

Port Lands Flood Protection and Enabling Infrastructure Due Diligence Report

Toronto, Ontario

October 20, 2016



WATERFRONTToronto

Prepared by:

**Waterfront Toronto
20 Bay Street, Suite 1310
Toronto, Ontario M5J 2N8
416.214.1344**

In collaboration with:

**City of Toronto
Toronto and Region Conservation Authority
Toronto Port Lands Company**



Port Lands Flood Protection and Enabling Infrastructure Due Diligence Report

Prepared for:

Government of Canada
Province of Ontario
City of Toronto

October 20, 2016

Consultant Team:

Michael Van Valkenburgh Associates, Inc. (MVVA), Landscape Architect
CH2M, Earthwork Engineering and Environmental, Geotechnical & Hydrogeological Strategy
LimnoTech, Hydrology/Geomorphology
WSP/MMM Group Limited (MMM), Civil Engineer
Golder Associates Ltd. (Golder), Geotechnical and Environmental Engineer
Inter-Fluve, Ecology
W.F. Baird & Associates Coastal Engineers Ltd (Baird), Hydraulic Modelling
Riggs Engineering Ltd. (Riggs), Marine Engineer and Dockwall Structural Assessment
HDR Inc. (HDR), Scheduling, Risk Analysis & Quantification Services
GHD Limited (GHD), Environmental, Geotechnical & Hydrogeological Investigation
Ernst and Young Orenda Corporate Finance Inc. (EY), P3/AFP Project Screening Service
Hanscomb Ltd. (Hanscomb), Cost Consultant
PricewaterhouseCoopers LLP (PwC), Peer Review urbanMetrics Report
Fasken Martineau Dumoulin LLP (Fasken), Environmental Legal
Cushman and Wakefield (C&W), Real Estate Advisor
urbanMetrics Inc. (urbanMetrics), Economic Market and Strategic Advisor
Hemson Consulting Ltd. (Hemson), Development Charge Analysis

Agency Advisors:

Hydro One Networks Inc. (HONI), Utility
Infrastructure Ontario (IO), AFP Subject Matter Expert

Peer Reviewers:

Rijkswaterstaat Ministry of Infrastructure & the Environment (Rijkswaterstaat), Government of Netherlands
Peter Kiewit Infrastructure Co. (Kiewit), Construction Services



Artist Rendering Looking West Across the Naturalized Mouth of the Don River in Full Vision Scenario



Contents

| | |
|---|-----------|
| 1. Executive Summary | 14 |
| 1.1 Evolution of the Project | 18 |
| 1.2 Due Diligence Program | 18 |
| 1.3 Recommended Project Scope | 19 |
| 1.4 Schedule | 20 |
| 1.5 Procurement Delivery Options Analysis | 21 |
| 1.6 Implementation Plan | 22 |
| 1.7 Peer Review Results | 22 |
| 1.8 Conclusions | 23 |
| 2. Project Background | 26 |
| 2.1 The Case for Flood Protection | 27 |
| 2.2 Project History | 31 |
| 3. Due Diligence Overview | 36 |
| 3.1 Due Diligence Program Goals | 37 |
| 3.2 Project Team Organization and Approach | 38 |
| 3.3 Project Scope | 40 |
| 3.4 Due Diligence Program Scope and Deliverables | 40 |
| 4. Technical Due Diligence Results | 46 |
| 4.1 Subsurface Site Conditions | 47 |
| 4.2 Environmental Management Approach | 48 |
| 4.3 Earthwork | 50 |
| 4.4 Earthwork Staging | 52 |
| 4.5 Flood Protection Features | 55 |
| 4.5.1 Site Grading Strategy | 55 |
| 4.5.2 River Slope Armouring | 57 |
| 4.5.3 Don Greenway | 57 |
| 4.5.4 Don Roadway Valley Wall Feature | 57 |
| 4.5.5 First Gulf/Unilever Flood Protection Landform | 60 |
| 4.5.6 Sediment and Debris Management Area | 60 |
| 4.5.7 Flow Control Weir System | 60 |

| | |
|--|-----------|
| 4.5.8 Keating Channel Modification | 60 |
| 4.5.9 Eastern Avenue Flood Protection | 60 |
| 4.6 Hydraulic Validation | 61 |
| 4.7 Land Creation | 62 |
| 4.8 Marine Structures | 62 |
| 4.9 Public Realm, Parkland and Habitat Enhancement | 64 |
| 4.9.1 Planting | 64 |
| 4.9.2 Aquatic Habitat | 64 |
| 4.10 Roads and Bridges | 65 |
| 4.11 Existing Buildings: Relocation/Demolition | 67 |
| 4.12 Municipal Services | 67 |
| 4.13 Park Program | 71 |
| 5. Recommended Scope, Cost Estimate and Financial Due Diligence | 74 |
| 5.1 Integrated Cost, Schedule and Risk Assessment | 75 |
| 5.2 Comparison Between Original Scope and Recommended Scope Cost Estimate | 81 |
| 5.3 Market Demand Analysis | 84 |
| 5.4 Development Charges Eligibility Analysis | 85 |
| 5.5 Economic Impact Analysis | 86 |
| 6. Procurement Strategy | 88 |
| 6.1 Component Packaging for Procurement Analysis | 89 |
| 6.2 Context for Delivery Option Selection | 89 |
| 6.3 Assessment of Delivery Options | 90 |
| 6.4 Interpretation of Results | 93 |
| 6.5 Project-Specific Procurement Principles | 93 |
| 6.6 Recommended Project Delivery | 95 |

