Revitalizing Cities Through Design of Waterfront Brownfields
by

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ABSTRACT

Revitalizing Cities Through Design of Waterfront Brownfields

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Post-World War II, large-scale city expansion associated with rapid urbanization has rendered many urban waterfronts in city centres as obsolete brownfield landscapes. Upon being remediated, these sites have the potential to be converted from underutilized land to vibrant urban waterfront neighbourhoods. A remediated waterfront site in the Port Credit neighbourhood of Mississauga, Ontario provided the opportunity to develop a design for revitalizing the site in response to concerns expressed by the public. Two waterfront brownfield case studies, one in downtown Toronto and the other along the lakeshore of Mississauga, were analyzed within the framework of principles of New Urbanism to ascertain how relevant issues had been addressed. The proposed design responds both to public concerns and the goal to integrate the site into the surrounding community. This research will contribute to a better understanding of socially and environmentally sensitive approaches to waterfront brownfield revitalization, as well as providing urban planners and landscape architects with tools for creating dynamic possibilities for accommodating emerging public demands in the heart of cities.
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Brownfield is an urban planning term used to describe land previously used for industrial, commercial, or institutional purposes with known or suspected contamination. These properties are often vacant or underused based on how they were utilized in the past. They are commonly located in prime areas of towns and cities – along the waterfront or at the edge of downtown (Marshall, 2001).

Historically, industrial sites were placed in the city cores along the waterfront because of the convenience of transport and ample water supplies. Many of these industrial sites were abandoned due to changing transportation systems and urban growth. This ongoing process of brownfield site abandonment has influenced waterfront brownfield redevelopment in the past twenty years (Marshall, 2001). These are ideal locations for revitalized usages such as housing, businesses, and public open spaces.

According to the Canadian Real Estate Association (2013), there are about 20,000 to 30,000 brownfield sites across Canada. Many of them are placed on prime city land, ripe for redevelopment. These brownfields offer great opportunities for smart growth through urban intensification especially when they are in desirable locations. The redevelopment of existing urban brownfield districts at higher densities implies that there will be less need to put development on open lands. Recent research has shown that nearly every hectare of land developed in a brownfield project may save up to 1.8 hectare of greenfield land in an outlying area (Canadian Real Estate Association, 2013).
Waterfront brownfield projects can potentially alter the land uses adjacent to and surrounding the project site. Waterfront land has played a significant role in the process of industrial development, shaping the image of cities and recapturing financial investment. Once the land has been modified through design to provide new amenities and programs, and through removing the stigma of an abandoned or underutilized former industrial site, it can immediately start to positively affect the surrounding land, communities, and neighbourhoods. These brownfield sites may take the form of urban renewal plans developed by the municipality, or master plans for retail or cultural districts. The proposals for redevelopment will encourage the clean-up of other abandoned brownfield sites and will facilitate the progress of large-scale urban design projects. They also provide design opportunities for the further development of, for example, public transportation, green infrastructure, main streets, housing, light industry, commercial districts, and open space (De Sousa, 2001).

1.2 New Urbanism principles

In order to envision development for razed brownfields, design strategies and principles are important to help create new neighbourhoods that will contribute to revitalizing existing communities. New Urbanism provides an accepted set of principles that fit with this aim.

The principles of the New Urbanism concept were introduced to solve urban planning issues in North America during the early 1980s. Cities were shaped by automobiles because of the larger urban intensification and more jobs required; this process also caused cities to expand their borders to accommodate for increased population (Bressi, 1994). New Urbanism responded to these issues by integrating a walkable mixed-use neighbourhood with varied housing types and more job opportunities. It has had a profound impact on many aspects of urban planning and local land-use strategies.
New Urbanism encompasses seven basic principles:

1.2.1 Mixed land uses

New Urbanism blends a balanced mix of land use patterns including neighbourhoods with residential and fine blocks, buildings mixed with retail facilities, recreational and institutional facilities, as well as plentiful job opportunities that are close to home. It has improved people’s daily interaction and has saved more time especially for people who do not drive (CNU, 2006).

1.2.2 Varied housing types with high residential density

A wide range of different housing types and high residential density offers residents of different economic situations to live in the same neighbourhood and have access to the same amenities within a community-wide network. For instance, low density development may cause more time for people who commute (Duany & Plater-Zyberk, 1994).

1.2.3 Walkable pedestrian friendly environment

New Urbanism street patterns should follow human-scaled streetscape to support pedestrians, bicycles and transit systems. They should include five to ten minutes walking distance from the centre to the edge, and encourage street life by prioritizing pedestrians. The residents should have easy access to the other services and amenities (Bressi, 1994).

1.2.4 Interconnected street system

The street system should be interconnected to provide services for the residents in order to create a sense of scale and order. It also improves accessibility to different destinations and increases walking behaviour. The interconnected street system plays a significant role in reinforcing bicycles and pedestrian flow, as well as strengthening mobility throughout the entire neighbourhood (CNU, 2006).
1.2.5 Safety and security

A safe neighbourhood contains human-scaled places and casual interaction where people feel comfortable and safe. A safe street network with pedestrian and cyclist offers people a sense of security and shapes the community. On-street parking can protect pedestrians from the traffic and keep them safe.

1.2.6 Public spaces

One of the main goals of New Urbanism is to create a sense of neighbourhood where accessible natural areas and public spaces are combined. Public spaces with a range of housing types bring people a recreational service and improve people’s daily interactions (CNU, 2006).

1.2.7 Climate response

New Urbanism principles also aim to create a community that unites the local climate. They could positively change people’s active behaviour and have an impact on how people utilize the space. People might experience dramatic change during different seasons and change their travel behaviour (CNU, 2006).

1.3 Ecological aspects

The waterfront is where land meets water. Waterfront brownfields, located on the interface between water and land, require special attention to the ecological qualities of both the shoreline and related wetlands.

Coastal wetlands are generally related to upland forests regions. They play a significant role as a filtering capability of the water system as well as a buffer to protect wildlife habitat (Canadian Wildlife Service, 2012). Over the past 100 years, half of the world's wetlands have
disappeared due to rapid urban intensification and up to 70 percent of wetlands in southern Ontario have been lost including marshes and bays (Canadian Wildlife Service, 2012).

The waterfront should be a diverse landscape that supports ecological values. It plays an important role in protecting eco-systems by providing a habitat for various aquatic species and other telluric animals. The coastal wetland of the waterfront also offers native biodiversity in the Great Lakes; it helps to protect the ecological function between land and water such as contamination cycling and ground water recharging. These are all crucial factors that should be integrated into the design process (France, 2003).

1.4 Case study method in landscape architecture

A review of literature on brownfield development revealed extensive literature on brownfield remediation yet very little published information on how to approach design strategies that address waterfront design issues. Therefore, a case study method was identified for use in this research to understand waterfront brownfield regeneration design on other similar sites, as well as to develop a conceptual design for the study site in the future.

