Lower Don Lands Infrastructure Master Plan and Keating Channel Precinct Environmental Study Report

APPENDICES

May 2010

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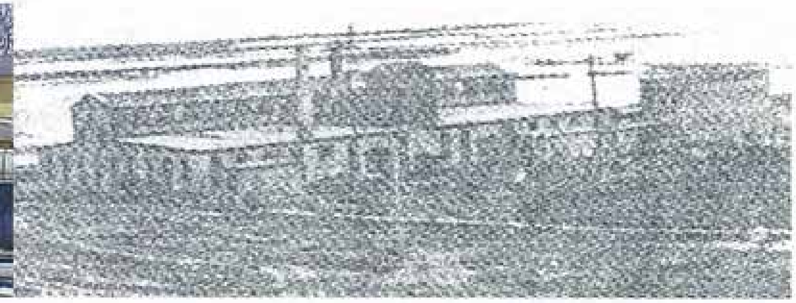
Appendices Table of Contents

Appendix 5-A1

Built Heritage Features and Archaeology

Listed Heritage Buildings

Fire Hall No. 30 - 39 Commissioners Street - Listed status in 2003 for architectural and contextual reasons.

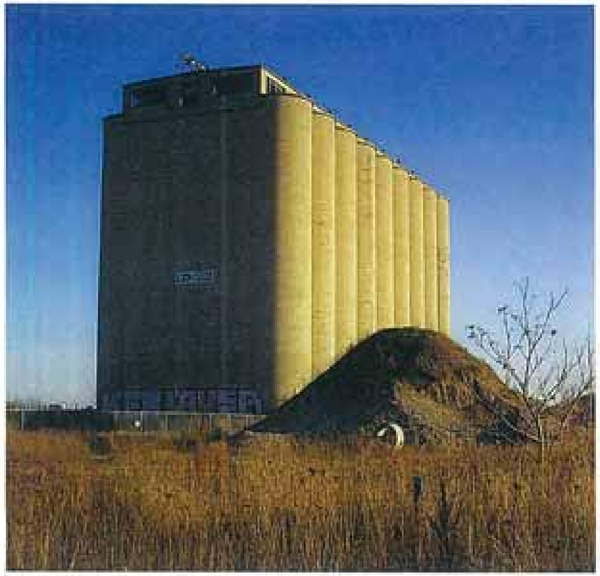


Queen's City Foundry - 16 Munition Street - Listed status in 2003 for architectural and contextual reasons.

Toronto Harbour Commissioners Storage Buildings - 62 Villiers Street - Heritage Preservation Services has requested Listed status for architectural and contextual reasons.

Century Coal Company - 312 Cherry Street - Heritage Preservation Services has requested Listed status for architectural and contextual reasons.

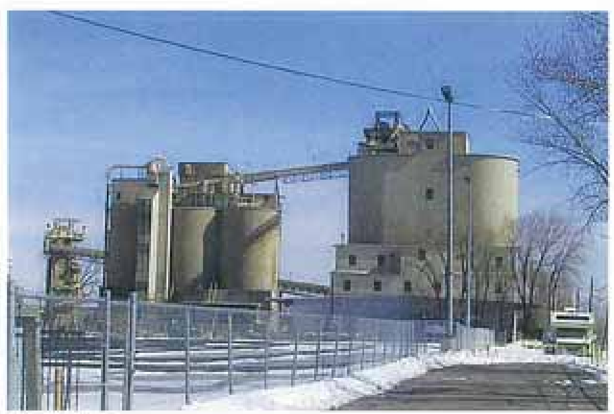
Historic Buildings and Structures



Victory Soya Mills

Villiers Street

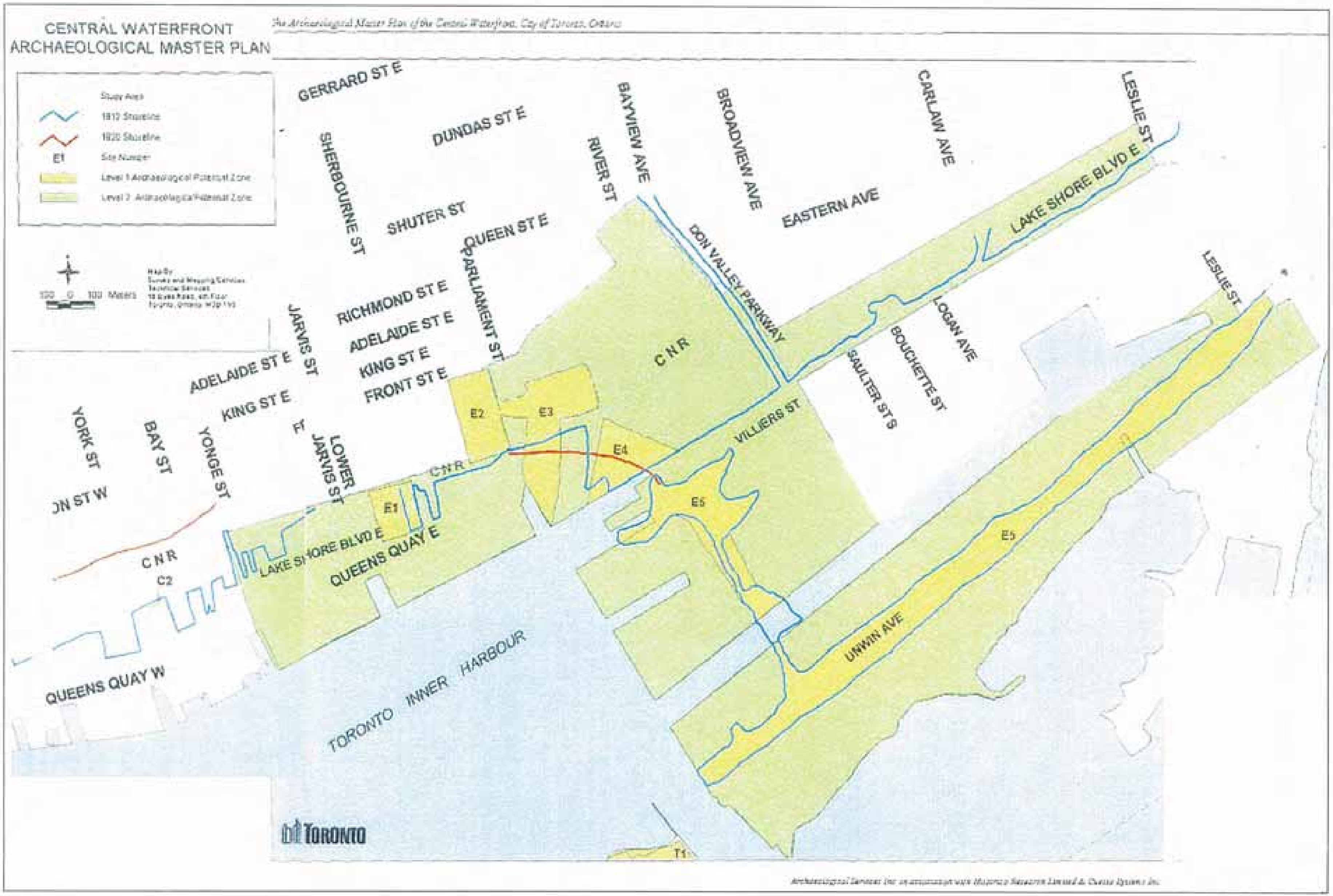
Toronto Hydro



La Farge

Cherry Street Bridge over Ship Channel

Level 1 and Level 2 Archaeological Potential Zones



Appendix 5-A2

References

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References

Terrestrial, Aquatic and Landscape Ecology

Bird Studies Canada Website, 2006:
Tommy Thompson Park Bird Research Station, 2006: http://www.bsc-eoc.org/national/ttpbrs.html. Accessed on October 17, 2006.

Chapman, L.J. and D.F. Putnam, 1966:
The Physiography of Southern Ontario (2nd Edition). University of Toronto Press, Toronto.

Croft and Chow-Fraser, 2007: Use and development of the Wetland Macrophyte Index to detect water quality impairment in fish habitat of Great Lakes Coastal Marshes. Journal of Great Lakes Research. 33(SI 3). 172-197.

Dillon, 2006:
Lower Don River West Remedial Flood Protection Project: Class Environmental Assessment, Environmental Study Report.

Environment Canada Website, 2006:
Great Lakes Coastal Wetlands, 2006:
http://www.on.ec.gc.ca/wildlife/factsheets/fs_coastal_wetlands-e.html. Accessed on October 18, 2006

Eyles, N., 2002:
Ontario rocks: three billion years of environmental change. Fitzhenry & Whiteside Limited.

Federation of Ontario Naturalists Website, 2006
Urban Forests, an Important Part of our Heritage, 2006:
http://www.ontarionature.org/resources/ conservation_factsheets.html. Accessed on October 17, 2006.

Jackson, L.J., C. Ellis, A.V. Morgan and J.H. McAndrews, 2000:
Glacial Lake Levels and Eastern Great Lakes Palaeo-Indians. Geoarchaeology 15(5): 415 – 440.

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray, 1998:
Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

Natural Heritage Information Centre (NHIC), Ontario Ministry of Natural Resources Website, 2006:
http://nhic.mnr.gov.on.ca/MNR/nhic/queries/nhic.mwf. Accessed on October 16, 2006

Ontario Ministry of Natural Resources, 1993:
Ontario Wetland Evaluation System: Southern Manual. Third Edition. Ontario Ministry of Natural Resources. 178pp.

Ontario Ministry of Natural Resources, 1999:
Natural Heritage Reference Manual: For Policy 2.3 of the Provincial Policy Statement. Ontario Ministry of Natural Resources. 127pp.

Ontario Ministry of Natural Resources, 2000:
Significant Wildlife Habitat Technical Guide. Queen's Printer. 151 pp.

Scott W. B., Crossman E. J. 1998. Freshwater Fishes of Canada. Galt House Publications Ltd. Oakville, ON.

Tommy Thompson Park Bird Research Station Website, 2006:
http://ttpbrs.blogspot.com/. Accessed October 17, 2006

Toronto and Region Conservation (TRCA), 2007:

Baseline data for the Inner and Outer Harbour (Toronto and Region Conservation Authority 2007).

Toronto and Region Conservation (TRCA), 2004:
Lower Don Valley Biological Inventory

Toronto and Region Conservation (TRCA), 1992. DON River Watershed: State of the Ecosystem. Prepared by Paragon Engineering Ltd and Ecologistics Ltd.

Toronto and Region Conservation (TRCA), 2004. Lower Don River Environmental Assessment Aquatic Investigations and Data Summary.

Toronto Green Community, 2007:
Toronto's Ice Age. http://www.lostrivers.ca/points/iceage.htm. Accessed on January 12, 2007.

Toronto Region Conservation (TRCA) , 1997:
Don Watershed Report Card

Varga, S., D. Leadbeater, J. Webber, J. Kaiser, B. Crins, J. Kamstra, D. Banville, E. Ashley, G. Miller, C. Kingsley, C. Jacobson, K. Mewa, L. Tebby, E. Mosley and E. Zajc, 2000:

Distribution and Status of the Vascular Plants of the Greater Toronto Area. Ontario Ministry of Natural Resources. Aurora District. August 2000.

White, D.J., E. Haber and C. Keddy, 1993:
Invasive plants of natural habitats in Canada. Report prepared for the Canadian Wildlife Service, Environment Canada in co-operation with the Canadian Museum of Nature. 121pp.

Wilson, W.G. and E.D. Cheskey, 2001:
Leslie Street Spit – Tommy Thompson Park Important Bird Area Conservation Plan. Report to the Leslie Street Spit IBA Stakeholders, IBA Canada.

Cultural Environment

- Waterfront Toronto's Competition Brief - Waterfront Master Plan, Appendix 3 Forty Steps to a New Don, Appendix 4 East Bayfront and Port Industrial Area: Environment in Transition, Appendix 5 The Archaeological master Plan of the Cetnral waterfront, Appendix 6 Central Waterfront" East bayfront and Port Lands Industrial Heritage Property Sutdy, Appendix 7, Built Heritage of the East Bayfront, Appendix 8

- The historical review contains excerpts from the document entitled, "*Indian Claims Commission, Mississaugas of The New Credit First Nation Inquiry, Toronto Purchase Claim*" (June 2003).

- The History of the Mississaugas of The New Credit First Nation – Praxis Research Associates (undated booklet provided by M. Sault at meeting in June 2008)

Anderson, T.W.; and C.F M. Lewis
1985 Postglacial Water-Level History of the Lake Ontario Basin. In *Quaternary Evolution of the Great Lakes,* edited by P.F. Karrow and P.E. Calkin, pp. 231-253. Special Paper 30. Geological Association of Canada, St. Johns.

ASI (Archaeological Services Inc.)
1992 Report on a Background Assessment of Heritage Features of the Railway Lands West, City of Toronto. Report on file, Ontario Ministry of Culture, Toronto.
2003 Archaeological Master Plan of the Central Waterfront, City of Toronto, Ontario. Report on file, Ontario Ministry of Culture, Toronto.
2007 Transitional Sports Fields in the Portlands, City of Toronto. Report on file, Heritage Preservation Services, City of Toronto Planning Department, Toronto.

ASI and HRL (Archaeological Services Inc. and Historica Research Limited)
2004 Stage 1 Archaeological Assessment of the East Bayfront, West Donlands and Portlands Areas, City of Toronto, Ontario. Report on file, Ontario Ministry of Culture, Toronto.

AST et al. (Archaeological Services Inc., in association with Cuesta Systems Inc., and Commonwealth Historic Resources Management Limited, Golder Associates, and Historica Research Limited)

2003 A Master Plan of Archaeological Resources for the City of Toronto, Draft Interim

Report. Report on file, Heritage Preservation Services, Culture Division, City of Toronto

Berm, C.

1993 *Historic Fort York: 1793-1993.* Natural Heritage/Natural History Press, Toronto.

Burger, D.

1993 *Revised Site Regions of Ontario: Concepts, Methodology and Utility.* Ontario Forest Research Institute, Forest Research Report 129.

Chapman, L.J., and D.F. Putnam

1984 *The Physiography of Southern Ontario.* Second Edition. Ontario Ministry of Natural Resources, Toronto

Freeman, E.B.

1976 *Toronto's Geological Past — An Introduction.* Ontario Division of Mines, Miscellaneous Publications.

Goad, C.E.

Atlas of the City of Toronto and Suburbs, 1880, 1884, 1893, 1903, 1923, 1931, 1938 and 1951. Toronto.

HHI (Historic Horizon Inc.)

1994 A Heritage Assessment of Block 37, Part of the Railway Lands, Toronto, Ontario. Report on file, Ontario Ministry of Culture, Toronto.

Hills, G.A.

1958 Forest-Soil Relationships in the Site Regions of Ontario. In *First North American Forest Soils Conference,* pp. 190-212. Agricultural Experiment Station, Michigan State University, East Lansing, Michigan.

HRL (Historica Research Limited)

1983 *A Heritage Study of Toronto's Railways.* Report on file, Historica Research Limited, London, Ontario.

1986 *Railway Lands Precinct A Environmental Report: Heritage.* Report on file, Historica Research Limited, London, Ontario.

1989 *Heritage Assessment of Archaeological Features, Precincts 1, 3, 4, 5 and 6, Southtown Development, Toronto.* Report on file, Ontario Ministry of Culture, Toronto.

Krentz, D.

1985 The Geomorphic Evolution of the Toronto Islands. Unpublished Senior Honours Essay, Department of Geography, Faculty of Environmental Studies, University of Waterloo.

Martin-Downs, D.

1988 *Don River Biological Inventory Past, Present and Future Evaluation.* Technical Report 16. Ontario Ministry of the Environment, Toronto.

Ministry of Culture

2006 Standards and Guidelines for Consultant Archaeologists- Archaeological Fieldwork Final Draft. Toronto: Cultural Programs Branch, Archaeology and Planning Unit

Pearson, W.H

1914 *Recollections and Records of Toronto of Old.* William Briggs, Toronto.

Sauriol, C.

1981 *Remembering the Don: A Rare Record of Earlier Times Within the Don River Valley.* Consolidated Amethyst Communications Inc., Scarborough.

Scadding, H.

1966 *Toronto of Old: Collections and Recollections Illustrative of the Early Settlement and Social Life of the Capital of Ontario.* Abridged and edited by F.H. Armstrong. Originally published 1873. Oxford University Press, Toronto.

Stinson, Jeffery

1990 *The Heritage of the Port Industrial District, Volume 1.* Report on file, Toronto Harbour Commission, Toronto.

Stinson, J., and M. Moir

1991 *Built Heritage of the East Bayfront.* Environmental Audit of the East Bayfront/Port Industrial Area Phase 2 Technical Paper 7. The Royal Commission on the Future of the Toronto Waterfront, Toronto.

Soils

Archaeological Services Inc. (2004), Stage 1 Archaeological Assessment of the East Bayfront, West Don Lands and Portlands Areas. April 2004.

Rogers, D.P., Ostry, R.C. & Karrow, P.F. (1961), Metropolitan Toronto, Bedrock Contours, Ontario Department of Mines, Preliminary Map 102, February 1961.

Sharpe, D.R. (1980), Quaternary Geology of Toronto and Surrounding Area; Ontario Geological Survey Preliminary Map P. 2204, Geological Series. Scale 1:100 000. Compiled 1980.

CH2M HILLa (2008), Final Factual Report, Soil and Groundwater Investigation, 54 Commissioners Street, dated April 2008.

CH2M HILLb (2008), Factual Report, Supplemental Phase II Environmental Site Assessment, Site 52W – 105 Villiers Street, dated April 2008.

CH2M HILLc (2008), Factual Report, Supplemental Phase II Environmental Site Assessment, Site 58 –150 Commissioners Street, dated April 1008.

CH2M HILLd (2008), Final Factual Report, Soil and Groundwater Investigation, 281 Cherry Street, dated April 2008.

CH2M HILLe (2008), Final Factual Report, Phase II Environmental Site Assessment, 309 Cherry Street ROWs, 54 Commissioners Street, dated April 2008.

CH2M HILLf (2008), Final Factual Report, Soil and Groundwater Investigation, 10 Munition Street, dated April 2008.

CH2M HILLg (2008), Factual Report, Supplemental Phase II Environmental Site Assessment, Site 52E – 165 Villiers Street, dated April 2008.

CH2M HILLh (2008), Factual Report, Supplemental Phase II Environmental Site Assessment, Site 52C – 155 Villiers Street, dated April 2008.

Golder Associates Ltd. (2006), Phase II Environmental Site Assessment, 480 Lakeshore Boulevard East, Toronto, Ontario, dated August 2006.

DCS Drawing (2008), Contaminant Zone Interval Depth From Ground Surface Elevation, dated June 9, 2008.

Appendix 6-A1

Traffic and Transit Analysis

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Lower Don Lands

Transportation Analysis for ESR

City of Toronto

Lower Don Lands

Transportation Analysis
for ESR

April 2010

This report takes into account the particular instructions and requirements of our client.
It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party

Ove Arup & Partners Consulting Engineers PC
155 Avenue of the Americas, New York NY 10013
Tel +1 212 229 2669 Fax +1 212 229 1056
www.arup.com

Job number 96135

Contents

Appendices

1 Introduction

This document summarizes the analysis conducted to determine the traffic and transit impacts resulting from the proposed Lower Don Lands (LDL) site. This analysis is a comparison of the Central Waterfront Secondary Plan (which was adopted by Toronto City Council in 2003 and updated in 2007) and the LDL Plan which represents a refinement of the LDL site that has taken place since 2007.

The refined LDL Transportation network was developed with the mission to promote sustainability, walkability and bikeability within the district and the waterfront. To ensure the transportation network met these goals, two tasks were conducted over the duration of the design process: an urban design study to determine the layout and interaction of various multi-modal facilities within the site and an analytical study to determine the mobility needs within the district and region. This document focuses on the latter study.

To quantitatively assess the mobility needs, the design team developed a microsimulation model and a corresponding set of performance measures. These performance measures were developed with the broader sustainable mission in mind and include multi-modal measures such as person delay which factors in the delay felt by each person within a vehicle, thus ensuring that high occupancy vehicles such as buses and streetcars are prioritized over lower occupancy vehicles. The performance measures are described in more detail in the next section, but include multi-modal measures such as person delay, transit delay, pedestrian crossing times, pedestrian waiting times, transit travel times and vehicle travel times.

As noted above, the analysis was performed using a microsimulation model. Microsimulation models are more sophisticated than standard traffic analysis tools and allow users to test the impacts of congestion on multiple modes of transportation on a larger network. Microsimulation models also provide better representation of queues and their interaction with adjacent intersections, a function not found in other types of modelling platforms.

Microsimulation models are typically first developed for the existing conditions in order to calibrate to existing travel patterns and driver behaviour. The existing network is then modified to reflect various network and travel demand changes to represent one or more future scenarios. These future scenarios (or models) are then run in order to compare the resulting impacts to the street and transit network.

A microsimulation model was selected for this project for many reasons, but primarily to model the interaction of multiple modes of transport such as autos, streetcars and pedestrians. Additionally, there is significant development proposed along the waterfront, and the collective impact of this development has not yet been tested on a larger network. Finally, there were various levels of development that were proposed for the site and this is easily tested in a microsimulation environment.

A key input into a microsimulation model is data from the regional model that contains trip origins and destinations, numbers of trips and the regional transportation network. For this analysis, the City of Toronto's (City) regional model was used as the basis for the microsimulation model. It was also used to perform the transit analysis described in this document.

Various background documents have been created over the course of the project and summarize the development of the microsimulation models and the detailed results of testing. These documents are attached in the appendix and a summary is provided in this report which covers the following highlights:

- Methodology

- Summary of Network-wide results
- Results for the Traffic Analysis
- Results for the Transit Analysis
- Summary of Findings

2 Methodology

2.1 Model Development

In terms of microsimulation analyses, there are many platforms that can be used. The two most commonly used platforms in North America are Paramics and Vissim. Both tools have their strengths and limitations. Vissim is best suited for corridor modelling where modes may share lanes. Paramics is better suited for modelling larger networks, with a high degree of route-choice. Due to the size and complexity of the network, and the many possible routing patterns around the new developments, Paramics was selected as the preferred microsimulation modeling tool.

The Paramics model was developed using the City of Toronto's regional model to represent travel demand and transit information. The network study area is bounded by, and includes, Jarvis Street to the west, Queen Street to the north, Leslie Street to the east and the waterfront to the south. The time periods for the analysis include the AM and PM Peak hours for traffic (8:00 AM to 9:00 AM and 5:00 PM to 6:00 PM, respectively) and the same AM Peak hour for transit.

The Existing Conditions model was calibrated and validated to existing traffic data provided by the City. The validation targets used to gauge the models relative representation of existing conditions was determined based on a review of industry standard targets. The targets focused on screenline, link and turning movement counts as the primary basis of validation. Intersection approach delay, travel times and queue lengths were also used, in some part, to validate the model.

The analysis year selected for the future models is the mature state. In other words, it is the year that represents full build-out of all the developments in the Port Lands, East Bayfront and West Don Lands.

2.2 Performance Measures

This analysis compares the development scenarios by evaluating various performance measures. These measures were selected based on their ability to represent the impacts of the new development on various modes of travel.

While vehicular performance measures are typically used to gauge the overall performance of a transportation network, other modes of transport need to be addressed. The performance measures for this analysis aim to address all users of the transportation network through the use of measures such as transit-only delay, person delay (a weighted average of transit delay and vehicular delay) and pedestrian crossing time at intersections.

The performance measures are grouped at the following levels:

Network-wide – this includes a weighted average of the key intersection approaches within the entire microsimulation model study area.

Corridor-wide – this includes results along major transit lines and vehicular corridors within the study area

Intersection Approach – this includes results for the approach to key intersections within in the study area

Additional information about the key corridors and intersections can be found in the appendix.

Delay was the key performance measure used and represents the additional time, above the free flow travel time, required to traverse a link. The following list summarizes the detailed performance measures used:

> ***Person Delay*** – a weighted average of the delay experienced by transit and private vehicle users. This average takes into account the fact that transit vehicles carry more passengers compared to private vehicles.
>
> ***Transit Delay*** – delay experienced by transit vehicles
>
> ***Vehicular Delay*** – delay experienced by private vehicles including passenger cars, taxis and trucks. Further detail of vehicular delay is provided below.
>
> ***Travel Time*** – the time it takes, in seconds, for a vehicle to traverse a corridor. Free flow travel time is also provided in the appendix as another basis for comparison.
>
> ***Speed*** – the average speed, in kilometres per hour, that a vehicle takes to traverse a link.
>
> ***Pedestrian Crossing times* -** the time allocated for pedestrians to cross the specific approach.
>
> ***Pedestrian Wait times*** – the time between the end of the walk phase and the start of the next walk phase

For vehicular delay, a Level of Service (LOS) classification system was used which is based on the Highway Capacity Manual (HCM) developed by the Transportation Research Board. This method categorizes various levels of delay based on the operations they describe. Table 1 summarizes the delay ranges for each LOS and the following text summarizes the type of conditions a driver is likely to encounter at each LOS.

Table 1: Level of Service Classifications

LOS	Control Delay per Vehicle (s/veh)
A	≤ 10
B	> 10-20
C	> 20-35
D	> 35-55
E	> 55-80
F	> 80

LOS A through C describes operations with low to moderate delay. LOS D and E describes operations with heavy to very heavy delay. Most cities try to avoid going above LOS D and in other cases, LOS E. LOS D is the upper limit of what is considered acceptable by most city agencies before various improvements are undertaken. Some Jurisdictions allow LOS E conditions in dense urban environments such as LDL.

A delay exceeding 80 seconds for any given approach to an intersection is considered to be “unacceptable to most drivers”, according to the HCM, and is given a LOS F.

For the purposes of this analysis, a vehicular delay exceeding 80 seconds, or LOS F, has been flagged as a hotspot for areas outside the LDL site. An LOS F in this case indicates intersections that require further analysis and, in some cases, improvements to offset the high delay. Within the LDL site specifically, a target of LOS D or better was set.

For transit, an additional analysis has been conducted with the Toronto Transit Commission (TTC) to determine if the forecast transit service is still acceptable given the increase in transit passenger demand. With this proposed service in mind, the transit delay at the intersection of Queens Quay and Cherry Street was analysed to determine if proposed layout of the intersection is adequate to handle the proposed streetcar demand.

2.3 Scenarios for Analysis

This analysis compares the following scenarios in their mature state:

1. ***Do Nothing Scenario*** – The Do Nothing Scenario represents the Central Waterfront Secondary Plan as described above.
2. ***LDL Scenario*** – This scenario represents the LDL development as further refined by the LDL-design team since 2007. It has undergone significant analysis in order to find the most feasible alignment for both vehicles and streetcars. It also includes higher employment estimate and a shift in development to the parcels north of the Keating Channel when compared to the Do Nothing Scenario.

The project team established a range of population and employment projections, of which the employment range represents an increase compared to the Central Waterfront Secondary Plan originally envisioned. The LDL Scenario above represents the low range of development intensity within LDL area. There is a possibility that the higher level of development may take place. However, given that the LDL scenario above is based on 100% permitted build out of all surrounding waterfront development, whereas most mature areas of the City are less than the total plan for build out[1], the high scenario was not modelled. The potential increase in trips between the low estimate and the high estimate is summarized in Section 3. Furthermore, the difference between the low and high growth scenarios is unlikely to make a substantive difference in the findings for this exercise.

A summary of the various levels of development is shown in Table 2.

Table 2: Summary of Development in LDL

Development	***Commercial GFA* (m^2)***	***Employees***	***Residential Units***	***Residents***
Do Nothing Scenario	106,280	3,190	12,410	19,860
LDL Scenario	243,760	8,500	12,030	19,250
LDL (High) Scenario	299,700	10,420	12,030	24,060

*GFA = Gross Floor Area

The key development differences between the Do Nothing Scenario and the LDL Scenario are as follows:

- The LDL Scenario has approximately 5000 more employees when compared to the Do Nothing Scenario.
- The Do Nothing Scenario has the same number of employees when compared to the LDL Scenario. However the distribution of office development is primarily south of the Keating channel (approximately 95% of employees, compared to 35% in the LDL Scenario and 80% of residents compared to 65% in the do nothing scenario).

[1] Source: City of Toronto, Transportation Planning Section

The LDL (High) Scenario represents an approximately 25% increase in both the number of employees and residents.

2.4 Street and Transit Networks

The following Street and Transit Networks were used as the basis for the analysis.

Figure 1: Do Nothing Street Network (Source: City of Toronto)

Figure 2: LDL Scenario Street and Transit Network

The transit network proposed by the project team is generally consistent with the Central Waterfront Secondary Plan envisioned network. The only difference being that streetcars between Cherry Street and Don Roadway run along Villiers Street in the LDL scenario instead of Commissioners Street in the Do Nothing Scenario.

The key difference between the Do Nothing Scenario and LDL Scenario street networks is the additional crossing of the Keating Channel at Munition Street which connects the site and Lake Shore Boulevard. Furthermore, Lake Shore Boulevard is realigned and Queens Quay is extended between Cherry Street and Don Roadway.

3 Results

The following sections summarize the key traffic and transit results from the analysis.

Section 3.1 summarizes the overall network results. Based on these results, various traffic and transit results are selected for additional discussion in Sections 3.2 and 3.3, respectively. Section 3.4 provides the results of a sensitivity test performed for an even higher development intensity scenario.

Additional detail can be found in the Appendix.

3.1 Summary of Results

The following table summarizes the results from the various scenarios during the AM and PM peak periods.

Table 3: Summary of Scenario Results

	AM			PM		
	Existing Condition	***Do Nothing Scenario***	***LDL Scenario***	***Existing Condition***	***Do Nothing Scenario***	***LDL Scenario***
Weighted Network Results						
Person Delay (seconds)	19	29	28	23	43	42
Transit Delay (seconds)	23	31	31	27	40	40
Vehicle Delay (seconds)	16	28	26	20	45	43
Corridor Results:						
Transit: Number of corridors with an average speed in the following ranges:						
20 to 30 km/h	0	2	4	0	1	2
less than 20 km/h	2	8	6	2	9	8
Autos: Number of corridors with an average speed in the following ranges:						
greater than 50 km/h	1	0	0	0	0	0
40 to 50 km/h	7	1	2	7	1	1
30 to 40 km/h	11	5	3	8	2	4
20 to 30 km/h	3	10	12	7	13	11
less than 20 km/h	2	8	7	2	8	8
Intersection Approach Results						
Total Number of Intersection Approaches	92	111	115	92	111	115
Person delay greater than 80 seconds	0	5	0	0	17	17
Transit delay greater than 80 seconds	1	2	5	1	7	10
Vehicle delay greater than 80 seconds	0	6	0	0	18	16
Increase in ped crossing times (when compared to existing)		5	5		4	4
Decrease in ped crossing times (when compared to existing)		10	12		12	12
Decrease in ped waiting times (when compared to existing)		4	4		3	3
Increase in ped waiting times (when compared to existing)		11	13		13	13

The results show the following:

- Person delay, transit delay and vehicle delay increase in both the Do Nothing and LDL scenarios when compared with the Existing condition.
- Person delay, transit delay and vehicle delay in the LDL Scenario are typically less when compared to the Do Nothing Scenario.
- Transit speeds are generally faster in the LDL Scenario when compared to the Do Nothing Scenario
- Pedestrian crossing times have not changed significantly between the Existing Condition and both the Do Nothing and LDL Scenarios.

Vehicle delay and vehicle travel times are discussed further in Section 0 because of the extensive amount of detail.

Transit delay is high at some intersection approaches, primarily where transit operates with private vehicles in the roadway. There are some approaches within and adjacent to the LDL site where transit delay exceeds 80 seconds. These approaches, and corresponding corridors, will require a corridor-wide review to ensure that the signal timing plans are optimized for transit performance. For the purposes of this report, the intersection of Queens Quay and Cherry Street is further analysed to ensure the proposed transit service can be accommodated through this intersection. These results are presented in Section 3.3.

3.2 Traffic

3.2.1 Delay Outputs

Vehicular delay and Level of Service (LOS) results were produced for the Existing, Do Nothing, and LDL Scenario models.

The overall intersection results for the LDL site for each of the future scenarios in the AM and PM are presented in Figure 3 and Figure 4, respectively. LOS is presented for each intersection based on a weighted average of the delay of each approach.

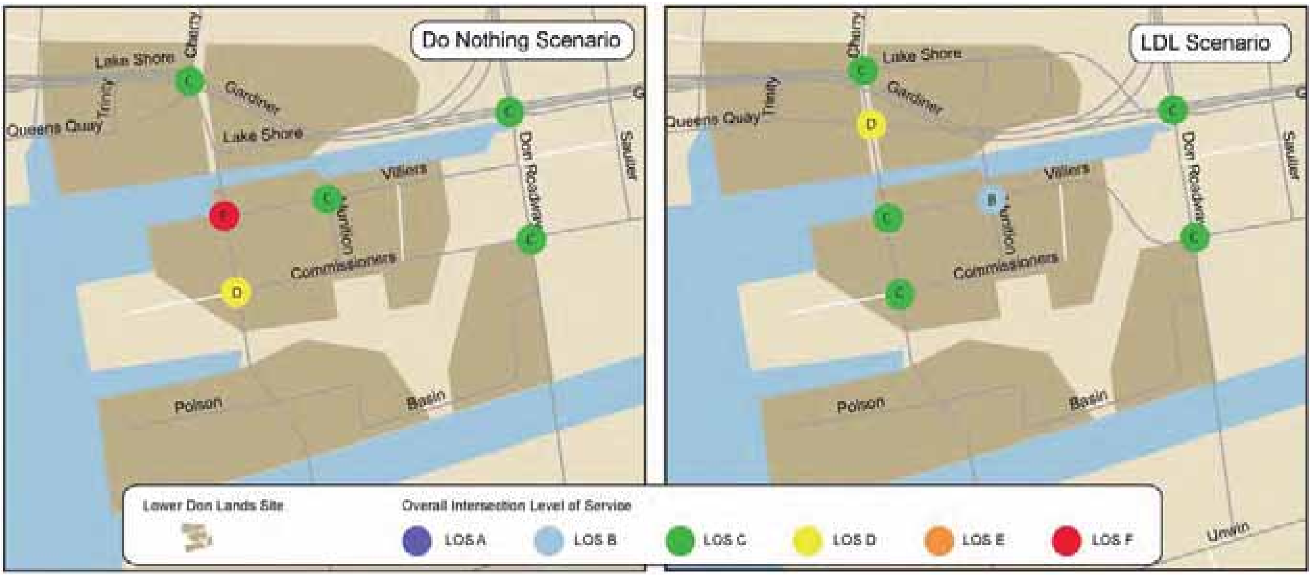

Figure 3: AM Peak Hour Intersection Level of Service in Future Models

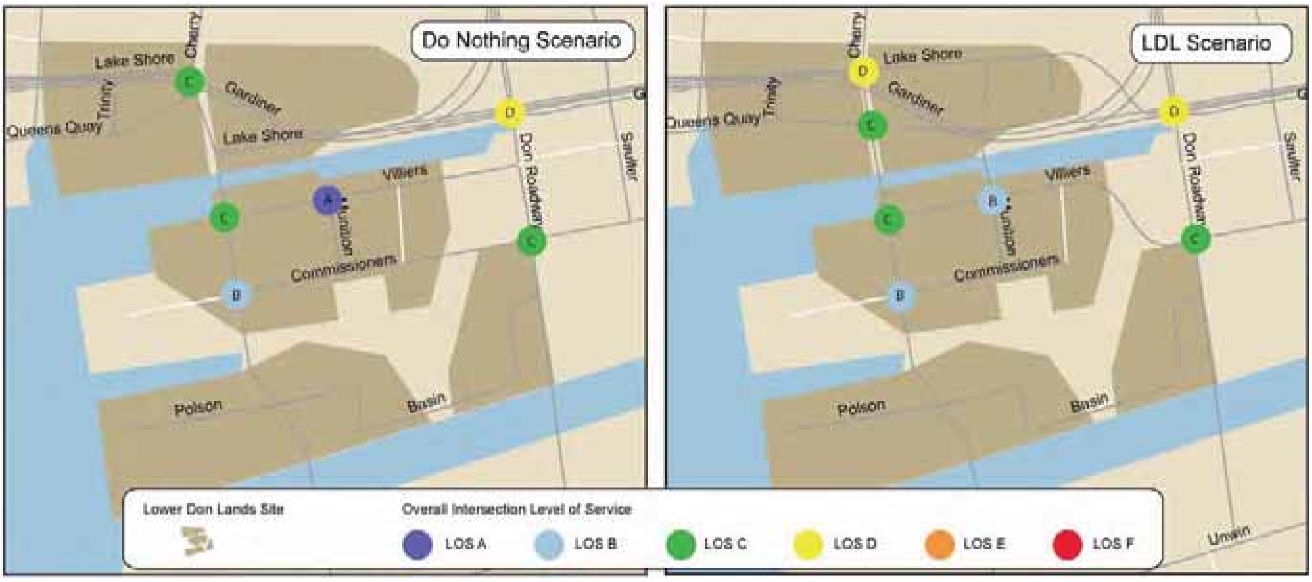

Figure 4: PM Peak Hour Intersection Level of Service in Future Models

These results show the following:

- For the Do-Nothing Scenario, there is one intersection that operates at LOS F - the intersection of Cherry Street and Villiers Street in the AM Peak Hour. This is due to the distribution of development which is focused just south of the Keating Channel. This forces a large number of vehicles to cross the Keating Channel via the only available crossing at Cherry Street.
- For the LDL Scenario, there are no intersections within the LDL site that operate at LOS E or F in the in either the AM or PM peak hours. This is due to the balance of development distribution on both sides of the Channel and the addition of a Keating Channel crossing at Munition Street.
- Based on overall intersection LOS, intersections experience higher LOS in the AM Peak Hour. This is caused by the congestion outside of the LDL area in the PM that meters or limits the flow of vehicles into the LDL site.

While the above figures illustrate overall intersection LOS, Table 4 and Table 5 provide both the delay and LOS by approach for the key intersections in the LDL site for the AM Peak Hour and PM Peak Hour, respectively. Further detail is provided in the Appendix for both the AM and PM Peak Hours.

Due to the different intersection configurations of each scenario, not all scenarios will have results for each intersection approach. The key difference to note is at the intersection of Lake Shore Boulevard, Queens Quay and Cherry Street. This intersection does not exist under the existing condition, but is represented as one intersection in the Do Nothing Scenario and two intersections in the LDL Scenario.

Table 4: Delay (in seconds) and Level of Service of Key Intersections in LDL - AM

Intersection	Approach	AM Peak Hour					
		Existing Condition		Do Nothing Scenario		LDL Scenario	
		Delay	LOS	Delay	LOS	Delay	LOS
Lake Shore Blvd at Cherry Street	Lake Shore Blvd EB	13.1	B	4.1	A	39.1	D
	Lake Shore Blvd WB	8.3	A	9.7	A	32.0	C
	Cherry Street NB	25.0	C	92.2	F	37.1	D
	Cherry Street SB	1.4	A	29.9	C	24.7	C
Lake Shore Blvd at Don Roadway	Lake Shore Blvd EB	6.8	A	41.1	D	38.7	D
	Lake Shore Blvd WB	8.0	A	17.8	B	19.3	B
	Don Roadway NB	21.4	C	23.9	C	23.8	C
	Don Roadway SB	24.8	C	47.9	D	49.5	D
Queens Quay at Cherry Street	Queens Quay EB	--	--	7.1	A	32.3	C
	Queens Quay WB	--	--	--	--	24.2	C
	Cherry Street NB	--	--	(see above)*		47.0	D
	Cherry Street SB	--	--	(see above)*		20.0	B
Villiers Street at Cherry Street	Villiers Street EB	--	--	148.2	F	42.2	D
	Villiers Street WB	0.5	A	176.0	F	25.0	C
	Cherry Street NB	0.0	A	160.3	F	36.5	D
	Cherry Street SB	0.0	A	16.7	B	21.3	C
Villiers Street at Munition Street	Villiers Street EB	0.00	A	0.00	A	18.7	B
	Villiers Street WB	0.00	A	0.30	A	12.7	B
	Munition Street NB	0.00	A	30.94	C	26.3	C
	Munition Street SB	--	--	--	--	19.8	B
Commissioners Street at Cherry Street	Commissioners Street EB	0.0	A	79.7	E	12.8	B
	Commissioners Street WB	2.2	A	31.0	C	16.8	B
	Cherry Street NB	0.0	A	58.4	E	31.8	C
	Cherry Street SB	0.0	A	31.1	C	15.6	B
Commissioners Street at Don Roadway	Commissioners Street EB	8.9	A	13.2	B	16.1	B
	Commissioners Street WB	4.6	A	30.8	C	19.4	B
	Don Roadway NB	--	--	51.8	D	28.6	C
	Don Roadway SB	9.1	A	10.7	B	15.5	B

* In the Do Nothing Scenario, the intersection of Queens Quay and Cherry Street will have similar results for the intersection of Lake Shore Blvd and Cherry Street in the northbound and southbound directions.

The AM results show the following:

- Both future scenarios have increased delay times compared to the Existing Conditions due to increased demand in and around the LDL site.
- All movements in the LDL Scenario perform equal to or better than LOS D while several movements in the Do Nothing Scenario perform at LOS E or F. This is most evident at the approaches to the intersection of Cherry Street and Villiers Street. This high delay is due to the distribution of development which funnels most of the vehicles into this one intersection.
- The main difference between the Do Nothing Scenario and LDL Scenario occurs at the entry and exits to/from the LDL site. The LDL Scenario performs slightly better at these intersections due to the distribution of development to areas north of the Keating Channel plus the additional channel crossing at Munitions Street.

Table 5: Delay (in seconds) and Level of Service of Key Intersections in LDL- PM

Intersection	Approach	PM Peak Hour					
		Existing Condition		Do Nothing Scenario		LDL Scenario	
		Delay	LOS	Delay	LOS	Delay	LOS
Lake Shore Blvd at Cherry Street	Lake Shore Blvd EB	17.9	B	2.9	A	44.7	D
	Lake Shore Blvd WB	9.4	A	15.8	B	49.2	D
	Cherry Street NB	28.8	C	52.6	D	35.3	D
	Cherry Street SB	8.9	A	53.0	D	45.2	D
Lake Shore Blvd at Don Roadway	Lake Shore Blvd EB	13.2	B	58.9	E	43.4	D
	Lake Shore Blvd WB	7.5	A	35.3	D	39.1	D
	Don Roadway NB	25.5	C	24.9	C	30.8	C
	Don Roadway SB	44.3	D	82.3	F	40.6	D
Queens Quay at Cherry Street	Queens Quay EB	--	--	10.1	A	38.0	D
	Cherry Street NB	--	--	(see above)*		21.2	C
	Cherry Street SB	--	--	(see above)*		20.7	B
Villiers Street at Cherry Street	Villiers Street EB	--	--	50.4	D	42.7	D
	Villiers Street WB	2.6	A	38.2	D	28	C
	Cherry Street NB	0.0	A	33.2	C	21.9	C
	Cherry Street SB	0.0	A	19.2	B	46.9	D
Villiers Street at Munition Street	Villiers Street EB	0.0	A	0.0	A	5.0	A
	Villiers Street WB	0.0	A	0.2	A	13.5	B
	Munition Street NB	0.0	A	1.2	A	17.9	B
	Munition Street SB	--	--	--	--	17.7	B
Commissioners Street at Cherry Street	Commissioners Street EB	0.0	A	19.2	B	16.6	B
	Commissioners Street WB	9.7	A	18.8	B	16.3	B
	Cherry Street NB	0.0	A	7.5	A	7.8	A
	Cherry Street SB	0.0	A	14.9	B	19.5	B
Commissioners Street at Don Roadway	Commissioners Street EB	8.5	A	11.0	B	9.9	A
	Commissioners Street WB	3.9	A	29.9	C	32.3	C
	Don Roadway NB	--	--	12.7	B	28.3	C
	Don Roadway SB	10.0	A	13.9	B	16.1	B

* In the Do Nothing Scenario, the intersection of Queens Quay and Cherry Street will have similar results for the intersection of Lake Shore Blvd and Cherry Street in the northbound and southbound directions.

The PM results show the following:

- Both future scenarios have increased delay times compared to the Existing Conditions due to increased demand in and around the LDL site.
- No movement in the LDL Scenario performs worse than LOS D while two movements in the Do Nothing Scenario perform at LOS E or F. The LDL Scenario performs slightly better at these intersections due to the distribution of development to areas north of the Keating channel plus the additional channel crossing at Munitions Street.

In the PM models, congestion northwest of the site in eastern downtown restricts the number of vehicles entering the LDL site. This congestion is likely due to the significant increase in demand throughout the network.

3.2.2 Travel Time Outputs

Travel time results were generated for the Do Nothing Scenario and LDL Scenario. These results show the travel time (in seconds) for the key corridors passing through the LDL site, as well as other key corridors outside the site that are influenced by the development and that link the LDL area to greater Toronto. In addition, the existing traffic condition is also analysed for establishing a context for comparisons. For an additional level of comparison, the Appendix contains the free flow travel time for the given corridors.

Table 6 below summarizes the travel time results for the key corridors within the LDL site.

Table 6: Travel Times (in seconds) for corridors within the LDL site

Corridor	AM			PM		
	Existing Condition	**Do Nothing Scenario**	**LDL Scenario**	**Existing Condition**	**Do Nothing Scenario**	**LDL Scenario**
Lake Shore Boulevard						
Eastbound	440	530	590	390	840	740
Westbound	340	440	480	330	560	530
Approx Length (km)	3.8	3.8	3.9	3.8	3.8	3.9
Queens Quay						
Eastbound	70	170	240	80	200	290
Westbound	70	220	360	70	300	250
Approx Length (km)	0.8	1.2	1.7	0.8	1.2	1.7
Villiers Street (Cherry Street to Don Roadway)						
Eastbound	60	130	120	30	90	90
Westbound	60	350	90	60	110	90
Approx Length (km)	0.7	0.7	0.8	0.4	0.7	0.8
Commissioners Street (Don Roadway to Leslie Street)						
Eastbound	170	250	210	240	350	440
Westbound	160	230	210	200	270	340
Approx Length (km)	1.7	1.7	1.7	1.7	1.7	1.7
Cherry Street						
Northbound	220	610	440	230	380	370
Southbound	220	370	360	240	410	430
Approx Length (km)	2.3	2.4	2.4	2.3	2.4	2.4

The results show the following key points:

- There is an increase in congestion between the Existing Condition and the two future scenarios. This is shown by the increase in travel times between the Existing Condition and Do Nothing scenario. This increase in congestion is to be expected given the growth in background traffic that takes place over time as well as the increased development along the waterfront.
- The LDL Scenario has comparable travel times when compared with the Do Nothing Scenario. The largest travel time increase is 140 seconds which occurs along Queens Quay in the AM peak hour. This increase is partly due to the longer length of Queens Quay in the LDL Scenario.
- The northbound Cherry Street movement in the AM peak hour under the Do Nothing Scenario has a higher travel time when compared to the LDL Scenario. This long delay is a result of high traffic demand south of the Keating Channel with limited route choices to cross the Channel.
- The eastbound movement on Lake Shore Boulevard has a higher travel time in the LDL scenario when compared to the Do Nothing Scenario in the AM Peak. This is likely a result of trips within the LDL development that cannot make it to the Lake Shore Boulevard due to congestion on Cherry Street and Don Roadway in the Do Nothing Scenario. This high travel time also indicates that the six through-travel lanes, with off-peak parking and turn lanes are needed.

Table 7 summarizes the travel time results for the key corridors outside the LDL site.

Table 7: Travel Times (in seconds) for corridors outside of the LDL site

Corridor	AM			PM		
	Existing Condition	**Do Nothing Scenario**	**LDL Scenario**	**Existing Condition**	**Do Nothing Scenario**	**LDL Scenario**
Queen Street						
Eastbound	410	430	440	450	440	450
Westbound	430	490	480	440	470	450
Approx Length (km)	3.6	3.6	3.6	3.6	3.6	3.6
Richmond Street						
Westbound	140	140	150	140	200	190
Approx Length (km)	1.4	1.4	1.4	1.4	1.4	1.4
Adelaide Street						
Eastbound	120	120	120	130	150	180
Approx Length (km)	1.6	1.6	1.6	1.6	1.6	1.6
King Street						
Eastbound	180	200	200	210	270	270
Westbound	210	230	230	200	240	250
Approx Length (km)	1.6	1.6	1.6	1.6	1.6	1.6
Jarvis Street						
Northbound	250	270	290	320	490	550
Southbound	220	250	290	370	1090	970
Approx Length (km)	1.1	1.1	1.1	1.1	1.1	1.1
Parliament Street						
Northbound	130	180	190	140	220	250
Southbound	160	200	220	150	280	250
Approx Length (km)	1.0	1.0	1.0	1.0	1.0	1.0
Eastern Avenue						
Eastbound	190	210	230	190	200	200
Westbound	170	220	210	180	180	190
Approx Length (km)	2.2	2.2	2.2	2.2	2.2	2.2
Leslie Street						
Northbound	190	210	230	190	200	200
Southbound	170	220	210	180	180	190
Approx Length (km)	1.5	1.5	1.5	1.5	1.5	1.5

These results show the following:

- There are minor changes between the Do Nothing and LDL Scenario.
- Key corridors at the edge of the model, notably Jarvis Street in the PM peak hour, experience increased level of congestion under the two future scenarios when compared to the Existing Condition, which translates to longer travel times.

3.2.3 Observations/Findings

The results show that in the future, there is an increased level of congestion present in both the Do Nothing and LDL Scenarios.

The Do Nothing Scenario has some problem areas where the overall intersection delay or approach delay reached LOS E or F. These problem areas are located primarily at the crossings of the Keating Channel. The increased delay in the Do Nothing Scenario is due to the distribution of development which is focused just south of the Keating Channel. This distribution places most of the vehicular demand on the Channel crossing at Cherry Street which is limited in its ability to handle the demand given all the various users at this intersection. In the LDL scenario, some of the overall development is distributed north of the Channel which reduces the overall demand crossing the channel. The remaining demand originating from or destined south of the channel is then provided with an additional crossing at Munitions Street which helps relieve some of the pressure at Cherry Street and Don Roadway.

Travel time increases are consistent between the Do Nothing Scenario and the LDL Scenario. Key corridors at the edge of the model, notably Jarvis Street in the PM peak hour, experience increased level of congestion under the two future scenarios when compared to the Existing Condition, which translates to longer travel times within the entire study area. This is likely due to the significant increase in demand throughout the network, but could partly be due to the fact that these streets are on the boundaries of the model network.

3.3 Transit

3.3.1 Outputs

As part of the East Bayfront Environmental Assessment, TTC generated a ridership forecast for the Do Nothing Scenario. The results of this analysis are summarized below in Figure 5.

Figure 5: AM Peak Hour Ridership Forecast (Source: TTC)

The results show that in the Do Nothing Scenario, the peak forecast ridership of 4,250 passengers will occur along the westbound movement at Queens Quay just east of Jarvis Street. TTC has set their transit service in and around the LDL-site based on this peak ridership number and the provision of service is sufficient to meet the expected peak demands.

To test the net increase in trips as a result of the LDL Scenario, TTC performed a similar analysis as described above with the results presented in Figure 6.

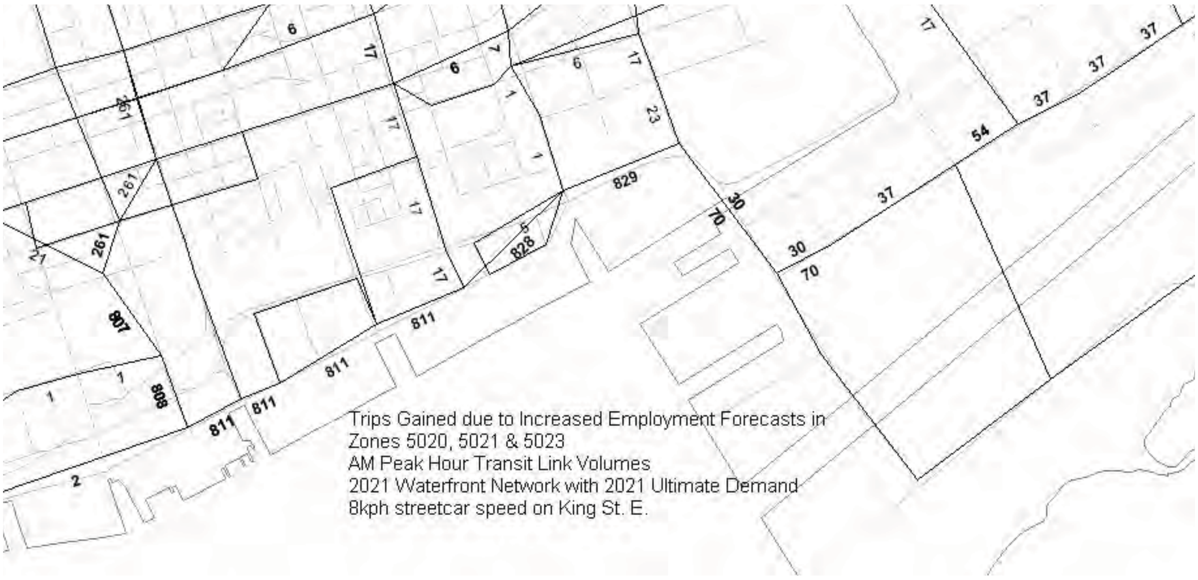

Figure 6: AM Peak Hour Trips Gained in LDL Scenario (Source: TTC)

These results show that there is no net increase in trips at the peak location in the peak direction of travel as a result of the increased employment development in the LDL Scenario. This result is due to the fact that new employment will generate trips towards the site in the AM Peak hour as opposed to away from the site.

3.3.1.1 Queens Quay at Cherry Street

The proposed streetcar service noted above will result in a large volume of streetcars crossing the Keating Channel at Cherry Street in both the AM and PM peak hour.

The microsimulation model was used to determine if the streetcar network and signals are adequate to handle the proposed service. The streetcar delay at the key approaches to the intersection of Queens Quay at Cherry Street was compared to the proposed headway. If the delay is less than the headway, then the streetcar service is sufficient.

Table 8: Streetcar delay (in seconds) for approaches to Queens Quay/Cherry Street

	AM			**PM**		
Approach	**Headway (sec)**	**Do Nothing Scenario Delay (sec)**	**LDL Scenario Delay (sec)**	**Headway (sec)**	**Do Nothing Scenario Delay (sec)**	**LDL Scenario Delay (sec)**
Queens Quay EB	240	37	61	240	41	63
Cherry Street NB	171	44	42	171	40	39
Cherry Street SB	600	41	92	600	48	9

The results show the following:

- The largest delay occurs at Cherry Street SB where each streetcar experiences an average of 92 seconds of delay. This is still far less than the 600 second headway.
- Cherry Street NB is the busiest approach for streetcars. At this location, no streetcar experiences a delay greater than 44 seconds. This is much less than the 171 second headway which confirms that all streetcars are able to pass through this intersection.

3.3.2 Observations/Findings

The results show that the TTC's forecasted service as planned for the Do Nothing Scenario is also adequate for the LDL Scenario. Furthermore, the configuration of Queens Quay and Cherry Street is adequate to handle the forecasted service.

The results also show that the LDL scenario has a better balance between employees and residents.

3.4 LDL (High) Scenario

A third scenario was studied – the LDL (High) Scenario which represents a build out of a higher level of intensity. The LDL (High) Scenario is forecast to add 400 to 600 new auto trips to the 27,000 AM and 31,000 PM trips already in the LDL Scenario. This increase is considered relatively small and comparable to the increase in trips between the Do Nothing Scenario and the LDL Scenario. This result would increase the travel time on key corridors, to the same degree the increase between the Do Nothing Scenario and the LDL Scenario which is relatively minor.

The LDL (High) Scenario is forecast to add 600 to 850 additional transit trips to the transit system in the AM Peak hour. Most of these trips would be added to the 4,250 trips in the peak direction. With a capacity of 260 passengers per train, this increase would result in a requirement of an additional 3 trains per hour.

For roadways and the transit system, both are expected to perform well for either the LDL Scenario or LDL (High) Scenario.

4 Summary of Findings

Three future scenarios were analysed using a microsimulation model and the TTC's operational model. The findings from these analyses are summarized below.

- The distribution of development in the LDL Scenario reduces the future traffic demand crossing Keating Channel which is constrained with limited crossings.
- The addition of the Munition Street vehicular crossing in the LDL Scenario improves the connectivity between the neighbourhoods north and south of the Keating Channel.
- The LDL Scenario does not result in a significant increase in delay and travel times when compared to the Do Nothing Scenario.
- No movement in the LDL site operate at LOS E or worse in the LDL Scenario
- Key corridors at the edge of the study area, notably Jarvis Street in the PM peak hour, experience increased level of congestion under the two future scenarios when compared to the Existing Condition. This is likely due to the significant increase in demand throughout the network.
- The LDL scenarios represent an increase in development, primarily employment, when compared to the Do Nothing Scenario. This increase, however, creates a better balance between employment and residential development which improves utilization of off-peak direction transit service.
- The transit demand in the LDL Scenario can be accommodated by the planned service level for the Central Waterfront Secondary Plan development density.
- The configuration of Queens Quay and Cherry Street is adequate to handle the forecasted service.
- The LDL(High) Scenario results in the need for three additional trains in the peak direction in the AM Peak hour.

These findings show that the process of refining the LDL site has not adversely affected the transportation system when compared to the Central Waterfront Secondary Plan as approved by the City in 2003. Furthermore, the refinements made as part of the design process has provided a transportation system that meets the needs of all users and works under the numerous physical constraints on site.

Appendix A

Transportation Analysis Supporting Documentation

A1 LDL Microsimulation Model Performance Measures for Alternative Evaluation

To	City of Toronto Waterfront Toronto	Reference number	
cc	MVVA	File reference	
From		Date	March 27, 2009
Subject	LDL Microsimulation Model Performance Measures for Alternative Evaluation		

The attached table provides a sample output from the model that will be used to inform the transportation section of the evaluation criteria. This output will contain performance measures that will be used in conjunction with screen shots and 3-D videos to communicate the impact on the transportation network as a result of the various alternatives associated with the Lower Don Lands (LDL) development.

The model output will be broken down into the following sections in order of ascending detail:

- Network-wide results
- Transit-line results
- Corridor results
- Key Intersection results

Each section will contain additional detail as summarized below. Please note that the sample output shows one line, corridor or facility for example purposes. The final output will contain a more complete list as agreed upon by the City.

The delay for various movements is calculated as the difference in modeled (ie actual) travel time and the free-flow travel time and is reported in seconds.

Network-wide results

This section will contain weighted results of all the key intersections in the study area. This section will focus on network-wide performance measures and will include the following:

- Person delay – a weighted average that takes into account the delay experienced by transit and vehicle users. This takes into account the fact that transit vehicles carry more passengers compared to vehicles.
- Transit delay – delay experienced by transit vehicles.
- Vehicle – delay experienced by vehicles including passenger cars, taxis and trucks.

Transit Line Results

This section will contain specific results for the major transit lines within the study area and will include:

- Free Flow Travel Time – the time it takes a transit vehicle to travel along its route without congestion. This travel time includes dwell time.
- Modeled Travel Time – the actual time for transit vehicles to travel along its route including the effects of congestion. If there is no congestion, the modeled travel time will equal the free flow travel time. This travel time includes dwell time.

The proposed streetcar routes, as shown in the map at the end of memo, subject to review are:
Existing Line 504 Broadview – King to Broadview: Operating between Dundas West Station and Broadview Station via King St.
Proposed Branch of Line 504 Lower Don Lands – King to Cherry to Commissioners: Operating along King St. and Cherry to Commissioners serving the Lower Don Lands and West Don Lands precincts.
Proposed Line 517 – Unwin: Operating between Union Station and Unwin Ave. via Queens Quay East
Proposed Line 523 – Leslieville: Operating between Union Station and Queen St. East via Queens Quay East, Commissioners St., and Leslie St.
Proposed Line 524 – Broadview: Operating between Broadview Station and Unwin Ave. via Broadview Ave.

Corridor Results
This section will contain specific vehicular results for the major corridors within the study area and will include:

- Free flow travel time - for vehicles as described above
- Modeled travel time – for vehicles as described above

The proposed east-west key corridors, as shown in the map at the end of memo, subject to review are:

- *Queen Street*
- *Richmond Street*
- *Adelaide Street*
- *King Street*
- *Lake Shore Boulevard*
- *Queens Quay*
- *Villiers (between Cherry and Don Roadway)*
- *Commissioners (between Don Roadway and Leslie Street)*
- *Eastern Avenue*

The proposed north-south key corridors, as shown in the map at the end of memo, subject to review are:

- *Jarvis Street*
- *Parliament Street*
- *Cherry Street*
- *Leslie Street*

Key Intersections
Key intersections have been identified and separated into two groups: Level I and Level II. The data collected will be the same for both groups. Level I intersections will be analyzed and the information will be presented to the community. Level II intersections will be used as supporting analysis for the technical team, including the City, but will not be presented to the community. This section will contain specific results for the key intersections within the study area and will include:

- Person delay – as described above
- Transit delay – as described above
- Vehicle delay – as described above
- Pedestrian Crossing Time – the time allocated for pedestrians to cross the specific approach.
- Pedestrian Wait Time between phases – the time between the end of the walk phase and the start of the next walk phase.

