Canadian Brownfields Case Study

Port Lands Flood Protection Project

Source: Greenberg Consultants Inc.

Lower Don Lands Concept[1]

PROJECT SUMMARY

The Don Mouth Naturalization and Port Lands Flood Protection Project (DMNP) is a massive brownfield remediation and environmental engineering undertaking. The naturalization of the mouth of the Don River is the centerpiece of a flood protection strategy meant to unlock 290 hectares of southern downtown Toronto for revitalization.[2] These former industrial lands cannot undergo redevelopment until the risk of flooding is abated. The project is a central piece of the larger effort to transform Toronto's underutilized waterfront into a series of beautiful parks and vibrant mixed-use neighbourhoods.

History

The Port Lands is a 356 hectare area defined by the Keating Channel, the Don River and Lakeshore Boulevard to the north, Toronto Inner Harbour on the west, Ashbridges Bay on the east, and Lake Ontario and Tommy Thompson Park to the south.[3] The industrial area is planned to become a series of premier mixed-use neighbourhoods and linear network of publicly accessible waterfront parks.

The Port Lands were once the largest wetlands on Lake Ontario.[4] The current landmass was created though decades of infilling beginning in the late 1880s in order to make more land available for industry and shipping.[5] The natural mouth of the Don River was filled in and the Keating Channel was engineered to provide an outlet for the Don River watershed into Lake Ontario.[6] The configuration of the Don River

QUICK FACTS

Location
Toronto, Ontario

Project type
Flood Protection, Waterfront Revitalization, Brownfield Remediation

Site size
356 hectares

Land uses
Cement distribution, food services, heavy machine rental, various products and services

Keywords/special features
Port Lands, Naturalization, Flood Protection, Catalyst, Artificial River Valley, Climate Adaptation

Website
https://trca.ca/conservation/

Project address
Port Lands
Toronto, Ontario

Brownfield Awards
2020 Brownie Award Finalist: Reach Out: Communications, Marketing and Public Engagement

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Case studies were prepared as a course assignment by students enrolled in PL8312/PLE845: Brownfields & Sustainable Development, School of Urban and Regional Planning, Ryerson University (Winter 2021). Information for the case studies was obtained from online sources, available reports, and, in some cases, site visits and direct communication with stakeholders.

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mouth was primarily engineered for the purpose of achieving transportation efficiency.[7] The singular focus on industrial needs resulted in significant environmental degradation and major flood risks to the surrounding area. Initiatives to rehabilitate the Don River can be traced back to 1989 when a citizens group formed the Task Force to Bring Back the Don.

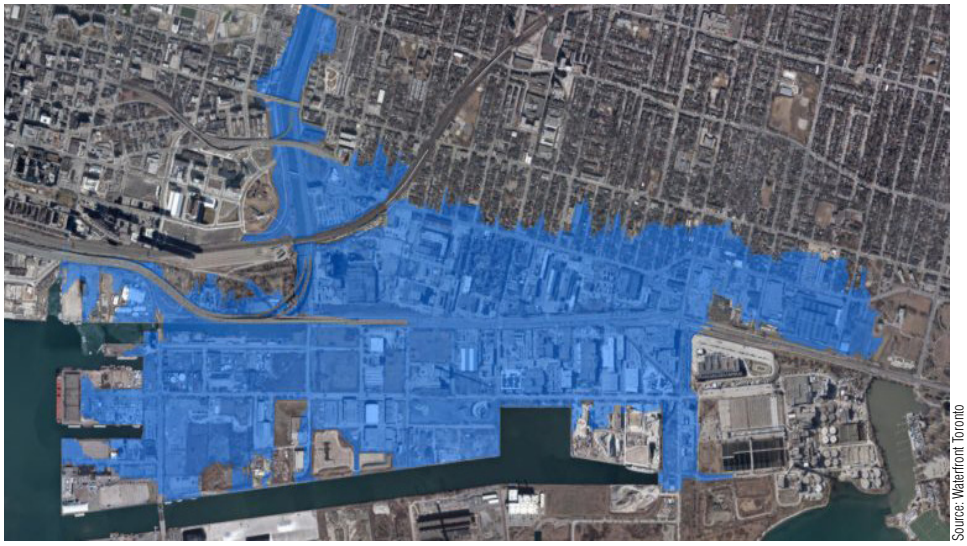
Site Characteristics

In the case of a 100-year storm event or a Regulatory Flood (Hurricane Hazel level flooding), approximately 290 acres of southern downtown Toronto is at risk of major flooding.[8] Abating this risk was identified as a top priority of the Federal, Provincial and Municipal Governments when Waterfront Toronto was first established in 2001.[9]

Over the historical pattern of development, the Port Lands' former wetland ecology was virtually extinguished. Fish habitat features within the Lower Don River and Keating Channel are characterized as degraded, highly disturbed, uniform in nature, and lacking in habitat diversity and complexity.[10] There is little ecological value remaining and no significant species present.[11]

The Port Lands has undergone significant soil and groundwater contamination. The infill projects of the late 1800s and mid-1900s used numerous sources of industrial infill with no regard for potential environmental impacts. Such sources include dredge spoils, excavated nature soils from borrow pits and construction sites, construction debris, residual stockpiled materials, and other similar sources.[12] In combination with this infill, the heavy industrial and commercial uses in the Port Lands have contributed to widespread soil contamination.