| | |
|---|------------|
| 7. Implementation Plan | 98 |
| 7.1 Implementation Approach and Team Organization | 99 |
| 7.2 Climate Change Considerations | 100 |
| 7.3 Permitting and Approvals | 101 |
| 7.4 Legacy Ownership | 104 |
| 7.5 Coordination | 106 |
| 7.6 Public Consultation and Communication | 110 |
| 8. Peer Review | 112 |
| 9. Summary and Recommendations | 116 |
| 9.1 Due Diligence Program Summary | 117 |
| 9.2 Recommendations | 118 |
| Glossary | 123 |
| List of Appendices | 131 |

Table of Figures / Charts

| | | |
|-------------------|---|----|
| Figure 1 | <i>Lower Don River Project area set within the context of the Port Lands and the Central Waterfront</i> | 16 |
| Figure 2 | <i>DMNP EA Flood Plain Map Illustrating the areas that are currently at risk of flooding under the Regulatory Flood Event</i> | 27 |
| Figure 3 | <i>Land Available for Development</i> | 29 |
| Figure 4 | <i>Aerial View of Existing Conditions</i> | 30 |
| Figure 5 | <i>Aerial View of Proposed Full Vision for the Port Lands and Surrounding Areas</i> | 31 |
| Figure 6 | <i>Evolution of Plan Development</i> | 32 |
| Figure 7 | <i>Team Organization Chart and Integration</i> | 37 |
| Figure 8 | <i>Due Diligence Schedule Overview</i> | 38 |
| Figure 9 | <i>Project Components Considered During Due Diligence</i> | 39 |
| Figure 10 | <i>Contamination Profile</i> | 49 |
| Figure 11 | <i>Conceptual Grading Adjustments for Flood Protection</i> | 51 |
| Figure 12 | <i>Earthworks: Stage I</i> | 53 |
| Figure 13 | <i>Earthworks: Stage II</i> | 53 |
| Figure 14 | <i>Earthworks: Stage III</i> | 54 |
| Figure 15 | <i>Earthworks: Stage IV</i> | 54 |
| Figure 16 | <i>Flood Protection and Slope Armouring</i> | 56 |
| Figure 17a | <i>Example of Exposed Armour</i> | 58 |
| Figure 17b | <i>Example of Exposed Armour with Wetland Habitat</i> | 58 |
| Figure 18 | <i>Example of Bioengineered Bank</i> | 59 |
| Figure 19 | <i>Example of Large Wood Stabilization</i> | 59 |
| Figure 20 | <i>Marine Structures</i> | 63 |
| Figure 21 | <i>Bridges and Roads Plan</i> | 66 |
| Figure 22 | <i>Interim Road Network and Building Removal / Relocation</i> | 68 |
| Figure 23 | <i>Servicing Replacement and Modification</i> | 69 |
| Figure 24 | <i>Full Vision Wetland Habitat and Park Program Plan</i> | 70 |

| | | |
|-------------------|--|---------|
| Figure 25 | <i>Water Access at Brooklyn Bridge Park, Brooklyn, NY</i> | 71 |
| Figure 26 | <i>Wooded Upland at Corktown Common, Toronto, ON</i> | 72 |
| Figure 27 | <i>Esplanade at East Bayfront Water's Edge Promenade, Toronto, ON</i> | 72 |
| Figure 28 | <i>Prospect at Brooklyn Bridge Park, Brooklyn, NY</i> | 73 |
| Figure 29 | <i>Playground at Corktown Common, Toronto, ON</i> | 73 |
| Figure 30 | <i>Cost Estimate Build-Up</i> | 76 |
| Figure 31 | <i>Project Delivery Schedule</i> | 77 |
| Figure 32 | <i>Project Cost Risk Analysis</i> | 80 |
| Figure 33a | <i>Recommended Project Scope Map and Key Components</i> | 82 |
| Figure 33b | <i>Recommended Scope Cost Estimate by Component</i> | 83 |
| Figure 34 | <i>Annual and Cumulative Investments</i> | 85 |
| Figure 35 | <i>Selected Economic Impacts</i> | 87 |
| Figure 36 | <i>Summary of Procurement Options</i> | 91 |
| Figure 37 | <i>Procurement Options - Value for Money Assessment</i> | 92 |
| Figure 38 | <i>Procurement Principles</i> | 94-95 |
| Figure 39 | <i>Proposed Procurement Approaches</i> | 97 |
| Figure 40 | <i>Approvals Timeline</i> | 101 |
| Figure 41 | <i>Legacy Ownership</i> | 105 |
| Figure 42 | <i>Other Neighbouring Infrastructure Projects</i> | 108-109 |
| Figure 43 | <i>Artist Renderings of Full Vision Lower Don River Naturalization and Accompanying Public Realm</i> | 134-135 |

1. Executive Summary

The Port Lands Flood Protection and Enabling Infrastructure Project (the Project) is a comprehensive plan for flood protecting southeastern portions of downtown Toronto – including parts of the Port Lands, South Riverdale, Leslieville, south of Eastern Avenue and the First Gulf/Unilever development site – that are at risk of flooding under a provincially-defined Regulatory Storm event. As a result, these areas are within a Provincially-designated Special Policy Area and are effectively undevelopable and economically underutilized until the flood risk is removed.