The proposed list Level I intersections, as shown in the map at the end of memo, are:

- *Queen Street at Jarvis Street*
- *Queen Street at Parliament Street*
- *Queen Street at King Street*
- *Queen Street at Broadview Avenue*
- *Queen Street at Carlaw Avenue*
- *Queen Street at Leslie Street*
- *Richmond Street at Jarvis Street*
- *Richmond Street at Parliament Street*
- *Adelaide Street at Jarvis Street*
- *Adelaide Street at Parliament Street*
- *King Street at Jarvis Street*
- *King Street at Parliament Street*
- *King Street at River Street*
- *Eastern Avenue at Broadview Avenue*
- *Lake Shore Boulevard at Lower Jarvis Street*
- *Lake Shore Boulevard at Lower Sherbourne Street*
- *Lake Shore Boulevard at Parliament Street*
- *Lake Shore Boulevard at Cherry Street*
- *Lake Shore Boulevard at Queens Quay*
- *Lake Shore Boulevard at Don Roadway*
- *Lake Shore Boulevard at Carlaw Street*
- *Lake Shore Boulevard at Leslie Street*
- *Queens Quay at Lower Jarvis Street*
- *Queens Quay at Lower Sherbourne Street*
- *Queens Quay at Lower Parliament Street*
- *Queens Quay at Cherry Street*
- *Villers Street at Cherry Street*
- *Villers Street at Munition Street*
- *Commissioners Street at Cherry Street*
- *Commissioners Street at Don Roadway*
- *Basin Street at Cherry Street*

The proposed list Level II intersections, as shown in the map at the end of memo, are:

- *Queen Street at Sherbourne Street*
- *Queen Street at Sumach Street*
- *Queen Street at River Street*
- *Richmond Street at Sherbourne Street*
- *Adelaide Street at Sherbourne Street*
- *King Street at Sherbourne Street*
- *King Street at Sumach Street*
- *Eastern Avenue at Carlaw Avenue*
- *Eastern Avenue at Leslie Street*
- *Lake Shore Boulevard at Broadview Avenue*
- *Commissioners Street at Saulter Street*
- *Commissioners Street at Carlaw Avenue*
- *Commissioners Street at Leslie Street*

Figure 1: Proposed Light Rail Lines along Future Road Network
Lower Don Lands, Toronto
March 2009

ARUP

Figure 2: Future Road Network

Lower Don Lands, Toronto

March 2009

Lower Don Lands Future Model Results

Goals

- Provide a Background of the Model
- Summarize Future Model Results
- Discussion
- Next Steps

Model Background: Extents

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Model Background

- Demand Inputs:
  - City of Toronto’s AM EMME Travel Patterns
  - AM Travel Patterns Inverted for PM
- Validation
  - To Industry Standard
  - Aggressive Targets Set

TORONTO City of Toronto City Planning, Transportation

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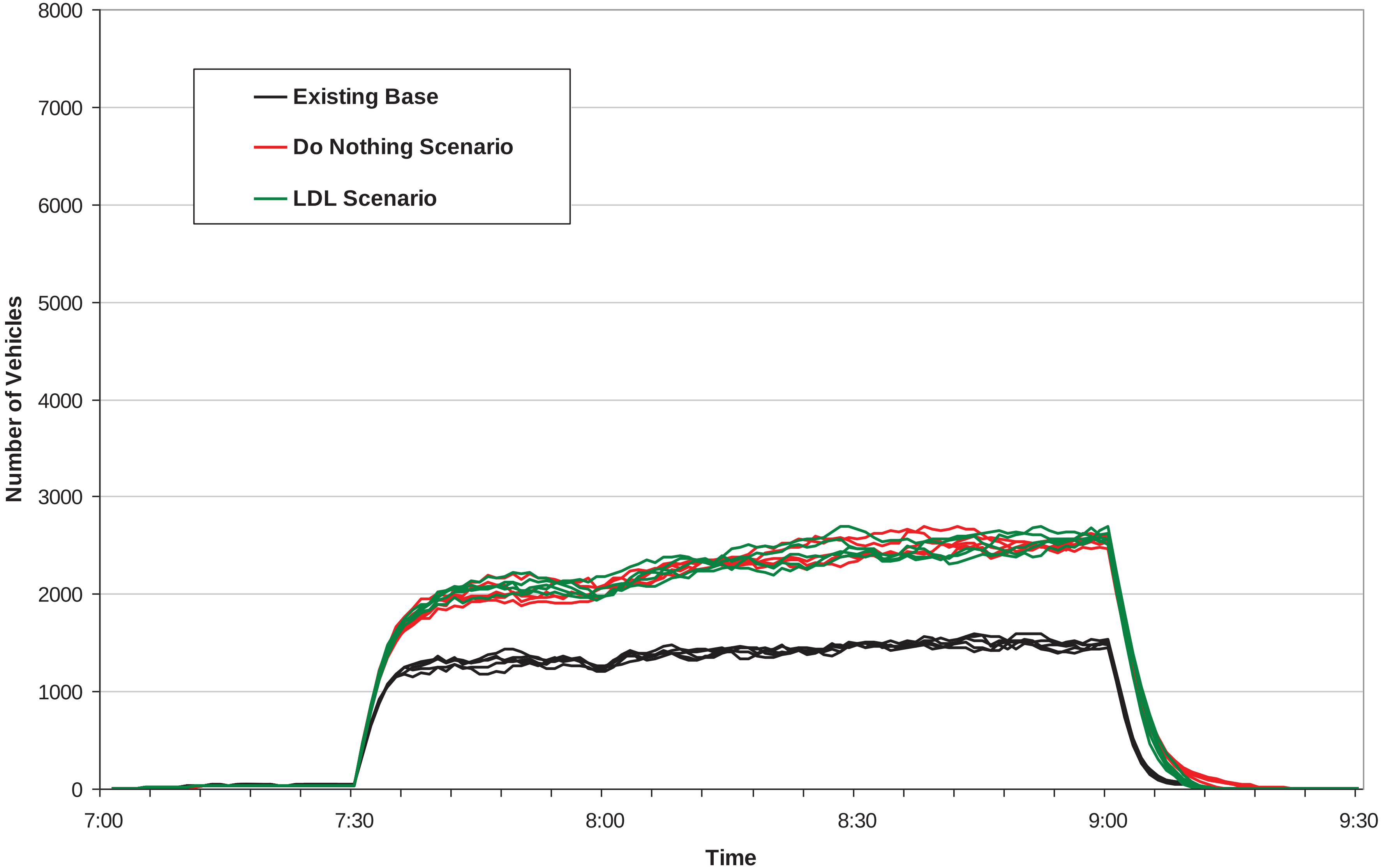
Model Background: Future Model Inputs

Source	*Commercial GFA (m2)*	*Employees*	*Res Units*	*Residents*
Do Nothing Scenario	106,280	3,190	12,410	19,860
LDL Scenario (Low)	243,760	8,500	12,030	19,250
LDL Scenario (High)	299,700	10,420	12,030	24,060

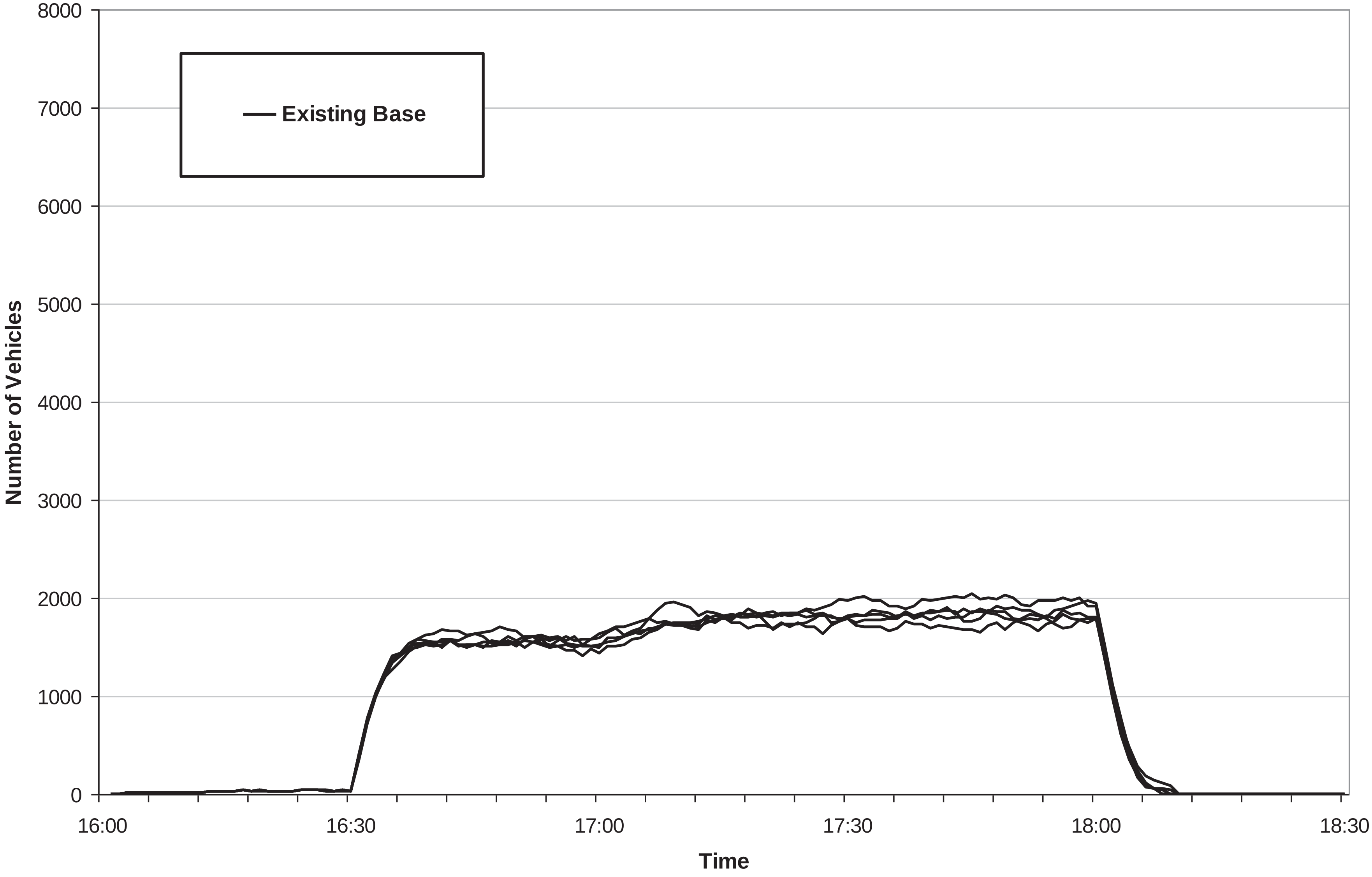
Model Background: Future Model Summary

Scenario	*Trips (vehicles/hour)*	
	AM	***PM***
2006	21,109	24,845
2031 Do Nothing Scenario	27,337	31,663
2031 LDL Scenario	27,956	32,411

Vehicles in the Network (AM)



Vehicles in the Network (PM)



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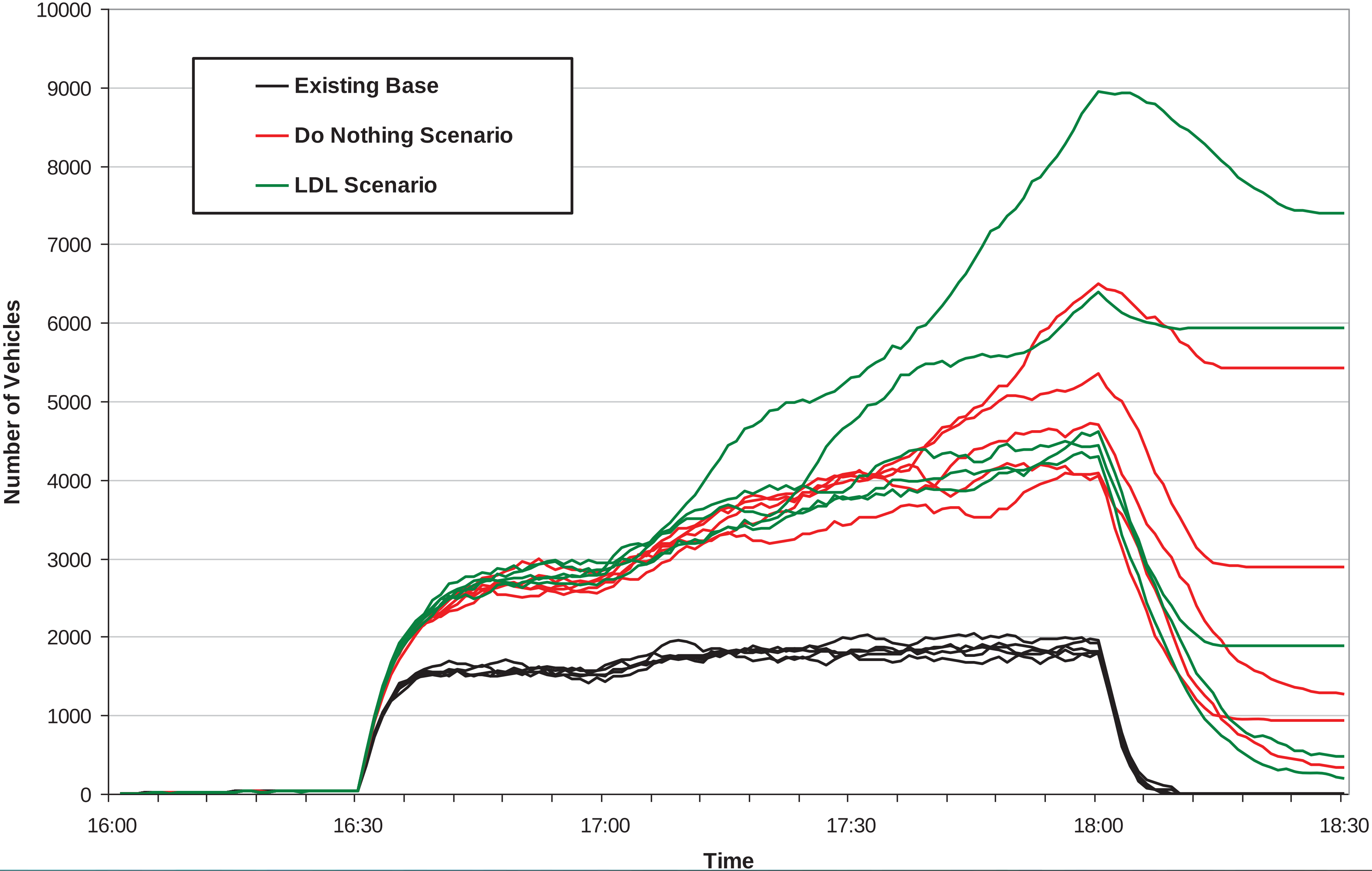
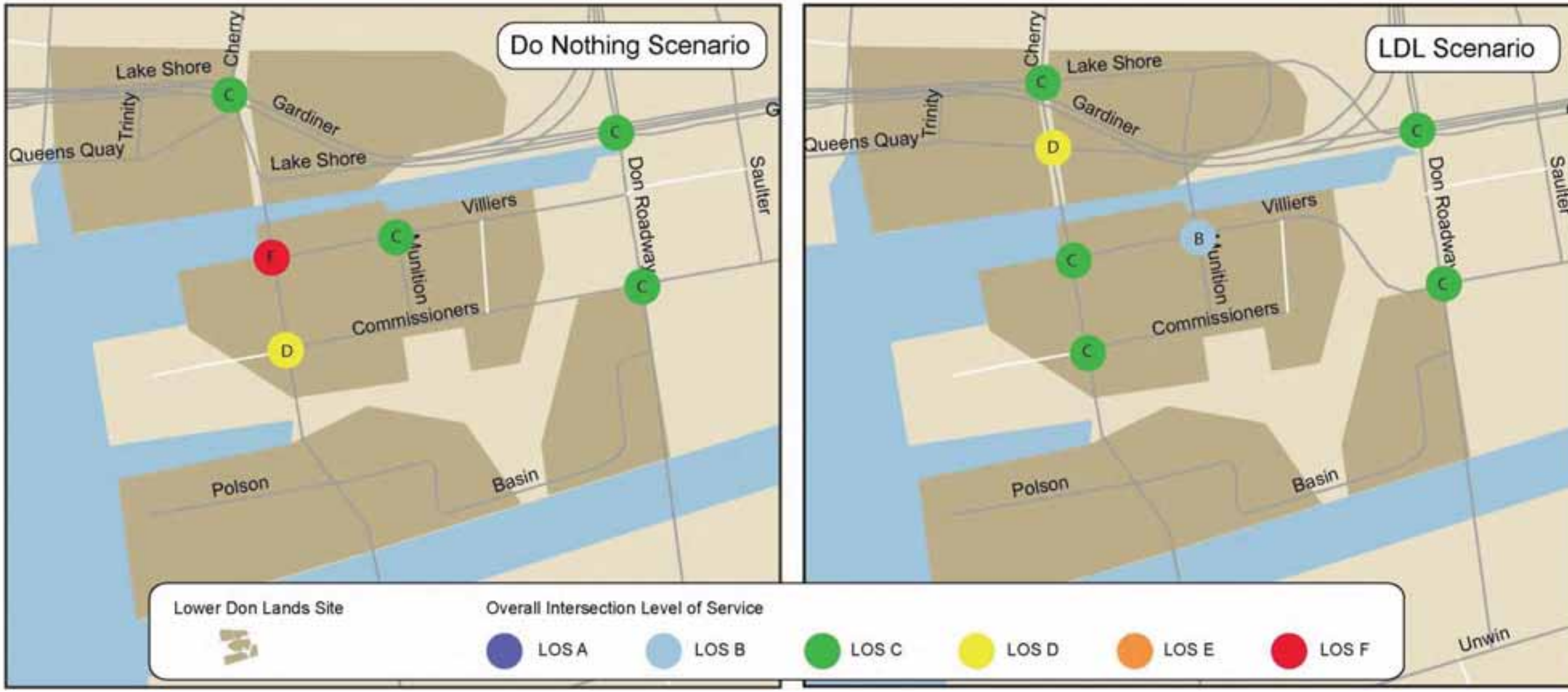
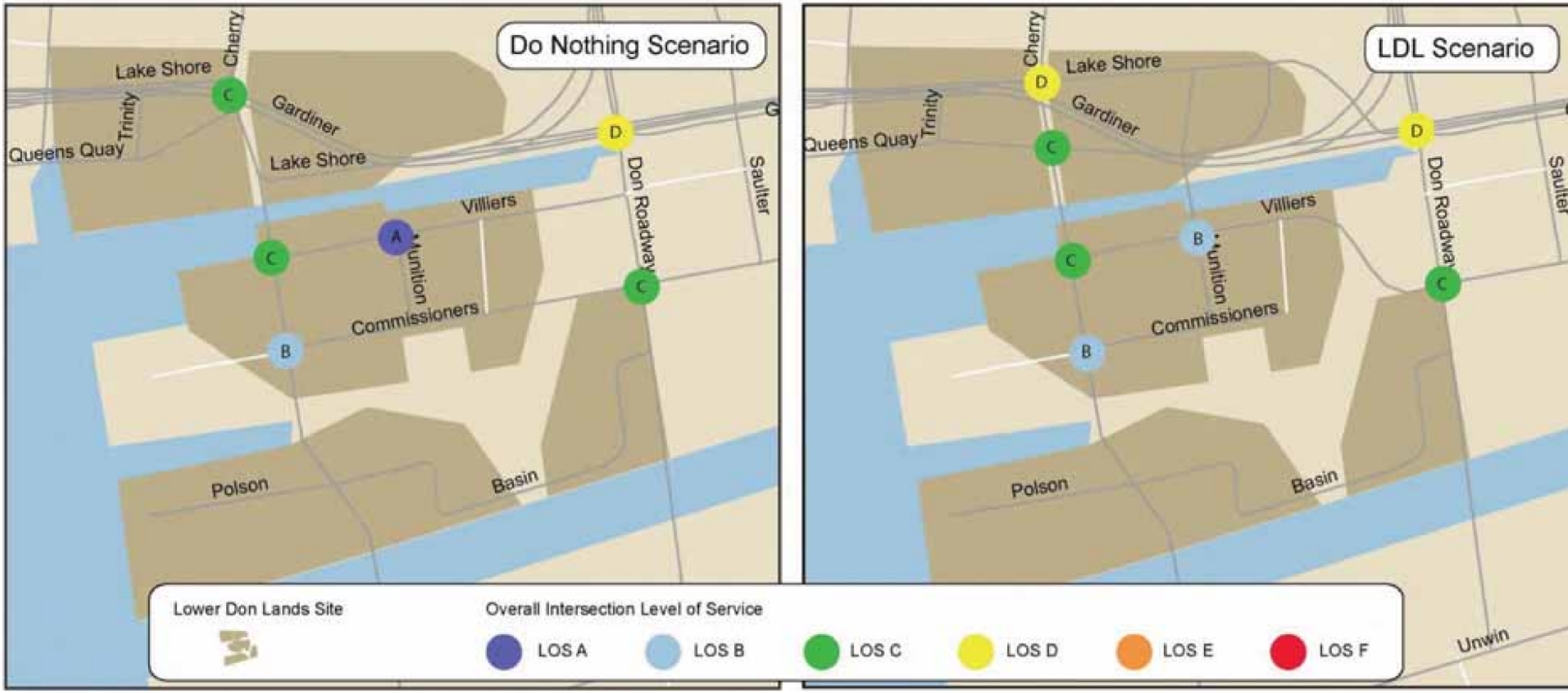
Vehicles in the Network (PM)



AM Level of Service



PM Level of Service



PM Simulation

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Next Steps

- Discussion of Impacts
- Discussion of Potential Alternatives
- How to Present These Results

Network-wide Results (weighted average of intersection approaches)

Measures	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Person Delay (sec)	*19*	*29*	*28*	*23*	*43*	*42*
Transit Delay (sec)	*23*	*31*	*31*	*27*	*40*	*40*
Vehicular Delay (sec)	*16*	*28*	*26*	*20*	*45*	*43*

Do Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Team - LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Alternative Evaluation Criteria

Transit Line Results:

Route	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Route 504 Existing Eastbound	*Free Flow Travel Time (sec)*	*499*	*507*	*507*	*499*	*497*	*497*
	Modeled Travel Time (sec)	*500*	*513*	*514*	*512*	*638*	*592*
	Modeled Speed (kph)	*16.9*	*16.5*	*16.4*	*16.5*	*13.2*	*14.3*

Approx Route Length (in model boundaries): 2.35 km *# of Stops : 9*

Route	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Route 504 Existing Westbound	*Free Flow Travel Time (sec)*	*494*	*501*	*501*	*513*	*518*	*518*
	Modeled Travel Time (sec)	*501*	*521*	*520*	*532*	*568*	*549*
	Modeled Speed (kph)	*16.9*	*16.2*	*16.3*	*15.9*	*14.9*	*15.4*

Approx Route Length (in model boundaries): 2.35 km *# of Stops : 9*

Route	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Route 504 New Eastbound	*Free Flow Travel Time (sec)*		*964*	*1190*		*1012*	*1232*
	Modeled Travel Time (sec)		*1118*	*1195*		*1341*	*1352*
	Modeled Speed (kph)		*16.8*	*15.8*		*14.0*	*13.9*

Approx Route Length (in model boundaries): 5.23 km *# of Stops : 14*

Route	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Route 504 New Westbound	*Free Flow Travel Time (sec)*		989	*1178*		1103	1311
	Modeled Travel Time (sec)		1150	*1205*		1304	1338
	Modeled Speed (kph)		*16.4*	*15.6*		*14.4*	*14.1*

Approx Route Length (in model boundaries): 5.23 km *# of Stops : 13*

Route	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Route 517 Eastbound	*Free Flow Travel Time (sec)*		735	*847*		696	819
	Modeled Travel Time (sec)		938	*869*		961	904
	Modeled Speed (kph)		*18.9*	*20.4*		*18.5*	*19.6*

Approx Route Length (in model boundaries): 4.93 km *# of Stops : 6*

Route	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Route 517 Westbound	*Free Flow Travel Time (sec)*		648	641		736	730
	Modeled Travel Time (sec)		818	640		905	738
	Modeled Speed (kph)		*21.7*	*27.7*		*19.6*	*24.0*

Approx Route Length (in model boundaries): 4.93 km *# of Stops : 7*

Route	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Route 523 Eastbound	*Free Flow Travel Time (sec)*		994	1105		978	1094
	Modeled Travel Time (sec)		1132	1120		1225	1210
	Modeled Speed (kph)		*16.6*	*16.8*		*15.4*	*15.5*

Approx Route Length (in model boundaries): 5.23 km *# of Stops : 10*

Route	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Route 523 Westbound	*Free Flow Travel Time (sec)*		984	1017		1062	1096
	Modeled Travel Time (sec)		1274	1180		1263	1158
	Modeled Speed (kph)		*14.8*	*15.9*		*14.9*	*16.3*

Approx Route Length (in model boundaries): 5.23 km *# of Stops : 10*

Route	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Route 524 Northbound	*Free Flow Travel Time (sec)*		357	357		352	352
	Modeled Travel Time (sec)		560	515		546	581
	Modeled Speed (kph)		*18.8*	*20.5*		*19.3*	*18.1*

Approx Route Length (in model boundaries): 2.93 km *# of Stops : 6*

Route	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Route 524 Southbound	*Free Flow Travel Time (sec)*		380	380		378	378
	Modeled Travel Time (sec)		400	396		434	443
	Modeled Speed (kph)		*26.4*	*26.6*		*24.3*	*23.8*

Approx Route Length (in model boundaries): 2.93 km *# of Stops : 5*

Do Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario - LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Corridor Results (vehicles only):

Corridor	Measure	Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Queen Street Eastbound	*Free Flow Travel Time (sec)*	*308*	*282*	*309*	*376*	*365*	*350*
	Modeled Travel Time (sec)	*415*	*432*	*439*	*453*	*444*	*447*
	Modeled Speed (kph)	*31.4*	*30.2*	*29.7*	*28.8*	*29.4*	*29.1*
	Approx Length (in model boundaries)	*3.62*	*3.62*	*3.62*			
Queen Street Westbound	*Free Flow Travel Time (sec)*	*369*	*373*	*392*	*344*	*365*	*367*
	Modeled Travel Time (sec)	*434*	*488*	*479*	*436*	*472*	*451*
	Modeled Speed (kph)	*30.0*	*26.7*	*27.2*	*29.9*	*27.6*	*28.9*
	Approx Length (in model boundaries)	*3.62*	*3.62*	*3.62*			
Richmond Street Westbound	*Free Flow Travel Time (sec)*	*112*	*112*	*108*	*115*	*112*	*114*
	Modeled Travel Time (sec)	*139*	*142*	*145*	*139*	*201*	*191*
	Modeled Speed (kph)	*35.8*	*35.1*	*34.3*	*35.8*	*24.7*	*26.0*
	Approx Length (in model boundaries)	*1.38*	*1.38*	*1.38*			
Adelaide Street Eastbound	*Free Flow Travel Time (sec)*	*118*	*115*	*117*	*112*	*114*	*112*
	Modeled Travel Time (sec)	*119*	*118*	*118*	*134*	*147*	*185*
	Modeled Speed (kph)	*49.2*	*49.3*	*49.3*	*43.6*	*39.9*	*31.6*
	Approx Length (in model boundaries)	*1.62*	*1.62*	*1.62*			
King Street Eastbound	*Free Flow Travel Time (sec)*	*121*	*133*	*118*	*129*	*166*	*152*
	Modeled Travel Time (sec)	*181*	*199*	*197*	*212*	*266*	*266*
	Modeled Speed (kph)	*31.6*	*28.8*	*29.1*	*27.0*	*21.5*	*21.5*
	Approx Length (in model boundaries)	*1.59*	*1.59*	*1.59*			
King Street Westbound	*Free Flow Travel Time (sec)*	*114*	*125*	*144*	*165*	*136*	*154*
	Modeled Travel Time (sec)	*209*	*231*	*229*	*204*	*236*	*247*
	Modeled Speed (kph)	*27.4*	*24.7*	*25.0*	*28.1*	*24.3*	*23.2*
	Approx Length (in model boundaries)	*1.59*	*1.59*	*1.59*			
Lake Shore Boulevard Eastbound	*Free Flow Travel Time (sec)*	*319*	*324*	*409*	*305*	*338*	*384*
	Modeled Travel Time (sec)	*439*	*530*	*593*	*385*	*838*	*737*
	Modeled Speed (kph)	*32.8*	*25.8*	*23.8*	*37.4*	*16.3*	*19.2*
	Approx Length (in model boundaries)	*4.01*	*3.80*	*3.92*			
Lake Shore Boulevard Westbound	*Free Flow Travel Time (sec)*	*294*	*341*	*332*	*310*	*354*	*363*
	Modeled Travel Time (sec)	*337*	*438*	*485*	*334*	*563*	*534*
	Modeled Speed (kph)	*40.4*	*31.1*	*27.5*	*40.8*	*24.2*	*25.0*
	Approx Length (in model boundaries)	*3.78*	*3.78*	*3.70*			
Queens Quay Eastbound	*Free Flow Travel Time (sec)*	*70*	*139*	*200*	*64*	*153*	*170*
	Modeled Travel Time (sec)	*73*	*169*	*237*	*80*	*202*	*292*
	Modeled Speed (kph)	*39.3*	*26.4*	*26.1*	*35.9*	*22.1*	*21.2*
	Approx Length (in model boundaries)	*0.80*	*1.24*	*1.72*			
Queens Quay Westbound	*Free Flow Travel Time (sec)*	*64*	*146*	*176*	*64*	*134*	*141*
	Modeled Travel Time (sec)	*69*	*221*	*358*	*68*	*301*	*251*
	Modeled Speed (kph)	*41.7*	*20.2*	*17.3*	*42.0*	*14.8*	*24.7*
	Approx Length (in model boundaries)	*0.80*	*1.24*	*1.72*			
Villiers Street (between Cherry Street and Don Roadway) Eastbound	*Free Flow Travel Time (sec)*	*58*	*74*	*95*	*57*	*71*	*87*
	Modeled Travel Time (sec)	*59*	*126*	*116*	*61*	*92*	*95*
	Modeled Speed (kph)	*42.3*	*19.9*	*27.7*	*41.0*	*27.3*	*34.0*
	Approx Length (in model boundaries)	*0.69*	*0.70*	*0.90*			
Villiers Street (between Cherry Street and Don Roadway) Westbound	*Free Flow Travel Time (sec)*	*53*	*76*	*85*	*59*	*64*	*85*
	Modeled Travel Time (sec)	*60*	*351*	*87*	*63*	*107*	*87*
	Modeled Speed (kph)	*41.7*	*7.2*	*33.8*	*39.4*	*23.5*	*33.6*
	Approx Length (in model boundaries)	*0.69*	*0.70*	*0.81*			
Commissioners Street (between Don Roadway and Leslie Street) Eastbound	*Free Flow Travel Time (sec)*	*136*	*201*	*194*	*168*	*209*	*213*
	Modeled Travel Time (sec)	*167*	*252*	*214*	*169*	*348*	*442*
	Modeled Speed (kph)	*37.9*	*24.9*	*29.3*	*37.4*	*18.0*	*14.2*
	Approx Length (in model boundaries)	*1.76*	*1.74*	*1.74*			
Commissioners Street (between Don Roadway and Leslie Street) Westbound	*Free Flow Travel Time (sec)*	*156*	*199*	*198*	*123*	*198*	*205*
	Modeled Travel Time (sec)	*155*	*231*	*213*	*158*	*271*	*343*
	Modeled Speed (kph)	*40.7*	*27.1*	*29.4*	*39.9*	*23.2*	*18.3*
	Approx Length (in model boundaries)	*1.76*	*1.74*	*1.74*			

Do Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario - LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Eastern Avenue Eastbound	*Free Flow Travel Time (sec)*	*161*	*156*	*158*	*144*	*144*	*144*
	Modeled Travel Time (sec)	*190*	*213*	*232*	*185*	*199*	*201*
	Modeled Speed (kph)	*41.4*	*37.0*	*33.9*	*42.5*	*39.6*	*39.2*
	Approx Length (in model boundaries)	*2.19*	*2.19*	*2.19*			
Eastern Avenue Westbound	*Free Flow Travel Time (sec)*	*152*	*150*	*152*	*159*	*158*	*156*
	Modeled Travel Time (sec)	*168*	*218*	*209*	*181*	*184*	*187*
	Modeled Speed (kph)	*50.3*	*38.7*	*40.3*	*46.7*	*46.0*	*45.1*
	Approx Length (in model boundaries)	*2.34*	*2.34*	*2.34*			
Jarvis Street Northbound	*Free Flow Travel Time (sec)*	*160*	*152*	*147*	*165*	*167*	*151*
	Modeled Travel Time (sec)	*253*	*271*	*287*	*319*	*490*	*546*
	Modeled Speed (kph)	*16.1*	*15.1*	*14.3*	*12.8*	*8.3*	*7.5*
	Approx Length (in model boundaries)	*1.14*	*1.14*	*1.14*			
Jarvis Street Southbound	*Free Flow Travel Time (sec)*	*151*	*154*	*168*	*158*	*154*	*163*
	Modeled Travel Time (sec)	*218*	*254*	*293*	*369*	*1090*	*971*
	Modeled Speed (kph)	*18.7*	*16.1*	*14.0*	*11.1*	*3.8*	*4.2*
	Approx Length (in model boundaries)	*1.14*	*1.14*	*1.14*			
Parliament Street Northbound	*Free Flow Travel Time (sec)*	*118*	*162*	*140*	*116*	*173*	*188*
	Modeled Travel Time (sec)	*132*	*182*	*190*	*144*	*221*	*246*
	Modeled Speed (kph)	*24.5*	*20.1*	*19.0*	*22.6*	*16.6*	*14.7*
	Approx Length (in model boundaries)	*0.90*	*1.02*	*1.00*			
Parliament Street Southbound	*Free Flow Travel Time (sec)*	*146*	*169*	*158*	*130*	*147*	*131*
	Modeled Travel Time (sec)	*157*	*199*	*221*	*149*	*280*	*246*
	Modeled Speed (kph)	*20.7*	*18.4*	*16.3*	*21.8*	*13.1*	*14.7*
	Approx Length (in model boundaries)	*0.90*	*1.02*	*1.00*			
Cherry Street Northbound	*Free Flow Travel Time (sec)*	*199*	*280*	*293*	*216*	*280*	*258*
	Modeled Travel Time (sec)	*219*	*605*	*443*	*231*	*375*	*365*
	Modeled Speed (kph)	*37.0*	*13.9*	*19.3*	*35.2*	*22.5*	*23.5*
	Approx Length (in model boundaries)	*2.25*	*2.34*	*2.38*			
Cherry Street Southbound	*Free Flow Travel Time (sec)*	*212*	*274*	*224*	*224*	*316*	*275*
	Modeled Travel Time (sec)	*223*	*366*	*357*	*238*	*407*	*428*
	Modeled Speed (kph)	*36.4*	*23.2*	*24.0*	*34.1*	*20.8*	*20.0*
	Approx Length (in model boundaries)	*2.26*	*2.36*	*2.38*			
Leslie Street Northbound	*Free Flow Travel Time (sec)*	*145*	*155*	*163*	*157*	*167*	*166*
	Modeled Travel Time (sec)	*175*	*281*	*188*	*183*	*283*	*353*
	Modeled Speed (kph)	*30.5*	*19.0*	*28.3*	*29.0*	*18.8*	*15.1*
	Approx Length (in model boundaries)	*1.48*	*1.48*	*1.48*			
Leslie Street Southbound	*Free Flow Travel Time (sec)*	*137*	*155*	*158*	*112*	*129*	*136*
	Modeled Travel Time (sec)	*173*	*358*	*348*	*175*	*244*	*209*
	Modeled Speed (kph)	*30.7*	*14.9*	*15.3*	*30.5*	*21.8*	*25.5*
	Approx Length (in model boundaries)	*1.48*	*1.48*	*1.48*			

Notes:
Delay is measured as: Actual Travel Time - Free Flow Travel Time
Person Delay is a weighted average of delay experienced by transit users and vehicle users
Transit delay is the delay experienced by buses and streetcars
Vehicle delay is the delay experienced by vehicles

Detailed Intersection Results .

Key Intersections Level I:

Queen Street at Jarvis Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Queen Street EB	Auto & Truck Volumes	310	329	336	529	486	605
	Bus & Streetcar Volumes	12	12	12	10	8	10
	Person Delay (sec)	22.83	23.99	23.62	48.77	79.55	34.41
	Transit Delay (sec)	26.56	28.28	28.16	47.97	54.48	38.76
	Vehicle Delay (sec)	12.31	12.62	11.82	49.86	110.84	29.17
	Level of Service	B	B	B	D	F	C
	Pedestrian Crossing Time (sec)	26	26	26	23	23	23
	Ped wait time between phases (sec)	44	44	44	47	47	47
Queen Street WB	Auto & Truck Volumes	590	765	760	485	553	638
	Bus & Streetcar Volumes	17	17	17	14	11	15
	Person Delay (sec)	22.29	23.58	23.98	33.82	32.45	33.36
	Transit Delay (sec)	26.40	26.82	26.41	40.72	41.34	42.11
	Vehicle Delay (sec)	13.68	18.33	20.08	19.11	19.17	18.87
	Level of Service	B	B	C	B	B	B
	Pedestrian Crossing Time (sec)	26	26	26	23	23	23
	Ped wait time between phases (sec)	44	44	44	47	47	47
Jarvis Street NB	Auto & Truck Volumes	812	926	948	1112	818	898
	Bus & Streetcar Volumes	0	0	0	1	0	1
	Person Delay (sec)	8.50	10.16	10.22	10.07	8.42	9.16
	Transit Delay (sec)	0.00	0.00	0.00	12.98	0.00	12.84
	Vehicle Delay (sec)	8.50	10.16	10.22	9.88	8.42	8.86
	Level of Service	A	B	B	A	A	A
	Pedestrian Crossing Time (sec)	32	32	32	35	35	35
	Ped wait time between phases (sec)	38	38	38	35	35	35
Jarvis Street SB	Auto & Truck Volumes	1096	1165	1200	782	557	642
	Bus & Streetcar Volumes	3	3	3	0	0	0
	Person Delay (sec)	9.82	10.28	12.41	36.75	127.31	102.67
	Transit Delay (sec)	4.92	5.25	4.98	0.00	0.00	0.00
	Vehicle Delay (sec)	10.79	11.23	13.76	36.75	127.31	102.67
	Level of Service	B	B	B	D	F	F
	Pedestrian Crossing Time (sec)	32	32	32	35	35	35
	Ped wait time between phases (sec)	38	38	38	35	35	35

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Queen Street at Parliament Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Queen Street EB	Auto & Truck Volumes	193	263	264	430	502	597
	Bus & Streetcar Volumes	12	12	12	10	8	10
	Person Delay (sec)	26.03	24.10	24.96	13.81	14.21	14.44
	Transit Delay (sec)	31.04	30.46	31.44	16.99	16.50	16.46
	Vehicle Delay (sec)	3.32	2.95	3.54	8.32	11.66	11.98
	Level of Service	A	A	A	A	B	B
	Pedestrian Crossing Time (sec)	37	37	37	36	36	36
	Ped wait time between phases (sec)	33	33	33	34	34	34
Queen Street WB	Auto & Truck Volumes	473	661	702	280	294	300
	Bus & Streetcar Volumes	17	17	17	15	14	15
	Person Delay (sec)	16.59	15.56	15.12	20.07	19.78	18.74
	Transit Delay (sec)	20.18	19.93	19.60	23.29	23.00	22.07
	Vehicle Delay (sec)	7.18	7.58	7.31	7.53	8.38	6.61
	Level of Service	A	A	A	A	A	A
	Pedestrian Crossing Time (sec)	37	37	37	36	36	36
	Ped wait time between phases (sec)	33	33	33	34	34	34
Parliament Street NB	Auto & Truck Volumes	380	392	384	553	565	636
	Bus & Streetcar Volumes	3	3	3	5	4	4
	Person Delay (sec)	23.84	29.25	23.90	28.13	27.89	43.40
	Transit Delay (sec)	52.00	64.16	51.65	35.83	35.55	50.43
	Vehicle Delay (sec)	5.52	7.20	6.02	23.07	24.27	40.59
	Level of Service	A	A	A	C	C	D
	Pedestrian Crossing Time (sec)	21	21	21	22	22	22
	Ped wait time between phases (sec)	49	49	49	48	48	48
Parliament Street SB	Auto & Truck Volumes	306	291	282	298	297	287
	Bus & Streetcar Volumes	4	4	4	5	5	5
	Person Delay (sec)	23.93	25.28	25.83	25.39	27.87	25.44
	Transit Delay (sec)	34.43	37.03	38.03	35.12	38.95	33.08
	Vehicle Delay (sec)	13.93	13.52	13.22	13.47	14.30	15.72
	Level of Service	B	B	B	B	B	B
	Pedestrian Crossing Time (sec)	21	21	21	22	22	22
	Ped wait time between phases (sec)	49	49	49	48	48	48

Queen Street at Broadview Avenue		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Queen Street EB	Auto & Truck Volumes	303	486	462	483	679	704
	Bus & Streetcar Volumes	23	23	23	26	20	24
	Person Delay (sec)	32.80	33.33	34.06	30.02	26.84	26.88
	Transit Delay (sec)	36.61	38.48	39.29	34.74	33.21	31.65
	Vehicle Delay (sec)	11.94	15.69	15.46	11.49	13.17	15.04
	Level of Service	B	B	B	B	B	B
	Pedestrian Crossing Time (sec)	36	36	36	39	39	39
	Ped wait time between phases (sec)	34	34	34	31	31	31
Queen Street WB	Auto & Truck Volumes	329	588	573	454	613	582
	Bus & Streetcar Volumes	26	24	24	19	18	19
	Person Delay (sec)	21.75	24.11	24.51	18.88	22.83	24.99
	Transit Delay (sec)	23.33	26.14	26.66	21.54	25.20	28.60
	Vehicle Delay (sec)	12.63	18.07	17.84	10.77	17.67	16.41
	Level of Service	B	B	B	B	B	B
	Pedestrian Crossing Time (sec)	36	36	36	39	39	39
	Ped wait time between phases (sec)	34	34	34	31	31	31
Broadview Avenue NB	Auto & Truck Volumes	462	463	491	493	506	532
	Bus & Streetcar Volumes	0	14	7	0	12	7
	Person Delay (sec)	24.75	46.23	42.31	19.90	35.41	32.18
	Transit Delay (sec)	0.00	49.85	53.20	0.00	39.83	34.38
	Vehicle Delay (sec)	24.75	38.35	30.68	19.90	27.57	30.22
	Level of Service	C	D	C	B	C	C
	Pedestrian Crossing Time (sec)	22	22	22	19	19	19
	Ped wait time between phases (sec)	48	48	48	51	51	51
Broadview Avenue SB	Auto & Truck Volumes	280	350	348	192	307	328
	Bus & Streetcar Volumes	6	13	13	6	13	13
	Person Delay (sec)	16.92	24.98	23.99	20.65	28.47	25.74
	Transit Delay (sec)	19.95	29.46	28.06	22.71	32.32	29.48
	Vehicle Delay (sec)	12.20	12.86	12.92	15.96	16.61	14.91
	Level of Service	B	B	B	B	B	B
	Pedestrian Crossing Time (sec)	22	22	22	19	19	19
	Ped wait time between phases (sec)	48	48	48	51	51	51

Queen Street at Carlaw Avenue		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Queen Street EB	Auto & Truck Volumes	299	291	310	432	588	596
	Bus & Streetcar Volumes	16	16	16	14	12	14
	Person Delay (sec)	21.89	23.15	22.22	18.07	20.80	19.79
	Transit Delay (sec)	25.23	26.04	25.00	22.20	28.39	26.70
	Vehicle Delay (sec)	8.87	11.59	11.79	8.33	9.52	8.39
	Level of Service	A	B	B	A	A	A
	Pedestrian Crossing Time (sec)	26	26	26	23	23	23
	Ped wait time between phases (sec)	44	44	44	47	47	47
Queen Street WB	Auto & Truck Volumes	412	867	781	434	440	431
	Bus & Streetcar Volumes	25	25	25	18	18	18
	Person Delay (sec)	19.69	24.11	21.12	31.80	31.49	31.06
	Transit Delay (sec)	22.38	26.30	23.57	37.38	37.23	36.67
	Vehicle Delay (sec)	7.81	19.51	15.51	14.95	14.40	13.98
	Level of Service	A	B	B	B	B	B
	Pedestrian Crossing Time (sec)	41	41	41	40	40	40
	Ped wait time between phases (sec)	29	29	29	30	30	30
Carlaw Avenue NB	Auto & Truck Volumes	158	292	307	468	488	501
	Bus & Streetcar Volumes	5	0	0	4	0	0
	Person Delay (sec)	69.48	32.60	31.98	45.95	25.63	27.07
	Transit Delay (sec)	86.88	0.00	0.00	82.36	0.00	0.00
	Vehicle Delay (sec)	29.28	32.60	31.98	23.30	25.63	27.07
	Level of Service	C	C	C	C	C	C
	Pedestrian Crossing Time (sec)	17	17	17	18	18	18
	Ped wait time between phases (sec)	53	53	53	52	52	52
Carlaw Avenue SB	Auto & Truck Volumes	389	422	414	335	461	441
	Bus & Streetcar Volumes	10	10	10	9	9	9
	Person Delay (sec)	32.57	33.82	32.64	31.05	31.97	35.96
	Transit Delay (sec)	41.87	44.39	42.69	38.13	40.39	43.74
	Vehicle Delay (sec)	15.15	15.58	14.96	17.21	20.01	24.39
	Level of Service	B	B	B	B	C	C
	Pedestrian Crossing Time (sec)	17	17	17	18	18	18
	Ped wait time between phases (sec)	53	53	53	52	52	52

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Queen Street at Leslie Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Queen Street EB	Auto & Truck Volumes	232	374	386	393	666	673
	Bus & Streetcar Volumes	21	21	21	17	19	21
	Person Delay (sec)	15.91	15.78	15.98	46.20	14.93	15.55
	Transit Delay (sec)	16.73	17.20	17.42	49.51	19.01	19.37
	Vehicle Delay (sec)	10.42	9.96	10.25	35.79	6.29	6.86
	Level of Service	B	A	B	D	A	A
	Pedestrian Crossing Time (sec)	29	29	29	37	37	37
	Ped wait time between phases (sec)	41	41	41	33	33	33
Queen Street WB	Auto & Truck Volumes	549	849	861	398	404	381
	Bus & Streetcar Volumes	24	31	31	19	26	26
	Person Delay (sec)	9.87	44.13	50.03	8.34	28.63	28.34
	Transit Delay (sec)	9.45	49.94	56.30	8.60	32.59	32.10
	Vehicle Delay (sec)	11.22	28.67	33.72	7.44	10.04	9.64
	Level of Service	B	C	C	A	B	A
	Pedestrian Crossing Time (sec)	29	29	29	37	37	37
	Ped wait time between phases (sec)	41	41	41	33	33	33
Leslie Street NB	Auto & Truck Volumes	275	259	244	594	724	751
	Bus & Streetcar Volumes	5	13	12	4	11	10
	Person Delay (sec)	13.91	24.66	25.39	18.08	20.47	21.25
	Transit Delay (sec)	19.51	28.60	29.89	35.64	29.86	33.42
	Vehicle Delay (sec)	6.49	10.28	8.98	9.90	10.40	10.03
	Level of Service	A	B	A	A	B	B
	Pedestrian Crossing Time (sec)	25	25	25	25	25	25
	Ped wait time between phases (sec)	45	45	45	45	45	45

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Richmond Street at Jarvis Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Richmond Street WB	Auto & Truck Volumes	1771	1926	1953	1277	1299	1501
	Bus & Streetcar Volumes	12	12	12	3	2	3
	Person Delay (sec)	16.28	18.08	19.84	28.87	53.09	44.00
	Transit Delay (sec)	14.60	19.08	21.42	32.45	18.94	27.55
	Vehicle Delay (sec)	17.11	17.63	19.14	28.26	57.55	46.39
	Level of Service	B	B	B	C	E	D
	Pedestrian Crossing Time (sec)	24	24	24	18	18	18
	Ped wait time between phases (sec)	46	46	46	52	52	52
Jarvis Street NB	Auto & Truck Volumes	793	775	803	1095	976	1052
	Bus & Streetcar Volumes	0	0	0	1	0	1
	Person Delay (sec)	37.16	48.56	45.98	43.56	52.21	57.92
	Transit Delay (sec)	0.00	0.00	0.00	31.66	0.00	29.53
	Vehicle Delay (sec)	37.16	48.56	45.98	44.35	52.21	59.88
	Level of Service	D	D	D	D	D	E
	Pedestrian Crossing Time (sec)	31	31	31	37	37	37
	Ped wait time between phases (sec)	39	39	39	33	33	33
Jarvis Street SB	Auto & Truck Volumes	812	764	800	1106	515	616
	Bus & Streetcar Volumes	0	0	0	1	0	0
	Person Delay (sec)	8.94	21.83	26.68	36.73	159.15	126.93
	Transit Delay (sec)	28.90	28.10	29.10	3.25	0.00	0.00
	Vehicle Delay (sec)	8.94	21.83	26.68	38.93	159.15	126.93
	Level of Service	A	C	C	D	F	F
	Pedestrian Crossing Time (sec)	31	31	31	37	37	37
	Ped wait time between phases (sec)	39	39	39	33	33	33

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Richmond Street at Parliament Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Richmond Street WB	Auto & Truck Volumes	1607	1515	1478	1126	1481	1572
	Bus & Streetcar Volumes	12	12	12	3	3	3
	Person Delay (sec)	14.73	12.59	13.28	7.64	10.18	14.16
	Transit Delay (sec)	13.72	9.30	11.49	2.27	12.47	14.97
	Vehicle Delay (sec)	15.28	14.49	14.33	8.68	9.88	14.05
	Level of Service	B	B	B	A	A	B
	Pedestrian Crossing Time (sec)	30	30	30	30	30	30
	Ped wait time between phases (sec)	40	40	40	40	40	40
Parliament Street NB	Auto & Truck Volumes	444	594	644	497	524	667
	Bus & Streetcar Volumes	4	3	3	5	4	4
	Person Delay (sec)	27.20	27.62	25.33	27.56	30.98	35.92
	Transit Delay (sec)	48.69	51.59	36.37	35.91	51.02	47.69
	Vehicle Delay (sec)	13.11	18.81	21.33	21.44	20.76	31.42
	Level of Service	B	B	C	C	C	C
	Pedestrian Crossing Time (sec)	26	26	26	26	26	26
	Ped wait time between phases (sec)	44	44	44	44	44	44
Parliament Street SB	Auto & Truck Volumes	155	160	167	241	245	273
	Bus & Streetcar Volumes	4	4	4	5	5	5
	Person Delay (sec)	34.55	34.72	33.81	21.19	18.62	23.25
	Transit Delay (sec)	49.03	49.53	48.83	26.59	21.83	29.93
	Vehicle Delay (sec)	7.35	7.78	7.62	13.02	13.86	14.32
	Level of Service	A	A	A	B	B	B
	Pedestrian Crossing Time (sec)	26	26	26	26	26	26
	Ped wait time between phases (sec)	44	44	44	44	44	44

Adelaide Street at Jarvis Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Adelaide Street EB	Auto & Truck Volumes	727	1152	1245	1700	1713	1619
	Bus & Streetcar Volumes	3	3	3	3	3	2
	Person Delay (sec)	18.98	20.26	20.95	42.55	75.89	96.20
	Transit Delay (sec)	26.75	26.62	26.55	71.88	73.60	73.36
	Vehicle Delay (sec)	16.64	19.05	19.97	39.03	76.15	97.74
	Level of Service	B	B	B	D	E	F
	Pedestrian Crossing Time (sec)	20	20	20	24	24	24
	Ped wait time between phases (sec)	50	50	50	46	46	46
Jarvis Street NB	Auto & Truck Volumes	720	716	729	745	649	739
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	1.65	6.71	4.40	13.44	36.68	54.04
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	1.65	6.71	4.40	13.44	36.68	54.04
	Level of Service	A	A	A	B	D	D
	Pedestrian Crossing Time (sec)	37	37	37	33	33	33
	Ped wait time between phases (sec)	33	33	33	37	37	37
Jarvis Street SB	Auto & Truck Volumes	1001	1045	1088	855	617	738
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	29.34	28.36	32.51	63.90	139.01	101.19
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	29.34	28.36	32.51	63.90	139.01	101.19
	Level of Service	C	C	C	E	F	F
	Pedestrian Crossing Time (sec)	37	37	37	33	33	33
	Ped wait time between phases (sec)	33	33	33	37	37	37

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
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Adelaide Street at Parliament Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Adelaide Street EB	Auto & Truck Volumes	715	1125	1127	1418	1190	1167
	Bus & Streetcar Volumes	3	3	3	2	2	1
	Person Delay (sec)	3.61	3.69	4.01	6.06	6.02	9.09
	Transit Delay (sec)	0.51	0.31	0.51	0.68	1.65	1.51
	Vehicle Delay (sec)	4.56	4.35	4.69	6.55	6.46	9.32
	Level of Service	A	A	A	A	A	A
	Pedestrian Crossing Time (sec)	16	16	16	16	16	16
	Ped wait time between phases (sec)	54	54	54	54	54	54
Parliament Street NB	Auto & Truck Volumes		362	416	225	289	403
	Bus & Streetcar Volumes	4	3	3	5	4	4
	Person Delay (sec)	6.19	7.59	8.25	11.91	8.92	13.12
	Transit Delay (sec)	6.19	6.12	6.67	13.48	10.54	14.77
	Vehicle Delay (sec)	10.80	8.48	9.13	9.38	7.41	12.07
	Level of Service	B	A	A	A	A	B
	Pedestrian Crossing Time (sec)	15	15	15	15	15	15
	Ped wait time between phases (sec)	55	55	55	55	55	55
Parliament Street SB	Auto & Truck Volumes	87	114	126	228	400	375
	Bus & Streetcar Volumes	4	4	4	5	5	5
	Person Delay (sec)	48.47	46.91	46.47	27.95	24.12	29.23
	Transit Delay (sec)	58.34	58.39	58.19	35.07	36.06	43.79
	Vehicle Delay (sec)	15.41	17.59	19.48	16.59	13.26	15.08
	Level of Service	B	B	B	B	B	B
	Pedestrian Crossing Time (sec)	15	15	15	15	15	15
	Ped wait time between phases (sec)	55	55	55	55	55	55

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

King Street at Jarvis Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
King Street EB	Auto & Truck Volumes	164	190	170	659	479	678
	Bus & Streetcar Volumes	11	17	17	16	15	21
	Person Delay (sec)	30.36	31.77	31.77	31.68	149.79	108.48
	Transit Delay (sec)	34.80	35.32	34.85	38.91	157.37	104.17
	Vehicle Delay (sec)	8.74	8.57	9.41	18.90	132.88	117.96
	Level of Service	A	A	A	B	F	F
	Pedestrian Crossing Time (sec)	30	30	30	33	33	33
	Ped wait time between phases (sec)	40	40	40	37	37	37
King Street WB	Auto & Truck Volumes	164	446	449	659	432	494
	Bus & Streetcar Volumes	13	19	19	10	15	15
	Person Delay (sec)	27.17	25.99	25.94	29.57	37.52	38.68
	Transit Delay (sec)	29.39	29.54	29.40	40.78	43.35	44.24
	Vehicle Delay (sec)	14.40	14.99	15.29	17.18	22.44	26.40
	Level of Service	B	B	B	B	C	C
	Pedestrian Crossing Time (sec)	30	30	30	33	33	33
	Ped wait time between phases (sec)	40	40	40	37	37	37
Jarvis Street NB	Auto & Truck Volumes	390	894	866	403	768	840
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	14.40	15.23	15.13	17.31	30.77	41.43
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	14.40	15.23	15.13	17.31	30.77	41.43
	Level of Service	B	B	B	B	C	D
	Pedestrian Crossing Time (sec)	28	28	28	25	25	25
	Ped wait time between phases (sec)	42	42	42	45	45	45
Jarvis Street SB	Auto & Truck Volumes	806	851	904	912	504	604
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	10.52	10.18	10.71	28.12	93.09	45.40
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	10.52	10.18	10.71	28.12	93.09	45.40
	Level of Service	B	B	B	C	F	D
	Pedestrian Crossing Time (sec)	28	28	28	25	25	25
	Ped wait time between phases (sec)	42	42	42	45	45	45

King Street at Parliament Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
King Street EB	Auto & Truck Volumes	0	334	366	0	210	403
	Bus & Streetcar Volumes	11	20	19	16	15	19
	Person Delay (sec)	28.84	27.44	26.15	32.00	28.58	29.55
	Transit Delay (sec)	28.84	30.77	29.56	32.00	31.30	33.32
	Vehicle Delay (sec)	11.90	13.08	13.15	13.66	14.78	16.60
	Level of Service	B	B	B	B	B	B
	Pedestrian Crossing Time (sec)	37	37	37	39	39	39
	Ped wait time between phases (sec)	33	33	33	31	31	31
King Street WB	Auto & Truck Volumes	108	330	389	210	269	251
	Bus & Streetcar Volumes	14	3	3	10	4	16
	Person Delay (sec)	33.79	22.39	21.67	27.12	20.04	27.73
	Transit Delay (sec)	36.14	35.11	33.98	33.01	31.78	31.74
	Vehicle Delay (sec)	11.66	13.97	14.30	6.74	8.37	9.08
	Level of Service	B	B	B	A	A	A
	Pedestrian Crossing Time (sec)	37	37	37	39	39	39
	Ped wait time between phases (sec)	33	33	33	31	31	31
Parliament Street NB	Auto & Truck Volumes	352	330	389	260	269	380
	Bus & Streetcar Volumes	4	3	3	5	4	4
	Person Delay (sec)	20.40	20.64	20.64	20.76	23.10	21.55
	Transit Delay (sec)	27.85	31.72	31.77	29.45	32.77	31.80
	Vehicle Delay (sec)	14.23	13.31	13.98	8.57	13.49	14.66
	Level of Service	B	B	B	A	B	B
	Pedestrian Crossing Time (sec)	21	21	21	19	19	19
	Ped wait time between phases (sec)	49	49	49	51	51	51
Parliament Street SB	Auto & Truck Volumes	208	141	138	174	525	526
	Bus & Streetcar Volumes	4	4	4	5	5	5
	Person Delay (sec)	40.23	44.29	45.16	48.05	39.00	39.35
	Transit Delay (sec)	54.55	54.55	54.55	59.15	62.09	56.05
	Vehicle Delay (sec)	20.14	23.09	25.34	24.83	22.99	27.78
	Level of Service	C	C	C	C	C	C
	Pedestrian Crossing Time (sec)	21	21	21	19	19	19
	Ped wait time between phases (sec)	49	49	49	51	51	51

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

King Street at River Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
King Street EB	Auto & Truck Volumes	369	481	506	715	601	688
	Bus & Streetcar Volumes	11	11	11	16	11	15
	Person Delay (sec)	2.81	2.37	2.27	3.64	4.63	3.83
	Transit Delay (sec)	3.49	2.89	2.84	3.83	3.48	3.20
	Vehicle Delay (sec)	1.34	1.49	1.38	3.32	6.15	4.81
	Level of Service	A	A	A	A	A	A
	Pedestrian Crossing Time (sec)	42	42	42	42	42	42
	Ped wait time between phases (sec)	28	28	28	28	28	28
King Street WB	Auto & Truck Volumes	369	126	144	715	173	174
	Bus & Streetcar Volumes	13	13	13	10	10	10
	Person Delay (sec)	0.55	0.74	0.85	0.36	1.05	0.66
	Transit Delay (sec)	0.77	0.83	0.97	0.71	1.04	0.76
	Vehicle Delay (sec)	0.00	0.01	0.05	0.00	1.09	0.25
	Level of Service	A	A	A	A	A	A
	Pedestrian Crossing Time (sec)	42	42	42	42	42	42
	Ped wait time between phases (sec)	28	28	28	28	28	28
River Street NB	Auto & Truck Volumes		177	221		69	97
	Bus & Streetcar Volumes		0	0		0	0
	Person Delay (sec)		6.17	11.17		11.72	8.53
	Transit Delay (sec)		0.00	0.00		0.00	0.00
	Vehicle Delay (sec)		6.17	11.17		11.72	8.53
	Level of Service		A	B		B	A
	Pedestrian Crossing Time (sec)	16	16	16	16	16	16
	Ped wait time between phases (sec)	54	54	54	54	54	54
River Street SB	Auto & Truck Volumes	607	513	488	98	168	171
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	4.30	6.54	8.61	6.40	16.11	15.45
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	4.30	6.54	8.61	6.40	16.11	15.45
	Level of Service	A	A	A	A	B	B
	Pedestrian Crossing Time (sec)	16	16	16	16	16	16
	Ped wait time between phases (sec)	54	54	54	54	54	54

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Eastern Avenue at Broadview Avenue		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Eastern Avenue EB	Auto & Truck Volumes	660	923	947	1642	1548	1556
	Bus & Streetcar Volumes	3	3	3	2	2	1
	Person Delay (sec)	12.22	14.81	14.70	11.02	13.00	13.74
	Transit Delay (sec)	6.06	8.26	8.46	14.24	5.11	0.0
	Vehicle Delay (sec)	14.25	16.36	16.14	10.77	13.61	14.07
	Level of Service	B	B	B	B	B	B
	Pedestrian Crossing Time (sec)	36	36	36	36	36	36
	Ped wait time between phases (sec)	34	34	34	34	34	34
Eastern Avenue WB	Auto & Truck Volumes	1378	1389	1322	773	902	962
	Bus & Streetcar Volumes	4	4	4	2	2	2
	Person Delay (sec)	2.67	3.42	2.92	8.20	5.60	6.86
	Transit Delay (sec)	0.86	1.62	0.86	12.67	11.24	12.57
	Vehicle Delay (sec)	3.05	3.79	3.37	7.36	4.69	6.00
	Level of Service	A	A	A	A	A	A
	Pedestrian Crossing Time (sec)	36	36	36	36	36	36
	Ped wait time between phases (sec)	34	34	34	34	34	34
Broadview Avenue NB	Auto & Truck Volumes	77	238	220	71	167	160
	Bus & Streetcar Volumes	0	14	7	0	12	7
	Person Delay (sec)	17.04	17.59	18.83	15.82	18.40	14.60
	Transit Delay (sec)	0.00	17.06	19.36	0.00	18.79	14.37
	Vehicle Delay (sec)	17.04	19.79	17.61	15.82	16.36	15.28
	Level of Service	B	B	B	B	B	B
	Pedestrian Crossing Time (sec)	22	22	22	22	22	22
	Ped wait time between phases (sec)	48	48	48	48	48	48
Broadview Avenue SB	Auto & Truck Volumes	85	173	162	172	241	233
	Bus & Streetcar Volumes	0	7	7	0	7	7
	Person Delay (sec)	14.12	7.67	7.66	18.68	16.05	13.27
	Transit Delay (sec)	0.00	4.72	5.00	0.00	12.30	8.99
	Vehicle Delay (sec)	14.12	16.34	16.06	18.68	23.96	22.64
	Level of Service	B	B	B	B	C	C
	Pedestrian Crossing Time (sec)	22	22	22	22	22	22
	Ped wait time between phases (sec)	48	48	48	48	48	48

Lake Shore Boulevard at Lower Jarvis Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Lake Shore Blvd EB	Auto & Truck Volumes	406	1034	1126	838	1104	1521
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	8.29	10.60	10.97	12.79	113.00	53.89
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	8.29	10.60	10.97	12.79	113.00	53.89
	Level of Service	A	B	B	B	F	D
	Pedestrian Crossing Time (sec)	25-57	25-57	25-57	31-52	31-52	31-52
	Ped wait time between phases (sec)	55-87	55-87	55-87	60-81	60-81	60-81
Gardiner Off-Ramp EB	Auto & Truck Volumes	217	734	726	63	599	388
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	37.94	38.04	37.19	49.17	137.19	80.97
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	37.94	38.04	37.19	49.17	137.19	80.97
	Level of Service	D	D	D	D	F	F
	Pedestrian Crossing Time (sec)						
	Ped wait time between phases (sec)						
Lake Shore Blvd WB	Auto & Truck Volumes	890	1490	1537	884	1175	1358
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	24.85	36.48	45.51	26.70	32.38	34.51
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	24.85	36.48	45.51	26.70	32.38	34.51
	Level of Service	C	D	D	C	C	C
	Pedestrian Crossing Time (sec)	25-57	25-57	25-57	31-52	31-52	31-52
	Ped wait time between phases (sec)	55-87	55-87	55-87	60-81	60-81	60-81
Jarvis Street NB	Auto & Truck Volumes	129	447	456	370	422	501
	Bus & Streetcar Volumes	5	5	5	6	5	5
	Person Delay (sec)	39.93	43.35	45.31	45.90	137.66	93.16
	Transit Delay (sec)	44.20	56.28	56.72	53.92	188.12	109.45
	Vehicle Delay (sec)	27.86	32.82	36.20	36.43	94.12	81.31
	Level of Service	C	C	D	D	F	F
	Pedestrian Crossing Time (sec)	31-63	31-63	31-63	36-57	36-57	36-57
	Ped wait time between phases (sec)	49-81	49-81	49-81	55-76	55-76	55-76
Jarvis Street SB	Auto & Truck Volumes	871	974	976	1141	681	730
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	25.49	42.42	54.94	30.88	152.27	150.90
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	25.49	42.42	54.94	30.88	152.27	150.90
	Level of Service	C	D	D	C	F	F
	Pedestrian Crossing Time (sec)	31-63	31-63	31-63	36-57	36-57	36-57
	Ped wait time between phases (sec)	49-81	49-81	49-81	55-76	55-76	55-76