A case study method is commonly used in many domains such as architecture, engineering, and planning; it has gained more popularity for landscape architecture. It is an insightful way to show how landscape architects share their work with peers. As Francis (1999) stated: “A case study is a well-documented and systematic examination of the process, decision-making, and outcomes of a project that is undertaken for the purpose of informing future practice, policy, theory and/or education” (p. 43).

Case study analysis is a useful research method that often answers questions between policy and design; it is also beneficial for the participatory planning and design of this research and helps to expand emerging concepts and ideas for the study site amongst the existing
community. In addition, case studies contribute to the development of the landscape architecture research base and bring these research advances up to professional level (Francis, 1999).

A complete case study can be applied to emphasize several aspects; it should include:

- Project name
- Location
- Date designed/planned
- Size
- Client
- Managed by
- Context
- Site analysis
- Project background
- History
- Design development
- Architect(s)
- Landscape architects
- Program elements
- Photograph(s)
Case study analysis should play a central role in landscape architecture research and design process; it is an efficient method for the professions to go about developing a research base and improving practice. Francis (1999) suggests that case studies help landscape architects to understand the positive and negative aspects of existing design approaches in order to avoid “re-inventing the wheel” (p. 43).

1.5 Problem statement

Issues related to deindustrialization have been the subject of studies in numerous disciplines since the mid-1970s. However, the reuse of urban brownfield lands has emerged as one of the fastest growing issues in the field of landscape architecture. Brownfield redevelopment has received attention from municipalities and urban planners because of the various range of potential benefits, such as tax policy, changing economic activities, new environmental regulations and urban revitalization. However, most of the literature that examines brownfield site redevelopment is focused on technical aspects of brownfield clean-up or remediation. Encouraging development of these sites is difficult as the cost of cleaning-up the land to safety standard is more than the land would be worth after redevelopment (De Sousa, 2001). There remains a need for better understanding of how planning and design strategies can lead to achieving waterfront brownfield revitalization outcomes that meet the needs of urban communities (De Sousa, 2001).

1.6 Goal and objectives

The goal of this study was to demonstrate the potential of waterfront brownfield sites to revitalize communities. The purposes of this study was to propose a design solution that contributes to improving integration of brownfield sites with the surrounding community.
The following objectives were established to meet this goal:

- To explore literature that informs neighbourhoods development on waterfront brownfield sites;
- To investigate case studies that demonstrate strategies for integrating former brownfields into the surrounding urban community;
- To identify principles from the case studies that contribute positively to re-integration of waterfront brownfield site with the surrounding community;
- To identify a site and propose a conceptual design for a brownfield site, applying the strategies identified from the case studies;
- To assess the proposed design in terms of the opportunities it provides for improving integration with the existing community.

1.7 Thesis structure

This thesis includes five chapters.

Chapter One is focused on general background introduction and literature review for this thesis. The literature review focused on the theory of New Urbanism, ecological aspects in relation to waterfront brownfields and the case study method. The research goal and objectives are also presented.

Chapter Two focuses on the research methodology and study site suitability. The design process is developed based on the literature review, and a description of the selected site is presented.

Chapter Three focuses on the site inventory and analysis, as well as the key site-related issues.
Chapter Four presents two case studies. The first case study is the Toronto Port Lands Estuary design approach and the second case study is the Inspiration Lakeview Master plan. Synthesis and design approaches are discussed in terms of how they relate to the study site.

Chapter Five presents the conceptual design development of the study site, including design drawings and an assessment of the design.

Chapter Six is a synthesis of the research findings and comparison with the case studies in order to discuss whether the design has met the research goal and objectives. The research limitations and future research are also addressed in this chapter, as well as the implications for landscape architecture.
Chapter Two | Methodology and site suitability

2.1 Research process

The research methodology starts from the literature review related to waterfront brownfield revitalization and other relevant literature information such as the New Urbanism principles, brownfield redevelopment, ecological aspects and the case study method. Goals and objectives were developed based on the literature review and then used to critically generate the overall methodological structure.

Selecting a study site in this research consisted of three components: site selection, site inventory, and site analysis. After critical analysis of the site's condition, key issues were addressed based on these elements.

Two major case studies were selected based on case study selection criteria. The first case study was the Toronto Port Lands Design Approach done by Michael Van Valkenburgh
Associates, Inc. New York. The second case study was The Lakeview Master Plan, finished by Urban Strategies Inc in 2005. After analyzing these two case studies, design principles were synthesized to address the issues of waterfront brownfield revitalization that relate to the study site.

The design concept for the study site was developed based on the findings of the literature review and the case studies.

The last chapter focuses on the discussion and conclusion of this study, as well as how this research will contribute to a better understanding of approaches to developing cohesive urban spaces for waterfront brownfield revitalization.

2.2 Study site suitability

In many countries, urban brownfield lands have been a challenging part of urban development; these areas face the same issue for developers and planners, such as physical, economic, and social problems. The urgency of redesigning these lands has gained importance as urban populations continue to grow at a fast pace. To explore and conduct site-oriented research, a real waterfront brownfield site was required for this study to provide existing environmental and social contexts and to be able to meet the goal of integrating the site into the surrounding community. The following criteria were established for selecting a study site.

2.2.1 Site context

The site is located within an existing urban community.
2.2.2 Prior use

The site is on a waterfront and was previously used for industrial purposes. The site was contaminated and has been remediated.

2.2.3 Visual Accessibility

The site should provide easy access for inspection and have sufficient background studies that document existing conditions of the site.

The access of visual images was mainly adopted through Google Maps including satellite images and other conditions of the site. Base maps were conducted from the Geographic Information System and converted into design diagrams.

2.2.4 Manageable size and complexity

The site has a preliminary development program resulting from community engagement and consistent with existing community planning priorities.
2.2.5 Preliminary program

The site should have a reasonably clear program based on community engagement and suitability within existing community planning priorities (Figure 1).

Figure 1. Port Credit Engagement 2012 (Source: http://www.mississauga.ca)

The City of Mississauga founded the Port Credit public project on innovative and comprehensive engagement. The city has always made opportunities for elaborate meetings and events to hear from a variety of voices such as walks and talks, lunch and learn, community meeting, and on-line surveys.
General Comment Summary from the 70 Mississauga Road South site survey found that:

- Residents are concerned about increased noise, contamination, and disruption
- Need for carry in vehicular flows for the differing land uses and assess the impact of the traffic congestion stemming from increased traffic flows connecting high traffic corridors to the development
- The need to separate pedestrian and bike lane connections in the waterfront area, as well as set back the vehicles connections
- High-rise developments are not wanted along the Lakeshore Road
- Proposed building heights are not suitable for new development; they should be distributed in the centre of the site and should not affect the existing residences privacy by overseeing onto existing properties (City of Mississauga, 2012)

2.3 Site description

![Figure 2. Key map of the study site](image)
The design site (70 Mississauga Road South) for this thesis research was selected based on the study site suitability (Figure 2). It is located on the north shore of Lake Ontario and includes the waterfront area that runs south of the Port Credit River. The site is very easy to access from the J.C Saddington Park, where the civic spine of Hurontario Street meets Lakeshore Road. Nearby is an estuary of the Credit River, where it empties into Lake Ontario.