Due to the urban nature of the Don River watershed, there is no well defined hydrograph. As a consequence, flooding can occur around the mouth of the Don River at any time throughout the year.[13] The Don River often exceeds Provincial Water Quality Objectives for many substances.[14] The major sources of river pollutants are runoff from roads, residential, industrial and commercial land uses, effluent from the North Toronto Sewage Treatment Plant, combined sewer overflows along Taylor-Massey Creek and the Lower Don, and spills from industrial and commercial lands.[15] The Keating Channel itself is a sediment trap with only 10 to 15 percent of total sediment loads continuing into the Inner Harbour.[16] On average, 30,600 cubic metres of sediment must be removed from the channel annually.[17]



Source: Waterfront Toronto

290-hectare area currently at risk of flooding from the Don River[20]

Environmental degradation, significant groundwater and soil contamination, underutilized land, and flooding risk have resulted in an area that is poorly designed and unattractive. There are significant challenges to redeveloping the Port Lands for future generations. Fortunately, the process is already well underway.

Redevelopment Project Description

Due to the flood risk affecting the Port Lands and surrounding area, flood mitigation measures are integral to unlocking the area for revitalization. The naturalization of the mouth of the Don River will serve as a catalyst for the redevelopment of the entire Port Lands. The park system that will frame the new river mouth will serve as an outlet for excess stormwater, enough to accommodate major storm events that would otherwise be catastrophic to the area.

The development of the Port Lands is regulated through the Central Waterfront Secondary Plan. The plan is centered around four core principles:

A. Removing Barriers/Making Connections
B. Building a Network of Spectacular Waterfront Parks and Public Spaces
C. Promoting a Clean and Green Environment
D. Creating Dynamic and Diverse New Communities[18]

While the Port Lands is one piece of this overall plan, it represents a significant portion of the waterfront. As part of promoting a clean and green environment, the renaturalization of the

2007 Design Competition Winning Submission by Michael Van Valkenburgh Associates, Inc.[19]

Source: Waterfront Toronto

Don River and the provision of flood protection measures are key to moving forward on the other planning goals.

The project has evolved greatly over the last thirty-two years from concept to implementation. Through environmental assessments, alternatives considerations and an international design competition, the concept by landscape architecture firm Michael Van Valkenburgh Associates, Inc. has become the working plan. The project is currently undergoing environmental engineering to realize. While Keating Channel is being preserved as an ode to the area's industrial history, the mouth of the Don River is being extended by way of an artificial river valley.

Key Challenges

This is a unique project considering there is no current environmental regulatory approval process in Ontario for carving a river through a brownfield. Risk assessments and clean up processes had to be imported and scaled up from smaller site-specific examples. The scope of the project and the funding did allow room for piloting and scaling up.

Rerouting the Don River requires 1 million cubic metres of soil to be excavated or dredged.[21] The soil is intended to be reused within the project footprint to the extent practicable. The most widespread contaminants are petroleum hydrocarbons.[22] The following ex-situ treatment methodologies were considered: bioremediation, thermal desorption, soil washing, and chemical stabilization for metals-impacted soil.[23] Offsite disposal is not expected to be widely applied and will only be utilized for limited amounts of excessively contaminated soil.[24]

Beyond upfront remediation, a series of risk management measures are being applied in order to eliminate or manage direct exposure of human and ecological receptors to impacted soil and groundwater.[25] The categories of measures include physical barriers in the form of hard and fill caps, vapour intrusion controls within heritage and future buildings, and administrative controls in the form of site-specific health, safety and soil management plans.[26]

Once remediation efforts are completed, the Lower Don Lands will become a safe place for people, plants and animals. With risk management measures in place the new precincts of the Port Lands will transform the formerly blighted area into mixed use destinations designed for vibrant and compact urban living balanced with natural landscapes. New housing and commercial spaces will frame the river valley parkland system. These flood-proofed neighbourhoods of the future will be supportive of transit investments contributing to the sustainability of the waterfront.

Financing and Funding

In July 2017, Waterfront Toronto received $1.5 billion in funding from all three levels of government in order to complete the DMNP.[27] This initial investment will garner wide economic benefits in the form of $1.1 billion in value added to the national economy, 10,829 person years of employment and $373 million in tax revenues for all three levels of government.[28] The expected future benefits related to development are even greater: $4.0 billion in value to the national economy, 41,100 person years of employment and $1.5 billion in revenues to all three governments.[29] This catalytic brownfield remediation project will have wide-ranging benefits beyond the City of Toronto.

Benefits and Lessons Learned

In the new era of sustainability, the transformation of Toronto's waterfront is an opportunity for world-class city building. The renaturalization of the Don River's mouth is not only a flood protection strategy but a method of creating aesthetically pleasing integrated parkland for a downtown lacking in quality green spaces.

The DMNP marries concepts of climate adaptation, human scale design, mixed use development, and ecological diversity. Climate adaptation projects can be extremely profitable when government funding is used to pioneer catalytic projects spurring development in the surrounding area. By ensuring districts are future-proofed against increasingly frequent storm events, private developers are assured that their investments will be safe and profitable.

Source: Waterfront Toronto

River valley excavation east of Cherry Street[30]

Source: Waterfront Toronto

Render of the future naturalized mouth of the Don River facing west[31]

Endnotes

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