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Lake Shore Blvd at Lower Sherbourne Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Lake Shore Blvd EB	Auto & Truck Volumes	675	1292	1360	870	1205	1598
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	28.01	41.22	43.20	28.06	134.28	102.73
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	28.01	41.22	43.20	28.06	134.28	102.73
	Level of Service	C	D	D	C	F	F
	Pedestrian Crossing Time (sec)	30-57	30-57	30-57	30-57	30-57	30-57
	Ped wait time between phases (sec)	47-74	47-74	47-74	47-74	47-74	47-74
Lake Shore Blvd WB	Auto & Truck Volumes	683	1190	1235	745	1085	1078
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	36.88	55.68	71.71	39.99	87.50	86.59
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	36.88	55.68	71.71	39.99	87.50	86.59
	Level of Service	D	E	E	D	F	F
	Pedestrian Crossing Time (sec)	30-57	30-57	30-57	30-57	30-57	30-57
	Ped wait time between phases (sec)	47-74	47-74	47-74	47-74	47-74	47-74
Sherbourne Street NB	Auto & Truck Volumes	70	326	316	165	282	256
	Bus & Streetcar Volumes	0	4	4	0	4	5
	Person Delay (sec)	16.70	47.25	60.75	20.00	143.45	179.38
	Transit Delay (sec)	0.00	43.26	55.11	0.00	96.02	198.57
	Vehicle Delay (sec)	16.70	50.63	65.44	20.00	188.34	154.82
	Level of Service	B	D	E	C	F	F
	Pedestrian Crossing Time (sec)	20-37	20-37	20-37	20-37	20-37	20-37
	Ped wait time between phases (sec)	67-84	67-84	67-84	67-84	67-84	67-84
Sherbourne Street SB	Auto & Truck Volumes	82	108	139	87	215	252
	Bus & Streetcar Volumes	5	5	5	6	5	5
	Person Delay (sec)	70.30	71.12	75.45	61.23	89.49	109.88
	Transit Delay (sec)	77.27	81.09	81.11	66.65	86.63	112.26
	Vehicle Delay (sec)	39.29	37.39	60.66	34.04	94.67	106.43
	Level of Service	D	D	E	C	F	F
	Pedestrian Crossing Time (sec)	20-37	20-37	20-37	20-37	20-37	20-37
	Ped wait time between phases (sec)	67-84	67-84	67-84	67-84	67-84	67-84

Lake Shore Blvd at Parliament Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Lake Shore Blvd EB	Auto & Truck Volumes	476	614	757	926	808	1191
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	27.97	32.72	35.42	30.38	48.79	52.83
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	27.97	32.72	35.42	30.38	48.79	52.83
	Level of Service	C	C	D	C	D	D
	Pedestrian Crossing Time (sec)	varies	varies	varies	varies	varies	varies
	Ped wait time between phases (sec)	varies	varies	varies	varies	varies	varies
Lake Shore Blvd WB	Auto & Truck Volumes	950	1388	1188	973	1282	1119
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	21.19	26.05	37.96	19.37	44.00	31.08
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	21.19	26.05	37.96	19.37	44.00	31.08
	Level of Service	C	C	D	B	D	C
	Pedestrian Crossing Time (sec)	varies	varies	varies	varies	varies	varies
	Ped wait time between phases (sec)	varies	varies	varies	varies	varies	varies
Parliament Street NB	Auto & Truck Volumes	154	381	529	400	361	472
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	15.86	38.25	42.90	22.17	64.43	57.31
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	15.86	38.25	42.90	22.17	64.43	57.31
	Level of Service	B	D	D	C	E	E
	Pedestrian Crossing Time (sec)	varies	varies	varies	varies	varies	varies
	Ped wait time between phases (sec)	varies	varies	varies	varies	varies	varies
Parliament Street SB	Auto & Truck Volumes	427	416	407	449	576	590
	Bus & Streetcar Volumes	0	4	4	0	5	5
	Person Delay (sec)	16.52	26.92	44.01	14.60	76.37	63.86
	Transit Delay (sec)	0.00	30.63	50.25	0.00	63.77	56.93
	Vehicle Delay (sec)	16.52	24.33	39.77	14.60	83.79	68.14
	Level of Service	B	C	D	B	F	E
	Pedestrian Crossing Time (sec)	varies	varies	varies	varies	varies	varies
	Ped wait time between phases (sec)	varies	varies	varies	varies	varies	varies

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Lake Shore Blvd at Cherry Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Lake Shore Blvd EB	Auto & Truck Volumes	316	538	608	913	604	830
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	13.08	4.07	39.10	17.85	2.86	44.67
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	13.08	4.07	39.10	17.85	2.86	44.67
	Level of Service	B	A	D	B	A	D
	Pedestrian Crossing Time (sec)	59	14	35	59	14	33
	Ped wait time between phases (sec)	45	90	69	45	90	71
Lake Shore Blvd WB	Auto & Truck Volumes	858	1161	898	1019	1029	919
	Bus & Streetcar Volumes	5	0	0	5	0	0
	Person Delay (sec)	6.77	9.72	32.03	7.83	15.78	49.23
	Transit Delay (sec)	3.23	0.00	0.00	3.55	0.00	0.00
	Vehicle Delay (sec)	8.27	9.72	32.03	9.37	15.78	49.23
	Level of Service	A	A	C	A	B	D
	Pedestrian Crossing Time (sec)	59	14	35	59	14	33
	Ped wait time between phases (sec)	45	90	69	45	90	71
*Cherry Street NB**	Auto & Truck Volumes	254	797	429	429	570	362
	Bus & Streetcar Volumes	5	20	6	5	21	6
	Person Delay (sec)	32.78	60.77	63.20	40.82	43.48	62.13
	Transit Delay (sec)	38.20	43.73	88.83	55.00	40.04	84.31
	Vehicle Delay (sec)	25.02	92.21	37.07	28.78	52.57	35.34
	Level of Service	C	F	D	C	D	D
	Pedestrian Crossing Time (sec)	32	20	30	32	20	25
	Ped wait time between phases (sec)	72	84	74	72	84	79
*Cherry Street SB**	Auto & Truck Volumes	275	127	253	268	297	486
	Bus & Streetcar Volumes	5	15	6	4	15	6
	Person Delay (sec)	12.49	36.07	65.22	17.17	43.57	64.39
	Transit Delay (sec)	20.87	36.78	89.52	24.45	41.00	85.74
	Vehicle Delay (sec)	1.39	29.94	24.71	8.86	53.02	45.20
	Level of Service	A	C	C	A	D	D
	Pedestrian Crossing Time (sec)	32	20	30	32	20	25
	Ped wait time between phases (sec)	72	84	74	72	84	79
Overall Intersection	*Vehicle Delay (sec)*	10.56	34.60	34.13	15.43	25.47	45.08
	Level of Service	B	C	C	B	C	D

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Lake Shore Blvd at Queens Quay		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Lake Shore Blvd EB	Auto & Truck Volumes		560	654		634	782
	Bus & Streetcar Volumes		0	0		0	0
	Person Delay (sec)		14.43	2.16		20.10	2.13
	Transit Delay (sec)		0.00	0.00		0.00	0.00
	Vehicle Delay (sec)		14.43	2.16		20.10	2.13
	Level of Service		B	A		C	A
	Pedestrian Crossing Time (sec)						
	Ped wait time between phases (sec)						
Lake Shore Blvd WB	Auto & Truck Volumes		665	819		690	915
	Bus & Streetcar Volumes		0	0		0	0
	Person Delay (sec)		21.70	1.02		35.48	2.73
	Transit Delay (sec)		0.00	0.00		0.00	0.00
	Vehicle Delay (sec)		21.70	1.02		35.48	2.73
	Level of Service		C	A		D	A
	Pedestrian Crossing Time (sec)						
	Ped wait time between phases (sec)						
Queens Quay NB	Auto & Truck Volumes			50			49
	Bus & Streetcar Volumes			0			0
	Person Delay (sec)			1.12			1.27
	Transit Delay (sec)			0.00			0.00
	Vehicle Delay (sec)			1.12			1.27
	Level of Service			A			A
	Pedestrian Crossing Time (sec)						
	Ped wait time between phases (sec)						

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
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Lake Shore Blvd at Don Roadway		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Lake Shore Blvd EB	Auto & Truck Volumes	231	730	739	785	726	863
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	6.83	41.12	38.71	13.22	58.90	43.43
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	6.83	41.12	38.71	13.22	58.90	43.43
	Level of Service	A	D	D	B	E	D
	Pedestrian Crossing Time (sec)	40-46	38	38	50-56	38	38
	Ped wait time between phases (sec)	58-64	66	66	48-54	66	66
Lake Shore Blvd WB	Auto & Truck Volumes	708	789	1010	526	918	1090
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	7.97	17.85	19.29	7.48	35.25	39.08
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	7.97	17.85	19.29	7.48	35.25	39.08
	Level of Service	A	B	B	A	D	D
	Pedestrian Crossing Time (sec)	40-46	38	38	50-56	38	38
	Ped wait time between phases (sec)	58-64	66	66	48-54	66	66
Don Roadway NB	Auto & Truck Volumes	171	568	494	357	514	427
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	21.44	23.88	23.77	25.45	24.91	30.76
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	21.44	23.88	23.77	25.45	24.91	30.76
	Level of Service	C	C	C	C	C	C
	Pedestrian Crossing Time (sec)	38	45	45	34	45	45
	Ped wait time between phases (sec)	66	59	59	70	59	59
Don Roadway SB	Auto & Truck Volumes	384	888	879	411	786	856
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	24.78	47.90	49.48	44.32	82.34	40.55
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	24.78	47.90	49.48	44.32	82.34	40.55
	Level of Service	C	D	D	D	F	D
	Pedestrian Crossing Time (sec)	38	45	45	45	45	45
	Ped wait time between phases (sec)	66	59	59	59	59	59
Overall Intersection	*Vehicle Delay (sec)*	13.66	33.68	33.10	20.01	51.85	39.53
	Level of Service	B	C	C	C	D	D

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Lake Shore Blvd at Carlaw Avenue		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Lake Shore Blvd EB	Auto & Truck Volumes	1220	1705	1679	3505	3306	3637
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	47.98	49.66	50.99	18.28	38.10	33.55
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	47.98	49.66	50.99	18.28	38.10	33.55
	Level of Service	D	D	D	B	D	C
	Pedestrian Crossing Time (sec)	38-60	60	60	38-60	60	60
	Ped wait time between phases (sec)	66-44	44	44	66-44	44	44
Lake Shore Blvd WB	Auto & Truck Volumes	2814	2654	2699	1209	1496	1431
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	16.57	22.49	22.83	16.82	21.15	18.83
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	16.57	22.49	22.83	16.82	21.15	18.83
	Level of Service	B	C	C	B	C	B
	Pedestrian Crossing Time (sec)	38-60	60	60	38-60	60	60
	Ped wait time between phases (sec)	66-44	44	44	66-44	44	44
Carlaw Avenue NB	Auto & Truck Volumes	229	419	363	326	731	753
	Bus & Streetcar Volumes	5	0	0	5	0	0
	Person Delay (sec)	41.55	114.00	51.39	43.08	165.32	176.24
	Transit Delay (sec)	43.78	0.00	0.00	37.09	0.00	0.00
	Vehicle Delay (sec)	38.01	114.00	51.39	49.23	165.32	176.24
	Level of Service	D	F	D	D	F	F
	Pedestrian Crossing Time (sec)	30	26	26	30	26	26
	Ped wait time between phases (sec)	74	78	78	74	78	78
Carlaw Avenue SB	Auto & Truck Volumes	408	402	406	364	296	247
	Bus & Streetcar Volumes	5	5	5	5	5	5
	Person Delay (sec)	43.46	84.51	76.12	43.66	67.21	80.74
	Transit Delay (sec)	59.59	98.44	86.73	52.32	74.58	96.82
	Vehicle Delay (sec)	29.05	71.89	66.62	35.01	58.14	57.00
	Level of Service	C	E	E	D	E	E
	Pedestrian Crossing Time (sec)	30	26	26	30	26	26
	Ped wait time between phases (sec)	74	78	78	74	78	78

Lake Shore Blvd at Leslie Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Lake Shore Blvd EB	Auto & Truck Volumes	933	1062	1025	3140	2772	3095
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	77.33	71.87	73.83	31.61	46.88	40.26
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	77.33	71.87	73.83	31.61	46.88	40.26
	Level of Service	E	E	E	C	D	D
	Pedestrian Crossing Time (sec)	57	57	57	88	88	88
	Ped wait time between phases (sec)	87	87	87	56	56	56
Lake Shore Blvd WB	Auto & Truck Volumes	2500	2567	2603	1066	1201	1125
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	15.49	20.63	20.93	34.20	43.25	34.54
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	15.49	20.63	20.93	34.20	43.25	34.54
	Level of Service	B	C	C	C	D	C
	Pedestrian Crossing Time (sec)	57	57	57	88	88	88
	Ped wait time between phases (sec)	87	87	87	56	56	56
Leslie Street NB	Auto & Truck Volumes	194	224	208	364	1091	914
	Bus & Streetcar Volumes	5	12	12	3	11	10
	Person Delay (sec)	47.13	49.50	46.25	39.60	81.27	115.86
	Transit Delay (sec)	57.03	54.16	52.29	54.42	94.69	113.27
	Vehicle Delay (sec)	28.54	31.62	21.79	30.70	71.43	117.82
	Level of Service	C	C	C	C	E	F
	Pedestrian Crossing Time (sec)	39	39	39	28	28	28
	Ped wait time between phases (sec)	105	105	105	116	116	116
Leslie Street SB	Auto & Truck Volumes	608	851	852	432	351	349
	Bus & Streetcar Volumes	5	12	12	3	14	15
	Person Delay (sec)	41.56	63.72	59.28	44.46	78.73	69.80
	Transit Delay (sec)	53.16	63.72	56.71	57.89	80.31	75.33
	Vehicle Delay (sec)	34.61	63.71	61.96	37.21	74.24	53.06
	Level of Service	C	E	E	D	E	D
	Pedestrian Crossing Time (sec)	39	39	39	28	28	28
	Ped wait time between phases (sec)	105	105	105	116	116	116

Queens Quay at Lower Jarvis Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Queens Quay EB	Auto & Truck Volumes	477	543	528	845	722	740
	Bus & Streetcar Volumes						
	Person Delay (sec)	4.39	10.16	10.53	7.20	167.52	172.81
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	4.39	10.16	10.53	7.20	167.52	172.81
	Level of Service	A	B	B	A	F	F
	Pedestrian Crossing Time (sec)	38	64	64	38	64	64
	Ped wait time between phases (sec)	42	40	40	42	40	40
Queens Quay WB	Auto & Truck Volumes	687	706	723	540	557	665
	Bus & Streetcar Volumes	5	15	15	5	15	14
	Person Delay (sec)	8.71	10.54	10.77	7.95	5.64	6.09
	Transit Delay (sec)	4.44	2.29	2.46	5.36	2.37	2.20
	Vehicle Delay (sec)	10.97	23.47	22.98	9.84	12.05	12.05
	Level of Service	B	C	C	A	B	B
	Pedestrian Crossing Time (sec)	38	64	64	38	64	64
	Ped wait time between phases (sec)	42	40	40	42	40	40
Lower Jarvis Street SB	Auto & Truck Volumes	120	294	312	122	266	238
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	5.34	13.06	14.58	12.67	54.63	145.87
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	5.34	13.06	14.58	12.67	54.63	145.87
	Level of Service	A	B	B	B	D	F
	Pedestrian Crossing Time (sec)	18	28	28	18	28	28
	Ped wait time between phases (sec)	62	76	76	62	76	76

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Queens Quay at Lower Sherbourne Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Queens Quay EB	Auto & Truck Volumes	279	288	307	549	640	621
	Bus & Streetcar Volumes	0	14	15	0	14	15
	Person Delay (sec)	0.00	50.27	49.54	0.11	68.63	78.15
	Transit Delay (sec)	0.00	61.34	60.76	0.00	101.08	100.58
	Vehicle Delay (sec)	0.00	11.05	9.55	0.11	16.92	38.67
	Level of Service	A	B	A	A	B	D
	Pedestrian Crossing Time (sec)		54	54		54	54
	Ped wait time between phases (sec)		50	50		50	50
Queens Quay WB	Auto & Truck Volumes	508	451	461	379	282	393
	Bus & Streetcar Volumes	0	15	15	0	16	15
	Person Delay (sec)	0.29	8.51	14.19	0.24	47.78	44.77
	Transit Delay (sec)	0.00	1.41	2.60	0.00	48.04	48.09
	Vehicle Delay (sec)	0.29	25.70	41.61	0.24	46.71	35.84
	Level of Service	A	C	D	A	D	D
	Pedestrian Crossing Time (sec)		54	54		54	54
	Ped wait time between phases (sec)		50	50		50	50
Sherbourne Street NB	Auto & Truck Volumes						
	Bus & Streetcar Volumes						
	Person Delay (sec)						
	Transit Delay (sec)						
	Vehicle Delay (sec)						
	Level of Service						
	Pedestrian Crossing Time (sec)						
	Ped wait time between phases (sec)						
Sherbourne Street SB	Auto & Truck Volumes	214	358	377	244	320	339
	Bus & Streetcar Volumes	5	5	5	6	5	5
	Person Delay (sec)	3.10	28.50	36.23	3.32	28.64	32.67
	Transit Delay (sec)	2.31	35.89	44.61	2.67	31.74	24.82
	Vehicle Delay (sec)	4.44	20.99	28.14	4.48	25.13	41.10
	Level of Service	A	C	C	A	C	D
	Pedestrian Crossing Time (sec)		15	15		15	15
	Ped wait time between phases (sec)		89	89		89	89

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Queens Quay at Parliament Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Queens Quay EB	Auto & Truck Volumes		437	428		715	683
	Bus & Streetcar Volumes		15	16		14	15
	Person Delay (sec)		20.74	22.50		21.20	24.43
	Transit Delay (sec)		26.20	25.88		23.01	23.13
	Vehicle Delay (sec)		7.09	13.30		18.61	26.52
	Level of Service		A	B		B	C
	Pedestrian Crossing Time (sec)		67	67		54	54
	Ped wait time between phases (sec)		37	37		50	50
Queens Quay WB	Auto & Truck Volumes		187	454		45	189
	Bus & Streetcar Volumes		15	15		16	15
	Person Delay (sec)		7.04	9.02		36.55	35.61
	Transit Delay (sec)		6.18	5.70		37.34	38.06
	Vehicle Delay (sec)		12.05	17.01		16.45	21.45
	Level of Service		B	B		B	C
	Pedestrian Crossing Time (sec)		67	67		54	54
	Ped wait time between phases (sec)		37	37		50	50
Parliament Street SB	Auto & Truck Volumes		330	220		722	443
	Bus & Streetcar Volumes		4	4		5	5
	Person Delay (sec)		19.78	23.09		20.27	18.82
	Transit Delay (sec)		25.11	27.27		23.50	26.16
	Vehicle Delay (sec)		15.06	17.83		18.75	12.78
	Level of Service		B	B		B	B
	Pedestrian Crossing Time (sec)		25	25		38	38
	Ped wait time between phases (sec)		79	79		66	66

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Queens Quay at Cherry Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Queens Quay EB	Auto & Truck Volumes		413	213		716	300
	Bus & Streetcar Volumes		15	15		15	16
	Person Delay (sec)		28.63	55.90		28.75	57.94
	Transit Delay (sec)		36.78	60.51		41.00	63.07
	Vehicle Delay (sec)		7.08	32.30		10.07	38.02
	Level of Service		A	C		B	D
	Pedestrian Crossing Time (sec)		14	38		14	35
	Ped wait time between phases (sec)		90	66		90	69
Queens Quay WB	Auto & Truck Volumes			211			0
	Bus & Streetcar Volumes			0			0
	Person Delay (sec)			24.19			
	Transit Delay (sec)			0.00			0.00
	Vehicle Delay (sec)			24.19			0.00
	Level of Service			C			A
	Pedestrian Crossing Time (sec)			38			35
	Ped wait time between phases (sec)			66			69
*Cherry Street NB**	Auto & Truck Volumes		797	643		570	494
	Bus & Streetcar Volumes		20	22		21	21
	Person Delay (sec)		60.77	43.47		43.48	34.32
	Transit Delay (sec)		43.73	42.06		40.04	38.57
	Vehicle Delay (sec)		92.21	47.01		52.57	21.17
	Level of Service		F	D		D	C
	Pedestrian Crossing Time (sec)		20	39		20	42
	Ped wait time between phases (sec)		84	65		84	62
*Cherry Street SB**	Auto & Truck Volumes		127	201		297	268
	Bus & Streetcar Volumes		5	6		5	6
	Person Delay (sec)		38.14	69.35		50.12	64.22
	Transit Delay (sec)		41.00	92.07		47.58	93.39
	Vehicle Delay (sec)		29.94	19.96		53.02	20.65
	Level of Service		C	B		D	C
	Pedestrian Crossing Time (sec)		20	39		20	42
	Ped wait time between phases (sec)		84	65		84	62
Overall Intersection	*Vehicle Delay (sec)*		59.99	36.46		33.43	25.80
	Level of Service		E	D		C	C

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Villiers Street at Cherry Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Villiers Street EB	Auto & Truck Volumes		85	37		36	20
	Bus & Streetcar Volumes		0	0		0	0
	Person Delay (sec)		148.20	42.25		50.41	42.73
	Transit Delay (sec)		0.00	0.00		0.00	0.00
	Vehicle Delay (sec)		148.20	42.25		50.41	42.73
	Level of Service		F	D		D	D
	Pedestrian Crossing Time (sec)		17	20		17	17
	Ped wait time between phases (sec)		53	50		53	53
Villiers Street WB	Auto & Truck Volumes	84	52	100	137	143	193
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	0.54	175.96	25.01	2.62	38.23	28.00
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	0.54	175.96	25.01	2.62	38.23	28.00
	Level of Service	A	F	C	A	D	C
	Pedestrian Crossing Time (sec)		17	20		17	17
	Ped wait time between phases (sec)		53	50		53	53
Cherry Street NB	Auto & Truck Volumes	257	712	553	476	430	294
	Bus & Streetcar Volumes	5	20	7	4	20	7
	Person Delay (sec)	10.75	84.42	46.46	7.30	45.60	44.32
	Transit Delay (sec)	18.34	47.70	57.24	19.23	49.21	57.24
	Vehicle Delay (sec)	0.00	160.31	36.52	0.00	33.18	21.87
	Level of Service	A	F	D	A	C	C
	Pedestrian Crossing Time (sec)		28	25		28	28
	Ped wait time between phases (sec)		42	45		42	42
Cherry Street SB	Auto & Truck Volumes	220	334	178	382	661	393
	Bus & Streetcar Volumes	5	14	7	5	15	7
	Person Delay (sec)	0.00	34.91	46.24	0.00	32.60	44.76
	Transit Delay (sec)	0.00	40.87	54.97	0.00	40.72	43.10
	Vehicle Delay (sec)	0.00	16.74	21.26	0.00	19.18	46.93
	Level of Service	A	B	C	A	B	D
	Pedestrian Crossing Time (sec)		28	25		28	28
	Ped wait time between phases (sec)		42	45		42	42
Overall Intersection	*Vehicle Delay (sec)*	0.08	119.55	32.31	0.36	26.94	34.60
	Level of Service	A	F	C	A	C	C

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Commissioners Street at Cherry Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Commissioners Street EB	Auto & Truck Volumes	45	116	44	67	26	17
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	0.00	79.65	12.84	0.00	19.24	16.57
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	0.00	79.65	12.84	0.00	19.24	16.57
	Level of Service	A	E	B	A	B	B
	Pedestrian Crossing Time (sec)		17	20		17	17
	Ped wait time between phases (sec)		53	50		53	53
Commissioners Street WB	Auto & Truck Volumes	94	179	63	158	176	43
	Bus & Streetcar Volumes	5	0	0	4	0	0
	Person Delay (sec)	14.46	31.02	16.80	15.38	18.83	16.26
	Transit Delay (sec)	17.62	0.00	0.00	18.46	0.00	0.00
	Vehicle Delay (sec)	2.18	31.02	16.80	9.72	18.83	16.26
	Level of Service	A	C	B	A	B	B
	Pedestrian Crossing Time (sec)		17	20		17	17
	Ped wait time between phases (sec)		53	50		53	53
Cherry Street NB	Auto & Truck Volumes	162	612	481	536	314	253
	Bus & Streetcar Volumes	0	7	7	0	7	7
	Person Delay (sec)	0.00	58.59	34.87	0.00	39.18	28.54
	Transit Delay (sec)	0.00	58.76	37.78	0.00	58.76	38.87
	Vehicle Delay (sec)	0.00	58.44	31.78	0.00	7.45	7.75
	Level of Service	A	E	C	A	A	A
	Pedestrian Crossing Time (sec)		28	25		28	28
	Ped wait time between phases (sec)		42	45		42	42
Cherry Street SB	Auto & Truck Volumes	241	274	146	333	506	255
	Bus & Streetcar Volumes	5	7	7	5	7	7
	Person Delay (sec)	11.60	45.72	46.91	13.38	33.85	43.71
	Transit Delay (sec)	18.70	53.60	55.90	25.62	52.64	55.81
	Vehicle Delay (sec)	0.00	31.10	15.61	0.00	14.91	19.47
	Level of Service	A	C	B	A	B	B
	Pedestrian Crossing Time (sec)		28	25		28	28
	Ped wait time between phases (sec)		42	45		42	42
Overall Intersection	*Vehicle Delay (sec)*	0.38	50.03	26.13	1.40	13.40	13.91
	Level of Service	A	D	C	A	B	B

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Commissioners Street at Don Roadway		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Commissioners Street EB	Auto & Truck Volumes	128	142	265	190	116	169
	Bus & Streetcar Volumes	5	8	13	5	8	13
	Person Delay (sec)	43.97	25.32	7.35	43.11	25.55	2.46
	Transit Delay (sec)	56.27	28.27	4.89	61.23	28.46	1.07
	Vehicle Delay (sec)	8.86	13.22	16.12	8.45	10.99	9.92
	Level of Service	A	B	B	A	B	A
	Pedestrian Crossing Time (sec)	32	26	26	32	25	25
	Ped wait time between phases (sec)	38	44	44	38	45	45
Commissioners Street WB	Auto & Truck Volumes	188	335	261	299	723	565
	Bus & Streetcar Volumes	5	21	22	4	21	20
	Person Delay (sec)	10.20	44.04	42.33	4.92	41.49	42.69
	Transit Delay (sec)	13.09	46.94	46.10	5.95	46.89	46.74
	Vehicle Delay (sec)	4.60	30.80	19.43	3.91	29.88	32.27
	Level of Service	A	C	B	A	C	C
	Pedestrian Crossing Time (sec)	32	26	26	32	25	25
	Ped wait time between phases (sec)	38	44	44	38	45	45
Don Roadway NB	Auto & Truck Volumes		680	639		400	392
	Bus & Streetcar Volumes		13	7		13	7
	Person Delay (sec)		34.01	26.56		22.27	27.36
	Transit Delay (sec)		21.23	24.18		26.31	26.62
	Vehicle Delay (sec)		51.80	28.56		12.68	28.33
	Level of Service		D	C		B	C
	Pedestrian Crossing Time (sec)	26	26	19	26	25	20
	Ped wait time between phases (sec)	44	44	51	44	45	50
Don Roadway SB	Auto & Truck Volumes	127	330	247	141	430	402
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	9.09	10.68	15.45	9.95	13.85	16.07
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	9.09	10.68	15.45	9.95	13.85	16.07
	Level of Service	A	B	B	A	B	B
	Pedestrian Crossing Time (sec)	26	26	19	26	25	20
	Ped wait time between phases (sec)	44	44	51	44	45	50
Overall Intersection	*Vehicle Delay (sec)*	7.11	34.25	22.24	6.63	20.32	24.52
	Level of Service	A	C	C	A	C	C

King Street at Queen Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Queen Street EB	Auto & Truck Volumes	342	436	425	497	665	696
	Bus & Streetcar Volumes	12	12	12	10	8	10
	Person Delay (sec)	1.26	1.17	1.31	2.04	1.62	1.73
	Transit Delay (sec)	1.18	1.04	1.25	2.45	1.96	2.12
	Vehicle Delay (sec)	1.47	1.42	1.43	1.44	1.32	1.33
	Level of Service	A	A	A	A	A	A
	Pedestrian Crossing Time (sec)						
	Ped wait time between phases (sec)						
Queen Street WB	Auto & Truck Volumes	674	767	776	397	448	448
	Bus & Streetcar Volumes	30	30	30	24	24	24
	Person Delay (sec)	1.71	2.15	2.52	3.56	4.68	5.82
	Transit Delay (sec)	1.96	2.38	2.87	3.75	4.92	6.51
	Vehicle Delay (sec)	0.92	1.49	1.54	2.70	3.75	3.13
	Level of Service	A	A	A	A	A	A
	Pedestrian Crossing Time (sec)						
	Ped wait time between phases (sec)						
King NB	Auto & Truck Volumes	334	478	510	441	407	511
	Bus & Streetcar Volumes	11	11	11	16	11	15
	Person Delay (sec)	4.62	6.31	7.05	7.02	14.57	12.78
	Transit Delay (sec)	4.16	4.36	5.01	5.80	9.69	7.72
	Vehicle Delay (sec)	5.73	9.59	10.25	10.24	24.17	23.21
	Level of Service	A	A	B	B	C	C
	Pedestrian Crossing Time (sec)						
	Ped wait time between phases (sec)						

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Basin Street at Cherry Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Basin Street EB	Auto & Truck Volumes	92	231	462	112	96	211
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	1.28	73.90	58.38	1.26	26.74	21.73
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	1.28	73.90	58.38	1.26	26.74	21.73
	Level of Service	A	E	E	A	C	C
	Pedestrian Crossing Time (sec)		17	20		17	17
	Ped wait time between phases (sec)		53	50		53	53
Basin Street WB	Auto & Truck Volumes		217	98		258	76
	Bus & Streetcar Volumes		0	0		0	0
	Person Delay (sec)		32.47	5.47		17.86	12.91
	Transit Delay (sec)		0.00	0.00		0.00	0.00
	Vehicle Delay (sec)		32.47	5.47		17.86	12.91
	Level of Service		C	A		B	B
	Pedestrian Crossing Time (sec)		17	20		17	17
	Ped wait time between phases (sec)		53	50		53	53
Cherry Street NB	Auto & Truck Volumes	70	372	72	428	155	67
	Bus & Streetcar Volumes	0	8	7	0	8	7
	Person Delay (sec)	0.00	39.68	21.65	0.00	44.00	16.36
	Transit Delay (sec)	0.00	54.16	22.76	0.00	54.33	17.04
	Vehicle Delay (sec)	0.00	17.03	13.84	0.00	5.16	11.25
	Level of Service	A	B	B	A	A	B
	Pedestrian Crossing Time (sec)		28	25		28	28
	Ped wait time between phases (sec)		42	45		42	42
Cherry Street SB	Auto & Truck Volumes	153	229	127	357	438	209
	Bus & Streetcar Volumes	0	7	8	0	7	8
	Person Delay (sec)	0.00	45.04	33.53	0.00	37.93	31.58
	Transit Delay (sec)	0.00	58.19	38.30	0.00	58.19	38.21
	Vehicle Delay (sec)	0.00	15.84	11.66	0.00	14.39	13.06
	Level of Service	A	B	B	A	B	B
	Pedestrian Crossing Time (sec)		28	25		28	28
	Ped wait time between phases (sec)		42	45		42	42

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Villiers Street at Munition Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Villiers Street EB	Auto & Truck Volumes	16	39	83	162	77	93
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	0.00	0.00	18.71	0.00	0.00	5.03
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	0.00	0.00	18.71	0.00	0.00	5.03
	Level of Service	A	A	B	A	A	A
	Pedestrian Crossing Time (sec)		25	25		25	25
	Ped wait time between phases (sec)		45	45		45	45
Villiers Street WB	Auto & Truck Volumes	26	16	198	110	89	300
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	0.00	0.30	12.73	0.00	0.22	13.52
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	0.00	0.30	12.73	0.00	0.22	13.52
	Level of Service	A	A	B	A	A	B
	Pedestrian Crossing Time (sec)		25	25		25	25
	Ped wait time between phases (sec)		45	45		45	45
Munition Street NB	Auto & Truck Volumes	99	168	190	166	112	100
	Bus & Streetcar Volumes	0	0	0	0	0	0
	Person Delay (sec)	0.00	30.94	26.32	0.00	1.21	17.85
	Transit Delay (sec)	0.00	0.00	0.00	0.00	0.00	0.00
	Vehicle Delay (sec)	0.00	30.94	26.32	0.00	1.21	17.85
	Level of Service	A	C	C	A	A	B
	Pedestrian Crossing Time (sec)		20	20		20	20
	Ped wait time between phases (sec)		50	50		50	50
Munition Street SB	Auto & Truck Volumes			142			72
	Bus & Streetcar Volumes			0			0
	Person Delay (sec)			19.84			17.65
	Transit Delay (sec)			0.00			0.00
	Vehicle Delay (sec)			19.84			17.65
	Level of Service			B			B
	Pedestrian Crossing Time (sec)		20	20		20	20
	Ped wait time between phases (sec)		50	50		50	50
Overall Intersection	*Vehicle Delay (sec)*	0.00	23.34	19.40	0.00	0.56	13.41
	Level of Service	A	C	B	A	A	B

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Key Intersections Level II:

Queen Street at Sherbourne Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Queen Street EB	Auto & Truck Volumes	251	304	320	486	522	650
	Vehicle Delay (sec)	10.95	14.82	18.00	16.25	19.47	19.33
	Level of Service	B	B	B	B	B	B
Queen Street WB	Auto & Truck Volumes	622	776	775	489	533	587
	Vehicle Delay (sec)	15.80	17.63	17.60	8.35	16.46	14.05
	Level of Service	B	B	B	A	B	B
Sherbourne Street NB	Auto & Truck Volumes	347	568	550	493	438	470
	Vehicle Delay (sec)	21.56	26.21	26.54	23.95	45.76	61.26
	Level of Service	C	C	C	C	D	E
Sherbourne Street SB	Auto & Truck Volumes	332	341	321	484	504	564
	Vehicle Delay (sec)	11.05	11.80	12.25	16.86	28.56	28.72
	Level of Service	B	B	B	B	C	C
Queen Street at Sumach Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Queen Street EB	Auto & Truck Volumes	240	303	299	539	661	742
	Vehicle Delay (sec)	4.92	4.74	6.00	7.17	8.42	9.36
	Level of Service	A	A	A	A	A	A
Queen Street WB	Auto & Truck Volumes	453	684	712	211	255	259
	Vehicle Delay (sec)	11.14	13.72	13.66	6.62	8.01	7.81
	Level of Service	B	B	B	A	A	A
Sumach Street SB	Auto & Truck Volumes	65	87	86	107	109	108
	Vehicle Delay (sec)	9.39	7.14	6.79	5.79	4.45	6.14
	Level of Service	A	A	A	A	A	A
Queen Street at River Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Queen Street EB	Auto & Truck Volumes	251	309	304	542	664	736
	Vehicle Delay (sec)	14.25	14.73	15.19	14.28	14.94	14.50
	Level of Service	B	B	B	B	B	B
Queen Street WB	Auto & Truck Volumes	559	641	633	213	271	273
	Vehicle Delay (sec)	5.31	8.40	7.30	5.85	5.60	5.99
	Level of Service	A	A	A	A	A	A
River Street NB	Auto & Truck Volumes	128	203	212	126	143	137
	Vehicle Delay (sec)	23.83	30.38	28.30	19.10	18.69	20.78
	Level of Service	C	C	C	B	B	C
River Street SB	Auto & Truck Volumes	320	453	465	238	263	247
	Vehicle Delay (sec)	10.32	10.00	9.40	17.44	16.47	16.23
	Level of Service	B	A	A	B	B	B
Richmond Street at Sherbourne Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Richmond Street WB	Auto & Truck Volumes	1736	1820	1872	1096	1236	1583
	Vehicle Delay (sec)	7.19	9.19	10.40	5.42	9.37	11.70
	Level of Service	A	A	B	A	A	B
Sherbourne Street NB	Auto & Truck Volumes	342	534	512	600	479	417
	Vehicle Delay (sec)	16.11	29.63	27.49	37.49	70.01	90.24
	Level of Service	B	C	C	D	E	F
Sherbourne Street SB	Auto & Truck Volumes	314	308	306	412	383	404
	Vehicle Delay (sec)	10.79	9.39	8.94	21.55	40.25	53.98
	Level of Service	B	A	A	C	D	D

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Adelaide Street at Sherbourne Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Adelaide Street EB	Auto & Truck Volumes	857	1420	1482	1659	1648	1741
	Vehicle Delay (sec)	4.71	5.07	5.38	8.70	18.83	30.67
	Level of Service	A	A	A	A	B	C
Sherbourne Street NB	Auto & Truck Volumes	319	463	450	242	196	188
	Vehicle Delay (sec)	1.88	4.46	4.98	23.64	34.29	61.20
	Level of Service	A	A	A	C	C	E
Sherbourne Street SB	Auto & Truck Volumes	286	306	292	492	419	416
	Vehicle Delay (sec)	17.71	20.46	20.55	24.02	53.46	77.97
	Level of Service	B	C	C	C	D	E
King Street at Sherbourne Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
King Street EB	Auto & Truck Volumes	76	85	96	268	292	475
	Vehicle Delay (sec)	8.24	9.35	8.13	8.93	15.50	19.67
	Level of Service	A	A	A	A	B	B
King Street WB	Auto & Truck Volumes	253	279	305	287	340	386
	Vehicle Delay (sec)	9.71	11.10	11.81	9.53	11.38	15.92
	Level of Service	A	B	B	A	B	B
Sherbourne Street NB	Auto & Truck Volumes	400	528	506	305	230	232
	Vehicle Delay (sec)	28.41	36.31	37.55	39.92	107.72	103.79
	Level of Service	C	D	D	D	F	F
Sherbourne Street SB	Auto & Truck Volumes	259	285	286	335	373	439
	Vehicle Delay (sec)	23.94	19.86	23.21	19.10	51.68	44.02
	Level of Service	C	B	C	B	D	D
King Street at Sumach Street		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
King Street EB	Auto & Truck Volumes	193	363	340	308	447	495
	Vehicle Delay (sec)	6.27	14.58	13.58	11.05	23.09	26.42
	Level of Service	A	B	B	B	C	C
King Street WB	Auto & Truck Volumes	670	613	614	325	245	299
	Vehicle Delay (sec)	9.09	26.38	22.63	11.09	27.42	25.88
	Level of Service	A	C	C	B	C	C
Sumach Street NB	Auto & Truck Volumes	209	117	156	370	139	162
	Vehicle Delay (sec)	0.61	2.13	1.66	1.09	2.33	1.88
	Level of Service	A	A	A	A	A	A
Sumach Street SB	Auto & Truck Volumes	34	101	92	54	62	64
	Vehicle Delay (sec)	13.96	9.57	9.57	16.34	15.11	12.22
	Level of Service	B	A	A	B	B	B
Eastern Avenue at Carlaw Avenue		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Eastern Avenue EB	Auto & Truck Volumes	450	686	652	1444	1299	1289
	Vehicle Delay (sec)	17.51	20.36	21.12	5.14	7.60	5.44
	Level of Service	B	C	C	A	A	A
Eastern Avenue WB	Auto & Truck Volumes	1247	1212	1263	633	753	749
	Vehicle Delay (sec)	9.16	37.19	33.07	11.65	12.23	14.59
	Level of Service	A	D	C	B	B	B
Carlaw Avenue NB	Auto & Truck Volumes	223	454	441	508	725	790
	Vehicle Delay (sec)	16.08	31.22	20.94	18.89	21.68	23.54
	Level of Service	B	C	C	B	C	C
Carlaw Avenue SB	Auto & Truck Volumes	447	594	564	373	383	349
	Vehicle Delay (sec)	12.74	20.39	20.94	28.37	23.11	19.56
	Level of Service	B	C	C	C	C	B

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Eastern Avenue at Leslie Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Eastern Avenue EB	Auto & Truck Volumes	286	532	540	1141	1169	1185
	Vehicle Delay (sec)	19.43	30.82	28.97	17.38	21.80	24.36
	Level of Service	B	C	C	B	C	C
Eastern Avenue WB	Auto & Truck Volumes	1144	1291	1291	424	609	603
	Vehicle Delay (sec)	7.64	27.93	28.49	6.95	7.38	6.94
	Level of Service	A	C	C	A	A	A
Leslie Street NB	Auto & Truck Volumes	222	205	193	552	852	859
	Vehicle Delay (sec)	17.21	22.11	24.65	18.71	41.45	38.12
	Level of Service	B	C	C	B	D	D
Leslie Street SB	Auto & Truck Volumes	416	649	647	218	196	177
	Vehicle Delay (sec)	13.66	66.30	68.64	13.36	18.93	20.30
	Level of Service	B	E	E	B	B	C
Lake Shore Boulevard at Broadview Avenue		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Lake Shore Blvd EB	Auto & Truck Volumes		1232	1268		968	1110
	Vehicle Delay (sec)		31.85	35.40		37.71	23.28
	Level of Service		C	D		D	C
Lake Shore Blvd WB	Auto & Truck Volumes		1003	1083		749	764
	Vehicle Delay (sec)		30.06	27.13		39.67	38.09
	Level of Service		C	C		D	D
Broadview Avenue NB	Auto & Truck Volumes		424	423		658	647
	Vehicle Delay (sec)		190.42	126.92		125.78	146.25
	Level of Service		F	F		F	F
Broadview Avenue SB	Auto & Truck Volumes		164	165		204	201
	Vehicle Delay (sec)		38.47	34.69		27.46	25.18
	Level of Service		D	C		C	C
Commissioners Street at Carlaw Avenue		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Commissioners Street EB	Auto & Truck Volumes	72	549	495	373	326	247
	Vehicle Delay (sec)	3.22	18.41	9.46	4.17	80.70	110.60
	Level of Service	A	B	A	A	F	F
Commissioners Street WB	Auto & Truck Volumes	275	130	111	153	493	491
	Vehicle Delay (sec)	1.49	6.49	5.13	3.60	40.11	87.25
	Level of Service	A	A	A	A	D	F
Carlaw Avenue NB	Auto & Truck Volumes		78	67		267	253
	Vehicle Delay (sec)		28.63	29.72		33.32	58.43
	Level of Service		C	C		C	E
Carlaw Avenue SB	Auto & Truck Volumes	387	431	444	219	113	98
	Vehicle Delay (sec)	9.48	95.48	80.41	9.09	17.71	18.24
	Level of Service	A	F	F	A	B	B

DO Nothing - Secondary Plan Estimate (Based on Secondary Plan Population and Employment Estimates)
LDL Scenario- LDL Design Team Estimate (Based on Low End of Municipal EA Population and Employment Estimates)

Commissioners Street at Leslie Street		Existing Condition AM	Do Nothing AM	LDL Scenario AM	Existing Condition PM	Do Nothing PM	LDL Scenario PM
Commissioners Street EB	Auto & Truck Volumes	117	146	134	165	475	336
	Vehicle Delay (sec)	9.83	9.42	7.18	10.76	67.06	39.80
	Level of Service	A	A	A	B	E	D
Commissioners Street WB	Auto & Truck Volumes	18	16	12	40	22	13
	Vehicle Delay (sec)	0.92	5.88	2.76	2.34	4.66	8.32
	Level of Service	A	A	A	A	A	A
Leslie Street NB	Auto & Truck Volumes	47	134	127	128	546	541
	Vehicle Delay (sec)	3.61	100.13	15.82	4.31	25.39	60.47
	Level of Service	A	F	B	A	C	E
Leslie Street SB	Auto & Truck Volumes	122	677	645	146	130	159
	Vehicle Delay (sec)	1.71	18.75	17.30	1.67	11.14	9.70
	Level of Service	A	B	B	A	B	A
Commissioners at Saulter		**Existing Condition AM**	**Do Nothing AM**	**LDL Scenario AM**	**Existing Condition PM**	**Do Nothing PM**	**LDL Scenario PM**
Commissioners Street EB	Auto & Truck Volumes	145	381	265	205	217	179
	Vehicle Delay (sec)	0.87	37.71	13.36	0.85	18.40	79.85
	Level of Service	A	D	B	A	B	E
Commissioners Street WB	Auto & Truck Volumes	246	251	252	224	636	597
	Vehicle Delay (sec)	0.00	12.41	10.20	0.00	22.14	37.18
	Level of Service	A	B	B	A	C	D
Saulter Street NB	Auto & Truck Volumes	2	21	17	85	411	388
	Vehicle Delay (sec)	0.51	20.59	17.01	2.28	19.54	20.22
	Level of Service	A	C	B	A	B	C
Saulter Street SB	Auto & Truck Volumes		639	547		347	244
	Vehicle Delay (sec)		25.57	22.76		23.92	20.04
	Level of Service		C	C		C	C

Notes:
*These results may be duplicated in the Do Nothing model due to intersection configuration (Cherry Street NB and SB are the same for the intersections at Queens Quay and at Lake Shore)
Delay is measured as: Actual Travel Time - Free Flow Travel Time
Person Delay is a weighted average of delay experienced by transit users and vehicle users
Transit delay is the delay experienced by buses and streetcars
Vehicle delay is the delay experienced by vehicles

A2 Future Model Results

Appendix 6-A2

Munition Street LRT Alignment Option

Toronto Transit Commission

ARUP

To	Tim Laspa, City of Toronto Mike Ronson, TTC	Reference number	96135/OR
cc		File reference	4-05
From	Olivia Ryan, Arup x 22292 (Toronto) David Pratt, Arup	Date	June 5, 2009
Subject	LDL - Munition Street LRT alignment option		

This memo responds to the query raised by both the City of Toronto and TTC for an LRT route on the north side of the Keating Channel, east of Cherry Street to better serve the higher density LDL development in this quadrant. The memo first outlines the LRT network generally, and discusses stop locations to serve the development. It then discusses the detailed technical design issues with an LRT route over the Munition Street Bridge and concludes with a discussion on adequate access to stop locations.

1.1 LRT Network

In the early network development phase (Phases 1+2), the MVVA team considered different LRT network options for the Keating Channel crossing. Figure 1 shows an early sketch of our preferred LRT network with alignments along Queens Quay, Cherry Street and Villiers Street. Figure 2 shows a similar sketch of an alternative LRT network that we evaluated that differs with the Villiers Street connection by the extension of Queens Quay across Cherry Street and south over the Keating Channel at a point between the Cherry Street and Munition Street bridges. As Cherry Street and Queens Quay LRT alignments were already predetermined from the West Don Lands and Queens Quay EAs respectively, these routes are common to both of the options. For ease of reporting, the LRT alignment east of Cherry Street shall be referred to as the Villiers Street LRT alignment generally, with the "Preferred alignment" as shown in Figure 1 and the "Alternative alignment" shown in Figure 2. It is noted that there are many variations on the Alternative alignment with respect to the crossing point of the LRT over the channel which is explored in this memo.

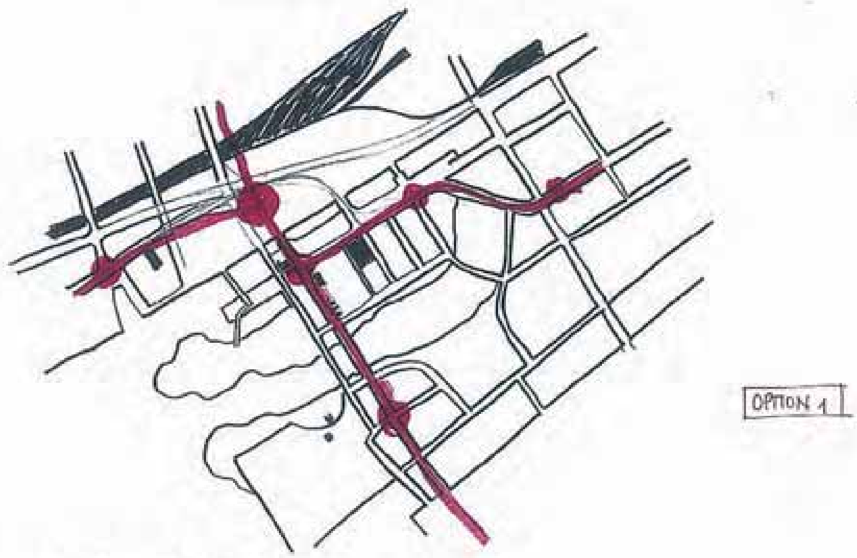


Figure 1: Preferred LDL LRT network

Figure 2: Alternative LDL LRT network

Possible stop locations are shown in both the Preferred and Alternative alignments by the coloured circles. Stop locations are located to balance the need to maximize access from the surrounding area, while ensuring an efficient service that minimizes delays caused by stopping too frequently. The average stop spacing in the Preferred Alignment is 300m. The average stop spacing in the Alternative Alignment is either a lot less than 300m or a lot more depending on whether a stop is located on the north side of the Keating Channel. This issue is discussed in more detail in Section 1.2.

The Preferred LRT alignment only requires one LRT bridge and less track work since the LRT routes running along Villiers and Cherry Streets share the same track on Cherry Street between Queens Quay and Villiers Street. This represents a significant cost saving for the Preferred LRT alignment compared to the Alternative alignment.

1.2 Geometrical Issues with the Alternative LRT Alignment

Plans showing a possible horizontal layout and vertical profile of the Alternative are included in Appendix A. The horizontal alignment shows two alternatives that differ at the point of crossing the Keating Channel. Both alignments avoid the Gardiner columns, and are in keeping with the south running LRT alignment on Queens Quay, and north running alignment on Villiers. The vertical profiles are similar for the two alternatives so the profile for the alignment that crosses the channel at Munition Street is shown although issues with both alternatives are discussed in this section. Constraints to both vertical profiles are given by the need to tie into the Cherry Street/Queens Quay intersection, and to meet the high water level at the Keating Channel (78.85m). This elevation also allows for the 3m clearance required for boats to pass underneath, and also the 2.5m clearance required for the pedestrian boardwalk to be located along the edge of the Channel.

A summary of the design implications is given below:

- The horizontal alignment for Alternative 1 (shown in red) has been located to keep the LRT as close to the Munition Street bridge as possible such that there would be a combined LRT/road bridge rather than two separate structures over the Keating Channel. Combining the bridge into a single structure for LRT and auto traffic means that the stop line on the Munition Street approach would need to be pushed north further away from the intersection to avoid the point at which the LRT crosses over Munition Street. Having the stop line located so far from the intersection reduces the efficiency of the traffic operations and decreases the pedestrian amenity here.
- The vertical profile for Alternative 1 shows that a section of the horizontal curve just north of the channel is part of the bridge structure (between approximate Ch 1+080.000 and 1+090.000). Having a horizontal curve on bridge means that a wider, and thus more expensive, structure will be required.
- The second horizontal profile (LRT Alternative 2 shown in brown lines on the same horizontal plan) shows a separate LRT structure over the channel that is located sufficiently west of Munition Street to avoid the presence of a horizontal curve on the bridge. This alignment also avoids the issue of crossing over the northern Munition Street stop line at the Villiers Street intersection however it requires a separate new structure over the Channel.
- The horizontal LRT curve south of the channel as the LRT turns from Munition into Villiers means that the platform needs to be located some 30m+ further east of the Munition Street intersection.
- Given the need to meet the 78.85m elevation over the channel, the resulting vertical profile is some 2m higher than the existing grade, and approximately 1m higher than the proposed surface in this location according to the Preferred Alignment surface. Consequently, this alignment will require significantly more fill than the Preferred Alignment.
- In both Alternative Alignments, locating a stop on the north side of the channel prior to any horizontal curves means it needs to be located at around Ch 0+900.000, some 120m from the Cherry Street/Queens Quay intersection. The next location where a stop is possible is on Villiers Street immediately east of Munition Street at approx 1+220.000. This stop location on

the north side is not ideal for efficient LRT running time as it is so close to the Cherry Street/Queens Quay intersection stop, however, without it, the distance to the next possible stop is more than 500m from the Cherry Street/Queens Quay intersection which is greater than the preferred 300m spacing.

1.3 Location of Development

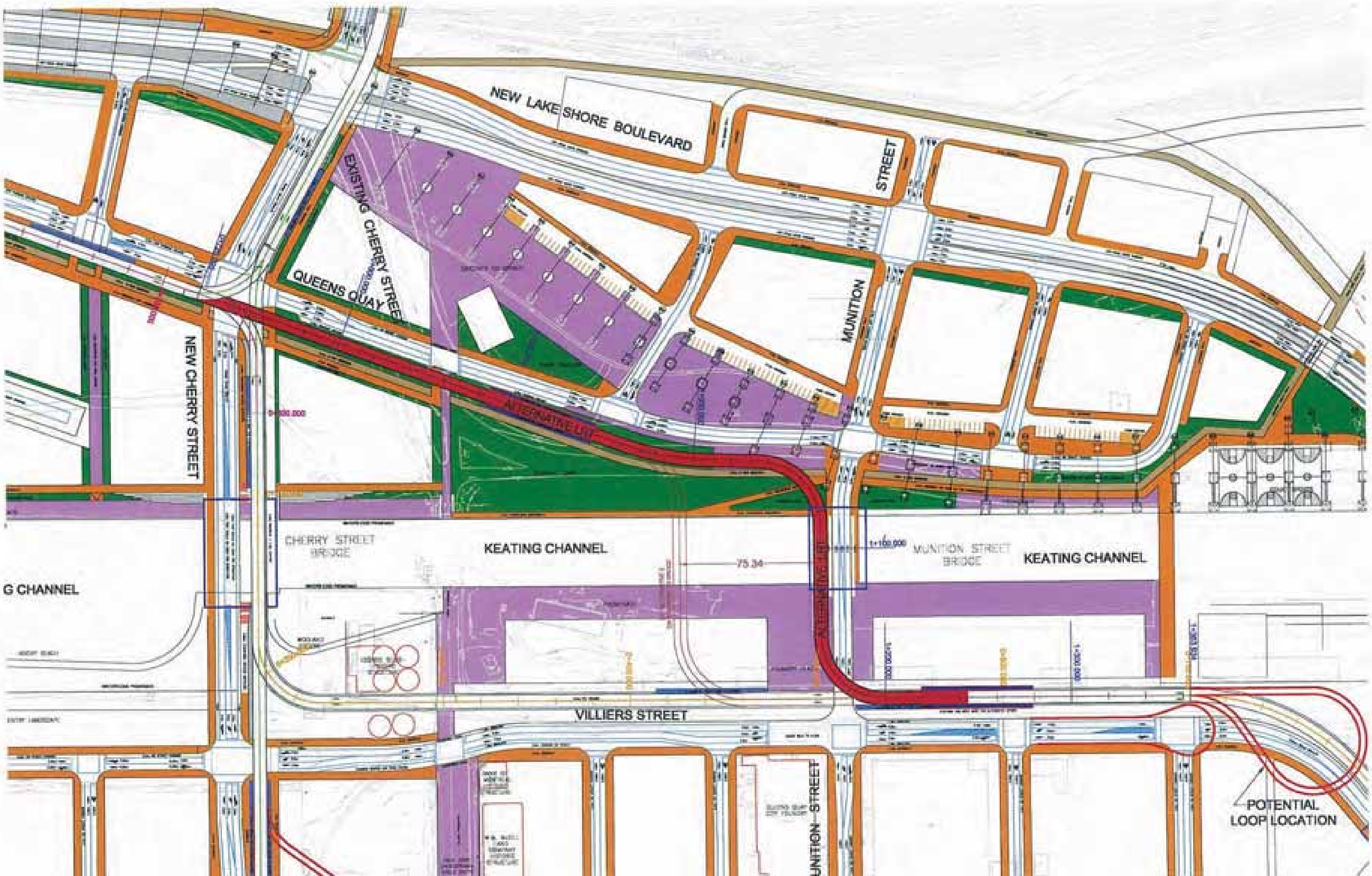
A key concern raised by the City is the potential level of service resulting from the higher density development located north of the Keating Channel and a LRT route located south of the channel. It is noted that the front door of every building in the Keating Channel Precinct is within 300m (5 minutes) of a transit stop. It is also noted that almost the entire development in this area is within a 600m (10 minutes) walking distance of the key stop at the Cherry Street/Queens Quay intersection and that the entire area is within the more commonly adopted 800m walking distance for good access to transit. Finally, it is important to note that passengers' choice of stop can be influenced by its surrounding programming as well as its location. The Urban Design Guidelines and the Zoning for the Keating Channel Precinct emphasize the clustering of pedestrian-oriented uses near transit stops. A transit user's choice of stop and route could be influenced by these adjacent amenities. Consequently, the team feels that the development in this area more than meets access standards for the stop at the Cherry Street/Queens Quay intersection.

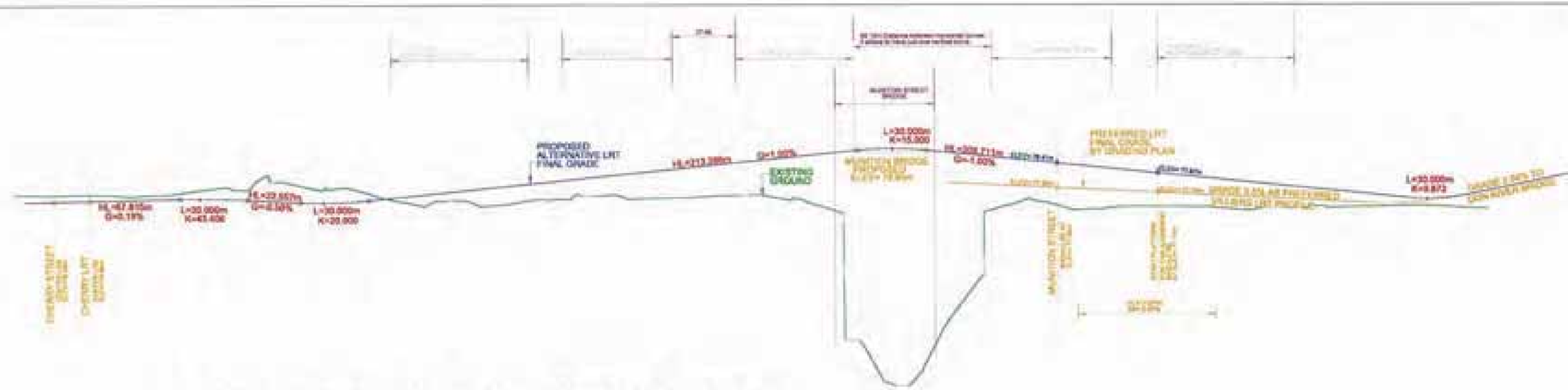
1.4 Summary

In summary, the MVVA team believes that the Preferred LRT Alignment offers a superior solution to the overall LRT network for the LDL master plan.

