even longer, to complete the whole process of relocation, depending on their company scale and the ability of financing. As the SOEs gradually move out of the central city, former old industrial plants become vacant, waiting for the redevelopment coming soon.

A professional team from the Dalian Land Resources and Housing Bureau (DLRHB) is then sent to the vacant former industrial sites to carry out Phase One land development which refers to site preparation regarding the process of dismantling the old buildings & fixtures on the old sites, and leveling the ground to make the land become “serviced land”. Serviced land is a real estate terminology in China which especially refers to land for

⁴⁸ The allocated land use right is quite different from the assigned land use right through bid invitation, auction or quotation, which will be introduced later.

Figure 5.7: A Conventional Planning Process of Brownfield redevelopment



To Be Continued...

Legend:

-  Dalian Land Reserve and Transaction Center (DLRTC)
-  State-Owned Enterprises (SOEs)
-  Dalian Urban Planning Bureau (DUPB)
-  Dalian Land Resources and Housing Bureau (DLRHB)
-  Developer engaged in Phase One Land Development
-  City Council
-  Developer engaged in Phase Two Land Development
-  Dalian Environmental Protection Bureau (DEPB)
-  Dalian Development & Reform Commission (DDRC)
-  Dalian Urban & Rural Construction Committee (DURCC)

Source: seventeen interviews in City of Dalian; Dalian Land Reserve and Transaction Center (2006); Dalian Urban Planning Bureau (2006)

which the dismantlement of above-ground buildings & fixtures and natural land consolidation has been completed, and is serviced with “Availability of 7 Issues” (including traffic, electricity, water, drainage, telecommunication, cable TV and gas) and ready for the new construction. Serviced land is a semantic counterpart to “raw land” which is described as land that has not undergone basic infrastructure construction (water/sewage, stormwater management and other utilities) and can not be developed into new land uses directly. The Phase One land development is a required preliminary process before the vacant industrial land can be recorded into the land reserve system and then be supplied to the land market for redevelopment. Usually DLRHB is responsible for Phase One land development. However, considering the potential for bureaucratic inefficiency, DLRHB will not always do it itself. Instead, DLRHB will issue a certificate to a qualified developer and authorize it to carry out Phase One land development. The latter approach is more often adopted in Dalian according to a government official at the Dalian Economic Committee. The qualified developer is elected by means of bidding.

Once the Phase One land development is completed and the brownfield becomes serviced land, it will be put into the record of urban land reserve by DLRTC. The DLRTC is a municipal department which is responsible for managing the urban land reserve system including land purchase, requisition & recall, land reserve and supplying land to the market. The DLRTC assembles those serviced lands from dispersed land users, clears their title and consolidates them for future supply.

At the same time, a detailed plan is drafted by the Dalian Urban Planning Bureau (DUPB) and revised after public hearings. It is then examined and approved by the City Council. A detailed plan, in conformance with the master plan, outlines the goals, objectives and policies regarding the redevelopment of brownfields, usually accompanied by schedules identifying proposed land uses, development constraints, the general planar lay out, and provisions of the by-law such as set backs and building permits.

With the establishment of the detailed plan, the DLRTC releases a public notification with mass media to call for potential developers to redevelop the proposed brownfield site. Under the Constitution of the People's Republic of China, the state owns the nation's lands and assigns licenses to those who inhabit, utilize, and improve it. Therefore, public notification is not announced to transfer ownership of the proposed land, but to assign the right to the use of proposed state-owned land to the market through bid invitation, auction or quotation. Because the DLRTC does not undertake the environmental study of brownfields, detailed information regarding the contamination on the brownfields will not be included in the public notification. Typically, public notification will outline the basic condition of the proposed land such as location and area, permitted land use, the planning control indexes, the qualification requirement for potential applicants in bidding, auction or quotation for the assigned land use right, and other associated measures and regulations in bidding, auction or quotation. The base price or minimum price will be first evaluated by a qualified land evaluation institute in accordance with the relevant provisions, and then decided by the DLRTC in light of the evaluation result and the industrial policy of the municipal government in Dalian (City of Dalian, 2002). The base

price or minimum price will be kept secret by the DLRTC until the bidding, auction or quotation of the assignment has reached a conclusion.

Potential developers who are interested in the redevelopment of proposed brownfields submit their application to the DLRTC for bidding, auction or quotation before the deadline. The bid winner or auction winner will sign the Contract for Assignment of the Right to the Use of State-owned Land with the assignor DLRTC on the condition that the charges for the assigned land use right has been paid in full. It should be noted here that the assigned land use right, unlike the allocated land use right, is subject to a specified term and limitations on the redevelopment to general purposes similar to detailed plan and zoning classifications, depending on the specific terms in the Assignment Contract. Generally speaking, the highest timeframe of the assigned land use right for residential use is 70 years; for industrial use is 50 years; for non-profit organizational use such as education and research institutes is 50 years; for commercial, tourism and recreational use is 40 years; while for all other uses is 50 years (DLRTC, 2002). Ninety percent of the proceeds from the assignment of the right through to the use of State-owned land will be transferred back to the SOEs which are involved in the industrial relocation for their future restructuring and innovation, while the rest 10% of the proceeds is retained by the municipality for public use (City of Dalian, 2003).

When all the formalities for the assigned land use right transaction are cleared, developers begin to prepare an Environmental Impact Assessment (EIA) report for the approval by Dalian Environmental Protection Bureau (DEPB), as well as a project feasibility report for the approval by Dalian Development & Reform Commission (DDRC), and the application for Land Use Planning Permit to DUPB. According to the *People's Republic of China Environmental Impact Assessment Law* which took effect in September 2003, any land use plan or regional development plan is required to submit an EIA report which analyzes and forecasts the environmental impacts of such a plan, and proposes counter-measures to mitigate adverse environmental impacts (SEPAC, 2002). There is no exception in the City of Dalian. If the conclusion of the EIA report is not accepted in the course of examination and approval by the authority, namely the DEPB,

the development plans are not allowed to be implemented. In addition to the EIA report, the developer needs to obtain the Dalian Development & Reform Commission's (DDRC) approval for the project feasibility report. Besides, according to the Urban Planning Act 1989⁴⁹, prior permissions for land and property developments from the planning authority before the commencement of construction are required, which contain Land Use Planning Permit, Land Development Permit and Building Permit. The DUPB will evaluate the development applications against the non-statutory Detailed Plan and issue a Land Use Planning Permit to developers attached with land use planning parameters such as plot ratio, site coverage and building height. When the EIA report, the project feasibility report and the Land Use Planning Permit are all approved, as well as the land site details finalized, a Land Development Permit will be issued to the developer by DUPB. Then, the developer can proceed to commission architects to design the building. After the review of building designs by the Dalian Urban & Rural Construction Committee (DURCC) staff, a Building Permit is issued and the redevelopment of a brownfield site can proceed to the stage of contamination clearance and new construction. The DEPB will undertake follow-up monitoring during the process of contamination clearance and construction to ensure that the project is being undertaken in conformity with the EIA report.

5.5 Challenges to Brownfield Redevelopment in Dalian

Through nine interviews with government officials from DEPB, DUPDI, DEC and DLRTC, four challenges to brownfield redevelopment in Dalian were identified. The prior concern is about the potential pollution problems left on the former industrial land. Since most of the enterprises involved in the large scale industrial relocation are SOEs in heavy industries which produce a significant amount of pollution in the central city, there is more or less some perceived or unknown contamination resulted from past industrial uses left on the land. "Considering that these former industrial sites are designated for residential or commercial use in the near future according to the City's master plan, we

⁴⁹ The Urban Planning Act was abated on January 1st, 2008 and a new planning act called Urban and Rural Planning Act enacted on October 28th, 2007 replaced it and took effect on January 1st, 2008. However, the provisions regarding the prior permits for urban land and property development remain unchanged.

need to pay special attention to the potential pollution problems left on the sites”, said Mr. Ni, one of the top officials in DEPB, “although developers are required to undertake an Environmental Impact Assessment and get their Environmental Impact Assessment report approved by us before the commencement of construction, we still can not optimistically think that the potential contamination will be thoroughly cleared by the developer and the site is suitable for people to inhabit or utilize.” On the one hand, the EIA of a brownfield project usually focuses on the contamination related to the air, water and solid wastes, which can be perceived directly and easily (Environmental Expert from DUT). Yet the hidden potential contamination in the soil is seldom studied in the EIA. On the other hand, there is currently no national or provincial environment laws and regulations that especially regulate the cleanup criteria for soils and groundwater contaminants in brownfields (Government Official in DEPB). The only national standard that can be used in identifying whether a brownfield site is ready for redevelopment of other land uses after remediation is the *Environmental Quality Standard for Soils* promulgated by SEPAC in 1995. But this set of criteria may be too loose and does not fit into the specific conditions of brownfield sites in the city, because it is originally applied to cultivated land not urban land. Urban land, especially land for residential use, may require more stringent soil and groundwater standards to be protective of all receptors. As a result, potential contamination left on brownfields may still exist and pose a potential environmental risk to public health, even though the developer has implemented EIA and undertaken some methods to remediate the site.

“...As a matter of fact, we have already received some appeals from residents living in a residential quarter, reporting that they began to feel uncomfortable after they had lived there for two or three years, and they suspected there might be some chemical wastes in the soil left by the former paint factory that had not been cleaned up, and it might be the chemical contaminants in the soil that made them feel uncomfortable. Since everything is still under investigation, I could not tell you more details about it right now. But what I do can tell you is that those appeals have aroused special concerns in our bureau, even the City Council, and we are getting down to establishing an environmental regulation in the near future to regulate the redevelopment of former industrial sites. People do not need to wait too long.” (Government Official in DEPB)

The second challenge to brownfield redevelopment identified in Dalian is the lack of detailed historical information on former industrial enterprises, which leads to uncertain identification of potential contamination and presents problems to DEPB staff when they examine and approve the EIA report. DEPB does not have a record of former industrial enterprises' historical site information, even though most of the enterprises are SOEs. One of the main reasons for this is that many SOEs themselves do not have the management of archives clearly recording their past manufacturing and operations. Furthermore, some of the enterprises may no longer exist due to relocation and restructuring. They may have shut down, while some may have amalgamated into other companies. Thus, many of the past historic documents are inevitably destroyed or missing while some of the insiders may have retired. Without a clear understanding of historical site information, it is hard for developers to identify potential contaminants of concern and potential areas of contamination on brownfields and thus the accuracy of EIA can not be assured. The lack of detailed historical information on brownfields has become a serious problem to DEPB, particularly in the case of hazardous solid wastes. Before the enforcement of the *Law on Prevention and Control of Environmental Pollution by Solid Wastes of the People's Republic of China* in 1995, enterprises usually adopted landfill as a method to dispose of hazardous solid wastes (HSWs). However, due to the unavailability of documentation, it is very difficult for DEPB to collect complete past information associated with the generation, transportation and disposal of HSWs in the past, thereafter increasing the inaccuracy in identifying potential contaminations on brownfield sites where former industries might have produced HSWs.

The third challenge of brownfield redevelopment in the City of Dalian is to assemble multiple dispersed adjacent properties into a parcel that is shaped and sized appropriately for redevelopment in the large scale of industrial relocation. This often requires recalling the dispersed land use rights from various individual land users and incorporating several contiguous parcels under a single land use right. However, some industries may not be willing to move and relocate outside the City, even though the land under their properties belongs to the state and they are required to move according to the released municipal notification. This is mainly because most of the employees in the industries live at the

Central City which is close to urban amenities, and they are reluctant to move to the suburb where they need to spend considerable amount of time everyday in commuting from their homes. Moreover, some affected households from residential brownfields may be also unwilling to move out of their apartments or houses because of unsatisfactory resettlement compensation. “Frankly speaking, it is really an arduous job to assemble the dispersed brownfields from individual land users. No one psychologically wants to move and resettle in a new place once he/she has stayed at a place for years, except that the compensation exceeds the cost of resettlement. So the timeframe of redeveloping those former industrial sites is usually prolonged” a governmental official at DLRTC told the researcher.