This \$1.25 billion project – which enjoys broad support from diverse stakeholders including community groups, developers and environmentalists, and which has secured key environmental assessment approvals from the Ministry of the Environment and Climate Change (MOECC)¹ – will unlock nearly 290 hectares (715 acres) for revitalization and facilitate billions of dollars in private investment. It also represents the second phase of a two-phased project; the first phase being the flood protection landform built in the West Don Lands that now protects 210 hectares (519 acres) of eastern downtown Toronto and enabled the emergence of a new mixed-use community in a former floodplain, including the successful construction of the Pan/Parapan Am Games Athletes’ Village.

Naturalizing the mouth of the Don River for flood protection is not a new idea; it was one of the first priority projects that the three orders of government mandated Waterfront Toronto to advance. Working together over the past decade, Waterfront Toronto, Toronto and Region Conservation Authority (TRCA), the City of Toronto

1 Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment received MOECC approval on January 28, 2015, and the Lower Don Lands Master Plan Class Environmental Assessment was approved by MOECC in 2014.

and the Toronto Port Lands Company (TPLC) have developed and refined a solution to protect the Port Lands and adjacent areas from potential loss of life and costly flood damage associated with a major flood event, while also triggering economic development – as was the case in the West Don Lands. The Project provides flood protection through the creation of a new, naturalized mouth for the Don River and other significant flood protection measures. This will result in two additional outlets for the Don River, which ultimately will be surrounded by new parks, green space and public realm enhancements before and as development occurs in the area.

This Project will provide critical flood protection and will also spur innovation, economic growth and create jobs while allowing for the development of mixed-use communities for all ages and income levels that are sustainable, livable, and beautiful.

The Project will enable the delivery of climate-positive strategies and outcomes, setting a compelling environmental and economic example for other cities to follow. As cities around the world gain a better understanding of the necessary changes to design, planning, transit, infrastructure and technology to create more sustainable and livable cities, this Project will serve as an ideal testbed for solutions to tackle the challenges posed by climate change. The Port Lands and the growth of a new climate-positive community on the waterfront will serve as a platform to showcase and bring to scale innovative products, policies, solutions and processes in strategic economic sectors such as clean technology, design, sustainable construction and energy systems. This will both attract private equity investment and foster collaboration between governments and private enterprises.

In the last decade, governments across the country have had to contend with weather events that are occurring with more frequency and severity.



Figure 1 Lower Don River Project area set within the context of the Port Lands Flood Protection and Enabling Infrastructure Due Diligence Report

In particular, floods are happening more often in urban areas and the financial risk to governments to pay for the damages is also increasing. Without adequate mitigation and protection measures in place, governments will continue to assume the risk and costs associated with major flooding across this vast area as a result of damage to existing bridges, roads, utilities and buildings. Moreover, a lack of flood protection infrastructure means the Port Lands cannot be transformed into a long-term asset; an asset that could help to achieve climate change objectives and support the growth and economic competitiveness of Toronto, Ontario and Canada. Investing strategically in the Project not only unlocks development value and protects existing neighbourhoods, but also protects governments from significant financial risk. This is underlined by the Canadian National Disaster Management Strategy's estimated cost-benefit ratio for investment in flood protection: for every dollar invested, five dollars of potential damages are avoided. See **Section 2.1: The Case for Flood Protection**.

Achieving flood protection through a green infrastructure approach will also help achieve several additional strategic public policy objectives:

- ***City building:*** Unlocking the Port Lands for revitalization will help curb urban sprawl by allowing the development of new communities next to Toronto's downtown core that are connected by transit and cycling networks. Further, flood protection is vital for the development of the First Gulf/Unilever site, which offers significant potential as an employment hub.
- ***Climate change:*** This creative approach to flood protection will improve Toronto's resiliency. Over 1,000 metres of new river channel, 13 hectares of new coastal wetland and four hectares of terrestrial habitat will strengthen biodiversity and help clean our water.

- ***Economic development:*** The Project and the future development of Villiers Island are opportunities to develop platforms to showcase innovative products, policies, solutions and processes in strategic economic sectors such as cleantech, design, sustainable construction and energy systems.

There exists here enormous potential for residential and employment-generating commercial development in a part of the city that has been left unchanged during decades of development and modernization elsewhere in Toronto's downtown. The Project will also substantially enhance the area's public realm, beautifying a key part of the downtown, and continuing the transformation and revitalization of Toronto's waterfront.

The Project's construction phase has the potential to deliver wide economic benefits. A 2016 update to the study completed by urbanMetrics estimates that spending on design and construction of the Project will generate approximately:

- \$1.1 billion in value to the Canadian economy;
- 10,829 person years of employment; and
- \$373 million in tax revenues to all orders of government.