Appendix A

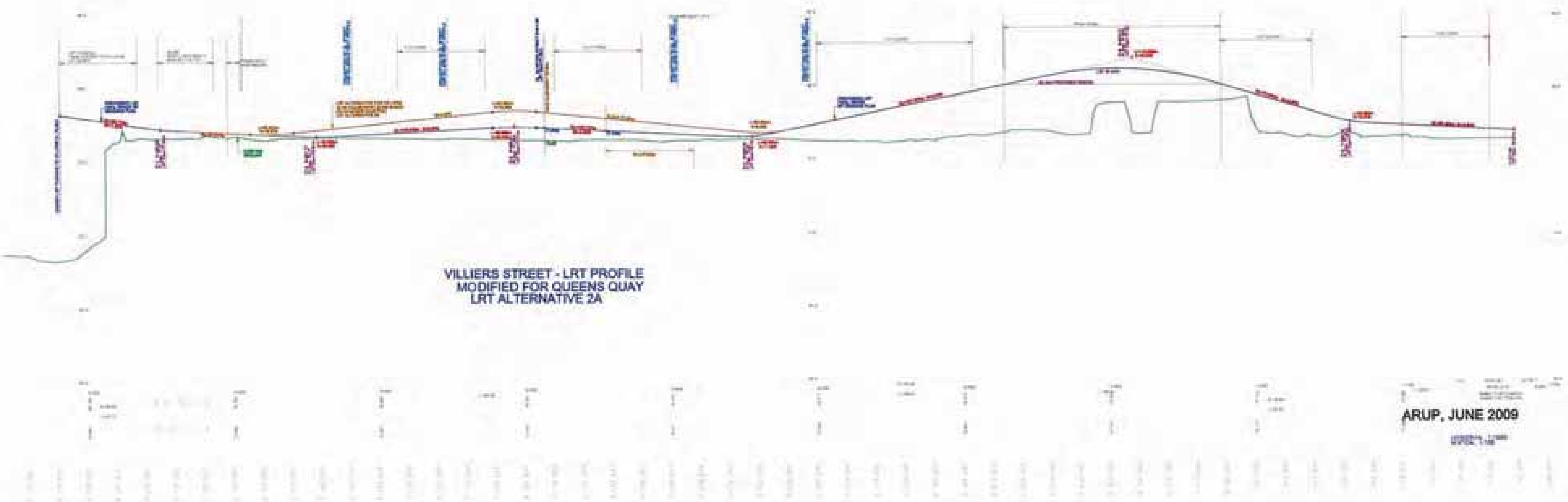
Alternative LRT Alignments - Horizontal and Vertical


NEW LAKE SHORE BOULEVARD
STREET
EXISTING CHERRY STREET
QUEENS QUAY
MUNITION
NEW CHERRY STREET
CHERRY STREET BRIDGE
KEATING CHANNEL
MUNITION STREET BRIDGE
KEATING CHANNEL
G CHANNEL
75.34
VILLIERS STREET
MUNITION STREET
POTENTIAL LOOP LOCATION



ALTERNATIVE QUEENS QUAY LRT TO VILLIERS-
THROUGH MUNITION BRIDGE

ARUP, JUNE 2009



VILLIERS STREET - LRT PROFILE
MODIFIED FOR QUEENS QUAY
LRT ALTERNATIVE 2A

ARUP, JUNE 2009

Appendix 6-A3

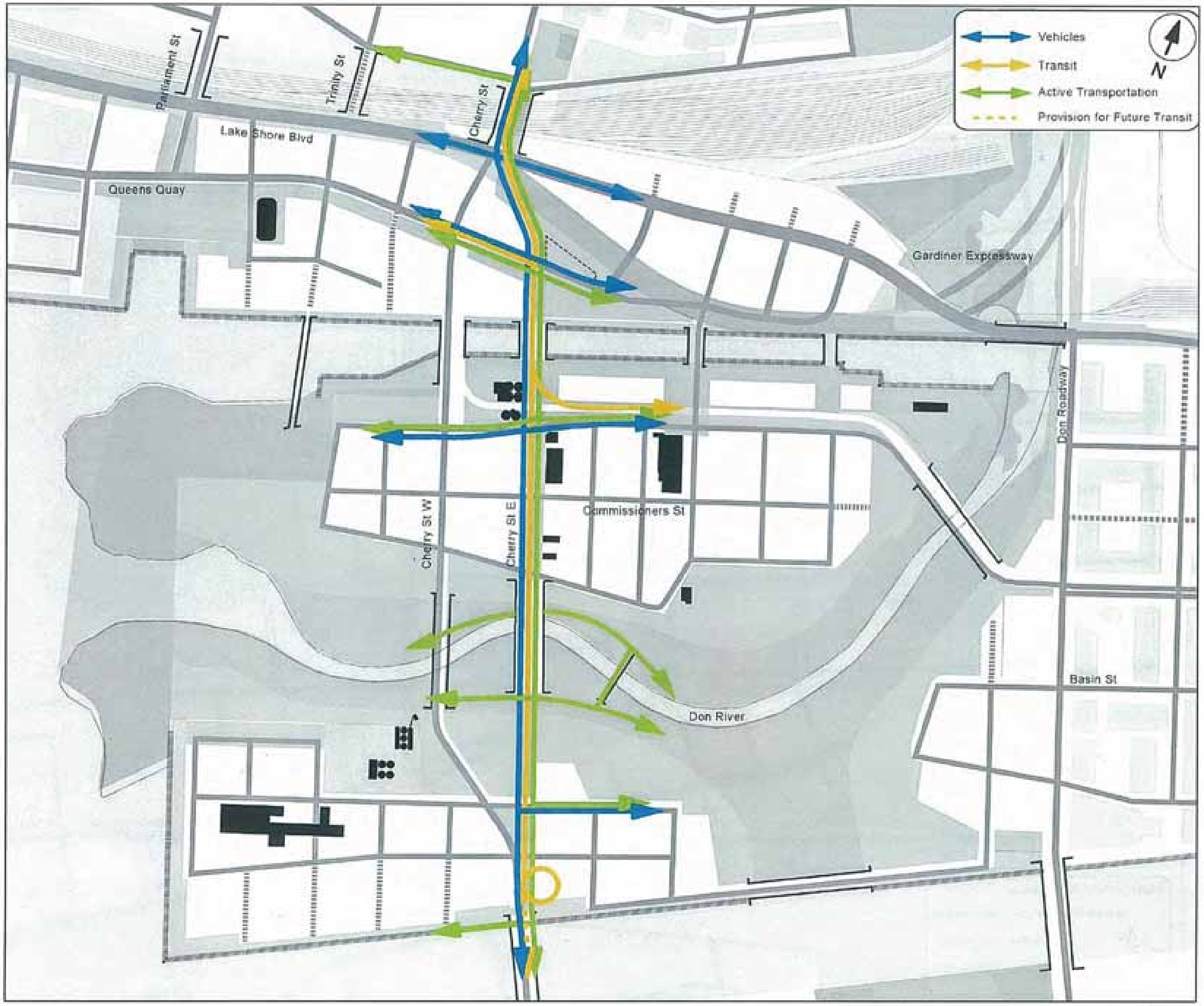
Plans – Transportation Alternative Solutions

WATERFRONToronto

TORONTO

Toronto Transit Commission

Cherry Street Alternative 1



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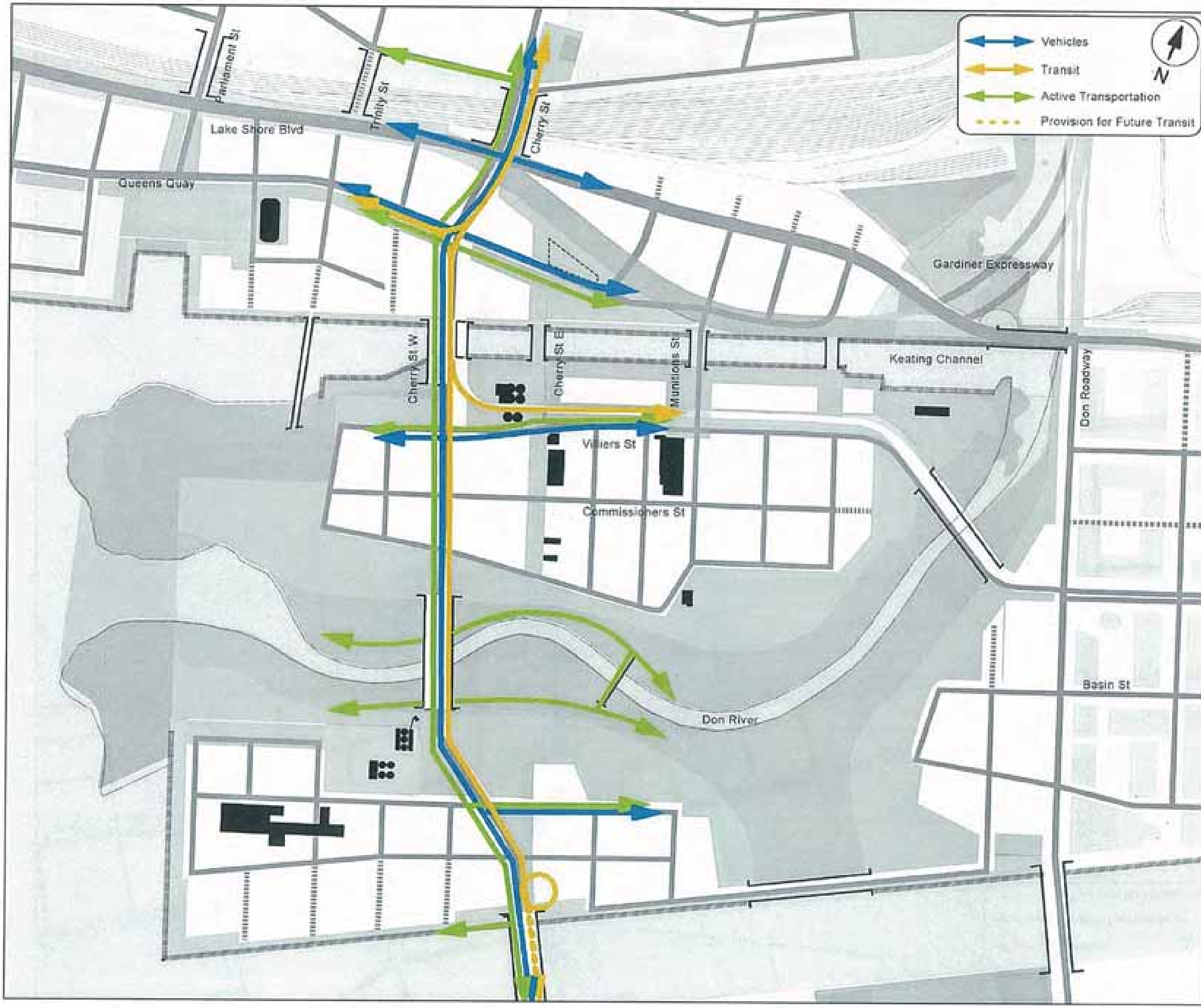
Cherry Street Alternative 2



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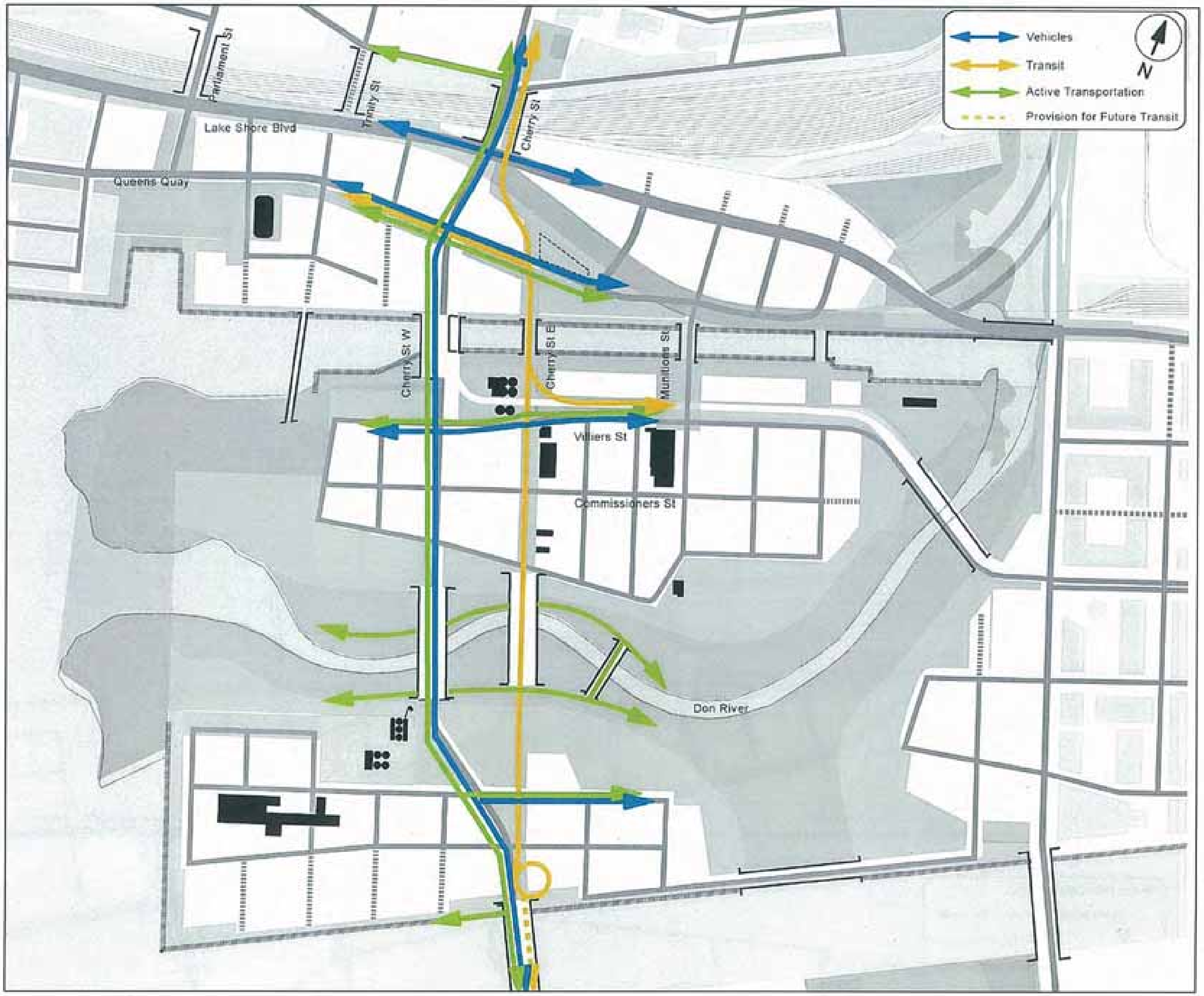
Cherry Street
Alternative 3



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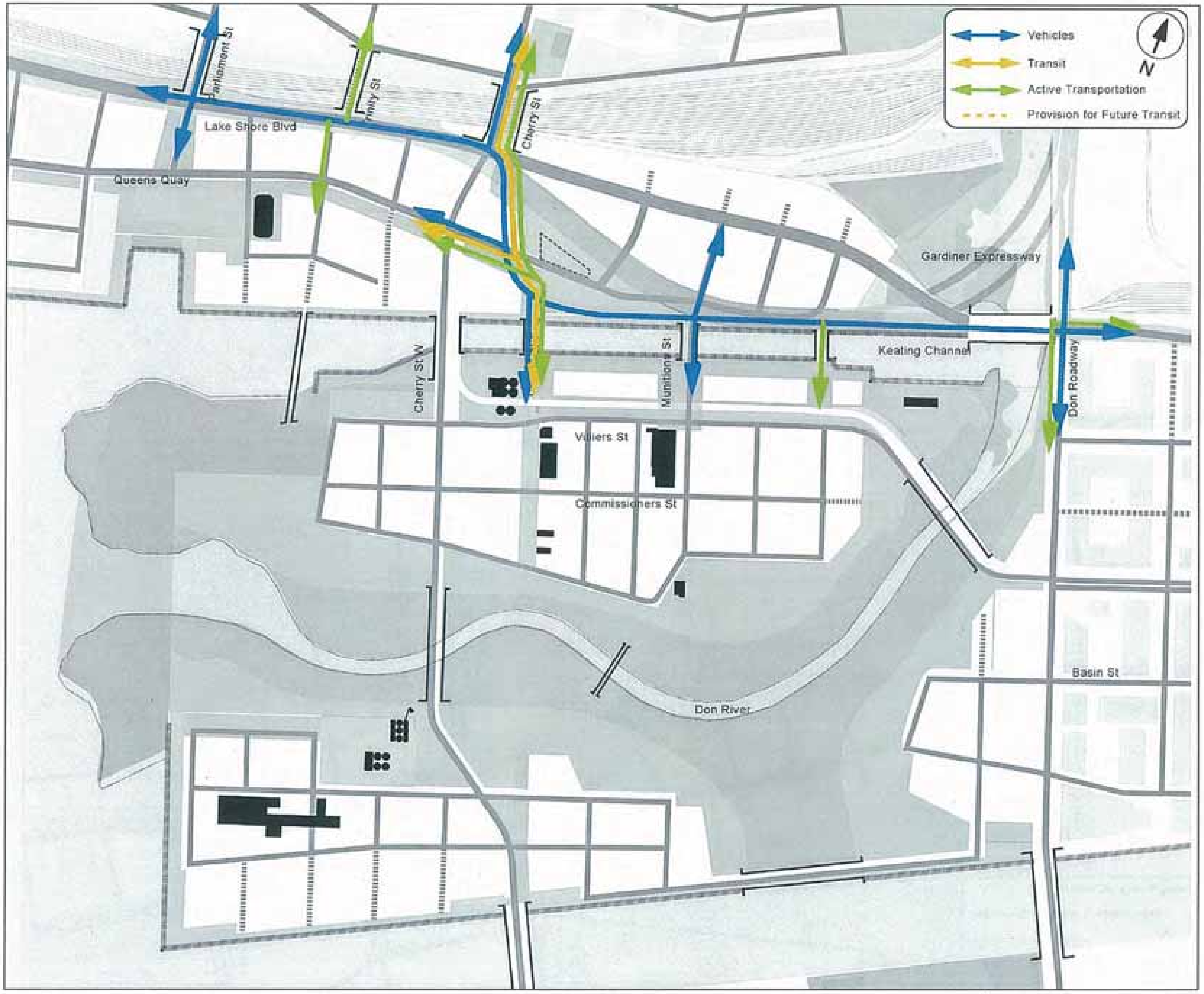

Lake Shore Boulevard Alternative 1

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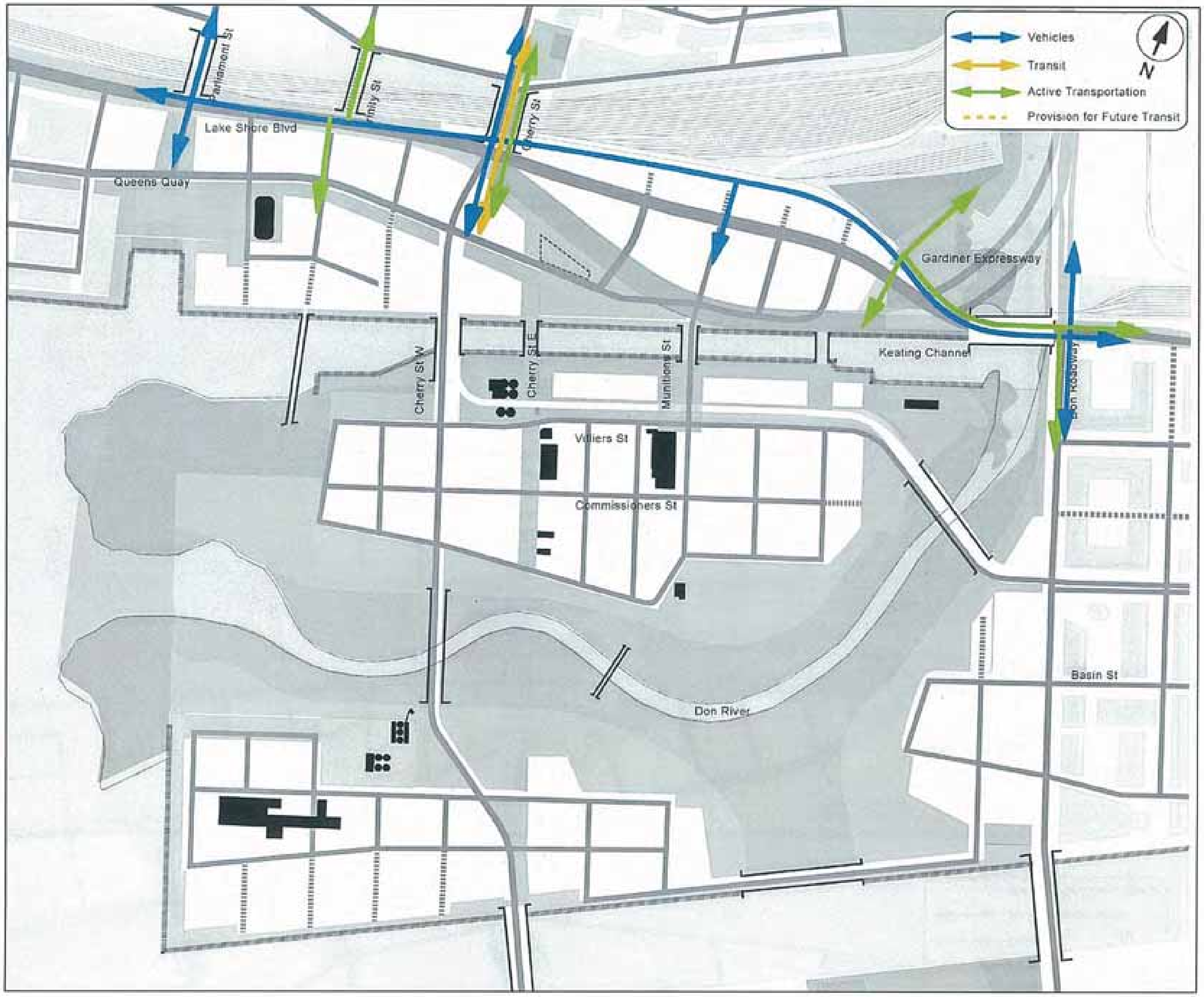
Lake Shore Boulevard Alternative 2



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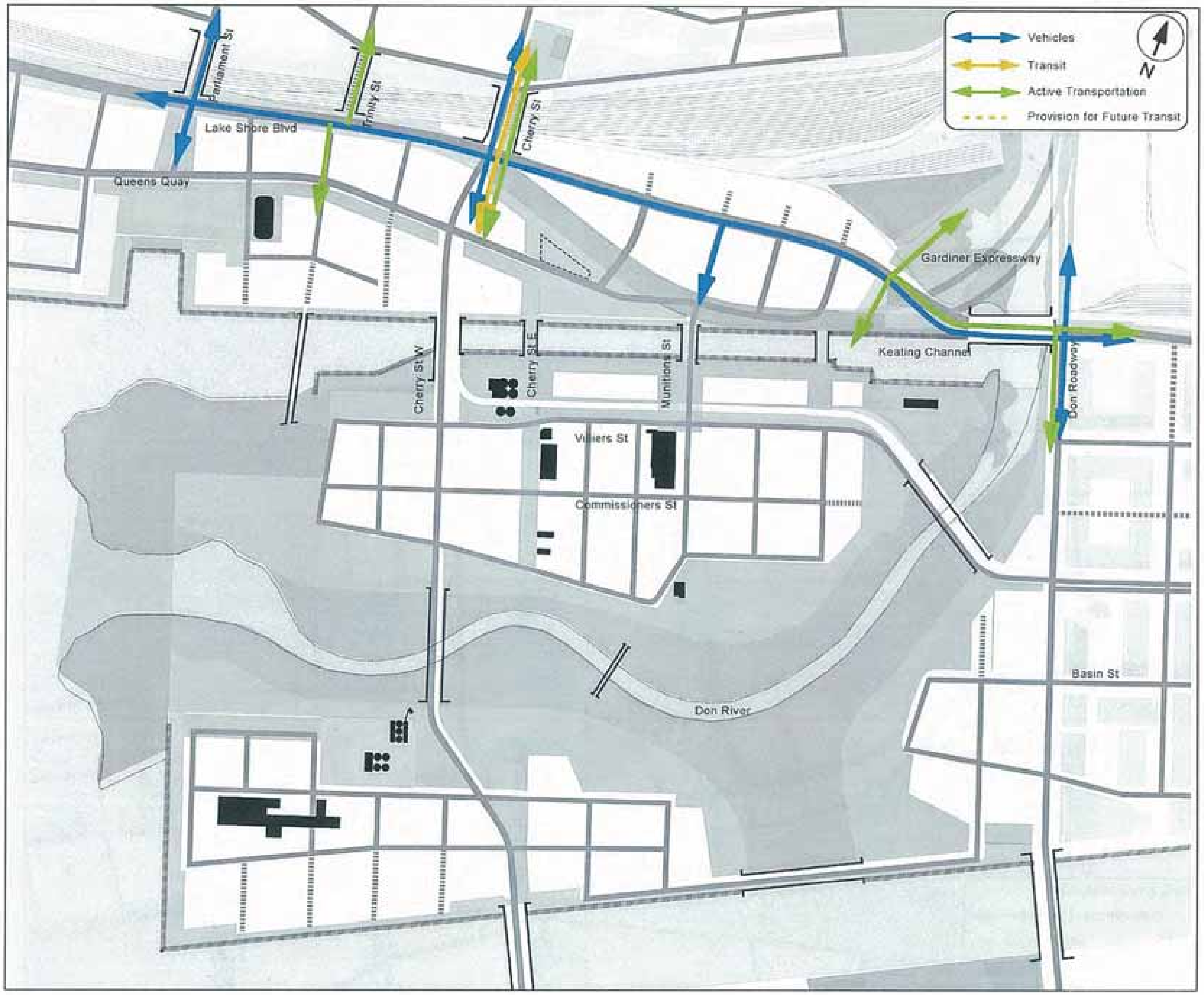

Lake Shore Boulevard Alternative 3

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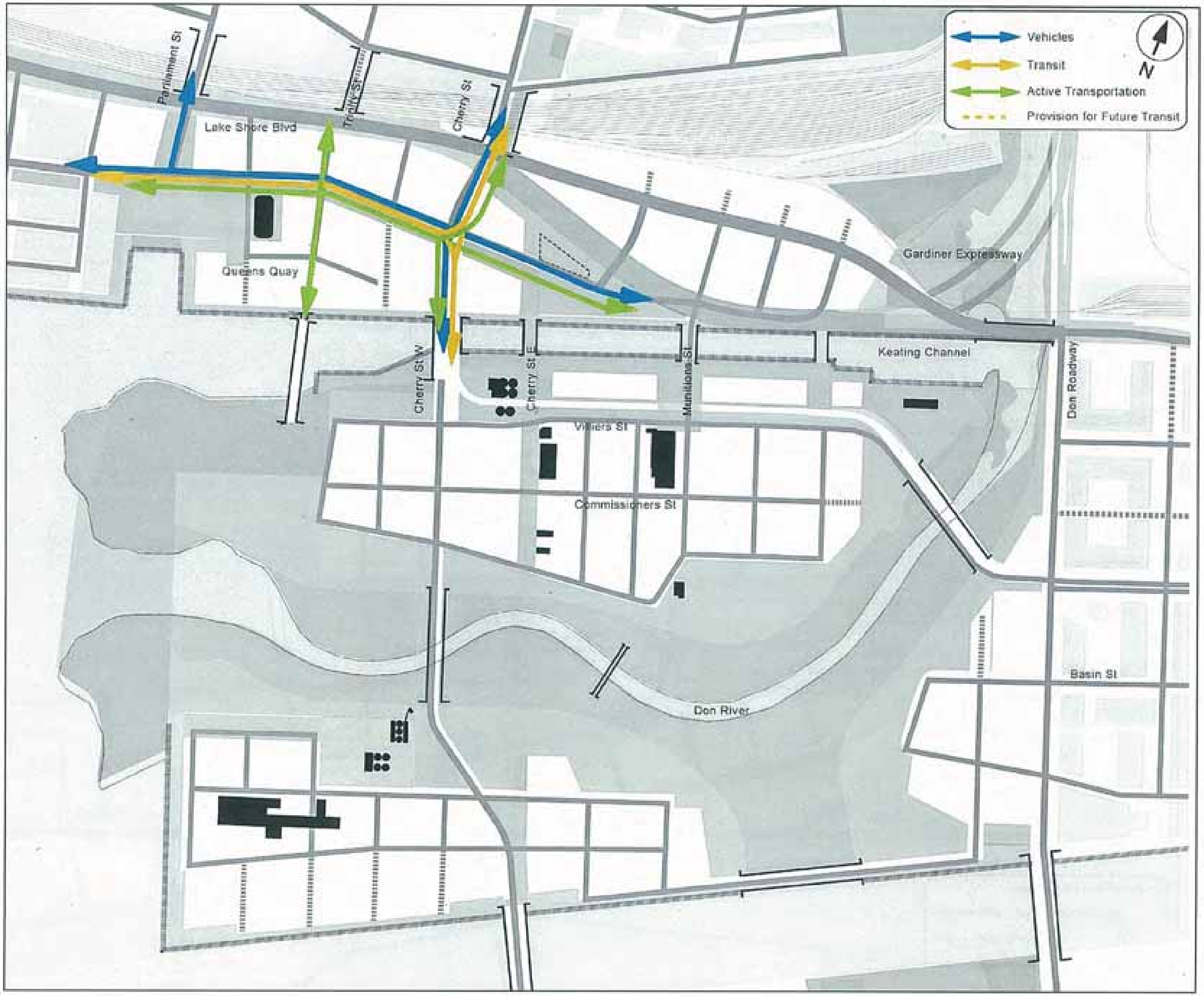

Queens Quay Alternative 1

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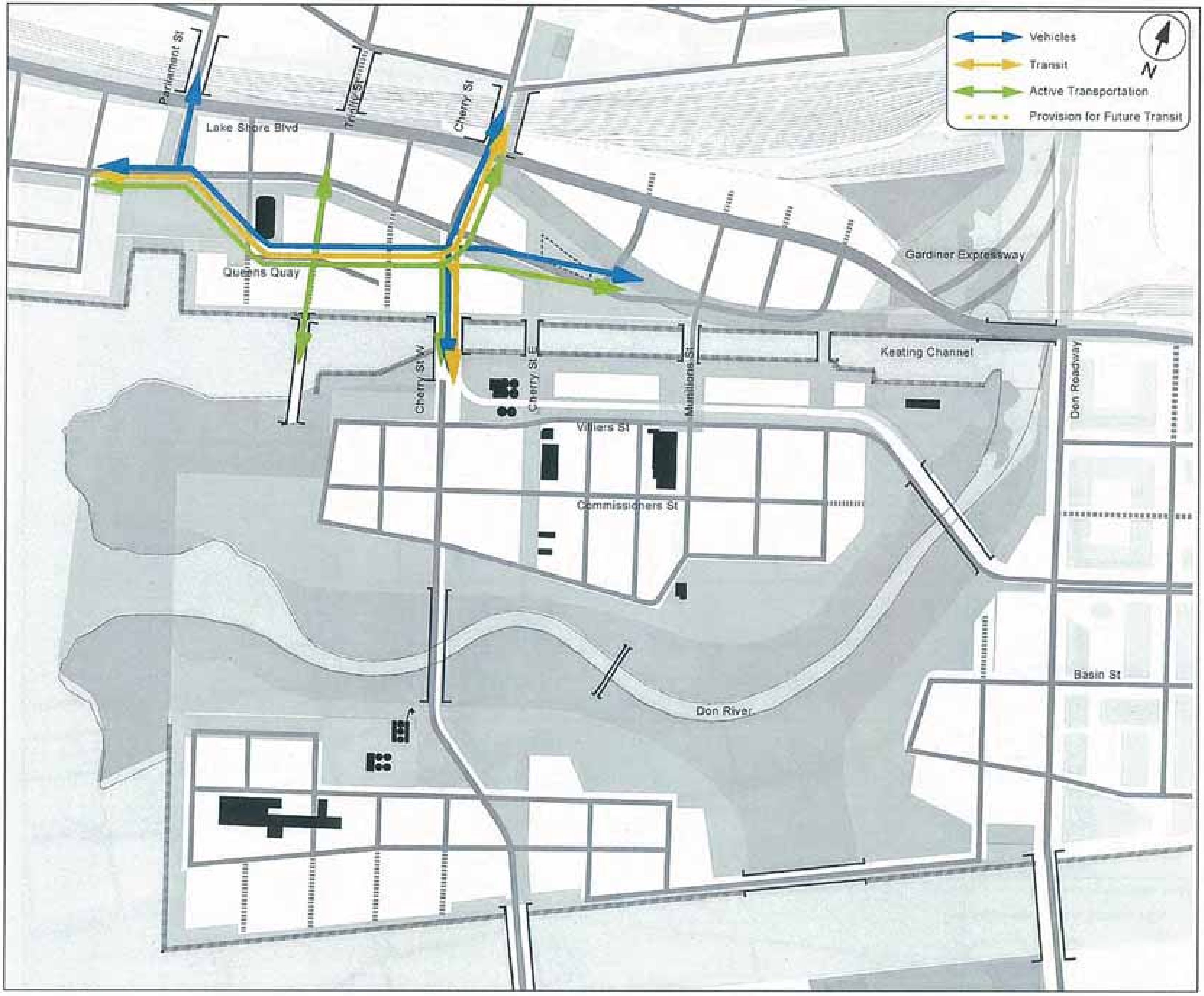
Queens Quay Alternative 2



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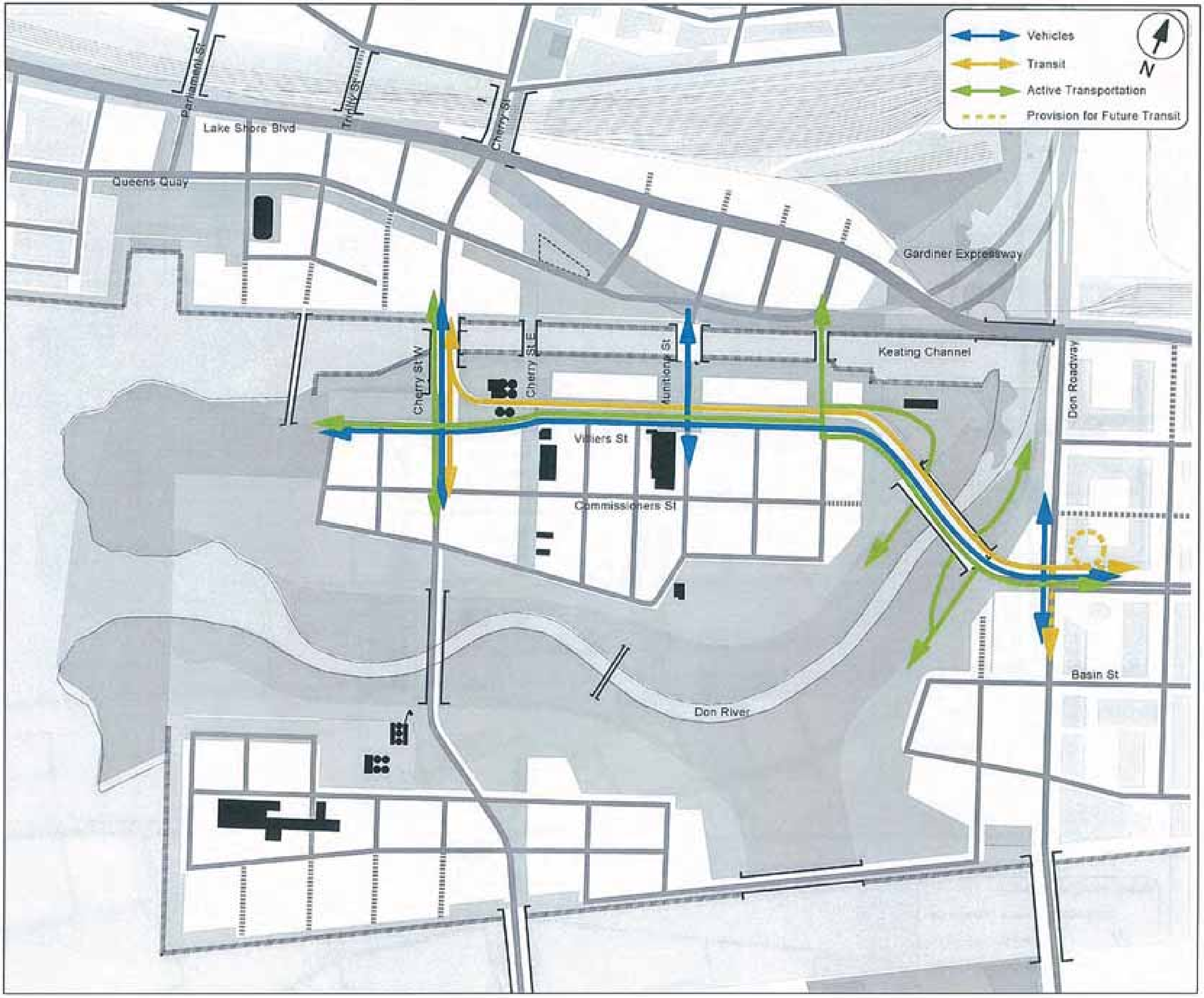

Commissioners Street Alternative 1

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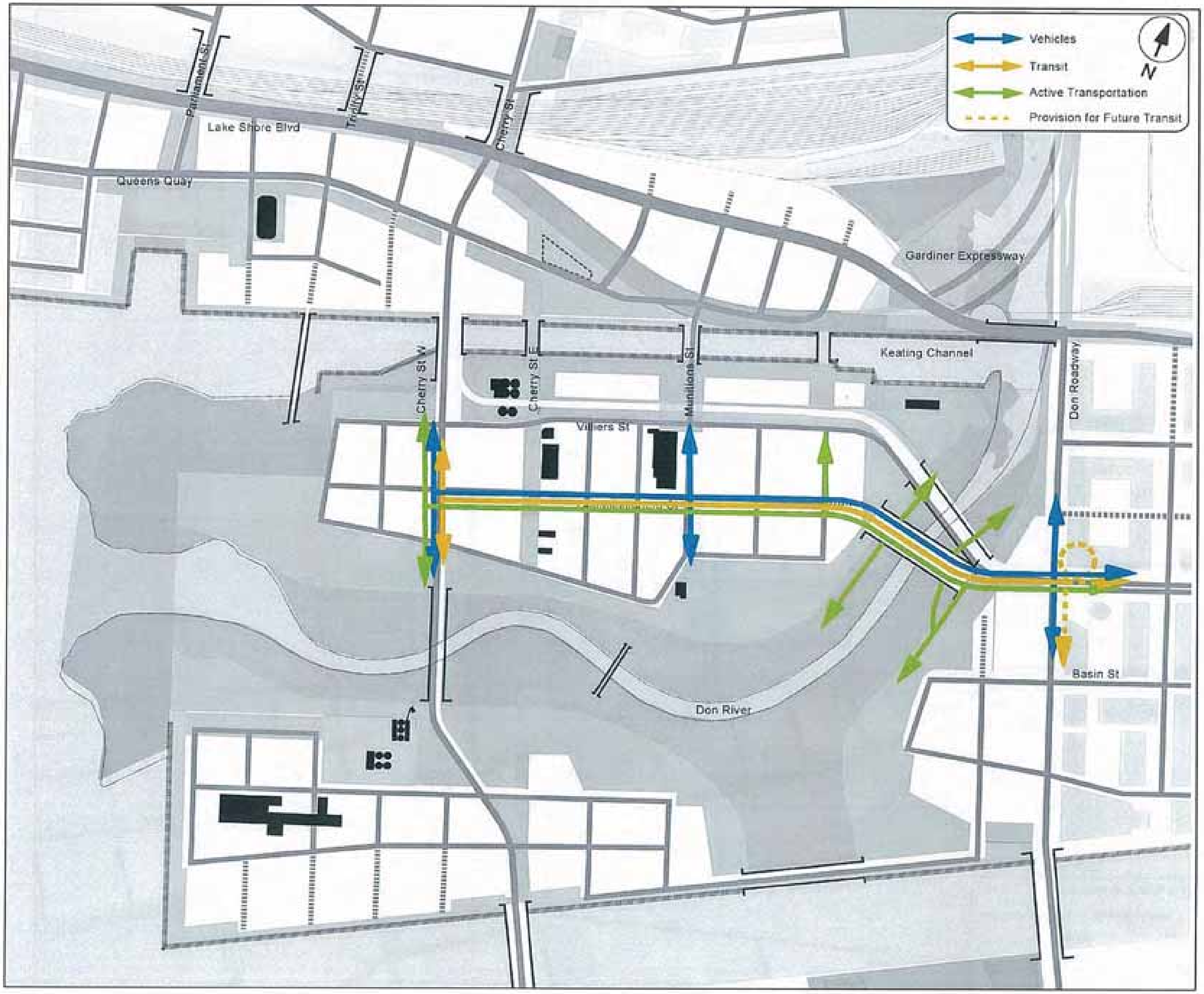
Commissioners Street Alternative 2



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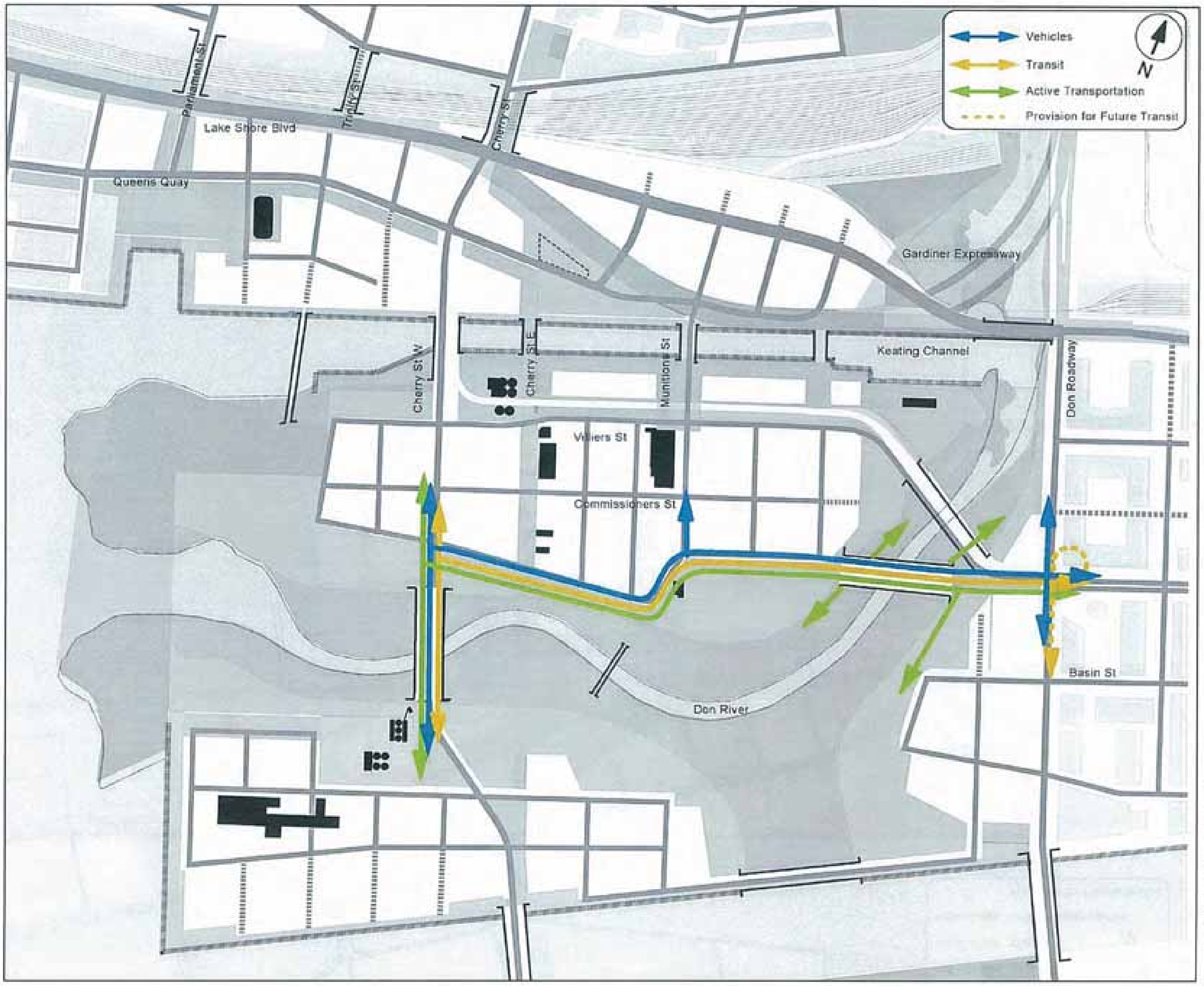
Commissioners Street Alternative 3



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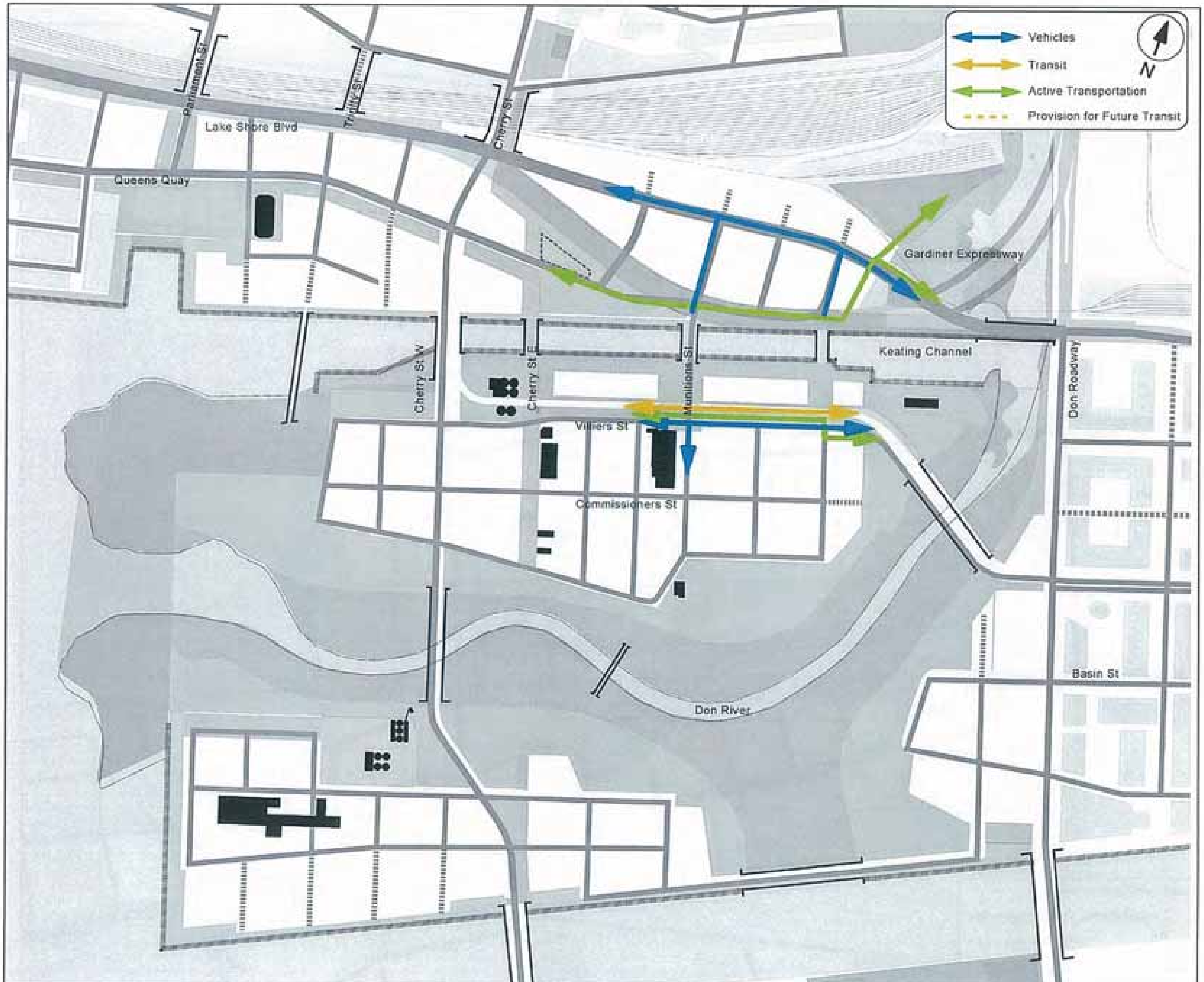
Keating Channel Crossings Alternative 1



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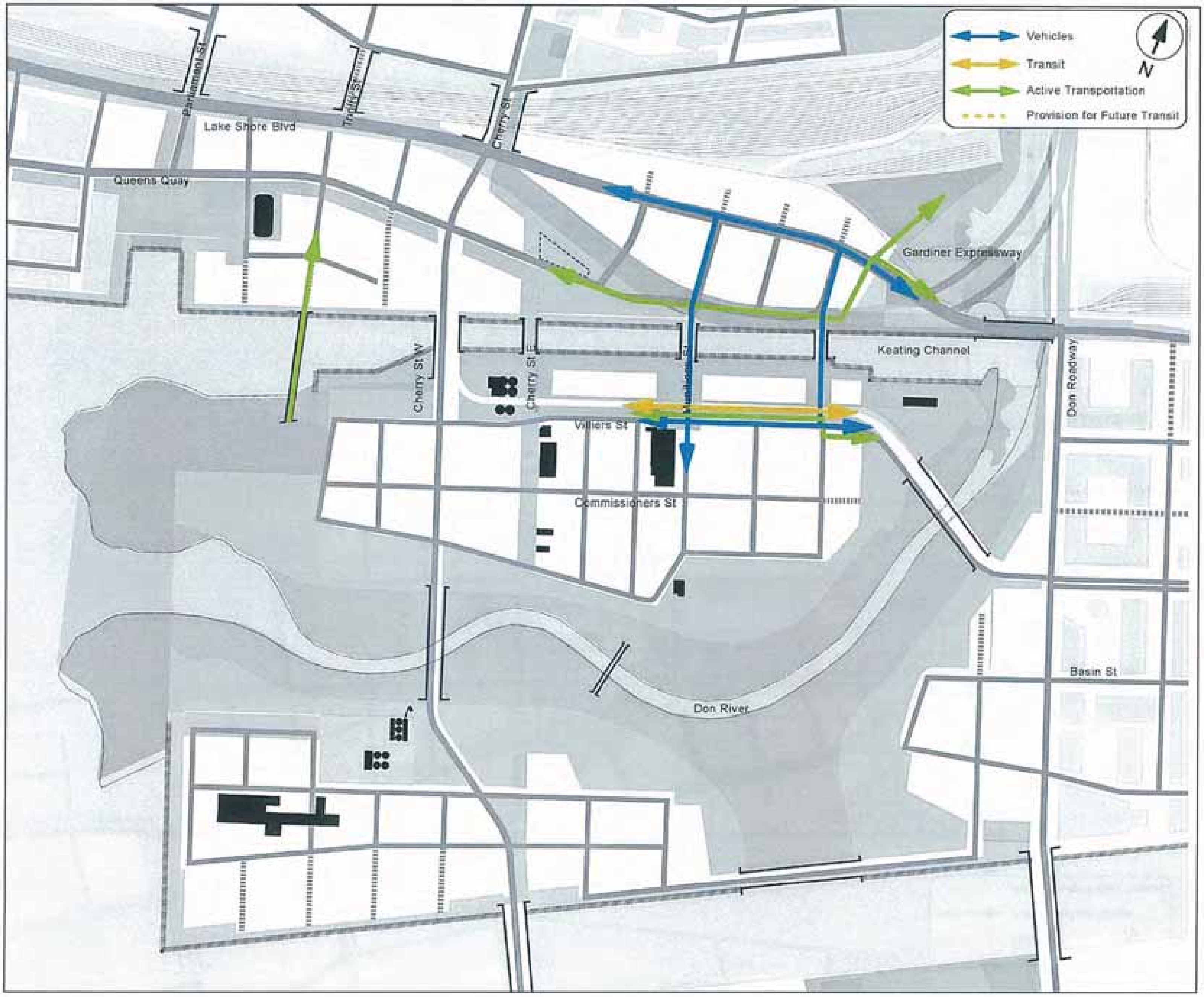


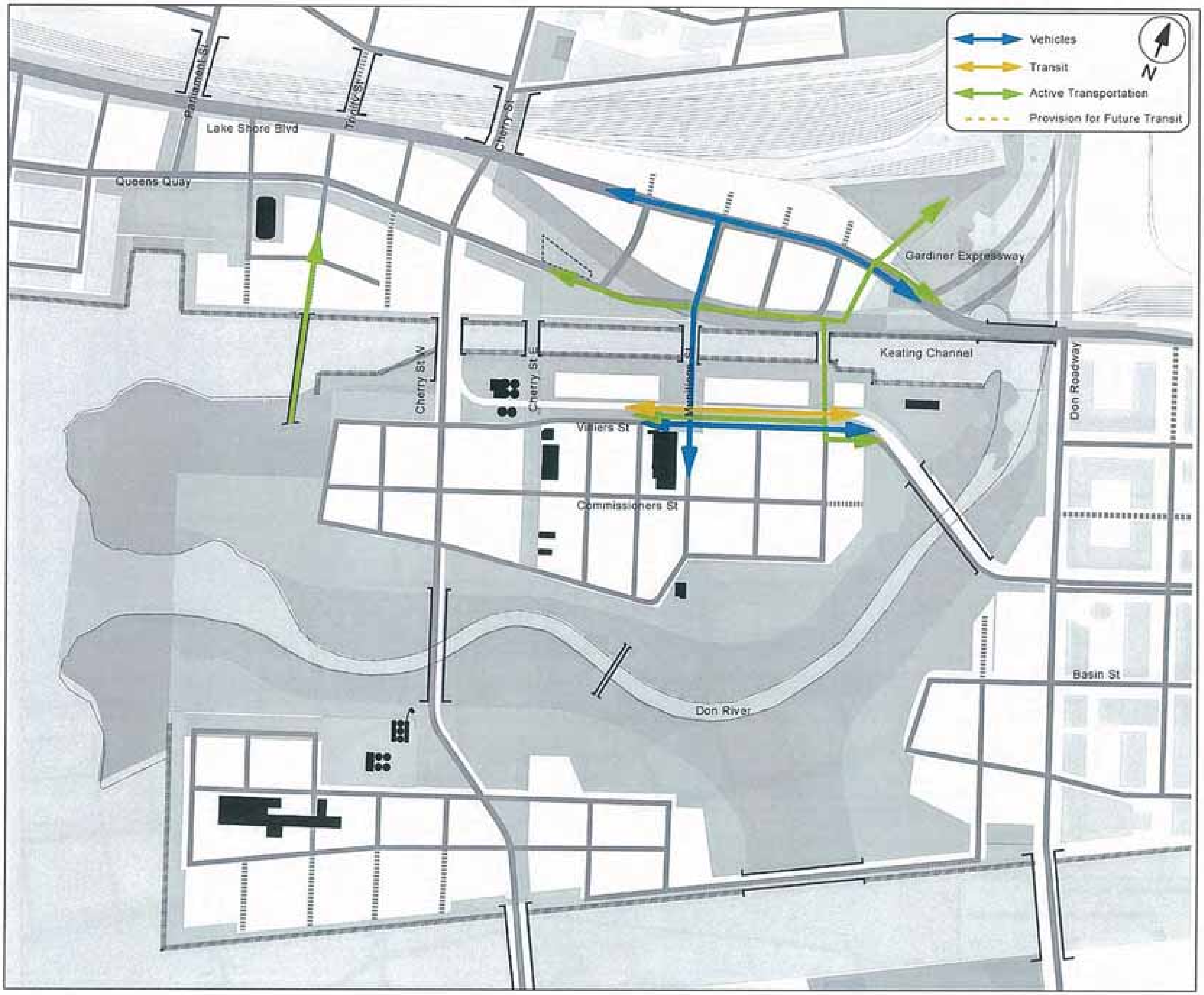
Keating Channel Crossings Alternative 2

Lower Don Lands
Environmental Assessment
Master Plan

Transportation
Alternative Solutions

December 2008

ARUP



Keating Channel Crossings Alternative 3

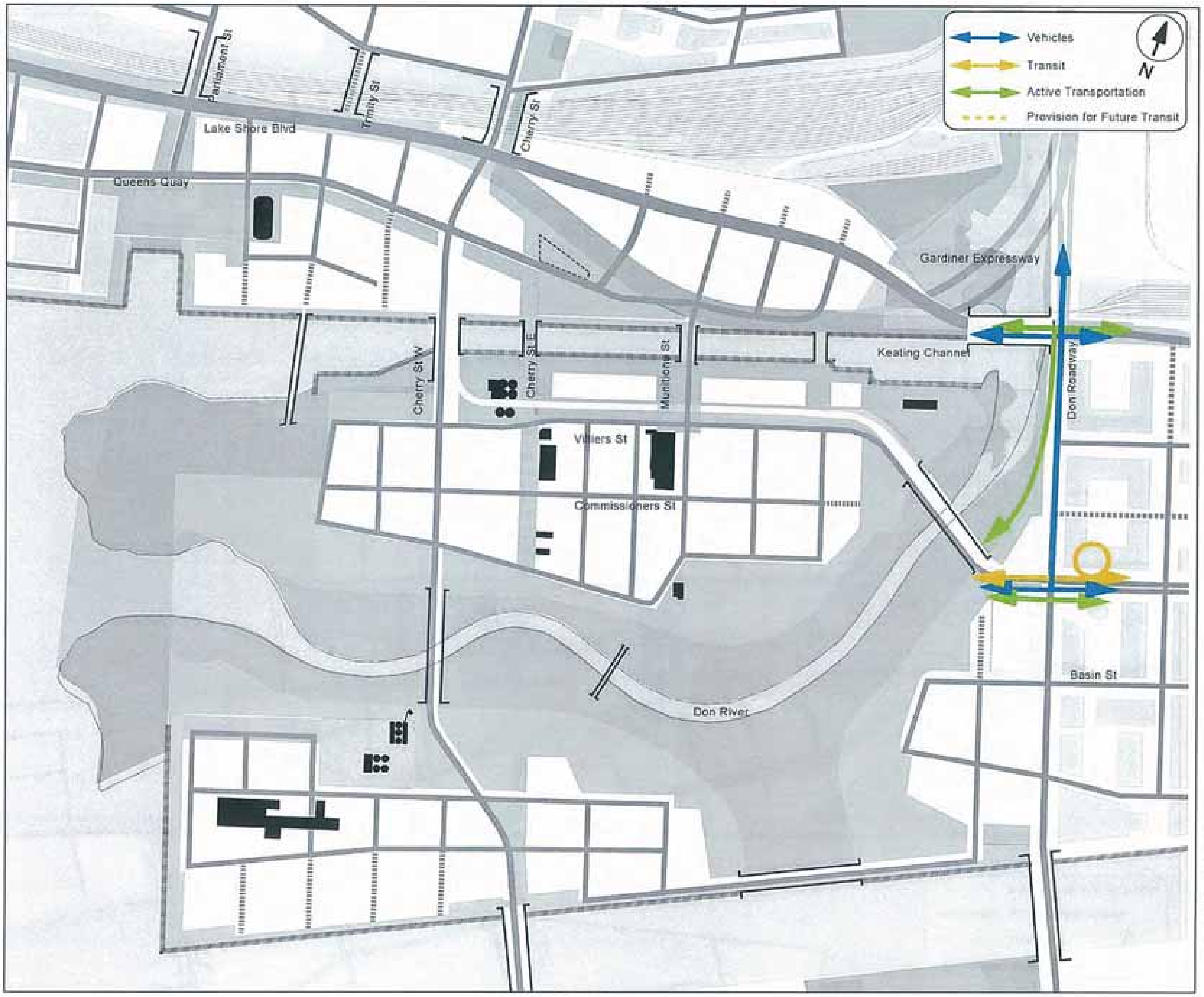
Lower Don Lands
Environmental Assessment
Master Plan

Transportation
Alternative Solutions

December 2008

ARUP

Don Roadway
Alternative 1



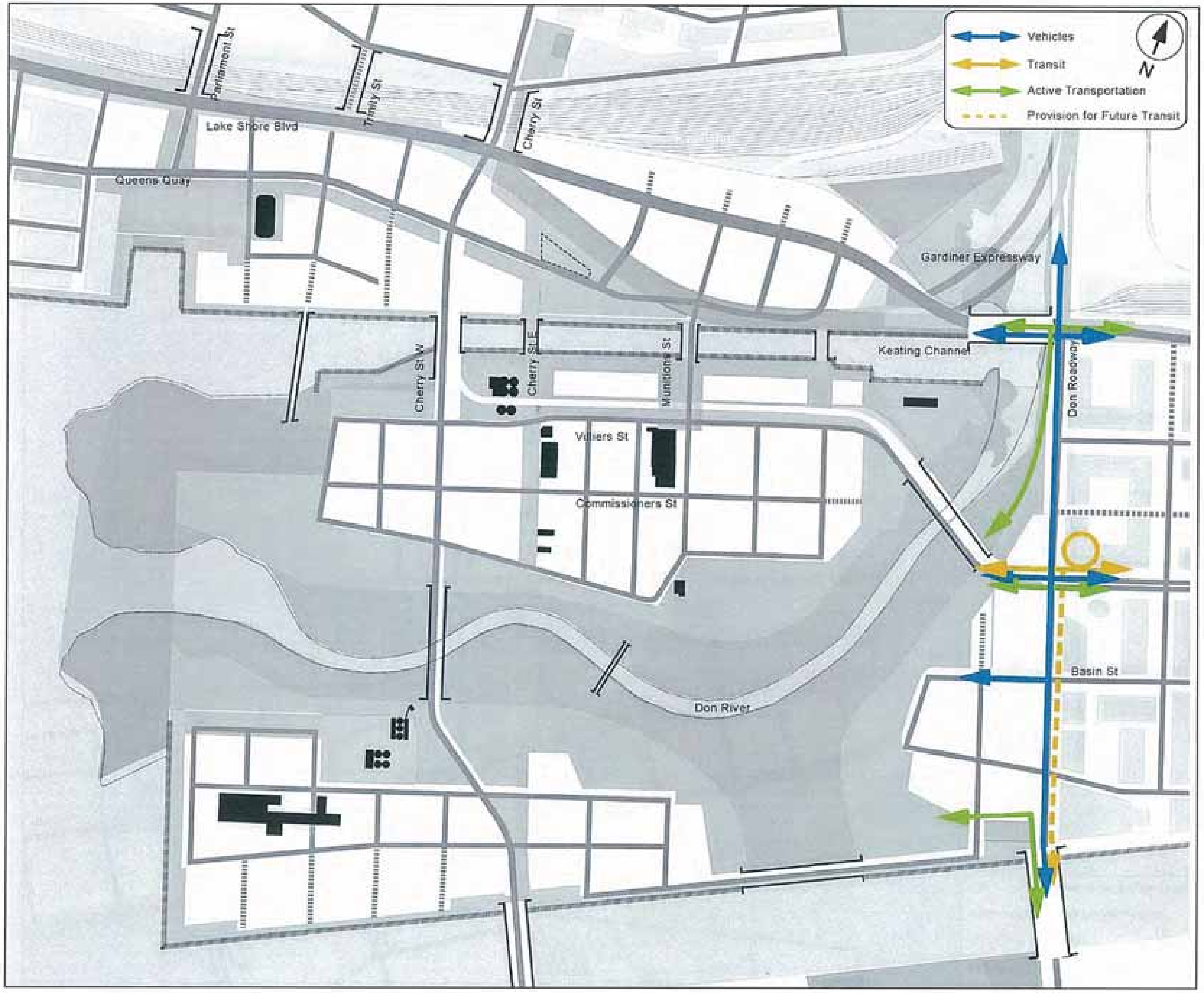
Lower Don Lands
Environmental Assessment
Master Plan

Transportation
Alternative Solutions

December 2008

ARUP

Don Roadway Alternative 2



Lower Don Lands
Environmental Assessment
Master Plan

Transportation
Alternative Solutions

December 2008

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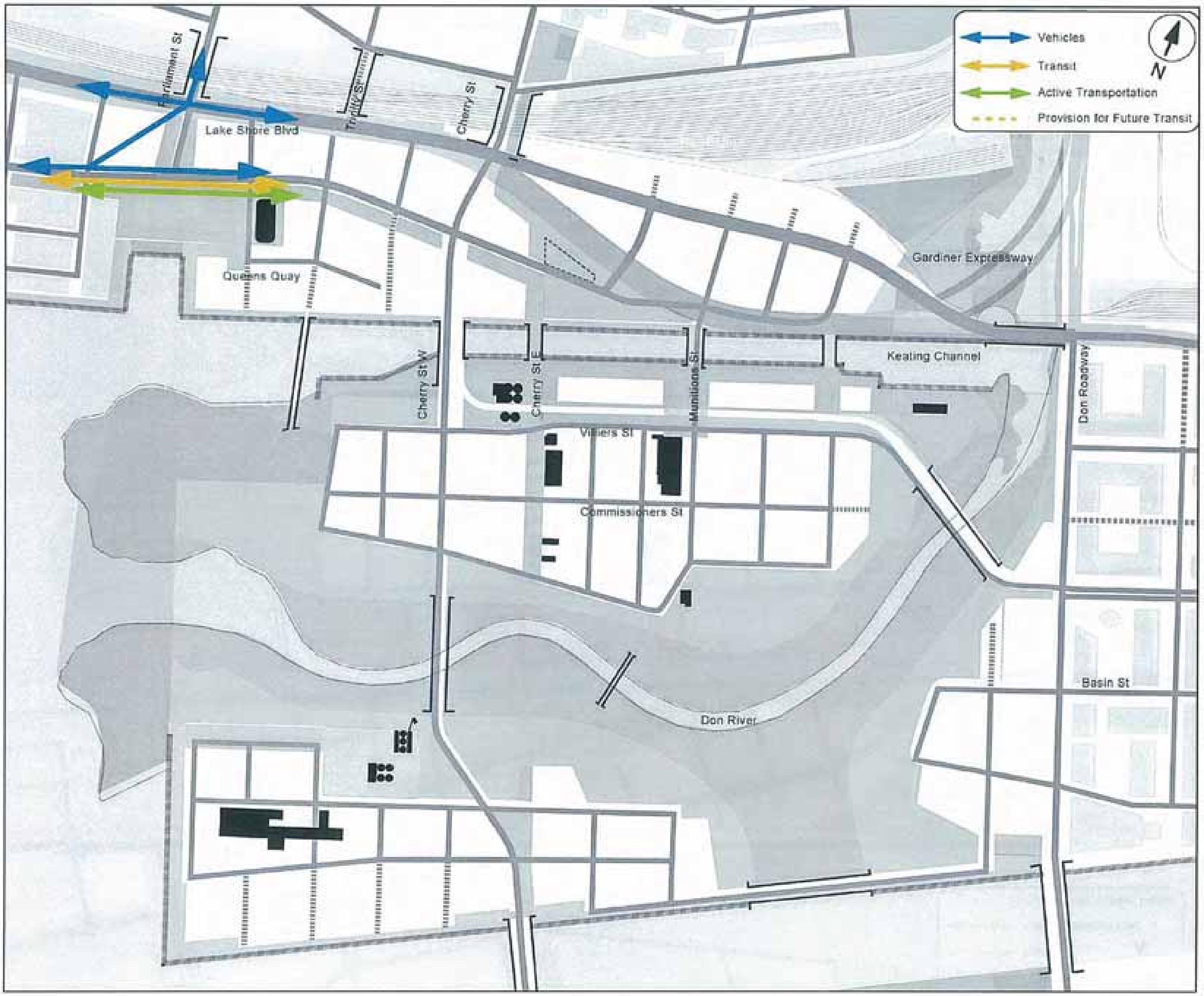