The final challenge that was repeatedly emphasized in the interviews with government officials is not directly related to the redevelopment of brownfields, but an economic problem stemming from the whole process of industrial relocation and brownfield redevelopment. That is the issue of unemployment. It has been mentioned before that 90% of the proceeds from assignment of the right to the use of former industrial land will be transferred back to the SOEs which are involved in the industrial relocation for their future restructuring and innovation. The industrial restructuring and innovation inevitably trigger layoffs and employees no longer qualified for the new jobs are thus laid off. Unemployment becomes worse, particularly when it comes to the case of the SOEs that have stopped their operation in the industrial restructuring. “Unemployment is increasingly challenging the safety and stability of our society in Dalian...The placement of these laid-off employees has become an urgent social problem drawing the City Council’s attention” said Mr. Tong, an official at DEC.

5.6 Municipality’s Response to the Challenges of Brownfield Redevelopment in Dalian

The potential environmental problems in brownfield redevelopment have caused great safety concerns in the City of Dalian. In November 2006, the City Council released a *Decision on Implementing the Scientific Concept of Development and Strengthening*

Environmental Protection (the “*Decision*”), which for the first time put forward that “the vacant former industrial site is not allowed to be redeveloped until soil risk assessment and site restoration have been undertaken and completed” (City of Dalian, 2006b). Later in August 2007, the City Council released *Notification of Enhancing Environment Pollution Prevention in the Process of Industrial Relocation* (the “*Notification*”), which for the second time emphasized the request for soil contamination cleanup and brought forward policies regarding the liability of contamination (City of Dalian, 2007a). According to the *Notification*, developers are required to commission a qualified environmental impact assessment agency to carry out EIA on soils before redeveloping a brownfield site. It is not until the identified contaminants have been cleaned up to meet the related national environmental protection standards that the developer is able to proceed with new construction. The original polluter of brownfields is responsible for all the remediation costs, following the principle of “polluter pays” according to the *Notification*. The cleanup cost can be brought into the relocation cost or the bankruptcy liquidation in accounting by the industries involved in the relocation. In the case that the original polluter is absent or out of the discharge ability, the municipal government will bear part or all of the cost, hinging on the specific condition of the case and the City’s financial ability.

The City of Dalian has been very progressive in implementing the *Notification*. In September 2007, DEPB made a decision to launch a joint program with foreign investors to cooperatively remediate the 700,000 m² brownfield sites at the District of Ganjingzi. These sites formerly housed eight industrial enterprises, among which seven were heavy industries. DEPB decided to remediate the sites before they could be redeveloped for commercial and residential use. Considering the limited remediation technology currently available, DEPB wanted to attract foreign investment and bring in advanced remediation technology. The municipal government would pay for the cleanup cost while the foreign enterprises would give technological support for the program. According to the official at DEPB, the municipal government hoped the program could be a showcase of brownfield redevelopment in Dalian, which not only reduced potential environmental risk on public

safety but also helped to disseminate advanced remediation technology among developers (Cong, 2007).

As to the challenge of the lack of detailed historical site information on brownfields, the City still has not yet come up with an effective counter-measure. “What we currently do is to hold workshops and interviews with the old environmentalists of the city and other related insiders’ of the company, in order to acquire historical site information of brownfields such as their past operations and disposals of wastes. But the effect is rather limited. You know, some of the insiders may have passed away or have retired. It is hard to get in touch with them” The official at DEPB told the researcher disappointedly. In the case of hazardous solid wastes, the City established a new department called the *Department of Dalian Solid Wastes Management* at DEPB in August 2002, which was especially responsible for supervising and monitoring the whole process of production, transportation and disposal of HSWs in the City. Industrial enterprises which produce HSWs in their operation are required to declare and register all the information of HSWs to the Department. Therefore, the municipal government can keep a very good record of all the present HSWs in Dalian and have stringent control of the HSWs management. However, as aforementioned, past information regarding the production, transportation and disposal of HSWs before 1995 when the *Law on Prevention and Control of Environmental Pollution by Solid Wastes of the People’s Republic of China* was not enacted is still incomplete. As a result, the EIA on brownfields where former industrial enterprises may have produced HSWs is covered with clouds of uncertainty. The City is still working on methods to clear those clouds.

In terms of the challenges related to enterprises’ and individuals’ unwillingness to relocate and the issue of unemployment, the City of Dalian has issued two documents in order to smooth the process of industrial relocation and brownfield redevelopment. In August 2006, the *Regulation of Industrial Enterprises’ Relocation and Transformation in the Central City of Dalian* (the “*Regulation*”) was released, which required the relocated SOEs to actively provide other job opportunities, if possible, for the laid-off employees before they finally dismiss them (City of Dalian, 2006c). If the SOEs do not have the

capacity to provide possible jobs, they must give an appropriate amount of compensation to the employees when they are dismissed, so that the employees can maintain their minimum living standard before they find new jobs by themselves. Unemployed people can apply for jobless claims from the City according the *Regulations*. In February 2007, another document *Revised Implementation Measures for Urban Housing Demolition and Relocation in City of Dalian* was issued, which pointed out the countermeasures exclusively for potential conflict over resettlement compensation from affected individual property owners in the industrial relocation (City of Dalian, 2007b). By way of public consultation, the municipal government and the affected individual property owners will together decide and commission a real estate evaluation company to appraise the old buildings, and then work out the amount of appropriate compensation that will satisfy both sides. Resettlement contracts are signed between the municipal government and the existing property owners. If two parties can not reach agreement, either one can resort to the intermediate court in the city for a justified adjudication. All these measures are designed to mitigate potential opposition and appeals from residents who are required to relocate.

5.7 Example of Lingshui Bay Area Redevelopment Project

Lingshui Bay is a shallow estuary through which Lingshui River enters the Yellow Sea. It is located in western part of Dalian, surrounded by a region called Lingshui Bay Area. Lingshui Bay, together with Xinghai Bay and Xiaoping Island, were once considered the Three Jewels in the City of Dalian. With the crystal clean water running from Lingshui River into the Ocean, a long sandy beach as well as an abundance of greenery and flowers nearby on the Bay Area, Lingshui Bay had once been one of the favorite resorts for Dalian People. However, the industrialization and urban development in the past had dramatically changed Lingshui Bay and the bay area. Lingshui Bay is no longer a shiny jewel in western Dalian, but a *Lingluan* bay which in Chinese means disorder and pollution (See Figure 5.8). Raw sewage from both households and industrial enterprises are discharged directly to Lingshui River without treatment. Solid wastes were dumped on roadsides. Stinky smells from the aquatic products breeding & processing factory

disperses over the north end of Lingshui Bay. “Lingshui Bay Area shouldn’t be in the way it currently presents. Particularly considering its geographic location, Lingshui Bay Area should be a *treasure* in Western Dalian, not a *Lingluan* Bay Area. It lies astride the important transportation corridor between Dalian and Lushun (the fast-traffic-lane, Lushun South Road) and is exceptionally close to Dalian University of Technology in the north and Dalian High-Tech Industrial Park in the south” The Director of the Construction Bureau of Dalian High-Tech Industrial Zone said to the researcher.

Figure 5.8: Observations on Lingshui Bay Area



Sewage Leaking on Lingyuan Road



Wastes Piling along the Roadside



Overlooking the Smeltery Sitting besides Lingshui River



Abandoned Hyperbolic Cooling Tower at the Third Coal Power Plant



Lingshui River and nearby Sewer Pipes



Wharf of the Aquatic Products Breeding & Processing Factory on the Bay



Lingshui Bay Wholesale Market for Agricultural and Sideline Products



Shabby Residential Building on Lingyuan Road

In early 2006, the Dalian High-Tech Industrial Zone (DHTIZ) launched the Lingshui Bay Area Redevelopment Project which was aimed to remediate the contamination and redevelop the bay area into a Science & Culture Region (See Figure 5.9 for the perspectives of urban design). The project is part of the City's long term planning project *Detailed Plan for Qixianling Industrial Base* under the administration of DHTIZ. In order to facilitate the redevelopment process, DHTIZ ad hoc established the Lingshui Bay Area Redevelopment Office which exclusively took charge of the project. According to an official at the Lingshui Bay Area Redevelopment Office, the project is composed of three main steps.

Figure 5.9: Perspectives of the Redevelopment Area



Main Entrance of Redevelopment Area Birds Eye View of Main Redevelopment Area

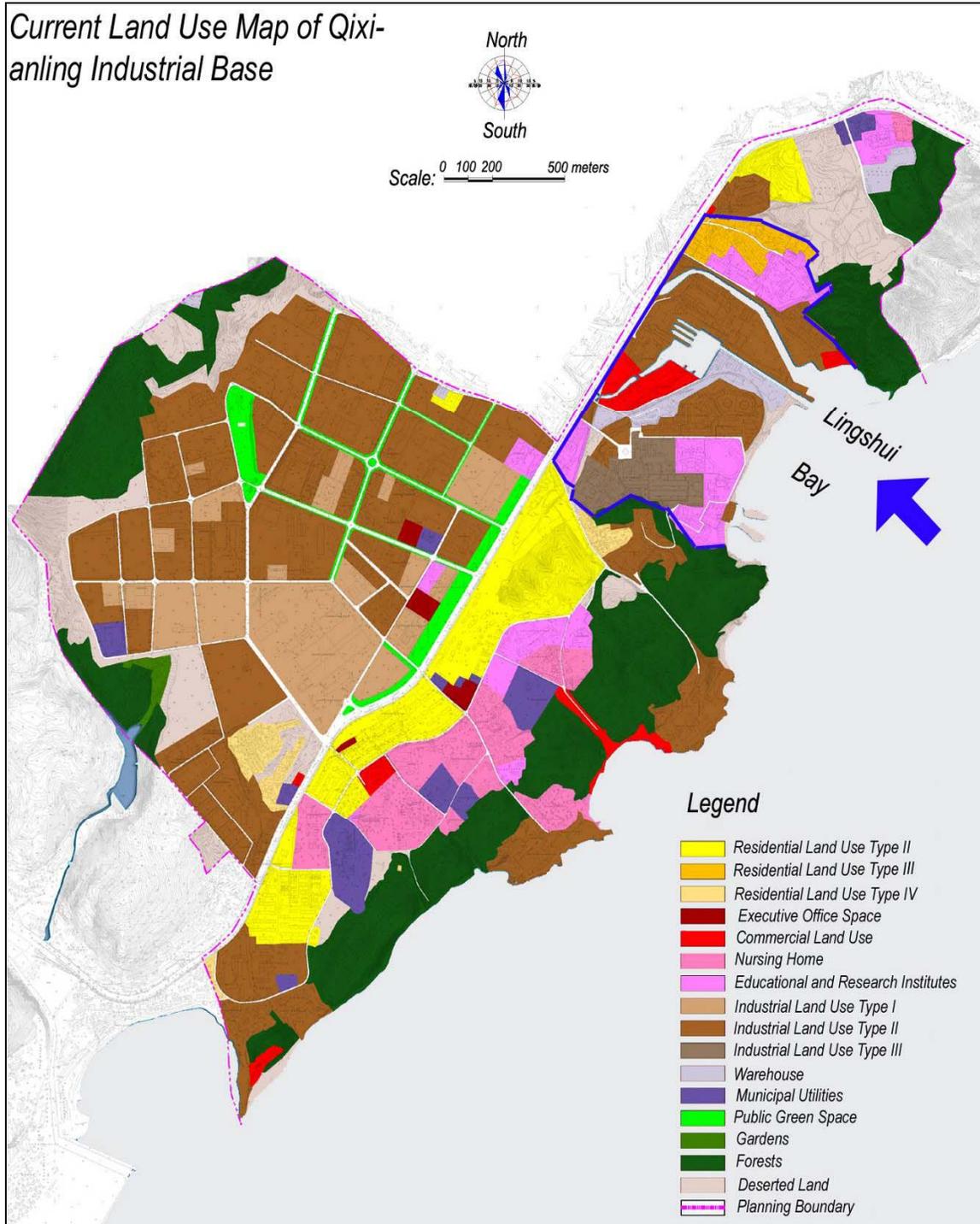
Source: DUPDI (2006), p17

First, 34 enterprises and institutions, whether they are large or small, as well as near 300 households will be moved and relocated to the suburb. Industrial enterprises creating heavy pollution will either be relocated or closed in situ, including the Third Coal Power Plant, the Aquatic Products Breeding & Processing Factory and the smeltery. The shabby residential quarter on Lingyuan Road which is serviced with antiquated municipal utilities will be torn down and redeveloped into a new modern residential community. The Lingshui Bay Wholesale Market for Agricultural and Sideline Products which is polluted by sewage and wastes will be closed and dismantled. Figure 5.10 includes a current land use map of Lingshui Bay Area, and Figure 5.11 is an intended land use map. Comparing both Figures, it reveals that most of the former industrial sites which may have caused potential environmental contamination are designated to be redeveloped for educational and research institutes, or for residential use.