The City of Mississauga and its waterfront represent the typical brownfield abandonment situation in Ontario. Historically, most industries were laid out in the city cores and along the waterfront for the convenience of water supplies and workforce. The industrialization of the site began as a brick manufacturing site in the 1800s and lasted until 1927, shifting to an oil refinery in 1932 and continuing until 1978. The portion of the site devoted to the petrochemical industry lasted until 1985 and has been abandoned ever since decommissioning took place in 1987 (City of Mississauga, 2012).

The 70 Mississauga Road South site is a 28-hectare area on the western portion of the central waterfront of the City of Mississauga. When considering its suitable location and manageable size, it represents the typical brownfield revitalization that links the extended city and its waterfront development. Over the decades, transportation development such as railways and urban expressways have shaped barriers between urban development and waterfront transformation.

These abandonment brownfields and waterfronts have become a great opportunity for urban revitalization and the merging of the city cores. Port Credit has played a significant role in driving local business and industry. It is the most important ongoing project that City of Mississauga is currently implementing for the overall waterfront brownfield revitalization. Combined with the site condition, 70 Mississauga Road South offers a realistic social and
natural context for applying a landscape-based development strategy with the goal of integrating the site into the surrounding community (City of Mississauga, 2012).
Chapter Three | Site inventory and analysis

3.1 Site context

As a neighbourhood in the City of Mississauga, Port Credit was the first trading post established in the 1700s for the exchange of goods from European countries. After the 18th century, manufacturing industries began building oil refineries and other industries along the edge of Port Credit Village (City of Mississauga, 2012).

From the 1900s, the stonehooking trade and other industries such as the Port Credit Brick Yard (1891–1927) and the St. Lawrence Starch Works (1889–1989) kept the port alive; they provided employment for many local residents and revitalized economic conditions (City of Mississauga, 2012).

Over the last two centuries, Port Credit has changed with distinct areas of growth carved out on both sides of the Credit River (Figure 3). The commercial core of the village extends along the Lakeshore Road and the East bank of the Credit River. The historic residential districts and the architectural character of Old Port Credit Village have been retained, as well as its early street names (City of Mississauga, 2012).

Figure 3. Texaco refinery, Port Credit, 1960 and Port Credit Aerial, 2004 (Source: http://www.heritagemississauga.ca)
As the village grew, Port Credit acquired Town status in 1961 and soon after merged with the City of Mississauga in 1974. In 2005, the Old Port Credit Village was designated as a Heritage Conservation District. The harbour, on the West bank under the lighthouse, now serves as a centre for recreational boating and fishing (City of Mississauga, 2012).

### 3.2 Ecological context (Shoreline)

Port Credit’s shoreline and the Port Credit River’s evolution has experienced long-time growth and transformation; the original condition of the shoreline has changed in form and expanded (Figure 4). These changes reflect the Lake Ontario shoreline gradual transition from industrial and landfill use to today’s shape.

![Figure 4. Map showing the shoreline change over time (Source: http://www.heritagemississauga.ca)](http://www.heritagemississauga.ca)

Waterfront is defined as land fronting on the edge of a body of water. Historically, Canadian waterfronts were abundant aquatic and telluric habitats with bluffs, beaches, estuaries and bays, supporting a wide range of ecosystems for cities. City ravines and rivers flowed through densely forested watersheds into the Great Lakes, creating a dynamic and diverse environment. Waterfront planning should meet the needs of the ecological context and
prevent habitat fragmentation and environmental damages. Waterfront brownfield revitalization should also focus on providing habitat for other species rather than just human use (Canadian Wildlife Service, 2012).

According to the Mississauga Official Plan, the Port Credit area serves as an important ecological feature by supporting habitat biodiversity for plants and other animal species. The mouth of the Credit River creates a dynamic ecological environment and is a significant estuary where the Credit River drains into the Lake Ontario (Figure 5). Moreover, as a famous fishing spot, this area includes a significant wetland community and is recognized in the Provincial Greenbelt Plan as an important external connection. In addition, this estuary area serves to purify the air and water (City of Mississauga, 2012).

3.3 Existing site condition

Figure 5. Aerial perspective of 70 Mississauga Road South Site (Source: http://www.heritagemississauga.ca)
Figure 6. Port Credit Neighbourhood (Source: http://www.mississauga.ca)

Figure 7. Port Credit shoreline condition (Source: http://www.heritagemississauga.ca)
3.4 Proposed program

Proposed program was developed based on the preliminary program from the City’s Official Plan and Port Credit project research. As a new mixed-use neighbourhood and for the City in general, 70 Mississauga Road South site offers great potential to provide a multi-functional community for the city residents and visitors.

Key elements in the proposed program are:

- 2 kilometres of continuous, publicly accessible, waterfront trail connected to the 1600 kilometres’ public trail along the shore of Lake Ontario
- Units of medium density housing and high density housing
- Units of mixed-use commercial space
- Green space for local residents
• Waterfront park

• Activation of Lakeshore Road West as a major mixed-use transit corridor (Figure 6).

By following the criteria of the site selection, a comprehensive site analysis, and design strategies were conducted and site-related issues were identified and addressed.

3.5 Key issues

Through critical analysis of study site inventory and related literature, key site-related issues were addressed from the review of the public engagement program. The following issues serve as the foundation for the case study selection and inform the design:

**Accessibility and public spaces.** Waterfront land has played a significant role in the industrial development process, and should be the key to public accessibility in the urban planning process. How the land is utilized and integrated into the existing community has great significance for waterfront brownfield revitalization.

**Connectivity.** The major transit corridor on the Lakeshore West Road lacks local transit system efficiency into the study site; the current transit system only covers the main streets of the Port Credit neighbourhood such as Lakeshore West and the Mississauga Road. Bringing in more vehicular flows to connect high traffic corridors into the site is vital; it benefits people on travel from home to work more efficiently and conveniently by providing access to different amenities throughout the surrounding urban area.

**Density.** According to the City’s Official Plan, the proposed density for 70 Mississauga Road South site target is low-density residential, medium-density residential, and high-density residential, as well as how different housing types integrate with the existing Port Credit neighbourhoods.
**Mixed-use.** The 70 Mississauga South Road site is proposed to be a mixed-use residential neighbourhood. Critical to shaping a better mixed-use neighbourhood is how to deal with different uses and how to separate spaces between public and private.

**Ecological aspect.** The study site is located in the city’s most attractive place: in the centre of Port Credit, on the waterfront of Lake Ontario and near the Port Credit River. The proposed design should contribute to fulfilling the ecological potential of this site.
Chapter Four | Case studies

Exploring possible design approaches by addressing key site-related issues, several case studies were selected based on the criteria of site selection. The case study method allows the researcher to carefully examine data in context. Because design strategies vary based on key issues, two case studies were analyzed in this research. Site inspections and a review of the literature were conducted to establish design principles for the site.

