



Figure 28 Prospect at Brooklyn Bridge Park, Brooklyn, NY (Michael Van Valkenburgh Associates, Inc.)



Figure 29 Playground at Corktown Common, Toronto, ON (Michael Van Valkenburgh Associates, Inc.)

## 5. Recommended Scope, Cost Estimate and Financial Due Diligence

Through the completion of the due diligence program, the Project Team developed a detailed cost estimate based on drawings, specifications, concept design and soil volumes provided. Further details related to the estimating, Project scope adjustments, risk analysis, and contingency setting processes and results are included in this section and the related appendices.

As part of this program, the \$975 million (YOE) cost estimate for the Original Scope was updated based on current due diligence findings, then used to develop the Recommended Scope, which has an estimated cost of \$1.25 billion (YOE) that in turn includes hard (construction) costs, soft costs (such as design, engineering, and permitting/approval fees), applicable taxes, and a contingency of 30 per cent, including an allowance for escalation.

In addition to the cost estimating work, and to validate projections identified in earlier studies, consultants were retained to update the Market Demand Analysis, Land Sale Revenue Projections, Development Charges Analysis and Economic Impact Analysis. These updated studies and peer reviews are included as appendices, referenced within individual sections below.

## 5.1 Integrated Cost, Schedule and Risk Assessment

Cost consultants Hanscomb Limited (Hanscomb) have prepared base cost estimates in 2016 dollars for individual Project components based on the integrated concept designs and preliminary construction methodologies developed and documented by the Project Team, and have consolidated these into comprehensive Project cost estimates. In addition to using its own construction cost database, informed by an understanding of current market trends, Hanscomb has integrated cost data provided by CH2M (documented in

its Environmental Cost Estimate) and Riggs, respectively, for specialized soil/environmental management and marine construction work.

Hanscomb's base cost estimates incorporate quantities and unit prices (or lump sums) that are representative of average, planned conditions, exclusive of hidden risk factors, and that are as unbiased as possible (i.e., neither over-optimistic nor over-conservative). Unit price assumptions have also been critically reviewed by other members of the Project Team.

A design and pricing allowance equivalent to 10 per cent of the estimated construction cost has been added to each component estimate to account for items that have not been sufficiently defined in concept design to be quantified in the estimate. For example, a general requirement for a physical barrier – such as stone armouring – has been identified, but its exact form and extent remain to be determined. As the design proceeds, and decisions are made regarding the Project's detailing and materials, this allowance will be consumed or transferred to the Project's contingency.

Over and above the direct cost of constructing the physical work shown on the drawings, a contractor will incur a variety of indirect costs including General Requirements and Contractor Overhead and Profit. General Requirements include items such as mobilization at the construction site, environmental protection during construction, temporary facilities such as site trailers and temporary power, storage and staging areas, site management, project coordination, and bonding and insurance. These indirect costs have been accounted for by applying a factor of 13 per cent.

Cost Element	Amount (\$ millions)
<b>Base Construction Cost Estimate (2016\$)</b> <sup>1</sup>	<b>\$ 784</b>
20% Soft Cost Factor (2016\$)	\$ 157
1.76% Non-recoverable HST (2016\$)	\$ 17
<b>Base Project Cost Estimate (2016\$)</b>	<b>\$ 958</b>
Escalation Allowance <sup>2</sup>	\$ 119
<b>Escalated Project Cost Estimate (YOE\$)</b>	<b>\$ 1,077</b>
Contingency <sup>2</sup>	\$ 173
<b>Recommended Project Budget (YOE\$)</b>	<b>\$ 1,250</b>

1. Includes 13% General Requirements/Contractor Overhead and Profit, totalling \$71 million; and 10% Design and Pricing Allowance totalling \$82 million.
2. Combined Escalation Allowance plus Contingency equal approximately 30% of Base Project Cost Estimate.

Figure 30 Cost Estimate Build-up

In order to convert the base construction cost estimate into a base project cost estimate (please refer to **Figure 30**), markups were then applied to cover:

- Soft costs, including design, engineering, and specialist consultant fees, permit and approval fees, and project management costs. The applied 20 per cent soft cost factor is also intended to cover lease termination and business relocation costs, which are assumed to total approximately \$5 million; and
- Non-recoverable (net) Harmonized Sales Tax, at 1.76 per cent.

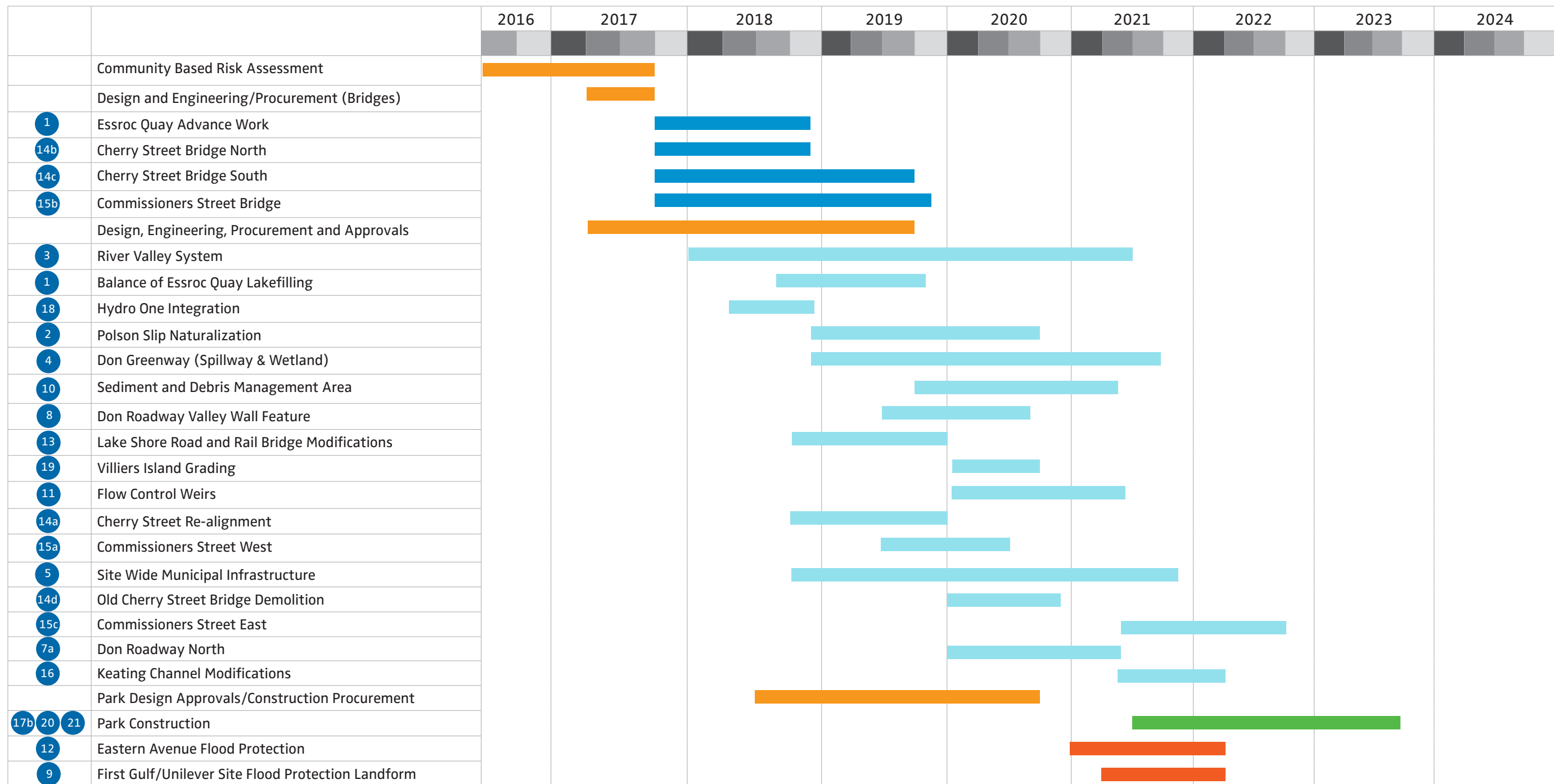
No provision was made in the base cost estimates for financing costs, premium costs or innovation opportunities that may be associated with the application of a P3/AFP process. Applicable escalation and contingency allowances were calculated through the process described below, which integrates cost and schedule considerations.

A high-level project schedule, which addressed design, approval and construction activities, was developed by HDR through a collaborative

effort with the Project Team. The schedule<sup>1</sup>, presented in **Figure 31**, was developed based on detailed consideration of earthwork staging (including the need to mitigate the risk of flooding during construction), traffic management and maintenance of access, the proposed procurement/project delivery methodology, and the potential for design or construction efficiencies. This schedule baseline also assumes negligible delay due to unforeseen circumstances. In essence, a project timeline was constructed assuming the Project is delivered to plan, and on this basis, an expected completion date of late 2023 was established.

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1 Note that the identification of specific scope items as potential advance work in Figure 31 represents one possible scenario, which forms the basis for the work presented in this Due Diligence report, but which is subject to change. The Project Team has and will continue to assess whether there are other scope items that could be advanced. Certain schedule assumptions have been superseded, given the September 14, 2016 announcement by representatives from the three orders of government that funding has been allocated to accelerate designing and constructing the entirety of Scope Item 1 (Essroc Quay Lakefill).



Legend

- Design and Approvals
- Potential Advance Construction Scope
- Core Construction Scope
- Park Construction Scope
- Stand-alone Construction

Figure 31 Project Delivery Schedule



The projected 2023 finish date relies upon the early retention of a constructor as part of implementing the customized delivery solution described in **Section 6: Procurement Strategy**. Working collaboratively with a constructor facilitates concurrent design and construction, enabling certain Project components to be advanced. In addition, to support completion in 2023, funding would need to be confirmed no later than the second calendar quarter of 2017.

As part of the due diligence work, HDR Corporation (HDR) conducted an initial two-day risk identification and quantification workshop with full participation by the Project Team and various Project stakeholders. During this workshop, potential risks and opportunities were identified and recorded in a Project Risk Register, accompanied by a consensus view of the probability of occurrence and the likely cost and schedule impacts should the risk manifest. The workshop also included an assessment of the base cost uncertainty, which considered the quantity and unit price estimates based on the concept design developed for each component of the Project.

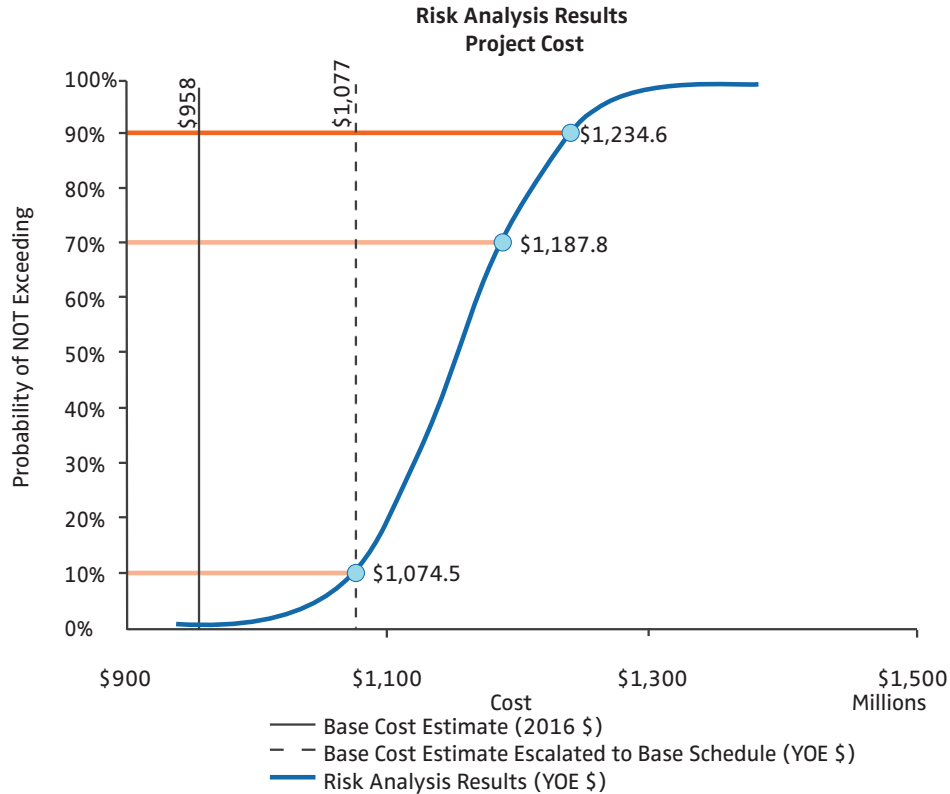
HDR conducted a follow-up risk workshop to further refine the outputs, and to identify and evaluate proactive responses to key Project risk factors, which could reduce risk and uncertainty.

HDR developed a project-specific risk assessment simulation model, which employs industry best practice probabilistic techniques to perform risk-based cost and schedule analyses. The foundation for the model has been utilized extensively by HDR in providing decision support for numerous other large scale infrastructure projects, adjusted for project-specific conditions. The model inputs include:

- The detailed baseline construction cost estimate marked up by 20 per cent for soft costs and a further 1.76 per cent for non-recoverable HST;
- The corresponding HDR baseline Project schedule, with costs allocated to the appropriate schedule activities;
- Base cost uncertainty information; and,
- The Risk Register.

The model calculates the probability that a project can be completed within a given budget and by a selected target date, in order to support contingency setting or validation. This model features a methodology where specific event risks are identified and quantified instead of applying fixed percentages for unknowns. In this manner, a project-specific risk reserve is developed by quantifying the risk events that can affect the given project. The risk-based approach is particularly appropriate for projects having few precedents or benchmarks.

This contrasts with the traditional method of dealing with project unknowns by applying an across the board contingency factor based on judgment, experience, and a set of assumptions with unknown confidence. More often than not, the traditional single-value estimate under- or over-represents the project cost, masking the critical uncertainty inherent in a particular project. It



Note: \$957.9 million is the unescalated base cost estimate for the Project, while \$1,076.8 million is the escalated base cost estimate. The curve shows the range of potential cost outcomes for the Project and the corresponding probabilities that the Project can be completed at or below the indicated cost.

Figure 32 Project Cost Risk Analysis

implies a sense of precision beyond what can be achieved during planning, scoping or early design phases.

Hanscomb analyzed applicable construction escalation trends over time and recommended a 3.3 per cent year-over-year escalation rate be used for the Project (refer to the appended Hanscomb Report, *Recommendations and Rationale for Construction Cost Escalation Factors*). A year-over-year escalation rate of 2.5 per cent was adopted, however, in order to be consistent with the City of Toronto’s standard practice for budgeting major capital infrastructure investments. The escalation rate assumption was built into HDR’s model to allow the cost results to be expressed in nominal (or year of expenditure (YOE)) dollars and the

model was run to produce probability distributions for cost and schedule outputs. Sensitivity to changes in the assumed escalation rate was addressed in the risk assessment simulation model.

**Figure 32** represents the simulation results for Project cost, after taking into consideration escalation, base cost uncertainty (variability), the monetary impact of the risks and opportunities identified in the Risk Register, and the monetary impact of schedule delays which give rise to additional overhead costs and increased escalation costs.