Second, a comprehensive environmental pollution remediation will be carried out extensively on the Lingshui Bay Area, including the land polluted by raw sewage and wastes, the abandoned railways, the contaminated Lingshui River and the waterfront.

Third, an infill project will be launched to reshape the coastline of Lingshui Bay and provide new lands for recreational/cultural public open space (See Figure 5.11). A new

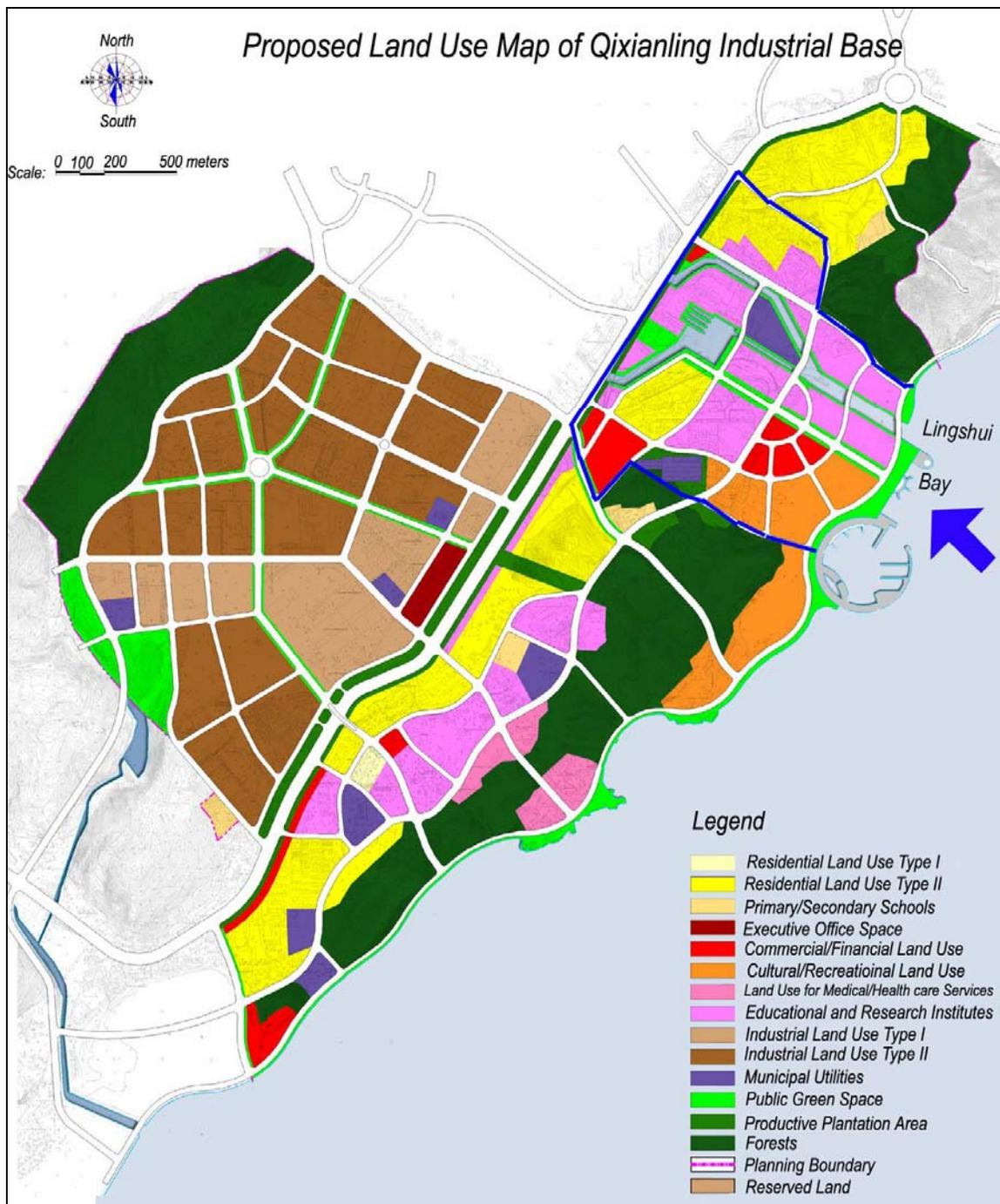
Figure 5.10: Current Land Use of Lingshui Bay Area⁵⁰



Source: DUPDI (2006), p4

⁵⁰ For explanations related to the classification of various urban land uses in China, please refer to Appendix VIII.

Figure 5.11: Proposed Land Use of Lingshui Bay Area



Source: DUPDI (2006), p8.

high way Binhai in the north and stretching towards south to Lushun, in order to mitigate the traffic pressure on Lushun South Road. In total, the Lingshui Bay Area Redevelopment Project will cover a redevelopment area of 3-5 square kilometers and an estimated amount of \$330 million will be invested in the construction of new infrastructure (Director at the Construction Bureau of DHTIZ).

In interviews with government officials from the Construction of Bureau at the DHTIZ and the Lingshui Bay Area Redevelopment Office, all four interviewees unanimously considered the greatest challenge in the Lingshui Bay Area Redevelopment Project was to relocate affected enterprises and households in the bay area and assemble multiple dispersed properties into a parcel suitable for redevelopment. Because of disorganized urban development in the past, the land use rights on Lingshui Bay Area had been allocated to various interest groups, including SOEs, private enterprises, the Army, etc.

“Thirty four enterprises and institutions are required to move and relocate, involving the Third Coal Power Plant, Lushun Naval Logistics Base, Dalian Maritime University, and so forth. Do you know what they mean to us? We need to negotiate and persuade them to move single by single, dealing with all kinds of complicated conflicts and interest groups...You can’t imagine how hard it is to reach agreement with them. Some of them are governed by two different District governments, Ganjingzi District and Shahekou District. Some are the premises of Lushun Naval Logistics Base. We have totally no idea about what to do next when the project affects the army’s interest. It is almost impossible to ask the army to compromise.” (Official at Lingshui Bay Area Redevelopment Office)

According to the interviewees, DHTIZ had spent a large amount of time and energy in negotiating with various affected interest groups in order to reach agreement. The issue of resettlement compensation had also been pending for a long period, causing the delay in the relocation and dismantlement of the residential quarter on Lingyuan Road.

Another barrier relates to the potential contamination on Lingshui Bay Area. Contamination is two-fold in the redevelopment project. On the one hand, although environmental pollution remediation will be carried out extensively on the Lingshui Bay Area including the potential contaminated land, Lingshui River and the waterfront, DHTIZ could not assure the contamination on brownfield sites would be completely cleaned up. A director at the Construction Bureau of DHTIZ said: “we can clean up the

contaminants in Lingshui River and the bay to reach the national standards on inland water and seawaters. But when it comes to the contaminants on brownfields, we are not so confident... because there is no national or provincial cleanup standard available in hand with regards to the soil and groundwater contaminants in brownfields.” On the other hand, DHTIZ was concerned about the potential negative environmental impact of the infill project along the coastline of Lingshui Bay. The primary purpose of the infill project was to remediate the contaminants around Lingshui Bay and to provide new lands for new development. DHTIZ worried that the infill would otherwise destroy the natural ecosystem on the bay and the waterfront, unexpectedly causing new environmental contamination.

As of July 27th, 2006, the Lingshui Bay Area redevelopment project had been launched for nearly seven months. Although the project was still in the stage of industrial and residential relocation, substantive progress had been made. The relocation and dismantlement of the 36,000 square-meter residential quarter on Lingyuan Road had almost been completed. Households in the community had already moved out and an authorized developer who won in the bidding had already started the Phase One land development on the site. Agreements between DHTIZ and Lushun Naval Logistics Base had been reached. Lushun Naval Logistics Base had agreed DHTIZ to dismantle its 24000 square-meter Lingshui Bay Wholesale Market for Agricultural and Sideline Products, as well as its 3.9 kilometers abandoned railway. The environmental impact assessment of the infill project along the Lingshui Bay coastline had been completed by environmental experts at Dalian University of Technology and submitted to the DEPB for examination and approval.

Great progress has been made in the Lingshui Bay Area Redevelopment project according to a telephone interview with the Director at the Construction Bureau of DHTZ on February 25th, 2008. A waste water disposal factory located on the south end of Lingshui Bay has been completed and begun its operation. All the raw sewage from current households and industrial enterprises at Lingshui Bay area are no longer discharged directly to the Lingshui River without treatment, but flow through newly

established sewer pipes into the factory for disposal. As a result, the contamination of the Lingshui River is controlled from the source. Solid wastes piling along the roadside in the bay area have already been dug and dumped away to the landfill sites for treatment. Contaminated sediments in Lingshui River and Lingshui Bay will be dredged and removed this year 2008 according to the official. In addition, negotiations with the Third Coal Power Plant, Dalian Maritime University and other enterprises which have not reached agreement with DHTIZ are still expected to continue in 2008.