4.1 Case Studies selection criteria

Based on the background and literature review, it was determined that all case studies should reflect the following qualities and characteristics:

- Project located on a former brownfield site
- Project site located on a waterfront (river or lake) within the urban core of a city
- Development emphasis on community planning
- Transit systems including roadways, pedestrian, and bicycle network
- Project includes publicly-accessible open space
- Enough information available that describes the systems supporting the design

4.2 Case Study One: Port Lands Estuary, Ontario, Canada

The Toronto Port Lands is an example of urban redevelopment now occurring on Toronto’s urban brownfields and its waterfront. Although the land has not been fully reconstructed, many conceptual design approaches developed over the past few years have shown there is significant redevelopment potential for this site. This underutilized industrial area located
on the waterfront and conveniently located close to downtown is an unprecedented future development opportunity for the city (Figure 9).

The design proposal analyzed in this research was prepared by Michael Van Valkenburgh Associates, Inc. in 2008. The case focuses on the revitalization of an extensive urban brownfield and its waterfront development. By analyzing the variety of design approaches and evaluating whether the land is elevated to a higher and better use – for instance, from industrial to commercial – this case connects to its waterfront and brings great opportunities to the new development for Toronto Port Lands.

4.2.1 Redevelopment of the Toronto Port Lands

Figure 9. Key map for Toronto Port Lands (Image adapted from Google Maps)
The Toronto Port Lands is a 113-hectare area limited by the Keating Channel, the Don River, and Lakeshore Boulevard (Figure 10). The site is one of the biggest post-industrial sites in the City of Toronto. Filling Lake Ontario to create more land for industrial purposes began in the 1880s and eventually created the Port Lands as it is known today (Waterfront Toronto, 2002). Transit-oriented development and intensification targets were designed to achieve sustainability goals for this community. This work sets the development of “transit-first” communities to be built by Waterfront Toronto. The design approach established the connection plan for the site called transit-supportive Precinct Plans – an active public realm along the designated transit corridors connected from downtown Toronto to the site.

Figure 10. Aerial perspective of the Toronto Port Lands (Source: http://media.gettyimages.com)
The Toronto Port Lands is a 113-hectare area limited by the Keating Channel, the Don River, and Lakeshore Boulevard (Figure 11). The site is one of the biggest post-industrial sites in the City of Toronto. Filling Lake Ontario to create more land for industrial purposes began in the 1880s and eventually created the Port Lands as it is known today (Waterfront Toronto, 2002). Transit-oriented development and intensification targets were designed to achieve sustainability goals for this community. This work sets the development of “transit-first” communities to be built by Waterfront Toronto (Figure 8). The design approach established the connection plan for the site called transit-supportive Precinct Plans – an active public realm along the designated transit corridors connected from downtown Toronto to the site.

Figure 11. Lower Don Lands redevelopment (Source: http://media.gettyimages.com)
4.2.2 Transit-Oriented Design

Regarding the transit-oriented approach, this design approach provided key transportation corridors that have shaped the space between the post-industrial port and new community on the other side of the railway and highway barriers. As shown in Figure 13, bringing in a new LRT transit system and connecting it to the existing subway stations offers more options and convenience to the residents. On the other hand, it also focuses on balancing the roadway network between Minor Waterfront Road and Major Waterfront Road from East to West.

This design approach has not only provided transit service but has also provided mid-size cities and large urban centres with existing and future transportation infrastructure. Based on increasing commuting distances, according to the Ontario Transit Supportive Guideline (2015), an efficient transportation system becomes more necessary in planning. However, transit is not just about getting people to their destination. It becomes as an opportunity to limit our influence on the environment. Enhancing efficient transportation can also strengthen communities (Ontario Transit Supportive Guideline, 2015).
Figure 12. Transit plan and road connection diagrams (Source: http://media.gettyimages.com)
4.2.3 Mixed use corridors and connectivity

In order to plan major transit corridors for medium- and high-density communities, reinforcing connections between surrounding blocks on both sides of the corridor and transit network is vital. Transit corridors indicate spaces to concentrate growth and intensification close to transit thus providing more efficient connectivity; it also includes density and mix-of-uses along major transit routes (Ontario Ministry of Transportation, 1996).

The range of a corridor should follow a 5 to 10-minute (400 - 800m) radius walk from focal points on the transit route. Major corridors contain a wide range of building typology and density along the length, which can affect the surrounding environment scale and intensity (Ontario Ministry of Transportation, 1996).

The transit corridor should function to support existing or proposed transit system levels. Here, it is vital to balance patterns of circulations, improve connections with transit routes between developing areas, and create a pattern for intensification when planning a neighbourhood and blocks within the transit corridors (Ontario Ministry of Transportation, 1996).

4.2.4 Bikeway and pedestrian network

This design approach also provided a key bikeway and pedestrian network. Roadways are expanded with open transit and balance the transit connections. Repositioning the urban river critically links the lakefront and the harbour together with complete streets for bicycles and pedestrians (Figure 13).
Figure 13. Bikeway and pedestrian network diagram (Source: http://media.gettyimages.com)

4.2.5 Accessibility and public open spaces

Public open spaces have shaped the City of Toronto and its waterfront by a natural landscape grid pattern. This design approach utilizes a safe pedestrian access to the waterfront and
truly benefits the accessibility of the site. Integrating different accessibility components has high potential for waterfront redevelopments. Pedestrian routes have been given priority, and the roadway network supports the intensification for future development, facilitating public access to the land and open spaces have become critical.

4.2.6 Summary of design principles and functions

- Creates new bikeway nexus
- Enables extensive pedestrian network
- Opens the Port Lands with transit
- Balances the roadway connections between primary and secondary waterfront road
- Repositions the urban river and lakefront
- Transforms the site and the City and reconnects people and water

As proposed, a design approach like this would offer a space that connects people to the waterfront. The river and the harbour have shaped various streetscapes and building typologies on site. The site landscape elements analyzed are very consistent with reflecting its character. Within each block, the detail of pedestrian realms such as traffic signals and road networks patterns are in place to prioritize pedestrian usage. The transit-oriented design visualizes many prospects for social and environmental interaction for future development of the site.

4.3 Case Study 2: Inspiration Lakeview Master Plan, Ontario, Canada

4.3.1 Context: Site Location and Description

As the eastern landmark of the City of Mississauga, Ontario Power Generation's Lakeview
Generating Station has been one of the primary industrial waterfront sites of the City of Mississauga, known by locals as “the quadruple smokestacks.” After 43 years’ service, the majority of the power plants were removed in 2007, and the site has become a re-envisioned area. In 2017, a proposed waterfront redevelopment project emerged and was later revised following a public community engagement process. Since then, the project of “Inspiration-Lakeview” has re-launched (Figure 14).

The Lakeview lands site is a post-industrial area along the Lake Ontario waterfront (Figure 15). Located in the southeast portion of Mississauga, the site includes roughly 99 hectares that include the former Lakeview Generating Station lands (64 ha) and the Lakeview business
employment area (35 ha). From wastewater treatment, regional infrastructure to low-density neighbourhoods, the site is surrounded by natural conservation areas and major arterial corridors.