The urbanMetrics report also indicates that there are economic benefits related to future development unlocked by the Project, including approximately:

- \$4.0 billion in value added to the Canadian economy;
- 41,100 person years of employment; and
- \$1.5 billion in revenues to the three orders of government.

These numbers do not include the additional long-term economic impact associated with the proposed development of the First Gulf/Unilever

site, a 60-acre, 12 million square foot commercial development, envisaged as a major employment node (approximately 50,000 jobs) on the east bank of the Don River. Nor do the numbers include the financial impact generated by net new economic activities driven by commercial and residential occupants in these newly flood-protected areas.

This Project is an ideal investment to revitalize the waterfront while creating durable economic benefits to the city, the province and the nation. In addition, the Project will make a significant contribution towards strengthening our climate change resiliency, which is a priority for each order of government.

1.1 Evolution of the Project

In 2006, the Ontario Ministry of Environment (now Ministry of Environment and Climate Change) approved the Environmental Assessment Terms of Reference for the Don Mouth Naturalization and Flood Protection Project EA (DMNP EA). In 2007, the Port Lands Estuary Plan submitted by Michael Van Valkenburgh Associates Inc. (MVVA) won Waterfront Toronto's international design competition, which specifically sought a master vision and solution that integrated naturalization, flood protection, infrastructure and the land use potential of the area. This design has continued to evolve over time and forms the basis for the Project. See **Section 2.2: Project History**.

The Project has progressed through several necessary regulatory approvals. On January 28, 2015, the MOECC approved the DMNP EA, which documents the Project's core elements. Beyond the required flood protection infrastructure described in the DMNP EA, the Project includes associated major municipal infrastructure needed to enable flood protection and unlock development, such as bridges, roads, and underground services. This infrastructure was outlined in the companion

Lower Don Lands Master Plan Class Environmental Assessment (LDL MPEA), which came into effect in 2014. Taken together, the Project provides necessary infrastructure to establish new communities in the Port Lands, including Villiers Island, Polson Quay, South River and the Film Studio District (including the new McCleary District), which could accommodate housing for 18,000-25,000 people and commercial space for 25,000-30,000 jobs. It also enables the redevelopment of the significant First Gulf/Unilever site and other nearby areas.

The Project has been informed by extensive engagement and consultation with the public, government agencies, stakeholders, landowners and developers, and is consistent with the City of Toronto's primary waterfront planning document, the Central Waterfront Secondary Plan.

1.2 Due Diligence Program

In order to create more certainty on the Project's cost, schedule and risks, the Project Team began a due diligence program in June 2015. A team of professional consultants was competitively procured and engaged to conduct the due diligence program. The consulting team includes expertise in major project development, geotechnical, civil, environmental, hydraulic and structural engineering, landscape, river and dock wall design, environmental law, project planning, cost estimating, scheduling, risk assessment, public-private partnership (P3)/alternative finance and procurement (AFP) screening, economic and real estate impact analysis.

While the ultimate scope of the Project was derived from the approved Environmental Assessments, there were still many aspects that required further detail in order to develop a more reliable and detailed cost estimate, schedule, risk assessment and risk mitigation plan. Therefore, the due diligence program began with refining

the river valley and flood protection infrastructure design, detailed investigations into site, soils and environmental conditions, and developing an environmental strategy to address those conditions.

More specifically, a concept design was developed that outlines key elements of the Project in sufficient detail to enable the Project Team to determine the underlying engineering, structural and environmental requirements, and to better calculate costs and quantify risks. For example, the Project Team has established what the river profile looks like and how wide and deep it must be to accommodate a Regulatory Flood event. The Project Team has also modelled the flow of water in the proposed river valley during severe storm events, and the resulting forces acting to erode the valley surface. This provided the necessary understanding of the detailed requirements for flood protection infrastructure.

Finally, because of the unique and unprecedented aspects of the Project, the Project Team is working closely with the MOECC and other agencies on developing an environmental management framework, including the completion of a Community Based Risk Assessment. The Project Team is also aware of other specific and predictable environmental and regulatory approvals needed, and has determined requirements, approvals and processes to proceed with other Project infrastructure, such as roads, bridges and utilities.

As part of the due diligence program, a project delivery options analysis was conducted, including examining P3/AFP and conventional delivery options. Potential revenues from the sale of City-owned lands and development charges were also assessed, and the underlying economic impact study used to outline the Project's benefits was validated.

This report has also been subject to two independent third-party peer reviews by organizations familiar with delivering similar infrastructure projects. The objective of the peer review was to assess the strengths of the process/analyses undertaken and the rationale for the conclusions and recommendations presented.

1.3 Recommended Project Scope

The due diligence findings have led the Project Team to a revised scope for the Project, which is called the Recommended Scope, with a cost estimate of \$1.25 billion in year-of-expenditure (YOE) dollars, which includes hard (construction) costs, soft costs (such as design, engineering, and approvals), taxes, and a contingency of 30 per cent to address escalation and risk. Through probabilistic risk assessment, the Project Team has determined that there is a 90 per cent probability of completing the Project on or below budget and on schedule, taking into account all identified cost and schedule risks and opportunities. High-level cost estimate methodologies can be found in **Section 5: Recommended Scope, Cost Estimate and Financial Due Diligence**. The current cost estimate is based on a project-specific delivery model. **Section 6: Procurement Strategy** outlines the project delivery model assessment.