5.8 Stakeholders' Perceptions on Applying the Successful Brownfield Redevelopment Approaches to the City of Dalian

Seventeen face-to-face interviews in the City of Dalian, China were carried out with key stakeholders involved in brownfield redevelopment, including environmental consultants and scholars from DUT, planners and government officials from DUPDI, DEPB, DEC, DLRTC, and DHTIZ. According to the interviews, two types of perception were found among stakeholders with regard to applying the successful municipal experiences in Ontario to the City of Dalian. The majority of the interviewees (10 in 17) considered that it was impossible to apply those Canadian experiences to Dalian. In the eyes of the ten interviewees, the difference in brownfield redevelopment between Canadian cities and Dalian was identified as the main factor accounting for their disagreement regarding the application. The difference includes four main aspects: (1) different situation of brownfield redevelopment in two countries; (2) different challenges facing the municipalities; (3) different environmental law system in two countries; and (4) different land ownerships. They are reflected by the following typical arguments from the ten stakeholders:

“...applying the Canadian municipal experiences to Dalian? How could that be possible? The situation of brownfield in Dalian is totally different from Canada. We don't need to worry about developers' unwillingness to redevelop those former industrial sites. In fact every time when we supply the vacant former industrial land to the market, we've got many applications from various developers for participation in the bidding or auction. The market force itself works very well. In this case, it is not necessary for the City to adopt any policy especially aimed to

encourage the developers, needless to say the Canadian experiences...” (An official from DLRTC)

“...I don’t think the Canadian experiences are going to work out in Dalian. They are not panacea. They are designated to solve their own set of problems in brownfield facing their cities. City of Dalian has its own distinctive challenges in the redevelopment of brownfield. We don’t have the same problems as in Canada. Policies turn to work in Canada, which does not mean they are going to work in Dalian, in China. It is just like the old Chinese idiom *Suit the Remedy to the Illness*. We can’t take the medicine for cough to cure loose bowels. They just don’t fit...” (An official from DEC)

“...In the industrial relocation and redevelopment of former industrial sites, our priority concern is not that these brownfield sites will be or are being left idle or abandoned, but the environmental risks arising from the potential contamination left on the sites after the redevelopment. Our current environmental legislations and regulations associated with brownfield redevelopment are not as comprehensive and stringent as in Canada. Developers do not have to spend a large amount of money in remediating the sites in order to meet the standards. I think what the City needs to do right now is to make concerted efforts to precipitate the establishment of environmental regulations regarding the cleanup of former industrial sites. It is not necessary for us to apply the Canadian experiences to Dalian to attract potential developers into brownfield redevelopment...” (An official from DEPB)

“...It is very good that you can do such kind of cross-nation and cross-culture research to introduce successful foreign experiences to China. However, we can not ignore the basic situation of two countries. You know, what is the biggest difference between Canada and China in redeveloping former industrial sites? It is not the difference in economics, neither in the environmental law system. It is the political system that fundamentally dictates the redevelopment of brownfield is going to be different in two countries. We are a socialist country based on public ownership. All the land in China is owned by the state. That means the ownership of all former industrial lands belongs to the state. However, in Canada, it is a country based on private ownership. Those municipal approaches used in Canadian cities are mostly initiated to facilitate the redevelopment of privately owned brownfield sites. The subject of these policies is different from China. How can it be feasible to apply them to Dalian? It is not realistic...” (A scholar from DUT)

Even though the majority of the interviewees denied the potential of applying Canadian experiences to the City of Dalian, seven interviewees considered that it might be meaningful. It was identified that there were three types of opinions among these stakeholders. Four of them considered that even though the current situation of

brownfield redevelopment in Canadian cities and in Dalian was different, the City of Dalian should learn from Canada to prioritize environmental issues in front of economic growth. Two of them thought that the municipal government in Dalian might learn the financial incentive programs from Canada mainly because the environmental laws related to brownfields in China would be strengthened in the long run. Only one of them suggested that the Canadian experiences with regard to marketing and brownfield coordinator might be of help to the City of Dalian. These three types of opinions from the seven stakeholders are reflected by the following typical arguments:

“...Here I would rather say the City of Dalian should learn from Canadian municipalities in stead of applying their approaches to Dalian. I don't suggest we should carry out exactly the same kind of policies in brownfield redevelopment as in Canadian cities, because our situation is quite a lot different from Canada. However, let's take a close look at these Canadian experiences. We can clearly find that they are all driven by a strong commitment to brownfield redevelopment. Furthermore, under the commitment is the motivation to ensure public health and safety in their cities. That's the point I want to mention here. City of Dalian should learn from the Canadian cities and place the issue of public health and safety as No. 1 priority in front of the economic growth. Former industrial sites should not have been redeveloped in such a blind way as it is today. More attentions should be paid into the cleanups of contamination ...” (An environmental expert from DUT)

“...In the short run I think the potential for us to apply Canadian successful municipal experiences in brownfield redevelopment is very weak, as we face different challenges. However, in the long run, they might be of help to our city...As you know, early this year our State Environmental Protection Administration (SEPA) released a regulatory document *Decision on Implementing the Scientific Concept of Development and Strengthening Environmental Protection*. The document advocated all levels of government in China drawing up the drafts of environmental legislation and regulations related to soil contamination. It called for soil risk assessment and site restoration on former industrial sites as well. So we can foresee that in the very near future, there is going to be a series of legislations and regulations regarding contaminated land being enacted. At that time, environmental remediation will become a major issue in the redevelopment of brownfield. Then maybe the Canadian experiences can become helpful to Dalian, like providing grants or funding for environmental site assessment and the municipality taking up leadership role in brownfield redevelopment...” (An official from DEPB)

“...I think we might learn from Canada of marketing and brownfield coordinator. What we marketing are not the brownfield incentive programs, since we don't have those programs in Dalian. What I consider is the marketing of our brownfield

redevelopment vision for the community. We need local support on the future land use plan. It is the lack of public support from the community that our work to relocate and resettle affected enterprises and individuals becomes so tough...Also I think the brownfield coordinator might be a wonderful tool to run in Dalian. We need someone to work as a bridge connecting the City with the private sector to ensure the effective and efficient communication between them. This can help the City to reshape its image from policy maker to partner..." (An official from DHTIZ)

Chapter 6: Discussion and Conclusions

In order to achieve the research objectives outlined in Section 1.2, this chapter will analyze the similarities and differences in brownfield redevelopment between two selected Canadian cities and Dalian. Findings based on the comparison will be further presented, followed by the recommendations to China's practice. The chapter will also discuss the implications of Canadian brownfield redevelopment experiences to the City of Dalian.

6.1 Comparing Brownfield Redevelopment between Canadian Cities and Dalian, China

Five interesting aspects of brownfield redevelopment between Canadian cities and Dalian, China are compared. These comparative points include the historic formation, geography of brownfields, impetus, barriers to redevelopment and the planning process. The comparison emphasizes the different realities existing in Canadian cities and Dalian, as well as the similarities present under the differing context. Key findings derived from the comparison will be identified, followed by recommendations to China's brownfield practice.

6.1.1 Historic Formation of Brownfields

In both countries, the formation of brownfields follows a similar pattern. It is more or less related to two typical processes: the extensive industrialization and the follow-up industrial decentralization. History tells us that each of the two processes happened in Canada decades earlier than China. The early age of industrialization would always seem intensive with many industrial establishments erected along railroads or waterways and located within the urban cores due to transportation costs and the economy of agglomeration (Crafts & Mulatu, 2005), no matter whether it was in "Busy Berlin", "the Birmingham of Canada" or "Dairen". The prosperity of industrialization was then followed by an industrial decentralization process: old industrial buildings became vacant

as firms closed down or gradually migrated from urban centers to the suburbs or overseas. Various industrial resources, such as capital and technology, were decentralized outside the cities. Consequentially, brownfields were formed in the urban areas.

Despite similarities in the broad context of industrialization, the underlying forces contributing to the industrial decentralization in the two countries differ significantly. Traditional industries in Kitchener and Hamilton had experienced a serious recession during the 1980's. They confronted fierce competition from international markets and the shrinkage of domestic demand. Many manufacturing industries were closed. The industrial decentralization in two cities happened spontaneously with the market as the driving force. However, decentralization in Dalian was quite different. It was determined more by governmental intentions than by the market. Most of the old industrial firms in Dalian are SOEs. The government holds predominant powers in the decision-making process of SOEs. Before 1978, when Chinese economic reforms started, industrial firms in Dalian did not have the right to make their own decisions regarding site selection. A sequence of five-year plans for social-economic development in Dalian dictated the way industrial firms were located and developed. Later, the SOEs had to move out of the city centre when the government decided to restructure its urban layout following the master plan.

Key Finding: The formation of brownfields in Dalian is more governmental policy-oriented not market-oriented, which results from the State ownership of urban land.

In Canada, most of the brownfield sites are privately owned and they are usually left vacant for a long period of time by property owners because of their concerns on the costly upfront environmental studies and remediation costs while at the same time being fear of the potential liability of contamination in the future. However, in China, the State owns all the land in urban areas while land in rural and suburban areas is owned by peasant collectives under the *Constitution of the People's Republic of China* and the *Land Administration Law of P.R.C.* These state or collective ownerships of land are the fundamental necessities of maintaining the socialist society in China while developing

the market economy. Therefore, when it comes to the ownership of brownfield sites in the City of Dalian, they are all State-owned. State ownership has two major impacts on the formation and redevelopment of brownfields in Dalian.

When modern land reform in the amendment of the Chinese Constitution in 1988 allowed that “land use can be transacted according to the law”, the municipal government acquired a new source of revenues through the separation of land ownership and land use rights of State-owned urban land. In other words, the municipality can raise a large amount of money by assigning land use rights to urban land users for a specified term of years. When the City of Dalian needed extra revenues to fund the SOEs for their restructuring and innovation, the City came up with the decision of relocating the SOEs in the central city and selling the land use rights of brownfields to developers for land use fees. That is also the reason why the formation of brownfields in Dalian was so closely related to industrial relocation.

State ownership of brownfields also indicates that the state is not only the beneficiary of land use right transactions, but also assumes responsibility for liability related to perceived or potential contamination on brownfields. In terms of the fair allocation of liability, even though the principle of “polluter pays” applies in current environmental laws and regulations, the liability of contamination on a brownfield site should not only be imposed on the industrial firms, but also the government since most of the industrial firms themselves are State-owned and the government had benefited from both the income taxes of SOEs and the proceeds from land use transactions.

However, under current environmental laws and regulations, the potential liability related to contamination has not been taken into account by the City when the municipality sells the land use rights of former industrial sites. The transaction price of brownfield sites does not reflect the potential remediation cost and the liability of contamination in the future. In Hamilton, the developer of LIUNA bought the parking lot which was a former wire manufacturing plant from the City of Hamilton at a price of only \$1 because the cost of potential contamination and environmental liability had partly mitigated the

profitability of the brownfield project. In contrast, land use rights of brownfields in Dalian have been transferred at a significant price in the past. It is estimated that the City had received more than \$4 billion from the transaction of land use rights on former industrial sites during the period of industrial relocation from 1995 to 1999 (Nie, Li and Lu, 2003).

Recommendation:

1. The Chinese government should be more proactive in brownfield policy-making, including developing an appropriate environmental policy with respect to the liability of contamination and establishing a national strategy of brownfield redevelopment.
2. The Chinese government should also be responsible for contamination cleanup in order to facilitate the fair allocation of liability.

State ownership of urban land in China reveals a basic fact that the land ownership of brownfield sites belongs to the State. This type of land ownership indicates that all levels of Chinese governments (central, provincial and municipal) should take proactive actions in brownfield policy-making. However, the research indicates that brownfield policy-making in China has been evolving more slowly than in Canada. There is no such a national brownfield redevelopment strategy in China as provided by the National Round Table on the Environment and the Economy (NRTEE) in Canada (NRTEE, 2003). It was not until December 3rd, 2005 that the central government took its first major step in dealing with brownfield problems, namely, the release of the *State Council's Decision on Implementing the Scientific Concept of Development and Strengthening Environmental Protection*⁵¹, which for the first time called for soil risk assessment and restoration on contaminated sites after former industrial enterprises have moved out. Furthermore, there is not any environmental policy established to address the issue of contamination liability on brownfields. Therefore, the Chinese government should take more proactive efforts in rule-making, regulating and planning brownfield redevelopment. National principles on brownfield sites liability should be developed. A national strategy regarding the

⁵¹ Available at http://www.gov.cn/zwjk/2005-12/13/content_125680.htm

redevelopment is recommended in order to guide the provincial and municipal governments.