As shown in **Figure 32**, the un-escalated baseline cost for the Project has been estimated at approximately \$958 million, based on the



\$784 million construction cost estimated by Hanscomb (appended as the *Conceptual Estimate for Waterfront Toronto's Recommended Scope*) plus 20 per cent markup for soft costs and a further 1.76 per cent markup for non-recoverable HST. Running the model including projected escalation but without the risk component shows the base cost dollars to be approximately \$1.08 billion (YOE).

The risk analysis results are shown in the form of an S curve, with the ultimate Project cost in year-of-expenditure dollars plotted on the horizontal axis and the corresponding probability that the Project will be completed at or below budget on the vertical axis. Taking into account all identified cost and schedule risks and opportunities, the results show that there is:

- A 90 per cent probability that the Project can be completed for \$1.23 billion or less;
- A 70 per cent probability that the Project can be completed for \$1.19 billion or less; and
- A 10 per cent probability that it can be completed for less than \$1.07 billion.

On the basis of these simulation results, a Project cost estimate of \$1.25 billion has been carried. The cost estimate incorporates a total reserve of \$292 million, or approximately 30 per cent, to address the potential impacts of project risk and construction escalation (please refer to **Figure 31**). This yields a high – or approximately 90 per cent – probability that the Project will be delivered within or below the cost estimate based on implementation using a flexible, customized project delivery solution, as recommended in **Section 6: Procurement Strategy**.

**Figure 33a** shows the Recommended Scope of the Project and **Figure 33b** breaks down the \$1.25 billion recommended budget by individual Project components.

## 5.2 Comparison Between Original Scope and Recommended Scope Cost Estimate

In July 2015, representatives of the Government of Canada, the Province of Ontario, and the City of Toronto announced funding for the due diligence project. The announcement referenced a preliminary \$975 million cost estimate, which had been developed based on the substantial work of the EA but without the benefit of the extensive site characterization and other due diligence undertaken since.

Through the completion of due diligence work, it was determined that the preliminary budget figure was insufficient to achieve the Project goals.

**Figure 33b** also provides a breakdown of the original \$975 million cost estimate (the Original Scope estimate) by Project Component, and compares these component costs to the updated estimates, which add up to the \$1.25 billion Recommended Scope cost estimate. The key factor driving the increased cost is the enhanced understanding of site conditions gained through due diligence. This in turn drives additional soil excavation, soil/groundwater treatment, and material handling/import costs resulting from:

- The extent of flowing sand and compressible soils identified through borehole and soil sampling work;
- Design development; and
- Enhanced erosion control and risk management measures.

In order to allow for some additional required scope identified through due diligence, and to offset some of the increased cost, the Project scope was reviewed in detail to identify opportunities to defer non-essential work that does not have an immediate impact on Project goals.

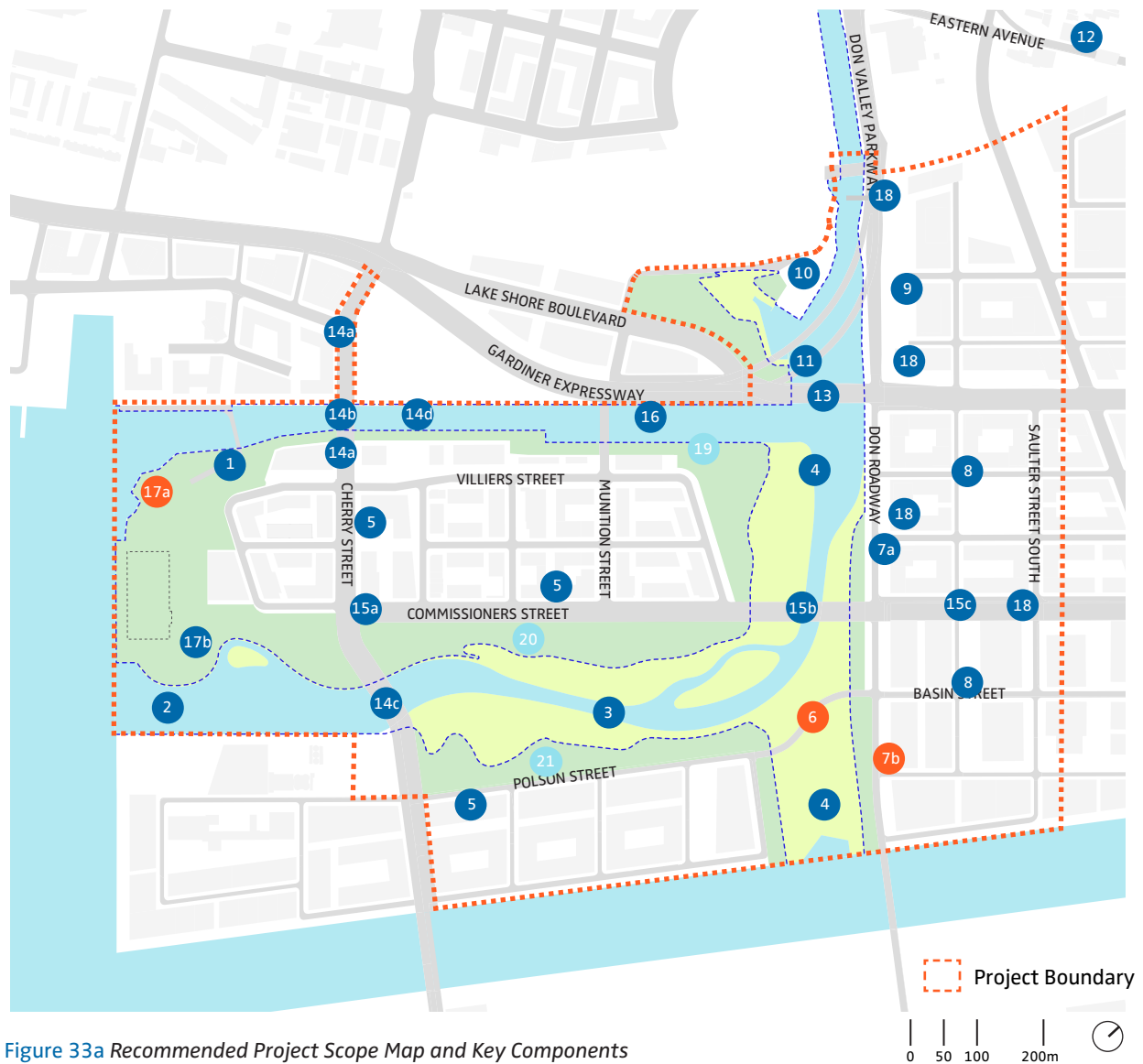


Figure 33a Recommended Project Scope Map and Key Components

Legend

- |                                      |   |  |                                  |
|--------------------------------------|---|--|----------------------------------|
| 1 Essroc Quay Lakefilling            | 7b Don Roadway South                                  | 14a Cherry Street Re-alignment (incl. BRT)       | 16 Keating Channel Modifications |
| 2 Polson Slip Naturalization         | 8 Don Roadway Valley Wall Feature                     | 14b Cherry Street Bridge North (incl. BRT)       | 17a Promontory Park North        |
| 3 River Valley System                | 9 First Gulf/Unilever Site Flood Protection Land Form | 14c Cherry Street Bridge South (vehicular only)  | 17b Promontory Park South        |
| 4 Don Greenway (Spillway & Wetland)  | 10 Sediment and Debris Management Area                | 14d Old Cherry Street Bridge Demolition          | 18 Hydro One Integration         |
| 5 Site Wide Municipal Infrastructure | 11 Flow Control Weirs                                 | 15a Commissioners Street West (incl. BRT)        | 19 Villiers Island Grading       |
| 6 Basin Street Bridge                | 12 Eastern Avenue Flood Protection                    | 15b Commissioners Street Bridge (vehicular only) | 20 River Park North              |
| 7a Don Roadway North                 | 13 Lake Shore Road & Rail Bridge Modifications        | 15c Commissioners Street East (vehicular only)   | 21 River Park South              |

		Estimated Cost (YOE \$millions)			Explanation	
		Recommended Scope	Original Scope	Variance		
1	2	Essroc Quay Lakefilling and Polson Slip Naturalization	\$ 125	\$ 90	\$ 35	Refined design of lakefill and naturalized river mouth; more complex construction requirements.
3	4	River Valley System and Don Greenway (Spillway and Wetland)	\$ 486	\$ 128	\$ 358	Refined earthwork methodology/quantity and cost assumptions and environmental management requirements.
5		Site Wide Municipal Infrastructure	\$ 102	\$ 36	\$ 66	Municipal services originally carried with roads is now broken out separately, actual network design have replaced previous allowances.
6		Basin Street Bridge	-	\$ 37	\$ (37)	
7a	7b	Don Roadway North and South	\$ 7	\$ 63	\$ (56)	South portion deferred. Current estimate breaks out costs for municipal services and Hydro One infrastructure modifications elsewhere. See items 5 & 18.
8		Don Roadway Valley Wall Feature	\$ 27	\$ 12	\$ 15	Refined design
9		First Gulf/Unilever Site Flood Protection Landform	\$ 5	\$ 5	\$ 0	
10		Sediment and Debris Management Area	\$ 78	\$ 53	\$ 25	Refined design
11		Flow Control Weirs	\$ 38	\$ 38	\$ 0	
12		Eastern Avenue Flood Protection	\$ 5	\$ 5	\$ 0	
13		Lake Shore Road and Rail Bridge Modifications	\$ 19	\$ 71	\$ (52)	Dimensions reduced from prior assumptions. Proposed Gardiner/Lake Shore reconfiguration has eliminated need for the rail bridge modifications.
14a		Cherry Street Re-alignment (incl. BRT)	\$ 22	\$ 62	\$ (40)	Current estimate breaks out costs for municipal services elsewhere. See item 5. Improvements deferred south of Polson Street.
14b		Cherry Street Bridge North (incl. BRT)	\$ 55	\$ 32	\$ 23	Revised pricing assumptions and additional design information.
14c		Cherry Street Bridge South (vehicular only)	\$ 42	\$ 42	\$ 0	
14d		Old Cherry Street Bridge Demolition	\$ 4	\$ 13	\$ (9)	Reduced extent of dockwall work related to demolition.
15a		Commissioners Street West (incl BRT)	\$ 18	\$ 40	\$ (22)	Current estimate breaks out costs for municipal services elsewhere. See item 5.
15b		Commissioners Street Bridge (vehicular only)	\$ 43	\$ 54	\$ (11)	Revised pricing assumptions and additional design information.
15c		Commissioners Street East (vehicular only)	\$ 7	\$ 60	\$ (53)	Current estimate breaks out costs for municipal services and Hydro One infrastructure modifications elsewhere. See Items 5 & 18.
16		Keating Channel Modifications	\$ 35	\$ 50	\$ (15)	Duplicate scope eliminated.
17a	17b	Promontory Park North and South	\$ 42	\$ 63	\$ (21)	Refined design and park programming. Full landscaping limited to south end of park.
18		Hydro One Integration	\$ 12	\$ 21	\$ (9)	Reduced scope of work assumed required specifically to enable flood protection. Note: original estimate also included supplementary allowances for modifications to Hydro One assets in Items 7a & 15c.
19		Villiers Island Grading	\$ 28	-	\$ 28	New scope required to achieve complete flood protection without reliance on adjacent development progress.
20		River Park North	\$ 23	-	\$ 23	Partially replaces deferred (north) portion of Promontory Park.
21		River Park South	\$ 27	-	\$ 27	Partially replaces deferred (north) portion of Promontory Park.
<b>Total</b>		<b>\$ 1,250</b>	<b>\$ 975</b>	<b>\$ 275</b>		

● Original Scope ● Added Scope ● Deferred Scope

Figure 33b Recommended Scope Cost Estimate by Component

The Recommended Scope and corresponding cost estimate of \$1.25 billion reflects the following changes to the Original Scope:

Deferrals:

- Basin Street Bridge (**Scope Item 6**);
- Don Roadway South (**Scope Item 7 b**); and
- Promontory Park North (**Scope Item 17 a**).

Reductions:

- Reduced scope to defer construction of transit infrastructure on two of the three remaining bridges (**Scope Items 14 c** and **15 b**). The Cherry Street Bridge North (**Scope Item 14 b**) will include dedicated lanes for interim BRT service and all three of these bridges will be designed and constructed with the capacity to accommodate future LRT infrastructure;
- Reduced scope to defer LRT infrastructure on all roads, but space will be provided for interim BRT service that can later be replaced by an LRT;
- Rail bridge modification allowance (originally part of **Scope Item 13**) deleted due to Gardiner East work; and
- Allowance for modification of Hydro One transmission infrastructure reduced, based on assumed minimum requirements for achieving flood protection.

Additions:

- Villiers Island flood protection grading (**Scope Item 19**);
- River South Precinct flood protection grading (accounted for in conjunction with **Scope Items 3** and **4**);
- River Park North (**Scope Item 20**); and
- River Park South (**Scope Item 21**).

Additional upward and downward adjustments were made internal to various scope items, which resulted in a net zero impact on the overall budget. Of particular note, the plan to relocate the Gardiner East ramps to the Don Valley Parkway renders the extension of the rail bridge across the Lower Don River (part of **Scope Item 13**) obsolete.

### 5.3 Market Demand Analysis

Cushman & Wakefield was retained to complete a high level update of its 2012 Market demand forecast, which included revenue projections. The updated 2016 forecast focused on the market demand and land sale revenue for the period from 2023 to 2042 within Villiers Island and the Film Studio District (McCleary District) of the Port Lands.

The Cushman & Wakefield update concluded that:

- **Residential:** Growth in high-rise development is expected to remain strong over the forecast period. Residential demand in Villiers Island and the McCleary District is estimated at approximately 5,000 units over the 2023 to 2042 forecast period. This would account for all of the residential capacity in Villiers Island and part of the McCleary district. A higher residential forecast of 6,500 units was also deemed reasonable (325 units annually).