Figure 15. North and south existing condition of the site (Source: http://media.gettyimages.com)

4.3.2 Access and Connections

The site is currently served by GO Transit and linked to the local transit system referred to as “Mississauga MiWay.” Off-road cycling is accommodated with the Boulevard Trail which extends from Hydro Road to Dixie Road and connects to the Waterfront Trail. The north side of the site is bounded by a major arterial road, Lakeshore Road East, and the Lakeshore GO rail corridor. Except for Lakefront Promenade, East Avenue, and Rangeview Road, the residential and collector streets end at the northern reaches of the site, east of the site is a vacant area.
4.3.3 Design strategies

The following strategies represent the key components of the master plan for the Lakeview site:

**A continuous waterfront**

The key inspiration for the Lakeview site is to reconnect the site to its waterfront and the continuous waterfront park system along the Lake Ontario shore. The new waterfront will link to the Martin Goodman Waterfront Trail both east and west of the site and extend into Lake Ontario along the Western Pier (Figure 16). The Lakeview shoreline has been planned as a destination for the existing community - a place for walking, cycling, and interaction.

![Figure 16. Proposed link with waterfront diagram (Source: http://www.mississauga.ca)](http://www.mississauga.ca)
A blue and green network

The design strategy of Lakeview land mainly includes generous green and water-related open spaces. Along with East-West and North-South spines, this proposal aims to provide a diverse cultural and natural landscape for the public realm. The network offers a strong connection between the North and South link to the city, as well as liberates the East-West connections to urban parks (Figure 17). This mix of community and destination spaces will ultimately strengthen the continuous waterfront and unites the site to the City of Mississauga core.

Figure 17. Green space and water flow diagram (Source: http://www.mississauga.ca)
A fine grain street pattern and transit system

In order to serve various types of users such as transit-riders, vehicles, bikers, and pedestrians, the new urban pattern links from existing road network to a new fine-grain street pattern and provides living diversity and scale level (Figures 18). An efficient transit system was set up and used as a carrier to create an exclusive urban village. It is important to encourage residents and visitors to take public transit rather than private automobile, as well as to support local sustainability. This plan offers a full range of housing types, retail stores, jobs, and other community amenities through a comprehensive phased approach strategically integrated into the community.

![Figure 18. Street pattern and transit system (Source: http://www.mississauga.ca)](image)

Employment and innovation corridor

For future employment growth, Inspiration Lakeview plans have provided significant job opportunity to the community’s retail sector and institutions. The employment and innovation corridor is considered as transitional use between the Wastewater Treatment Facility (WWTF) and community, to attract new jobs and create a sense of community belonging (Figure 19). On the other hand, culture – the incubator of arts – is considered as both the
destination and the neighbourhood infrastructure, providing a unique venue and opportunity for expression.

These fundamental principles offer a clear guideline for designing open space, land use, transportation, and building types. Providing a unique Lakeview personality will define how future Lakeview neighbourhoods evolve. Interconnected landscapes and high-quality living will make Lakeview a destination and precedent for waterfront renewal.

Figure 19. Employment and Innovation Corridor diagram (Source: http://www.mississauga.ca)
4.3.4 Land use

The plan proposes a clear and defined neighbourhood with open spaces and multifunctional land uses which reflect their character and sense of place (Figure 20). Coloured labeled blocks and streets are laid out to assist with locating important neighbourhood landmarks at appropriate locations on the Land Use Plan. Employment areas are adequately separated from the main streets. Incubator residential and commercial residential are developed in parallel and without interference. Primarily, this plan offers significant design solutions for a sustainable community that allows residents to live and work.

Figure 20. Proposed land use plan (Source: http://www.mississauga.ca)
4.3.5 Street typologies

Main streets are designed as Complete Street type with opportunities for parkits, mixed-use, and sustainable streetscaping to improve the pedestrian realm, such as sufficient space for bikes, vehicles, and pedestrian traffic. Greenspace can buffer pedestrians from a higher transit system and supports a mix of transit-oriented land uses.

The residential area is narrower than the main streets; they are designed as more quiet settings that are accommodated in a higher density area. This offers both privacy and intimacy in the community (Figure 21).

![Diagram](http://www.mississauga.ca)

**Figure 21.** Street typologies sections (Source: [http://www.mississauga.ca](http://www.mississauga.ca))
4.3.6 Built form and density

With the primary built form, the current population for Lakeview lands is 22,750 people. The goal of the built form is to offer up to 15 storey high buildings and achieve 25% of the proposed housing from the mid-rise residential housing and taller buildings (Figure 22). By maximizing ground-related and family residential, limited taller buildings will be allowed to support the transit system and help to reach the target of approximately 8,000 new units in the next 30 years.

Figure 22. Building typology and density distribution (Source: http://www.mississauga.ca)
4.3.7 Sustainable neighbourhood

The Lakeview land has the potential to establish a green community by integrating innovative design solutions such as sustainable planning, storm water management, and a transit-oriented system.

4.3.8 Lakeview shoreline

As the city's unique waterfront, the Lakeview Shoreline stretches from the Marie Curtis Park to the Promenade Park, connecting the Western Pier intake channel and the city's industrial districts together. To interact with Lake Ontario while conserving the waterfront trail, a continuous waterfront green belt from the dock area to the new Lakeview Waterfront Connection (LWC) emerged (Figure 23). It allows for the intake channel and the pier to engage with activities at the water's edge. Easy access to the Western Pier provided links to Lake Ontario with flexible waterfront boulevard and pedestrian priority. Multi-purpose facilities have provided a new water-based place for social and cultural uses, such as restaurants and bars along the pier.

Figure 23. The Lakeview shoreline concept design (Source: http://www.mississauga.ca)
Living in an environmentally conscientious time means that waterscape has become an essential part of community design. This design approach is mainly focused on how to deal with community planning and water edge design solutions.

### 4.3.9 Summary of design principles and functions

The master plan shows a synthesis of Lakeview land regeneration and its surrounding neighbourhoods (Figure 24) by following key principles that define the project:

- Linking the city and its waterfront
- Providing accessible public space for all users
- Creating a green, innovative, and mixed-use community
- Laying out multifunctional connections between the transit, walking, and cycling
- Establishing a green community by integrating innovative design solutions
4.3.10 Conceptual Master Plan of the Lakeview Lands

Figure 24. Revised master plan of the Lakeview lands (Source: http://www.mississauga.ca)

4.4 Synthesis and approach

Based on the literature review and the two case studies, a synthesis was developed to summarize the case study principles and generate design strategies for the 70 Mississauga Road South site. From this synthesis, potential design approaches will be explored to address the key issues related to the site.
4.4.1 Accessibility and public open spaces

The key issue for the local waterfront is public access; each municipal harbour has its conditions and obstacles related to waterfront brownfield redevelopments, such as privatization and economic problems.

The waterfront plays a significant role as a city amenity; it represents a place and experience in leisure pursuits. Although it becomes a recreational resource in urban settings, it is vital to open the waterfront to the public, in particular for existing municipal infrastructure and recreational activities. It has an enormous impact on the waterfront brownfield redevelopment (Brownfields Ontario, 2016).