The Recommended Scope balances the delivery of flood protection and enabling infrastructure, such as roads, bridges, municipal servicing, parks and transit right-of-ways, with the necessary amount of public realm needed to serve as a catalyst for future residential and commercial investment and development. The Recommended Scope includes all flood protection and naturalization infrastructure – including river valley wetlands, natural habitat and public realm – as well as adjacent parks, roads, bridges and municipal services. The Recommended Scope also includes interim Bus Rapid Transit (BRT) infrastructure, which can be readily converted to accommodate future Light Rail

Transit (LRT). These Project components enable the immediate development of Villiers Island, the First Gulf/Unilever site and other adjacent development areas. For a full understanding of the Recommended Scope, please see **Figures 33a/b**.

The Recommended Scope does not include some parks, public realm and local roads and bridges that can be built as development proceeds (for example, Promontory Park North).

The initial cost estimate, before the due diligence program, was \$975 million (YOE). The key drivers of the increased cost estimate for the Project's Recommended Scope are the results of work done to update and collect new information on the site's soil characteristics. Specifically, an additional 179 boreholes and 98 monitoring wells were drilled, and several test pits were excavated across the Project site (on an approximate 50 metre grid spacing) to gather more soil and groundwater data. The results of these new soil samples, combined with data from 288 previously-drilled boreholes, were thoroughly analyzed by the Project Team, resulting in a better understanding of the nature, extent, and distribution of soil and groundwater contamination.

This work also led to the most relevant new finding, which is that the soils within and underneath the planned river valley/channel and adjoining lands are characterized by flowing sand and compressible peat. As a result, the excavation of the river valley must be wider and deeper than previously anticipated, because of the tendency for exposed soils on the river bank to erode during excavation. This approach is a more complex and costly construction than had previously been anticipated.

The presence of compressible peat layers has a number of implications for the design and construction of settlement-sensitive features, such as roads and park areas, both in terms of cost and the time required to allow for fill settlement

before the surface finishes can be installed, which is an important constraint on the overall Project schedule. The peat will also limit storage of excavated soils on adjoining lands through the construction phase of the Project, as the weight of excessive excavated soils, if applied, could cause sinking/settlement on the soil storage sites.

The Project Team has also determined that additional flood protection infrastructure, in the form of raised grades and perimeter reinforcement along the river valley and spillway, is required in the short-term as opposed to the preliminary phasing plan which had relied upon developers to protect individual sites as they were developed over time. Another driver of the cost increase is escalation; several years have passed since the original cost estimate, and therefore cost escalation over this time is factored into the current cost estimate.

Individual cost components and cost increase/decrease details are provided in **Section 5: Recommended Scope, Cost Estimate and Financial Due Diligence**.

1.4 Schedule

The Project Team has developed a schedule for the Recommended Scope with a target completion date in late 2023. This requires that the Project be funded in the second calendar quarter of 2017 and construction mobilization begin in the fourth calendar quarter of 2017. Should funding be delayed past the second quarter of 2017, additional costs due to escalation would increase the total estimated Project cost by approximately \$30 million per year.

We recognize that there are other major infrastructure projects that will be underway adjacent to the Project site that may affect the cost and schedule. Waterfront Toronto, together with the City of Toronto, Metrolinx and Infrastructure

Ontario have committed to working collaboratively and have initiated a coordination committee for this purpose. This committee will assess the potential impacts, risks and opportunities presented by these activities happening concurrently, and will develop a coordinated schedule. Please refer to **Section 7.5: Coordination**.

1.5 Procurement Delivery Options Analysis

Project delivery options (or models) define and establish the relationships among the various parties involved in delivering a capital project and the associated scope, and distribution of responsibility and risk. No one perfect model exists and potential options must be individually assessed for fit with a project's particular circumstances. This is especially true given the unique nature of the Project and the fact that a decade of work has already been invested in its development and in working through myriad complex regulatory and other issues.

A fundamental distinguishing feature of this Project is that the entire site is a brownfield, consisting of reclaimed land built over a marsh, surrounded by water and connected to the lake; the scale of soil and groundwater environmental issues is central to the Project and significantly influences and constrains risk transfer potential. In addition to allowing for the efficient, timely and cost-effective management of environmental risks in a collaborative manner with regulatory authorities, the selected delivery model should also allow for controlling the program and design content and quality to the extent necessary to ensure design excellence, enable an expedited start to construction, and provide sufficient flexibility to respond to a changing environment and logistical requirements.

The Project Team reviewed a broad range of delivery options, which included an in-depth

assessment of the potential for utilizing a P3/AFP model, and concluded that the needs of this unique and multi-faceted Project demand a customized delivery solution. A comprehensive set of principles was jointly formulated by the Project Team and Infrastructure Ontario (IO) to guide its development.