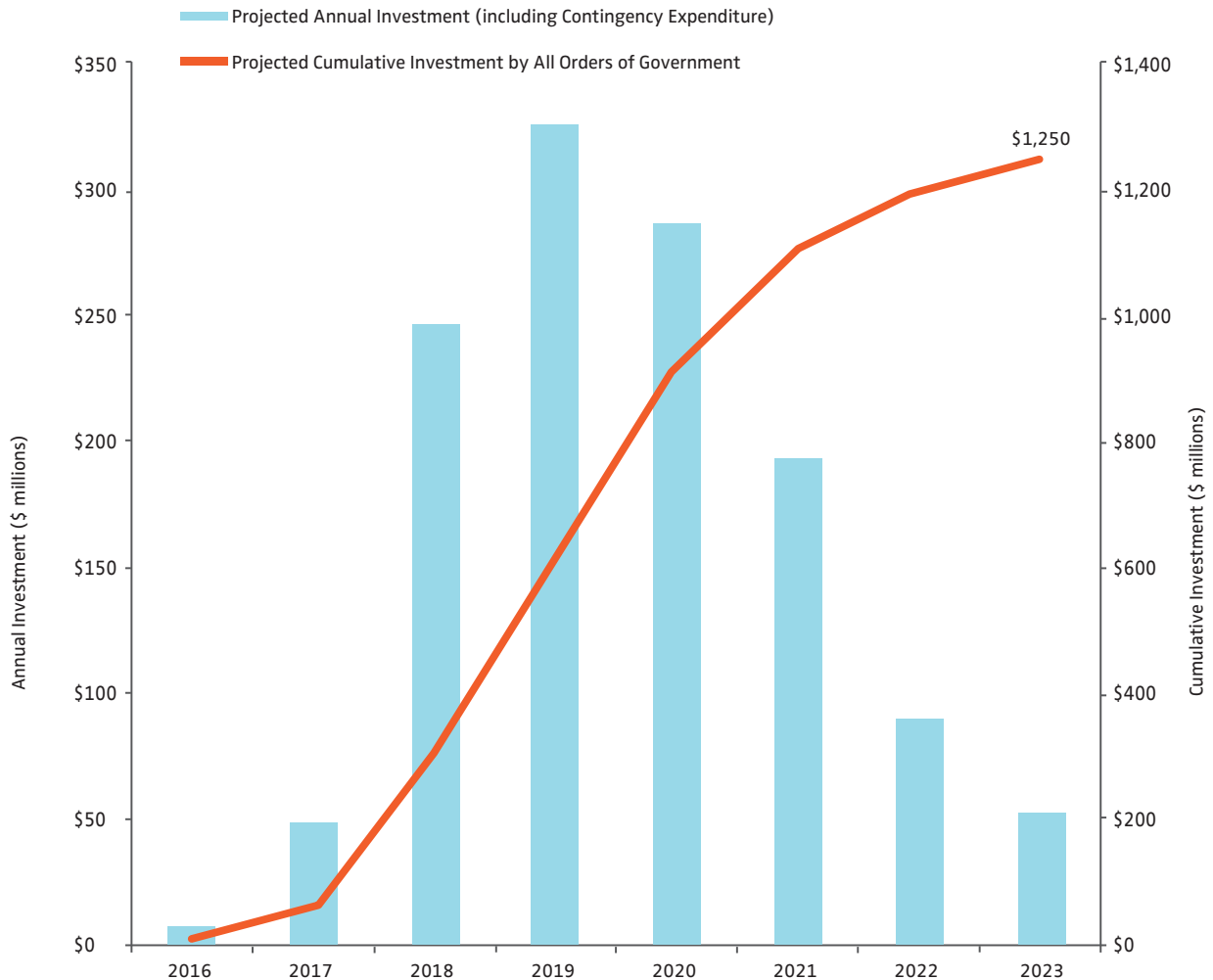


Figure 34 Annual and Cumulative Investments

- **Office:** Significant office demand of 1.2 million square feet to 2.6 million square feet is also forecasted, assuming higher order transit is in place. The midpoint of this range is 1.9 million square feet.
- **Retail:** Demand for local serving retail is projected at 296,000 square feet.

N. Barry Lyon Consulting were retained to complete a peer review of the updated Cushman & Wakefield findings and generally concurred with the findings of Cushman & Wakefield.

## 5.4 Development Charges Eligibility Analysis

In August 2012, Hemson completed a peer review of the financial elements of the 2012 PLAI Report. A key component of this work involved reviewing the development-related capital costs and revenues associated with the Port Lands development over a long-term time horizon. In 2013, Hemson completed a Development Charges Background Study for the City of Toronto and incorporated inputs from the 2012 PLAI Report.

Since then, Waterfront Toronto and the City of Toronto have updated Project scope, timing, and cost estimates. Accordingly, Hemson was retained in 2016 to update the development charge eligibility analysis and concluded that the majority of Project costs are growth-related and the City has the option to recover a portion of its costs from future development charges. This can represent a significant source of municipal capital funding for the Project over the long term.

## 5.5 Economic Impact Analysis

Waterfront Toronto retained urbanMetrics Inc. (urbanMetrics) in 2014 to complete an analysis of the potential economic impacts generated by long-term future construction activity in the Port Lands beyond 2023. This was part of a larger study looking at the various benefits likely to be generated by planned revitalization investment programs over a ten-year period between 2014 and 2023.

As requested by the Province, and as part of the due diligence program, PricewaterhouseCoopers (PwC) was retained to conduct a peer review of the urbanMetrics report. In particular, PwC was asked to analyze the urbanMetrics report and opine on the following:

- urbanMetrics' calibrations of its proprietary input-output model;
- Estimated expenditures and industry categorization used to estimate economic impacts for the Project and Port Lands future development;
- Assumptions used in analyzing the economic impacts; and
- Interpretation of the economic impact model's results.

PwC concluded that while the applied methodologies were reasonable, certain minor aspects of the methodology could be improved, such as using a more current Statistics Canada input-output model and a slightly revised discount rate.

In light of more recent development data produced through the ongoing planning in the Port Lands, as well as the PwC recommendations, urbanMetrics was engaged to update their analysis of the economic benefits associated with the Project.

urbanMetrics projected the following economic impacts of the Project, which are stronger than their earlier 2014 estimates:

- \$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 economic benefits associated with the First Gulf/Unilever site proposal were not included in the urbanMetrics' calculation. The 2016 study further provides a high level review and update of the potential economic impacts that could ultimately be generated by new construction in the Port Lands at full build-out (not including First Gulf/Unilever). The report concluded that this future construction activity is ultimately expected to generate:

- \$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 estimates are in line with previous projections in the urbanMetrics Waterfront Toronto 2.0 Economic Impacts of Planned Investment (2014-2023) report.

## Flood Protection and Future Development of the Port Lands Will Generate

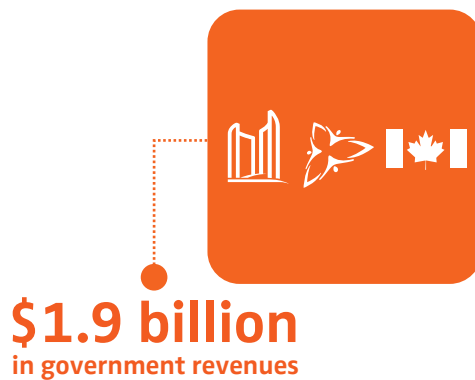
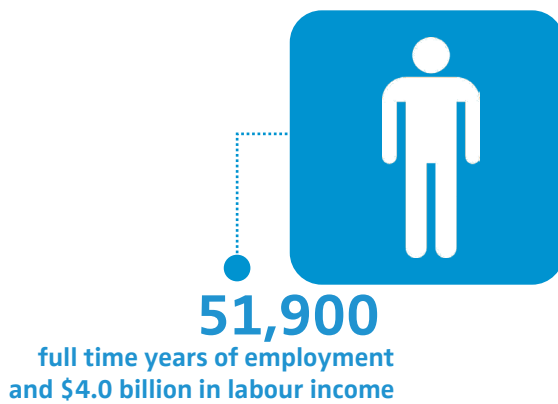
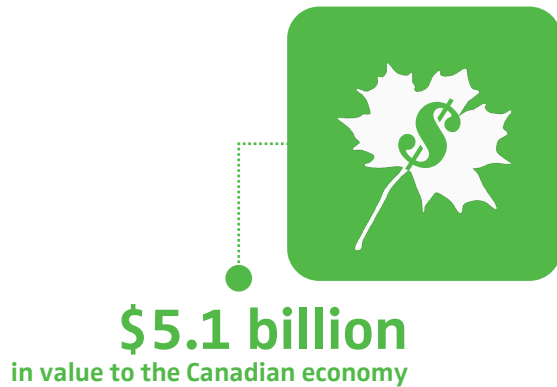


Figure 35 Selected Economic Impacts

## 6. Procurement Strategy



Developing a procurement strategy that is aligned with a project's unique characteristics and challenges is a critical step on the path to successfully delivering major infrastructure. Key elements of a procurement strategy include: packaging components for efficient delivery; selecting the optimal project delivery option(s); and determining contracting format(s) and contract terms.

## 6.1 Component Packaging for Procurement Analysis

For the purpose of procurement analysis, the components of the Recommended Scope identified in **Figure 33** were grouped into four categories:

- Potential advance work, including Essroc Quay Lakefilling (eastern portion of **Scope Item 1**), Cherry Street Bridges North and South (**Scope Items 14 b/c**), Commissioners Street Bridge North (**Scope Item 15 b**)<sup>1</sup>;
- Park programming and landscaping work, including Promontory Park South, River Park North, and River Park South (**Scope Items 17 b, 20** and **21**);

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1 The identification of specific scope components as potential advance work represents one possible scenario, which forms the basis for the work presented in this Due Diligence report, but which is subject to change. The Project Team has and will continue to assess whether there are other scope items that could be advanced. As announced on September 14, 2016 by representatives from the three orders of government, funding has been allocated to accelerate the design and construction of all of Scope Item 1, rather than just the eastern part, as described above.

- Stand-alone work, consisting of features located outside the primary project boundary, including those affecting privately-owned property slated for development (i.e., **Scope Item 9**: First Gulf/Unilever Site Flood Protection Landform and **Scope Item 12**: Eastern Avenue Flood Protection); and
- Core work (representing about 80 per cent of the estimated overall construction value and including all remaining Scope Items).

Logistical factors were the principal consideration in establishing these packages and assigning Project components to them. The nature of required resources and expertise was also taken into account. Dividing the Project components this way allows for construction to start as soon as possible, and to find efficiencies and cost savings related to delivering similar work components.

## 6.2 Context for Delivery Option Selection

Flood protection is a unique form of civil infrastructure. Although international precedent does exist (mostly in the Netherlands), there are few, if any, projects of truly similar scope and scale that have been completed in Canada. This must be taken into consideration when weighing delivery options for the Project. Some salient features of the Project and its environment must be considered when evaluating potential delivery options, such as the fact that the entire Project site is a brownfield, consisting of reclaimed land built over a marsh, surrounded by water and connected to the lake. Consequently, soil and groundwater environmental issues are central to the Project; their scale in proportion to the overall scope has significant implications for the Project's risk profile as well as the potential – and corresponding limitations – for risk transfer. Another important feature of the project that should be considered in evaluating delivery options, is that there is no established

environmental regulatory process governing the creation of a river through environmentally compromised lands (discussed in more depth in **Section 7.3: Permitting and Approvals**).

### 6.3 Assessment of Delivery Options

Over the past decade, Ontario and other Canadian provinces have been utilizing public-private partnerships (P3s) to deliver large scale social and civil infrastructure projects. P3s are one of a number of alternatives to the conventional, sequential Design-Bid-Build (DBB) contracting process, each of which aims to address, to some degree, the widely-acknowledged problem of construction cost overruns and other drawbacks of the DBB approach.

Ernst and Young Orenda Corporate Finance Inc. (EY) was engaged to help assess the numerous delivery options by performing market sounding and undertaking comprehensive qualitative and quantitative analyses using industry standard decision support tools. The process and results are detailed in the appended EY report. Our peer reviewers also provided opinions on the applicability of delivery options that informed our ultimate recommendation.

EY began by applying PPP Canada's P3 Screen – Suitability Assessment tool, which evaluates P3 applicability using 12 criteria. Market sounding was undertaken to gauge the level of market interest, capability, and capacity for delivering the Project, with a focus on P3/AFP delivery potential. The process leveraged a cross section of P3 industry intelligence, including general heavy civil and specialty contractors experienced with P3 delivery of similarly-scaled works, infrastructure developers/operators, lenders, and equity investors.

Industry participants were generally of the opinion that:

- Under a P3 model, the private sector will accept risk transfer for known or reasonably inferable conditions; however, uncertain site conditions and environmental approval risks would not be acceptable and would have to remain with the public sector;
- The selected delivery model should:
  - allow for early contractor involvement (constructability input); and
  - maximize opportunities for industry to provide innovation;
- The value of potential operations and maintenance scope does not appear sufficient to justify inclusion of these elements in a P3 procurement; and
- It is unlikely that 100 per cent of the design/construction scope can be bundled into a single efficient P3 procurement.

Of the possible P3 options, Design-Build-Finance (DBF) was considered by market sounding participants to be the most appropriate of the P3 alternatives.

Next, a list of conventional and P3 delivery options was developed for a deeper review (see **Figure 36**). Using a qualitative assessment process, a panel of senior project delivery staff from Waterfront Toronto, the City of Toronto, Infrastructure Ontario (IO), TRCA and the Ontario Ministry of Transportation identified the preferred conventional and P3 options to undergo a Value for Money (VfM) analysis: Construction Manager/General Contractor (CM/GC) and DBF.

The less preferred conventional options included DBB and Design-Build (DB). DBB, the most commonly used delivery method for civil infrastructure projects, is considered well suited

<b>Traditional Models</b>	
Design-Bid-Build (DBB)	The most common method of infrastructure procurement by the public sector. Design and construction are performed sequentially by a design consultant team and a construction contractor retained under separate contracts. The completed infrastructure asset is then handed over to the public sector for operation and maintenance.
Design-Build (DB)	Integrates the design and construction functions within a single team and contract, providing the public sector with a single contractual point of responsibility through the end of the construction phase.
Construction Manager/General Contractor (CM/GC)	A two-phase process typically adopted in order to accelerate project delivery. In the first (design) phase, the public sector contracts with a design consultant team to design an infrastructure asset, and also retains a construction contractor to work with the consultant to develop the project. Once the design is sufficiently advanced, the CM and the public sector may agree on a Guaranteed Maximum Price (GMP), which is based on the construction documents and specifications at the time of the GMP plus any reasonably inferable items or tasks. In the second (construction) phase, the CM provides the services of a general contractor, including competitively tendering sub-trade contracts, and takes on the risk of completing the agreed scope of work at or below the GMP, if one has been agreed.
<b>P3 Delivery Models</b>	
Build-Finance (BF)	Similar to DBB, but with the addition of a financing component, which puts private capital at risk in order to incentivize timely construction completion and handover.
Design-Build-Finance (DBF)	Similar in many respects to DB, but with the addition of a financing component, which puts private capital at risk in order to incentivize timely construction completion and handover. Under a DBF contract, the private sector assumes responsibility for the majority of the design work, all construction activities, and the short-term financing, and the risk of providing these services for a fixed fee.