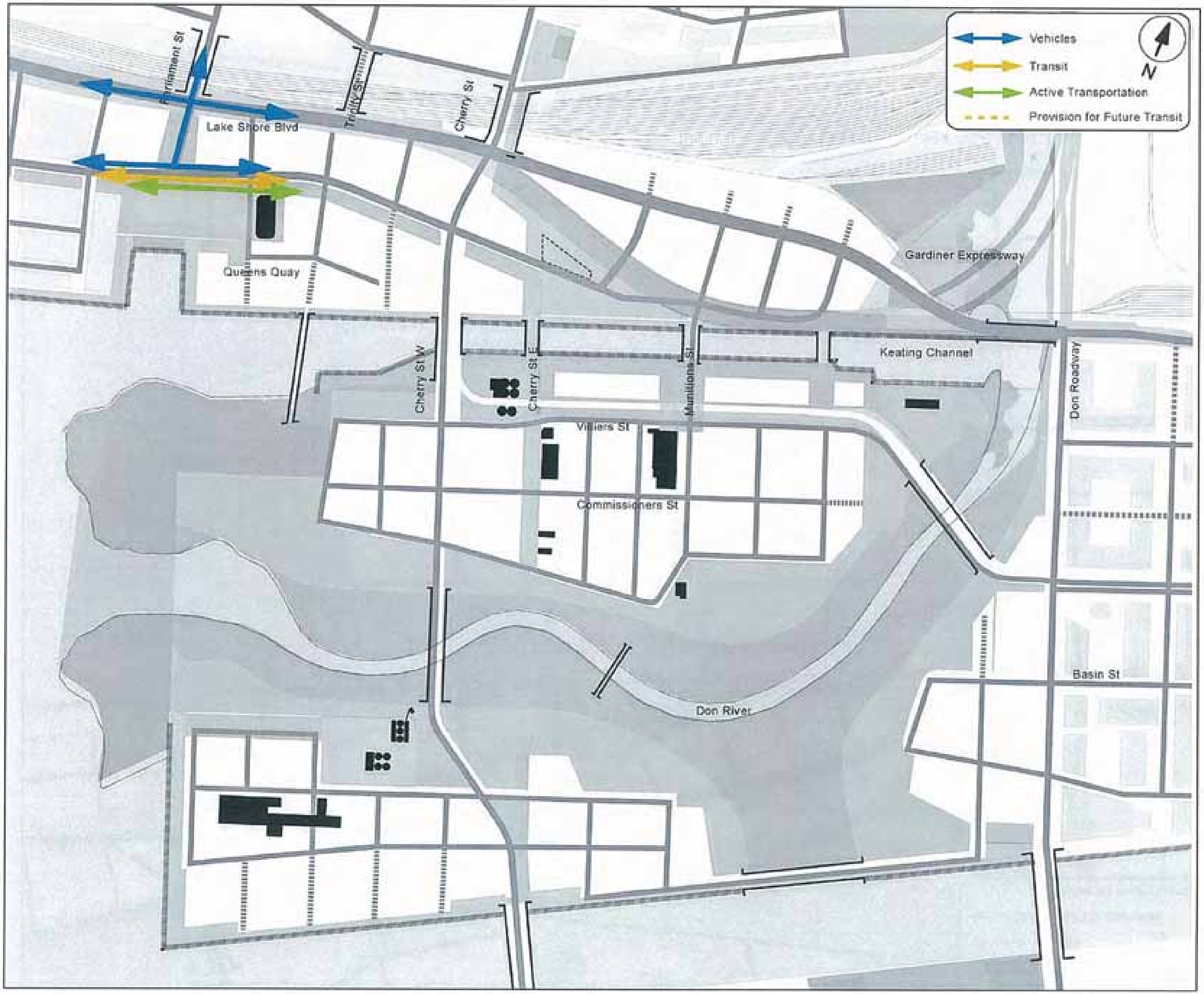
Parliament Street Alternative 1

Lower Don Lands
Environmental Assessment
Master Plan

Transportation
Alternative Solutions

December 2008

ARUP



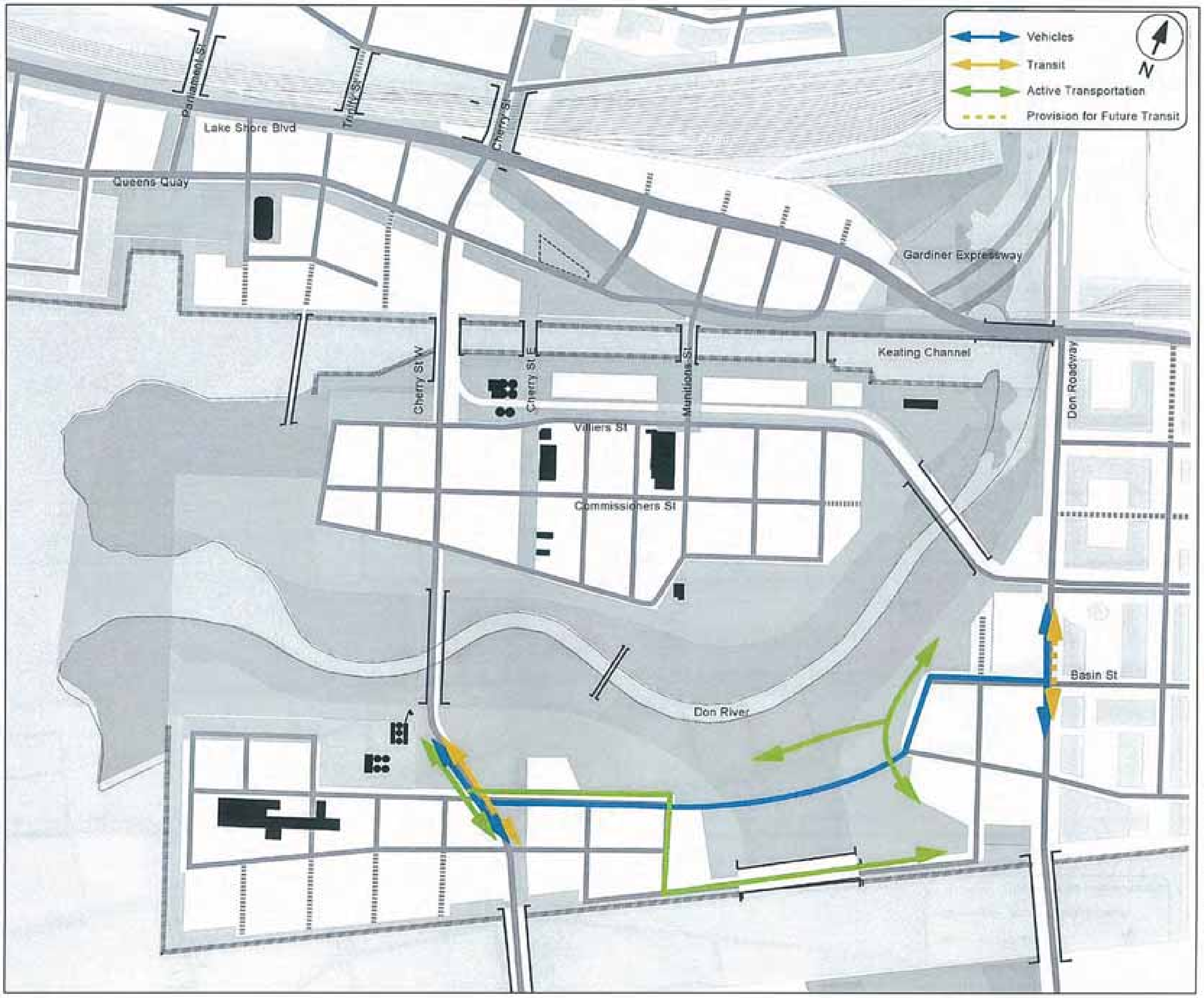
Parliament Street Alternative 2

Lower Don Lands
Environmental Assessment
Master Plan

Transportation
Alternative Solutions

December 2008

ARUP



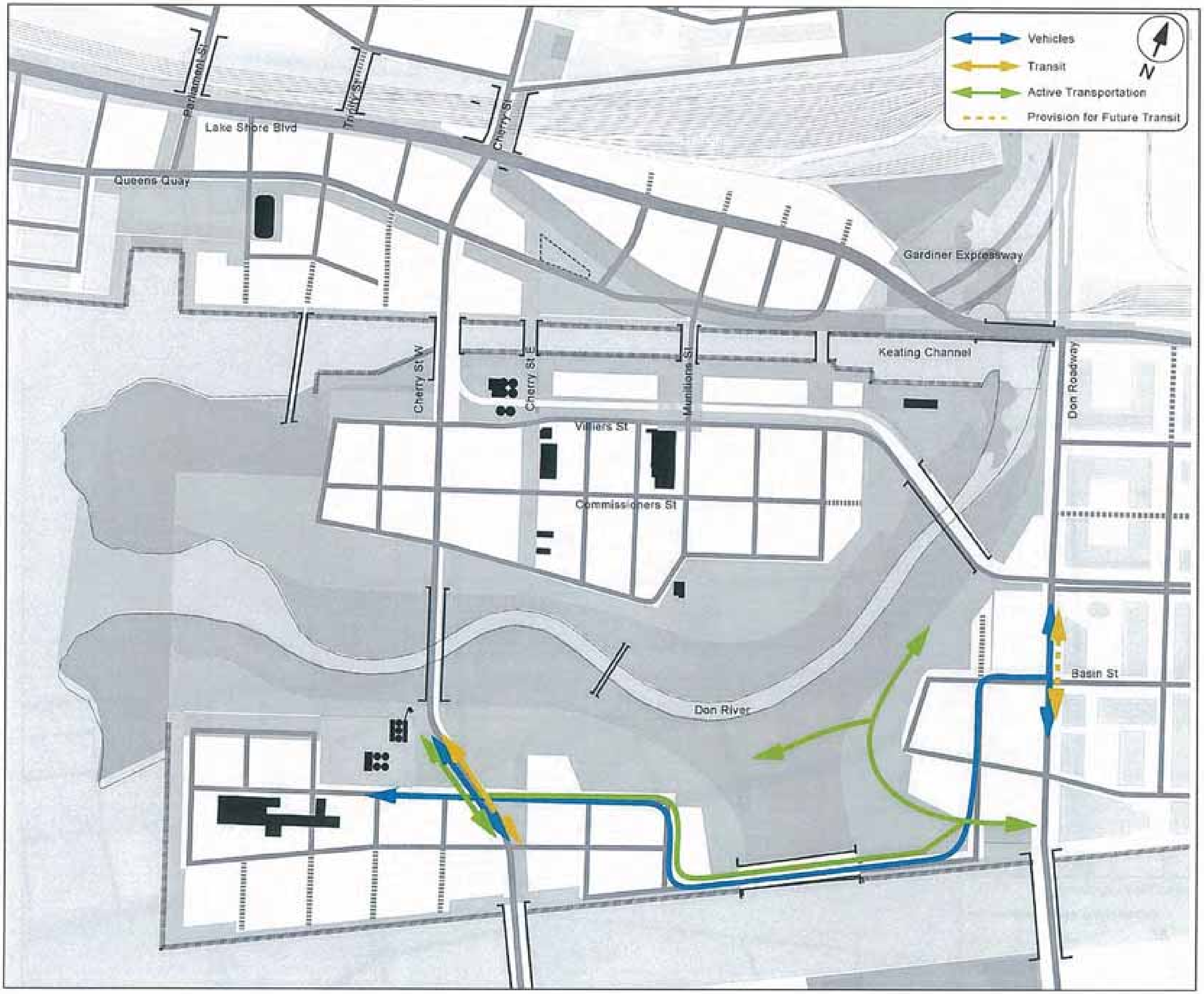
Basin Street
Alternative 1

Lower Don Lands
Environmental Assessment
Master Plan

Transportation
Alternative Solutions

December 2008

ARUP



Basin Street
Alternative 2

Lower Don Lands
Environmental Assessment
Master Plan

Transportation
Alternative Solutions

December 2008

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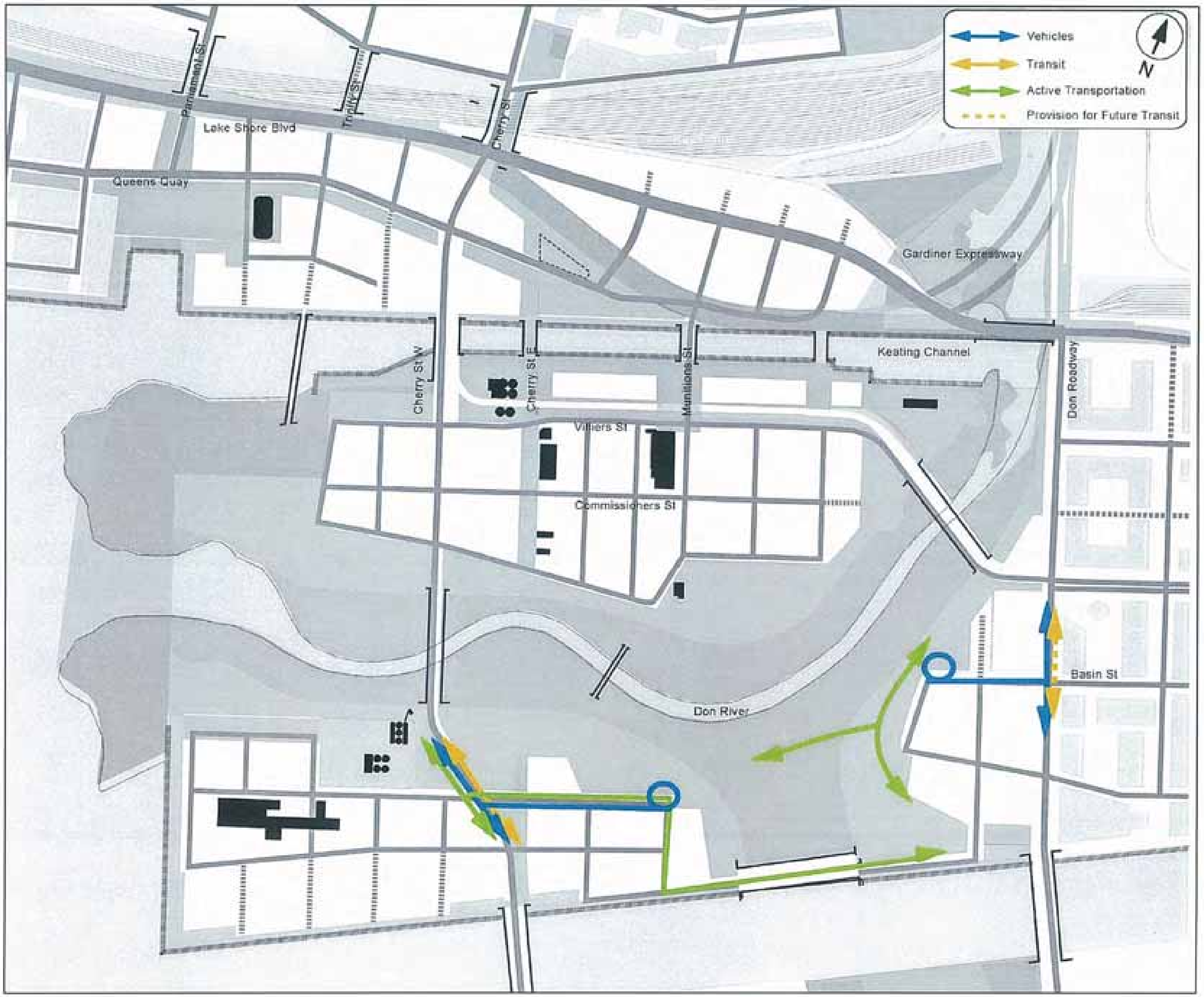
Basin Street
Alternative 3



Lower Don Lands
Environmental Assessment
Master Plan

Transportation
Alternative Solutions

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Appendix 6-A4

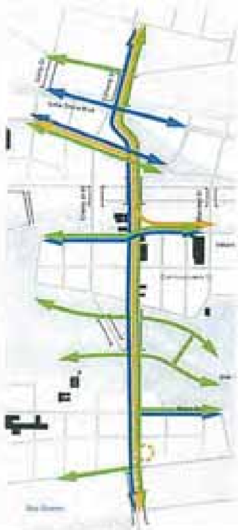
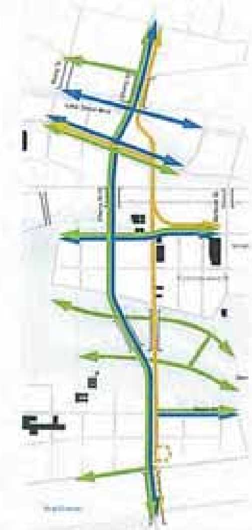
Evaluation of Transportation Alternative Solutions

WATERFRONToronto

TORONTO

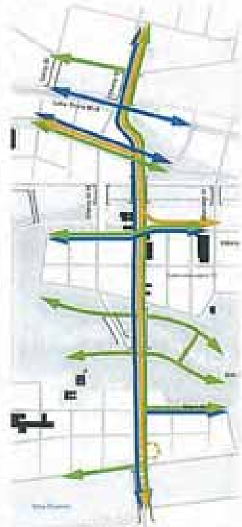
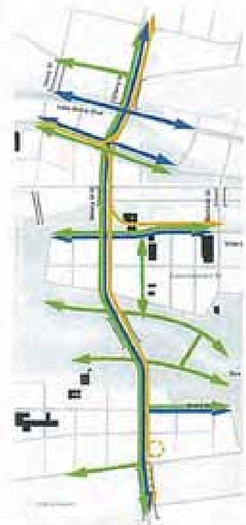
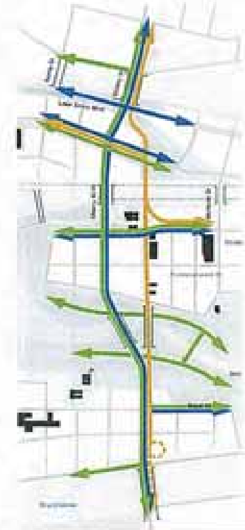
Toronto Transit Commission

Evaluation of Alternative Solutions: Cherry Street
(including the Crossings of the Keating Channel and the New Don River)
Advantages and Disadvantages

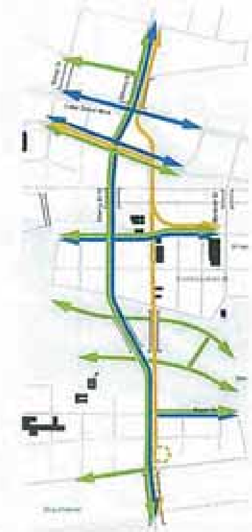
Evaluation Criteria	#1: Bundled East - All modes on existing alignment 	#2: Bundled West - All modes on new alignment 	#3: Unbundled - Autos on existing alignment - New transit crossing 
Natural Environment			
▪ Don Mouth Naturalization	Consistent with Don Mouth Naturalization	Consistent with Don Mouth Naturalization	Consistent with Don Mouth Naturalization
▪ New Natural Area	- Number of New Vehicular Bridges: 2 (reconstructed Keating Channel bridge and new bridge over Don River)	+ Provides greatest potential for street trees with two corridors - Number of New Vehicular Bridges: 2 (new Keating Channel bridge and new bridge over Don River)	- Two corridors minimise area for landscaping - Number of New Vehicular Bridges: 4 (2 new rail bridges and 2 new vehicular)
▪ Air Quality Impacts	Alternatives yield similar impacts	Alternatives yield similar impacts	Alternatives yield similar impacts
		Preferred	
Social Environment			
▪ Vibrant, mixed use community	+ Creates consolidated main N/S street promoting vibrant development - Access from one side of the North Keating lands west of existing Cherry Street limits potential for a vibrant, mixed use community	+ Creates consolidated main N/S street and N/S pedestrian promenade along existing Cherry Street ROW promoting vibrant development + Block pattern created at Home Depot site with an LRT hub further promotes a vibrant, mixed use community + Multimodal access from both sides of the North Keating lands west of Cherry Street provides greatest potential for a vibrant, mixed use community	+ Creates two main N/S streets; one vehicular and the other transit/pedestrian promenade promoting vibrant development + Multimodal access from both sides of the North Keating lands west of Cherry Street provides greatest potential for a vibrant, mixed use community
▪ Access to water	+ Enhanced multimodal access at 1 location across Keating Channel and to the water's edge - Access to water from north via a spatially constrained area of the fronting parklands	+ Enhanced multimodal access at 2 locations across Keating Channel and to the water's edge + Access to water from north available through a generous and open area of the fronting parklands	+ Enhanced multimodal access at 2 locations across Keating Channel and to the water's edge
▪ Noise	No noise sensitive receptors currently exist	No noise sensitive receptors currently exist	No noise sensitive receptors currently exist
		Preferred	

Evaluation of Alternative Solutions: Cherry Street
(including the Crossings of the Keating Channel and the New Don River)

Advantages and Disadvantages

Evaluation Criteria	#1: Bundled East - All modes on existing alignment	#2: Bundled West - All modes on new alignment	#3: Unbundled - Autos on existing alignment - New transit crossing
			
Economic Environment			
▪ Economically viable blocks	- Economic viability of blocks in west half of study area is limited by the single transportation corridor	+ West half of study area is better served by two transportation corridors, creating more economically viable blocks + A transportation-LRT hub on the Home Depot site provides the greatest economic potential	+ West half of study area is better served by two transportation corridors, creating more economically viable blocks
▪ Cost-effective to build	Alternatives 1 and 2 yield similar impacts	Alternatives 1 and 2 yield similar impacts	- Least cost-effective to build with two corridors
▪ Disruption to Businesses	- Construction of new Keating Channel bridge requires temporary bridges or closures. Potential for major disruptions to area businesses	+ New vehicular transportation corridor will allow businesses and traffic to continue with minimized disruptions. Cost of utility impacts is also reduced	- New transit corridor located on existing Cherry Street roadbed. Potential for major utility impacts and disruptions to area businesses
		Preferred	
Cultural Environment			
▪ Aboriginal people	No difference between alternatives re impact to traditional uses	No difference between alternatives re impact to traditional uses	No difference between alternatives re impact to traditional uses
▪ Heritage structures	- Greatest potential to impact heritage sites due to wider cross-section passing by EssRoc silos, Bank of Montreal and WM McGill historic structures	+ No proposed major modifications to existing Cherry Street and therefore minimal impacts to existing heritage structures on Cherry Street	- Potential impacts to access to heritage sites due to regrading, especially to the heritage silo and bank building and Keating Channel Bridge
▪ Archaeology	All alternatives may have slight impacts on archeological resources	All alternatives may have slight impacts on archeological resources	All alternatives may have slight impacts on archeological resources
		Preferred	
Sustainability			
▪ WT Sustainability Framework ▪ City sustainability standards	+ Encourages alternative transportation use	+ Greatest promotion of alternative transportation use through provisions of on-road bicycle lanes on Cherry Street west, and separate more recreational bike/ped facilities over existing Cherry Street bridge (east)	+ Encourages alternative transportation use
▪ Impervious surfaces	+ Bundled alternative minimizes vehicular road impervious surfaces	+ Bundled alternative minimizes vehicular road impervious surfaces	- 2 N/S streets increase impervious surface
		Preferred	

Evaluation of Alternative Solutions: Cherry Street
(including the Crossings of the Keating Channel and the New Don River)
Advantages and Disadvantages

Evaluation Criteria	#1: Bundled East - All modes on existing alignment	#2: Bundled West - All modes on new alignment	#3: Unbundled - Autos on existing alignment - New transit crossing
			
Land Use and Property			
• New land uses and redevelopment	+ Compact vehicular corridor promotes new/active land uses + Access to development properties, and opportunities for new land uses along corridors	+ Most compact vehicular corridor, maximizes new/active land uses + Greater access to developments with separate bike/ped corridors + Greatest opportunities for new land uses with two corridors + Location of Cherry/Queens Quay intersection opens up land use opportunities for North Keating lands	+ Multiple access to development properties, promotes new land uses along corridors - Two major transportation corridors limits development opportunities and new/active land uses
• Public realm goals	+ Alignment accommodates all transportation modes and has most opportunity to create an active street + Opportunities to design bridges that add to the public realm - Pedestrian would access open space features at confined locations - Shading over parkland due to a new vehicular bridge	+ Alignment accommodates all transportation modes and has most opportunity to create an active street + New vehicular crossings coupled with separate bike/footbridge have greatest opportunities for streetscaping and public realm + Direct pedestrian access from north available at key areas of open space and waterfront features - Shading over parkland due to a new vehicular bridge	+ Opportunities for active streets + Opportunities to design bridges that add to the public realm + Direct pedestrian access from the north available at key areas of open space and waterfront features - Pedestrian (via Transit) would access open space features at confined locations - Separation of transit crossing and vehicular crossing may create awkward variation in types of pedestrian crossings - Shading over parkland due to 2 new vehicular bridge
• Property	No displacement of businesses - Greatest potential for property impacts to existing business on Cherry	No displacement of businesses + Reduces property impacts to businesses fronting Cherry Street - Property taking required west of Cherry Street	No displacement of businesses + Reduces property impacts to businesses fronting Cherry Street - Property taking required west of Cherry Street
• Contaminated Soils	All soils have potential for contamination	All soils have potential for contamination	All soils have potential for contamination
		Preferred	

Transportation

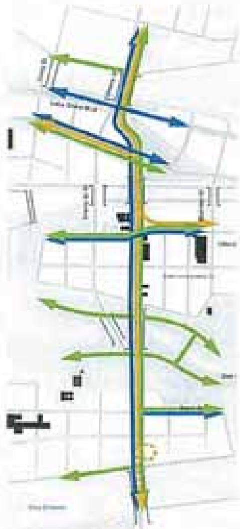
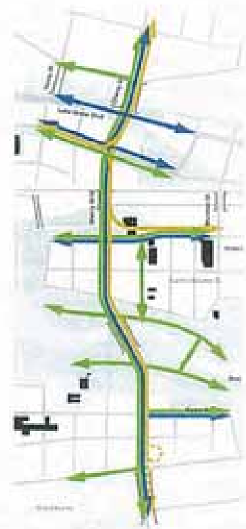
Evaluation of Alternative Solutions: Cherry Street
(including the Crossings of the Keating Channel and the New Don River)
Advantages and Disadvantages

Evaluation Criteria	#1: Bundled East - All modes on existing alignment 	#2: Bundled West - All modes on new alignment 	#3: Unbundled - Autos on existing alignment - New transit crossing 
• Walkability and promotes active transportation	Increases space for peds/bikes Compact, walkable neighborhood + Cherry Street becomes multi-modal corridor - Single corridor places less priority on ped/bikes - Increases bike route distance for west-bound cyclists	Increases space for peds/bikes Compact, walkable neighborhood + Dedicated pedestrian corridor on the existing Cherry Street alignment + Highly supports ped/bike mobility, as separate/continuous alignments are provided	Increases space for peds/bikes Compact, walkable neighborhood - Less compact and requires larger number of pedestrian and cyclist crossings - Discontinuous north-south bike access
• Transit priority	+ Increases accessibility to transit for the far east of the area - Slightly impacts transit flow and speed because transit shares the ROW with other modes - Single corridor places less priority on transit.	+ Potential transit hubs in both the North and South Keating communities at key land uses and central locations. - Slightly impacts transit flow and speed because transit shares the ROW with other modes.	+ Transit only (with pedestrians) boulevard, prioritizes transit + Increases accessibility to transit for the far east of the area
• Shift towards non-auto	Reduced number of lanes (from the existing 4 to the proposed 2) coupled with new transit service support low traffic growth	Reduced number of lanes (from the existing 4 to the proposed 2) coupled with new transit service support low traffic growth	Reduced number of lanes (from the existing 4 to the proposed 2) coupled with new transit service support low traffic growth
• Parking	Allows for opportunities for parking in the study area	Allows for opportunities for parking in the study area	Allows for opportunities for parking in the study area
• Traffic Operations	High connectivity with E/W roads, providing a flexible road network - Not rational Cherry/LSB intersection resulting in complicated traffic operations - Not rational Cherry/Villiers intersection resulting in complicated traffic operations	High connectivity with E/W roads, providing a flexible road network + Simpler intersection geometrics and operations with separate corridors. Realignment of Cherry allows right-angled intersection at Lake Shore Boulevard and Queens Quay for improved traffic operations	High connectivity with E/W roads, providing a flexible road network + Simpler intersection geometrics and operations with separate corridors. Realignment of Cherry allows right-angled intersection at Lake Shore Boulevard and Queens Quay for improved traffic operations
• Rail	Alignment may require modifications to underpass of rail corridor All alternatives assume withdrawal of rail service in the north-eastern Port Lands	Alignment may require modifications to underpass of rail corridor All alternatives assume withdrawal of rail service in the north-eastern Port Lands	Alignment may require modifications to underpass of rail corridor All alternatives assume withdrawal of rail service in the north-eastern Port Lands
		Preferred	

Evaluation of Alternative Solutions: Cherry Street

(including the Crossings of the Keating Channel and the New Don River)

Advantages and Disadvantages

Evaluation Criteria	**#1: Bundled East** - All modes on existing alignment 	**#2: Bundled West** - All modes on new alignment 	**#3: Unbundled** - Autos on existing alignment - New transit crossing 
Municipal Services			
▪ Utilities	- Difficult to implement while maintaining Cherry Street traffic during construction - Impact on existing utilities	+ Traffic can be maintained on existing Cherry Street ROW during construction + Minimal impact on existing utilities	+ Traffic can be maintained on existing Cherry Street ROW during construction - Impact on existing utilities
		Preferred	
SUMMARY		**Preferred**	

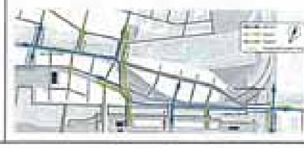
Evaluation of Alternative Solutions: Lake Shore Boulevard

Advantages and Disadvantages

Evaluation Criteria	#1: Do Nothing - Existing alignment 	#2: Rail Berm Alignment and Enlarged Crossing of the Don River - Aligned against the rail berm 	#3: Mid-Block Alignment and Enlarged Crossing of the Don River - Aligned mid-block 
Natural Environment			
▪ Don Mouth Naturalization	Consistent with Don Mouth Naturalization	Consistent with Don Mouth Naturalization	Consistent with Don Mouth Naturalization
▪ New Natural Area	No impact to significant or new natural areas	No impact to significant or new natural areas	No impact to significant or new natural areas
▪ Air Quality	Alternatives yield similar impacts	Alternatives yield similar impacts	Alternatives yield similar impacts
	Preferred	Preferred	Preferred
Social Environment			
▪ Vibrant, mixed use community	- Alignment provides no new access to the 480 Lake Shore site, limiting the ability to revitalize the site as a new vibrant, mixed use community	- Reduces amount of ground floor active space, both on the north side (against the berm) and on the south side because facing the berm. May create a vehicle only street with little pedestrian activity	+ Supports active uses on either side of the street
▪ Access to water	- Water's edge is unreachable for most of new development as LSB is at the water's edge	+ Makes water's edge available for use by public	+ Makes water's edge available for use by public + Provides good pedestrian access to the water's edge along the Keating Channel
▪ Noise	No noise sensitive receptors currently exist	No noise sensitive receptors currently exist	No noise sensitive receptors currently exist
			Preferred
Economic Environment			
▪ Economically viable blocks	+ All land north of the street would be developable	+ All land south of the street would be developable	+ Blocks on both sides are developable - Some awkward block sizes north of LSB (between street and berm)
▪ Cost-effective to build	+ Cost-effective because existing	- Most costly to build because longest	+ More cost-effective because of economic return due to more balanced development
▪ Disruption to Businesses	No disruption to businesses	No disruption to businesses	No disruption to businesses
	Preferred		
Cultural Environment			
▪ Aboriginal people	No difference between alternatives re impact to traditional uses	No difference between alternatives re impact to traditional uses	No difference between alternatives re impact to traditional uses
▪ Heritage structures	No impacts to heritage structures	No impacts to heritage structures	No impacts to heritage structures
▪ Archaeology	No impacts to archaeological resources	No impacts to archaeological resources	No impacts to archaeological resources
	Preferred	Preferred	Preferred

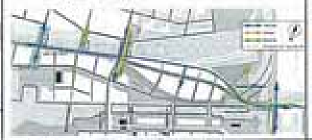
Evaluation of Alternative Solutions: Lake Shore Boulevard

Advantages and Disadvantages

Evaluation Criteria	#1: Do Nothing - Existing alignment 	#2: Rail Berm Alignment and Enlarged Crossing of the Don River - Aligned against the rail berm 	#3: Mid-Block Alignment and Enlarged Crossing of the Don River - Aligned mid-block 
Sustainability			
▪ WT Sustainability Framework ▪ City sustainability standards	+ Provides an urban street with potential for active uses on one side that can attract pedestrian activity	+ Provides an urban street with potential for active uses on one side that can attract pedestrian activity	+ Provides an urban boulevard with potential for active uses on both sides that can attract pedestrian activity
▪ Impervious surfaces	+ Minimizes new impervious surfaces as it uses the existing alignment	- Creates greater impervious surface (under Gardiner would remain impervious for peds + new street for cars). Also – regain pervious surface along existing Lake Shore Boulevard.	- Creates new impervious surface although the section under Gardiner would remain impervious for peds + new street for cars. Impervious surfaces are less than in Alt #2 (because a road to access the blocks would be needed at this location if Lake Shore is aligned north against the berm). Also – regain pervious surface along existing Lake Shore Boulevard.
	Preferred		Preferred
Land Use and Property			
▪ New land uses	- Limited opportunity for ground floor activity opportunities, potentially impacting redevelopment	- Lessens ground floor activity opportunities, potentially impacting redevelopment	+ Increases ground floor activity opportunities on both sides of the street, increasing redevelopment
▪ Public realm goals	+ Removes through traffic from majority of North Keating site, increasing opportunities for public realm improvements elsewhere	+ Removes through traffic from majority of LDL site, increasing opportunities for public realm improvements elsewhere	+ Creates active street through the centre of North Keating Lands that can be accentuated with numerous public realm amenities - Through traffic moves through North Keating site, potential for negative impacts to public realm
▪ Property	+ No change/impact to current property ownership	- Might affect Hydro Easement	+ No change/impact to current property ownership
▪ Contaminated Soils	All soils have potential for contamination	All soils have potential for contamination	All soils have potential for contamination
			Preferred
Transportation			
▪ Walkability	- Limited potential for pedestrian and ground floor activity may create perception of corridor that prioritise autos	- Limited potential for pedestrian and ground floor activity may create perception of corridor that prioritise autos	+ Creates a permeable street that enhances walkability + Supports compact and walkable neighborhood
▪ Transit priority	- Not rational Cherry/LSB intersection resulting in complicated transit operations	+ Improves transit interface at Cherry with better alignment than Alt #1	+ Improves transit interface at Cherry with better alignment than Alt #1
▪ Shift towards non-auto	- Potential to create vibrant multimodal use street limited, making non-auto modes less attractive	- Potential to create vibrant multimodal use street limited, making non-auto modes less attractive	+ Creating a vibrant multimodal use street, may discourage auto use through the site
▪ Parking	+ Allows for opportunities for parking only on one side of the street	+ Allows for opportunities for parking only on one side of the street	+ Allows for opportunities for parking on both sides of the street
▪ Traffic Operations	+ T intersections ending at Lake Shore may facilitate traffic flow with least conflicts due to turning movements + Removes through traffic from	+ T intersections ending at Lake Shore may facilitate traffic flow with least conflicts due to turning movements + Normalized intersection with Cherry	+ Normalized intersection with Cherry Street may improve traffic flow + Removes through traffic from majority of North Keating site

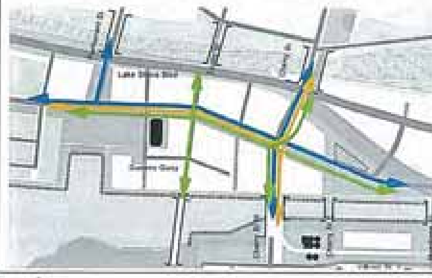
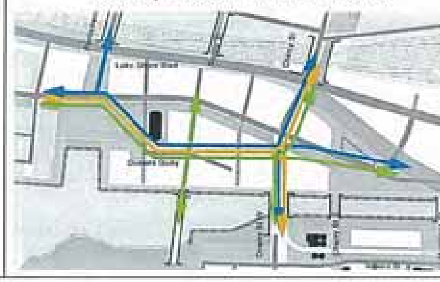
Evaluation of Alternative Solutions:
Lake Shore Boulevard

Advantages and Disadvantages

Evaluation Criteria	#1: Do Nothing - Existing alignment 	#2: Rail Berm Alignment and Enlarged Crossing of the Don River - Aligned against the rail berm 	#3: Mid-Block Alignment and Enlarged Crossing of the Don River - Aligned mid-block 
	majority of North Keating site - Not rational Cherry/LSB intersection resulting in complicated traffic operations - May encourage more through traffic, since there will be less conflicts with N-S traffic	Street may improve traffic flow - May encourage more through traffic, since there will be less conflicts with N-S traffic	- Alignment through middle of site requires all move intersections, which may create longer delays
▪ Rail	+ No impacts to rail network	- Potential impacts to rail berm and and TTR line - May affect road access to the rail yards	- May affect road access to the rail yards
			Preferred
Municipal Services			
▪ Utilities	- More difficult to implement changes to utilities while maintaining LSB traffic during construction - Impacts existing utilities	+ Traffic can be maintained on existing LSB during utilities work - Minimal impact on existing utilities	+ Traffic can be maintained on existing LSB during utilities work - Minimal impact on existing utilities
		Preferred	Preferred
SUMMARY			**Preferred**

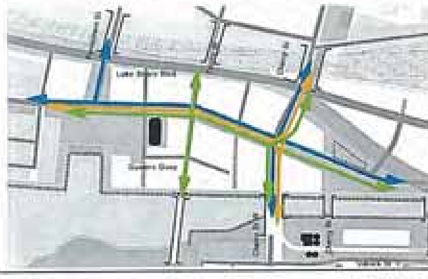
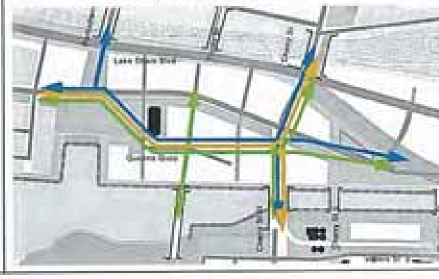
Evaluation of Alternative Solutions: Queens Quay

Advantages and Disadvantages

Evaluation Criteria	#1: North Alignment - Easterly Extension north of the silos 	#2: South Alignment Easterly Extension south of the silos 
Natural Environment		
• Don Mouth Naturalization	Not applicable, assuming Preferred Alternative for the DMNP EA is approved*	Not applicable, assuming Preferred Alternative for the DMNP EA is approved*
• New Natural Area	No impact on the new natural area	No impact on the new natural area
• Air Quality Impacts	Alternatives yield similar impacts	Alternatives yield similar impacts
	Preferred	**Preferred**
Social Environment		
• Vibrant, mixed use community	Supports transit alignment, creating an area for active engaging streets that are supported by transit	Supports transit alignment, creating an area for active engaging streets that are supported by transit
• Access to water	Provides pedestrian access to the water's edge along the Keating Channel	Provides pedestrian access to the water's edge along the Keating Channel
• Noise	No noise sensitive receptors currently exist	No noise sensitive receptors currently exist
	Preferred	**Preferred**
Economic Environment		
• Economically viable blocks	Provides for regular block sizes	Provides for regular block sizes
• Cost-effective to build	Costly extension but necessary to connect waterfront areas with transit Requires a crossing of the existing Parliament Street slip	Costly extension but necessary to connect waterfront areas with transit Requires a crossing of the existing Parliament Street slip - Potential grading challenges
• Disruption to Businesses	Alternatives yield similar impacts	Alternatives yield similar impacts
	Preferred	
Cultural Environment		
• Aboriginal people	No difference between alternatives re impact to traditional uses	No difference between alternatives re impact to traditional uses
• Heritage structures	No difference between alternatives re impact to heritage structures Allows a major complex with heritage value to be preserved	No difference between alternatives re impact to heritage structures Allows a major complex with heritage value to be preserved
• Archaeology	No difference between alternatives re impact to archeological resources	No difference between alternatives re impact to archeological resources
	Preferred	**Preferred**

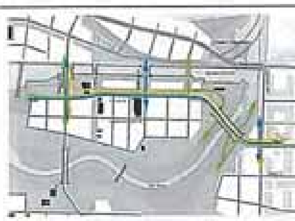
Evaluation of Alternative Solutions: Queens Quay

Advantages and Disadvantages

Evaluation Criteria	#1: North Alignment - Easterly Extension north of the silos 	#2: South Alignment Easterly Extension south of the silos 
Sustainability		
▪ WT Sustainability Framework ▪ City sustainability standards	Provides an urban boulevard with potential for active uses on both sides that can attract pedestrian activity Extend transit into the LDL site increasing sustainability of site Provide for extension east of LDL site	Provides an urban boulevard with potential for active uses on both sides that can attract pedestrian activity Extend transit into the LDL site increasing sustainability of site Provide for extension east of LDL site
▪ Impervious surfaces	- Increase of impervious surfaces due to extension of Queens Quay	- Greater increase of impervious surfaces due to extension of Queens Quay
	Preferred	
Land Use and Property		
▪ New land uses and redevelopment	+ Maximizes developable open space + Transit travels through centre of the site serving a pedestrian animated and retail lined Queen's Quay	- Has grading issues that could impact developable land mass
▪ Public realm goals	+ Supports public realm as does not impact park space	- Impacts proposed park, reducing public realm benefits
▪ Property	- Impacts middle of private property (i.e., Home Depot and Castan Lands)	- Impacts southerly half of private property (i.e., Home Depot and Castan Lands)
▪ Contaminated Soils	All soils have potential for contamination	All soils have potential for contamination
	Preferred	
Transportation		
▪ Walkability and promotes active transportation	Supports compact and walkable neighborhood Supports flexible network for all users Provides good pedestrian access to the water's edge along the Keating Channel	Supports compact and walkable neighborhood Supports flexible network for all users Provides good pedestrian access to the water's edge along the Keating Channel
▪ Transit priority	+ Increases transit access as QQ is aligned through the middle of the site	+ Increases transit access to the area but access may be limited with transit aligned near the edge of the water
▪ Shift towards non-auto	Supports limiting growth in auto travel as high frequency transit is prioritized	Supports limiting growth in auto travel as high frequency transit is prioritized
▪ Parking	Enhances opportunities for parking on both sides of the street	Enhances opportunities for parking on both sides of the street
▪ Traffic Operations	+ Simpler intersection geometrics and operations with a T intersection	- Not rational Parliament/ Queens Quay intersection may resulting complicated traffic operations
▪ Rail	Alignment does not impact rail network All alternatives assumes withdrawal of rail service in the north-eastern Port Lands	Alignment does not impact rail network All alternatives assumes withdrawal of rail service in the north-eastern Port Lands
	Preferred	
Municipal Services		
▪ Utilities	Similar impacts. Avoids most utilities in area	Similar impacts. Avoids most utilities in area
	Preferred	Preferred
SUMMARY	**Preferred**	

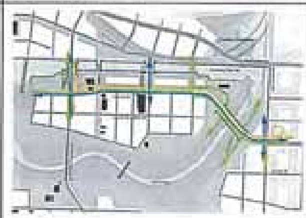
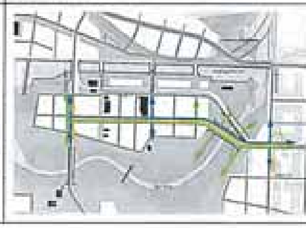
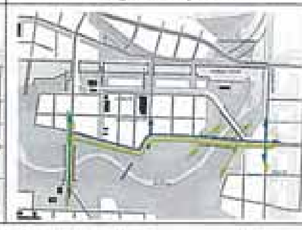
Evaluation of Alternative Solutions: Commissioners Street (including the Crossings of New Don River)

Advantages and Disadvantages

Evaluation Criteria	#1: At Villiers - Northern alignment on the existing Villiers St	#2: Mid-Block - Mid-block alignment between Villiers and Commissioners Sts	#3: Park Front - Alignment on the existing Commissioners, which is now the edge of he park
			
	Preferred		
Cultural Environment			
▪ Aboriginal people	No difference between alternatives re impact to traditional uses	No difference between alternatives re impact to traditional uses	No difference between alternatives re impact to traditional uses
▪ Heritage structures	No impacts to heritage structures	No impacts to heritage structures	No impacts to heritage structures
▪ Archaeology	Minimal potential for archaeological impacts	Minimal potential for archaeological impacts	Minimal potential for archaeological impacts
	Preferred	Preferred	Preferred
Sustainability			
▪ WT Sustainability Framework ▪ City sustainability standards	+ Encourages alternative transportation use allowing for the entire south and north Keating neighborhoods (including 480 Lake Shore) to be within 300 m walking distance from transit	+ Encourages alternative transportation use south of the channel	+ Encourages alternative transportation use south of the channel
▪ Impervious surfaces	No difference in amount of impervious surfaces	No difference in amount of impervious surfaces	No difference in amount of impervious surfaces
	Preferred		
Land Use and Property			
▪ New land uses and redevelopment	Creates typical street grid pattern allowing for standard development	Creates typical street grid pattern allowing for standard development	Creates typical street grid pattern allowing for standard development - One side of road is not developable impacting new land uses
▪ Public realm goals	Provides continuous access south of the Keating Channel for users. + Best orientation of bridge crossing to support the extension of the Don Valley bikeway trail to new river channel and greenway	Provides continuous access south of the Keating Channel for users. - Reduces exposure to public realm at water's edge (i.e., Keating Channel in north and new river to south) - Poor orientation of bridge to support extension of the Don Valley bikeway trail to new river channel and greenway	Provides continuous access south of the Keating Channel for users - Mixes pedestrian park uses with traffic negatively impacting public realm - Worst orientation of bridge to support the extension of the Don Valley bikeway trail to new river channel and greenway
▪ Property	+ Does not require complicated land acquisitions	- Land acquisition problematic on block between Cherry and Munition and between Munition and Don Roadway	+ Does not require complicated land acquisitions
▪ Contaminated Soils	+ Avoids contamination issues by using existing road	- Contamination issues	- Contamination issues
	Preferred		
Transportation			

Evaluation of Alternative Solutions: Commissioners Street (including the Crossings of New Don River)

Advantages and Disadvantages

Evaluation Criteria	#1: At Villiers - Northern alignment on the existing Villiers St	#2: Mid-Block - Mid-block alignment between Villiers and Commissioners Sts	#3: Park Front - Alignment on the existing Commissioners, which is now the edge of he park
			
Natural Environment			
• Don Mouth Naturalization	Consistent with Don Mouth Naturalization	Consistent with Don Mouth Naturalization	Consistent with Don Mouth Naturalization
• New Natural Area	+ Busy road is furthest from new river channel and wetland - Requires longer bridge over river	+ Busy road is buffered from new river channel and wetland - Requires largest bridge on curve over river	- Road on edge of natural area is less desirable and has greatest impact on Don Mouth Naturalization study - Detracts from creating a natural urban environment with road in close proximity
• Air Quality Impacts	Alternatives yield similar impacts	Alternatives yield similar impacts	Alternatives yield similar impacts
	Preferred		
Social Environment			
• Vibrant, mixed use community	Provides connectivity between neighbourhoods east/west of river + Northern Alignment is in closer proximity to North Keating neighbourhood, providing greater connectivity and more potential for vibrant and mixed uses + Creates a large cohesive block that is best for neighbourhood continuity	Provides connectivity between neighbourhoods east/west of river + Central alignment supports vibrant community south of the Keating Channel	Provides connectivity between neighbourhoods east/west of river + Connects park with surrounding vibrant mixed uses - Requires pedestrians to cross busy street to access park - Most removed from core of development - Only developable/active on one side of street
• Access to water	+ Direct access to Keating Channel	- Offers less exposure to Keating Channel	- Further from Keating Channel
• Noise	- Impacts sound studio on Villiers Street	No noise sensitive receptors currently exist	No noise sensitive receptors currently exist
	Preferred		
Economic Environment			
• Economically viable blocks	Block sizes are economically viable	Block sizes are economically viable	Block sizes are economically viable
• Cost-effective to build	+ Does not require complicated land acquisitions	- Highest remediation costs and complicated land acquisition - Remediation of site would need to be completed prior to road construction	- Requires temporary roads to keep existing Commissioners operational during construction of new bridge
• Disruption to Businesses	+ Reduces impacts to existing Commissioners during construction of new bridge + Businesses along the street can be maintained after construction - Reuses Villiers Street - Potential for temporary disruption to area businesses	- Road would require taking private property	- Reuses Commissioners Street - Potential for major utility impacts and disruption to area businesses

Appendix 7-A1

Water and Wastewater Evaluation

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Evaluation of Alternatives to Undertaking: Water Supply

<table>
<tr><th rowspan="2">Evaluation Criteria</th><th rowspan="2">Alternative 1:
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[Potable Water Demand : 7,600 m³/d]</th><th rowspan="2">Alternative 3:
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[Potable Water Demand: 6,400 m³/d]</th><th colspan="3">Alternative 4:
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[Potable water demand is 4,700 to 6,100 m³/d; Non-potable water demand is 300 to 1,700 m³/d]</th></tr>
<tr><th>4A: Public Non-Potable Water Supply Systems
[6,100 m³/d of potable + 300 m³/d of non-potable]</th><th>4B: Private Non-Potable Water Supply Systems
[5,000 m³/d of potable + 1,400 m³/d of non-potable]</th><th>4C: Public & Private Non-Potable Systems
[4,700 m³ of potable + 1,700 m³/d of non-potable]</th></tr>
<tr><td rowspan="3">Natural Environment
▪ Don Mouth Naturalization
▪ New Natural Area</td><td rowspan="2">X Not compatible with new river realignment through study area
X Leaving existing water services in place restricts design and construction of new natural area</td><td rowspan="2">✓ Compatible with new river realignment through study area.
✓ Minimal impact to new natural area.</td><td rowspan="2">✓ Compatible with new river realignment through study area.
✓ Minimal impact to new natural area.
✓ Less taxing on resources and environment.</td><td colspan="3">✓ Compatible with new river realignment through study area.
✓ Minimal impact to new natural area.
X Water treatment may be required to meet environmental requirements of alternate irrigation methods – Non-potable water has quality issues, the nature of which will depend on the source of this water, be it collected grey water, storm water, lake water or any other source. The treatment needs required to address quality issues such as health impacts (microbiological and/or chemical of origin), economic impacts (e.g corrosion, clogging, scaling) and aesthetics impacts. Will be a function of the end use for the portable water.</td></tr>
<tr><td>✓ Good resource utilization
✓ Good reduction in demands / loading on public infrastructure</td><td>✓ Better resource utilization
✓ Better reduction in demands / loading on public infrastructure</td><td>✓ Best resource utilization
✓ Best reduction in demands / loading on public infrastructure</td></tr>
<tr><td>Not Feasible</td><td>Feasible</td><td>Feasible</td><td>Feasible</td><td>Feasible</td><td>Preferred</td></tr>
<tr><td rowspan="3">Social Environment
▪ Vibrant, mixed use community
▪ Access to water</td><td rowspan="2">X Does not support new development on Lower Don Lands</td><td rowspan="2">✓ Supports all new developments on Lower Don Lands
✓ Allows full access to water</td><td rowspan="2">✓ Supports all new developments on Lower Don Lands
✓ Allows full access to water and reduces wasteful use</td><td colspan="3">✓ Supports all new developments on Lower Don Lands
✓ Allows full access to water, reduces wasteful use improves efficiency of use.
X Operational risk re: public health concerns need to be considered and managed in design and operation of non-potable water systems. – Public education is required to mitigate and manage the risks of operating a non-potable water supply system.</td></tr>
<tr><td>✓ Good improvement to potable water use efficiency</td><td>✓ Better improvement to potable water use efficiency</td><td>✓ Best improvement to potable water use efficiency</td></tr>
<tr><td>Not Feasible</td><td>Feasible</td><td>Feasible</td><td>Feasible</td><td>Feasible</td><td>Preferred</td></tr>
<tr><td rowspan="3">Economic Environment
▪ Economically viable blocks
▪ Cost-effective to build</td><td rowspan="2">✓ Low initial cost
X Limits block sizes and locations to where existing infrastructure is located and does not create new developable areas
X Not replacing very old infrastructure that may require replacement in near future</td><td rowspan="2">✓ Accommodates planned development
✓ Compatible with existing infrastructure and creation of new developable areas.
✓ Results in well developed operations and maintenance systems
✓ Cost-effective to build.
✓ Existing water treatment and bulk supply systems nearby for tie-in</td><td rowspan="2">✓ Accommodates planned development
✓ Compatible with existing infrastructure and creation of new developable areas.
✓ Results in well developed operations and maintenance systems
✓ Cost-effective to build.
✓ Reduces energy and other resources required to treat & distribute water
✓ Reduces burden on Toronto's potable water system and on internal water distribution
✓ Existing water treatment and bulk supply systems nearby for tie-in
X Additional cost of efficiency promoting efficiency measures, partially offset water supply system savings</td><td colspan="3">✓ Accommodates planned development
✓ Compatible with existing infrastructure and creation of new developable areas.
✓ Reduces energy and other resources required to treat & distribute water
✓ Reduces burden/dependency on Toronto's potable water system
✓ Reduces internal water distribution requirements
X Additional water abstraction, elementary treatment and distribution infrastructure required – For non-potable water to become available for use, it must be collected in ponds/tanks, treated as required to address the consumption needs and supplied to the consumption point by means of an additional distribution system. This distribution system must be kept separate from the potable water system and should be colour coded to minimize possibility of accidental cross-connection. The infrastructure needed for this system, as well as its ongoing operation will have a financial implication, and ongoing regulatory compliance implications
X Additional risk associated with operating a non-potable water supply system needs to be considered in the planning, design, operations and maintenance of this system – see above</td></tr>
<tr><td></td><td>X Some operations and maintenance systems need to be developed. – Procedures manual needs to be prepared and implemented for this new infrastructure</td><td>X Some operations and maintenance systems need to be developed. – Procedures manual needs to be prepared and implemented for this new infrastructure</td></tr>
<tr><td>Feasible</td><td>Feasible</td><td>Preferred</td><td>Feasible[3]</td><td>Feasible[3]</td><td>Feasible[3]</td></tr>
</table>

Legend ✓ Compliant with criteria
X Not compliant with criteria

(app 7-a1_ldl water alternatives.doc/109446-3ra)

Evaluation of Alternatives to Undertaking: Water Supply

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[4,700 m^3 of potable + 1,700 m^3/d of non-potable]</th></tr>
<tr><td rowspan="3">Cultural Environment
▪ Aboriginal people
▪ Heritage structures
▪ Archeology</td><td rowspan="2">✓ No impacts to heritage structures
✓ No new impacts to areas with potential for archaeological resources</td><td rowspan="2">X Potential impacts on heritage structures, but can be mitigated
X Potential impacts on archaeological resources, which can be mitigated</td><td rowspan="2">X Potential impacts on heritage structures, but can be mitigated
X Potential impacts on archaeological resources, which can be mitigated</td><td colspan="3">✓ No incremental impact to traditional uses of Aboriginal people</td></tr>
<tr><td>X Potential impacts on heritage structures by some sub-alternatives, but can be mitigated
X Potential impacts on archaeological resources by some sub-alternatives, which can be mitigated – components of public systems may impact on heritage structures and/or archaeological resources, depending on where these structures /resources are. If there are none, then no impact</td><td>X Potential impacts on heritage structures by some sub-alternatives, but can be mitigated
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<tr><td>Preferred</td><td>Feasible</td><td>Feasible</td><td>Feasible</td><td>Feasible</td><td>Feasible</td></tr>
<tr><td rowspan="3">Sustainability
▪ WT Sustainability Framework
▪ City sustainability standards
▪ Impervious surfaces</td><td rowspan="2">✓ No change to extend of impervious surfaces
X Is not consistent with WT's sustainability Framework or City's sustainability standards</td><td rowspan="2">✓ Is consistent with WT's Sustainability Framework and Standards
✓ Negligible creation of impervious surfaces
✓ Provides a renewal opportunity of very old existing infrastructure</td><td rowspan="2">✓ Is consistent with WT's Sustainability Framework and Standards
✓ Negligible creation of impervious surfaces and no incremental impact over Alternative 2.</td><td colspan="3">✓ Is consistent with WT's Sustainability Framework Standards
✓ Negligible/no creation of impervious surfaces
X Relies on water sources of where the quality of water may be limiting and varying. The non-potable water may require some degree of treatment and/or disinfection, as well as ongoing quality control – For example, surface runoff water may not be suitable for irrigation if sodium content is too high. Removal of sodium is very expensive.</td></tr>
<tr><td></td><td>✓ Highest use efficiency</td><td></td></tr>
<tr><td>Feasible</td><td>Feasible</td><td>Feasible</td><td>Feasible</td><td>Preferred</td><td>Feasible</td></tr>
<tr><td rowspan="3">Land Use and Property
▪ New Land Uses
▪ Public Realm Goals
▪ Property</td><td rowspan="2">✓ No impact on current properties
X Limits opportunities for new land use and redevelopment
X Not compatible with Public Realm Goals
X No new capacity</td><td rowspan="2">✓ Fully supports opportunities for new land use and redevelopment and provides the required new supply capacity.
✓ Is compatible with Public Realm Goals
✓ No impact on current property ownership</td><td rowspan="2">✓ It fully supports opportunities for new land use and redevelopment and provides the required new supply capacity
✓ Is compatible with Public Realm Goals
✓ No impact on current property ownership
✓ Least impact on development in terms of conditions of approval relative to non-potable water supply implementation.</td><td colspan="3">✓ It fully supports opportunities for new land use and redevelopment and provides the required new supply capacity
✓ Is compatible with Public Realm Goals
✓ No impact on current property ownership</td></tr>
<tr><td>X Additional ROW space requirement – to fit in additional distribution system</td><td>X Additional on-site space requirement– to fit in additional treatment and supply systems</td><td>X Additional ROW and on-site space requirement– to fit in additional distribution, treatment, supply systems</td></tr>
<tr><td>Not Feasible</td><td>Feasible</td><td>Preferred</td><td>Feasible</td><td>Feasible</td><td>Feasible</td></tr>
</table>

Legend ✓ Compliant with criteria
X Not compliant with criteria

(app 7-a1_kfl water alternatives.doc/109446-3ra)

Evaluation of Alternatives to Undertaking: Water Supply

Evaluation Criteria	Alternative 1: Do Nothing	Alternative 2: Conventional servicing using MOE Guidelines for Estimating Project Potable Water Demands [Potable Water Demand : 7,600 m^3/d]	Alternative 3: Conventional Servicing with Addition of Water Conservation / Efficiency Measures [Potable Water Demand: 6,400 m^3/d]	Alternative 4: Addition of Non-Potable Water Systems to further Reduce Potable Water Demands [Potable water demand is 4,700 to 6,100 m^3/d; Non-potable water demand is 300 to 1,700 m^3/d]		
				4A: Public Non-Potable Water Supply Systems [6,100 m^3/d of potable + 300 m^3/d of non-potable]	*4B: Private Non-Potable Water Supply Systems [5,000 m^3/d of potable + 1,400 m^3/d of non-potable]*	*4C: Public & Private Non-Potable Systems [4,700 m^3 of potable + 1,700 m^3/d of non-potable]*
Municipal Services • Support future land uses and densities? • Include sustainable design technology? • Impact existing or planned utilities?	✓ No utility impacts X Does not support future land use and densities X Does not include sustainable design technology	✓ Supports future land use and densities ✓ Include sustainable design technology X Will effect other existing and planned utilities (however, the entire system will be under redevelopment and effects can be managed to ensure compatibility)	✓ Supports future land use and densities ✓ Include sustainable design technology X Will effect other existing and planned utilities (however, the entire system will be under redevelopment and effects can be managed to ensure compatibility)	✓ Supports future land use and densities ✓ Include sustainable design technology X Potential of cross-connection with potable water systems (can be mitigated) X Not yet accepted as allowed practice by City of Toronto X Will effect other existing and planned utilities – in terms of special requirements and layout	✓ Allowed in terms of the most recent Building Code ✓ Does not impact existing or planned utilities	X Not yet accepted as allowed practice by City of Toronto X Will effect other existing and planned utilities– in terms of special requirements and layout
	Not Feasible	Feasible	Feasible	Feasible	Preferred	Feasible
SUMMARY	Not Feasible	Feasible	Feasible	Feasible	PREFERRED[1]	FEASIBLE[2]

1. Alternative 4B is the overall preferred alternative at this stage since it represents the highest degree of water use efficiency, without having the potential disqualification factors associated therewith. A trunk main system in accordance with Alternative 4B is shown on a Layout Plan. The shown layout and composition is subject to the Qualifying Conditions that are stated on that Layout Plan and herein. The proposed layout of watermains and the composition thereof may change when additional information becomes available.

2. Alternative 4C may become the overall preferred alternative in the long run. It has benefits over Alternative 4B (and the other alternatives), such as further reducing the water demand from City of Toronto's potable water system and reducing the peak flows for which the LDL distribution system has to be designed. However, it also has risks that need to be better understood and evaluated before being selected for implementation. The City of Toronto presently do not own and operate a non-potable water system. There are risks of accidental cross connections between the potable and non-potable systems that potentially have health and liability consequences. Such a system also requires that additional infrastructure and equipment be installed, operated and maintained. Alternative 4C should nevertheless be further investigated. Ways should be explored whereby user concerns of accidental intake and cross contamination would be addressed, and whereby the City of Toronto would develop the means and framework to address their own concerns regarding separate public-owned non- potable water systems.

3. Even though Alternative 3 has qualitatively identified as the preferred alternative under the "Economic Environment" criterion, any of Alternatives 3 and 4 may emerge as economically the better alternative during the more advanced stages of the project.

Legend ✓ Compliant with criteria
X Not compliant with criteria

(app 7-a1_ldl water alternatives.doc/109446-3ra)

Appendix 7-A2

Summary of Measures for Managing Risk of Non-Potable Water

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Mitigating Measures for Managing Risk of a Non-Potable Water Supply System

1. Non Potable water supply, Pipes and fittings must be clearly identified and marked to mitigate the potential for inadvertent cross connection with the potable mains drinking water distribution system.

2. Backflow prevention measures are required where potential exists for non-potable water to contaminate the potable water supply.

3. The quality of rainwater, greywater and reclaimed water, like potable water, will deteriorate if it is in contact with unsuitable materials of construction.