The customized delivery solution will incorporate elements of the widely-used Construction Manager/General Contractor (CM/GC) model along with specific approaches and incentives developed as part of P3/AFP project delivery and proven in that context. CM/GC is a two-phase process. In the pre-construction phase, the public sector contracts with a consultant team to design an infrastructure asset and in parallel retains a construction contractor to work collaboratively on developing the Project. In the subsequent construction phase, the construction contractor provides the full range of construction services normally provided by a general contractor, including responsibility for coordinating all work on site and for compliance with applicable Occupational Health and Safety legislation and regulations.

The customized delivery solution will also be structured into two phases, and will be designed to:

- Allow for the segmentation of the project into components that can be procured in the most appropriate and advantageous fashion consistent with the procurement principles;
- Enable procurement of integrated design and construction services (design-build) for specific Scope Items, where appropriate to do so;
- Provide for the acquisition of a full range of pre-construction planning services and as and where necessary during construction, the assumption of construction logistics planning and Occupational Health and Safety compliance at the Project site;

- Transfer risk where this can be done at reasonable cost and encourage collaborative management of residual risk that must be retained by the public sector;
- Facilitate early owner-consultant-contractor collaboration to progressively reduce risk; and
- Allow for early constructive engagement between regulatory authorities and the full delivery team, particularly with respect to innovative design and construction approaches.

1.6 Implementation Plan

Waterfront Toronto will assemble an expanded project management team to implement future phases of the Project. To ensure continuity, the team will include some of the same key staff who have led the due diligence program, augmented with experts drawn from the collective resources of Waterfront Toronto and its partner organizations TRCA, the City of Toronto, and TPLC, and potentially other public agencies and consultants. The on-going roles and responsibilities of the key consultants will be assessed and adjusted as necessary to align with the detailed procurement strategy.

In the near term, executive level leadership of the Project will continue to be provided by the Executive Steering Committee, which comprises senior executives from Waterfront Toronto, TRCA, and the City of Toronto. A Project Charter will be created, which will document the responsibilities and accountabilities of Waterfront Toronto and its partner organizations, and the Project governance structure and approval processes.

The project management team and the constructor will collaborate to develop and implement a risk management framework that builds on the risk assessment work completed as part of

due diligence and to advance discussions with regulatory authorities to progressively reduce regulatory risk. The project management team and the constructor will also jointly develop a comprehensive Project Execution Plan, which will document the scope, detailed budget and schedule, risk management framework, delivery organization, approval requirements and milestones, contracting, construction staging and interface management strategies, and control processes for the Project.

Realistic contingencies, controlled by the project management team under executive oversight, will be held in reserve to address challenges faced through completion of the Project.

1.7 Peer Review Results

As the Project is an unprecedented proposal for Toronto, the Project Team opted to have the Due Diligence Report peer reviewed to ensure its adequacy and accuracy were independently examined by qualified organizations.

Two separate, independent peer reviews of the due diligence program and results were completed. The first peer reviewer, Rijkswaterstaat is the organization that designs, constructs, manages and maintains flood protection, water, and road infrastructure on behalf of the Ministry for Infrastructure and the Environment in the Netherlands. Rijkswaterstaat is a world leader in the assessment and delivery of infrastructure comparable to the Project; its review was conducted from the perspective of a public sector project delivery agency. The second review, which was competitively procured, was undertaken by the Peter Kiewit Infrastructure Co. (Kiewit), a global construction services provider specializing in water and marine-based projects. Kiewit provided the complementary perspective of a heavy civil contractor with expertise in executing projects of

similar scale and complexity to the Project using a range of traditional and innovative delivery models.

The peer review terms of reference included providing an opinion on the scope, process, and thoroughness of the due diligence process, the project planning work completed and the conclusions reached. The peer reviewers also offered implementation recommendations for consideration by the Project Team. The peer reviewers examined an advanced draft of the due diligence report and supporting documentation, along with final consultant reports.

Both peer review teams concluded that the due diligence work completed by the Project Team was appropriately detailed.

Rijkswaterstaat agreed with the Project Team's conclusion that the \$1.25 billion recommended budget would be sufficient to deliver the Recommended Scope, and that the budget's contingency matched similar projects. It further noted that:

- Excavation of the river valley, soil handling and filling (also referred to as earthworks) will drive the construction phasing, and by applying the proposed construction schedule, the Project can be completed in 2023;
- The Project's identified risks are well documented and comparable with Rijkswaterstaat's projects; and
- The scale and complexity of managing soil in the Project is exceptional and the risk of unknown soil characteristics will remain significant.

From a contractor perspective, Kiewit noted that the Project elements that pose the greatest risk to meeting the proposed budget and schedule relate to:

- Confirming the regulatory requirements with respect to soil contaminants and the associated Risk Management Measures; and
- Poor subsurface conditions (such as compressible peat layers) that could result in damage to services such as roads and underground utilities when soils excavated from the river valley are placed on the site and cause sinking/settlement.

One of Kiewit's major recommendations for reducing the risks posed by poor subsurface conditions was to develop a Ground Improvement Plan that would aim to improve the strength of the soils/subsurface conditions, as an early step in the pre-construction phase.

Kiewit was of the opinion that using a collaborative delivery model with early contractor involvement would enable the Project to be developed within the budget and schedule.

Both peer review teams have extensive experience with P3 project delivery and neither considered the model a good fit for the Project.