Figure 36 Summary of Procurement Options

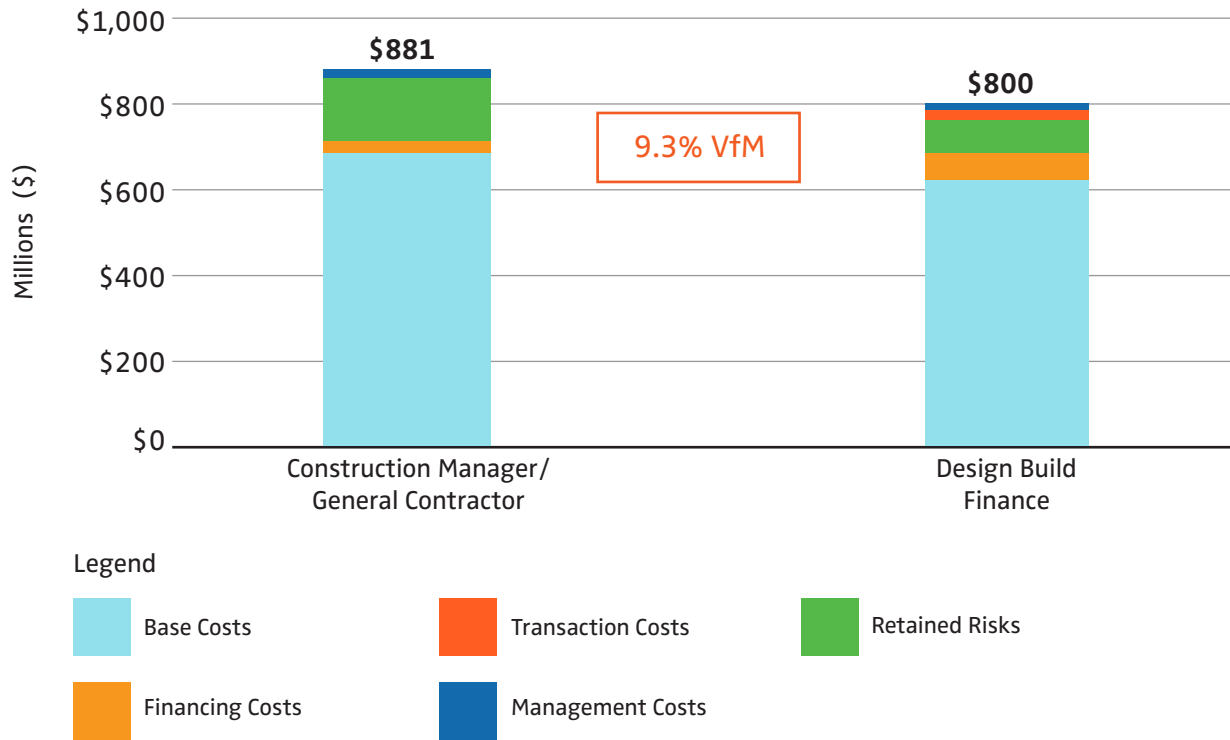


Figure 37 Procurement Options - Value for Money Assessment

to recurring, repetitive projects for which the public sector has a desire to specify its exact requirements and obtain firm, competitive prices based on a complete design. Key disadvantages of DBB are that the design is fully developed without the benefit of construction expertise, the highly prescriptive design requirements further limit potential innovation during construction, and the public sector retains the risk for design errors and omissions. DB partially overcomes these disadvantages by combining design and construction responsibilities in a single procurement, allowing for greater risk transfer, but this comes at the cost of reduced public sector control over design decisions.

The CM/GC delivery method augments the traditional scope of work of the general contractor with that of a construction manager under a single contract. This provides a number of benefits for projects with sensitive schedules

and potential constructability challenges that require special qualifications and extraordinary contractor cooperation. The early collaboration characteristic of the CM/GC approach, with ongoing owner-consultant-CM integration through the planning and design phases, allows for the efficient assessment of alternatives and innovation proposals, and enables the owner to make informed decisions on design options based on construction expertise. This helps to avoid costly change orders, decrease risk, optimize the construction schedule and minimize public impact. However, detailed implementation must be carefully managed to ensure that the benefits provided by competitive tension are not lost.

VfM is a quantitative analysis methodology intended to be used by the public sector as a decision-making tool to support and justify the selection of a project delivery model. This is undertaken separately from the budget-setting

process. Risk-adjusted costs are used to compare a P3 option with a Public Sector Comparator, in this case DBF and CM/GC, respectively (See **Figure 37**). Just like any business case or investment analysis, VfM is based on a number of critical estimates and assumptions, and on the judgement of those undertaking the analysis. While the fundamental concept behind VfM analysis is common to many jurisdictions, the specific assumptions and detailed application vary from place-to-place.

A fundamental principle underlying VfM analysis is the appropriate allocation of risk between the public and private sectors. The foundation for risk allocation is based on the premise that the party that is able to manage a given risk most efficiently (i.e., at the lowest cost) should assume that risk. In general, the private sector can better manage business-related risks, the public sector is better suited to handle regulatory risks, and some risks can and should be shared.

## 6.4 Interpretation of Results

A clearly preferred single procurement option did not emerge based on applying standard qualitative and quantitative assessment procedures. This result can be explained, in part, by the fact that both DBF and CM/GC are designed to align owner/contractor objectives, reduce risk, and drive better project outcomes than conventional DBB delivery, albeit in fundamentally different ways. Both options have strengths and weaknesses. For example, the DBF model provides a high degree of competitive tension and a range of incentives aimed at improving contractor and project performance while the early collaboration inherent in the CM/GC approach, with ongoing owner-consultant-CM integration through the planning and design phases, allows for the efficient assessment of alternatives and innovation proposals. Detailed implementation must, however, be carefully managed to ensure that the benefits provided by competitive tension are not lost.

## 6.5 Project-Specific Procurement Principles

Since the EY procurement assessment results did not produce a clear preferred option, the Project Team collaborated with IO and jointly established a comprehensive set of procurement principles to guide the development of a customized, project-specific delivery solution (see **Figure 38**).

<p><b>1. CONDUCT OPEN, FAIR, TRANSPARENT, AND COMPETITIVE PROCUREMENT</b></p> <ul style="list-style-type: none"> <li>a. Comply with Waterfront Toronto’s approved procurement policies in order to ensure fair, open, and transparent procurement.</li> <li>b. Competitively procure all work in order to achieve best value.</li> <li>c. Attract the best local and global innovators with relevant, suitably scaled construction experience and create the conditions required to maximize value and secure competitive pricing.</li> </ul>
<p><b>2. MANAGE OCCUPATIONAL HEALTH AND SAFETY COMPLIANCE RISK</b></p> <ul style="list-style-type: none"> <li>a. The public sector (Waterfront Toronto, Infrastructure Ontario, the City of Toronto, and/or any other delivery partners) will not assume the Constructor role and must not be exposed to any liability for ensuring compliance with Occupational Health and Safety legislation.</li> </ul>
<p><b>3. MANAGE RISK APPROPRIATELY</b></p> <ul style="list-style-type: none"> <li>a. Transfer risk to the private sector to the greatest extent reasonable to do so, consistent with the private sector’s ability to price and manage such risk.</li> <li>b. If and where appropriate, procure integrated design and construction services.</li> <li>c. Ensure that the public sector is equipped with the necessary information, mechanisms, and contingency to effectively manage the residual risk it may be required to retain.</li> <li>d. Limit the number of separate procurements (using a smaller number of larger contracts).</li> </ul>
<p><b>4. PRE-CONSTRUCTION PLANNING AND PROCUREMENT READINESS</b></p> <ul style="list-style-type: none"> <li>a. In order to complete critical pre construction planning tasks, ensure timely collaboration between a contractor and the Owner and its consultants to address: <ul style="list-style-type: none"> <li>i. construction logistics planning (staging, access, interfaces)</li> <li>ii. constructability evaluation</li> <li>iii. innovative technology identification and suitability assessment (with respect to earthwork, soil and groundwater management, etc.)</li> <li>iv. value improvement/engineering support</li> <li>v. cost estimating, scheduling, risk evaluation, and scope management support; and</li> <li>vi. contract packaging strategy development without creating a conflict of interest when procuring one or more of the work packages.</li> </ul> </li> <li>b. Prior to procuring specific work packages, complete sufficient design, site characterization, and other further analyses, and establish requirements, processes, and constraints (with respect to project performance, interfaces, and interaction with regulatory authorities, etc.) to the extent required to achieve reasonable certainty regarding the scope and conditions of work, accomplish effective risk transfer, and procure firm pricing.</li> </ul>
<p><b>5. ENCOURAGE INNOVATION</b></p> <ul style="list-style-type: none"> <li>a. Create conditions and provide incentives to facilitate innovation with respect to design, technology, construction means, methods, and logistics, etc., to achieve best value with respect to cost, time, quality, and construction execution (e.g., minimizing disruption to the public and businesses).</li> </ul>
<p><b>6. ALIGN PRIORITIES AND INCENTIVIZE VENDOR PERFORMANCE</b></p> <ul style="list-style-type: none"> <li>a. Include mechanisms or strategies to limit and manage integration risk with adjacent works, in order to ensure safe working conditions and avoid potential delays and claims.</li> <li>b. Include mechanisms to encourage the Contractor to collaborate with the Owner in developing appropriate and cost effective responses for addressing any conditions and circumstances differing from those known at the procurement stage.</li> </ul>

<p><b>7. MANAGE INTEGRATION AND CHANGED CONDITIONS RISK</b></p> <ul style="list-style-type: none"> <li>a. Include mechanisms or strategies to limit and manage integration risk with adjacent works, in order to ensure safe working conditions and avoid potential delays and claims.</li> <li>b. Include mechanisms to encourage the Contractor to collaborate with the Owner in developing appropriate and cost effective responses for addressing any conditions and circumstances differing from those known at the procurement stage.</li> </ul>
<p><b>8. ACHIEVE DESIGN EXCELLENCE</b></p> <ul style="list-style-type: none"> <li>a. Ensure design is optimized to address maintenance/life cycle considerations.</li> <li>b. Encourage integrated design of project components.</li> <li>c. Utilize Michael Van Valkenburgh and Associates (MVVA), who were selected through a competitive international design competition, to ensure that the competition-winning vision is achieved and that the final product provides a high quality of place and an excellent user experience.</li> <li>d. Complete the project within the approved budget.</li> </ul>
<p><b>9. MANAGE MARKET UNCERTAINTY TO CONTAIN COST</b></p> <ul style="list-style-type: none"> <li>a. Waterfront Toronto to lead the procurement and implementation with the support of other public agencies as appropriate, using forms of contract and contract terms (including flow through provisions mandated by Federal, Provincial, and municipal governments) already accepted in the broader Ontario and Canadian construction markets.</li> <li>b. Establish and communicate clear roles and responsibilities for public stakeholders with respect to project delivery oversight, support, and approval.</li> </ul>

Figure 38 Procurement Principles

## 6.6 Recommended Project Delivery Option

Considerable effort has been invested in assessing the fit of the DBF and CM/GC delivery models to the Project, which has led to the conclusion that each of these options has merit. A comprehensive set of principles has been jointly formulated by the Project Team and IO to guide the development of a customized project delivery solution, which can be tailored to meet the needs of this unique and multi-faceted Project and which will:

- 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 and 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.

**Figure 39** summarizes at a high level the assessment of delivery options and provides a preliminary indication of the specific Scope Components (or portions thereof) to which a given

approach might be applied. The proposed delivery approaches are subject to change based on the constructor's input and as additional information becomes available. Project Components listed below are not intended to illustrate the proposed organization of scope for construction tendering purposes.

The proposed delivery approaches presented all presuppose a financing element as part of the overall delivery solution. In this instance, financing does not refer to project finance and the complex lending agreements it entails, but rather denotes the payment regimes and related mechanisms defined in Principle 6(b). The use of tools such as milestone payments and increased retainage (beyond the statutory holdbacks required under construction lien legislation) provide additional financial incentive for the constructor and its subcontractors to meet required performance standards, such as schedule and quality compliance, and can be accommodated through traditional corporate lending to these entities.

Once the Project moves into implementation, the appropriate procurement approach for each component will be determined in consultation with the constructor, the Project Team and partner agencies (i.e., TRCA, TPLC, IO) and will be presented to the Project's Executive Steering Committee and Waterfront Toronto's Board of Directors for endorsement.



Proposed Delivery Approach	Project Components
Transfer construction (and potentially detailed design) responsibility to Gardiner East project delivery team	<ul style="list-style-type: none"> <li>13 Lake Shore Road &amp; Rail Bridge Modifications</li> <li>11 Flow Control Weirs</li> <li>10 Sediment &amp; Debris Management Area</li> </ul>
Transfer detailed design and construction responsibility to site owner/developer	<ul style="list-style-type: none"> <li>9 First/Gulf Unilever Flood Protection Landform</li> </ul>
Procure as stand-alone construction contract, upon completion of detailed design	<ul style="list-style-type: none"> <li>12 Eastern Avenue Flood Protection</li> </ul>
Procure integrated design and construction (design-build) services through the constructor for the Scope Item as a whole, subject to outcome of further feasibility assessment	<ul style="list-style-type: none"> <li>1 Essroc Quay Lakefilling</li> <li>14b Cherry Street Bridge North (incl. BRT)</li> <li>14c Cherry Street Bridge South (vehicular only)</li> <li>15b Commissioners Street Bridge (vehicular only)</li> </ul>
Procure integrated design and construction (design-build) services through the constructor for selected portions of the Scope Item (e.g., earthwork aspects), subject to outcome of further feasibility assessment	<ul style="list-style-type: none"> <li>2 Polson Slip Naturalization</li> <li>3 River Valley System</li> <li>4 Don Greenway (Spillway &amp; Wetland)</li> <li>8 Don Roadway Valley Wall Feature</li> <li>19 Villiers Island Grading</li> </ul>
Procure construction services through the constructor, once detailed design is complete, or sufficiently advanced	<ul style="list-style-type: none"> <li>2 Polson Slip Naturalization *</li> <li>3 River Valley System</li> <li>4 Don Greenway (Spillway &amp; Wetland) *</li> <li>5 Site Wide Municipal Infrastructure</li> <li>7a Don Roadway North</li> <li>8 Don Roadway Valley Wall Feature *</li> <li>14a Cherry Street Re-alignment (incl. BRT)</li> <li>14d Old Cherry Street Bridge Demolition</li> <li>15a Commissioners Street West (incl. BRT)</li> <li>15c Commissioners Street East (vehicular only)</li> <li>16 Keating Channel Modifications</li> <li>17b Promontory Park South</li> <li>19 Villiers Island Grading *</li> <li>20 River Park North</li> <li>21 River Park South</li> </ul>
Delivery approach to be determined in consultation with Hydro One upon confirmation of requirements	<ul style="list-style-type: none"> <li>18 Hydro One Integration</li> </ul>
* Includes final grading, finishes and potentially earthworks if Design-Build does not prove feasible.	

Figure 39 Proposed Procurement Approaches

# 7. Implementation Plan

## 7.1 Implementation Approach and Team Organization

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. Given the nature and scale of work required to implement the Project, and the many critical decisions that lie ahead, a detailed review of Project governance requirements would be conducted as part of implementation planning, and the composition and mandate of the Executive Steering Committee would be confirmed or modified as necessary. A Project Charter will be created, which will document the responsibilities and accountabilities of Waterfront Toronto and its partner organizations, and the ultimate governance structure and approval processes.

Waterfront Toronto will assemble an expanded project management team, which will utilize some of the same key staff and supporting resources who have led the due diligence program, to implement future phases of the Project (including design, field investigation and pilot testing, securing regulatory approvals, detailed construction planning and procurement, and construction). To ensure effective and efficient delivery, current resources would be augmented with the necessary additional project management and subject matter 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 of the key consultants will be assessed and the scope of their roles and responsibilities adjusted, as necessary, to align with the detailed procurement strategy. For example, should it be determined that integrated design and construction services will be procured for certain components of the Project, the design consultant

could transition to the role of compliance consultant, once performance specifications have been developed for a design-build procurement.

The need to ensure Project Team continuity was identified through the peer review, which concluded that:

*“The project team is qualified and experienced, and capable to manage this complex project. We found that the project team thoroughly understands the problems involved and has clear ideas to solve them. The knowledge they have accumulated is vital and the continuity of the project team is a key factor to success.”*  
[Rijkswaterstaat]

The peer review also emphasized the importance of carefully defining roles and responsibilities with respect to the design of the Project, noting that:

*“The quality of the design is of high level. The design as a whole will enhance the spatial quality of the Port Lands immensely and its positive effect on Toronto cannot be overstated. However, it will be a challenge to maintain or even enhance this level in the subsequent design, procurement and construction phases.”* [Rijkswaterstaat]

The Project Team proposes to retain a constructor, to take on pre-construction planning and construction phase responsibilities as described in **Section 6: Procurement Strategy**. The constructor would be selected through a two-stage process (a request for qualifications followed by a request for proposals from pre-qualified firms or teams) based on a range of criteria, including:

- Demonstrated experience in completing major river, coastline infrastructure;
- Contracting team experience in completing comparable works;

- Demonstrated ability to work strategically in sub-trade packaging;
- Ability to drive innovation through design and tendering processes;
- Overall cost and transparency in the determination of general conditions expenses;
- Contracting team fit with Project management team;
- Proposed plan to deliver required services; and
- Additional services and bid innovation offered in proposal.