4. Water used to wash cooking utensils will contain some fats, grease and oils and these substances if allowed to accumulate will cause fouling and this can cause offensive odours or blockages leading ultimately to the reclaimed water system malfunctioning. Generally this type of water source (from kitchens) is to be avoided as a source of greywater but if used, it will require a high degree of treatment and special attention to maintenance regimes.

5. Any system based on rainwater collection will contain traces of atmospheric and environmental pollutants, together with some animal and bird fecal matter. The extent of such contamination will vary from site to site but some degree of contamination must always be assumed and catered for by the design of such a reclaimed water system. Special attention is needed if hardstanding areas are used for vehicle parking due to risks of oil and fuel spills.

6. Water used to launder clothes and that from baths, washbasins, showers, spas and swimming pools will contain dissolved chemical additives such as phosphates, nitrates, chlorine, chlorides, sodium as well as organic particulate matter. Characteristics of these sources of water such as pH, dissolved oxygen and temperature will be subject to considerable variation. The chemical, physical and biological properties of these source waters must be measured as an integral part of the design and commissioning of the reclaimed water system.

7. When water is stored or stands in pipes and fittings it will be prone to warming which encourages growth of organisms. Stagnation of water increases the potential for pick up of contaminants from surfaces and air or by ingress. Rainwater storage systems must be covered with screens on both inlets and outlets. Insulation to minimize heat gain and for frost protection must be a feature of the design of a reclaimed water system. Particular attention must be paid to water replacement/turnover in all parts of the system; periods where water is likely to be static for longer than a week are to be avoided.

Appendix 7-A3

Summary of Sanitary Flow Calculations

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Toronto Transit Commission

TSH engineers architects planners

Memorandum

To:	Peter Middaugh	**Date:**	9 July, 2008
From:	Michael Collins	**TSH Project No.:**	42-97007
Re:	Lake Ontario Park – Sanitary Servicing Loadings at Lakeshore Blvd.		

Issue:

The City of Toronto has asked TSH to conduct a preliminary servicing analysis to examine the feasibility of directing flows from the proposed development Lake Ontario Park (LOP) located directly south of the Ship Channel through the proposed Lower Don Lands (LDL) project site, to connect to the sanitary sewer at Lakeshore Blvd.

Discussion:

As a part of the Lower Don Lands Project development, TSH is currently undertaking an assessment of the existing sanitary sewer capacity along Lakeshore Blvd from the Don Roadway to Logan Ave., and Logan Ave sanitary sewer from Lakeshore Blvd to Eastern Ave.

Currently, the additional downstream capacity of the existing sanitary sewer has not been finalized. The adjacent lands to the east of the Lower Don Lands comprise of mixed industrial use and flow monitoring data has not been obtained to accurately gauge current wastewater flows. Also, the wastewater flows from the proposed residential development have also not been finalized at this time stemming from uncertainty around population density and the integration of water efficiency measures.

Complications with respect to the current configuration of sanitary sewer have not been resolved during at this stage in the preliminary design. TSH currently assumes that a section of sanitary sewer on Logan Ave. has a negative slope with respect to the direction of flow, as taken from information provided by the City of Toronto for Logan Ave. as shown on as-built drawing labelled L-123. This information is to be verified with the City of Toronto. A dynamic analysis of this section has not been completed and effective capacity of this section is unknown at this time. As a result of the level of uncertainty, TSH has prepared numerous sanitary flow calculation alternatives illustrating the range of flow values likely to be seen from the proposed development. It is important to note that the following calculations do not take into account the pipe section which is currently identified as having a negative pipe slope relative to the direction of flow. The section with the next lowest capacity was used in the determination of the additional capacity assessment in the following scenarios.

The mixed use of the Lake Ontario Park area provides a similar challenge to the Lower Don Lands with regard to sanitary flow. A range of values has been comprised to illustrate the possible conveyance of flow in the existing sanitary infrastructure combined with a various proposed conditions for the Lower Don Lands. Tables 1 and 2 attached, illustrate the assumption and areas used in generating peak flow rates. The assumed industrial area provides the greatest restraint for servicing the Lake Ontario Park lands using typical MOE design guidelines for industry. The following table illustrates the range of expected flows from the entire Lake Ontario Park site with varying criteria for the industrial area.

Estimated Total Lake Ontario Park Flows	
Park w/ MOE Light Industrial	Park w/ MOE Heavy Industrial
98.7 L/s	138.1 L/s

The base peak flow rate for the servicing of the public beaches, picnic areas and passive parklands is approximately 32.4 L/s for the assumed tributary area of 58.3ha. The summary of these assumptions can be found in Table 1 and 2.

Using the estimated flows above and the various sanitary calculation scenarios, there is some evidence that suggests that LOP flows can be accommodated for using the MOE light industrial flow rates as representative for the industrial area and using values generated from TWRC Sustainability Framework and the Toronto Water Efficiency Plan for the LDL project area. However, there is some evidence that suggests that the flows can not be accommodated when using MOE design criteria for the LOP and the LDL.

Another major constraint for the servicing of the LOP site is the proposed Waterfront Event Site identified in the draft masterplan. In order to adequately capture the flows to be expected from this location, an estimated size and capacity of this facility must be determined. For the purposes of this preliminary assessment, this facility has been grouped with the proposed sport fields (refer to Table 1 and 2 for assumptions).

The use of the proposed passive park lands, and beach areas should not drastically change the base peak flow rate. Using this assumption it is possible to identify a maximum allowable employee density for the area based on a 125L/employee/8hr which provides washroom/shower facilities. Table 3 attached identifies the allowable number of employees and the employee density for the industrial area at any one time.

Conclusion:

It may be feasible to incorporate the LOP areas into the design of the LDL via a crossing at the end of the Don Roadway across the existing Ship Channel.

The existing capacities of the Lakeshore Blvd and Logan Ave. sewers do show evidence that suggests the additional flows from the LOP can be accommodated, but it is inconclusive at this time due to outstanding issues with respect to the LDL and as-built conditions of receiving infrastructure.

Recommendation:

TSH/MVVA must first resolve the outstanding issues regarding population density and the appropriate preferred design flow rate for the residential development in the Lower Don Lands.

Existing flow monitoring data of the adjacent lands to the east of the LDL project site will aid in developing accurate downstream capacity information.

Verify invert elevations for the sanitary trunk located on Logan Ave at Lakeshore Blvd. with the City of Toronto to confirm/develop the downstream sanitary capacity at that location.

Communicate with the City of Toronto the existing/proposed usage of the industrial site in the LOP area and also the size and capacity of the Waterfront Event site to finalize input flow criteria.

Next Steps:

Upon resolution of the outstanding items, TSH is to finalize downstream capacity information for Lakeshore and Logan and finalize the preferred unit flow rates and projected LDL sanitary flows.

Determine the need for new sanitary sewer infrastructure along Lakeshore Blvd and Logan Ave.

Communicate with the City of Toronto the maximum allowable flows (if any) to be collected from the LOP and conveyed through the LDL project to Lakeshore Blvd.

engineers
architects
planners

Project:	**Lower Don Lands**
Client:	**MVVA**
Project # :	**42-97007**
Prepared By:	**Michael Collins**
Date:	**9 July, 2008**

Recreational Area Constants/Assumptions

Passive Park Area
density = 10 c/ha
loading = 8 L/c/d

Beach Area
density = 185 c/ha
loading = 40 L/c/d

Picnic Area
density = 185 c/ha
loading = 20 L/c/d

Event Site / Recreational Fields
density = 1000 c/ha
loading = 50

Industrial Area
MOE Light Industrial
Unit flow = 35 m3/ha/d

Infiltration
Unit Allowance = 0.15 L/ha/s

Estimated Peak Population = 10005.5
Total Area = 115.3 ha

TABLE 1

DESCRIPTION: Representative flows for the development of the Lake Ontario Park region immediately south of the Ship Channel using MOE Light Industrial design criteria.

Location			Lake Ontario Park Recreational / Industrial					Rec/Comm	Industrial	Flows (L/s)						
Street/Description	From	To	Passive Park Area (ha)	Beach Area (ha)	Picnic Area (ha)	Event Site/ Sportfields	Industrial (ha)	Peaking Factor	Peaking Factor	Passive Park	Beach	Picnic	Event Site	Industrial	Infilt	Design
Lake Ontario Park - South of the Ship Channel		Lakeshore @ Don Roadway	**38.2**	**11.9**	**1.2**	**7.2**	**56.8**	2.95	3.00	0.03	3.01	0.2	12.3102	69.03	17.3	**98.7**

engineers
architects
planners

Project: Lower Don Lands
Client: MVVA
Project # : 42-97007
Prepared By: Michael Collins
Date: 9 July, 2008

Recreational Area Constants/Assumptions

Passive Park Area
density = 10 c/ha
loading = 8 L/c/d

Beach Area
density = 185 c/ha
loading = 40 L/c/d

Picnic Area
density = 185 c/ha
loading = 20 L/c/d

Event Site / Recreational Fields
density = 1000 c/ha
loading = 50

Industrial Area
MOE Light Industrial
Unit flow = 55 m3/ha/d

Infiltration
Unit Allowance = 0.15 L/ha/s

Estimated Peak Population = 10005.5
Total Area = 115.3 ha

TABLE 2

DESCRIPTION: Representative flows for the development of the Lake Ontario Park region immediately south of the Ship Channel using MOE Heavy Industrial design criteria

Location			Lake Ontario Park Recreational / Industrial					Rec/Comm	Industrial	Flows (L/s)						
Street/Description	From	To	Passive Park Area (ha)	Beach Area (ha)	Picnic Area (ha)	Event Site/ Sportfields	Industrial (ha)	Peaking Factor	Peaking Factor	Passive Park	Beach	Picnic	Event Site	Industrial	Infilt	Design
Lake Ontario Park - South of the Ship Channel		Lakeshore @ Don Roadway	**38.2**	**11.9**	**1.2**	**7.2**	**56.8**	2.95	3.00	0.03	3.01	0.2	12.3102	108.47	17.3	**138.1**

engineers
architects
planners

Project: Lower Don Lands
Client: MVVA
Project # : 42-97007
Prepared By: Michael Collins
Date: 9 July, 2008

Recreational Area Constants/Assumptions

Passive Park Area
density = 10 c/ha
loading = 8 L/c/d

Beach Area (washrooms w/ showers)
density = 185 c/ha
loading = 40 L/c/d

Picnic Area (washrooms w/o showers)
density = 185 c/ha
loading = 20 L/c/d

Event Site / Recreational Fields
density = 1000 c/ha
loading = 50 L/c/d

LOP Industrial Max Flow Contribution
TWRC CASE (MOE Peak Light Industrial)
Spare Capacity = 92.22 L/s
WEP CASE (MOE Peak Light Industrial)
Spare Capacity = 71.778297 L/s
MOE CASE (MOE Peak Light Industrial)
Spare Capacity = 32.381863 L/s

Industrial Criteria (washrooms w/ showering facilities)
Unit Flow (= 125 L/c/shift

Estimated Peak Population = 9759
Total Area = 115.1 ha

Infiltration (MOE Criteria)
Unit Allowance = 0.15 L/ha/s

TABLE 3

DESCRIPTION: Maximum Industrial employee occupancy maximizing the remaining existing downstream infrastructure capacity.

Location			Lake Ontario Park Recreational / Industrial					Rec/Comm	Industrial	Input Flows (L/s)						Industrial Capacity			
Street/Description	From	To	Passive Park Area (ha)	Beach Area (ha)	Picnic Area (ha)	Event Site/ Sportfields	Industrial (ha)	Peaking Factor	Peaking Factor	Passive Park	Beach	Picnic	Event Site	Infilt	Subtotal	Allowance (L/s)	# Workers	Workers/ Area (c/ha)
TWRC Case																			
Lake Ontario Park - South of the Ship Channel		Lakeshore @ Don Roadway	**38.0**	**11.9**	**1.5**	**6.9**	**56.8**	2.97	3.00	0.03	3.02	0.2	11.84023	17.3	32.4	**59.87**	13795	**242.9**
WEP Case																			
Lake Ontario Park - South of the Ship Channel		Lakeshore @ Don Roadway	**38.0**	**11.9**	**1.5**	**6.9**	**56.8**	2.97	3.00	0.03	3.02	0.2	11.84023	17.3	32.4	**39.43**	9084	**159.9**
MOE Case																			
Lake Ontario Park - South of the Ship Channel		Lakeshore @ Don Roadway	**38.0**	**11.9**	**1.5**	**6.9**	**56.8**	2.97	3.00	0.03	3.02	0.2	11.84023	17.3	32.4	**0.03**	7.22	**0.1**

Appendix 7-A4

Technical Submission #16 – Appendix D

TSH engineers architects planners

Memorandum

To:	Elizabeth Silver, MVVA	**Date:**	September 18, 2008
From:	Peter Middaugh, P.Eng, TSH	**TSH Project No.:**	42-97007
Re:	Lower Don Lands – Technical Submission 16: Municipal Servicing Plan – Wastewater		

1 Introduction

This memorandum is a "work in progress" technical document in which the existing wastewater servicing of the Lower Don Lands (LDL) and alternative servicing solutions area are presented to facilitate the selection of a preferred alternative. The works presented in this summary incorporate the most current assumptions made by the project team with the intent of providing a consistent and integrated approach to the selection of the preferred wastewater infrastructure solution.

2 Existing development and wastewater servicing

The existing Lower Don Lands project site is divided into to two distinct sanitary sewershed areas separated by the Keating Channel, and both contain a mixture dedicated sanitary and combined sewers. The sewers in this region were constructed during the late 1920's and 1930's as a part of the East Harbour Development. The existing site is occupied by a mixture of industrial uses and undeveloped land, shown in overview in **Figure 1** on page 13 .

Gross Land areas are approximately as follows

North of Keating Channel:	33ha
South of Keating Channel:	76ha
Total Area:	109ha

The layout of the system does not compliment the future development and land uses proposed by the MVVA team. A layout of the existing wastewater servicing is shown in **Figure 2** on page 14.

Existing sanitary flow monitoring data is not available to TSH. An interim assessment of the existing wastewater demand has been done by applying 70% of the lower typical value of MOE Guidelines for Design value to the stated land areas. The value applied is 24.5m^3/ha/d. The resulting peak wastewater flows in rounded figures are:

North of Keating Channel:	30L/s
South of Keating Channel:	70L/s

The figures listed above to not include peak flows during wet weather conditions.

2.1 North of the Keating Channel

This area within the project site is bordered by the Keating Channel to the south, the CNR rail yard to the north, the Don River to the east, and Parliament St. to the west. This area contains the proposed East Harbour and Keating Channel North Neighbourhoods.

The eastern portion of the sewershed is serviced by an existing 300mm vitrified clay sewer that flows east to west along Lakeshore Blvd. where it then travels north toward Cherry St. The western portion of the area is also serviced by a 300mm vitrified clay sewer that flows west to east along Lakeshore Blvd. towards Cherry St.

At the junction of the Keating Channel North and East Harbour sewers, the sanitary flow is directed into a 450mm vitrified clay sewer where it travels northward along Cherry St. through the West Don Lands, where it discharges into the Low Level Interceptor (LLI) at Eastern Ave.

This area also includes a 1350x1350mm concrete combined sewer outlet at the mouth of the Keating Channel which discharges combined flows collected outside the project limits during periods of wet weather.

2.2 South of the Keating Channel

This area within the project site is bordered by the Keating Channel to the north, the Ship Channel to the south, Lake Ontario to the west and the Don Roadway to the east. This area contains the proposed Keating Channel South, and the East & West Ship Channel neighbourhoods.

The southern portion of this development is mainly serviced by 525 and 600mm reinforced concrete sewers which flow from the western limit of Polson St. to Cherry St., is then redirected north on Cherry St. and eastward on Commissioners St where it discharges at the end of the Don Roadway.

The northern portion of this area is serviced via 300mm vitrified clay combined sewer which flow from west to east along Villiers St. and discharge into the sanitary trunk on the Don Roadway.

The Don Roadway sanitary sewer consists of 525mm and 600mm vitrified clay pipe which collects wastewater from Commissioners St. and Villiers St. and discharges into the sanitary trunk flowing west to east on Lakeshore Blvd. The sewage travels along Lakeshore Blvd where it is discharged to the north along Logan Ave where it reaches the LLI on Eastern Ave.

2.3 Existing Operational Issues

Investigations into the existing servicing configuration have revealed major operational issues as follows:

- The West Don Lands Class Environmental Assessment Master Plan reports that the Cherry St. sanitary sewer experiences surcharging conditions from the LLI during wet weather events. The hydraulic grade line of the sewer currently reaches surface elevations at the CNR underpass during these scenarios.

- A section of sewer on Logan Ave. located directly north of Lakeshore Blvd. appears to have a negative slope relative to the direction of flow. This section complicates the assessment of capacity of the receiving infrastructure.

The age and the material of the existing sanitary sewers in the study area suggest that the physical condition may be poor. The condition of the receiving sanitary sewer on Lakeshore Blvd and Logan Ave is unknown*.

**The City to report on the condition of the existing receiving sewer located outside the study*

3 Proposed development and occupancy levels

Team to provide comment on the assumptions of employment, population, and commercial distribution made to incorporate current information for the purpose of generating sanitary flow data.

The Lower Don Lands project will be a distinct community within the City of Toronto. It is a project goal to establish a sustainable community with a balance of mixed use residential, retail and employment opportunities all contained within the area to encourage localized neighbourhood communities within the development. These neighbourhoods are the East Harbour, Keating Channel North, Keating Channel South, East Ship Channel and West Ship Channel. An architectural rendering of the proposed condition is illustrated in **Figure 3** on page 15.

The current planned population for the entire Lower Don Lands community is estimated at 25,000 in a total developed area of 62.4ha, giving an average population density of 400p/ha and a total floor space of approximately 1,634,300m^2. The population density and residential/commercial balance is intended to vary across the 5 identified neighbourhoods. These differences have been accounted for in the design calculations for the proposed sanitary flows.

Original land use data received by the MVVA team on March 30, 2008 contained two documents providing detail for the land use of the Lower Don Lands. The documents titled "Lower Don Lands Community Building1.doc" (LDL.doc) and the "071011_Calc.xls" (Calc.xls) provide information pertaining to the proposed land use of each neighbourhood. These original documents can be found in **Appendix A** on page 17. The Calc.xls document has been modified to reflect recently communicated assumptions to determine a population distribution for the purpose of generating proposed sanitary flow scenarios.

The modifications which have been made to Calc.xls reflect information provided in the LDL.doc and the PIC on July 23, 3008. The total population projection for the Lower Don Lands remains unchanged; however the land use distribution has been adjusted to reflect additions such as 300,000m^2 of non retail employment space with 12,000 jobs and 55,000m^2 of commercial retail space.

For the summary of assumptions, calculations and interpretations of information received from the MVVA team for land use across the Lower Don Lands for the purposes of predicting sanitary flows, see **Appendix B** on page 21.

The Public Information Centre (PIC) on July 23, 2008 communicated information to the City of Toronto regarding the latest population and commercial distribution for the Lower Don Lands and specific information pertaining to the North Keating Precinct Plan (NKPP). This area is to contain a total of 12,000 residents, 7000 residential units, 6,600 jobs, and a total floor space area of 716,877m^2. Therefore, it has been assumed that 66% of the jobs bring the equivalent portion of the employment space. The result is 198,000m^2 of employment space in the NKPP area, which will be divided between the East Harbour and North Keating neighbourhoods based on floor space. The remainder of such land use will be distributed between the remaining neighbourhoods

The remaining 3 neighbourhoods South Keating Channel, West Ship Channel and East Ship Channel are intended to include more parkland and green spaces and are to have a lower population density than the NKPP. In total, these neighbourhoods contribute 917,427m^2 of floor space. These areas collectively will contain the remaining non-retail employment and retail areas of 85,000m^2 and 30,875m^2 respectively. These spaces will be allocated to each neighbourhood based on their individual floor spaces in relation the other ungrouped neighbourhoods.

3.1 East Harbour Neighbourhood

The Calc.xls document identifies the East Harbour Neighbourhood to contain 5,489 residents in a 10.5ha section of the NKPP area resulting in a population density of 520p/ha. The proposed development for the East Harbour projects the area to have a total floor space of approximately 327,514m^2. Of this, 90,459m^2 (45.7% of 198,000) is intended to be non-retail employment space. The distribution of the 55,000m^2 in East Harbour is dependent on the total floor space in relation to the entire Lower Don Development, which is 20% or approximately 11,022m^2 of retail space.

3.2 North Keating Channel Neighbourhood

This neighbourhood is projected to house 6,526 residents in 8.7ha of developed area, resulting in a population density of 750p/ha, and provide 389,363m^2 of floor space. Of the total non-retail employment space allotted for the NKPP, the remaining 54.3% or 107,541m^2 is assumed to be located in this neighbourhood. This neighbourhood also holds 23.8% of the total floor space and is thus given the equivalent portion of retail space equalling 13,103m^2.

3.3 South Keating Channel Neighbourhood

Projections allocate 4,536 residents for this neighbourhood in a total development area of 16.6ha, resulting in a population density of 275p/ha. The total floor space for this area is approximated at 318,243m^2. This neighbourhood will hold approximately 34.6% of the remaining employment space resulting in 35,382m^2. Additionally, the retail space that is attributed to this neighbourhood is 19.5% if 10,710m^2.

3.4 Ship Channel East Neighbourhood

This neighbourhood is planned to be the smallest section of the Lower Don Lands development and contain 2296 residents within a 5.3ha area. The resultant population density is 430p/ha, and a total developed floor space of 161,070m^2. For sanitary design purposes this area contains 17.6% of the remaining employment area equivalent to 17,908m^2, and 9.9% of the total floor area for the project resulting in 5421m^2 of retail.

3.5 Ship Channel West Neighbourhood

This neighbourhood is planned to be the largest in the Lower Don Lands development area with 21.3ha and a population of 6,244 residents. The resultant population density is 290p/ha, and a total developed floor space of 438,114m^2. For sanitary design purposes this area contains the remaining 47.8% of the employment area equivalent to 48,710m^2, and 26.8% of the total floor area for the project resulting in 14,744m^2 of retail space.

3.6 Summary

The expected residential commercial developments and estimated population when the LDL is fully redeveloped are summarised in **Table 1** and **Table 2**.

Table 1: Expected Commercial/Service Industry Developments

Description	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East	Total/All
Residential developments						

Commercial, retail: floor area (m^2)	11,022	13,103	10,710	14,744	5,421	55,000
Commercial, non-retail: floor area (m^2)	90,459	107,541	35,382	48,710	17,908	300,000
Commercial, total floor area (m^2)	101,481	120,645	46,092	63,454	23,328	355,000

Table 2: Expected Residential and Employment Population

Description	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East	Total/All
Residential population	5,489	6,526	4,536	6,244	2,296	25,091
Non retail employment	3,618	4,302	1,415	1,948	716	12,000
Retail employment *	441	524	428	590	217	2,200

* Assuming $25m^2$ of floor space per employee (MOE Guideline)

4 Wastewater servicing alternatives for proposed development

Five development alternatives, plus a number of sub-alternatives have been selected for presentation. These alternatives are discussed below.

For the purposes of evaluating the planning alternatives at this time, it is assumed that the existing wastewater discharge locations on Lakeshore Blvd and Cherry St. are utilized as previously discussed in the existing conditions.

4.1 *Alternative 1: Do Nothing*

The existing wastewater collection system within the project limits will not provide the technical servicing requirements for redevelopment. The system contains combined sewer inputs, and is not compatible with the new river excavation. The "Do Nothing" alternative is not further considered.

4.2 *Alternative 2 A: Rehabilitate, Reconstruct & Construct New*

Alternative 2A entails the reconstruction and rehabilitation of existing services where feasible, construction of new infrastructure in conformance with the new LDL layout and consider opportunities for connectivity of wastewater services to the lands south of the Shipping Channel.

4.3 *Alternative 2B: Rehabilitate, Reconstruct & Construct New + Commissioners St. Outlet*

Alternate 2B incorporates all of alternative 2A with the addition of a new sanitary outlet trunk Commissioners St. This alternative provides a gravity connection for the entire development and adjacent areas including south of the Shipping Channel.

4.4 *Alternative 3A: Alt 2A/B + SPS Forcemain*

Alternative 3A includes alternative 2A or 2B and the addition of sanitary pumping stations and forcemains. The sanitary pumping stations would be required to either cross some low lying areas and water bodies such as the Don River or required to lift sewage to an elevation to where gravity conveyance can be constructed.

4.5 *Alternative 3B: Alt 2A/B + Inverted Siphons*

Alternative 3B includes alternative 2A or 2B and the addition of inverted siphons to cross low lying areas and water bodies. This alternative uses any available or constructed head differential to cross low lying areas via gravity, and does not require additional inputs of energy. The proposed South Keating Channel and West Ship Channel neighbourhoods may be constructed to suit this zero-energy input method of servicing.

4.6 Alternative 4: Vacuum Sanitary System

The vacuum sanitary system is typically employed in costal areas with relatively flat terrain similar to that of the proposed development area, however primarily unused in Canada. The system operates by collecting wastewater from small tributaries to a common collection basin with an elevation tripped valve. The vacuum pumps cycle on and off to maintain a constant negative pressure within the system. The wastewater is conveyed at 4.5-5.5m/s to a collection tank where it then outlets to either a gravity sewer or forcemain.

The diameter of the sewer lines are much smaller than traditional gravity sewers and are independent of surface grading characteristics, which may provide a benefit in the high water table, coastal setting.

4.7 Alternative 5: Ship Channel West Eco-Island

The excavation of the Don River through the project site creates an island scenario for the proposed Ship Channel neighbourhood in the Lower Don Lands. The concept of creating an Eco-island out of the Ship Channel West neighbourhood would require all water and wastewater to be treated and distributed on site. This alternative would warrant and require the inclusion of many water efficient measures such as:

- Grey-water reuse
- High efficiency fixtures
- Rainwater harvesting
- Low water landscaping, etc.

5 Wastewater Unit Flow Rates

**City to provide comment on the sanitary unit flow rate assumptions used for the generation of predicted sanitary flows.*

To apply the land use and population assumptions made for the purposes of sanitary flow generation, a series of unit flow rates from various sources are used.

5.1 Residential Unit Flow Rate

The Waterfront Toronto Sustainability Framework of August 2005 identifies target water consumption rates of 260L/c/d for future development. Wastewater flows are typically witnessed at 70% of water consumption for residential areas. For this reason, the 70% of the 260L/c/d target is used as the full build out requirement for wastewater at 182L/c/d.

The MOE Sewer Design Guidelines unit flow rates for residences provide conservative values for the design of sanitary sewers for the proposed development. These values do reflect the trend towards reduced water use, or water efficiency strategies that could be implemented into the Lower Don Lands. The lower limit MOE residential value of 270L/c/d of potable water demand provides some assurance that the target consumption rate is somewhat conservative for design purposes.

The Toronto Water Efficiency Plan reports a water demand of 191L/c/d for multi-unit residences. This value provides some additional insight into water demands listed in similar developments that do not employ the use of high efficiency fixtures and/or other water conservation methods.

TSH is confident that the selected residential unit flow value of 182L/c/d will provide a reasonable interpretation of the full build out condition.

5.2 Commercial/Retail Unit Flow Rate

The proposed development is to incorporate 55,000m^2 of Commercial/Retail space. To remain slightly conservative in predicting the commercial/retail flow rates, and compensating for the range of expected businesses, a value of 4.0L/m^2/d of floor space is assumed for water consumption. To generate wastewater flows for these uses, 70% of the flow is assumed to be wastewater giving 2.8L/m^2/d. This value still falls within the range of typical values for Shopping Centres in the MOE Sewer Design Guidelines and is considered to be conservative for these analysis. This value is applied to the total floor space.

5.3 Non-Retail Employment Unit Flow Rate

As discussed in the proposed land use, the Lower Don Lands is proposed to contain 300,000m^2 of non-retail employment space and 12,000 employees occupying this floor space distributed throughout the project site. Waterfront Toronto Sustainability Framework presents a target unit consumption rate for employment areas as 80L/c/d. For wastewater it is assumed that 70% of this target conveyed as wastewater presenting a unit flow rate of 56L/c/d. For comparative purposes, this value is equivalent to providing allowance for 2.24L/m^2/d over the floor space.

5.4 Industrial Areas

5.4.1 Within Project Limits

The most recent land use information received from the MVVA team does not include any existing or proposed industrial uses. For the purposes of evaluating the alternative wastewater solutions at full build out condition, it is assumed that there is no industrial land use within the project limits. In the event industries remain in the Lower Don Lands indefinitely then special consideration in the determination of final sanitary flows will be necessary.

5.4.2 Outside Project Limits

The area directly east of the Lower Don Lands contains a mixed use of industrial sites. TSH currently does not possess any sanitary flow monitoring or water consumption data to accurately estimate the sewage loadings from this area.

The majority of the project site is either undeveloped or used for storage purposes; however it is difficult to predict the nature of individual sites. For this reason, the typical MOE Light Industrial value of 35m^3/ha/d is applied to the adjacent areas as a conservative approximation.

5.5 Summary of Unit Values

Table 3 is a summary of the unit flow values used in the preliminary sanitary analysis, as previously described in this section.

Table 3: Unit Flow Parameters for Land Use

	Residential	Commercial Retail	Non Retail Employment	Industrial Flows
Unit	L/c/d	L/m^2/d	L/c/d	m^3/ha/d
Value	182	2.8	56	35

6 Peaking Factor

**City to provide comment on the peaking factor assumptions used for the generation of predicted sanitary flows.*

The proposed mixed use nature of the Lower Don Lands and combination of residential and commercial uses requires additional consideration in the generation of sanitary flow information.

6.1 Harmon Peaking Factor

The Harmon Peaking Factor is an MOE standard for the generation of peak flows for residential developments, and is appropriate for the design of the Lower Don Lands. This peaking factor is a function of the population tributary to a sanitary sewer. Thus sanitary flows will change as the peaking factor changes in the evaluation of proposed outlet locations.

6.2 Diurnal Curve Adjustment

An adjustment was made to the peaking factors to accommodate for the proposed mixed residential and commercial use. **Appendix C** on page 22 shows the diurnal curve used from the State of California Water Agency Standards.

The Harmon Peaking Factor is purely a population based factor, and does not account for commercial areas. The adjustment is based off of the highest peaking rates between the "100% residential" and the "80% residential & 20% commercial" curves. The mixed use curve identifies a peaking factor that is 85% of the "100% residential" curve. This 0.85 factor is used to adjust the Harmon Peaking Factor to accommodate for the mixed use nature of the development and is applied to all commercial and residential uses.

6.3 Summary of Peaking Factors

Table 4 is a summary of the peaking factors based on residential population that are used in generating the projected flows for the proposed sanitary servicing alternatives. It is important to note, that as neighbourhoods become grouped at outlet locations, the theoretical peaking factor is reduced. The table below reflects this assumption.

Table 4: Peaking Factors by Neighbourhood and Outlet

Peak Scenario	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East
i) Individual Neighbourhoods	2.73	2.66	2.79	2.68	3.01
ii) Existing Outlets (Cherry & Lakeshore)	2.45*	2.45*	2.41**	2.41**	2.41**
iii) Common Outlet (Commissioners)	2.17	2.17	2.17	2.17	2.17

*Peaking factors contributing to Cherry St. sanitary sewer
**Peaking factors contributing to Lakeshore Blvd. sanitary sewer

7 Projected Flows

Preparing preliminary flow data will aid in the arrival of the preferred alternative for the evaluation of receiving infrastructure and the associated costs of reconstruction. All calculations in this section can be found in **Appendix D** on page 23.

7.1 Outlet Flows

Table 5 identifies the projected flows at the outlet locations and configurations previously identified.

Table 5: Projected Flows at Selected Outlet Locations

Sewage Outlet Location & Description	Contributin g Population	Peak Scenario	Future Flows (L/s)	Existing Flows (L/s)
Cherry St. @ CNR Underpass - North Keating & East Harbour	12015	ii	79.2	30
Don Roadway @ Lakeshore Blvd. - South Keating, East and West Ship Channel	13076	ii	81.7	70
Common Outlet (Commissioners) - All Neighbourhoods	25091	iii	144.6	N/A

7.2 *Individual Neighbourhood Flows*

Individual neighbourhood flows are calculated using peaking factors considering only the population of that neighbourhood. These values are reported for the consideration of rerouting flows and flow patterns. **Table 6** summarizes predicted flows from each neighbourhood using peak scenario 'i'

Table 6: Predicted Sanitary Flows per Neighbourhood

East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East
40.5 L/s	46.5 L/s	32.7 L/s	43.1 L/s	17.3 L/s

8 Existing Capacity Assessment

For the purpose of this document, this section only considers the assessment of capacity from the project boundary to the point where wastewater is discharged into the Low Level Interceptor (LLI) on Eastern Ave. This section does not take into consideration the conveyance of wastewater from the project site to the point of discharge at the project limit; these items are discussed further in the Technical Discussion of Alternatives. This section does not evaluate capacity or operational issues associated with the LLI.

All assessments of capacity are calculated using the Manning Equation.

8.1 *Cherry St. Outlet.*

The Cherry St. Outlet currently has a capacity in the vicinity of 100L/s, as communicated by RV Anderson. It is also understood that this sewer will be replaced with a sufficient sanitary sewer and lift station to accommodate the West Don Lands, and Lower Don Lands area tributary to this sanitary sewer.

The current capacity of the Cherry St. outlet is not sufficient to address the needs of both the Lower Don Lands and the West Don Lands. When the preferred servicing alternative is selected from the alternatives noted earlier, the corresponding flow condition must be communicated to RV Anderson to ensure the appropriate capacity is accommodated in the design and construction of the new sanitary sewer on Cherry St.

8.2 *Lakeshore Blvd. Outlet*

As mentioned previously in this document, a section of the Logan Ave sewer has been constructed with a negative slope with respect to the direction of flow. Preliminary calculations assessing capacity using the Manning Equation do not take this section into consideration, and thus this section is ignored for this assessment. A future dynamic analysis will be required to accurately approximate the capacity of this section*.

*Please note

Current land use assumptions which attribute a higher population and employment density to the lands to the north of the Keating Channel, and lower densities in the areas south of the Keating Channel support the use of this outlet to service the project site in the existing configuration. There is sufficient capacity to service the Keating Channel South, and the East & West Ship Channel neighbourhoods. See **Appendix E1** on page 24

Servicing the entire Lower Don Lands development through the Lakeshore Blvd/Logan Ave. sanitary outlet is a viable option. The preliminary calculations found in **Appendix E2** on page 25 illustrate that the full build out condition will consume the majority of remaining capacity in the trunk sewer. In the event that the adjacent lands have higher sewage loadings, a significant portion of the outlet sewer would require reconstruction. Water consumption/sanitary flow data for the industries in the area will aid in determining the feasibility of this condition*.

* Please note

9 Technical Discussion of Alternatives

This section is intended to provide technical information associated with some of the proposed wastewater alternatives which require technical evaluation to be considered as feasible solutions and to identify the additional work that would be required to employ these alternatives. **Figure 4** on page **Error! Bookmark not defined.** illustrates the preliminary evaluation of all wastewater alternatives as performed by TSH.

9.1 Alternative 2A – Rehabilitate, Reconstruct & Construct New

This alternative requires the use of gravity as the sole means for the conveyance of wastewater from the project site. Some of the existing lands such as the North Keating Channel, East Harbour and East Ship Channel, will have the ability to be serviced by gravity sewers. This of course is dependent on the proposed grading plans of these neighbourhoods.

The South Keating Channel neighbourhood can not be serviced simply through reconstruction, rehabilitation of existing, and constructing new gravity sewers on site. The proposed Don River through the project site will have an approximate bottom elevation of 72m. The existing sanitary invert at the Don Roadway and Lakeshore is approximately 73.8m and the invert at the LLI is approximately 72.4m. Therefore, a system that would convey wastewater to the LLI via gravity can not be constructed.

The Ship Channel West neighbourhood creates a similar situation with the introduction of the floodway. The proposed surface elevation of the floodway is approximately 74.5m. Therefore, to meet cover requirements, the invert elevation would be a maximum of 73.3m. Although this elevation is higher than the invert elevation at the LLI, a gravity sewer can not be constructed that meets capacity requirements. (Requires a sewer constructed at less than 0.05%)

For these reasons this alternative in not preferred.

9.2 Alternative 3B – Alt 2A/B + Inverted Siphons

This system operates in a similar manner to a conventional gravity system. The main difference is the loss of head that is witnessed as a result of crossing low lying areas (ie Don River). The greater the head differential is between the upstream and downstream of the crossing, the more flexible the design can be.

This alternative would require an inverted siphon to service the Ship Channel West and the South Keating Channel neighbourhood to convey all wastewater via gravity. Preliminary calculations show that in order to cross the Don River and the floodway via inverted siphons, that a minimum of 0.5m and 0.75m of additional head is required respectively. See **Appendix F1** and **F2** found on page 26 and 27 for preliminary inverted siphon calculations capturing this scenario.

This option is a feasible servicing solution at the full build-out scenario; however its implementation is dependent on the proposed grading for the site and the staging of the proposed development.

10 Limitations of Existing Information

The following is a summary of issues encountered during the preliminary assessment of alternatives as a result of unsuitable or insufficient information from various sources.

10.1 As-Built Information – resolution/quality

The as-built information received from the City of Toronto is complete with respect to covering the entire project area and the relevant lands adjacent to the project area. However some of this information lacks the detail required in evaluating preferred alternatives

The sheets were submitted to TSH electronically, and due to the size of the sheets, some of the information regarding invert elevations is unclear. Of particular concern are the sanitary sheets for Logan Ave., where a section of that sewer has been annotated multiple times. Many locations have been annotated several times with no indication of which elevations are most current*.

**Clarification by City staff is required*

10.2 Sanitary Flow Monitoring Data – not received

TSH has requested flow monitoring data from the City of Toronto and has not been received. To confidently evaluate the alternatives this information is required to estimate the expected flows from the adjacent lands and the existing areas that require servicing for the duration of the development.

It has been communicated to TSH by the City that this information may be available but is considered unreliable due to existing surcharging/wet weather flow conditions.

10.3 Water Consumption Data – not received

TSH has requested water consumption data from all consumers in the Lower Don Lands as well as users in the adjacent industrial lands. This information is critical in evaluating the existing water demands for the range of industrial uses in the adjacent lands and to determine the required water supply to maintain servicing to the site during the construction phases.

This information will also be used in arriving at/validating sanitary flow calculations that have been approximated using typical design values and project target rates.

10.4 Lake Ontario Park – servicing requirements

The City of Toronto not developed a servicing strategy for the redevelopment of Lake Ontario Park south of the Shipping Channel.

The development characteristics of the Lake Ontario Park lands are not clearly understood by the LDL Team and as such, water consumption/sanitary flow information is not available to begin incorporating this area into the evaluation of the Lower Don Lands servicing alternatives*.

*The City/Toronto Waterfront needs to provide direction in this regard

10.5 Surface Information of Adjacent Areas

Surface information east of the project site on Lakeshore Blvd and Logan Ave does not reflect current conditions. This information is useful in determining the need and feasibility of a new sanitary connection to the LLI at Logan Ave.

The only electronic information available to TSH is approximate topographic data obtained when the Gardiner Expressway extended to Leslie St. This information can not be used in generating an accurate surface in the evaluation of a new sewer. There are no as-built records obtained by TSH that illustrate recent surface information for Lakeshore or Logan Ave.

This information, when obtained from the city, will be useful in evaluating the feasibility and constructability of a gravity connection to the LLI from the Lower Don Lands.

11 Additional Information Requested

11.1 Accurate Field Information

11.1.1 Low Level Interceptor

The feasibility to provide a gravity connection to the project from the LLI at Logan Ave/Easter Ave should be investigated in greater detail. This option is reliant on the elevation of the LLI at Logan and Eastern Ave.

The quality of the existing as-built sewer records needs to be checked and as such we suggest that field investigations of the sanitary be conducted at Lakeshore and Don Roadway; Saulter St and Lakeshore; Bouchette St and Lakeshore; Logan and Lakeshore; and Logan and Eastern to ensure that all inputs to the system are properly accommodated for in the assessment of a gravity connection and to remove uncertainties associated with the assessment of this option.

11.1.2 Logan Ave Sanitary Sewer

Current as-built information identifies that a portion of the sanitary sewer on Logan Ave immediately north of Lakeshore Blvd. has a negative slope with respect to the direction of flow. It is believed that this may be a result of a conflict with a perpendicular storm sewer crossing.

This section of sanitary sewer in its assumed existing condition will require a dynamic hydraulic modelling approach outside of the Manning equation assessment of the sewer system to evaluate the capacity accurately

Field investigations of this work will serve two purposes. The first purpose is to determine if this scenario is actually occurring in the field and the extent of backfall for the evaluation. Secondly, to identify if utility conflicts exist that may prevent full length reconstruction of the sewer, and if the utilities can be relocated during reconstruction.

FIGURE 1: EXISTING LAND USE

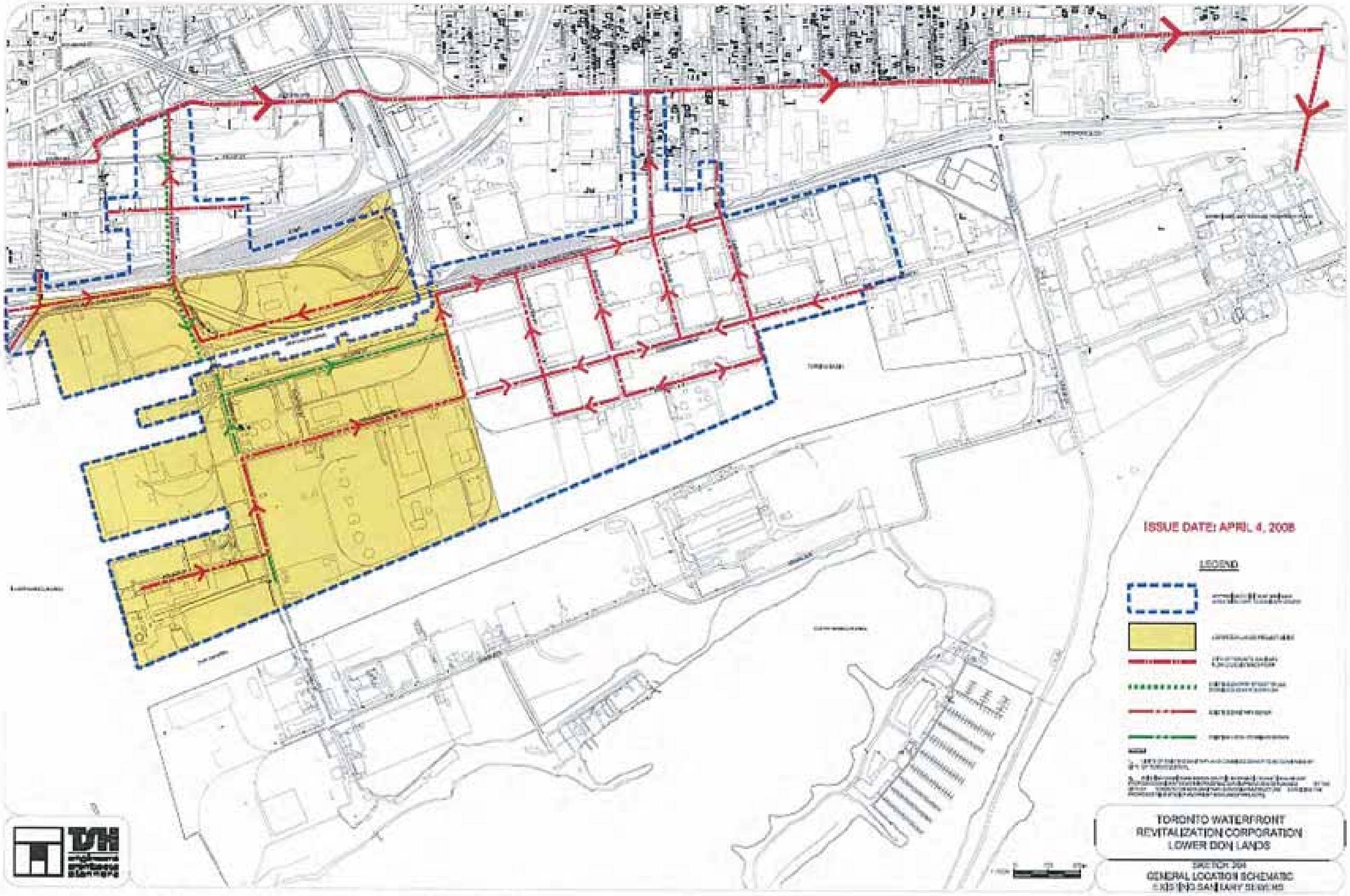


FIGURE 2: OVERVIEW OF EXISTING SERVICING

FIGURE 3: PROPOED REDEVELOPMENT OF THE LOWER DON LANDS

EVALUATION OF ALTERNATIVE PLANNING SOLUTIONS: WASTEWATER **DRAFT – WORK IN PROGRESS**

Evaluation Criteria	Alt.1: Do Nothing	Alt.2A: Rehab/ Reconstruct	Alt.2B: Rehab/ Reconstruct + Commissioners St.	Alt.3A: Alt 2A/B + SPS Forcemain	Alt.3B: Alt 2A/B + Siphon	Alt.4: Vacuum Sanitary System	Alt.5: Ship Channel West Eco-Island
Natural Environment ▪ Don Mouth Naturalization ▪ New Natural Area	- Not compatible with a new river alignment - Not compatible with the design and construction of new natural areas	+ Opportunity to minimize some impact to new natural areas - Not compatible with new river realignment	+ Compatible with new river alignment - Deep excavation requires disturbing contaminated fill	+ Compatible with new river alignment	+ Compatible with new river alignment + Mitigates exposure to contaminated areas	+ Compatible with new river alignment	+ Compatible with new river alignment + Maximizes natural area usage and resources
					Preferred		**Preferred**
Social Environment ▪ Vibrant, mixed use community ▪ Access to water	- Does not support new development in the study area	- May support some new development	+ Supports new development in Lower Don Lands area	+ Supports new development in Lower Don Lands area	+ May support new development in Lower Don Lands area	+ Supports new development in Lower Don Lands area	+ Supports the attraction of a environmentally friendly community
					Preferred		**Preferred**
Economic Environment ▪ Economically viable blocks ▪ Cost-effective to build	+ Low Cost - Limits Block Configurations	- May limit block configurations due to limited elevation for drainage + Moderate/Low Costs	+ Does not limit block sizes and locations - Very high costs	+ Does not limit block sizes/locations +Moderate initial Cost - Energy costs to maintain SPSs	+ Does not limit block sizes/locations + Moderate initial costs & no energy costs	+ Does not limit block sizes/locations - High initial costs +/- Energy operating costs/ less than SPSs	- Very high initial costs with installation of multiple systems - requires independent WWTP, WTP, solid waste management systems etc.
	Preferred						
Cultural Environment ▪ Aboriginal people ▪ Heritage structures ▪ Archaeology	+ No heritage impact to structure + No new impacts to areas with potential for archaeological resources	+ No incremental impact to Aboriginal people - Potential impacts to heritage structures/ archaeological	+ No incremental impact to Aboriginal people - Potential impacts to heritage structures/ archaeological	+ No incremental impact to Aboriginal people - Potential impacts to heritage structures/ archaeological	+ No incremental impact to Aboriginal people - Potential impacts to heritage structures/ archaeological	+ No incremental impact to Aboriginal people - Potential impacts to heritage structures/ archaeological	+ No incremental impact to Aboriginal people - Potential impacts to heritage structures/ archaeological
	Preferred						

+: implies comment supports the criteria
–: implies comment does not support the criteria

FIGURE 4: EVALUATION OF ALTERNATIVE PLANNING SOLUTIONS: WASTEWATER

EVALUATION OF ALTERNATIVE PLANNING SOLUTIONS: WASTEWATER **DRAFT – WORK IN PROGRESS**

Evaluation Criteria	Alt.1: Do Nothing	Alt.2A: Rehab/ Reconstruct	Alt.2B: Rehab/ Reconstruct + Commissioners St.	Alt.3A: Alt 2A/B + SPS Forcemain	Alt.3B: Alt 2A/B + Siphon	Alt.4: Vacuum Sanitary System	Alt.5: Ship Channel West Eco-Island
Sustainability ▪ WT Sustainability Framework ▪ City sustainability standards ▪ Impervious surfaces	- Not consistent with WT sustainability framework	+ Replace some aging infrastructure + Disconnect combined sewers - Does not reduce water or energy consumption practices	+ Replace some aging infrastructure + Disconnect combined sewers - Does not reduce water or energy consumption practices	- Continually consumes energy to operate SPSs + Replace aging infrastructure + Disconnect combined sewers	+ Replace aging infrastructure + Disconnect combined sewers + Does not require energy input	+ Replace aging infrastructure + Disconnect combined sewers +/- Requires less energy input than SPS + presents option of new low flow fixtures	+ Replace aging infrastructure + Disconnect combined sewers + Incorporates grey-water reuse/rainwater systems + High efficiency fixtures reduce potable water/future energy
					Preferred		**Preferred**
Land Use and Property ▪ New land uses ▪ Public realm goals ▪ Property	+ No property impacts - Limits opportunities for land use and redevelopment - Not compatible with Public Realm	+/- Can provide some services for proposed land use - South Keating and Ship Ch. W limited by gravity/channel excavation	+ Provides servicing requirements for proposed land use and development + Compatible with Public Realm	+ Provides servicing requirements for proposed land use and development + Compatible with Public Realm - Requires specific SPS locations	+/- Potential to provide services maximizing development potential +/- Potential to provide services to support Public Realm	+ Provides servicing requirements for proposed land use and development + Compatible with Public Realm + Vacuum stations have flexible locations	+ Provides servicing requirements for proposed land use and development + Compatible with Public Realm - Facilities require a large area of the developable land, reduces Public usage and property ownership
						Preferred	
Municipal Services ▪ Support future land uses and densities? ▪ Include sustainable design technology? ▪ Impact existing or planned utilities?	▪ No utility impacts ▪ Does not support land use and densities ▪ Does not include sustainable design technology	- Does not support land use/densities - Does not incorporate sustainable design technology - Does not address operational constraints on LLI	+ Supports future land uses and densities + Reduces loadings to LLI at Cherry and Logan + Provides servicing option to Lake Ontario Park - No sustainable design technology - Require major lift station at WWTP - Existing utilities on Commissioners St. impacted	+ Supports future land uses and densities + Reduces loadings to LLI at Cherry and Logan - Provides servicing option to Lake Ontario Park - No sustainable design technology + Gravity connections to LLI - Limited capacity in downstream sewers	+/- Potential to support future land use and densities + Does not require additional energy +Existing gravity connections can be utilized - Dependent on proposed grading plan and staging - Construction of new major outlet may be required due to loss of elevation at crossings	+ Supports future land uses and densities + Provides greatest flexibility to service island neighbourhoods + Small diameter pipes are more flexible during construction/ utility corridor + independent of site grading + Opportunity to reduce loadings on LLI + Eliminates wet weather flows/infiltration - Requires energy input - New technology requires new maintenance and operational demand	+/- Potential to provide services to support land uses and densities + Requires extensive sustainable design technology +Reduces loadings otherwise tributary to the LLI +Does not require sanitary crossing under floodway to service Ship Channel West - Watermain servicing Lake Ontario Park will require relocation - Maintenance liability very high
					Preferred		
SUMMARY							

+: implies comment supports the criteria
–: implies comment does not support the criteria

FIGURE 4: EVALUATION OF ALTERNATIVE PLANNING SOLUTIONS: WASTEWATER **DRAFT – WORK IN PROGRESS**

APENDIX A: ORIGINAL SOURCE DOCUMENTS RECEIVED BY PROJECT TEAM

071011_Calc.xls "Calc.xls"

Lower Don Calculation

Revision of Competition

10/11/07

	Provided Use Ratio Residential / Commercial, Retail	Total Development Area ha	Total Area of Blocks m2	Total Floor m2	Gross FSI	Net FSI	Building height (storeys)	Residential no of units (106 m2 total)	Commercial Retail m2	# Parking Residential	Parking Commercial	parking m2
East Harbour Neighborhood	80% / 20%	10.5	44,362	327,514	3.1	7.4	4-13 storeys	2,472	65,503	below	ground	0
							5 towers (16-30 storeys)					
North Keating Channel Neighborhood	90% / 10%	8.7	49,695	389,363	4.5	7.8	5-11 storeys	3,306	38,609	below	ground	0
							9 towers (15-33 storeys)					
South Keating Channel Neighborhood	90% / 10%	16.6	58,266	318,243	2.0	5.5	2-13 storeys	2,187	25,449	2,187	255	61,050
							4 towers (13-18 storeys)					
Shipping Channel Neighborhood - West	90% / 10%	21.3	74,417	438,114	2.1	5.9	3-12 storeys	3,010	35,061	3,010	350	84,000
							1 tower (30 storeys)					
Shipping Channel Neighborhood - East	85% / 15%	5.3	21,631	161,070	3.4	7.4	3-13 storeys	1,045	19,363	1,045	193	30,950
Total		62.4 (154,2 acres)	248,371	1,634,304	2.6	6.6		12,020	183,985			176,000

Assumed Parking Ratios: 1 stall / residential unit
1 stall / 100m² commercial space
Parking below ground is not included in Total Development Area
25 m / parking stall

Lower Don Lands Community Building1.doc "LDL.doc"
(excerpt)

3 Residential Development

Principles:

- Mixed unit types; emphasis on family units; higher proportion of family units in the South Keating Channel and Shipping Channel neighbourhoods; lower in the North Keating Channel neighbourhood
- Vary densities and building typologies to reflect this diversity
- Locate family units close to grade where possible
- Mixed income—at least 20 % affordable rental and 5 % low end of market
- Mix unit types and incomes within blocks and buildings, if possible
- Provide for aging in place (include long term care residences)

Preliminary Population Projections

TABLE 1 Projected Pop- (Total) Lower Don Neighbourhoods	No. Residential Units	Lower Projection: 1.6 PPH (Wtf Average)	Higher Projection: 2.5 PPH (City average)	Average Projection
East Harbour	2,472	3,955	6,180	5,141
North Keating Channel	3,306	5,290	8,265	6,877
South Keating Channel	2,187	3,499	5,468	4,847
Shipping Channel - West	3,010	4,816	7,525	6,261
Shipping Channel - East	1,045	1,672	2,613	2,173
Total	**12,020**	**19,232**	**30,050**	**25,000**

Assume population of 25,000

Preliminary Population Breakdown

	Waterfront Age Cohort Distribution		
Age Cohorts	**Average Projection: 2.08 PPH**	**Lower Projection: 1.6 PPH**	**Higher Projection: 2.5 PPH**
0-4 years	675	519	812
5-9 years	550	423	661
10-14 years	500	385	601
15-24 years	2350	1,808	2,825
25-64	18675	14,366	22,448
65+ years	2200	1,692	2,644
Total	**25,000**	**19,232**	**30,050**

Preliminary Community Facility Requirement Estimates (based on population breakdown)

5 Employment

Principles

- Achieve a balance of residents and jobs across the Waterfront based on current balance across the City of Toronto (.55 jobs per person)
- Provide for spaces that attract a variety of employment opportunities that are compatible with residential
- Provide in particular for "creative industries"
- Provide for water related industries
- Provide for both concentrations of employment activity (such as Film Port) as well as dispersed employment activity in mixed use settings

Preliminary Employment Projections

- Need to calculate projected and existing employment in Waterfront, South of Eastern and Distillery and compare to population projections for Waterfront and determine employment amounts for the Lower Don Lands
- Preliminary estimate is for approximately 250,000 sq m of non retail employment space

6 Retail and Services

Principles

- Provide for enough retail and service spaces (e.g. medical offices) to satisfy local needs of residents, employees and visitors
- Provide for large (supermarket type) facilities, specialty and convenience stores
- Locate most retail and services along "main street" type environments, with stores integrated into the base of mixed use buildings
- Cluster retail and service spaces around transit stops
- Allow for a more significant retail cluster on the 480 Lakeshore property in lower levels combined with mixed-use development above

Preliminary Estimates for Retail Space Requirements

- Provide for between 48,000 and 55,000 sq m of retail space
- Provide for at least one large supermarket, with perhaps a cluster of other retail possibilities
- Other retail to include specialty food stores, department type merchandise stores, home improvement type merchandise stores and other miscellaneous retail

7 Sustainability Infrastructure

Principles

- Find appropriate spaces for required large facilities such as storm water storage, lake cooling, solar panel reservoirs etc.
- Explore opportunities for locating such facilities in historic silos
- Explore opportunities to combine with educational and cultural programming

APPENDIX B: MODIFIED LAND USE DATA FOR SANITARY FLOWS

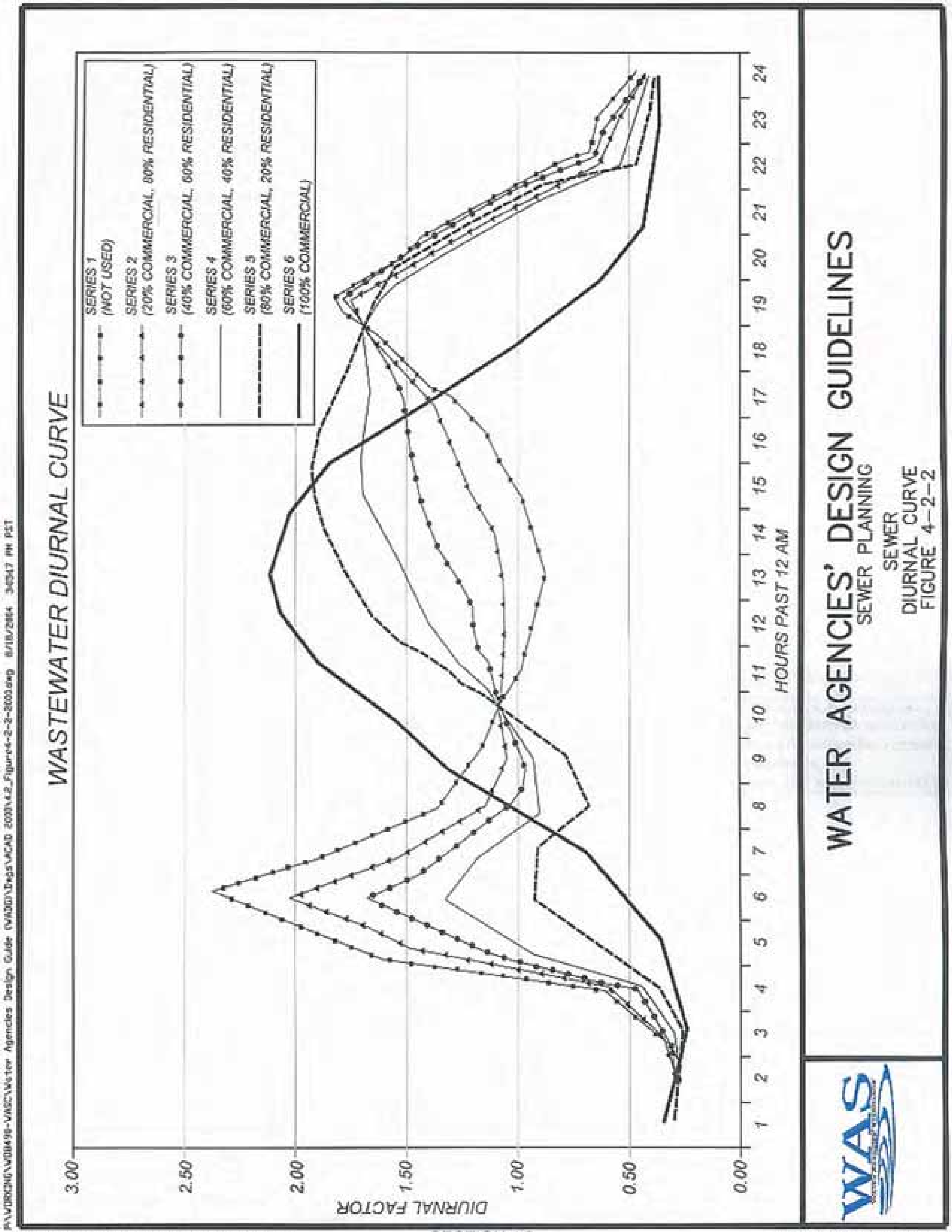
Note: Blue font denotes input data.
Note: Green font denotes new/altered input data extrapolated from MVVA team information

OCCUPANCY/DEVELOPMENT INFORMATION

Description	Unit	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East	Total/All	Comment
Information from spreadsheet/documents provided by Team								
Use ratio - residential		69.0%	69.0%	85.5%	85.5%	85.5%		New ratios based on new values forwarded by MVVA Team incorporated into design calcs
Use ratio - commercial/ employment/retail		31.0%	31.0%	14.5%	14.5%	14.5%		
Total development area	ha	10.5	8.7	16.6	21.3	5.3	62.4	
Total area of blocks	m^2	44,362	49,695	58,266	74,417	21,631	248,371	
Total floor area	m^2	327,514	389,363	318,243	438,114	161,070	1,634,304	
Residential Scenarios								Information presented during July 23 PIC illustrated that the North Keating Precinct Plan Area (NKPP) would contain approx. 7,000 units. 70sq.m (753sq.ft) units required to obtain 7000 units based on original floor space assumption for the NKPP
No. of 156 m^2 residential units		1,449	1,723	**1,745**	**2,402**	**883**	8,201	
No. of 70 m^2 residential units		**3,229**	**3,839**	3,888	5,352	1,968	18,276	
Commercial, retail (total floor area)	m^2	11,022	13,103	10,710	14,744	5,421	**55,000**	See email from Steve Willis to Marko Prgin dated July 21 2008 (adjusted to 55,000)
Non Retail Employment (total floor area)	m^2	90,459	107,541	35,382	48,710	17,908	**300,000**	North Keating and East Harbour share 66% of employment area. Information received by John Gladki on August 13, 2008 revised the employment projections to 300,000m2.
No. of Employees		3,618	4,302	1,415	1,948	716	**12,000**	See email from John Gladki via Karin Wall on Aug 12, 2008 RE: Population and Employment Projections. Employment area divided by 25m2 to arrive at no. of employees
Population								
160m2 residential units								
Lower projection (1.7 pph)		2,463	2,928	2,966	4,083	1,501	13,941	**Bold denotes values used in Assumed Projection.**
Higher projection (2.6 pph**)		3,767	4,479	**4,536**	**6,244**	**2,296**	21,322	
Average projection (~2.2 pph)		3,115	3,703	3,751	5,164	1,898	17,631	Modifications made to accommodate new assumptions for NKPP
75m2 residential units								
Lower projection (1.7 pph*)		**5,489**	**6,526**	6,221	8,564	3,148	29,948	
Higher projection (2.5 pph)		8,073	9,597	9,720	13,381	4,919	45,689	
Average projection (2.1 pph)		6,781	8,062	7,970	10,972	4,034	37,819	
ASSUMED PROJECTION		**5,489**	**6,526**	**4,536**	**6,244**	**2,296**	**25,091**	

*1.7pph calculated by the projected population divided by the number of units identified during PIC for the North Keating Precinct Plan area
**2.1pph calculated by the projected population outside NKPP (13000) divided by the remaing number of units outside NKPP (5000)