State ownership of brownfield sites also reveals that the government should be responsible for the contamination cleanup not just “polluter pays”. The principle of “beneficiary pays” should be supported in the remediation policy and legislation, based on the concept that there should be no “unfair enrichment”. Chinese government should not be exempted from contamination liability because it has benefited from both the income taxes of SOEs and the proceeds from land use transactions of brownfield land.

6.1.2 Geography of Brownfields

The distribution of brownfields in the three cities is similar in that most of the sites are concentrated on the old industrial areas of the city, either in an urban core or along major transportation connections. This could be easily understood because these enterprises were resource intensive and the transportation cost for raw materials as well as the output was a major part of the total operational cost.

However, there is an important difference between Canada and China. Many brownfields in Kitchener and Hamilton generally remain abandoned and idled for many years. They were the authentic yet not proud legacy of past industrialization. They usually could not be redeveloped without a strong funding commitment from the public sector. In contrast, brownfields in Dalian are fairly “young”, being formed over the past decade; more brownfield sites are currently being formed due to the large scale of industrial relocation starting from 1995. They were not being abandoned or derelict for a long period of time after firms had moved out. Some of them were redeveloped immediately once turning vacant.

Key Finding: In terms of the physical and site condition of brownfields, Chinese brownfields are different from those in Canada as they are not being abandoned but redeveloped rapidly once they become vacant.

The length of vacant periods, in a way, possesses a defining power to tell the difference between Canadian and Chinese brownfields. In Chapter 2 literature review, a brownfield site in this thesis is defined as "... real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant" (US EPA, 2002). With the case study in Dalian, the author considers this definition is especially suitable in the context of China. Many scholars may disagree with the author in defining brownfields in China. They may think if a former industrial site is developed into other forms of land uses once the former firm moved out, the site can not be called a brownfield site. In other words, they might think a former industrial site should stay vacant for quite a while before people can name it a brownfield. This argument is not a surprise as it seems appropriate in the North American context. For example, a brownfield in Canada is defined as "an abandoned, vacant, derelict or underutilized commercial or industrial property where past actions have resulted in actual or perceived contamination and where there is an active potential for redevelopment" (NRTEE, 2003, p A-3). However, this thesis research needs to adopt a wider definition which grasps contamination as the key feature of brownfields, and does not consider the importance of how long the site has stayed vacant and whether the land has been redeveloped. If contamination is contained and stays on site, even a new residential/commercial building is constructed on it, people should still call this site a brownfield, because it may explode as a time bomb of pollution some time in the future. Potential environmental hazards may happen suddenly when least expected.

Recommendation:

Former industrial sites in China should be also considered as brownfields which are "... real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant" (US EPA, 2002).

6.1.3 Impetus for Brownfield Redevelopment

Through the case study in Kitchener and Hamilton, it was found that they shared the same primary impetuses of redeveloping brownfields. The impetuses are the economic and environmental benefits brought by the redevelopment. First, brownfield redevelopment helps increase a city's property tax base and the municipal revenue. It makes further economic contribution by alleviating brownfields' negative impacts on property values. Second, the redevelopment helps to mitigate the environmental risks associated with the perceived or potential contamination left on brownfields and ensure the public health/safety within the community.

The impetus in Dalian seems to show the same kind of economic and environmental concerns as in two Canadian cities. The municipality wants to raise money for the restructuring and innovation of SOEs through relocation and the redevelopment of former industrial sites. The City also wants to redevelop brownfields to meet the growing land demand in the central city for service industries, residential housing developments and urban afforestation&greening. However, one issue worth discussing is whether Dalian interprets the environmental benefits differently from Kitchener and Hamilton. Dalian wants to move the heavy polluters out of the central city so as to improve urban environment quality. Both the government and residents are concerned about pollution, but their concerns are more associated with observable pollution such as air and water pollution than with the contamination in soil which is not easily observed. When these heavy polluters move out, the soil contamination they have caused is easily ignored just because the contamination is underground.

The factor leading to this phenomenon is the lack of environmental risk awareness. It has been identified in the western literature that contaminated soil and groundwater in a brownfield site can pose a variety of health and ecological/environmental risks, depending on the contaminants, pathways and receptors (Rao Kolluru, 1995; De Sousa, 2004; Ellerbusch, 2006; MOE, 2007). The case study in Dalian reveals that neither the public nor the government has been fully aware of environmental risks associated with brownfields.

Key Finding: Because of the insufficient awareness of potential environmental risks on brownfields, the impetus for redevelopments in Dalian has been interpreted differently from Canadian cities with respect to the environmental benefits.

In Kitchener and Hamilton, property values close to a brownfield site are significantly lower than the same properties located elsewhere. This is because the public is concerned about the environmental risks posed by brownfields and hesitates to live next to a contaminated site. However, in Dalian, the soaring housing price at the beautiful residential quarters which are built on former industrial sites in the central city in recent years shows that little attention has been paid by the public to the potential contamination arising from the past industrial activities on the site. Or in other words, one can say that the public in Dalian will seldom link former industrial sites with contamination. This can be seen by the daily use of brownfield words appearing in the public media and government documents. As a matter of fact, it was discovered in this research that even the term *Contaminated Sites* has not been widely adopted both by the municipality and the public, needless to say the term *Brownfields*. Alternatively, the planning terminology *Old Industrial Sites* and the real estate term *Former Industrial Sites* are more frequently adopted. However, it is unclear to the public and the government what they mean when they talk about *old/former industrial sites*. After all, these two terms have concealed the basic fact that they are more or less related to perceived or unknown contamination because of past industrial uses.

The environmental risks associated with brownfields have not become a particular concern to Chinese governments. That can be seen from the release of the No.5 Decree of the Ministry of Land and Resources P.R.C. --*Disposition Rules of the Unused Land* (the “*Rules*”) in April 1999. The unused land described in the *Rules* refers to construction land where landholders have legally acquired the land use rights from the government, yet where the new construction has not started within the term of years specified in the original assignment contract of land use right. According to the *Rules*, the government at or above the county level shall, with the approval of the original approving authority, take

back the landholders' right to the use of the land without compensation if the unused land has been vacant for two consecutive years (MLR, 1999). When the *Rules* is applied to a brownfield site, it happens that: if the developer has received the land use right of a former industrial site through legal bidding or auction and the developer has not begun the construction of proposed land use within two years, then the brownfield sites will become unused land and the municipality can revoke the land use right from developers. Shown by the *Rules*, it is clear that the central government has neglected the special case of brownfields which may pose potential environmental risks arising from their past use and may require uncertain years of remediation prior to the construction of proposed new use.

To some extent, people can say that the *Rules* has indirectly attributed to the prompt redevelopment of brownfields in Dalian. Moreover, according to the case study, it was not until 2006 that the municipal government began to address the potential environmental problems in brownfield redevelopment by releasing the *Decision*, yet brownfields have been formed and redeveloped in Dalian ever since the start of industrial relocation in 1995. With insufficient environmental awareness, the City of Dalian has been relatively slow in brownfield policy-making.

Recommendation:

1. There is a need for a uniform definition and common understanding of brownfields in China in order to increase general awareness of environmental pollution issues between the public and the government.
2. The central government should revise the provisions in the No.5 Decree of the Ministry of Land and Resources P.R.C. --*Disposition Rules of the Unused Land* and address the issue of brownfields separately.

Both the Chinese academic literature and government documents should make efforts in the recognition of *brownfields* and the adoption of this term. *Former industrial sites* should be regarded as *brownfields* which are properties, the expansion, redevelopment, or

reuse of which may be complicated by the presence or potential presence of contamination. By doing this, the public is educated and well informed of the associated environmental risks. The government can better regulate and address the problems in brownfield redevelopment. Public health and safety can be further protected.

Some scholars may doubt that the Chinese government will adopt the term *brownfields*, because the wide recognition and adoption of this term may otherwise increase the sensitivity of environmental pollution issues among the population and thereby slow down the rapid redevelopment. However, the prior concern regarding brownfield redevelopment in current China is not the issue of facilitating the redevelopment but the issue of ensuring public safety/health during the redevelopment. The case study in Dalian reveals that the municipality is becoming very concerned about the environmental pollution contained on brownfield sites. In fact, the central government in China is paying more and more attention to environment remediation and prevention while promoting economic development ever since October 2003 when the central government put forward the scientific concept of development (human-oriented, overall, coordinated and sustainable development) as a national development principle in the Third Plenary Session of the 16th CPC National Congress. For example, a national project, *the Survey on the Current Condition of National Land and the Protection & Remediation of Its Contamination*, was conducted by the State Environmental Protection Administration of China and the Ministry of Land and Resources P.R.C. from 2005 to 2008 in order to establish suitable legislation/regulations regarding the remediation and prevention of soil pollution. Therefore, the author considers that Chinese government will welcome and accept the term of *brownfields*, because only by doing this, the nature of the environmental pollution issues associated with former/old industrial sites can be kept in perspective and will be addressed appropriately.

6.1.4 Barriers to Brownfield Redevelopment

Barriers to brownfield redevelopment in the two selected Canadian cities are quite different from those in Dalian. Both Kitchener and Hamilton face similar barriers which

have already been frequently discussed in Canadian literature (De Sousa, 2006; Abdel-Aziz et al, 2004; NRTEE, 2003; Boles, 2003; De Sousa, 2001): the lack of upfront financing, concerns on liability of contamination and a complicated planning approval process. Particularly in Hamilton, developers also encountered the challenge of a lack of detailed information on brownfields in the city, including information on the existence, type, and extent of contamination, and the estimated cost of remediation, etc. Such information is generally collected through a Phase II ESA. Due to the expensive study cost, few property owners are willing to undertake it.

In the City of Dalian, developers do not encounter the same barriers as in Canadian cities. A different set of challenges was discovered. The **first** one would be the “time bomb” effect of the contamination. Even though developers are required to conduct an Environmental Impact Assessment and clean up the site to meet standards before redevelopment, potential contamination may still remain and the site may not be suitable for the proposed use. The contamination buried underground acts like a time bomb which may lead to serious accidents and harm in the future. The **second** challenge is the lack of historical information of brownfields. When DEPB staff examine and approve an EIA report, they do not have sufficient information in hand with regard to the history of such site. This leads to inaccuracy in the identification of potential contamination. The **third** is to assemble multiple dispersed adjacent properties into one parcel suitable for redevelopment, because the City lacks community support from affected industrial firms and individuals who are reluctant to relocate or resettle. The ongoing Lingshui Bay Area Redevelopment project in Dalian was delayed mainly because of this challenge. In addition, the issue of laid-off employees arises from the whole process of industrial relocation and brownfield redevelopment. Although it is not directly associated with the redevelopment of brownfields, it has challenged the safety and social stability in the City as far as one official from Dalian Economic Committee is concerned.

The challenges faced by Chinese municipalities are seldom discussed. Most of the Chinese academic literature has concentrated on the introduction of brownfield redevelopment experiences in developed countries (Fu and Jiang, 2005; Wang et al, 2006;

Zhang, 2004; Luo, 2002; Jiang, 2005; Zhao and Yang, 2006) and discussed the conversion of old industrial buildings into other uses without demolishing them from an urban landscape's perspective (Zhang et al, 2003; Wang and Ren, 2003; Wang, 2004; Chen and Bao, 2003). The case study of Dalian filled this gap and revealed challenges in brownfield redevelopment for the first time.

Key Finding: Brownfield developers in Dalian do not encounter the same barriers as in Canadian cities, which can be largely attributed to the gaps in current environmental legislation and regulations in China.