The project management team will develop a comprehensive Project Execution Plan, which will more fully set out the scope, detailed budget, schedule, risk management framework, delivery organization, approval requirements and milestones, contracting, construction staging and interface management strategies, and project control processes. In order to meet the Project delivery schedule, preparation of the Project Execution Plan would begin immediately, incorporate the outcomes of joint pre-construction planning with the constructor, and be subject to approval by the Executive Steering Committee.

The project management team and the constructor would work together to develop and implement a risk management framework that builds on the risk assessment work completed as part of due diligence. In addition to maintaining the risk register, quantitative risk analysis will be performed on a regular basis during Project execution. Permitting and regulatory requirements are an important element of this Project and it will be a priority for the constructor to work with the Project Team to advance discussions with regulatory authorities to progressively reduce regulatory risk.

Realistic contingencies, controlled by the Project Team under executive oversight, will be held in reserve to address challenges faced through all stages of Project delivery.

## 7.2 Climate Change Considerations

Climate change considerations were a core tenet of the DMNP EA from the beginning and were central to the flood protection features designed as part of the naturalization of the mouth of the Don River. A variety of passive and active adaptive management approaches for hydraulic and ecological variables have been incorporated into the design, such as:

- The wetlands have been designed to ensure a significant amount of bathymetric variability to address lake level fluctuations as a result of climate change. With undulating bathymetry, there will remain a diversity of wetland habitats and functions regardless of lake level changes;
- The valley system has been designed to accommodate water flows equivalent to a Hurricane Hazel-sized flood event, plus an additional 0.5 metres of water clearance to allow for increases in flood flow due to climate change;
- The wetland control structure will allow for the wetland to be temporarily closed off from Lake Ontario. This will allow the system to draw down the water in the wetland to encourage regrowth of species in the event of disruption due to prolonged high lake levels, ice damage or other causes that may result from climate change; and
- Flow control weirs will divert river flows during high frequency flood events into the Keating Channel, thereby reducing the effects of highly erosive storm flows on the naturalized habitats. Furthermore, a passive design element, in the form of the Spillway, has been integrated to help disperse the erosive energy of water during a major flood event by directing water into the Ship Channel. This mitigates the potential damages caused by large flood events.

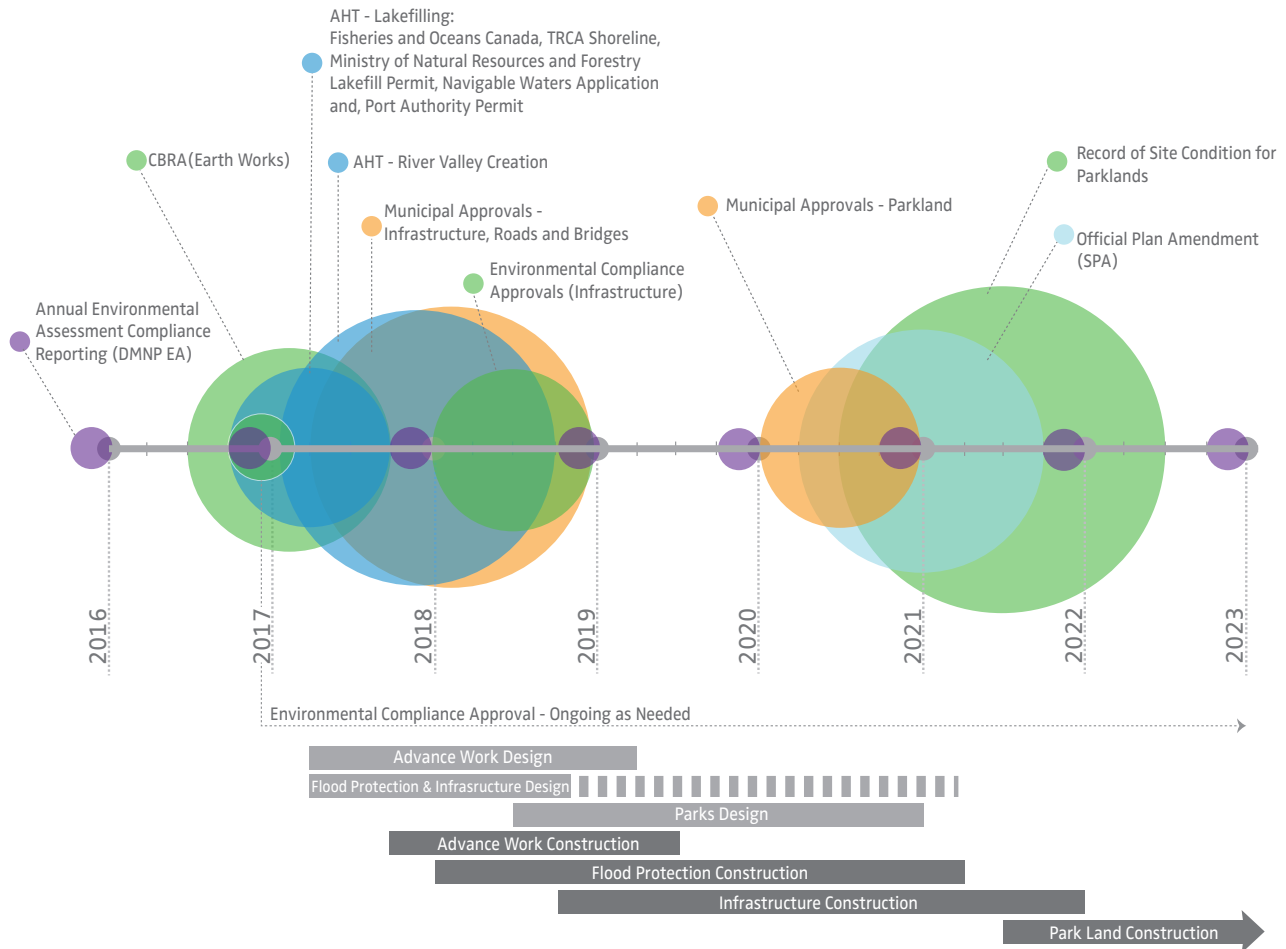


Figure 40 Approvals Timeline

### 7.3 Permitting and Approvals

Two key environmental assessment approvals have already been secured from the MOECC (the DMNP EA and LDL MP EA, received in 2015 and 2014, respectively), which serve as the blueprints for the flood protection and enabling infrastructure detailed in this report.

The environmental, planning, design and construction permitting and approvals applicable to delivering this Project are unique, but based on early engagement with MOECC and Aquatic Habitat Toronto (AHT) are considered to be achievable with diligent planning and management. **Figure 40** maps out the necessary approvals, their timing and the activity for which they are required.

It is important to note that given the unique character of this Project, the approval processes for some of the key Project components, such as the river creation and soil and groundwater management, are being developed in collaboration with regulatory authorities. As a result, the environmental management framework for the Project includes completing a Community Based Risk Assessment (CBRA) for the entire project area (consistent with the MOECC draft CBRA guidance document). In general, the CBRA uses the same technical and scientific practices used in Brownfield approvals. Records of Site Condition (RSC) for individual sites, where applicable, will be completed in accordance with O. Reg. 153/04. This CBRA and RSC approach has been discussed and preliminarily agreed upon with the MOECC, AHT

and project partners (City of Toronto, TPLC and TRCA). Given the uncertainties associated with the environmental conditions and complexity of the Project, ongoing involvement and concurrence with the environmental management approach from local (TRCA, City of Toronto), provincial (MOECC, Ministry of Natural Resources and Forestry), and federal (Fisheries and Oceans Canada, Transport Canada – Navigable Protection Act) regulators is critical to the successful and timely delivery of the Project.

### Planning Approvals

- Creating the Water Lot: Thirteen properties will be merged to create the water lot (i.e., the river and floodplain), all of which are currently owned by TPLC. This merger will be done in compliance with the *Planning Act* RSO 1990 and will be achieved either by *Planning Act* exemption from subdivision control and/or Conservation Authorities Act section (24), depending on if the water lot will be owned by the TRCA, City of Toronto, or another public entity.
- Official Plan Amendment to remove the Flood Plain and Special Policy Area designation: The subject lands are within a Special Policy Area in the former City of Toronto Official Plan (currently in-force). An Official Plan Amendment (OPA) is not needed to complete the Project as flood protection construction is permitted under the Special Policy Area designation. However, an OPA will be required to remove or alter the Special Policy Area designation and boundary to change the land use designation and official plan policies to allow for future development, and to re-designate the new river valley and floodplain as Natural Areas within the Official Plan. The OPA to designate the new river valley is anticipated to be submitted to City Council for approval in early 2017. A separate OPA

will be required to lift the Special Policy Area designation at a later date. The City of Toronto, TRCA and appropriate provincial ministries (Ministry of Municipal Affairs and Housing and Ministry of Natural Resources and Forestry) will be consulted in a timely manner consistent with development related enabling works.

- Lakefilling: The Port Lands are subject to the former City of Toronto Official Plan, which contains policies restricting lakefilling in Lake Ontario. Prior to commencement of the lakefilling around Essroc Quay, a Zoning by-law will need to be enacted by City Council identifying the use to which the land created by lakefilling may be put.

### Environmental permitting and approvals

- Community Based Risk Assessment (CBRA): The environmental regulatory framework in Ontario (i.e. Brownfields regulation) deals only with contamination within a single continuous property. Given the size of the Project area and the volume of soil movement required, the Project cannot be completed within this regulatory framework. To address this challenge, Waterfront Toronto has engaged the MOECC and AHT in the development of a CBRA solution that will be applicable to the entire Project area. This approach allows all the lands to be treated as a contiguous property for the purpose of evaluating the environmental conditions and developing a plan to ensure protection of human health and the environment, and obtaining the concurrence of all the regulators and agencies with the proposed approaches and assessment. Ongoing reporting and agency involvement and consultation will likely be required through construction. This ongoing involvement will likely result in project modifications to address issues that may emerge due to changes in environmental conditions and the

expectations of agencies/regulators. Once the Project is completed, development areas will be transitioned to segregated sites and would generally be subject to the MOECC Brownfields regulatory approval process for any future work and development.

### Aquatic Habitat Toronto (AHT) Coordinated Approvals

- Land Creation / Lake Filling & River Creation:**  
 The Essroc Quay land creation will impact fish habitat, navigable waterways and usable dockwall space and, as a result, approvals will be required from the Department of Fisheries and Oceans Canada, Transport Canada and Ports Toronto. This will be undertaken as a comprehensive process given that both the land creation/lake fill and the river creation are so closely interrelated in terms of fish habitat and port/transportation related issues.

We will work collaboratively with AHT to develop a phased approach to enable the land creation/lake fill to occur in advance of the river creation. AHT will also provide guidance and advice throughout this process to help clearly define, develop solutions and as a result expedite the process. Ongoing reporting and regulator involvement and consultation will also be required during construction to respond to refinements and/or modifications to the design that will occur as a result of unknown site conditions.

Some additional environmental permits and approvals may be required. The Table below provides a summary of the anticipated environmental review and approval processes that would be required.

Permit/Application	Managing Authority	Required Response
CBRA	MOECC/AHT	Acknowledgement
Record of Site Condition for Parklands <sup>1</sup>	MOECC	Acknowledgement
Fisheries Act	AHT/DFO	Approval
Environmental Compliance Approval <sup>2</sup>	MOECC	Approval
Lakefill: Public Lands Act Approval and Lakes and Rivers Improvement Act Permit	MNRF	Approval/Permit
Shoreline Development Approval	TRCA	Review Only
Permit-to-take-water	MOECC	Approval
Species at Risk	MNRF	Permit
Migratory Bird Conservation Act	Environment Canada	N/A
Navigation	Transport Canada	Approval
Harbour Master Authorization	Ports Toronto	Authorization
1. Application includes supplemental Phase One and Phase Two ESA and Risk Assessments. 2. Aspects of the work would require City of Toronto approval to discharge to sanitary or storm sewers.		

## Environmental Assessment Compliance

- DMNP EA approvals included a requirement for Annual EA Compliance Monitoring Reports outlining the progress of the DMNP EA Project design, implementation and post-implementation stages. TRCA, with the support of Waterfront Toronto and the City of Toronto, completed the EA Compliance Monitoring Program and the first Annual Report in early 2016.
- Waterfront Toronto will work with TRCA, to ensure that all future Annual EA Compliance Monitoring Reports are completed on time as specified in the approved EA Compliance Monitoring Program.

## Design Approvals and Construction Permits

- Municipal Approvals: Waterfront Toronto will work closely with the TRCA and City of Toronto as the future owners of the Project throughout the design, implementation and commissioning of the Project. This will include obtaining formal sign-off on design details for infrastructure, roads, public realm and parks. All necessary permits will be obtained before commencing construction, such as Toronto Public Utilities Coordinating Committee Clearance, Utility Cut Permit, Shoring and Piling Permit, Road Closure Permit, Municipal Servicing Approval, Streetscaping Approval, Parks Approval, Tree Removal Permits and Building Permits. Waterfront Toronto has been successful at developing streamlined approval processes for past projects and will work collaboratively with City and TRCA to do the same for this Project.
- Construction Permits: Once retained, it is expected that the contractor will comply with all permits obtained for the Project. In addition, there are specific permits that correspond to activities during construction, such as

Construction Traffic Management Approvals, Ports Toronto Construction Permit and Noise Exemption Bylaws, which would be the responsibility of the contractor to obtain.

## First Nations

Elements of the Crown's Duty to Consult with First Nations continue to be delegated to the co-proponents for the DMNP EA. Direct engagement with First Nations are required for specific permit related activities, such as the proposed CBRA approach, and the *Fisheries Act*, and Ports Toronto and *Navigation Protection Act* permits. LDL MP EA and DMNP EA approvals also clearly identify a need for continued engagement with First Nations throughout the design, implementation and post-implementation periods of the Project.

## 7.4 Legacy Ownership

Currently, the majority of properties in the Project area are government-owned (Toronto Port Lands Corporation (TPLC), Waterfront Toronto, The City of Toronto and Ports Toronto), with only six privately held parcels.