Like most cities in Canada, safe pedestrian access to the waterfront will have beneficial effects on urban quality of life and placemaking on land-use patterns. Integrating the different accessibility components has high potential for waterfront redevelopments, such as land use and transit system. Waterfront brownfield revitalization has become a barrier to uniting cities and its waterfronts. Pedestrian routes should be given priority when it comes to planning. The roadway network should support the intensification for future development, as well as facilitate the public transportation use of the waterfront.

The case study analysis demonstrated several design solutions for regenerating the connection between the city and waterfronts. For instance, the Lakeview Master plan opens the chance to interact with Lake Ontario while preserving the waterfronts existing conditions. Also, by providing a continuous waterfront experience to the Pier, it also gives the public access to Lake Ontario. With a link between the waterfront and the city, the waterfront is no longer isolated and can once again become a part of the city.

Another approach to enhance urban connections, suggested from the Toronto Port Lands
case study, is to include the transit system and balance the roadway connections between the primary and secondary waterfront road and the community. A transit-oriented plan seems to be more suitable and a lakefront boulevard with a public transportation network would serve all types of users, such as private transport, cycling, and pedestrians.

A fine-grained street pattern and an efficient transit system can see dramatic change between the residential and commercial area, as well as for the industrial based waterfront. In this case, the Port Credit River has played a significant role in Mississauga’s urban texture; the community embraced the possibility of public access to the river and the waterfront. The topographic change between the river and the neighbourhood shaped the city to its nature and became an integrated part of Mississauga’s cityscape. The existing condition of the site brings a chance to design the street pattern to accommodate recreational use and settlements with transportation and public facilities.

4.4.2 Connectivity

Bringing in more vehicular flows to connect high traffic corridors into the site is vital, as well as decreasing the traffic congestion for the neighbourhood. A transit-oriented design approach provides more flexibility for people to access the site more easily and makes the city more vibrant.

4.4.3 Density

A density distribution strategy, with a higher order transit service, can accommodate density and keep the site sustainable. As close-in locations have become more attractive to target home buyers and retail centres, today, urban infill has gained more widespread attention in urban planning. Municipalities are also encouraging the practice of infill development to support commercial and service users, offering the community an opportunity to achieve
higher density for amenities, such as public open spaces, community services, and retail establishments. Moreover, when it comes to distribution, density should include higher and lower portions; higher density should be associated with the most active spaces, and lower densities should be placed in less passive areas. According to the Port Credit Built Form Guidelines, high-rise buildings should include employment to facilitate higher density for the city; it can also save more land by reducing the building footprint for the city.

4.4.4 Mixed-use

The success of mixed-use development is characterized through pedestrian-friendly expansion that combines residential, commercial, or industrial applications. Balancing public and private spaces is one of the key principles of smart growth. The Lakeshore Road should be considered as a key location to promote Port Credit as a “sense of place” as it provides more public uses on the ground floor of the mixed-use corridor, as well as retailers and restaurants.

4.4.5 Ecological role

In Southern Ontario, the shoreline is constantly changing due to the large urban intensification and erosion, leading to severe habitat fragmentation and destruction. Therefore, the water’s edge should play a protective function in order to fulfill its ecological role in urban planning.
Chapter Five | Conceptual Design Development

Based on a synthesis of the literature review and case studies, a conceptual design was developed. In this section, the guiding design principles are described and applied to the study site, as well as the key issues from the site addressed and design solution generated.

5.1 New Urbanism design concept

As David Walters (2007) points out in his book *Designing Community: New Urbanism*, design theory focuses on the design concept of a neighbourhood as the primary guideline for urban planning. It forms the human-scaled urban design with a development of walkability, mixed-use, jobs, a variety of building types, as well as public accessibility and open spaces (Walters, 2007).

In the 1980s, the New Urbanism approach was introduced to develop new neighbourhoods resulting in many positive new development projects in North America, Europe, and some developing countries (Rahnama & Hossienpour, 2012).

Newer approaches to urbanization seek to achieve environmental sustainability by managing the links between nature and humans (Figure 26). The New Urbanism approach is considered as a fundamental guiding system for urban planning; it can be used to organize comprehensive design as a systematic basis for public zoning and urban planning (Rahnama & Hossienpour, 2012).
Figure 25. Section of natural environment to manmade environment (Rahnama & Hossienpour, 2012).

Today, as the boundary between the natural and man-made disappears, environmentalists are able to assess the design of the human-made environments, and urbanists are able to support the endurance of nature. The intersectionality of the urban to rural hierarchy has appropriate street and building types for each area along the continuum (Rahnama & Hossienpour, 2012).
5.2 Application of New Urbanism principles for the study site

Urbanism principles can be suitable for a wide range of scales, from a single house to a whole community. The following key New Urbanism characteristics were selected based on the site-related issues identified in Chapter 3 and were ultimately used as the guiding design principles for the 70 Mississauga Road South site.

5.2.1 Principle for walkability and connectivity

New Urbanism design target is a walkable community with intensive neighbourhood interaction. Most amenities should be within a 10-minute radius walking distance between home and work. The pedestrian and bike-friendly street should be accessible to all residents and interconnected without auto usage (Bressi, 1994). An interconnected street network also encourages walking behaviour and decreases the time and frequency of automobile trips for all the residents.

In terms of walkability and connectivity issues, the conceptual design should provide an overall complete street on site in order to reinforce the walkability and encourage walking behaviour. The design concept was adopted from the case studies principles aims to address these issues: create pedestrian network and bikeway nexus, open the site with transit system, as well as balance roadway connection between primary road and secondary road. These principles have played a fundamental role in the design process to meet the goal and objectives of this research.

5.2.2 Principle for mixed-use corridors accessible to all

New Urbanism provides a comprehensive mix of land uses including high-density commercial and residential corridors that are focused on growth along transit routes, as well as retail
centres, institutional facilities, recreational facilities, and employments lands. This large-scale integrated community serves residents more efficiently and saves time and energy; it offers job opportunities between home and work (Duany & Plater-Zyberk, 1994).

The mixed-use corridors were designed to focus on transit routes, such as the Lakeshore main street, and link the site together. On Lakeshore Road main street, a mixed use retail centres and other amenities has been applied in order to serve residents more efficiently; the traditional Port Credit building style is proposed to keep the consistency of the neighbourhood.

According to the City of Mississauga Official Plan, the key to the Port Credit area mixed-use development is characterized by pedestrian-friendly development that associates with residential, commercial, or other public uses. Therefore, the Lakeshore Road should be considered as a key point to promote Port Credit as a “sense of place” and a mixed-use corridor accessible to all.

5.2.3 Principle for varied housing types

New Urbanism solutions utilize overall settlement patterns with varied housing typologies that allow residents of differing economic situations to live in the same neighbourhood (CNU, 2006). This principle also forms the flexibility of household income change as people can relocate to different housing types within the same neighbourhood. These approaches have significantly increased land efficiency, reduced the size of the neighbourhood, as well as shortened the walking distance between centres and edges (Duany & Plater-Zyberk, 1994).