In China, current environmental legislation and regulations related to brownfield redevelopment are rather scant and limited. Brownfield developers in Dalian encounter less stringent criteria than their counterparts in Canada. They do not have to spend a considerable amount of time and money in studying and remediating the site to meet regulated criteria appropriate for the proposed land use. There are two key gaps in current environmental legislation and regulations:

The first gap relates to the prevention or remediation of contamination on urban land, particularly on former industrial sites. The four key national environmental statutes related to preventing/remediating soil contamination are the *Environmental Protection Law*, the *Land Administration Law*, *Environmental Quality Standard for Soil* and the *Environmental Quality Risk Assessment Criteria for Soil at Manufacturing Facilities*. In the provisions of the first two laws, they have synoptically put forward the idea of land protection, such as “prevent and remediate land contamination”; “remediate land and enhance the productivity of land”. However, they do not provide specific regulations in terms of how to guarantee the land from being contaminated and how to remediate land that is already contaminated. Furthermore, the standards set in the *Environmental Quality Standard for Soil* are not designed for urban land. Contaminants regulated in the law are limited to heavy metal elements and two organic contaminants ---hexachlorocyclohexane and DDT. The soil criteria regulated in the *Environmental Quality Risk Assessment Criteria for Soil at Manufacturing Facilities* are only applied to the environmental quality

risk assessment of soil in the initial decision-making of site selection and the stage of industrial operation. They are not applied to the vacant land where former industrial sites were located. As a result, there is no available environmental law or soil standard which is especially aimed to the prevention and remediation of contamination on urban land, particularly if it is on former industrial land.

The second gap concerns the application of Environmental Impact Assessment (EIA), especially of impacts that may exist in soil. Even though brownfield developers are required to carry out an EIA on former industrial sites and get the EIA report approved by DEPB, information of perceived/potential contamination provided in the report often is incomplete and limited. The application of an EIA on brownfields appears to be relatively weak. Through interviews with four environmental experts and scholars in DUT and two officials from DEPB, the deficiency of an EIA on brownfields represents two perspectives. **First**, the environmental elements included in an EIA of a brownfield project usually focus on the air, water and solid wastes which can be perceived directly and easily. Environmental studies of soil which may be potentially contaminated by past industrial use are seldom carried out. An environmental expert in DUT revealed that only 2 out of 15 brownfield projects he once participated in had performed a Soil Environmental Impact Assessment (SEIA). Current EIA requirements mainly emphasize the negative impacts of external pollution sources on a brownfield and the control of new pollution source arising from the new construction, while neglecting the perceived or potential contamination caused by its past industrial activities (Environmental Scholar from DUT). **Second**, the study scope of SEIA on a brownfield site is rather limited. The assessment factors in a SEIA mostly concentrate on heavy metal elements in the soil while neglecting the organic contaminants which in fact have already become important soil contaminants in China (Environmental Expert from DUT). In addition, most of the SEIAs on brownfields have not taken into account the proposed land use; neither does the regulated soil standards in current related regulations. Therefore, an EIA on a brownfield site is generally incomplete and deficient.

Recommendation:

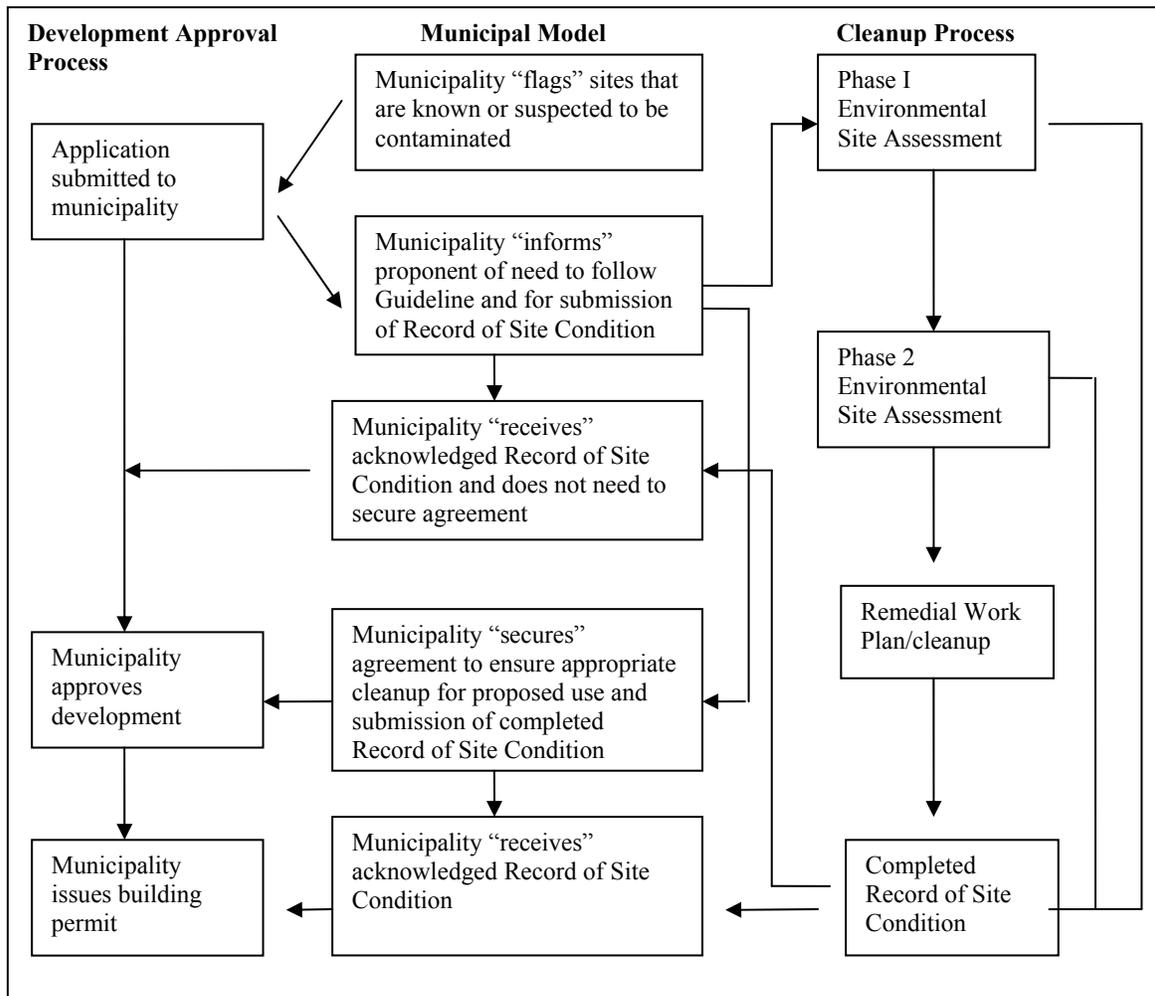
1. In order to avoid such environmental disasters as the Love Canal happening in the future and ensure public health/safety, the Chinese government should expedite legislation and upgrade existing environmental laws regarding the prevention and remediation of contamination on urban land, particularly if it is former industrial land.
2. The government should amend the existing *People's Republic of China Environmental Impact Assessment Law* to incorporate environmental studies of soil on brownfield sites in the EIA.
3. Soil criteria regulated in the current *Environmental Quality Standard for Soil* should be broadened to cover organic contaminants which are important contaminants in soil pollution, such as hexachlorobenzene, Pentachlorophenol, Petroleum Hydrocarbons (PHCs), etc.
4. It is advisable for China to take into account various types of land use when the government starts to develop appropriate clean-up criteria for brownfields, because different types of proposed land use (residential, industrial, commercial, parkland, etc.) may require different levels of standards to be protective of all receptors.

6.1.5 Planning Process of Brownfield Redevelopment

In Ontario, a development review and planning approval process for a brownfield project usually integrates planning and environment requirements. All relevant planning and environmental legislation and regulations need to be considered, including the *Planning Act*, the *Building Code Act*, the *Environmental Protection Act*, as well as the municipal policies such as official plans and zoning requirements. Brownfield developers or property owners are usually required to carry out environmental studies, site assessments and then submit an acknowledged Record of Site Condition (RSC) or approved Site Specific Risk Assessment (SSRA) to the municipality together with a planning application. Figure 6.1 is an example of planning process model for contaminated

properties in Ontario, Canada, which showcases how municipalities in Ontario integrate the various land and environmental-related process components when dealing with brownfields (MOE, 2004).

Figure 6.1: A Planning Process Model for Contaminated Properties in Ontario



Source: Ministry of Environment (2004), p43.

At first glance in the City of Dalian, a conventional planning process of brownfield redevelopment illustrated by Figure 5.7 may show that it has also integrated planning and environment requirements. Developers are required to undertake an EIA on brownfields and prepare an EIA report for the examination and approval by DEPB. However, there is a big difference between two countries. In Ontario, brownfield developers will not

receive planning approval from the municipality if the site has not been cleaned up to a protective level shown by a received RSC or approved SSRA. Developers are not allowed to commence the construction for new land uses. In Dalian, brownfield developers could usually get their planning application approved before the commencement of remedial work and new construction (See Figure 5.7). DEPB takes charge of the follow-up monitoring in order to ensure that developers have followed the EIA report and carried out the proposed counter-measures to remediate the site. In other words, the City of Dalian has not taken into account the contamination remediation in the planning review and approval process.

Key Finding: A conventional planning review and approval process of brownfield redevelopment in China has not taken into account contamination remediation.

Inspired by the Canadian planning approach, the author considers that introducing the remediation of contamination in the planning process of brownfield redevelopment in China is very necessary. Chinese municipalities need to have a more effective control of the perceived/potential contamination left on former industrial sites rather than monitoring the enforcement of an EIA report after developers have received planning approval. The unclear responsibility in the enforcement of the EIA report and the lack of an adequate monitoring system tend to result in the failure of brownfield developers to undertake the proposed method to clean up the contamination (Environmental Expert from DUT). In some cases, irresponsible brownfield developers may skip the remedial work and start new construction directly when they have received planning approval from the City. As a result, known or potential contamination on a brownfield site may still remain, posing an environmental risk concern to the City. By incorporating contamination remediation in the planning process, the municipality can better control the remedial work on brownfields. Developers will not be allowed to commence the new construction unless they have carried out the initial remediation for the proposed land use by following the EIA report. Canadian planning process is advisable in terms of mitigating the environmental risks associated with brownfields.

Recommendation:

Chinese government should integrate the remediation of contamination into the planning review and approval process in order to facilitate the efficient cleanup of brownfields.

6. 2 Implications of Canadian Experiences to Dalian's Practice

The comparison between two countries shows that brownfields in the City of Dalian are being formed, purchased and redeveloped in a different way from Kitchener and Hamilton. The challenges confronting the City also differ greatly from those in Canadian cities. But this does not mean that brownfield redevelopment in two countries have no intersections and that Canadian brownfield experiences have nothing to do with the Chinese practice. As a matter of fact, brownfield redevelopment in Canada and China do have something in common and Canadian successful experiences can be meaningful to the practice in the City of Dalian.

It might be more suitable to describe brownfield redevelopment in the two countries as two parallel lines at present which have the same tendency or direction yet do not intersect. For both countries, the redevelopment of brownfields is driven under the same guideline of sustainability. In Kitchener and Hamilton, brownfield redevelopment is driven by the pursuit of sustainable development and smart growth, while in the City of Dalian it is guided by the scientific concept of development which focuses on human-oriented, overall, coordinated and sustainable development. However, these two lines do not intersect presently because Canada has completed industrialization while China is still in the initial stage of industrialization. Canadian cities have taken one step ahead of Chinese cities over the issue of brownfield redevelopment. What is happening on brownfield sites in Dalian is pretty much similar to what it was in Canadian cities in the past when people had not been aware of the risks associated with contaminated brownfields and there was no such environmental laws particularly regulating the redevelopments.