APPENDIX C: DIURNAL CURVE



APPENDIX D: SANITARY FLOW CALCULATIONS

SEWAGE FLOW

Description	Unit	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East	Total/All	Source/comment
		Flow						
Unit/base values								
Residential Population	L/c.d	**182**	**182**	**182**	**182**	**182**	**182**	70% of Waterfront Toronto Target (260L/c/d) as suggested by Frikkie Becker in his review of Sanitary Works Summary
Non Retail Employment Population	L/c.d	**56**	**56**	**56**	**56**	**56**	**56**	70% of Waterfront Toronto Target (80L/c/d) as suggested by Frikkie Becker in his review of Sanitary Works Summary
Commercial, retail	$L/m^2.d$	**2.8**	**2.8**	**2.8**	**2.8**	**2.8**	**2.8**	70% of MOE design value of previously assumed $4L/m^2/d$ suggested by Frikkie Becker in his review of Sanitary Works Summary See MOE p7 Shopping Centre
Calculated Peak Factor Scenarios								
i)Individual Neighbourhood		3.21	3.14	3.28	3.15	3.54	N/A	Harmon formula (This peaking factor has been generated for various sewershed scenarios to evaluate pumping station/siphon configurations, flow routing and potential outlet options)
ii) Existing Outlets (Cherry and Lakeshore)		2.88	2.88	2.84	2.84	2.84	N/A	
iv) Common Outlet Location		2.55	2.55	2.55	2.55	2.55	2.55	
Peak extraneous flow allowance	L/ha.s	0.15	0.15	0.15	0.15	0.15	0.15	Range according to MOE Guidelines for Design, page A-2 is 0.1 to 0.28
Average sewage flow								
Residential Population	L/s	11.6	13.7	9.6	13.2	4.8	52.9	
Non Retail Employment Population	L/s	2.3	2.8	0.9	1.3	0.5	7.8	
Commercial, retail	L/s	0.4	0.4	0.3	0.5	0.2	1.8	
Subtotal	L/s	14.3	17.0	10.8	14.9	5.5	62.4	
Peak Residential sewage flows								ADJUSTED PEAK FLOW (These peak flow rates have been calculated using adjusted peaking flow rates to 85% of the population peak factor as suggested by Frikkie Becker. Please Refer to Fig 4-2-2 Wastewater Diurnal Curve for illustrative purposes. The peak flow rate for the "80% Residential and 20% Commercial" case is approximately 85% of the 100% Residential case. FOR PLANNING PURPOSES ONLY)
Diurnal Curve Peak Factor =	0.85							
Scenarios								
i)Individual Neighbourhood	L/s	38.9	45.2	30.2	39.9	16.5	N/A	
ii) Existing Outlets (Cherry and Lakeshore)		34.9	41.4	26.1	35.9	13.2	N/A	
	L/s							
iv) Common Outlet Location	L/s	30.9	36.8	23.5	32.3	11.9	135.3	
Peak extraneous flow allowance	L/s	1.6	1.3	2.5	3.2	0.8	9.4	
Peak sewage flow Scenarios								
i)Individual Neighbourhood	L/s	**40.5**	**46.5**	**32.7**	**43.1**	**17.3**	**N/A**	
ii) Existing Outlets (Cherry and Lakeshore)	L/s	**36.4**	**42.8**	**28.6**	**39.1**	**14.0**	**N/A**	
iv) Common Outlet Location	L/s	**32.5**	**38.1**	**25.9**	**35.5**	**12.7**	**144.6**	

APPENDIX E1: LAKESHORE BLVD/LOGAN AVE CAPACITY ASSESSMENT - FLOWS SOUTH OF THE KEATING CHANNEL

TSH
engineers
architects
planners

Project: **Lower Don Lands**
Client: **MVVA**
Project # : **42-97007**
Prepared By: **Michael Collins**
Date: **17-Sep-08**

Residential
q = average daily per capita flow = 182 L / cap / day
I = unit of peak extraneous flow = 0.15 L / ha / sec
M = peaking factor = 1+(14 / (4 + P^.5)) where P is the population in thousands
Qp = P*q*M / 86.4 L/sec
Peak Adjustment Factor = 0.85

Existing Industrial (East of LDL)
q = MOE typical daily flow = 35 m^3/ha/d
I = unit of peak extraneous flow = 0.23 L / ha / s

Employment/Commercial
q = commercial/tourist flow rate = 28 m^3 / ha / d
p = employment area flow rate = 56 L/c/d

PROPOSED FLOW SCENARIO No. 1 **APPENDIX E 1**
DESCRIPTION:
Development Area South of Keating Channel Contribute Flow to Lakeshore Blvd: Rehabilitate/Use existing sanitary sewer - Light Industrial adjacent lands

Location: Street/Description	From	To	Residential / Commercial / Industrial: Residential Population	Total Comm Area (ha)	Employment Population	Industrial Area (ha): Increment	Industrial Area (ha): Total	Residential Peaking Factor	Industrial Peaking Factor	Flows (L/s): Pop	Comm/ Employ	Industrial	Infilt	Design	Existing Pipe Configuration: Mannings n	Upstream Inv. (m)	Downstream Inv. (m)	Length (m)	Diameter (m)	Slope	Capacity (L/s)	Full Flow Velocity (m/s)	Actual Velocity (m/s)
Lower Don Lands - South of the Keating Channel		MH37	**13076**	**3.0875**	**4079**	0	0	2.41	0.00	66.5	8.791998	0.00	6.5	**81.7**									
Lakeshore Blvd	MH37	MH36	13076	3.0875	4079	0	0	2.41	0.00	66.5	8.791998	0.00	6.5	**81.7**	0.013	73.783	73.771	13.40	0.600	0.09%	**183.7**	0.65	0.620143806
(MH#s from K-61)	MH36	MH35	13076	3.0875	4079	0	0	2.41	0.00	66.5	8.791998	0.00	6.5	**81.7**	0.013	73.771	73.688	81.7	0.600	0.10%	**195.7**	0.69	0.660726077
	MH35	MH34	13076	3.0875	4079	0	0	2.41	0.00	66.5	8.791998	0.00	6.5	**81.7**	0.013	73.688	73.603	82.9	0.600	0.10%	**196.6**	0.70	0.627385992
	MH34	MH33	13076	3.0875	4079	0	0	2.41	0.00	66.5	8.791998	0.00	6.5	**81.7**	0.013	73.603	73.521	83.50	0.600	0.10%	**192.4**	0.68	0.649598641
Saulter St.	MH33	MH32	13076	3.0875	4079	**30.4**	30.4	2.41	3.40	66.5	8.791998	41.87	13.5	**130.6**	0.013	73.445	73.371	93	0.675	0.08%	**237.1**	0.66	0.662549295
	MH32	MH31	13076	3.0875	4079	0	30.4	2.41	3.40	66.5	8.791998	41.87	13.5	**130.6**	0.013	73.371	73.240	111.3	0.675	0.12%	**288.3**	0.81	0.76897322
Bouchette St.	MH31	MH30A	13076	3.0875	4079	**7.2**	37.6	2.41	3.30	66.5	8.791998	50.26	15.1	**140.6**	0.013	73.240	73.039	105.80	0.675	0.19%	**366.5**	1.02	0.923944608
	MH30A	MH30	13076	3.0875	4079	0	37.6	2.41	3.30	66.5	8.791998	50.26	15.1	**140.6**	0.013	73.039	72.994	14.00	0.675	0.32%	**476.7**	1.33	1.12287897
	MH30	MH6	13076	3.0875	4079	0	37.6	2.41	3.30	66.5	8.791998	50.26	15.1	**140.6**	0.013	72.994	72.896	91.1	0.675	0.11%	**275.6**	0.77	0.770272443
Logan Ave.	MH6	MH5	13076	3.0875	4079	**42.1**	79.7	2.41	2.70	66.5	8.791998	87.17	24.8	**187.2**	0.013	72.783	72.591	37.5	0.675	0.51%	**601.5**	1.68	1.416929111
(MH#s from L-123)	MH5	MH4	13076	3.0875	4079	0	79.7	2.41	2.70	66.5	8.791998	87.17	24.8	**187.2**	0.013	72.591	72.841	107.3	0.675	-0.23%	**N/A**	N/A	#NUM!
	MH4	MH3	13076	3.0875	4079	0	79.7	2.41	2.70	66.5	8.791998	87.17	24.8	**187.2**	0.013	72.841	72.619	104.5	0.675	0.21%	**385.7**	1.08	1.028664788
	MH3	MH2	13076	3.0875	4079	0	79.7	2.41	2.70	66.5	8.791998	87.17	24.8	**187.2**	0.013	72.619	72.57	101.8	0.675	0.16%	**333.2**	0.93	0.931262119
	MH2	MH1	13076	3.0875	4079	0	79.7	2.41	2.70	66.5	8.791998	87.17	24.8	**187.2**	0.013	72.57	72.439	107.6	0.675	0.40%	**531.4**	1.48	1.339574585
	MH1	LLI	13076	3.0875	4079	1	80.7	2.41	3.70	66.5	8.791998	88.27	25.0	**188.5**	0.013	72.439	72.41	4.5	0.675	0.64%	**674.8**	1.89	1.589665996

*All MH #s taken from as-built drawings L-123 and K-61 supplied by the City of Toronto

APPENDIX E2 – LAKESHORE BLVD/LOGAN AVE CAPACITY ASSESSMENT: ENTIRE LOWER DON LANDS FLOWS

engineers
architects
planners

Project: Lower Don Lands
Client: MVVA
Project # : 42-97007
Prepared By: Michael Collins
Date: 17-Sep-08

Residential
q = average daily per capita flow = 182 L / cap / day
I = unit of peak extraneous flow = 0.15 L / ha / sec
M = peaking factor = 1+(14 / (4 + P^.5)) where P is the population in thousands
Qp = P*q*M / 86.4 L/sec Peak Adjustment Factor = 0.85

Existing Industrial (East of LDL)
q = MOE typical daily flow = 35 m^3/ha/d
I = unit of peak extraneous flow = 0.23 L / ha / s

Employment/Commercial
q = commercial/tourist flow rate = 28 m^3 / ha / d
p = employment area flow rate = 56 L/c/d

PROPOSED FLOW SCENARIO No. 2 APPENDIX E 2
DESCRIPTION:
Entire Development Area Contribute Flow to Lakeshore Blvd: Rehabilitate/Use existing sanitary sewer - Light Industrial adjacent lands

Location			Residential / Commercial / Industrial					Residential	Industrial	Flows (L/s)					Existing Pipe Configuration								
Street/Description	From	To	Residential Population	Total Comm Area (ha)	Employment Population	Industrial Area (ha) Increment	Industrial Area (ha) Total	Peaking Factor	Peaking Factor	Pop	Comm/ Employ	Industrial	Infilt	Design	Mannings n	Upstream Inv. (m)	Downstream Inv. (m)	Length (m)	Diameter (m)	Slope	Capacity (L/s)	Full Flow Velocity (m/s)	Actual Velocity (m/s)
Lower Don Lands - South of the Keating Channel		MH37	**25000**	**5.5**	**12000**	0	0	2.17	0.00	114.4	20.76685	0.00	6.5	**141.6**									
Lakeshore Blvd	MH37	MH36	25000	5.5	12000	0	0	2.17	0.00	114.4	20.76685	0.00	6.5	**141.6**	0.013	73.783	73.771	13.40	0.600	0.09%	**183.7**	0.65	0.714210779
(MH#s from K-61)	MH36	MH35	25000	5.5	12000	0	0	2.17	0.00	114.4	20.76685	0.00	6.5	**141.6**	0.013	73.771	73.688	81.7	0.600	0.10%	**195.7**	0.69	0.742345773
	MH35	MH34	25000	5.5	12000	0	0	2.17	0.00	114.4	20.76685	0.00	6.5	**141.6**	0.013	73.688	73.603	82.9	0.600	0.10%	**196.6**	0.70	0.745764114
	MH34	MH33	25000	5.5	12000	0	0	2.17	0.00	114.4	20.76685	0.00	6.5	**141.6**	0.013	73.603	73.521	83.50	0.600	0.10%	**192.4**	0.68	0.729843761
Saulter St.	MH33	MH32	25000	5.5	12000	**30.4**	30.4	2.17	3.40	114.4	20.76685	41.87	13.5	**190.5**	0.013	73.445	73.371	93	0.675	0.08%	**237.1**	0.66	0.728260961
	MH32	MH31	25000	5.5	12000	0	30.4	2.17	3.40	114.4	20.76685	41.87	13.5	**190.5**	0.013	73.371	73.240	111.3	0.675	0.12%	**288.3**	0.81	0.837409093
Bouchette St.	MH31	MH30A	25000	5.5	12000	**7.2**	37.6	2.17	3.30	114.4	20.76685	50.26	15.1	**200.6**	0.013	73.240	73.039	105.80	0.675	0.19%	**366.5**	1.02	1.024219319
	MH30A	MH30	25000	5.5	12000	0	37.6	2.17	3.30	114.4	20.76685	50.26	15.1	**200.6**	0.013	73.039	72.994	14.00	0.675	0.32%	**476.7**	1.33	1.271277861
	MH30	MH6	25000	5.5	12000	0	37.6	2.17	3.30	114.4	20.76685	50.26	15.1	**200.6**	0.013	72.994	72.896	91.1	0.675	0.11%	**275.6**	0.77	0.825969473
Logan Ave.	MH6	MH5	25000	5.5	12000	**42.1**	79.7	2.17	2.70	114.4	20.76685	87.17	24.8	**247.1**	0.013	72.783	72.591	37.5	0.675	0.51%	**601.5**	1.68	1.516260383
(MH#s from L-123)	MH5	MH4	25000	5.5	12000	0	79.7	2.17	2.70	114.4	20.76685	87.17	24.8	**247.1**	0.013	72.591	72.841	107.3	0.675	-0.23%	**N/A**	N/A	#NUM!
	MH4	MH3	25000	5.5	12000	0	79.7	2.17	2.70	114.4	20.76685	87.17	24.8	**247.1**	0.013	72.841	72.619	104.5	0.675	0.21%	**385.7**	1.08	1.120212283
	MH3	MH2	25000	5.5	12000	0	79.7	2.17	2.70	114.4	20.76685	87.17	24.8	**247.1**	0.013	72.619	72.57	101.8	0.675	0.16%	**333.2**	0.93	0.998600026
	MH2	MH1	25000	5.5	12000	0	79.7	2.17	2.70	114.4	20.76685	87.17	24.8	**247.1**	0.013	72.57	72.439	107.6	0.675	0.40%	**531.4**	1.48	1.417257522
	MH1	LLI	25000	5.5	12000	1	80.7	2.17	3.70	114.4	20.76685	88.27	25.0	**248.5**	0.013	72.439	72.41	4.5	0.675	0.64%	**674.8**	1.89	1.701106677

*All MH #s taken from as-built drawings L-123 and K-61 supplied by the City of Toronto

APPENDIX F1: INVERTED SIPHON CALCULATIONS - SHIP CHANNEL WEST CROSSING THE FLOODWAY

TSH engineers architects planners

Process Calculations

Proposed inverted syphons - Prelimary calculations
Scenario 1 Ai: Ship Channel West
Flow input at Don Roadway at Ship Channel

Client:	**MVVA**	Prepared:	**FW BECKER**
Project:	**Lower Don Lands Development**	Checked:	
TSH Project No:	**42-97007**	Date:	**August 21, 2007**

			Single Barrel			Double, per line:	
Design Criteria			**Config 1**	**Config 2**	**Config 3**	**Config 1**	**Config 2**
Future Sewer Design Capacity	Qmax	L/s	43.1	43.1	43.1	21.55	21.55
	Qmin	L/s	10.775	10.775	10.775	5.3875	5.3875
Syphon Information							
Length	L	m	350	350	350	350	350
Outlet Invert		m	74.40	74.4	74.4	74.40	74.40
Inlet Invert		m	75.64	**75.13**	74.78	77.03	75.25
Pipe diamater and hydraulics							
Pipe Diameter - Nominal		mm	**300**	**350**	**400**	**200**	**250**
Pipe Diameter - ID[a,c]	D	mm	**261**	**287**	**328**	**177**	**220**
C-Factor[b,c]	C		115	120	120	105	110
Secondary loss Coefficients	K_{tot}		2	2	2	2	2
Required Head	h	m	**1.24**	**0.73**	**0.38**	**2.63**	**0.85**
Flow rate at max flow	Vmax	m/s	0.81	0.67	0.51	0.88	0.57
Check 2: Achieve Vmax ? 0.6[c]			OK	OK	Low	OK	Low
Flow rate at min flow	Vmin	m/s	0.20	0.17	0.13	0.22	0.14

a. HDPE DR11 for HDD application

NB (inches)	ID (inches)	NB (mm)	ID (mm)
4	3.633	100	92
6	5.349	150	136
8	6.963	200	177
10	8.679	250	220
12	10.293	300	261
14	11.301	350	287
16	12.915	400	328
18	14.532	450	369
20	16.146	500	410
22	17.760	550	451

b. C-values from MOE Design Guidelines Water Distr 2.4 (p10)
..-8": 100
8"-12": 110
12"-24": 120

c. Adjust **D** and **C** manually to achieve desired outcome

APPENDIX F2 – INVERTED SIPHON CALCULATIONS: SOUTH KEATING CHANNEL CROSSING THE DON RIVER

TSH engineers architects planners

Process Calculations

Proposed inverted syphons - Prelimary calculations
Scenario 1 Aii: South Keating Channel
Flow input at Don Roadway at Villiers St.

Client:	MVVA	Prepared:	FW BECKER
Project:	Lower Don Lands Development	Checked:	
TSH Project No:	42-97007	Date:	August 21, 2007

			Single Barrel			Double, per line:	
Design Criteria			Config 1	Config 2	Config 3	Config 1	Config 2
Future Sewer Design Capacity	Qmax	L/s	32.7	32.7	32.7	16.35	16.35
	Qmin	L/s	8.175	8.175	8.175	4.0875	4.0875
Syphon Information							
Length	L	m	200	200	200	200	200
Outlet Invert		m	73.83	73.83	73.83	73.83	73.83
Inlet Invert		m	74.91	**74.27**	74.09	74.75	74.13
Pipe diamater and hydraulics							
Pipe Diameter - Nominal		mm	**250**	**300**	**350**	**200**	**250**
Pipe Diameter - ID[a,c]	D	mm	**220**	**261**	**287**	**177**	**220**
C-Factor[b,c]	C		110	115	120	105	110
Secondary loss Coefficients	K_{tot}		2	2	2	2	2
Required Head	h	m	**1.08**	**0.44**	**0.26**	**0.92**	**0.30**
Flow rate at max flow	Vmax	m/s	0.86	0.61	0.51	0.66	0.43
Check 2: Achieve Vmax ? 0.6			OK	OK	Low	OK	Low
Flow rate at min flow	Vmin	m/s	0.22	0.15	0.13	0.17	0.11

a. HDPE DR11 for HDD application

NB (inches)	ID (inches)	NB (mm)	ID (mm)
4	3.633	100	92
6	5.349	150	136
8	6.963	200	177
10	8.679	250	220
12	10.293	300	261
14	11.301	350	287
16	12.915	400	328
18	14.532	450	369
20	16.146	500	410
22	17.760	550	451

b. C-values from MOE Design Guidelines Water Distr 2.4 (p10)

..-8": 100
8"-12": 110
12"-24": 120

c. Adjust **D** and **C** manually to achieve desired outcome

TSH engineers architects planners

Memorandum

To:	MVVA: Elizabeth Silver	**Date:**	September 17, 2008
Cc:			
From:	TSH: Peter Middaugh, P.Eng	**TSH Project No.:**	42-97007
Re:	Lower Don Lands – Technical Submission No. 16: Municipal Servicing Plan – Water Supply		

1 Introduction

This memorandum is a "work in progress" technical document in which the existing water servicing of the Lower Don Lands (LDL) and development alternatives for this area are presented.

2 Existing development and water servicing

The existing LDL development is largely industrial and the layout and lands are shown in overview in **Appendix A**. Gross land areas are approximately as follows:

North of Keating Channel:	33 ha
South of Keating Channel:	76 ha
Total area:	109 ha

A layout of the backbone of the existing water servicing is shown in **Appendix B**. A large part of the existing water supply system had been constructed about 80 years ago is nearing the end of its lifespan.

Existing water consumption figures had been requested from the City of Toronto and the response is being awaited. An interim assessment of the existing water demand had been done by applying the lower guideline value of MOE Guidelines for Design to the stated land areas. This unit value is 35 m^3/ha.d. The resulting water demands, in rounded figures, are:

North of Keating Channel:	1,200 m^3/d
South of Keating Channel:	2,700 m^3/d
Total LDL Area:	3,900 m^3/d

3 Proposed development and occupancy levels

Future residential and non-residential developments are described in *other project documentation*. The development concept is shown in **Appendix C**.

The expected residential commercial developments and estimated population when the LDL is fully redeveloped are summarised in **Table 1** and **Table 2**. The sources of this data are provided in the Sanitary Servicing Report.

Assumed irrigation areas are shown in **Table 3**. The values shown in **Table 3** are artificial values and are to be updated when more detailed information is available.

Table 1: Expected commercial/service industry developments

Description	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East	Total/All
Commercial, retail: floor area (m^2)	11,022	13,103	10,710	14,744	5,421	55,000
Commercial, non-retail: floor area (m^2)	90,459	107,541	35,382	48,710	17,908	300,000
Commercial, total floor area (m^2)	101,481	120,645	46,092	63,454	23,328	355,000

Table 2: Expected residential population

Description	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East	Total/All
Residential population	5,489	6,526	4,536	6,244	2,296	25,091
Non retail employment *	3,618	4,302	1,415	1,948	716	12,000
Retail employment *	441	524	428	590	217	2,200

* Assuming 25 square meter of floor space per employee (MOE Guidelines for Design)

Table 3: Assumed irrigation areas

Description	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East	Total/All
Total irrigation area* (ha)	3.6	3.2	5.5	6.9	1.5	20.7
Total area under simultaneous irrigation (ha)	1.2	1.1	1.8	2.3	0.5	6.9

* Assumed areas - to be revised when the extent of parks and other areas to be irrigated are determined

4 Water servicing for proposed developments

Four development alternatives, plus a number of sub-alternatives have been selected for presentation. These alternatives are discussed below.

4.1 Alternative 1: Do Nothing

The existing water servicing infrastructure is largely at the end of its useful service life and does not conform to the proposed LDL redevelopment. The "Do Nothing" alternative is therefore not further considered.

4.2 Alternative 2: Conventional servicing

Alternative 2 entails the reconstruction and rehabilitation of existing services where feasible, construction of new infrastructure in conformance with the new LDL layout and improvement of the water supply to the lands south of Shipping Channel.

This alternative entails conventional servicing for a situation where water demand estimates are based on MOE guidelines.

4.3 Alternative 3: Conventional servicing and water efficiency measures

Alternative 3 is the same as **Alternative 2**, but with reduced water demands as a result of sustained application of water efficiency measures such as:

- Metering practices, such as metering of water at individual household/flat level
- Encouraging/requiring the use of high efficiency water fixtures and appliances
- Landscaping with plants with low water needs
- Programs to promote water consciousness and public support/education for water conservation measures

4.4 Alternative 4: Addition of non-potable water supply systems

Alternative 4 is the same as **Alternative 3**, but with the addition of non-potable water supply systems that are aimed at reducing the potable water demand and thereby:

(a) Reducing the energy and/or treatment input requirements for water supply; and
(b) Potentially circumventing, or delaying upgrading requirements to the city's water supply infrastructure.

A variety of opportunities to implement non-potable water supply systems are summarised in **Appendix D**. Specific combinations of non-potable sources and applications that are considered as particularly applicable to the LDL development are singled out below as **Alternatives 4A**, **4B** and **4C**.

4.4.1 Alternative 4A – Public Operated Non-Potable Water Supply System

An opportunity for this project would be to use lake water as a non-potable water source for the City to irrigate public parks, sport fields and street trees in streets, especially those located in proximity to the lake. Other potential uses for this non-potable water are toilet flushing water for public/private washrooms, fire fighting supplementation and emergency wetland supplementation.
Note: Effects of raw water quality to be added to the evaluation…

Other potential sources for non-potable water are harvested rainwater and grey water.

Rainwater collected from rooftops present opportunities of supplementing wetlands, water trees and shrubs in street allowances and supplying toilet flushing cisterns with little or no additional energy input.

At the LDL Lake Ontario is considered a better source for non-potable water than grey water. Grey water would require a higher level of treatment intervention and potentially poses a higher health risk. The risks and benefits of grey water reuse as a non-potable water source needs to be further examined. City input on this issue is requested.

4.4.2 Alternative 4B – Private Operated Non-Potable Water Supply System

The development blocks with frontage on the waterfront could use lake water as a non-potable water source to irrigate landscape or provide secondary source of non-potable water for toilet flushing.
Development blocks not fronting onto the parkland along the perimeter of the river could collect roof water runoff and store such water for the purpose of offsetting potable water use for toilet flushing, or this water could be used for watering of trees and shrubs in the street allowances.

As noted in Section 4.4.1 the risks and benefits of grey water reuse needs to be further explored.

4.4.3 *Alternative 4C – Public and Private Operated Non-Potable Water Supply Systems*

Alternative 4C represents the opportunity of combining non-potable water solutions for both public and privately operated systems. Thereby:

- The Local Authority provides a non-potable water distribution system using storm water / lake water obtained from a submerged storm sewer system. The water may be used for irrigation, public toilet flushing, fire fighting supplementation and emergency wetland supplementation. It is also made available to private developments for irrigation and toilet flushing; and
- Private entities provide non-potable water for toilet flushing in their buildings, using roof collected rainwater, lake water from the public system and potentially reused grey water.

5 Future water requirements

Future water requirements have been estimated by using proposed development information and typical norms for water demands in the various development categories. The input values and calculation results are presented below.

5.1 Unit water consumption values used to estimate total water requirements

Unit water demands and input values used to estimate the total water demands for the proposed developments are presented in Tables 4 to 7 below.

Table 4: Residential and commercial unit water demands

Water demand category	Unit	Alt 2	Alt 3	Alt 4A	Alt 4B	Alt 4C
Residential Population	L/c.d	260	220	220	175	175
Non Retail Employment Population	L/c.d	80	60	60	35	35
Day visitors (RE Building Code)	L/c.d	20	20	20	5	5
Commercial, retail (RE MOE guide p5)	$L/m^2.d$	4	4	4	3.5	3.5

[Summarised description of the Water Servicing Alternatives (for purposes of assessing water demands) :

Alt 2 Conventional servicing.

Alt 3 = Alt 2 plus sustained water efficiency measures such as metering at individual household level, enforcing the use of high efficiency fixtures / appliances, low water landscaping and water conservation consciousness / public support programs

Alt 4A = Alt 3 plus public-owned non-potable water supplies for irrigation (and also supplying non-potable water to private gardens)

Alt 4B = Alt 3 plus privately owned non-potable water supplies for toilet flushing (and also public systems for flushing of public toilets)

Alt 4C = Alt 3 plus Public & Private non-potable water supplies irrigation and for toilet flushing]

Table 5: Per capita water demand for toilet flushing

Residential Population	L/c.d	45
Non Retail Employment Population	L/c.d	45
Day visitors	L/c.d	15
Commercial, retail	$L/m^2.d$	0.5

Table 6: Unit irrigation water demand and application rate

Annual Unit Irrigation Requirement	$m^3/ha.a$	1500
Summertime Unit Irrigation Requirement	$m^3/ha.d$	42
Irrigation rate	mm/h	5

Table 7: Input values for peak flow factors and initial fire flow assessment

Description	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East	Total/All
Base population	5,489	6,526	4,536	6,244	2,296	25,091
Peaking factor - Max Day *	2	2	2	2	2.25	1.8
Hourly peak factor*	3	3	3	3	3.38	2.7
Fire flow allowance to MOE Guidelines, App N, p N-3 (L/s)	150	160	140	160	100	310

* MOE guideline, Appendix L

5.2 Estimated total water demand

The calculated water demands for the development areas for each of the water servicing alternatives are summarised in Tables 8 and 9.

Table 8: Average daily potable water demand

Description	Potable Water Demand (m^3/d)						Non-Potable Water Demand (m^3/d)	Total Water Demand (m^3/d)
	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East	All areas		
Alt 2	1,810	2,140	1,410	1,930	700	7,990	0	7,990
Alt 3	1,520	1,790	1,200	1,650	590	6,750	0	6,750
Alt 4A	1,470	1,750	1,130	1,550	570	6,460	290	6,750
Alt 4B	1,180	1,380	960	1,310	470	5,290	1,460	6,750
Alt 4C	1,130	1,340	880	1,210	450	5,000	1,750	6,750

Table 9: Peak flow rates for the potable water system

Description	Peak flow rates for the potable water system (L/s)					
	East Harbour	North Keating	South Keating	ShipCh. West	ShipCh. East	All areas
Alt 2	207	223	196	234	125	566
Alt 3	201	215	191	228	122	540
Alt 4C with fire flow	176	191	160	188	112	414
Alt 4C without fire flow	68	81	54	74	35	246

The estimated future total water demand represents a 75% to 100% increase over the estimated existing water demand in the LDL. *(Note: this statement is to be updated when more accurate existing water demand information becomes available).*

6 Resource requirements by water supply alternatives

6.1 *Comparison of water requirements*

The water requirements in the LDL as a function of the water servicing alternatives are summarised in **Figure 1**.

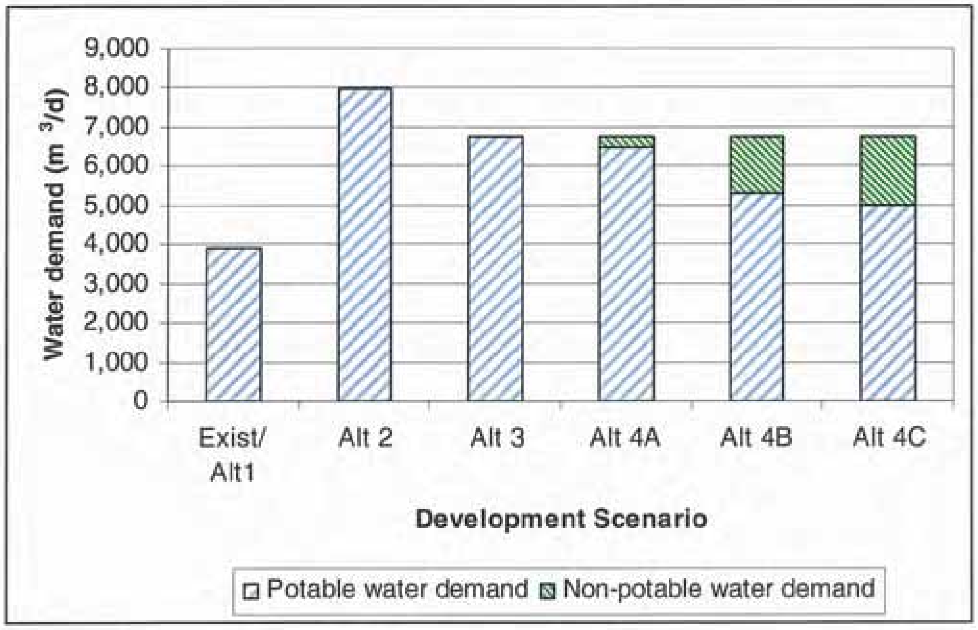


Figure 1: Water requirements in the LDL*

***Note**: The total water demand under the scenario "Exist/Alt1" is the lowest, but this scenario serves a lower occupation level. For the development alternatives, compare only Alternatives 2 to 4.

6.2 *Comparison of energy requirements*

In this section the energy required to produce and distribute water for each of the alternatives is estimated, and a comparison of alternatives is made on this basis. The energy requirements were calculated using a theoretical approach and is subject to the various assumptions given in **Table 10** below.

Table 10: Input data and assumptions for energy requirement calculations

Description	Values	Source/Remarks
Pressure range in water distribution networks of Toronto	Minimum: 276 kPa Maximum: 793 kPa	From: City of Toronto documentation (from Internet)
Energy required to abstract lake water and produce potable water	Average: 80 kPa	Artificial value - should be updated when the actual data is available
Energy required to abstract lake water and produce non-potable water for outdoor use	Typical: 60 kPa	Assumed typical value
Energy required to abstract lake water and produce non-potable water for indoor use	Typical: 70 kPa	Assumed typical value
Energy requirement for non-potable water distribution system – outdoor use	Typical: 250 kPa	Assumed typical value
Average boosting energy requirement for non-potable water for toilet flushing	Typical: 150 kPa	Assumed value
Average efficiency at which energy is used/provided	68%	

Results of calculation

The energy required to supply water as per the various development alternatives, expressed in MWh/a, is summarised in **Figure 2**.

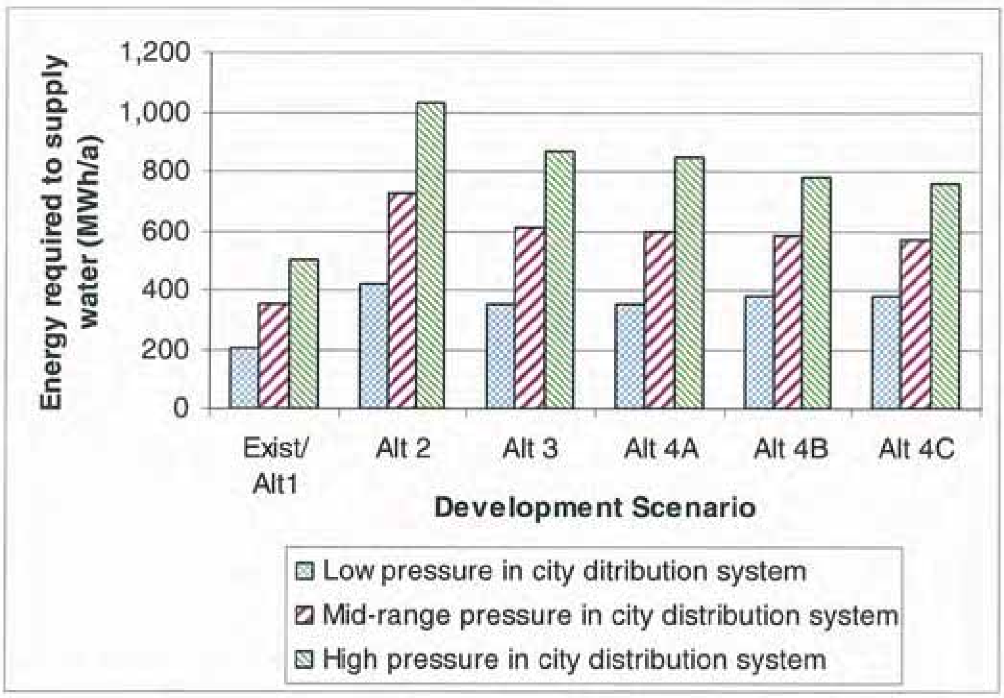


Figure 2: Comparison of energy requirements for supply of water*

***Note**: The total energy requirements for water supply under the scenario "Exist/Alt1" are the lowest, but this scenario serves a lower development level. For the development alternatives, compare only Alternatives 2 to 4.

6.3 Other resources

Introductory remarks: Alternatives 4A, 4B and 4C will require less water treatment resources/materials than Alternatives 1 to 3. More in-depth research is required in order to quantify the extent of this potential saving. Some information in this regard is as follows:

In 2004, the water production cost of the City of Toronto amounted to 12c per cubic metre of water produced (12c/m^3). *Source: Toronto Water Annual Report 2004 (as found on Internet).*
If the non-potable source requires only halve of this production input, the total cost saving for the LDL (as a measure of the saving on total resource requirements) amounts to about $ 160,000 per annum.

... further evaluations: to follow ...

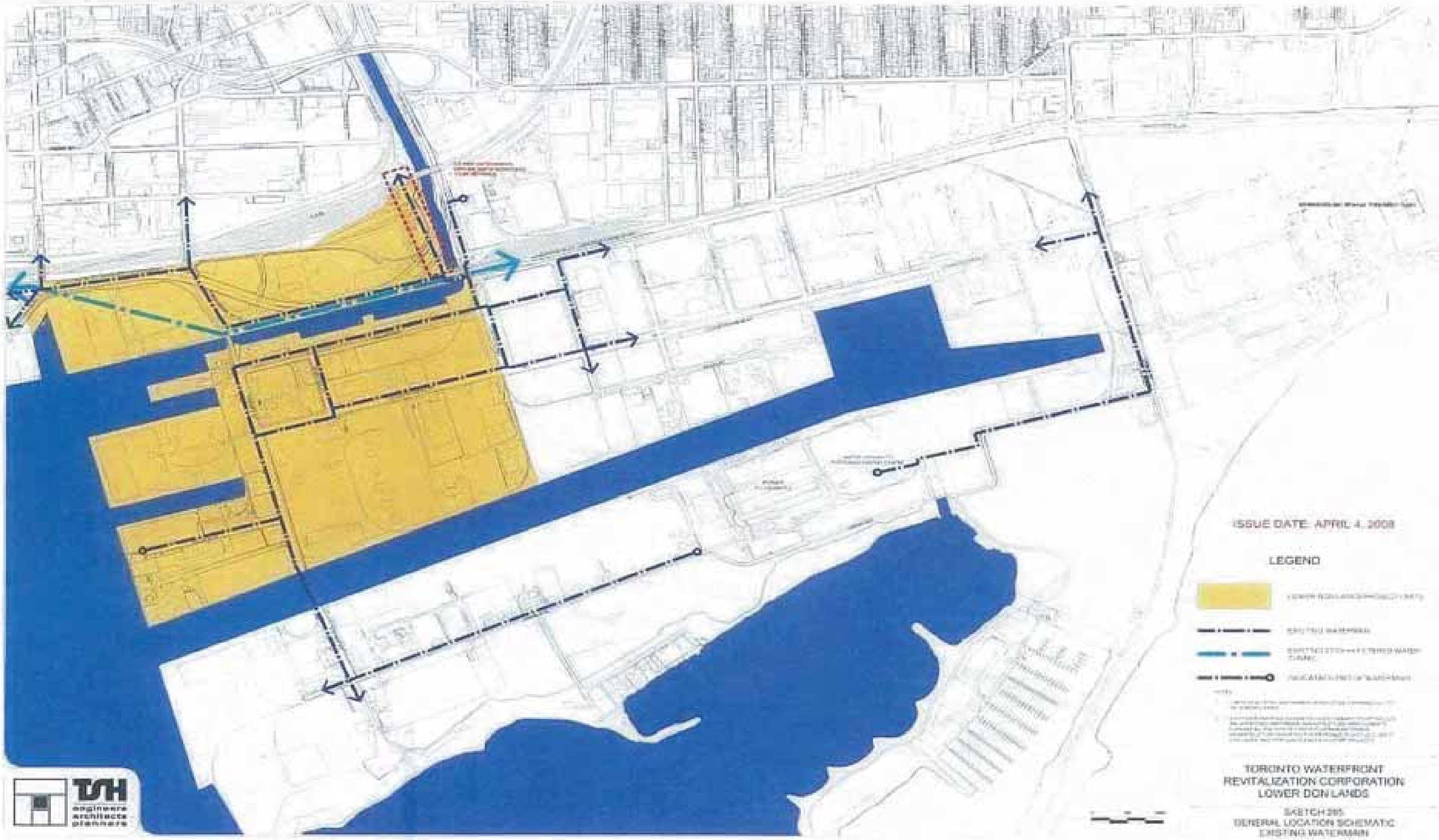
7 Bulk watermains

A conceptual layout of the proposed bulk watermains and connections to the nearby City of Toronto watermains are shown in **Appendix E**.

Link "C" in this figure is shown as potentially not required. The need and timing for the provision of this link must be determined by hydraulic modelling. It is worth noting that the bulk water pipelines for the LDL that are needed to carry total flows may be larger than the existing lines to which they must connect. In such instance the total flows can be provided by making more connections of smaller diameter and Link "C" may then indeed be required by the time that full build-out is achieved, or earlier.

APPENDIX A: EXISTING LAND USE

APPENDIX B: OVERVIEW OF EXISTING WATER SERVICING



APPENDIX C: PROPOSED REDEVELOPMENT OF THE LOWER DON LANDS

APPENDIX D: OPTIONAL SOURCES FOR AND APPLICATIONS OF NON-POTABLE WATER SYSTEMS

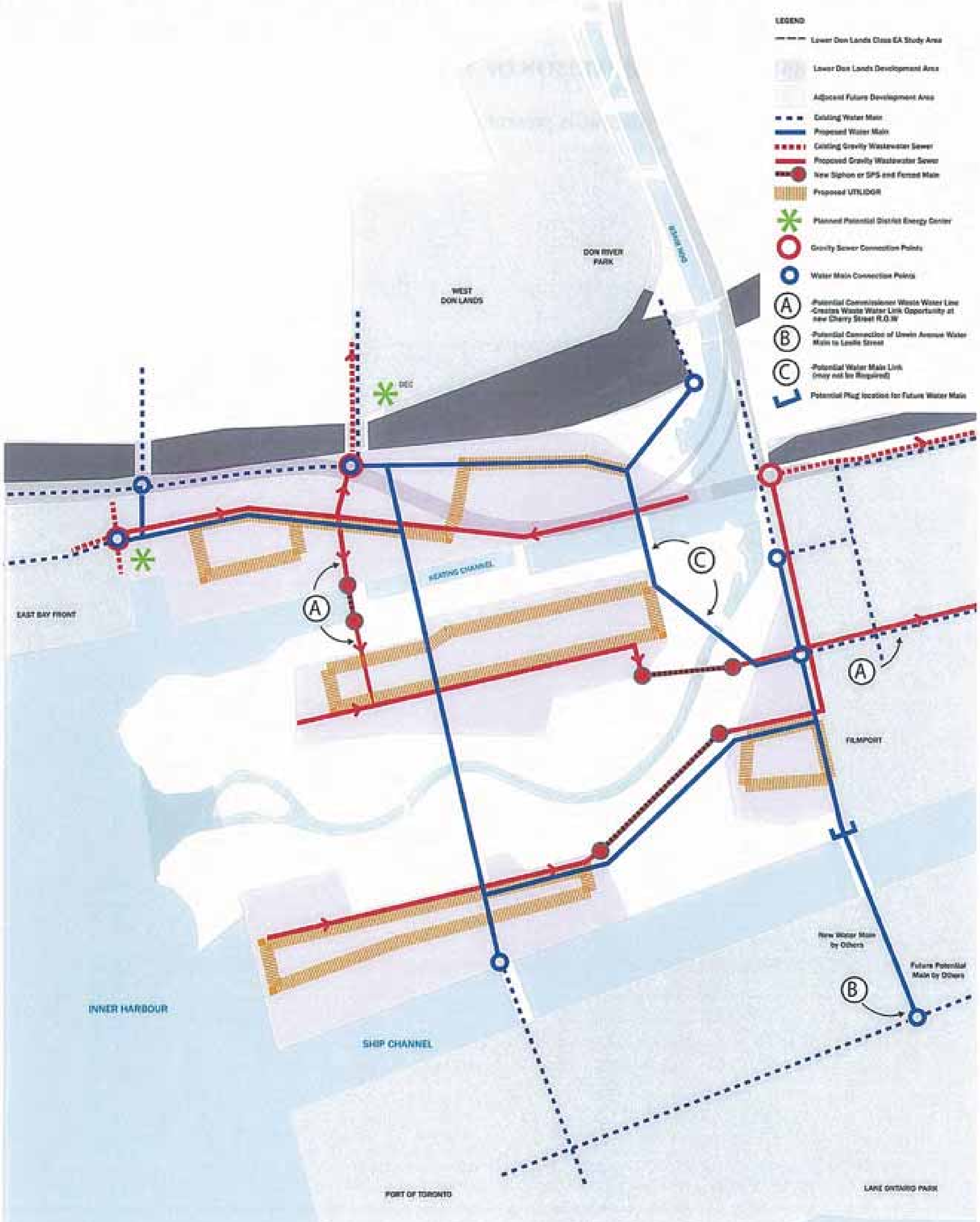
Non-potable water Source/Application	Lake water	Storm water / Lake water	Harvested rainwater	Recycled grey water	WPCP Effluent on "Eco island"
Public water uses					
Irrigation: public parks, trees, sport grounds	Pump from lake; Drip / flood irrigation	Pump from duct; Drip / flood irrigation			Treat and pump
Public washrooms: Toilet flushing	Pump from lake; Treat; Pressurize	Pump from duct; Treat; Pressurize		Treat, Balancing Storage, Pressurize	
Wetland supplementation	Pump from lake; Release in wetland	Pump from duct; Release in wetland	Gravity flow from roofs of buildings on wetland front		Treat and release / pump
Tree watering in streets ROW			Gravity flow from roofs not on wetland front		
All of above and fire water for entire LDL	Pump from lake; Treat; Store; Distribute	Pump from duct; Treat; Store; Distribute			
Residential buildings[1] at waterfront / storm duct					
Gardening	Pump from lake; Treat; Drip / flood irrigation	Pump from duct; Treat; Drip / flood irrigation			
Toilet flushing	Pump from lake; Treat; Pressurize	Pump from duct; Treat; Pressurize		Treat, Balancing Storage, Pressurize	
Supplementary Fire Water System	Pump from lake; no treatment - backup only	Pump from duct; no treatment - backup only			
Residential buildings[1] not at waterfront / storm duct					
Gardening					
Toilet flushing			Treat; Balancing Storage, Pressurize	Treat, Balancing Storage, Pressurize	

1. Not at the individual household scale, but corporately for the building complex

Most suitable for irrigation and wetland supplementation
Suitable for provision of toilet flushing water, especially when the availability of potable water becomes restricted
Viable alternatives under particular conditions

Suggested guidelines (AWWA[2] Manual M24) for treatment of water for urban non-potable use: Filtration and disinfection is required. Pre-filtration treatment may also be required to ensure the following: pH = 6 - 9 BOD_5 < 10 mg/L Turbidity < 2 NTU No detectable fecal coli per 100mL 2. American Water Works Association	Precautions against inadvertent cross-connections between the potable and non-potable water systems include the following: Colour-code all installations Post notices Allow only authorised/controlled access to the systems Keep updated record drawings Do periodic inspections in tunnels/maintenance holes Use air-gap separation where supplementing from potable systems

APPENDIX E: BULK WATERMAINS AND CONNECTIONS – CONCEPTUAL LAYOUT



APPENDIX F: SUMMARISED COMPARISON OF ALTERNATIVES

A summarised comparison of the alternatives is presented on the following two 11" x 17" sized sheets.

Evaluation of
Alternative Planning Solutions:
Water Supply

Evaluation Criteria	Alt.1 : Do Nothing	Alt.2 : Conventional servicing [Potable Water Demand : 8000 m^3/d]	Alt.3 : Addition of water efficiency measures [Potable Water Demand: 7000 m^3/d]	Alt.4 : Addition of non-potable water systems [Potable Water Demand is 5000 to 6500 m^3/d; Non-potable Water Demand is 500 to 2000 m^3/d]		
				4A: Public non-potable systems [6500 + 500 m^3/d]	4B: Private non-potable systems [5300 + 1700 m^3/d]	4C: Public & Private non-potable systems [5000 + 2000 m^3/d]
Natural Environment ▪ Don Mouth Naturalization ▪ New Natural Area	- Not compatible with new river realignment through study area - Leaving existing water services in place restricts design and construction of new natural area	+ Compatible with new river realignment through study area. + Minimal impact to new natural area.	+ Compatible with new river realignment through study area. + Minimal impact to new natural area. + Less taxing on resources and environment.	+ Compatible with new river realignment through study area. + Minimal impact to new natural area. + Opportunity of lower cost water to maintain New Natural Area		
						Preferred
Social Environment ▪ Vibrant, mixed use community ▪ Access to water	- Does not support new development in Lower Don Lands study area	+ Supports new development in Lower Don Lands study area + Improves access to water	+ Supports new development in Lower Don Lands study area + Improves access to water and reduces wasteful use	+ Supports new development in Lower Don Lands study area + Improves access to water		
						Preferred
Economic Environment ▪ Economically viable blocks ▪ Cost-effective to build	+ Low initial cost - Limits block sizes and locations to where existing infrastructure is located and does not create new developable areas - Not replacing very old infrastructure that may require replacement in near future	+ Accommodates good block sizes + Compatible with existing infrastructure and creation of new developable areas. + Well developed operations and maintenance systems + Cost-effective to build. + Existing water treatment and bulk supply systems nearby for tie-in	+ Accommodates good block sizes + Compatible with existing infrastructure and creation of new developable areas. - Some operations and maintenance systems need to be developed + Reduces energy and other resources required to treat & distribute water + Reduces burden on Toronto's potable water system and on internal water distribution - Additional cost of efficiency promoting measures, partially offsetting water supply system savings - Additional ongoing maintenance requirements	+ Accommodates good block sizes + Compatible with existing infrastructure and creation of new developable areas. + Reduces energy and other resources required to treat & distribute water + Reduces burden/dependency on Toronto's potable water system and on internal water distribution - Additional water abstraction, elementary treatment and distribution infrastructure required - Additional health issues and operations and maintenance requirements		
					- Some operations and maintenance systems need to be developed.	- Some operations and maintenance systems need to be developed.
			Preferred			

LEGEND:
\+ implies comment supports criteria
\- implies comment does not support criteria
(app 7-a4-memo_water services_17sep08.doc/109446-3ra)

Evaluation Criteria	Alt.1 : Do Nothing	Alt.2 : Conventional servicing [Potable Water Demand : 8000 m³/d]	Alt.3 : Addition of water efficiency measures [Potable Water Demand: 7000 m³/d]	Alt.4 : Addition of non-potable water systems [Potable Water Demand is 5000 to 6500 m³/d; Non-potable Water Demand is 500 to 2000 m³/d] 4A: Public non-potable systems [6500 + 500 m³/d]	4B: Private non-potable systems [5300 + 1700 m³/d]	4C: Public & Private non-potable systems [5000 + 2000 m³/d]
Cultural Environment ▪ Aboriginal people ▪ Heritage structures ▪ Archaeology	+ No impacts to heritage structures + No new impacts to areas with potential for archaeological resources	+ No incremental impact to traditional uses of Aboriginal people - Potential impacts on heritage structures, but can be mitigated - Potential impacts on archaeological resources, but can be mitigated	+ No difference between alternatives re impact to traditional uses. + No impact on heritage structures. + No impact to archaeological resources.	+ No incremental impact to traditional uses of Aboriginal people - Potential impacts on heritage structures by some sub-alternatives, but can be mitigated - Potential impacts on archaeological resources by some sub-alternatives, but can be mitigated		- Potential impacts on heritage structures by some sub-alternatives, but can be mitigated - Potential impacts on archaeological resources by some sub-alternatives, but can be mitigated
	Preferred					
Sustainability ▪ WT Sustainability Framework ▪ City sustainability standards ▪ Impervious surfaces	- Is not consistent with WT's sustainability Framework or City's sustainability standards + No change to impervious surfaces	+ Is consistent with WT's Sustainability Framework and Standards + Negligible creation of impervious surfaces + Provides a renewal opportunity of very old existing infrastructure	+ Is consistent with WT's Sustainability Framework and Standards + No creation of impervious surfaces	+ Is consistent with WT's Sustainability Framework Standards + Negligible creation of impervious surfaces - Relies on water sources of which the quality of water may be restrictive and varying, and the non-potable water would also require some degree of treatment and ongoing quality control		
						Preferred
Land Use and Property ▪ New land uses ▪ Public realm goals ▪ Property	- Limits opportunities for new land use and redevelopment + No impact on current properties - Not compatible with Public Realm – no new capacity	+ It maximizes opportunities for new land use and redevelopment + Is compatible with Public Realm and provides the required new supply capacity + No impact on current property ownership	+ It maximizes opportunities for new land use and redevelopment + Is compatible with Public Realm + No impact on current property ownership	+ No negative impact on new land use and redevelopment + Is compatible with Public Realm + No impact on current property ownership		
		Preferred				
Municipal Services ▪ Support future land uses and densities? ▪ Include sustainable design technology? ▪ Impact existing or planned utilities?	- Does not support future land use and densities - Does not include sustainable design technology + No utility impacts	+ Supports future land use and densities + Include sustainable design technology - Will effect other existing and planned utilities (however, the entire system will be under redevelopment and effects can be managed to ensure compatibility)	+ Supports future land use and densities + Include sustainable design technology + Does not impact existing or planned utilities	+ Supports future land use and densities + Include sustainable design technology - Will effect other existing and planned utilities (however, the entire system will be under redevelopment and effects can be managed to ensure compatibility) - Potential of cross-connection with potable water systems (can be mitigated)		
			Preferred			
SUMMARY						**PREFERRED**

LEGEND:
+ implies comment supports criteria
- implies comment does not support criteria

Appendix 7-A5

Lower Don Lands Vacuum Sewer Considerations

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Toronto Transit Commission

AECOM
300 Water Street, Whitby, ON, Canada L1N 9J2
T 905.668.9363 F 905.668.0221 www.aecom.com

Memorandum

Date:	November 11, 2008
To:	File
From:	FW Becker
Project Number:	42-97007
Subject:	LDL Vacuum Sewage Study

Distribution:

LDL VACUUM SEWER CONSIDERATIONS

1. Introduction

In this memorandum the vacuum sewage alternative for servicing the LDL are outlined. The purpose is to identify elements of the system that must be accounted for in the development planning if this system is found to be the most appropriate for one or more of the proposed LDL neighbourhoods.

2. System Overview

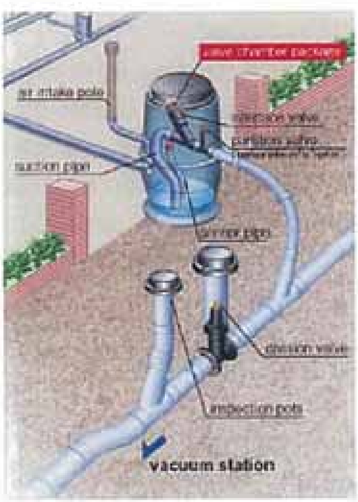
2.1 General description

Wastewater from one or more residences flows by gravity or pumping to a holding tank known as the valve pit or chamber. When the wastewater level reaches a certain level, sensors within the chamber open a vacuum valve that allows the contents to be vacuumed into the network of collection piping. Vacuum piping, such as fusion welded HDPE pipe is laid underground shallowly in the saw tooth profile with typical 0.2 to 0.3% down grade slopes, followed by the upward lifts. Diameters vary, but are up to 300mm in nominal bore. Isolation valves are installed at about 400m intervals for maintenance purposes.

There are no manholes with a vacuum system; instead, access can be obtained at each vacuum valve chamber.

The vacuum or draw within the system is created at a vacuum station. Vacuum stations are contained in small buildings and consist of a storage tank, a system of vacuum pumps and control systems. According to SIVAC [see *http://www.sivacvacuumsewer.com/index02.html*] the collection tank capacity at the vacuum station depends on the application, but is typically in the range of 1.23 to 18 m^3. From the collection tank the sewage is delivered to the main sewer pipeline or to the sewage treatment facilities.

AECOM




vacuum station


colection tank/sewer pump


vacuum pump

Courtesy with respect to pictures on this page: SIVAC

In general, the collectable distance of sewage from the vacuum station is 2 – 4 km. It can be extended to about 5 km if the local topography allows and sewage flows are small.

A video in which the system operation is demonstrated can be viewed on the FLOVAC website at: http://www.flovac.com/index.php?option=com_content&task=view&id=15&Itemid=1

2.2 Vacuum stations

The vacuum station is the heart of the vacuum sewer system and is in many respects similar in design to a conventional wastewater pumping station. These stations are typically two-story concrete and block buildings with approximate footprint of 7.5 m x 9 m. Equipment in the station includes a collection tank, a vacuum reservoir tank, vacuum pumps, wastewater pumps, and pump controls. In addition, an emergency generator is standard equipment, whether it is located within the station or outside the station in an enclosure or is of the portable, truck-mounted variety.
[Reference: http://www.epa.gov/nrmrl/pubs/625191024/625191024ch1.pdf]

2.3 Energy use

The energy needed to induce vacuum flow is provided by vacuum pumps at the vacuum station that run intermittently and maintain the vacuum sewer line in vacuum condition at all times. Air collected from the vacuum sewer line is released to the atmosphere and sewage is collected in the collection tank. The degree of vacuum in the collection tank is typically maintained at −50kPa to −70kPa and the vacuum pipeline is so designed that −25kPa degree of vacuum reaches the end of the vacuum sewer line. The vacuum interface valve only actuates if typically −25kPa suctioning is available [see SIVAC web page at *http://www.sivacvacuumsewer.com/index02.html*]. The valve operates pneumatically in response to the created vacuum and no electricity is needed to open or close the valve.

Flow rates in vacuum pipelines are in the range of 4.5 to 5.5 m/s [see AIRVAC web page at http://www.airvac.com/how_works.htm]. These high flow rates would result in very high friction losses if the system is designed for normal full bore flow. However, the saw tooth profile of the vacuum line and air component therein is used to significantly reduce flow friction losses and to make the system competitive with pumping systems under certain application conditions.

Little (2004) reports that electricity requirements are typically 30 to 40 kWh per person per year.

It is evident that vacuum waste removals systems are driven by generated energy. From an energy conservation point of view they would therefore only be feasible where alternative systems, such as pumping systems would consume comparable amounts of generated energy, or more. Such conditions reportedly exist in areas for which vacuum systems are effective, as described herein.

2.4 Advantages and disadvantages of vacuum sewers

Advantages of vacuum sewer systems include

- Higher flexibility in selection of sites for vacuum stations than for lift stations and higher flexibility avoiding utilities and structures on pipeline routes.
- Lesser trenching and pipe diameter requirements than with gravity sewers and reduced installation time.
- Aeration of sewage prevents the odour-formation associated with anaerobic conditions.
- The installations make it possible to provide fully sealed pipes with secure access and inspection points to be constructed. Vacuum sewer systems are considered to be free of ex- and infiltration and allow their usage in water protection areas. For this reason, vacuum sewer lines may even be laid in the same trench as potable water lines (depending on local authority regulation).
- Vacuum toilets, if used, can reduce the amount of water flushed away to less than 1 litre per flush. However, the maintenance requirements of these toilets introduce new technologies to the end-user.
- High flow rates keep the system free of blockages and sedimentation.

Disadvantages include:

- External energy is required at the vacuum station (as is the case with lift stations).
- Length of lines is generally limited to 3 - 4 km laid in flat area. These restrictions are due to friction and static head losses, which typically range from 3 - 4.5 m.
- Steep terrain would require the addition of conventional lift stations.
- In cold climates such as Canada, the shallowly installed pipelines will have to be insulated.
- Odours can occur close to the vacuum station, in which case odour control measures may be necessary.
- Systems should be designed with inputs from an experienced manufacturer (concepts are usually free of charge)
- Systems require ongoing operations and maintenance attendance by trained staff.

3. Conditions that favour the use of vacuum sewer systems

Modern vacuum sewer systems represent tried and tested technologies that are being used worldwide on all continents in over 35 countries, including the USA and Canada (WEF, 2007).

Vacuum sewers can operate in conjunction with vacuum toilets (with very low flush) or normal low-flush toilets, and can pick up all other household wastewater flows for vacuum conveyance. They are most suited to flat topography, and are very useful in high-water-table locations such as around lake edges or along coastal strips. Vacuum lines have to be provided with regular low points (or transportation pockets) to facilitate plug flow between dwelling vacuum holding tanks and central collecting tanks (MFE, 2003).

Conditions that favour the use of vacuum sewer systems therefore include:

- Sensitive ecosystems where sewage infiltration needs to be eliminated.
- Flat or undulating terrain with many small elevation changes.
- Rocky areas, or alternatively soils where poor pipe laying conditions exist.
- High water table.
- Areas with restricted construction access, or where other structural limitations make gravity drainage difficult.

It is generally recommended that there be at 75 to 100 household equivalents per vacuum station, for the use of a vacuum sewer system to be cost effective (WEF, 2007). This minimum property requirement tends to make vacuum sewers most conducive for communities with a relatively high density of properties.

4. Application in the LDL

The flat grades of the Lower Don Lands, the high water table and ecosystem protection requirements would favour the use of a full, or partially applied vacuum-transmission system in the LDL. This particularly applies at the Keating South and Shipping Channel West neighbourhoods. However, the number of equivalent residential units by far exceeds the densities that are recommended for vacuum sewer systems to be competitive and this system is therefore not recommended for the LDL.

5. Sources and references

Little (2004). A comparison of sewer reticulation system design standards gravity, vacuum and small bore sewers. WATER SA Vol .30 No. 5 (special ed). ISSN 0378-4738.

MFE (2003). Ministry for the Environment, New Zeeland. Sustainable Wastewater Management: A handbook for smaller communities. Handbook - Ref. ME477, Summary - Ref. ME478. Part 3. June 2003.

WEF (2007). Water Environment Federation. *Alternative Sewer Systems.*, 2nd ed. Manual of Practice No. FD-12. Alexandria, Virginia.

Various web sites as referenced in the text.

Web sites of some suppliers:

AIRVAC: www.airvac.com
FLOVAC: www.flovac.com
Roediger Vacuum GmbH: www.roevac.com
SIVAC: *www.sivacvacuumsewer.com*

fwb
Encl.

Appendix 7-A6

Wastewater Reuse

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Wastewater Reuse: Rationale, Potential Benefits and Factors Driving Its Further Use

Water and wastewater reuse has various benefits. First, recycled wastewater (greywater) can serve as a dependable water source, for some applications. For example, greywater with adequate treatment can meet specific needs and purposes, such as toilet flushing, cooling water, and other applications.

The second benefit of wastewater reuse is that it leads to reduced potable water consumption and treatment needs, with associated cost savings. Reducing potable water demand through wastewater reuse and efficiency improvement is a step towards achieving Waterfront Toronto sustainability objectives and target and it may also reduce or delay the need for additional infrastructure requirements.

In summary, reusing treated wastewater enables a sustainable approach to resource utilization.

Rationale for Wastewater Reuse

- Water is a resource to be managed efficiently.
- Wastewater reuse more appropriately matches water use application with water resource quality resulting in more effective and efficient use of water.
- The goal of water resource sustainability is more attainable when wastewater reuse option is implemented.

Potential Benefits of Wastewater Reuse

- Wastewater reuse reduces potable water demands.
- Wastewater reuse is environmentally responsible.
- Implementing Wastewater reuse can delay the need for improvements to the potable water supply and delivery system.
- Wastewater reuse can save resources: Reclaimed water originating from municipal wastewater contains nutrients; if this water is used to irrigate public open spaces.

Factors Driving Further Implementation of Wastewater Reuse

- Proximity: Reclaimed water is readily available in the vicinity of the urban environment, where water resources are most needed and are highly priced.
- Dependability: Reclaimed water provides a reliable water source, even in drought years, as production of urban wastewater remains nearly constant.
- Versatility: Technically and economically proven wastewater treatment processes are available now that can provide water for non potable use and even for potable reuse.

- Safety: Non-potable water reuse systems require back flow prevention measures to protect the potable water supply system.
- Competing demands for water resources: Increasing pressure on existing water resources due to population growth.
- Fiscal responsibility: Growing recognition among water and wastewater managers of the economic and environmental benefits of using reclaimed water.
- Public interest: Increasing awareness of the environmental impacts associated with overuse of water supplies, and community enthusiasm for the concept of wastewater reuse.
- Proven track record: The growing numbers of successful wastewater reuse projects all over the world.
- A more accurate cost of water: The introduction of new water charging arrangements (such as full cost pricing) that more accurately reflect the full cost of delivering water to consumers, and the growing use of these charging arrangements.
- More stringent water quality standards: Increased costs associated with upgrading wastewater treatment facilities to meet higher water quality requirements for effluent disposal.
- Necessity and opportunity: Motivating factors for development of wastewater reuse projects such as droughts, water shortages, and restrictions on wastewater effluent discharges, plus economic, political, and technical conditions favourable to wastewater reuse.