The density distribution at the study site contains higher and lower portions and facilitate different densities for the city. For instance, the plan should take advantage of the waterfront location as well as along Lakeshore Road main street to achieve high density for the city. On
the other hand, taking a higher order transit service through the site will also accommodate density and preserve the sustainability of the community. This design strategy was also utilized in the Lakeview Land Master Plan in order to contribute to meet its density goal.

5.2.4 Principles for access to natural areas and public spaces

Green open spaces offer recreational opportunities and link residents with the natural environment. Applying this New Urbanism principle has the potential to decrease the gap between public and private life, creating a bridge between natural areas and public spaces. Integrating varied types of housing into an existing environment may be challenging but it improves the identity and civic pride of the community, as well as strengthens residents’ daily interaction (Moule & Polyziodes, 1994).

Regarding access to natural areas and public spaces, another principle, taken from the Toronto Port Lands case study, is to link the community and waterfront and re-position the lakefront. Integrating different means of providing accessibility has the potential to open the waterfront to the public. The roadway connection sustains the urban intensification and attract more people to the waterfront. Repositioning and redefining the waterfront brings controversial issues but risk often comes with opportunities as well. Design should provide natural areas that contain easy access to the waterfront and offer different amenities in order to attract more people.

5.2.5 Principles for the ecological aspect

In the Lakeview Master plan, the continuous waterfront experience to the Pier was very practical, and it also offers public access to the Lake Ontario. A design strategy like this opens the opportunities to interact with water while protecting the existing shoreline.
Because of the coastal geographical location opportunities and the needs for wildlife habitat, the design approach takes the existing conditions and integrates them into a urban naturalized wetland area on the shoreline of the 70 Mississauga Road South site.

5.3 Design drawings and explanation

The concept of New Urbanism, combined with principles from the case studies were applied to the 70 Mississauga South Road site to create a set of drawings. These drawings show the design strategies synthesized from the overall literature review and case studies.

Existing land use map of the City of Mississauga

The existing land use map of the City of Mississauga (Figure 26) shows the overall data such as the total area of Mississauga both in hectares and acres, a summary of statistics that include the existing land use divided by percentage, as well as the existing land use change in hectares from 2008 to 2015. The study site was located on the map to compare the overall context in the city.

The Port Credit Neighbourhood map

The Port Credit Neighbourhood map (Figure 27) shows the overall land use map with the total area of hectares and acres; the land use followed the same color code in Figure 26. The Port Credit neighbourhood was divided into three main components by the City of Mississauga, including the Lakeshore Road West neighbourhood, the community node area, and the Lakeshore Road East neighbourhood. Map also contains the population by age group from 2006 to 2031 in order to target attention to different ages and reinforce the identity and diversity of the community. The general ecological context of the Port Credit neighbourhood shows the overall ecological elements in the neighbourhood, such as green space,
neighbourhood area and the Port Credit River, as well as how these existing elements influence the site in general.

**Connectivity network of the Port Credit Area**

The connectivity network diagram (Figure 28) shows overall movement and mobility network of the Port Credit area, which contains existing site conditions and proposed design strategies from the City of Mississauga. According to the Official City Plan and the Light Rail Transit (LRT) plan, the proposed Hurontario LRT (formerly the Hurontario-Main LRT) is a planned light rail line in the city of Mississauga, which extends between Brampton and Port Credit area, this line will run along where Hurontario Street and the Lakeshore Road meets. The service is expected to enter in the next five years. On the other hand, another important transportation hub GO transit will be on site as well, with these two important lines of transportation crossing the study site, it improves the quality of people’s life and brings great convenience for traveling in the future.

The proposed roadways penetrate the study site from the existing surrounding neighbourhood. Community nodes were provided based on the existing bus route and people’s daily interaction such as the Port Credit Recreation Area and community nexus (Figure 28).

According to the New Urbanism principle of access to natural areas and public spaces, design should offer recreational opportunities and connect residents with the natural environment. The diagram also shows the potential of how people may utilize the Credit River Recreation Area open space and links to the surrounding natural environment such as the waterfront trail, J.C Saddington Park and the Port Credit Marina.

**Proposed land plan**
The proposed land use plan (Figure 29) indicates the functionality and potentiality of the land use on the site. The roadway network was developed based on the existing conditions such as extending the existing road patterns, reinforcing the connection between the site and the waterfront, as well as providing the central green space by taking advantage of the existing pond for light trails around the wetland and natural interpretation.

**Conceptual master plan**

The conceptual master plan (Figure 30) brings a finer scale to the design. It shows a process that reflects the overall goal and objectives associated with the design concept, as well as expresses detail planning such as building footprints, green spaces, and stormwater management.

**Circulation diagram**

From the connectivity network of the Port Credit Area diagram (Figure 31), a detailed circulation diagram emerged. In this diagram, a proposed bus route was provided to reinforce mixed-use corridors along the Lakeshore Road and through the study site. The proposed public transport system encourages residents and visitors to take public transit rather than private automobile and supports local sustainability, as well as saving more time and energy.

The walking distance from the centre of the site to the boundary is roughly about ten to fifteen minutes. This encourages street life by prioritizing pedestrians and offers easy access to the other services and amenities.

With walkable distance from all the site residents and the existing neighbourhood, complete streets provide on-site access and protect pedestrians. The proposed waterfront trail allows residents more convenient and comfortable access to natural areas and public spaces.
Building typology

The building typology diagram (Figure 32) focuses on the variety of housing types and block details. In this diagram, detailed block perspectives have been presented. According to the Official City Plan, the Port Credit Neighbourhood building typology includes low-density residential, medium-density residential, and high-density residential. The design solution utilizes overall settlement patterns with varied housing typologies that have significantly increased the land efficiency and reduced the walking distance. The detailed building typologies include a variety of purposes such as office/retail, mixed use residential and office, grocery store, medical clinic, and medium density stacked townhouse. The design did not include low-density residential, as recommended by the City. The site is surrounded by single-detached houses on both west and east sides; additional low density housing does not take advantages of this unique site.
Figure 26. Existing Land Use Map 2015
**Figure 27. PORT CREDIT NEIGHBOURHOOD**

**PORT CREDIT AREA STATISTICS**

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| Existent Combined Residents and Jobs Density | 551 ha |

**POPULATION BY AGE GROUP 2006-2031**

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**ECOLOGICAL CONTEXT OF PORT CREDIT AREA**

- LAKESHORE ROAD WEST NEIGHBOURHOOD AREA
- COMMUNITY NODE AREA
- LAKESHORE ROAD EAST NEIGHBOURHOOD AREA
Figure 28. CONNECTIVITY NETWORK OF THE PORT CREDIT AREA

PROPOSED HURONTARIO LIGHT RAIL TRANSIT (LRT) | LAKESHORE WEST TRANSIT SERVICE | CONCEPTUAL CONNECTIONS TO THE Study Site

PROPOSED GO TRANSIT STATION | EXISTING WATERFRONT TRAIL | COMMUNITY NEXUS

CREDIT RIVER RECREATION AREA | COMMUNITY NODES

MOST TRANSIT STATIONS WITHIN A 10-20 MINUTES WALKING DISTANCE
**Figure 29. PROPOSED LAND PLAN**

**PORT CREDIT MIXED USE MAIN STREET**
This property is positioned for preserve the Port Credit Heritage style on the Lakeshore road.