Looking back to the industrial past in Canada, people can find that brownfields were also not a particular concern at one time. The term *Brownfields* was not created until the 1990's and the development of generic criteria for use at contaminated sites in Ontario essentially began in the early 1980's (MOE, 2007) while brownfield sites had already existed for a long time. Therefore, learning from successful Canadian experiences has profound meaning to the practice of brownfield redevelopment in Dalian, which is a heavy industry city and aims to be an Eco-city. The following is the discussion of the potential application.

Firstly, Dalian can learn from Kitchener and Hamilton to take up the leadership or establish partnership with the private sector or other levels of government to proactively involve in the redevelopment of brownfields owned by the State. It was discovered in the case study that potential environmental contamination left on the brownfield sites has become a prior concern for the City of Dalian. When DEP B received complaints from residents in a residential quarter developed on a brownfield site, the City Council began to pay particular attention to this issue. Government documents such as the *2006 Decision* and the *2007 Notification* emphasize the necessity of an EIA on soil in the redevelopment of brownfields. However, because of the gaps in current environmental legislation and regulations in China, more proactive actions are needed in Dalian to deal with potential contamination. Dalian can learn from Canadian experiences to take up the leadership and work as a pioneer in brownfield redevelopment with a strong commitment to address the issue of potential contamination and to ensure public health and safety. Moreover, by establishing some kind of partnership (private or inter-government) in pilot projects, the City can work closely with developers, environmental experts and other related stakeholders to showcase the development of appropriate remediation criteria, the introduction of new scientific remediation technologies and the use of community consultation techniques, etc. All of these are greatly needed at present in Dalian. The success of the Bayfront Park in Hamilton is a very good example from which Dalian can learn. Bayfront Park was Hamilton's very first major brownfield project which was started at a very early time when the issue of brownfields was just known to the City. The big picture under which the project was started and redeveloped is similar to today's

Dalian. It was found that the partnerships among community stakeholders and the provincial government had contributed to the success of the park.

Recommendation:

1. The municipality should establish a brownfield working group for the discussion of brownfield problems in the city. The working group should be made up of stakeholders from both the private and public sector, including developers, environmental experts, planners, lawyers, lenders and government officials. An action plan should be made by the working group in order to develop a municipal brownfield strategy and overcome the challenges.

2. The municipality should play a leader role in mitigating the potential environmental risks associated with former industrial sites. The City should also be responsible for the cleanup of contamination not only the SOEs. The land use right of brownfield sites should not be transacted in the market until the land has been remediated.

Secondly, Dalian can learn from the marketing efforts and the brownfield coordination, which are proven effective in creating community trust/support on the redevelopment of brownfields, improving the regulatory environment, and reshaping the City's image in front of the public. Although the marketing efforts in Kitchener and Hamilton are focused on the marketing of financial incentive programs, they can be also applied as an idea for Dalian aiming to the brownfield redevelopment vision for the community (Official from DHTIZ). According to the case study, one of the challenges confronting the City is the lack of community support when the municipality wants to recall multiple dispersed land use rights from various land users and assemble them into one parcel suitable for redevelopment. Various methods of marketing, such as advertisements of the brownfield redevelopment vision and presentations on the benefits brought by the redevelopment in public meetings, will all help to improve the mutual understandings between the City and the community. In addition, brownfield coordinators can provide useful information and suggestions for developers in terms of planning approvals, funding applications and even technological support. They could serve as a single point of contact between the City and

the private sector, significantly enhancing their mutual understanding and cooperation. It was considered that such a single point of contact in the locality to deal with development issues was one of the most important things that a community can do to encourage redevelopment of brownfields, whether privately or locally owned (Finneran, 2006).

Recommendation:

1. Dialogues regarding the industrial relocation and brownfield redevelopment between the municipality and local citizens should be started. They can be in the form of public consultation, workshops and presentations. The municipality should introduce the potential value in the redevelopment and clarify the future vision of the community. Marketing brochures and City web site should provide citizens a sense of certainty about the redevelopment and they should be easily accessed by the public.
2. The municipality should assign a knowledgeable municipal staff in every department which has a stake in the brownfield redevelopment to work directly with developers through the approval process. A brownfield coordinator can be assigned to provide timely guidance and advice for developers whenever they encounter any question or difficulty related to municipal policies and administrative procedures.

Thirdly, Dalian can learn from the Site Specific Risk Assessment (SSRA) approach to develop appropriate clean-up criteria for a brownfield site. In Ontario, there are two types of risk-based approaches in use to establish criteria for specific contaminants: the generic approach and the SSRA. The MOE *Site Condition Standards* (commonly known as generic standards) currently used under the *Guideline for Use at Contaminated Sites in Ontario* were derived through the generic approach (MOE, 1997). The generic approach is a conservative approach which takes into account all the various ways that humans, plants, wildlife and the natural environment can be exposed to the contamination. Generic standards are thus developed into broad categories based on land uses (agricultural, residential/park land, industrial/commercial land use), groundwater use (potable/nonpotable), soil texture (surface/subsurface soil) and the depth of contaminants (full depth and stratified). However, it may be difficult and costly to remediate a

brownfield site to meet the generic standards set out by the MOE. In addition, not all of the exposures considered in generic standards will be occur at a particular brownfield site. Under these circumstances, a SSRA approach may be used. It takes into account the information about the conditions and characteristics of a specific property (such as the physical characteristics and the potential use of the land) in the development of property specific standards. The case study of Dalian reveals that currently there are no available national/provincial cleanup criteria for brownfield developers to implement when they undertake an EIA and remediate the brownfield sites. The ongoing Lingshui Bay Area Redevelopment project has also faced this challenge. Under these circumstances, a SSRA approach might be a useful scientific technique for both the City and the developer to establish appropriate clean-up standards on a specific brownfield site and thus protect human health and the environment.

Recommendation:

Internal DEPB staff should work closely with environmental experts/scholars from DUT, developers and other external stakeholders to discuss the adoption of the SSRA approach and the development of appropriate cleanup standards.

6.3 Conclusions

The two Canadian cities, Kitchener and Hamilton have achieved encouraging success in redeveloping their brownfield site. Their success has an inevitable association with government's persistent commitment, various financial incentives through CIP, effective marketing efforts, and good public-private partnerships. The researcher regards these issues as successful municipal experiences based on a common-sense assumption that all municipal programs/approaches are considered "successful" if the redevelopment occurs as opposed to the corresponding option of not being redeveloped at all.

The case study in Dalian reveals that brownfield redevelopment in China is confronting many challenges from aspects of potential environmental risks, detailed historic site information, and community support. The ongoing example of the Lingshui Bay Area

Redevelopment Project further confirms such findings. Fortunately, several corresponding municipal policies were made from 2006 to 2007 addressing these challenges, and more are being discussed/enacted.

In general, Canadian practices of brownfield redevelopment are different from Chinese practices at several points. However, in terms of the research purpose of exploring the potential application of brownfield redevelopment in Dalian, China, based on municipal experiences in Ontario, Canada, the answer would be: the successful municipal experiences learned from Kitchener and Hamilton are meaningful references to Dalian's practice. The municipal government of Dalian can learn from Kitchener and Hamilton to establish partnerships with private sectors to proactively participate in the redevelopment of brownfields owned by the State. The City can also learn from the idea of brownfield redevelopment marketing and brownfield coordinator which would be helpful in creating community support, improving the regulatory environment, and reshaping the City's public image. The SSRA approach used in Canada to develop appropriate clean-up criteria for a brownfield site may be a useful scientific technique for Dalian. Nevertheless, upper levels of Chinese government must take hard efforts of rule-making, regulating and planning, in order to ultimately disable the time bombs of brownfields' contamination at the local level.

6.4 Academic Contribution and Future Research Direction

This research has presented an overview of Canadian experiences of brownfield redevelopment and the potential of applying Canadian experiences to Chinese practice. The researcher has made the following academic contributions. First, the researcher built up case studies in two Canadian cities which are known to be the brownfield redevelopment leaders in Ontario. Case studies allow the researcher to comprehensively summarize the experiences of redeveloping Canadian brownfields at a city level which are relatively limited in current academic literature. Second, the researcher investigated the situation and challenges of redeveloping brownfields in China, a leading developing country. This thesis has contributed to literature as one of the earliest case studies on

brownfield redevelopment in developing countries. Third, this research bridges the experiences of developed countries to practices of developing countries. By exploring the potential of redeveloping brownfields in China based on Canadian experiences, the research has set up a model for future research in international development.

Subsequent research should be carried out in terms of developing a systematic indicator framework to monitor and evaluate the performance of municipal brownfield policies, with emphasis on all the three aspects of concerns (environmental, social and economic). Successful municipal experiences of brownfield redevelopment should be measured and summarized in a standardized way which creates more certainty and clarity.

In addition, due to time and funding limitations, this research only examined two Canadian cities and one Chinese city. More case studies are needed in order to examine the stakeholders' perceptions and the potential of applying Canadian experiences to Chinese practice. China is still at the beginning stage of brownfield development. Government, enterprises and citizens have just begun to realize the environmental risks of contaminated land. Different regulations in this field are expected to emerge in the near future, which would significantly impact the thinking and behaviours of various stakeholders in China's brownfield redevelopment. The ongoing changes in China make it necessary to further investigate brownfield practices in China so as to further recommend policies and strategies. It should be noted that future research might still face the challenge in the short run with regard to the data collection of environmental contamination/remediation on brownfields from Chinese governments, mainly due to the government's lack of transparency. However, in the long run, as the democratic reform progresses in China, this situation will be improved and more transparency will be provided by the government.

Appendix I: Interview Questions for Local Government Officials/Planners in Canada

Background Information about Brownfield Redevelopment

- 1) Based on your work experience, how do you understand the concept of brownfield sites?
- 2) How many brownfield sites are there in your city? How much area do the brownfields cover? What are the locations of the brownfield sites in your city? Does the city have a formal brownfield inventory?
- 3) In terms of the formation/history of brownfields, what are the main characteristics of brownfields in your city?
- 4) Is brownfield redevelopment considered as a policy priority in your city? If so, why does the municipality want to encourage brownfield redevelopment? What are the guiding principles?

Impediments to Brownfield Redevelopment and Policy Tools for Overcoming

Impediments

- 5) Does the municipality encounter any impediment in redeveloping brownfields? According to the previous research on brownfield redevelopment, the following are the most common impediments cities may confront in brownfield redevelopment. Please choose the impediments applicable to your city and rank them by significance.

-Liability of contamination

-Lack of financing

-Marketability of brownfield projects

-Clean-up criteria

-Administrative burden and complexity

-Lack of information on brownfields (location, history, remediation or disposal options, etc.)

-Market conditions (including site location, site size and configuration, building characteristics, construction cost, and access to a skilled labor force)

-Awareness and communication

-Land fragmentation and ownership issues

- 6) Other than the above impediments, are there any impediments to your city? If yes, please specify.
- 7) How does your city overcome the impediments? Has your city developed any policy tools listed as follows? Or any other policy tools?

-Liability protection

-Financial incentives

-Streamlined regulatory process

-Standardized clean-up criteria

-Build public/private partnerships

-Public education

- 8) Has the city launched any municipal programs to implement the aforementioned policy tools? If any, please briefly introduce them. What are the results of these policies?
- 9) Has the municipality made any indicators to evaluate the brownfield performance?

Comments

- 10) Do you think the brownfield redevelopment policies and initiatives are effective? Why?
- 11) In your opinion, what are the most successful experiences in terms of policy tools in brownfield redevelopment in your city? Please illustrate them with some successful brownfield redevelopment projects in the city.
- 12) Do you have any expectations or recommendations for the future brownfield redevelopment in your city?