Upon completion of the Project, privately held properties will remain unchanged. The process for transferring ownership of newly created assets will be finalized in consultation with our government and agency partners and is anticipated to be as follows:

- The newly created river, aquatic habitat, sediment management basin, the Keating Channel and the spillway (from top of bank down) will be owned by TRCA;
- Roads, bridges and parkland (from the top of bank to adjoining roadways) will be owned and maintained by the City of Toronto; and



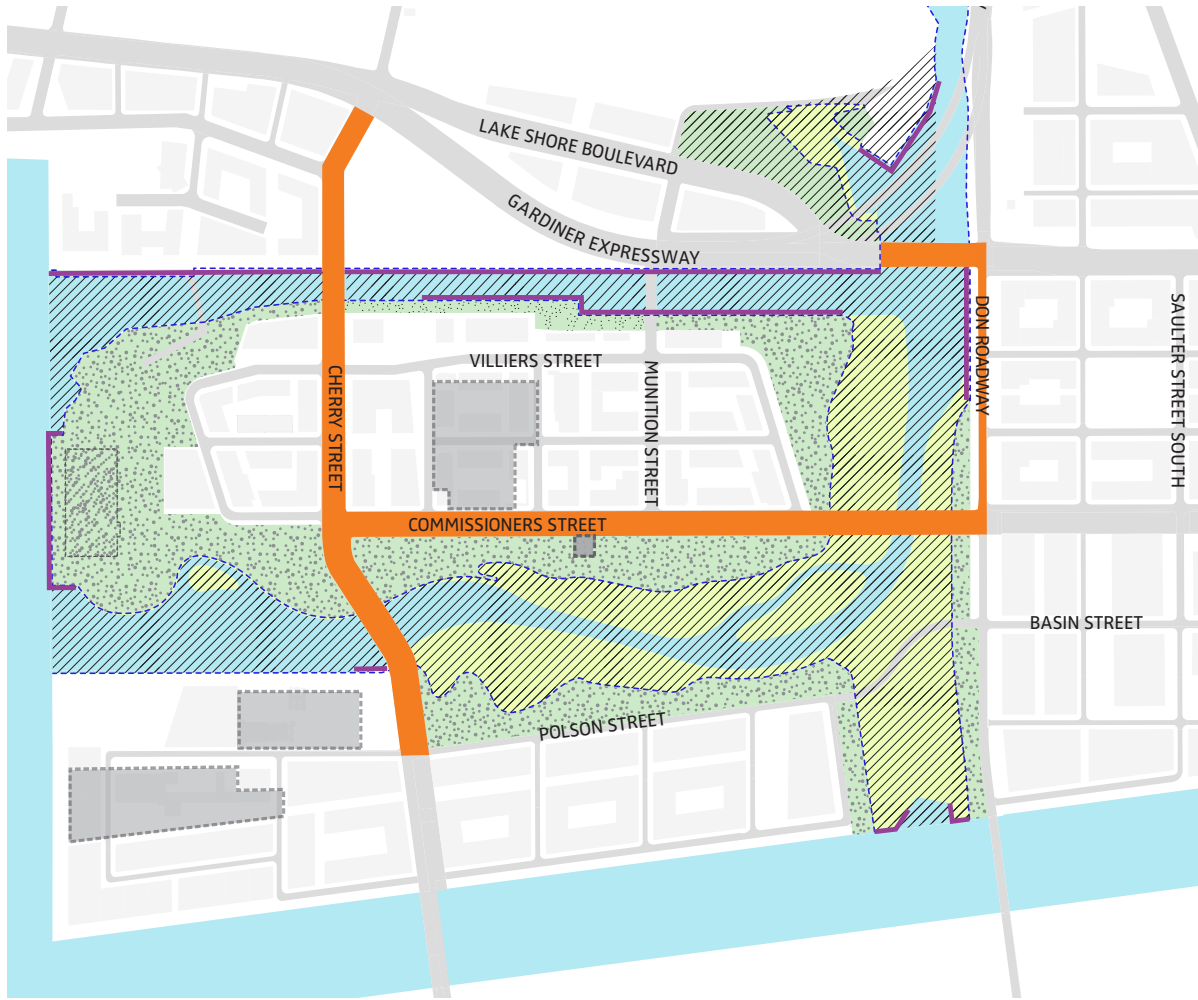







Figure 41 Legacy Ownership

Legend

-  TRCA
-  Privately Owned
-  City of Toronto (Transportation Services)
-  City of Toronto (Parks, Forestry and Recreation)
-  Dockwalls (Ownership Varies)

- The disposition of the remaining lands targeted for development will be led by Waterfront Toronto. Once sold as individual sites, the private developers will be responsible for development and will be required to construct, or contribute costs towards, further enabling infrastructure within newly created development blocks. Roads and parkland created through these efforts will be owned and maintained by the City of Toronto.

A detailed review of dockwall ownership will be completed through the design phase of the Project to determine a long term, integrated plan that addresses ownership and maintenance of these structures. Only those dockwalls specifically impacted by the Project will be modified as a part of the Project.

## 7.5 Coordination

There are a number of other very large planned infrastructure projects with similar construction schedules as the Project and in locations that are within and adjacent to the Project site. In order to ensure the successful delivery of these projects, it is imperative that careful planning and coordination occur. 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 should be formalized, and should assess the potential impacts, risks and opportunities presented by these activities happening concurrently, and develop a coordinated schedule. It is also recommended that the procurement and delivery model selected for design and construction services for the Project provide the flexibility required to ensure integrated delivery with aligned goals and minimize conflict.

The following summarizes the Scope Items within the Project where close coordination with the neighbouring infrastructure projects identified in **Figure 42** will be required:

1. *Sediment and Debris Management Area and Flow Control Weirs:* The Sediment and Debris Management Area and Flow Control Weirs located on the west side of the Don River and north of the Lake Shore Bridge (**Scope Items 10** and **11**) are proposed as part of the Project. The details of the sediment and debris management areas and their operational designs will be further refined as part of the detailed design for the Project. Given the close proximity between this scope and that of the Gardiner East Expressway implementation construction coordination will be required.
2. *Lake Shore Road and Rail Bridge Modifications:* The Gardiner East EA proposes rebuilding the Lake Shore Boulevard Bridge over the Don River to provide sufficient width for six travel lanes, an eastbound left turn lane, as well as a multi-use trail and sidewalk. In addition, the Project identified that this bridge would need to be widened to ensure sufficient flood water conveyance (**Scope Item 13**). Coordination between the Project and the Gardiner East Project may result in efficiencies in the design of the Lake Shore Boulevard bridge.
3. *First Gulf/Unilever Flood Protection Landform:* A flood protection landform is required on the east bank of the Don River on the First Gulf/Unilever site to permanently eliminate the risk of flooding to the east of the Don River (**Scope Item 9**). The design and implementation of this component of the Project will need to be undertaken in coordination with the adjacent or nearby projects being completed by others as well as the First Gulf/Unilever development plan.

4. Cherry Street (North of the Keating Channel):  
As part of the Project, Cherry Street north of the Keating Channel will be realigned to accommodate the relocation of the Cherry Street Bridge to the west (**Scope Item 14 a**). As part of the Lake Shore Boulevard realignment and streetscape improvements it is required that the Project and Gardiner East teams work together to resolve the intersection of Lake Shore Boulevard and Cherry Street to ensure that there is a coordinated plan, with no duplication and/or gaps and a clear implementation strategy.
  
5. Hydro One Bridge Modifications: In order to reduce impacts on the flood water flows it is proposed that the Hydro One Utility Bridge that currently crosses over the Lower Don River be modified or replaced (**Scope Item 18**). Given the close proximity to the Metrolinx Rail Bridge, the Gardiner Expressway-DVP ramp and other nearby projects the construction schedule and scope of this work will need to be coordinated.

**Figure 42** on the next page provides a map and a brief description of the projects being undertaken in sites adjacent to and/or overlapping with the Project.

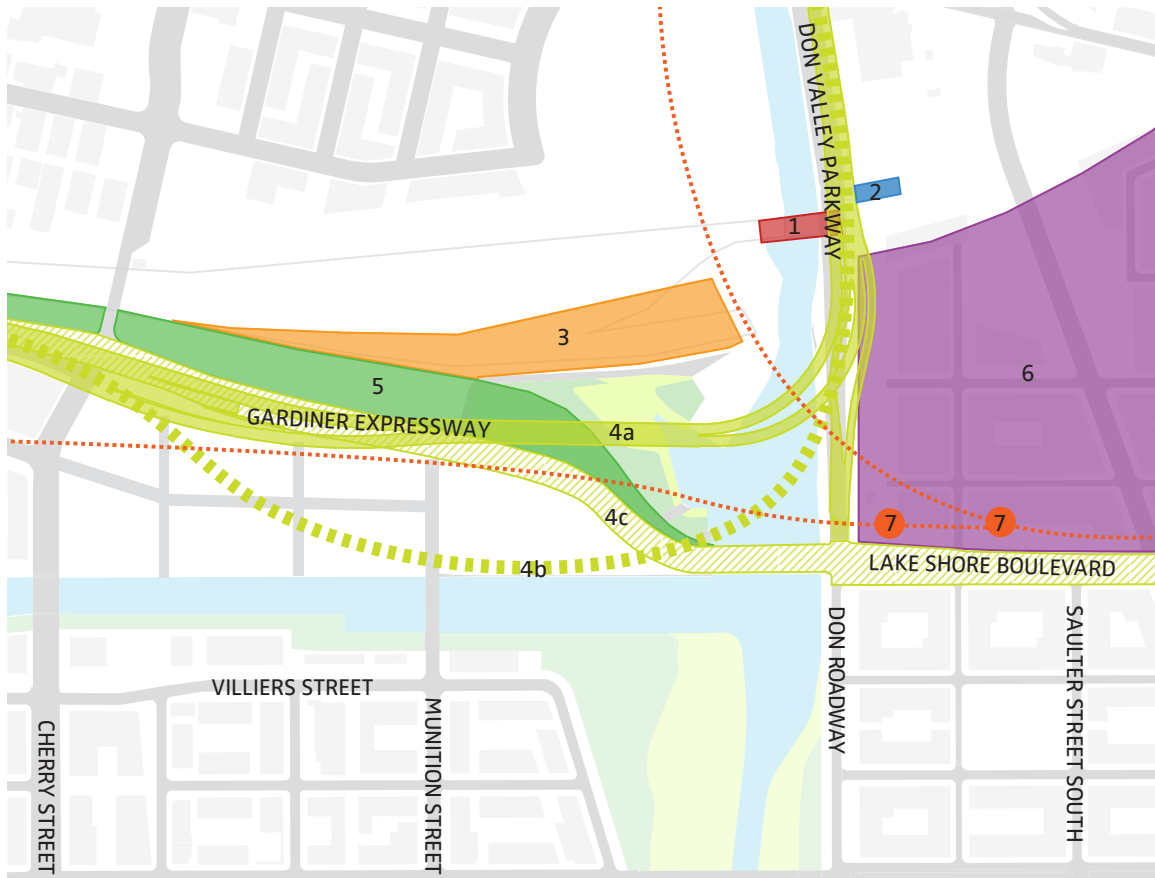











Figure 42 Other Neighbouring Infrastructure Projects

Legend

- |   |  |
|---|--|
|  1 Don River Metrolinx Rail Bridge Widening/ Lengthening   |  5 Gardiner East Linear Public Space            |
|  2 GO Transit Electrification                              |  6 First Gulf/Unilever Site                     |
|  3 Don Rail Yard Expansion                                 |  7 The Don River and Central Waterfront Project |
|  4a Gardiner Expressway East Hybrid 3 Implementation       |  |
|  4b Gardiner Expressway-Don Valley Parkway Ramp Demolition |  |
|  4c Lake Shore Boulevard Realignment                       |  |

1	<p><b>Don Valley Parkway Metrolinx Rail Bridge Widening/Lengthening:</b> The preferred Hybrid Three alternative for the Gardiner Expressway East includes lengthening the adjacent Metrolinx Rail Bridge across the Don Valley Parkway (DVP). This is necessary to accommodate the tighter radius of the more northern Hybrid Three alignment. Based on the concept design, it is anticipated that the eastern portion of the bridge will need to be widened and reconstructed to allow for better placement of the support columns/piers and enable the DVP-Gardiner ramp and Don Roadway to pass beneath. In addition, Metrolinx is proposing to add a fourth track on the bridge to accommodate Regional Express Rail. This additional track does not require a widening of the bridge, however, the recent announcement for a potential new station at this location that may straddle the bridge would require the widening of the bridge in order to accommodate platforms and/or additional amenities for the station at track level. Any widening of the bridge to accommodate a new station will need to avoid impacting the realigned DVP-Gardiner ramp.</p>
2	<p><b>GO Transit Electrification:</b> To electrify the Lakeshore East Rail Corridor the following infrastructure will need to be built around the Don River/DVP area: an overhead contact system consisting of wires and the associated support structures running along the rail corridor; a traction power facility (TPF) that boosts voltage; and gantries that carry the power to/from the rail corridor. The TPF will be located north of the tracks and on the east side of the DVP, adjacent to a potential new station straddling the Metrolinx Rail Bridge across the DVP and Don River.</p>
3	<p><b>Don Rail Yard Expansion:</b> In order to accommodate the larger fleet required for Regional Express Rail and the expansion of the Union Station Rail Corridor, including the additional fourth track along the Lakeshore East route, Metrolinx is proposing that its current yard located just west of the Don River be expanded further south.</p>
4a 4b 4c	<p><b>Gardiner Expressway East Hybrid Three Implementation and Gardiner Expressway-Don Valley Parkway Ramp Demolition:</b> The City Council-approved Hybrid Alternative Three alignment for the Gardiner East Expressway includes demolishing the existing Gardiner East-DVP ramp and constructing a new ramp further north, as well as demolishing the eastbound and westbound Logan Ramps and constructing new ramps at Cherry Street. This project also includes realigning Lake Shore Boulevard between Cherry Street and Logan Avenue, and streetscape improvements to Lake Shore Boulevard.</p>
5	<p><b>Gardiner East Linear Public Space:</b> The Gardiner East EA also proposed a linear public space to the north of the future Gardiner Expressway and Lake Shore Boulevard alignment that will connect the Don Valley and Lake Shore Boulevard East trails through the Keating Channel Precinct west along Lake Shore Boulevard.</p>
6	<p><b>First Gulf/Unilever Site:</b> This development site is slated for redevelopment into a large commercial/retail employment node that would provide up to 50,000 jobs. Developer First Gulf initiated an OPA application to commence a policy review and to begin comprehensive planning of the Unilever site and adjacent lands.</p>
7	<p><b>The Don River and Central Waterfront Project:</b> The Don River and Central Waterfront Project proposes installing new deep underground infrastructure that will capture and treat combined stormwater and sanitary sewer overflows before they enter Toronto's waterways. It includes upgrades to the Don Sanitary Trunk Sewer system and twinning the Coxwell Sanitary Trunk Sewer. Within the Project area are two large 30 metre wide vertical storage shafts and the new bypass tunnel located deep within bedrock.</p>

## 7.6 Public Consultation and Communication

Consulting with the public is an important part of the decision-making process and integral to the successful completion of the Project. Extensive public and stakeholder consultations undertaken as part of the DMNP EA and the LDL MP EA have informed the current shape of Project plans. Over 5,000 members of the public were consulted from 2006 to 2015 during dozens of community meetings, open houses, tours, walks, design charettes, and other events. In addition, formal consultations were held with key stakeholders, landowners and users, utilities, railway owners and operators, agencies at all orders of government and Aboriginal communities.

As the Project proceeds beyond the current due diligence program, through the CBRA and into the detailed design and implementation phases, further consultation will be required with the public, stakeholders, government agencies, Aboriginal communities and others to ensure continued engagement with and contribution to the Project, and awareness of Project timelines and construction activities. Consultation will continue to include direct engagement and employ current methodologies, such as established stakeholder committees, public forums, site tours, as well as direct engagement with Aboriginal communities in conformance with established protocols.

During the implementation stage, consultation will primarily focus on providing information updates on new work that is about to proceed and potential impacts on the community, actions to minimize or mitigate disruption during construction, information on how construction related complaints may be raised and the completion of key milestones.