**PROPOSED MIXED USE CORRIDOR**
This property is ideally positioned for future high density residential and mixed use corridor.

**DEVELOPABLE LAND**
These areas are ideally positioned for future residential and commercial development on desirable land.

**STORMWATER and WETLANDS**
This existing pond suitable for light trails around wetland and natural interpretation. Should be maintained as a key naturalized area. Integrating stormwater systems into these sites is optimal.

**PORT CREDIT HERITAGE NEIGHBOURHOOD**
The Old Port Credit Village Heritage Conservation District and the Lakeshore Road “main street” present sensitive areas to be carefully considered, respected and integrated.

**POTENTIAL HIGH RISE BUILDINGS**
Taking advantage of the waterfront location and achieve high density for the city without taking too much land.

**VARiETY OF USE**
This property is ideally positioned for future institutional and mixed use.
Figure 30. Conceptual Master Plan
Figure 31. Circulation Diagram
Figure 31. Building Typology
5.4 Design Assessment

The design proposal is a result of applying principles and strategies synthesized from the literature review and the case studies. This section provides an assessment of how the key issues were resolved and how the design achieves the goal of integrating the site into the surrounding community.

Connectivity and Accessibility

The road network was reinforced and extended into the overall existing environment in order to make the site more accessible. The proposed transit system offers better connectivity and convenient access to various destinations through the surrounding area, such as connection with the proposed GO station in the neighbourhood. Pedestrian walkway and designated bike lanes are proposed for the site, and on-street parking provides separation between vehicular routes and sidewalks.

Density

High density housing and offices should take advantage of views and location and embrace a sense of openness. High rise buildings provide more opportunities to help a community achieve more intensive amenities such as community services and retail establishments. This design approach serves residents more efficiently as well as providing job opportunities close to home. Medium density occurs along Lakeshore Road to reinforce the traditional Port Credit building style and to recognize local neighbourhood character.

Public space

Providing priority for public space creates a hierarchy in the community. The green space in the centre has given local residents access to public space within walking distance and
reinforces community interaction, as well as enhances residents’ bonds to the community. The proposed waterfront trail reconnects the site with the existing 1600 kilometre waterfront trail along the shore of Lake Ontario.

**Mixed-Use corridors accessible for all**

All urban elements blend together as mixed-use development which includes varied types of residential, mixed commercial, cultural, and institutional functionally integrated into the existing environment. The mixed-use corridors are focused on growth on the Lakeshore Road main street and the transit route looping through the site. These corridors offer retail centres and other amenities that serve residents and the neighbourhood.

**Ecological aspect**

A naturalized wetland area is provided along the 70 Mississauga Road waterfront. The new waterfront edge is designed to protect various aquatic species and other telluric animals, as well as to prevent water erosion and fragmentation. These proposals contribute to environmental protection and ecological biodiversity that benefit the entire community.

**5.5 Design assessment summary**

In summary, assessment of the proposed design concept shows all site issues were addressed and all principles identified from the case studies were applied. The resulting design will ideally contribute to revitalizing both the Port Credit neighbourhood and the City of Mississauga.
Chapter Six | Discussion and Conclusion

This chapter summarizes the thesis, discusses recommendations, points out limitations of the study and outlines directions for future research.

6.1 Summary of the thesis

The goal of this study was to propose a design solution that contributes to improving integration of a brownfield site with the surrounding community. To meet this goal, literature was reviewed to identify typical development concerns and opportunities offered by brownfield sites. A brownfield site in Port Credit, Ontario was selected based on suitability criteria. Through site inventory and analysis and review of documents, key site-related issues were identified that had the potential to integrate this site with the surrounding neighbourhood and contribute to revitalization of this part of the City of Mississauga. Two case studies were selected to explore how the key site issues had been addressed on similar sites. From the literature review and case studies, principles were synthesized that provided direction on how to resolve the key issues associated with the Port Credit site. These principles were then applied in a design concept for the site. The design was assessed in relation to how it had contributed to meeting the goal of improving integration of brownfield sites with the surrounding neighbourhood.

6.2 Recommendations

A comparison of the design concept for 70 Mississauga Road South and the two case study sites reveals the following:

Revitalize desirable locations for smarter growth in urban intensification

In general, brownfield sites can be anywhere. When it comes to a desirable location,
especially in this research, waterfront plays a significant role in urban intensification; it is the most attractive place in the city. Revitalizing these locations becomes vital and should consider various factors such as connectivity and accessibility, density, mixed use corridors, public spaces and ecological protection.

Reposition older urban communities and integrate into surrounding areas

The difficulty of the brownfield revitalization process is a matter of connections: how to generate an overall landscape that links the entire environment. The surrounding areas should preserve the essence of a city and the existing hierarchy of its buildings. How to integrate these sites into the existing environment is crucial.

Recover abandoned and underutilized areas and beautify urban landscapes

Abandoned and underutilized areas present challenges to cities and towns worldwide. How to transform liabilities into assets has become an issue. A successful brownfield revitalization case can significantly alter lands and enhance the property values. A design integrated with beautiful streetscapes, varied housing types, and accessible public open spaces can create a sense of place where it improves people’s daily interactions and beautifies the urban landscape.

6.3 Limitations

There is limited information regarding brownfield locations in Canada because, as the literature suggest, brownfield sites may reflect poorly on the image of a city. It was also difficult to locate a study site because most municipalities are reluctant to release data regarding the location or status of brownfield sites.

In addition, regarding the design assessment, municipal staff or land owners were not involved in the evaluation of the proposed design concept or the design assessment. Thus,
the acceptability of the design and the validity of the design assessment.

Both of the case studies were between 99 and 113 hectares. Sites that are smaller or larger may raise very different issues with respect to their ability to revitalize a community.

Neither of the case studies provided details on ecological enhancement or protection.

6.4 Future research and implications

The majority of the related literature examines land clean-up and ecological remediation. The cost of the clean-up has played a significant role in solving the brownfield issue; essentially, it involves different parties from the municipality to the local community. Generating design solutions and finding ways to deal with a budget will be an important task for landscape architects.

In terms of design scale, brownfields can be as large as a community or as small as a gas station. Future research should focus on different design strategies to achieve a better solution, as well as on the different characteristics of brownfield revitalization.

Landscape architects have the capability to bridge the gap between architects, engineers, and environmental consultants with respect to development of waterfront brownfields. Landscape architects integrate built and natural systems in the planning, design, and implementation of the waterfront spaces.

This research will contribute to a better understanding of socially and environmentally cohesive urban spaces for waterfront brownfield regeneration, as well as provide urban planners and landscape architects with tools for creating dynamic possibilities for accommodating emerging public demands in contemporary cities.
6.5 Conclusion

This research confirms that waterfront brownfields are potential assets for modern cities. Especially in Southern Ontario cities on the Great Lakes, waterfront regeneration has the potential to positively alter land and offer a unique sense of place, as well as shape a better city image.
REFERENCES