Appendix II: Interview Questions for Consultants in Canada

- 1) Have you ever participated in any brownfield project? What is your role in these brownfield projects?
- 2) In your opinion, why does the municipal government should encourage brownfield redevelopment?
- 3) Based on your working experience, what do you think are the main impediments to a brownfield project? What is the most difficult part of your work?
- 4) How did you work cooperatively with developers, government officials, bankers and other participants to successfully overcome the impediments? Could you please introduce it with one successful brownfield project?
- 5) Do you think the brownfield redevelopment policies and initiatives in the City are effective? Why?
- 6) In your opinion, what are the most successful experiences in brownfield redevelopment in the City? What are the keys leading to the success?
- 7) Do you have any expectations or recommendations for the future brownfield redevelopment in the City? Have you heard about any comments/suggestions from developers or other consultants?

Appendix III: Interview Questions for Developer in the Kaufman Lofts Project, City of Kitchener, Canada

- 1) Is this your first time redevelop a brownfield site? How many brownfield sites have you ever redeveloped or participated in the redevelopment? Does the Kaufman Lofts differ from the other brownfield project you have ever involved? What are the differences?
- 2) What is the history of the Kaufman Lofts? What are the factors driving you to redevelop the site? When did the redevelopment begin? What is the development plan of this project? At present, in what stage is the project progressing? Are you satisfied with the progress?
- 3) Have you encountered any barrier in redeveloping the site (such as remediation, financing and planning approvals, etc)? What are they? Have they been addressed or already overcome? How did you overcome them?
- 4) Do you know the municipal incentives and/or brownfield programs available to your brownfield project? Has your brownfield project got assistance from those municipal brownifeld programs? If yes, please specify them.
- 5) How does the market respond to the project? In your opinion, do you consider the Kaufman Lofts is successful? If yes, what are the keys leading to the success? If no, what are the lessons we can learn from it?
- 6) Do you have any expectations or recommendations for the future brownfield redevelopment in the City?

Appendix IV: Interview Questions for Planner Involved in the Bayfront Park Project, City of Hamilton, Canada

- 1) Is this your first time participating in a brownfield project? What is your role in the project?
- 2) What is the history of the Bayfront Park? What are the factors driving the City to redevelop the site? When did the redevelopment begin? What is the development plan of this project?
- 3) Did the City encounter any barrier in redeveloping the site (such as contamination remediation, financing and community support)? What are they? How did the City overcome them?
- 4) When was the project completed? How does the community respond to the project? In your opinion, do you consider the Bayfront Park is successful? If yes, what are the keys leading to the success? If no, what are the lessons we can learn from it?
- 5) Does the City have any plan to monitor and improve the Park after the project is completed? Do you have any expectations or recommendations for the future brownfield redevelopment in the West Harbour area, based on the case of Bayfront Park?

Appendix V: Interview Questions for Local Government Officials/Planners in Dalian, China

- 1) What is your understanding of “brownfields”? Have you heard about this concept? Has the term been recognized and adopted in the municipality? If not, how does the City define sites that have been previously used and suspected of being contaminated? Are the terms *old industrial sites* and *contaminated sites* more frequently used in government documents?
- 2) How many brownfield sites are there in the city? Where are they located and distributed? How did they become vacant? Why did the municipality want to relocate the old industrial sites? When did that begin? Is the redevelopment of brownfields considered as a policy priority in the city? If so, why does the municipality want to encourage the redevelopment? What are the guiding principles?
- 3) What is the current situation of brownfields in Dalian? Are they being abandoned or being rapidly redeveloped? What are the brownfield sites usually redeveloped into? What are the main characteristics of brownfield redevelopment in Dalian?
- 4) How are brownfields being purchased, sold and redeveloped in the city? What is the conventional planning process? How many public/private sectors are involved in the process? What are they? What is the major responsibility of your department in terms of brownfield redevelopment and what is your role?
- 5) Has the potential environmental pollution left on former industrial sites been considered by the municipality in the redevelopment of brownfields? Is there a pollution incidence happening on a brownfield site? If so, how did the City manage it? What is the major impact of this incidence?
- 6) Are there any specific government policies with regard to the remediation of

pollutions (such as regulations related to the environmental impact assessment on a brownfield site)? Is there any related environmental legislation regarding the prevention and remediation of contamination on urban land, particularly if it is former industrial land? If so, what are they? What are the cleanup criteria? How does the municipality monitor and regulate the remedial work? How is the liability of contamination allocated among the stakeholders? What are the guiding principles in the allocation?

- 7) Does the municipality encounter any barrier/challenge in redeveloping brownfields? What are the major factors resulting in those barriers? How does the City overcome the barriers? Has the City developed any policy tool to particularly address the brownfield challenges?
- 8) Do you think the Canadian brownfield redevelopment approaches (such as a municipality's persistent commitment, various financial incentives through CIP, municipal leadership & partnership, marketing of the incentive programs and brownfield coordinator) can be potentially applied to the City of Dalian? Do they make sense in your opinion? Either yes or no, please explain it.
- 9) What do you think the municipality should do to maintain economic growth while at the same time ensuring public safety/health in brownfield redevelopment? Do you have any expectations or recommendations for the future brownfield redevelopment in the city?

Appendix VI: Interview Questions for Chinese Scholars/Environmental Experts

- 1) What is your understanding of “brownfields”? Have you heard about this concept? Has the term been recognized and adopted in Chinese academic literature? If not, how do the Chinese scholars define sites that have been previously used and suspected of being contaminated? Are the terms *old industrial sites* and *contaminated sites* more frequently used in academic literature?
- 2) Have you ever participated in any brownfield project? What is your role in these brownfield projects?
- 3) If you have ever participated in the environmental impact assessment of a brownfield project, could you please provide some details regarding how the environmental assessment was conducted on brownfields? What are the related regulations in current *People’s Republic of China Environmental Impact Assessment Law*?
- 4) Is there any related environmental legislation in current China regarding the prevention and remediation of contamination on urban land, particularly if it is former industrial land? If so, what are they? What are the cleanup criteria? How does the municipality monitor and regulate the remedial work? How is the liability of contamination allocated among the stakeholders? What are the guiding principles in the allocation?
- 5) Based on your professional experiences, what do you think are the main challenges to a brownfield project in Dalian? What are the major factors resulting in those challenges? What do you think is the most concerned environmental protection/remediation issue?
- 6) Do you think the Canadian brownfield redevelopment approaches (such as a

municipality's persistent commitment, various financial incentives through CIP, municipal leadership & partnership, marketing of the incentive programs and brownfield coordinator) can be potentially applied to the City of Dalian? Do they make sense in your opinion? Either yes or no, please explain it.

- 7) As a scholar/environmental expert, what would you suggest to overcome those challenges and maintain economic growth while at the same time ensuring public safety/health in brownfield redevelopment? Do you have any expectations or recommendations for the future brownfield redevelopment to the municipality?

Appendix VII: Interview Questions for Officials Involved in the Lingshui Bay Area Redevelopment Project, Dalian

- 1) Is this your first time participating in a brownfield project? What is the major responsibility of your department and what is your role?
- 2) What is the current situation in the Lingshui Bay area? What are the factors driving the City to redevelop the area?
- 3) When did the redevelopment begin? What is the development plan of this project? At present, in what stage is the project progressing? Are you satisfied with the progress?
- 4) What does the municipality plan to do in dealing with the existing and potential contamination in the bay area? How will the contamination be remediated?
- 5) Did the City encounter any barrier in redeveloping the site (such as contamination remediation, financing and community support)? What are they? Have they been addressed or already overcome? How did the City overcome them?
- 6) When will the project be completed? How does the community respond to the project?
- 7) Based on your current experiences in this project, do you have any expectations or recommendations for the future brownfield redevelopment in the city?

Appendix VIII: Types of Urban Land Use in China

Type	Definition
(R) Residential Land	All kinds of land occupancies for residential purposes.
(R1) Type I Residential Land	Low-rise residences with high quality municipal facilities, complete overall arrangement, and excellent neighborhood environment.
(R2) Type II Residential Land	Medium or high rise residences with good quality municipal facilities, good overall arrangement, and good neighborhood environment.
(R3) Type III Residential Land	Residences with somewhat good quality municipal facilities, poor overall arrangement, and poor neighborhood environment; or land intersecting with industrial land.
(R4) Type IV Residential Land	Simple and deteriorating residences
(C) Public Facility Land	Office buildings/facilities for administration, commerce, culture, education, public health, athletics and research.
(C1) Municipal administration office land	Land used by municipal administrative organizations as offices
(C2) Commercial and financial business land	Land used by commercial industry, financial industry, service industry, hotels, and marketplaces
(C3) Recreational and artistic land	Land used by press, artistic organizations, broadcasting, exhibition, and recreational parks
(C4) Athletic land	Land used for sport stadium, athletic training, excluding school playgrounds.
(C5) Health and hospitals land	Land used for medical treatment, health care, sanitation, epidemic prevention, clinics, and emergency.
(C6) Research and education land	Higher education, technical school, research and development (excluding primary, secondary schools and childcare, which should be classified as residential land)
(C7) Heritage relics land	Ancient relics, tombs, buildings, etc. Excluding those which have been used for other purposes other than culture.
(C8) Public facility land	Other land of public facilities, such as religious activity ground, social welfare centers, etc.
(M) Industrial Land	Land for factory production workshops and attachments, excluding surface mining.

(M1) Type I Industrial Land	Land for industries which basically do not interrupt and pollute the environment (such as residence and public facilities), including electronic industry, sewing industry, arts and crafts industry, etc.
(M2) Type II Industrial Land	Land for industries which disturb/pollute the environment (such as residence and public facilities) to a certain extent, including food processing factories, pharmaceutical and medication manufacturing, textile mills, etc.
(M3) Type III Industrial Land	Land for industries which disturb/pollute the environment (such as residence and public facilities) seriously, including excavation industry, metallurgical plants, mechanical manufacturing industry, paper manufacturing, leather manufacturing, etc.
(W) Warehouse Land	Land for depots, stacking ground, packaging workshops and attachments.
(T) Transportation Land	Land for Railways, roads, highways, pipelines, ports, airports and attachments
(S) Street and square Land	Streets, squares, and parking lots.
(U) Municipal public service Land	Land for performing public service, including buildings, structures, and maintenance facilities.
(G) Public Green Space	Public green land, and protective green land, excluding gardens and forests.
(D) Special purpose Land	Land used for special purposes, including military grounds, consulates, etc.
(E) Water body and other land	All other types of land, including rivers, lakes, ocean, reservoirs, etc.

Source: Ministry of Construction P.R.C. (1991)

Appendix IX: Abbreviations

CIP	Community Improvement Plan
DEC	Dalian Economic Committee
DEPB	Dalian Environmental Protection Bureau
DHTIZ	Dalian High-Tech Industrial Zone
DLRTC	Dalian Land Reserve and Transaction Center
DPS	Development Permit System
DUPDI	Dalian Urban Planning & Design Institute
DUPB	Dalian Urban Planning Bureau
DUT	Dalian University of Technology
EDGE	Encouraging and Directing Growth for Efficiency
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
ERASE	Environmental Remediation and Site Enhancement
ESA	Environmental Site Assessment
HSW	Hazardous Solid Waste
MMAH	Ministry of Municipal Affairs and Housing
MOE	Ministry of Environment
NRTEE	National Round Table on the Environment and the Economy
RSC	Record of Site Condition
SEPAC	State Environmental Protection Administration of China
SOE	State-Owned Enterprise
SSRA	Site-Specific Risk Assessment
TIF	Tax Incremental Financing
US EPA	United States Environmental Protection Agency

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