As part of the MOECC Conditions of Approval of the DMNP EA, the Project Team is required to develop a Complaints Protocol to be used during both the construction and operations stages of the Project. The complaints protocol will form part of a broader policy objective designed to ensure ongoing engagement with the community to minimize or mitigate disruption and resolve any construction-related issues.

Waterfront Toronto's existing Construction Liaison protocol, in combination with the existing City of Toronto Complaints Protocol, should be adopted to address issues that may arise during construction.



## 8. Peer Review



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, one from the perspective of a public sector project delivery agency and the other from the private sector. 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. The Rijkswaterstaat is a world leader in the assessment and delivery of infrastructure comparable to the Project, and is responsible for approximately \$1.75 billion annually in water-related infrastructure development.

Over the past decade, Rijkswaterstaat has completed The Room for the River Program, a \$3.5 billion flood mitigation initiative that safeguards flood prone areas in the Netherlands by increasing the capacity of rivers to safely convey far greater volumes of water and creating landscaped areas - also intended to flood - that improve the quality of the immediate surroundings. In particular, the Waal River Project in the City of Nijmegen included the construction of a secondary channel and several other key features in common with the Project, and lessons learned from its execution informed Rijkswaterstaat's peer review. Further, its approach to carrying out the peer review was based on the standard review processes employed on the Room for the River Program at the Project Decision milestone, which marks the transition from the planning to the execution phase.

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. Kiewit has constructed many of the most complex projects in North America. In 2015, it completed over \$10.2 billion in related infrastructure work and was ranked by Engineering News-Record as the fifth-largest North American contractor.

The terms of reference for the two peer reviews were as follows:

- Provide an opinion on the scope, process, and thoroughness of the due diligence and project planning work completed as a foundation for setting the Project budget and developing the Project delivery strategy;
- Recommend any material adjustments to the process, assumptions, and/or conclusions that should be considered by the Project Team;
- Identify any additional early works that should be undertaken to fill information gaps prior to approving the budget and committing funding; and
- Describe any alternate implementation approaches that should be considered by the Project Team, together with a rationale for the recommendation.

This was not expected to be an in-depth technical peer review, nor was it expected that the peer review teams would independently evaluate cost estimate details, such as quantities and unit prices.

The peer review teams examined an advanced draft of the due diligence report. They were given access to final consultant reports, where those were available, and to draft reports otherwise. The full peer review reports, which provide a snapshot of the due diligence program at a particular point

in time, are appended. While the fundamental technical, cost, schedule, and risk information remains unchanged from that provided to the peer reviewers, specific terminology used in the peer review reports may not be consistent with that used in the final due diligence report.

Both peer review teams concluded that the due diligence work completed by the Project Team was appropriately detailed for the current stage of project development.

*"... the goals of the Due Diligence Program have been reached: the Due Diligence Report provides adequate information necessary for the decision at hand. The contingencies and risk estimates are comparable with the Dutch situation for this phase of the project." [Rijkswaterstaat]*

*"The documents are in general of good quality, validated and based on adequate research and expertise." [Rijkswaterstaat]*

*"We believe that the effort and reach of the studies carried out to prepare the Due Diligence report are reasonable, and that no further up front consulting studies would be of benefit at this time". [Kiewit]*

With respect to the recommended budget and schedule, and the risk analysis undertaken, Rijkswaterstaat stated:

*"We confirm the conclusion of the project team that the recommended scope can be delivered within the 90% cost estimate and 90% time schedule"*

*"Given the construction cost estimate we found that the total cost estimate is complete and consistent with the recommended scope and other documents. In our experience the contingencies match with this type of projects. The 90% probability that the project can be completed for \$1.25 billion provides a realistic forecast, given the presented uncertainties".*

*"The schedule looks feasible and adequate."*

*"The earthworks drive the construction phasing and we agree with the project team that by applying the proposed strategy the project can be completed in 2023"*

*"In general, the risks are recognized and controlled ... The risk register contains risks that are comparable with our projects, and they are well documented."*

Kiewit was of the opinion that using a collaborative delivery model with early contractor involvement: *"will enable the project to be developed within the budget and target schedule."* Both peer review teams had extensive experience with P3 project delivery, but neither considered the model suitable for the Project.

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

- Confirmation of the regulatory requirements with respect to contaminants present and the associated Risk Management Measures (RMM); and
- The poor geotechnical conditions that will result in significant total and differential settlement when loading conditions are changed (by cutting and placing fill), and that could damage existing or new services, access roads and structures, unless appropriate measures are taken.

Kiewit also cited performance of bio-remediation and other techniques in these conditions as another critical unknown.

One of Kiewit's major recommendations for reducing the risks posed by poor geotechnical conditions was the development of a Ground Improvement Plan, as an early step in the pre-construction phase.

Rijkswaterstaat also addressed the centrality of earthwork and soil management to the Project and recommended measures to counter the associated risk, as follows:

*"The scale and complexity of managing soil in this project is exceptional. The appended reports show extensive research has been done on the existing conditions, especially on the physical and chemical characteristics of soil. The soil in the entire area is very heterogeneous and numerous contaminated spots have been determined. The risk of deviations in soil characteristics will remain significant. This risk is acknowledged by the project team and included in the Risk Register and Cost Estimate. We recommend validating the estimated volumes of soil with distinctive physical and chemical characteristics by additional surveys ... We recommend discriminating between hard requirements and assumptions with respect to earthworks in order to determine the boundary conditions within which the contractor has to work."*

## 9. Summary and Recommendations

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 effectively undevelopable and economically underutilized until the flood risk is removed.

The Project provides flood protection through the creation of a new, naturalized mouth for the Don River and other significant flood protection measures, which will result in two additional outlets for the river into Lake Ontario, new parks and green space along the river and inner harbor, and expanded opportunities for people to experience the water's edge. The Project also includes the major municipal infrastructure that must be constructed to maintain functional transportation and servicing networks and to enable development.

In addition to achieving flood protection, and mitigating the associated costs and risks, the completion of this Project will meet a number of other strategic objectives, such as:

- 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.

## 9.1 Due Diligence Program Summary

Waterfront Toronto and its partner organizations, the City of Toronto, TRCA, and TPLC have completed a comprehensive due diligence program in order to create more certainty on the Project's cost, schedule and risks. Before starting the due diligence process, the Project's cost estimate was \$975 million. While this estimate was reasonable based on the information available at the time, the ability to generate an accurate capital cost estimate was restricted in a number of ways, as outlined in **Section 3: Due Diligence Overview**.

As due diligence progressed, the scope was refined in order to ensure the realization of the Project's key objectives. The changes to the Project scope and the more detailed understanding of site conditions gained through due diligence (see **Section 4: Technical Due Diligence Results**) have resulted in a final Recommended Scope with a cost estimate of \$1.25 billion (YOE), and with a 90 per cent probability of completing the Project on or under budget and on schedule (see **Section 5: Recommended Scope, Cost Estimate and Financial Due Diligence**). The key factors driving the increased Project cost estimate are the additional soil excavation, soil/groundwater treatment and material handling/import costs due to the site's challenging soil conditions, the details of which were discovered during the due diligence process.

The \$1.25 billion cost estimate is based on commencing construction in the fourth calendar quarter of 2017, which would enable construction completion by the end of 2023. Should commencement of the Project be delayed, additional costs of approximately \$30 million annually would be incurred, owing to the impact of construction escalation.

A thorough review of project delivery options was undertaken (see **Section 6: Procurement Strategy**) and a recommended high level implementation plan was developed (see **Section 7: Implementation Plan**).

Additional financial due diligence was performed to validate previous studies regarding the benefits of implementing flood protection. These benefits include the direct economic impact of the \$1.25 billion investment in flood protection, the economic impacts of longer-term future construction activity in the Port Lands, forecast land sale revenues, and development charge projections (see **Sections 5.3, 5.4 and 5.5**).

Finally, given the magnitude and complexity of the Project and as a final step to validate the results of the due diligence program, we opted to have the report and selected supporting materials peer reviewed. Two independent third-party organizations were retained based on their substantial experience on programs that are directly comparable to the Project: Rijkswaterstaat, the Ministry of Infrastructure and the Environment from the Netherlands, and Peter Kiewit Infrastructure Co. (see **Section 8: Peer Review**).

It is important to note that the Rijkswaterstaat review team concluded that “the goals of the Due Diligence Program have been reached: the Due Diligence Report provides adequate information necessary for the decision at hand.” These conclusions are reinforced by Kiewit’s peer review, which found that “the effort and reach of the studies carried out to prepare the Due Diligence report are reasonable, and that no further up front consulting studies would be of benefit at this time.”

Additionally, the Rijkswaterstaat review team found that “The contingencies and risk estimates are comparable with the Dutch situation for this phase of the project. We confirm the conclusion of the project team that the recommended scope can be delivered within the 90% cost estimate and 90% time schedule.”

## 9.2 Recommendations

Based on the completion of the due diligence program and on the peer review findings we recommend that:

1. The findings of this Due Diligence Report be formally received by the three orders of government;
2. Waterfront Toronto continue work related to both the required CBRA process and the engagement of Aquatic Habitat Toronto to allow for construction to commence by the fourth calendar quarter of 2017;
3. A customized delivery solution be adopted for the Project that is 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 and 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.
4. Contingency funding to be retained and managed by the Project Team, for application as reasonably required to address unknown site conditions or Project requirements; and
  5. Project implementation oversight be provided in the near term by the Executive Steering Committee, which is already in place.

It is important to note that the projected 2023 Project completion date assumes that funding will be in place no later than the second calendar quarter of 2017. In the interim, Waterfront Toronto will continue with early design work and collaboration with MOECC and AHT on environmental reviews and site testing, as recommended by both our peer reviewers, to the extent that current funding will allow.





*Artist Rendering Looking Northwest at  
the Naturalized Mouth of the Don River*





# Glossary

**Armouring (and Buried Armouring):** Material used to protect streambeds, bridge abutments, pilings and other shoreline structures against scour or water erosion. It is made from a variety of rock types, commonly granite or limestone, and occasionally concrete rubble from building and paving demolition. It can be used on any waterway or water containment where there is potential for water erosion.

**Aquatic Habitat Toronto (AHT):** A consensus based partnership between agencies with a vested interest in the improvement of aquatic habitat on the Toronto Waterfront. Partners include Fisheries and Oceans Canada, Ministry of Natural Resources, Toronto and Region Conservation in consultation with the City of Toronto. Aquatic Habitat Toronto is responsible for the implementation of the Toronto Waterfront Aquatic Habitat Restoration Strategy (TWAHRS).

**Bathymetry:** The study of underwater depth of lake, river or ocean floors; the underwater equivalent to topography.

**Bioengineered Bank:** A soil conservation technique using plants and other vegetation to protect and secure unstable sites, such as shorelines. May also employ materials such as timber, concrete, rocks and dead branches as support.

**Bust Rapid Transit (BRT):** Bus rapid transit operates in a fully dedicated right-of-way, similar to a light rail transit, to avoid traffic congestion.

**Community Based Risk Assessment (CBRA):** A Ministry of Environment and Climate Change process guideline for estimating the probability of a human health or environmentally adverse effect to occur due to changes in environmental conditions resulting from human activities. It is typically conducted for multiple properties and includes the development of risk-based intervention values (IVs) for the contaminants of concern (COCs) within a given study area.

**Conceptual Site Model:** This is a representation of the environmental conditions within a given study area. It facilitates the communication of environmental information by providing a summary of where contaminants are present, how they move and what impacts they may have on human health or the environment.

**Construction Manager/General Contractor (CM/GC):** An alternative capital infrastructure procurement method used to accelerate project delivery. The CM/GC process is broken down into two contract phases. In the design (first) phase, the project owner contracts with a consulting engineer or architect to design an infrastructure asset, and separately but in parallel engages a construction contractor to work with the consultant to develop the project. Once the design is sufficiently advanced, the CM and the project owner may agree on a Guaranteed Maximum Price (GMP), which is based on the construction documents and specifications at the time of the GMP plus any reasonably inferred items or tasks. In the second contract phase, the construction phase, the CM provides the services of a general contractor, including competitively tendering sub-trade contracts, and takes on the risk of completing the agreed scope of work at or below the GMP, if one has been agreed.

**Cut/fill:** The process of removing (cut) or adding (fill) soil to achieve the desired level of grade.

**DELFT3D Hydraulic Model:** The Regulatory Flood model and design tool on record for the Project. It is an integrated modelling suite, which simulates two-dimensional (in either the horizontal or a vertical plane) and three-dimensional flow, sediment transport and morphology, waves, water quality and ecology and is capable of handling the interactions between these processes.

**Design-Bid-Build (DBB):** A capital infrastructure procurement method, widely used in both the public and private sectors, in which the project owner contracts with a consulting engineer or architect to design an infrastructure asset, and subsequently contracts separately with a construction contractor to build it based on the completed plans and specifications prepared by the consultant. Upon completion of construction, the infrastructure asset is handed back to the project owner for operation and maintenance.

**Design-Build-Finance (DBF):** An alternative capital infrastructure procurement method which combines into a single contract the responsibility for the majority of the design work, all construction activities, and the short-term financing for project, and the risk of providing these services for a fixed fee. Upon completion of construction, the infrastructure asset is handed back to the project owner for operation and maintenance.

**Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment**

**(DMNP EA):** The DMNP EA was initiated in 2004 by the Toronto and Region Conservation Authority in co-operation with Waterfront Toronto and the City of Toronto. In 2006, the Minister of the Environment approved the Terms of Reference, which set the framework for the DMNP to proceed in its effort to provide flood protection, naturalize the mouth of the river and facilitate the redevelopment and revitalization of the Lower Don Lands. The DMNP EA was submitted on March 3, 2014 and approved on January 28, 2015.

**Earthworks:** Excavation, soil handling, and fill placement.

**First Gulf/Unilever Site:** Municipally known as 21 Don Roadway, First Gulf owns this 30-acre parcel of land located at the intersection of Lake Shore Boulevard and the Don Valley Parkway. It forms part of a larger 60-acre site for which First Gulf is developing a master plan for 12-million square feet of office and retail space that is estimated to represent 50,000 jobs at full build out.

**Floodplain:** The Regulatory Floodplain is the approved standard used in a particular watershed to define the limit of the floodplain for regulatory purposes. Within the TRCA's jurisdiction, the Regulatory Floodplain is based on the regional storm, Hurricane Hazel, or the 100 year flood; whichever is greater.

**Full Vision:** The envisioned full build-out of all public realm, park programming, and transit infrastructure. Not all of the Full Vision elements were contemplated in the Original Scope, nor are they provided for in the Recommended Scope.

**Gardiner East Project:** The City Council-approved Hybrid Alternative Three alignment for the Gardiner Expressway East includes demolishing the existing Gardiner East-DVP ramp and constructing a new ramp further north, as well as demolishing the eastbound and westbound Logan Ramps and constructing new ramps at Cherry Street. This project also includes realigning Lake Shore Boulevard between Cherry Street and Logan Avenue, and streetscape improvements to Lake Shore Boulevard. It is anticipated that construction will commence in 2019 or 2020 and will be completed in 2025.

**Gardiner East EA:** The environmental assessment undertaken to identify the preferred alternative for the Gardiner Expressway and Lake Shore Boulevard reconfiguration from approximately Lower Jarvis Street to Leslie Street. This process led to Hybrid Alternative Three as the preferred alignment.