1.8 Conclusions

The Project Team has identified a Recommended Scope with a cost estimate of \$1.25 billion and a target completion date of late 2023. Completion of the Project will deliver flood protection, help to advance revitalization of the Port Lands and the adjacent First Gulf/Unilever site, drive economic growth, spur innovation and the delivery climate-positive strategies. Following a thorough assessment of project delivery alternatives, the Project Team recommends a customized delivery

solution, which reduces risk by leveraging contractor expertise during pre-construction planning, transfers design and construction risk where this can be done at reasonable cost, and encourages collaborative management of residual risk.

In order to deliver the Project within the \$1.25 billion recommended budget and to achieve the 2023 target completion date, funding would need to be in place in the second calendar quarter of 2017 to allow the immediate commencement of detailed design and enable mobilization for construction in the fourth calendar quarter of 2017. Should commencement of the Project be delayed, additional costs of approximately \$30 million annually would be incurred, owing to the impact of construction escalation.

2. Project Background

Toronto's long-term economic success is linked to its ability to attract the highly-mobile knowledge workers that drive continued investment, economic growth and jobs in the city. In competing with the top tier of global cities, Toronto must create the strong combination of opportunity and quality of life that appeals to these knowledge workers: active, sustainable urban communities – close to employment and transit – with easy access to the amenities that define city living.

As Toronto's downtown experiences continued population and job growth, the 356-hectare (880-acre) Port Lands remains the last significant undeveloped space in the heart of Canada's largest city. Formerly one of the largest natural wetlands in Lake Ontario, the Port Lands has the potential to substantially transform Toronto and support the city's competitiveness. Few cities have such a large swath of downtown waterfront land with an accompanying plan to unlock development. Currently, about 290 hectares (715 acres) of the area – including parts of South Riverdale, Leslieville, south of Eastern Avenue and the First Gulf/Unilever development site at the eastern base of the Don River – are at risk of flooding from the Don River watershed and cannot be revitalized until they are flood protected.

A solution is needed to address the fundamental challenge of transforming the underutilized Port Lands into a long-term asset for the people and economy of Toronto, Ontario and Canada.

2.1 The Case for Flood Protection

Providing flood protection for the Port Lands was identified as a top priority by all three orders of government when they first established Waterfront Toronto in 2001. The Project is the response to this challenge. A new mouth for the Don River will be created by excavating a new channel in the middle of the Port Lands between the Ship Channel and the Keating Channel, as well as a greenway for overflow in the event of a Regulatory Flood. The Project will result in two new outlets for the river into Lake Ontario, new parks and green space along the river and inner harbour, continuous riverfront open space and expanded opportunities for people to experience the water's edge.

The Project would effectively complete flood protection for the Lower Don River area; the first phase being the flood protection infrastructure recently completed in the West Don Lands, which flood protects 210 hectares (519 acres) of eastern downtown Toronto, including the West Don Lands, East Bayfront and parts of the Financial District and South Core. That work enabled considerable development, including \$1.3 billion of early-stage



Figure 2 DMNP EA Flood Plain Map Illustrating the areas that are currently at risk of flooding under the Regulatory Flood Event

development in each of the West Don Lands and East Bayfront, in addition to other commercial and residential developments in the surrounding area.

The appended PwC report, *Port Lands Flood Protection Preliminary Business Case, September 25, 2014*, stated the following with respect to the investment return on flood protection efforts:

Experience suggests that flood protection infrastructure can minimize the adverse effects of floods and can result in significant cost avoidance. Canada's own National Disaster Management Strategy stipulates that "Benefit-cost ratios for flood prevention measures in Australia, the United States and the United Kingdom are 3:1, 4:1 and 5:1, respectively". In Canada, the Red River Floodway was opened in 1968 following an investment of \$63 million by the Government of Manitoba and the Government of Canada. It provides protection for the 90-year flood risk. Since its construction, the floodway has been operated over 20 times and has prevented \$8 billion in flood damages in the province. The recent \$665 million expansion of the floodway now provides protection for the 700-year flood an event that could otherwise result in \$12 billion in damages. The estimated savings from Red River Floodway expansion represent a return of more than 200% on initial investment.

The Project, as proposed, incorporates the lessons learned in other jurisdictions and will mitigate potential flood damage for existing properties in the proposed development area while unlocking the economic potential of the Port Lands. The provision of flood protection in the proposed development area would save hundreds of millions or even billions in flood damage to existing infrastructure and recovery costs in the event of a regulatory flood event. Based on the return realized by

the investment in the Red River Floodway and the damage caused by the June 2013 flood in Calgary, the estimated benefit cost ratio for investment in the Project will be approximately 5:1. In other words, a \$1 investment in flood prevention infrastructure will mitigate \$5 in flood damage. Irrespective of the cost benefit benchmark used to estimate the benefits generated by the Project, the reality is that the investment in flood protection infrastructure will result in savings equal to a multiple of the initial investment.

The Government of Ontario has put land use and development limitations in place in the Port Lands through the Special Policy Area (SPA) designation to minimize the cost impact of flooding. Notwithstanding the SPA, which would mitigate the cost of potential flood damage, a major flood event would still materially impact existing bridges, roads, utilities and buildings over this vast area. Such a flooding event would cause significant damage in the immediate area, with some effects more broadly felt across the city should regional transportation and utility infrastructure sustain significant flood damage.