**Geomorphology:** The study of the characteristics, origins, and development of land forms.

**Grade Control Structure (and Buried Control Structure):** A hard structural layer (typically stone) located at or below the river bed surface designed to prevent bed erosion and scour to maintain the desired river bed elevation. Buried grade control structures typically extend the entire channel width; their depth and length along the channel depends on local river hydraulics and required stone sizing

**HONI:** Hydro One Networks Incorporated

**Lakefill:** An area of land previously underwater that was reclaimed from a lake through the placement of materials primarily derived from construction excavation and demolition.

**Levee:** A linear embankment built to prevent water flow into a floodplain area. Levee structures can be built with soil, concrete, or metal. Levee structures constructed with native soils are the most common and are typically vegetated with non-woody vegetation.

**LIDAR:** Light Detection and Ranging. LIDAR data is method of collecting ground surface elevation data with enough accuracy and precision to map regulatory flood lines and replace most manual ground surveying required for projects like these. It is collected by a device on an airplane measuring the rate at which light emitted by a laser is reflected off surfaces below it. The light, however, does not reflect off of water and is absorbed, so manual surveying is still required for watercourse areas.

**Lower Don Lands Master Plan Class Environmental Assessment (LDL MP EA):** Establishes city building requirements, including the transit, roads, bridges and services (water, sanitary and stormwater management). The LDL MP EA was initiated in 2008 and approved in 2014.

**Light Rail Transit (LRT):** Light rail transit that operates primarily along exclusive rights-of-way.

**MOECC:** Ministry of Environment and Climate Change, formerly Ministry of Environment (MOE)

**MVVA Report and MVVA Plans:** MVVA's appended report *Lower Don River Due Diligence and Validation Report* and accompanying set of plans.

**Original cost estimate:** The Project was initially estimated in 2014 to cost \$975 million (YOE) based on an assumed ten-year project schedule (2015-2025). This high level estimate was compiled by Waterfront Toronto using information from several sources and included a mark up of 40 per cent to allow for soft costs (such as design, engineering, approvals and taxes) and contingencies.

**Original Scope:** See Original Scope included in **Figure 33a**. The original cost estimate was based on these components.

**PLAI / Port Lands Acceleration Initiative:** In September 2011, Toronto City Council unanimously approved a protocol known as the Port Lands Acceleration Initiative (PLAI) to develop a business and implementation plan with the objective of accelerating development opportunities in the Port Lands. The PLAI sought to examine whether the Lower Don Lands could be developed more affordably and sooner than previously anticipated. As part of the PLAI planning process, the DMNP was put on hold and a short list of 'Alternative Methods' that were identified during the initial DMNP process were re-examined within the context of the City Council direction.

The purpose of the PLAI was to integrate core principles from the DMNP such as flood protection and naturalization, evaluate options for phased development and integrate higher-value interim and permanent uses during phasing. The PLAI also explored ways that the private sector could help spur development within the area. The ultimate goal of the PLAI was to reduce the overall cost of development and to create a phased approach to development that would provide opportunities for redevelopment to fund required infrastructure, including flood protection measures.

The analysis undertaken during the PLAI confirmed the fundamental conclusions of the DMNP EA. Certain modifications to the preferred alternative, known as Alternative 4WS (2010) were proposed. The option emerging from the review involved a slight realignment of the river, the river mouth and the Greenway. The outcomes of the PLAI indicated that large scale revitalization could occur based on phased implementation of the required flood protection and infrastructure.

**PLAI 2:** In 2012, Waterfront Toronto, the City of Toronto and the TRCA initiated additional planning for the Port Lands, including: amending and finalizing the DMNP EA (now complete and approved); amending and completing the LDL MP EA (now completed and approved); and precinct planning for Cousins Quay (now called Villiers Island) and the Film Studio District, the Port Lands Planning Framework, and Port Lands and South of Eastern Transportation and Servicing Master Plan Environmental Assessment, all of which are underway.

**Probabilistic Risk Simulation Model:** A mathematical model used to perform quantitative risk analysis. In probabilistic risk simulation, uncertain inputs in the model (such as the quantity of soil that will need to be excavated, or the cost of dewatering a cubic metre of soil excavated "in the wet") are represented using ranges of possible values known as probability distributions. Probability distributions associate a probability with each possible outcome and are a much more realistic way of describing the uncertainty in variables of a risk analysis. During a simulation, values are sampled at random from the input probability distributions. Each set of samples is called an iteration, and the resulting outcome from that sample is recorded. Probabilistic simulation does this thousands of times, and the result is a probability distribution of possible overall outcomes for the scenario being modelled. In this way, probabilistic simulation provides a much more comprehensive view of what may happen. Results show not only what could happen, but also how likely each outcome is. Using a probabilistic risk simulation model also makes it easy to see which input variables have the biggest effect on overall results and to address interdependent relationships between input variables, since it's important for accuracy to represent how, in the real world, when some factors go up, others go up or down accordingly.

**Project:** Don Mouth Naturalization and Flood Protection and Enabling Infrastructure Project.

**Project Team:** Waterfront Toronto, Toronto and Region Conservation Authority, City of Toronto, Toronto Port Lands Company and the consultants engaged for the due diligence program.

**Public Sector Comparator (PSC):** Estimates the hypothetical risk-adjusted cost if a project were to be financed, built, and potentially operated and/or maintained by the public sector using its traditional procurement approach.

**Public-private partnerships (P3):** Contractual agreements formed between a public agency and a private sector entity that allow for greater private sector participation in the delivery and financing of major capital infrastructure projects.

**Recommended Cost Estimate:** \$1.25 billion (YOE) is the cost estimate to complete the Recommended Scope based on the due diligence program completed to date.

**Recommended Scope:** See Recommended Scope Map in **Figure 33a**. Based on due diligence completed to date and current cost estimates, the Project Team has recommended a modified scope of work from that originally proposed. The Recommended Scope provides the needed flood protection as originally contemplated, as well as short to mid-term development supporting infrastructure as needed to drive the desired economic results of the Project and defers other components until such later time as development occurs.

**Records of Site Condition (RSC):** A document, prepared and filed to the Environmental Site Registry by a qualified person, that summarizes the environmental condition of a property based on the completion of environmental site assessments as per the O. Reg. 153/04.

**Regulatory Flood:** In this area of Ontario, the rainfall from a storm equivalent to Hurricane Hazel centred over the Don Watershed is used to define the limits of flooding, known as the Regulatory Flood.

**Regulatory Flood Line:** The extents (areas) of flooding calculated by the computer models based on a Regulatory Flood.

**Regulatory Floodplain:** The approved standard used in a particular watershed to define the limit of the floodplain for regulatory purposes.

**Regulatory Storm:** The largest storm an area could expect at the time of study development. This storm can be either a large historical storm, such as the Regulatory Flood described above, or a theoretical storm using local rain data to estimate the worst storm which could occur in 100 years.

**Risk Management:** In the environmental context, risk management means the implementation of a strategy or measures to control or reduce the level of risk estimated by the risk assessment to prevent, eliminate or ameliorate any adverse effect.

**Risk/Risk Register:** Risk is the combination of the probability of an uncertain event and its consequences to the Project. A positive consequence presents an opportunity; a negative consequence poses a threat. A Risk Register is a project management tool that records details of all identified project risks and opportunities, their quantification in terms of likelihood of occurring and potential impact on the project, initial plans for responding to (mitigating) each high level risk, the estimated costs of such mitigation strategies, and the individual assigned responsibility for monitoring and managing a given risk.

**Rock Revetment:** In stream restoration, river engineering or coastal engineering, revetments are sloping structures placed along water edges in such a way as to absorb the energy of incoming water.

**Rubble Containment System:** Rock or other materials used to armour shorelines, bridge abutments, pilings and other shoreline structures against scour and water or ice erosion.

**Scour:** The effect of eroding, creating holes or otherwise compromising the integrity of shorelines and bridge abutments caused by swiftly moving water.

**Site Specific Risk Assessment:** This is a process for estimating the probability of a human health or environmental adverse effect to occur due to changes in environmental conditions resulting from human activities. Under the O. Reg. 153/04, it can typically only be conducted for one property and includes the development of property specific standards for the contaminants of concern (COCs) for the property.

**Spill Zone:** Defined areas within the Flood Plain.

**TRCA:** Toronto and Region Conservation Authority.

**TPLC:** Toronto Port Lands Company.

**Toronto Remedial Action Plan (RAP):** Toronto and Region is listed as one of 40 locations around the Great Lakes where local environmental degradation may be causing harm to the wider Great Lakes system. These locations are referred to as Areas of Concern (AOCs). The clean-up, or remediation, of an Area of Concern occurs through a mandated process called a Remedial Action Plan, or RAP. Stage I of the formal Toronto and Region Remedial Action Plan was initiated in 1987 and Toronto and Region is currently in Stage 3 (implementation) of the RAP process. Toronto and Region RAP team believes the Toronto and Region could be in a position to prepare the Stage 3 RAP report and seek delisting as an Area of Concern by 2020.

**Value for Money (VfM) Analysis:** This is a quantitative analysis methodology intended to be used by the public sector as a decision-making tool to support and justify the selection of a project delivery model. The process compares the financial impacts of delivering a project as a P3 against those for the traditional public delivery alternative (the “Public Sector Comparator” or PSC). The PSC estimates the hypothetical risk-adjusted cost if a project were to be designed, built, financed (and potentially operated and maintained) by the public sector using its conventional procurement approach. A Shadow Bid is developed to estimate what the private sector would bid in response to a P3 request for proposals. When a P3 presents overall savings, it is said to provide “value for money”. This value is usually expressed as the percent difference by which the PSC cost estimate exceeds the P3 Shadow Bid.



**Wetland Control Structure:** A concrete or stone structure with removable gates, stop logs, and/or grates. These structures are used to regulate water levels within the wetlands and can function as a barrier to unwanted aquatic species. The structure can be as simple as a manhole with connected pipes or as complex as a vegetated open channel with an open box weir structure, depending on the site specific goals.

**Year-of-Expenditure (YOE):** A cost estimate expressed in Year-of-Expenditure (YOE) dollars is determined by adjusting the current dollar cost estimate for a multi-year design and construction project to account for the anticipated cost escalation (inflation) from the present time to the expected year in which construction occurs. For example, assuming three per cent year-over-year construction escalation, a construction project estimated to cost \$30 million in today's dollars and scheduled to be completed over the next three years at a uniform rate of progress would require annual investments of \$10 million, \$10.3 million, and \$10.6 million, for a total estimated cost of \$30.9 million in YOE dollars.

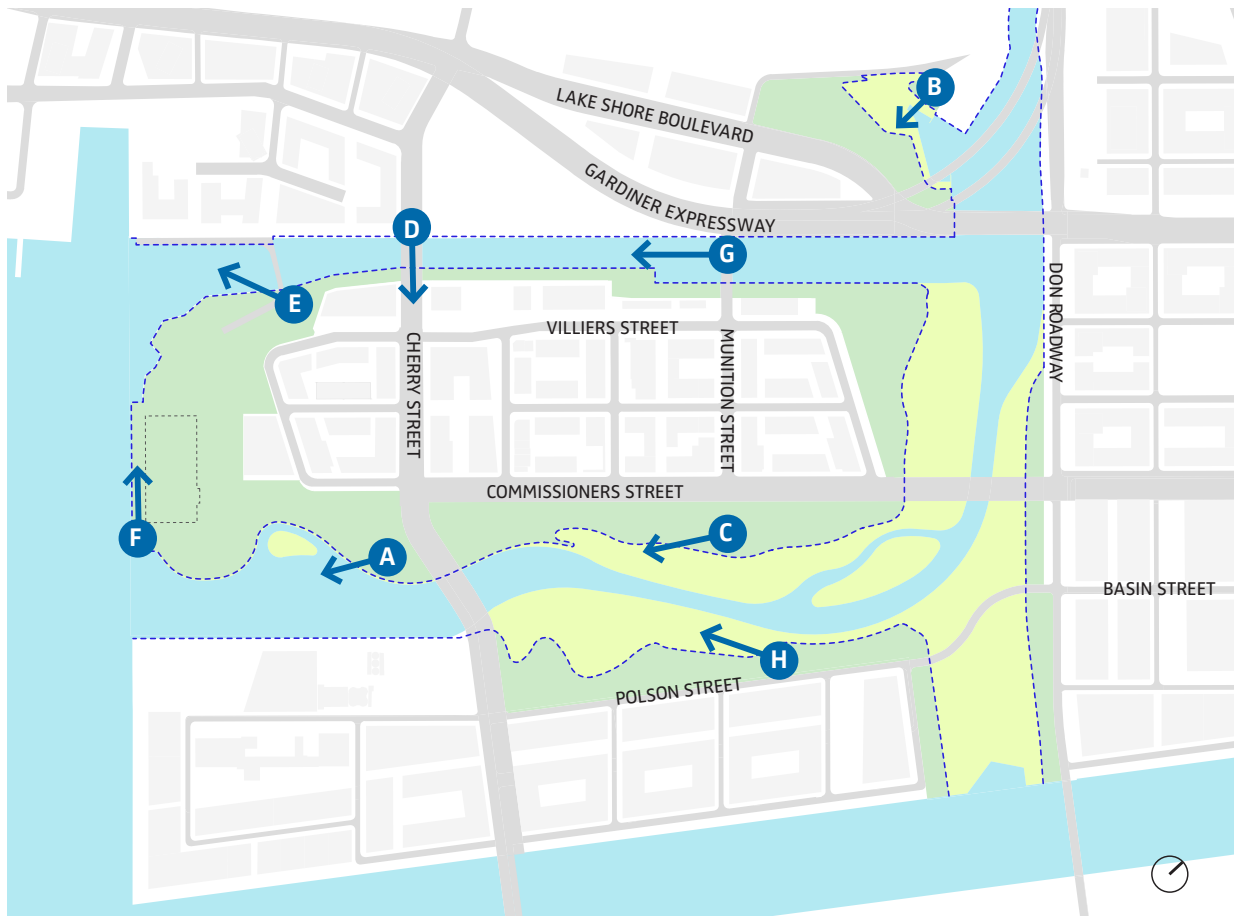


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**Figure 43** Artist Renderings of Full Vision Lower Don River Naturalization and Accompanying Public Realm (Prepared for PLAI)



**A** - View Looking Southwest Across the Naturalized Mouth of the Don River during Winter



**B** - View of Don Valley Trail Bike Path over Sediment Management Area during Spring



*C - View Looking Southwest towards Naturalized Channel during Fall*



*D - View Looking Southeast at Cherry Street Bridge during Summer*



*E - View Looking Southwest from Trinity Bridge during Spring*



*F - View Looking Northwest from Harbour Plaza during Winter*



*G - View Looking West along Keating Channel*



*H - View Looking West towards Naturalized Channel during Fall*

# Call to Action

*“The World Economic Forum recognizes water as the number one global risk and also mankind’s greatest opportunity. It connects economy and ecology, and is a key asset for sustainability and equity for our cities. Toronto’s resiliency depends on a comprehensive, collaborative approach to implementing innovative projects. Naturalizing the mouth of the Don River will increase capacity and enhance the ecology in this important watershed, restoring a vital natural environment within the city. When complete, this project will serve as a lasting example of embracing water as an asset for the city - turning the risk of flooding into an ecological, social and economic opportunity.”*

Henk WJ Ovink

Special Envoy for International Water Affairs Kingdom of The Netherlands







**WATERFRONT**Toronto