Flood protection will allow for the removal of the SPA and allow for prime urban waterfront land to be developed in a highly-sustainable manner, and effectively reintegrate the Port Lands into Toronto's urban fabric. The Project will transform underutilized brownfield land into new resilient and sustainable communities. It will also enhance habitat for natural species and re-establish wetlands in the area, which provide social and environmental benefits and naturally moderate the effects of flooding and erosion.

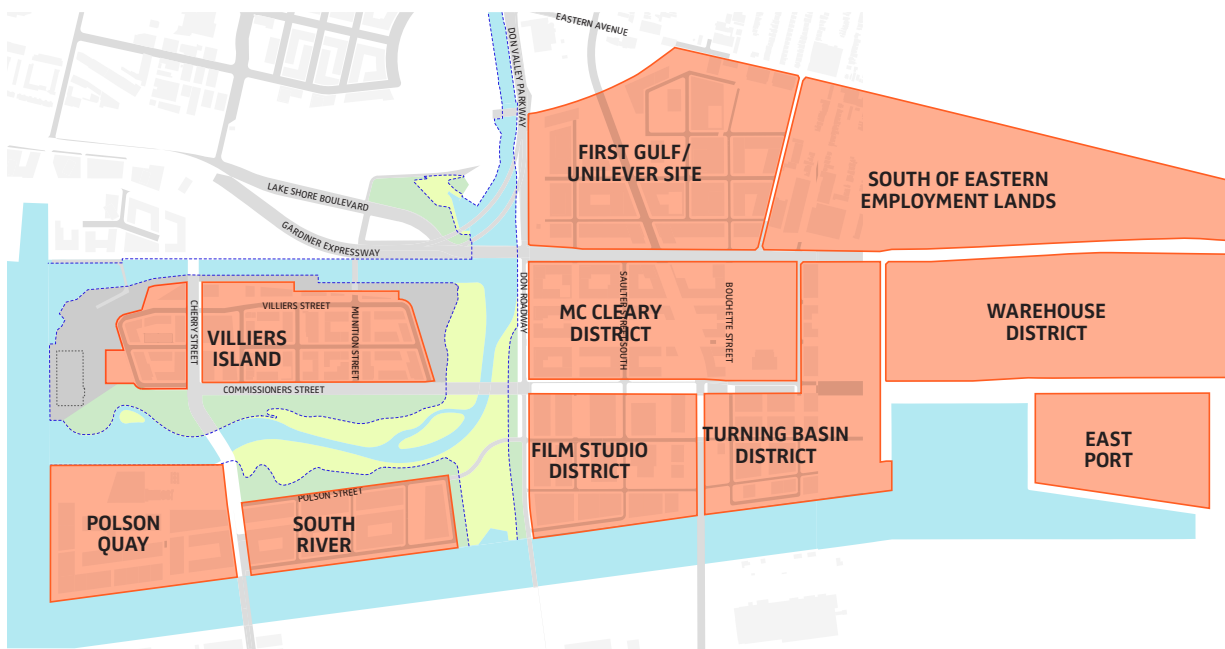


Figure 3 Land Available for Development



Legend

- Land Unlocked for Development by Flood Protection Measures
- Parkland
- Floodplain
- Regulatory Flood Line

There is a strong business case for investing in flood protection and other enabling infrastructure in the Port Lands, as it would:

- Protect against the potential loss of human life as a result of a catastrophic flooding at the mouth of the Don River;
- Mitigate the very substantial costs of repairing flood damage;
- Help governments achieve the goal of mitigating the impact of climate change and improving resiliency;
- Support the development of new, highly-livable, climate-positive mixed-use communities close to downtown employment areas;
- Attract a growing number of people to this new community, where they can experience the city's quality of life and its economic opportunities;
- Invite investment in commercial, institutional and other development; and
- Create jobs and drive economic development.

The net, long-term economic impact of the Project, as described in **Section 5.3: Market Demand Analysis**, will be a positive return on investment that will create an attractive new community in Toronto's downtown that will draw both residents and visitors. It will also make a substantial contribution to Toronto's economic competitiveness and add to the health, vitality and sustainability of Toronto's waterfront, to the benefit of the city, the province and the nation.



Figure 4 Aerial View of Existing Conditions

An updated and validated independent study completed by urbanMetrics in 2016 estimates that spending on Project design and construction will generate \$1.1 billion in value to the Canadian economy, 10,829 person years of employment and \$373 million in tax revenues to all orders of government. In addition, urbanMetrics estimates that future construction activity in the Port Lands – specifically, the development areas unlocked by the Project – is ultimately expected to generate 41,100 person years of employment, \$4.0 billions in value added to the Canadian economy, and \$1.5

billion in labour income and revenue to all orders of government. This study was peer reviewed by PwC as a part of the due diligence program and then updated by urbanMetrics based on peer review input.

These numbers do not include the additional long-term economic impact of developing the First Gulf/Unilever site. Nor do they include the financial impact generated by net new economic activities driven by commercial and residential tenants in those areas.