Appendix 7-A7

Gravity and Pressure Sewer System

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Pressure Sewers versus Gravity Sewers

1. Gravity Sewer Systems

Sanitary sewers are hydraulic conveyance structures that carry wastewater to a treatment plant or other authorized point of discharge. A typical method of conveyance used in sewer systems is to transport wastewater by gravity along a downward-sloping pipe gradient. These sewers, known as conventional gravity sewers, are designed so that the slope and size of the pipe is adequate to maintain flow towards the discharge point without surcharging manholes or pressurizing the pipe.

Conventional wastewater collection systems are the most popular method to collect and convey wastewater. Pipes are installed on a slope, allowing wastewater to flow by gravity from a house site to the treatment facility. Pipes are sized and designed with straight alignment and uniform gradients to maintain self-cleansing velocities.

Manholes are installed between straight runs of pipe to ensure that stoppages can be readily accessed.

Conventional gravity sewers are typically used in urban areas with consistently sloping ground because excessively hilly or flat areas result in deep excavations and drive up construction costs. Conventional gravity sewers remain the most common technology used to collect and transport domestic wastewater. In hilly areas that exhibit a large amount of topographic relief, a pressure sewer system may be more appropriate.

1.1 Advantages of a Gravity Sewer System

Conventional gravity sewer systems have been used for many years and procedures for their design are well established. When properly designed and constructed, conventional gravity systems perform reliably.

Properly designed and constructed conventional gravity sewers provide the following advantages:

a) Can handle grit and solids in sanitary sewage.
b) Can maintain a minimum velocity (at design flow), reducing the production of hydrogen sulfide and methane. This in turn reduces odours, blockages, pipe corrosion and the collection of volatile gasses.

1.2 Disadvantages of a Gravity Sewer System

Some of the disadvantages of gravity sewer systems are:

a) The slope requirements to maintain gravity flow can require deep excavations in hilly or flat terrain, driving up construction costs.

b) Sewage pumping or lift stations may be necessary as a result of the slope requirements for conventional gravity sewers, which result in a system terminus at the tail of the sewer, where sewage collects and must be pumped or lifted to a collection system. Pumping and lift stations substantially increase the cost of the operation of a collection system.

c) Manholes associated with conventional gravity sewers are a source of inflow and infiltration, increasing the volume of wastewater to be carried, as well as the size of pipes and lift/pumping stations, and, ultimately, increasing operating costs.

2. Lift Station

Wastewater lift stations are facilities designed to move wastewater from lower to higher elevation through pipes. Key elements of lift stations include a wastewater receiving well, often equipped with a screen or grating to remove coarse materials; pumps and piping with associated valves; motors; a power supply system; an equipment control and alarm system and an odour control system and ventilation system.

2.1 Advantages of Sanitary Lift Stations

Lift stations are used to reduce the capital cost of sewer system construction. When gravity sewers are installed in trenches deeper than 3 m, the cost of sewer line installation increases significantly because of the more complex and costly excavation equipment and trench shoring techniques required. The size of the gravity sewer lines is dependent on the minimum pipe slope and flow. Pumping wastewater can convey the same flow using smaller pipeline size at shallower depth, and thereby, reducing pipeline costs.

2.2 Disadvantages of Sanitary Lift Stations

Compared to sewer lines where gravity drives wastewater flow, lift stations require a source of electric power. If the power supply is interrupted, flow conveyance is discontinued and can result in flooding upstream of the lift station, It can also interrupt the normal operation of the downstream wastewater conveyance and treatment facilities. This limitation is typically addressed by providing an emergency power supply.

Key disadvantages of lift stations include:

a) High cost to construct and maintain and the potential for odours and noise.
b) Lift stations also require a significant amount of power, are sometimes expensive to upgrade, and may create public concerns and negative public reaction.

The low cost of gravity wastewater conveyance and the higher costs of building, operating, and maintaining lift stations means that wastewater pumping should be avoided, if possible and technically feasible. Wastewater pumping can be eliminated or reduced by selecting alternative sewer routes or extending a gravity sewer using direction drilling or other state-of-the-art deep excavation methods. If such alternatives are viable, a cost benefit analysis can determine if a lift station is the most viable choice.

3. Pressure Sewer

Pressure sewer systems move wastewater via pressure flow. They are used in sparsely populated or suburban areas in which conventional collection systems would be expensive. These systems generally use smaller diameter pipes with a slight slope or follow the surface contour of the land, reducing excavation and construction costs.

3.1 Pressure Sewers versus Gravity Sewers

Pressure sewers differ from conventional gravity collection systems because they break down large solids in the pumping station before they are transported through the collection system. Their watertight design and the absence of manholes eliminate extraneous flows into the system. Thus, alternative sewer systems may be preferred in areas that have high groundwater that could seep into the sewer, increasing the amount of wastewater to be treated. They also protect groundwater sources by keeping wastewater in the sewer.

The disadvantages of pressure sewage systems include increased energy demands, higher maintenance requirements and greater on-lot costs. In areas with varying terrain and population density, it may prove beneficial to install a combination of sewer types.

Given these activities are not Schedule C undertaking as prescribed by the Municipal Class EA process it is reasonable to select the preferred means of managing the wastewater with a functional servicing report as part of phase 5 (Implementation) of the Municipal class EA process

Appendix 8-A

Stormwater Evaluation

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Commission

Evaluation of Alternatives to Undertaking: Stormwater Management

Evaluation Criteria	Alternative 1: Do Nothing	Alternative 2:A Use Oil/Grit Separators (OGS) to Manage Total Suspended Solids (TSS)	Alternative 2B: Use Detention Pond/Sediment Trap to Manage Total Suspended Solids	Alternative 3: Integrated Treatment Train Approach to Manage Rate, Volume, Quality and Delivery of Hydrograph to Receiving Water
Natural Environment Having regard for protecting the natural and physical components of the Environment and the extent to which each alternative supports the planning and urban design goals of the LDL revitalization: • Don Mouth Naturalization • New Natural Area – (Wetlands)	X Does not address water quality issues. X Water quality treatment criteria is not met. X No enhancement Don Mouth Naturalization. X No new natural areas created.	✓ Water quality treatment is partially addressed by managing TSS, however, other parameters such as nutrients or fecal coliform may not be treated. X No enhancement of Don Mouth Naturalization. X No new natural areas created.	✓ Water quality treatment is partially addressed, however, not all pollutants may be treated. X No enhancement of the of Don Mouth. Naturalization	✓ Integrates approach to naturalization of watercourse by providing source control methods that allow for clean roof discharge to service riverine wetlands. ✓ Consistent with goals of Don Mouth Naturalization study by providing sources of potentially clean runoff from roofs to feed high quality wetlands. ✓ Can meet the required water quality objectives by providing more than one Best Management Practice (i.e., UV treatment) to address various pollutants.
	Not Preferred	**Feasible**	**Feasible**	**Preferred**
Social Environment Having regard for the potential impact related to residential and recreational needs, income generation, noise and vibration and health and safety: • Vibrant, mixed use community • Access to water	X No improvement in community linkages or aesthetics.	X No improvement in community linkages or aesthetics.	X No improvement in community linkages or aesthetics.	✓ Potentially provides for improved community linkages and aesthetics. ✓ Green or natural areas used for stormwater management may contribute to community/mixed use vibrancy and can increase access to the waters edge from built areas or residential land uses.
	Not Preferred	**Not Preferred**	**Not Preferred**	**Preferred**
Economic Environment Having regard for the potential impact related to employment activity, the costs associated with each alternative and the capability of each alternative to adequately service the study area: • Economically viable blocks • Cost-effective to build	X Does not support creation of economically viable blocks and does not have capability to adequately service area. ✓ No additional cost to build.	✓ Accommodates economically viable blocks and partially addresses capability to adequately service area ✓ Generally as cost effective as other alternatives (Alternative 2b and 3).	✓ Accommodates economically viable blocks and partially addresses capability to adequately service area ✓ Generally as cost effective as other alternatives (Alternative 2a and 3)	✓ Accommodates economically viable blocks and addresses capability to adequately service area ✓ Generally as cost effective as other alternatives (Alternative 2a and 2b), but reduces long term cost for future remediation of stormwater quality..
	Not Preferred	**Feasible**	**Feasible**	**Preferred**
Cultural Environment Having regard for the potential impact related to aboriginal people, archaeology and cultural heritage resources • Aboriginal people • Heritage structures • Archaeology	✓ No impact on cultural environment.	X Construction of new facilities may have the potential impact on cultural environment.	X Construction of new facilities may have the potential impact on cultural environment.	X Construction of new facilities may have the potential impact on cultural environment.
	Preferred	**Feasible**	**Feasible**	**Feasible**
Sustainability	X Maintains existing impervious surfaces.	✓ Provides partial improvement to water	✓ Is compatible with WT Sustainability	✓ Promotes sustainable stormwater

Legend ✓ Compliant with criteria
X Not compliant with criteria

(app_8-a1_swm options evaluation december 10 final.doc/109446-3ra)

Evaluation of Alternatives to Undertaking: Stormwater Management

Evaluation Criteria	Alternative 1: Do Nothing	Alternative 2:A Use Oil/Grit Separators (OGS) to Manage Total Suspended Solids (TSS)	Alternative 2B: Use Detention Pond/Sediment Trap to Manage Total Suspended Solids	Alternative 3: Integrated Treatment Train Approach to Manage Rate, Volume, Quality and Delivery of Hydrograph to Receiving Water
Having regard to the resource sustainability, technical sustainability, reliability, longevity and other engineering aspects of each alternative solution, including considerations in respect of: ▪ WT Sustainability Framework ▪ City sustainability standards ▪ Impervious surfaces ▪ Water Quality Improvement	X Not compatible with City and WT Sustainability Framework. X Provides no improvement to water quality	quality X Does not meet City Sustainability standards due to additional water quality treatments required X No reduction in impervious surfaces.	Framework. ✓ Meets City Sustainability standards by providing necessary water quality improvements. ✓ Provides for some reduction in impervious surfaces. ✓ Provides partial improvement to water quality	management by allowing clean roof water to flow to riverine wetlands. ✓ Provides the best improvement to water quality. ✓ Most compatible with WT Sustainability Framework. ✓ Meets City Sustainability standards. ✓ Provides for reduction in impervious surfaces.
	Not Preferred	**Feasible**	**Feasible**	**Preferred**
Land Use and Property Having regard for the potential impact related to proposed land use, private property and public realm: ▪ New land uses ▪ Public realm goals ▪ Property	X No change in land use. ✓ No additional property needed. X Does not address public realm goals. X Does not support future development of area. X Does not support linkages between areas.	✓ Limited impact to surface land use. ✓ Can be designed to accommodate public realm goals. ✓ Allows for multi-use of lands.	X Increased land use impact with stormwater management ponds. ✓ Can be designed to accommodate public realm goals. ✓ Allows for multi-use of lands.	✓ Potential reduction to land use impact if an underground tank is used. ✓ Potentially provides for public realm enhancement. ✓ Allows for multi-use of lands.
	Not Preferred	**Preferred**	**Feasible**	**Preferred**
Transportation ▪ Walkability ▪ Transit priority ▪ Zero-growth traffic ▪ Parking	✓ No change in transportation issues.	✓ No change in transportation issues.	✓ No change in transportation issues	✓ No change in transportation issues.
	Feasible	**Feasible**	**Feasible**	**Feasible**
Municipal Services Having regard for the potential impact related to land use compatibility, capability of each alternative to adequately service the study area, utility impacts, traffic disruption, and health and safety: ▪ Utilities	✓ No change in existing utilities. X Inadequate drainage provided.	X Requires additional utilities and infrastructure. ✓ Will meet drainage requirement.	X Requires additional utilities and infrastructure. ✓ Will meet drainage requirement.	X Requires additional utilities and infrastructure. ✓ Will meet drainage requirement. ✓ Potential decrease in demands for future infrastructure needs because portions of stormwater runoff may deal with through natural systems.
	Not Preferred	**Feasible**	**Feasible**	**Preferred**

Legend ✓ Compliant with criteria
X Not compliant with criteria
(app_8-a1_swm options evaluation december 10 final.doc/109446-3ra)

Evaluation of Alternatives to Undertaking: Stormwater Management

Evaluation Criteria	Alternative 1: Do Nothing	Alternative 2:A Use Oil/Grit Separators (OGS) to Manage Total Suspended Solids (TSS)	Alternative 2B: Use Detention Pond/Sediment Trap to Manage Total Suspended Solids	Alternative 3: Integrated Treatment Train Approach to Manage Rate, Volume, Quality and Delivery of Hydrograph to Receiving Water
SUMMARY	**Not Preferred** X Does not address stormwater quantity and quality issues.	**Feasible** ✓ Addresses stormwater quality and quantity.	**Feasible** ✓ Addresses both stormwater quality and quantity.	**Preferred** ✓ Addresses both stormwater quality and quantity. ✓ Provides for potential additional enhancement of stormwater by providing multiple methods for Stormwater Management. . ✓ Clean stormwater runoff from roof discharge may be used in natural areas ✓ By cutting down on the quantity of water in the standard system and cleaning the water in general through passive means there is a savings in the amount of mechanical water cleaning and management that will be required

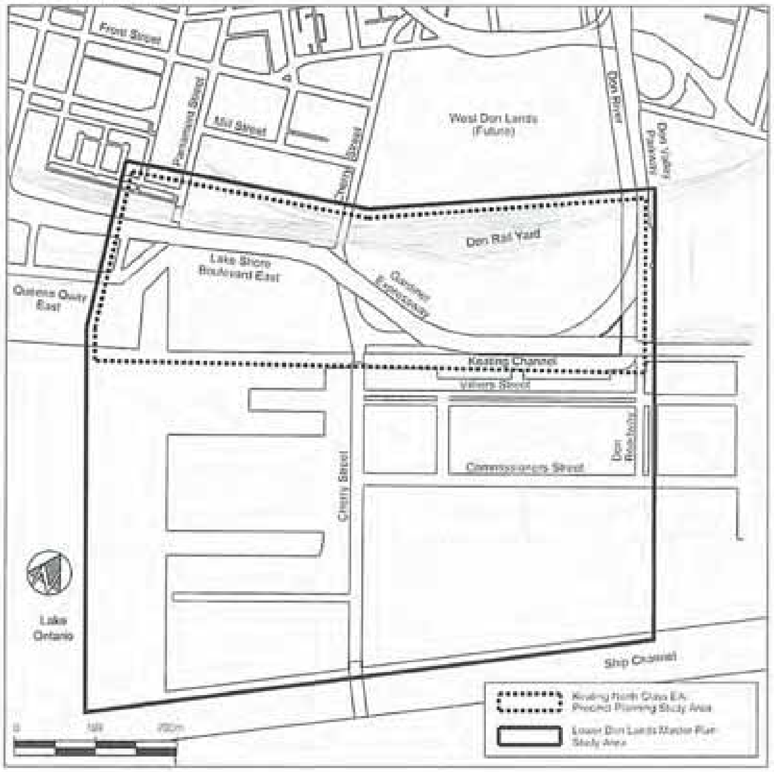
Appendix 9-A1

Notice of Study Commencement

Toronto Transit
Commission

NOTICE OF STUDY COMMENCEMENT
Lower Don Lands Municipal Class EA and Keating North Precinct Plan

Waterfront Toronto (formerly Toronto Waterfront Revitalization Corporation) and the City of Toronto, as co-proponents, are undertaking a study that integrates the Municipal Class Environmental Assessment (Class EA) process with the Precinct Planning process, in the Lower Don Lands area.



A Master Plan will be developed for transportation (including transit), water/wastewater and storm water management in the Lower Don Lands Area, in accordance with the Municipal Class EA 2000, as amended in 2007 (Phases 1 and 2). The Lower Don Lands study area is shown on the above plan and is generally bounded by the Don rail yard and Gardiner Expressway on the north, the Parliament Street slip on the west, the shipping channel on the south and Don Road on the east.

After the Master Plan is completed, the study will continue with Phases 3 and 4 of Municipal Class EA process in the Keating North Precinct area. The Schedule "C" Class EA for this area will be integrated with the Precinct Planning process in accordance with the Planning Act and Section A.2.9 of the Municipal Class EA. The Keating North Precinct area as shown on the above plan is generally bounded by the Don rail yard and Gardiner Expressway on the north, Parliament Street Slip on the west, Keating Channel on the south and the Don Road/Don Valley Parkway on the east.

The Lower Don Lands study area includes the Don Mouth Naturalization EA study area and will incorporate the outcome of that separate EA, which is currently underway. This study also replaces the Queens Quay EA Extension and Port Lands Transit EAs that were previously initiated by Waterfront Toronto.

Public consultation is a key component of this study. The proposed consultation plan provides for public forums at multiple points in the study. Further advertisements will be posted when public forum dates are scheduled.

During the Class EA and as part of the planning process, Waterfront Toronto and the City of Toronto will be collecting comments and information regarding this project from the public in accordance with the requirements of the *Ontario Environmental Assessment Act* and the *Planning Act*.

If you wish to receive further information or would like to be added to the project mailing list, please contact:

Andrea Kelemen
Waterfront Toronto
20 Bay Street, Suite 1310
Toronto, ON M5J 2N8
Tel: (416) 214-1344 ext. 248
Email: lowerdon@waterfrontoronto.ca
Fax: (416) 214-4591
Website: www.waterfrontoronto.ca

WATERFRONToronto

TORONTO

April 3, 2008

Appendix 9-A2

Public Information Centre #1

WATERFRONToronto

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Toronto Transit Commission

Help us plan the future of the Lower Don Lands

LOWER DON LANDS INFRASTRUCTURE MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT AND KEATING NORTH PRECINCT PLAN
Public Forum #1

Waterfront Toronto, the City of Toronto and the Toronto Transit Commission are developing a plan to revitalize the Lower Don Lands and create a vibrant, mixed use, sustainable community that embraces and respects a newly naturalized and flood-protected mouth of the Don River.

The revitalization plan will include proposals for new neighbourhoods, community facilities and public spaces, as well as a Master Plan for transportation (including transit), water, wastewater and stormwater infrastructure. This study is being conducted in accordance with the requirements of the *Municipal Class Environmental Assessment 2000*, as amended in 2007 (Phases 1 and 2).

The Lower Don Lands study area is generally bounded by the Don rail yard and Gardiner Expressway on the north, the Parliament Street slip on the west, the Ship Channel on the south and Don Roadway on the east.

Your ideas will help us plan the future of the Lower Don Lands. We invite you to attend the first Public Forum for this project:

Public Forum #1

Date:	**Wednesday, July 23, 2008**
Location:	**St. Lawrence Hall, 157 King Street East, Great Hall**
Time:	**6:00 p.m. – 7:00 p.m. (Open House)**
	7:00 p.m. – 9:00 p.m. (Presentation & Facilitated Discussion)

At the meeting, you can:

- Learn more about the Precinct Planning and the Class EA process for the Lower Don Lands; and
- Share your ideas for creating new neighbourhoods, relating these neighbourhoods to the Don River and providing access and infrastructure for the Lower Don Lands area.

Public Forum #1 will be the first in a series of opportunities for you to contribute your ideas as part of the planning process for the Lower Don Lands.

If you wish to receive further information or would like to be added to the project mailing list, please contact:

Debra Conlon
Manager, Project Communications
Waterfront Toronto
20 Bay Street, Suite 1310
Toronto, Ontario M5J 2N5
Tel: (416) 214-1344 ext. 264
Fax: (416) 214-4591
E-mail: dconlon@waterfrontoronto.ca
Website: www.waterfrontoronto.ca

Welcome

Welcome to the first Public Meeting for the Lower Don Lands Municipal Class Environmental Assessment (EA) Infrastructure Master Plan and Keating North Precinct Plan

WATERFRONToronto

Public Meeting #1
July 23rd, 2008
MVVA Team

www.waterfrontoronto.ca/lowerdonlands

What is a Class EA Master Plan?

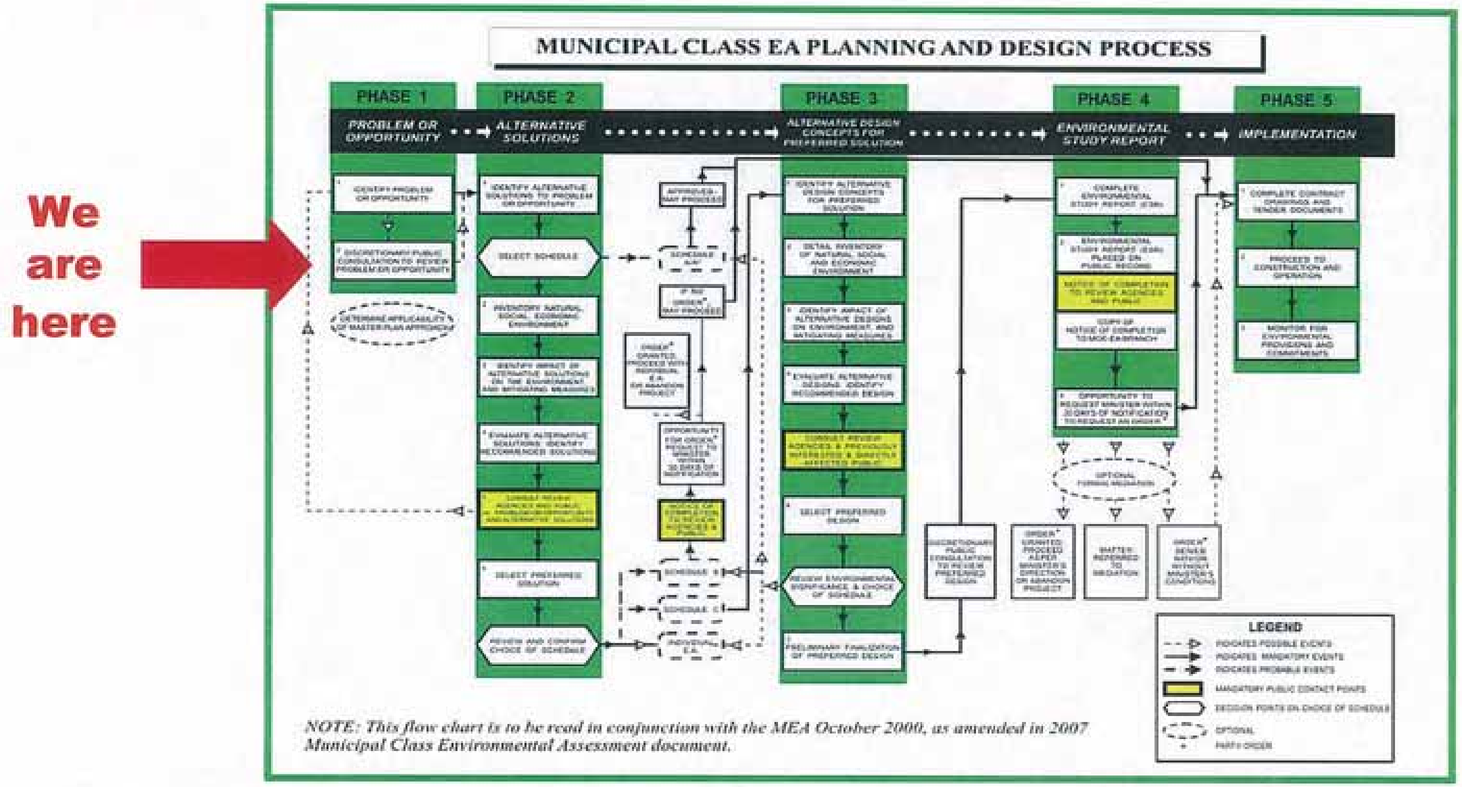
Master Plans are long range plans that integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. A Master Plan provides a "road map" for future improvements and sets a framework for planning subsequent projects and/or development.

Lower Don Lands Master Plan

This study will address transportation (road and transit), water, wastewater and stormwater improvements needed in the Lower Don Lands to support revitalization of the area. The Class EA Infrastructure Master Plan is being carried out by Waterfront Toronto, the City of Toronto and Toronto Transit Commission as tri-proponents.

Municipal Class EA Process

The Municipal Class EA requires that Master Plans address the first two phases of the Class EA process.



Study Area

The study area for this Master Plan is shown below.

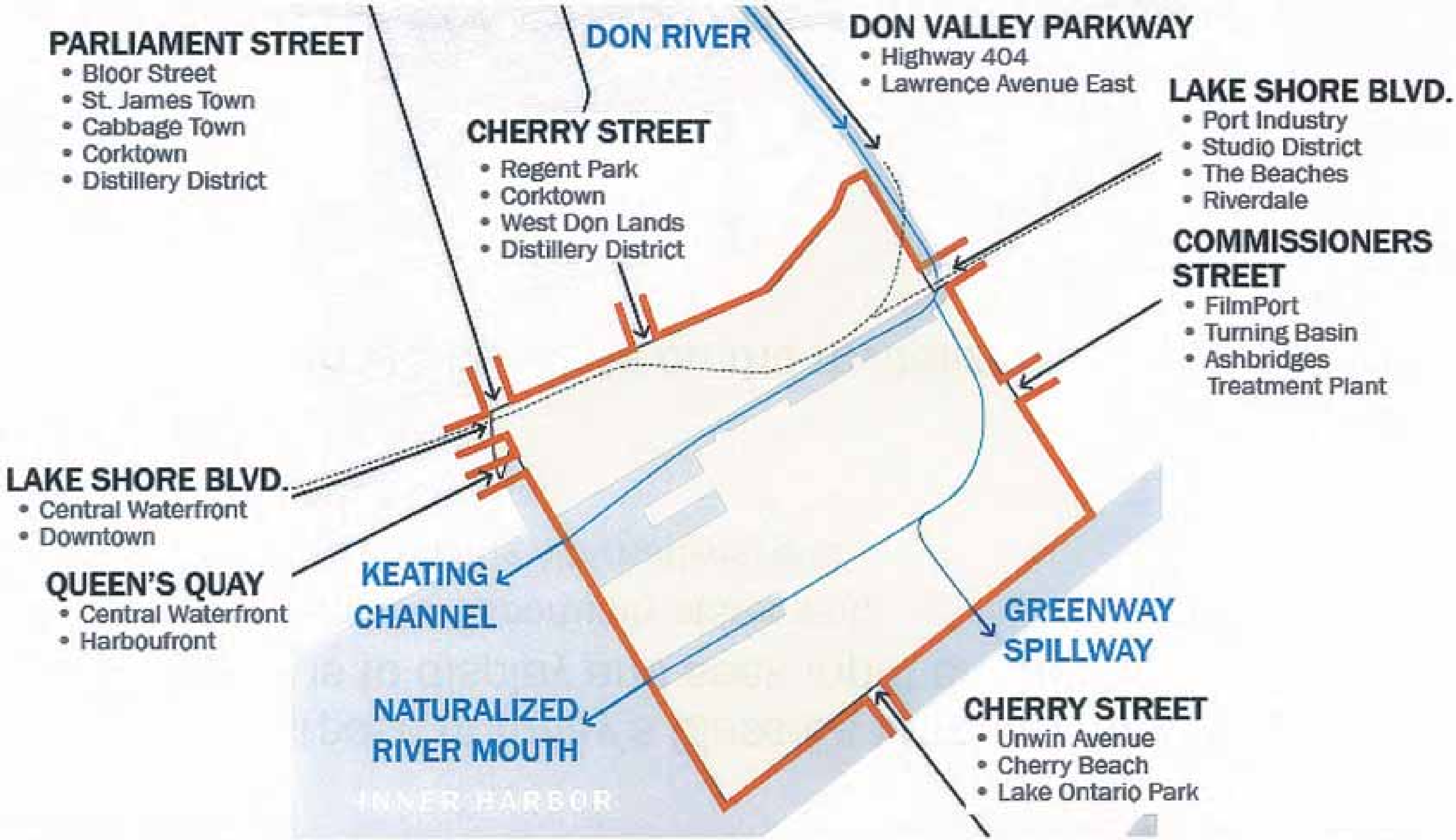
Legend
------- Study Area

Purpose of Open House

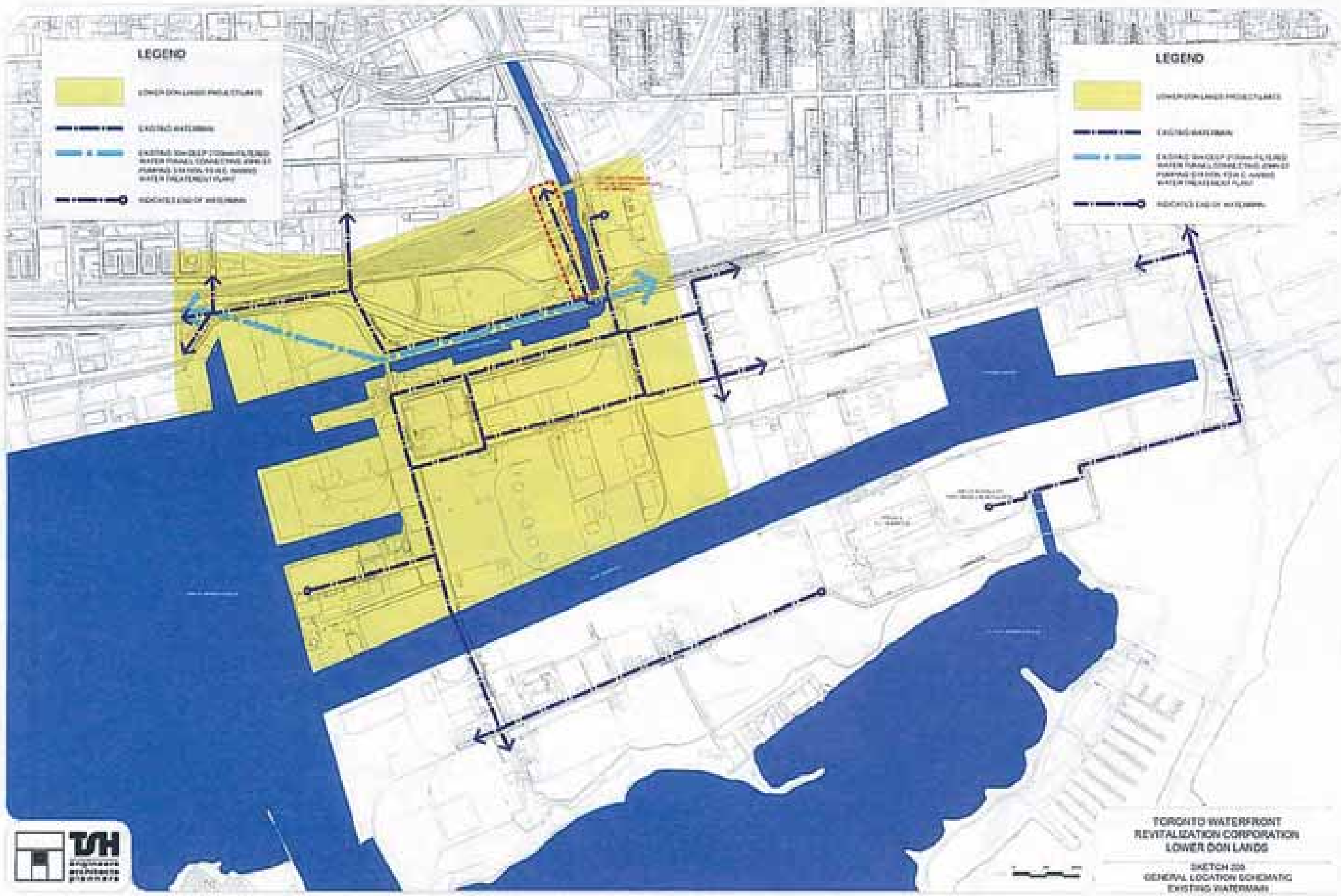
- The main purpose of today's Class EA Infrastructure Master Plan Open House is to display and seek input on the:
  - Draft Problem and Opportunity statement;
  - Infrastructure Planning Alternatives; and
  - Draft Evaluation Criteria.

A presentation will be made on the revitalization of the Lower Don Lands area.

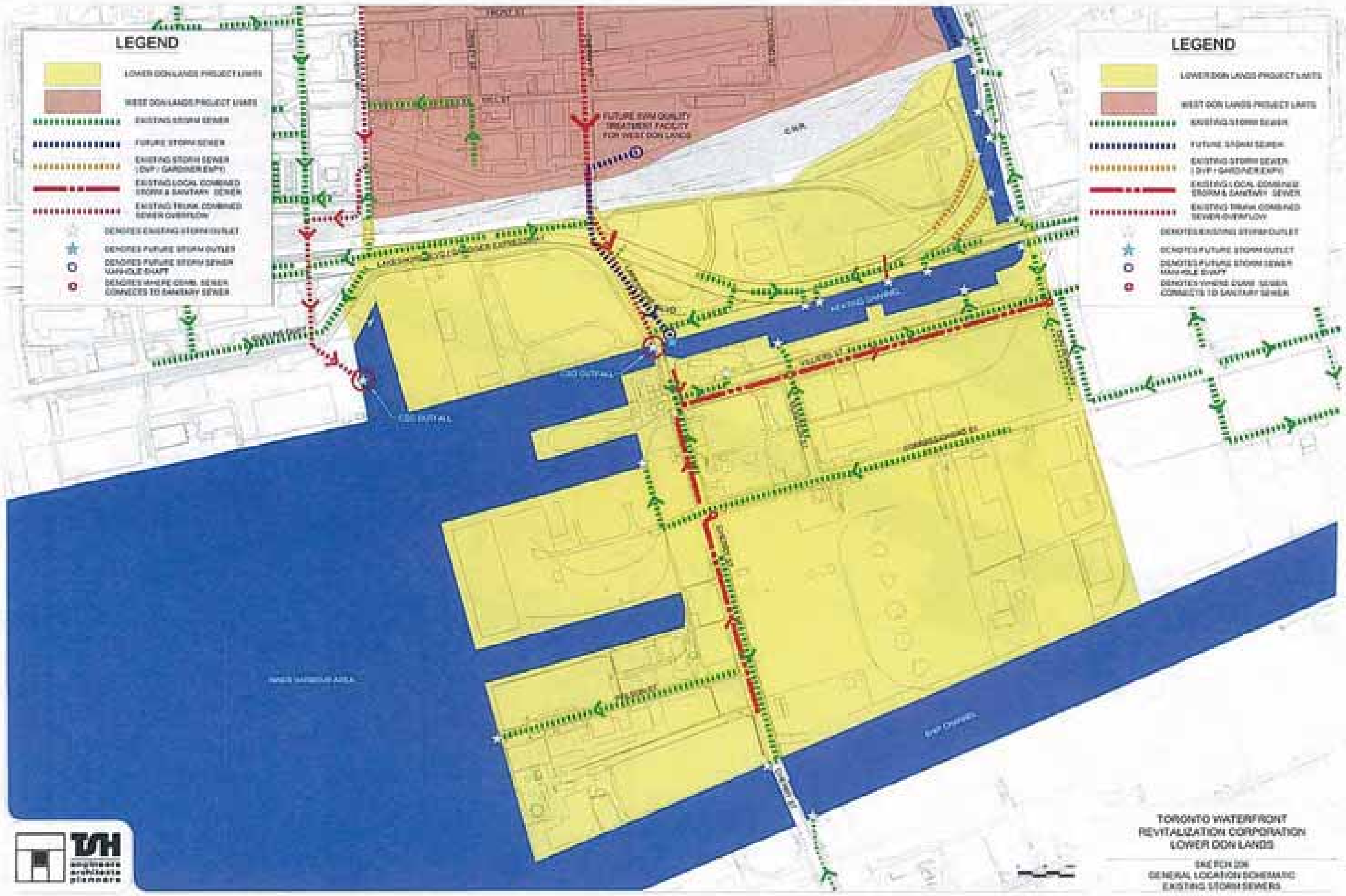
Site Context



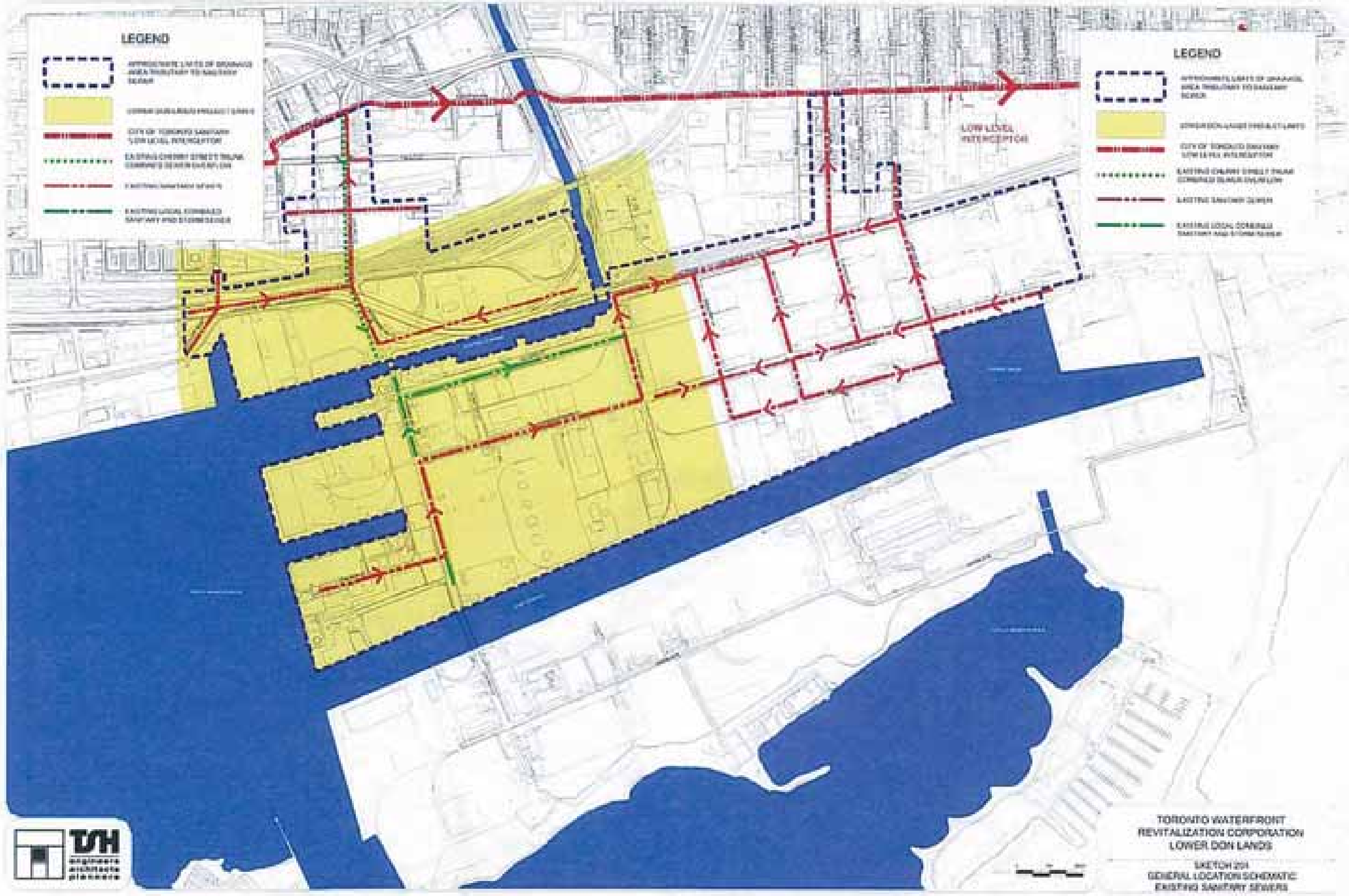
Existing Water Supply



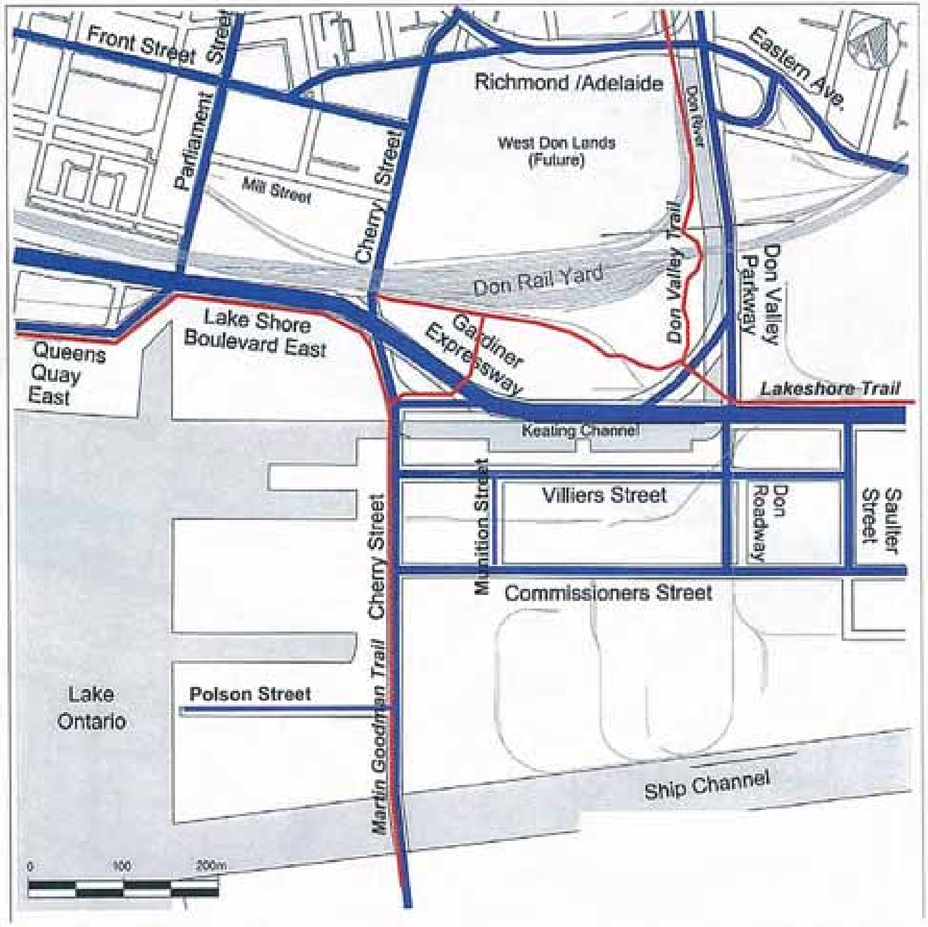
Existing Stormwater Management Features



Existing Wastewater System



Existing Road and Trail System



Proposed Waterfront Transit Facilities

Problem/Opportunity Statement

Waterfront Toronto, the City of Toronto and the Toronto Transit Commission are developing a plan to revitalize the lands at the northeastern portion of the Toronto Inner Harbour (Keating North and the Northwest Port Lands) to create a vibrant, mixed use, sustainable community that embraces and respects a newly naturalized and flood-protected mouth of the Don River. The new river channel will act as a critical piece of hydrological and ecological infrastructure offering a beautiful and functional natural feature around which diverse new communities are positioned.

The existing infrastructure (water, wastewater, stormwater, roads and transit service) is neither sufficient, nor is it configured appropriately to support the revitalization of the area and the relocation of the mouth of the Don. There is no higher-order transit service to the area, and the area is poorly connected to surrounding existing and planned neighbourhoods.

The Lower Don Lands is a keystone site between the Don River and the Inner Harbour, and between the downtown and future Port Lands development, at the crossroads of numerous transit, cycling and pedestrian routes. There is a significant opportunity with the implementation of the Don River project to improve existing infrastructure, relocate necessary elements, add transit, pedestrian and cycling facilities to serve local, recreational and commuter needs, improve or add new roads where new connections and access are needed, and to provide "green" stormwater facilities, water and sewer service as part of a comprehensive revitalization project that sets new standards for the achievement of sustainable planning and design.

Alternative Infrastructure Planning Solutions – Water Infrastructure

Alt # 1 = do nothing

Alt # 2 = reconstruct, rehabilitate existing, construct new and improve connectivity to lands south of Shipping Channel

Alt # 3 = Alt # 2 + water efficiency measures

Alt # 4 = Alt # 3 + Non-Potable Water Supply System
- Alt 4A = Public Operated Non-Potable Water Supply
- Alt 4B = Private Operated Non-Potable Water Supply
- Alt 4C = Combination of Alt 4A & 4B

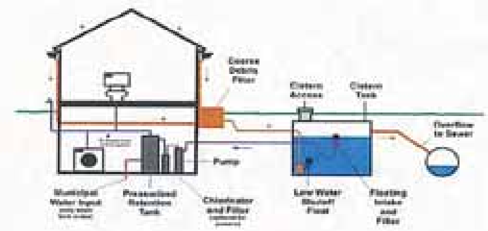
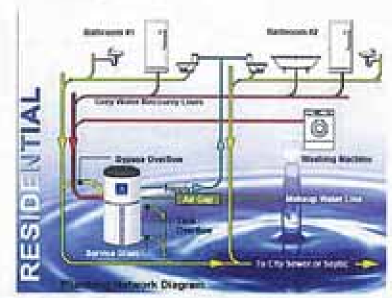


Figure 1.1: A typical domestic RWH system.

Water Infrastructure Opportunities

Public Infrastructure:
- Irrigation of public parks / trees with non-potable water supply
- Low water landscaping
- Rainwater harvesting
- Non-potable water supply / fire protection system

Private (Block Development):
- Metering practices
- High efficiency fixtures / appliance
- Low water landscaping
- Grey water re-use
- Rainwater harvesting
- Irrigation of landscape with non-potable water supply



Alternative Infrastructure Planning Solutions – Stormwater Infrastructure

Alt # 1 = do nothing

Alt # 2 = conventional conveyance and treatment approach
Alt # 2A = use oil / grit separators to manage TSS
Alt # 2B = use detention pond / sediment trap to manage TSS

Alt # 3 = integrated treatment train approach to manage rate, volume, quality and delivery of hydrograph to receiving water

Stormwater Infrastructure Opportunities

Public Infrastructure:

- Constructed wetlands
- Stormwater quality control facilities
- Disinfection
- Keating Channel circulation
- Stormwater utility for financing of operations
- Rain gardens
- Rain water harvesting
- Spill management plan
- BMP's for control of potential pollutants (road salts)
- Facilitates understanding, appreciation and use of fish and wildlife resources

Private (Block Development):

- Green roofs
- Rain gardens
- Rain water harvesting
- Stormwater quality control facilities
- BMP's for control of potential pollutants

Alternative Infrastructure Planning Solutions –Wastewater Infrastructure

Alt # 1 = do nothing
Alt # 2 = reconstruct, rehabilitate existing, construct new gravity sewers and assess need to service lands south of Shipping Channel
Alt # 3A = Alt # 2 + SPS / forcemain
Alt # 3B = Alt # 2 + Siphons at River Crossings
Alt # 4 = New vacuum sanitary sewer system
Alt # 5 = Eco-Island for Shipping Channel West Lands

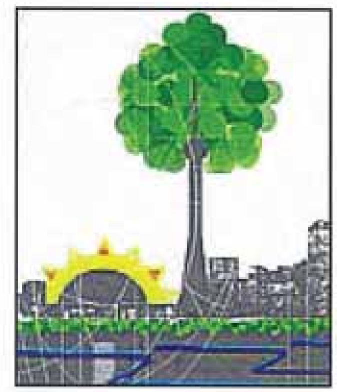
Wastewater Infrastructure Opportunities

Public Infrastructure:

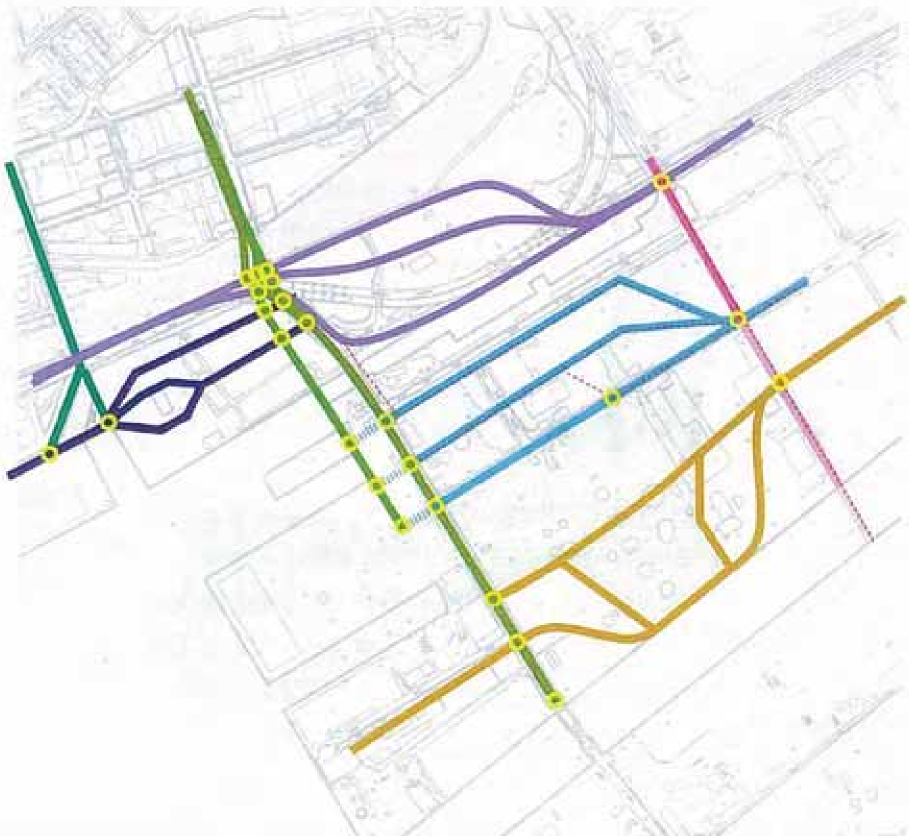
- Improve operation of LLI
- Gravity connection to LLI
- Eco Island : Ship Channel West Lands
- Vacuum sanitary sewers

Private (Block Development):

- Grey water re-use
- High efficiency fixtures



Alternative Infrastructure Planning Solutions –Road Network



- Parliament Street Alternatives
- Queens Quay Alternatives
- Cherrry Street Alternatives
- Lakeshore Boulevard Alternatives
- Commissioners Street / Villiers Street Alternatives
- Don Roadway Alternatives
- Basin Street Alternatives
- Transit Alternatives

Criteria for Evaluation of Infrastructure Planning Solutions

Theme	Evaluation Criteria	Transportation (roads, transit, pedestrians, and cyclists) [✓ is relevant]	Services (water, wastewater and stormwater) [✓ is relevant]
Natural Environment	Is it consistent with the goals of the Don Mouth naturalization study?	✓	✓
	Does it minimize impact to the *new* natural area?	✓	✓
Social Environment	Does it support a vibrant, mixed use community?	✓	✓
	Does it improve access to water's edge?	✓	
Economic Environment	Does it accommodate block sizes that are economically viable and developable?	✓	✓
	Is it cost-effective to build?	✓	✓
Cultural Heritage	Does it change or impact traditional uses of lands by Aboriginal people?	✓	✓
	Does it impact heritage structures?	✓	✓
	Does it impact areas with potential for archaeological resources?	✓	✓
Sustainability	Is it consistent with WT's Sustainability Framework and the City's standards for sustainability?	✓	✓
	Does it minimize impervious surfaces?	✓	✓
Land Use and Property	Does it maximize opportunities for new land uses and redevelopment?	✓	
	Does it impact current property ownership?	✓	
	Is it compatible with the goals for Public Realm?	✓	
Transportation Services	Does it provide a compact and walkable neighborhood?	✓	
	Does it prioritize transit?	✓	
	Future growth in travel is accommodated by providing an environment which encourages people to shift towards non-auto modes.	✓	
	Does it rationalize parking?	✓	
Municipal Services	Does it support future land uses and densities?		✓
	Does it include sustainable design technology?		✓
	Does it impact existing or planned utilities?	✓	✓
Stormwater	Is it compatible with the goals of Wet Weather Flow Master Plan?		✓
	Is it compatible with the goals of the Toronto GREEN Development Standard?		✓
	Does it provide improved flood protection?		✓
	Does it include natural processes for cleaning water before entering Lake Ontario?		✓
	Does it accommodate potential changes in extreme precipitation and water flow?		✓

Next Steps

After Public Meeting #1 the study team will finalize the Problem and Opportunity Statement and evaluate the Planning Alternatives for infrastructure improvements.

A second Public Meeting will be held in December to present and seek input on the Preferred Planning Solutions.

You will be contacted again at that time.

Your Input is Important

- Public participation is an important part of the study process.

- Please provide your comments to:

Andrea Kelemen, Communications + Marketing Coordinator
Waterfront Toronto
20 Bay Street, Suite 1310
Toronto, ON M5J 2N8
Tel: (416) 214-1344 ext 248
Email: lowerdon@waterfrontoronto.ca
www.waterfrontoronto.ca/lowerdonlands

Thank you for attending

Lower Don Lands

Public Forum #1

Summary of Participant Feedback

WATERFRONToronto Toronto Transit Commission TORONTO

Prepared for LDL Steering Committee Meeting Sept 17/18 2008

The public consultation event took place at St. Lawrence Hall on July 23rd 2008. It began with a one-hour open house, continued with a plenary presentation, questions of clarification from the floor, and roundtable discussions on four open ended questions. 77 participated signed in at the door.

Below are key representative comments from meeting participants.

Creating New Neighbourhoods

- Ensure there is a commitment to affordable housing, including plans for student housing.
- Apply ecological building and street designs.
- Aim for a zero carbon footprint.
- Aim for a self-sustaining community where residents are not required to leave to get the goods and services they need, (i.e. each neighbourhood should have small businesses and institutions that can satisfy the needs of the residents, e.g. grocery stores, pharmacy, recreation centre, schools).
- Introduce parks and facilities geared towards different uses/ages/abilities/interests.
- Discourage "gated" community design.
- Provide opportunities for public gatherings.
- Ensure safety is a high priority.
- Include elements to attract visitors.
- Use a variety of developers and not a monolithic development entity.
- Feature a variety of housing styles, heights, and building materials.
- Use examples and models from other successful communities.

- Feature a wide variety of trees species in all neighbourhoods.
- Feature interesting designs for Keating Channel bridges that can be creatively lit up at night.

Relating the New Neighbourhoods to the River

- Ensure public access to the waterfront and avoid private ownership of riverfront land that would restrict public access. Do not block off the waterfront with high-rises.
- Facilitate public water activities such as boating, kayaks, canoes, gondolas, fishing, water sports, wading, and skating. Docking facilities should work for small to large sizes of boats.
- Ensure a large portion of the water's edge is naturalized.
- Incorporate boats into the transit plan, (e.g. provide for a water taxi service).
- Offer views onto the river from walkways. Keep intensive activity away from naturalized river's edge.
- Develop cafes alongside the water's edge.

Providing Access and Infrastructure

- Reduce the use of cars by including some car-free streets in the design. Plan for students to live within walking distance of schools.
- Design the plans with narrow streets and restrict parking. Provide free shuttle buses to transport people from satellite parking lots and/or provide underground parking.
- Include many bike and inline skating paths for transportation and recreation, especially connecting north-south.
- Plan for intensive use of public transit, specifically streetcars/LRT.
- Consider the option of a new intermodal transit hub.
- Develop an integrated rain water conservation and management plan that addresses stormwater and river water. Avoid combined sewers. Use stormwater as much as possible, e.g. as features of children's playgrounds, a swimming pool or as ornamental fountains.
- Provide options for on-site waste and stormwater processing in some buildings.
- Consider sharing infrastructure with the West Don Lands.
- Integrate various heating and energy plants, (i.e. a district energy system).
- Use a lake based cooling system for buildings.

Other Comments and Ideas

- Avoid the possibility of big box stores.
- To encourage lively streets and pedestrian traffic for local businesses, do not make individual buildings self-contained with their own parking, gyms, entertainment facilities etc., but provide these centrally for all to share.
- There must be an ecological link north-south from Don River Park south to Villiers St. and bays end.
- There is a need to close Don Roadway and give the Filmport its own exit off the south bound Don Valley Parkway.
- Convert the silos in to hotels with a restaurant facility and observation decks.
- Widen the north-south greenway to 300-400m.
- Decrease the number of units to be developed.
- Include a cultural tourism destination on the site.
- Add fish terraces along the sea wall continued from the public promenade / boardwalk to the west.
- People are less likely to cross a bridge, especially at night.
- Add the property south of the shipping channel to the study area.
- Prior to the next public meeting, make available to individuals the alternate proposals so that those attending the meeting will have a chance to prepare their responses in advance.

Summary of participant feedback provided by:

LURA

LISTEN · UNDERSTAND · RELATE · ADVANCE

Appendix 9-A3

Public Information Centre #2

WATERFRONToronto

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Toronto Transit Commission

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Toronto Transit Commission

Help us plan the future of the Lower Don Lands

LOWER DON LANDS INFRASTRUCTURE MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT AND KEATING PRECINCT PLAN

Public Forum #2

Waterfront Toronto, the City of Toronto and the Toronto Transit Commission are developing a plan to revitalize the Lower Don Lands and create a vibrant, mixed use, sustainable community that embraces and respects a newly naturalized and flood-protected mouth of the Don River.

The revitalization plan will include proposals for new neighbourhoods, community facilities and public spaces, as well as a Master Plan for transportation (including transit), water, wastewater and stormwater infrastructure. This study is being conducted in accordance with the requirements of the *Municipal Class Environmental Assessment 2000*, as amended in 2007 (Phases 1 and 2).

The Lower Don Lands study area is generally bounded by the Don rail yard and Gardiner Expressway on the north, the Parliament Street slip on the west, the Ship Channel on the south and Don Roadway on the east.

Your ideas will help us plan the future of the Lower Don Lands. We invite you to attend the second Public Forum for this project:

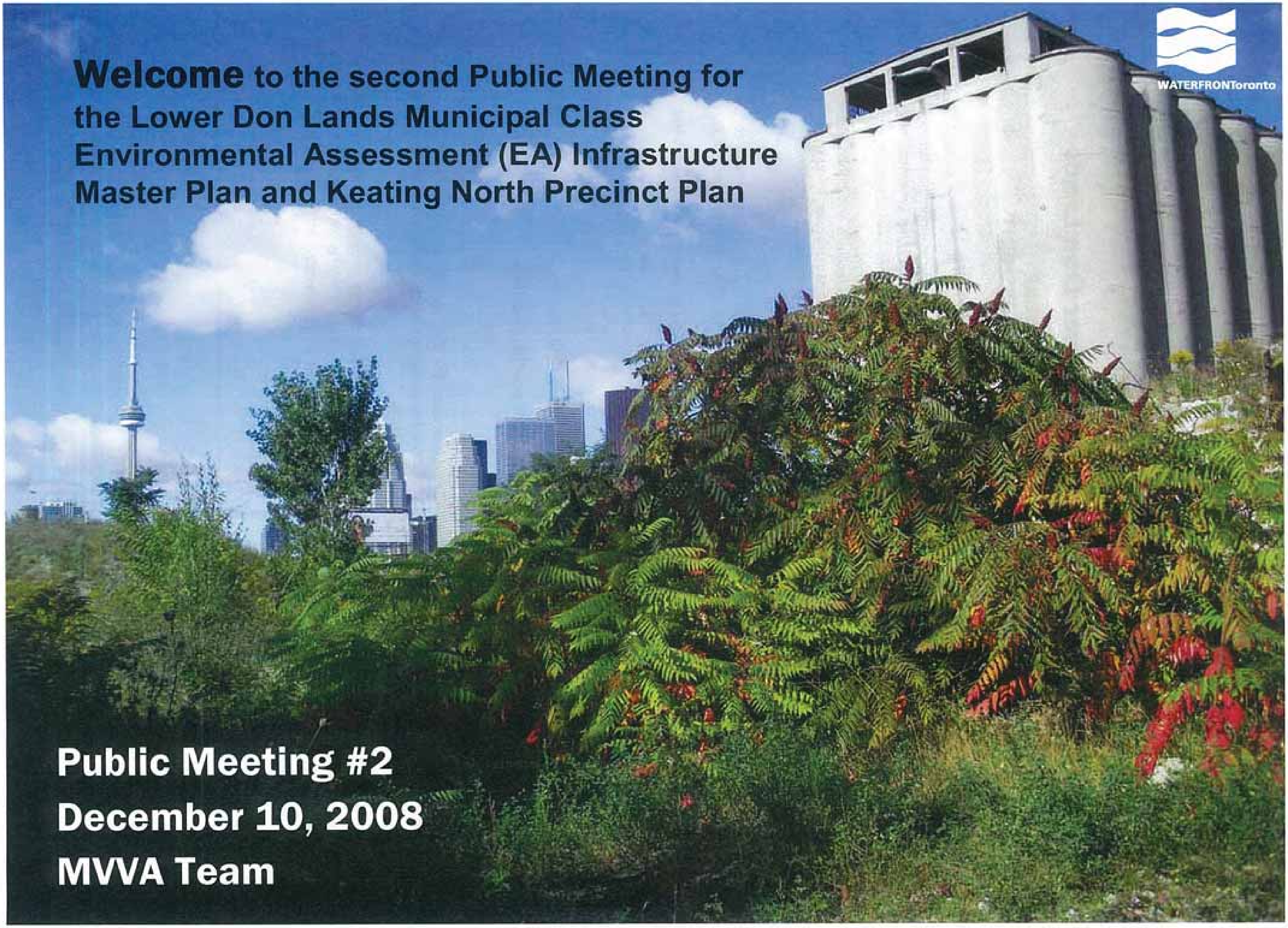
PUBLIC FORUM #2

Date:	**Wednesday, December 10, 2008**
Location:	**St. Lawrence Hall, 157 King Street East, Great Hall**
Time:	**6:00 p.m. – 7:00 p.m. (Open House)**
	7:00 p.m. – 9:00 p.m. (Presentation & Facilitated Discussion)

At Public Forum #2, you can:

- Learn more about the Precinct Planning and the Class EA process for the Lower Don Lands; and
Share your ideas on emerging plans for the Lower Don Lands, including new neighbourhoods, community facilities, public spaces, transit and other community infrastructure.

If you wish to receive further information or would like to be added to the project mailing list, please contact: Andrea Kelemen, Communications and Marketing Coordinator, Waterfront Toronto, lowerdon@waterfrontoronto.ca, (416) 214-1344 ext. 248 or visit the project website at: www.waterfrontoronto.ca/lowerdonlands.


Welcome to the second Public Meeting for the Lower Don Lands Municipal Class Environmental Assessment (EA) Infrastructure Master Plan and Keating North Precinct Plan
WATERFRONToronto
Public Meeting #2
December 10, 2008
MVVA Team

Purpose of Open House #2

WATERFRONToronto

The main purpose of this Open House is to present and seek input on the:

- Evaluation of transportation and infrastructure planning alternatives; and
- The preferred planning solutions and proposed transportation network.

Infrastructure proposed in this Class EA for flood vulnerable lands is based on the Preferred Alternative of the Don Mouth Naturalization Project (DMNP) EA and is dependent upon its approval.

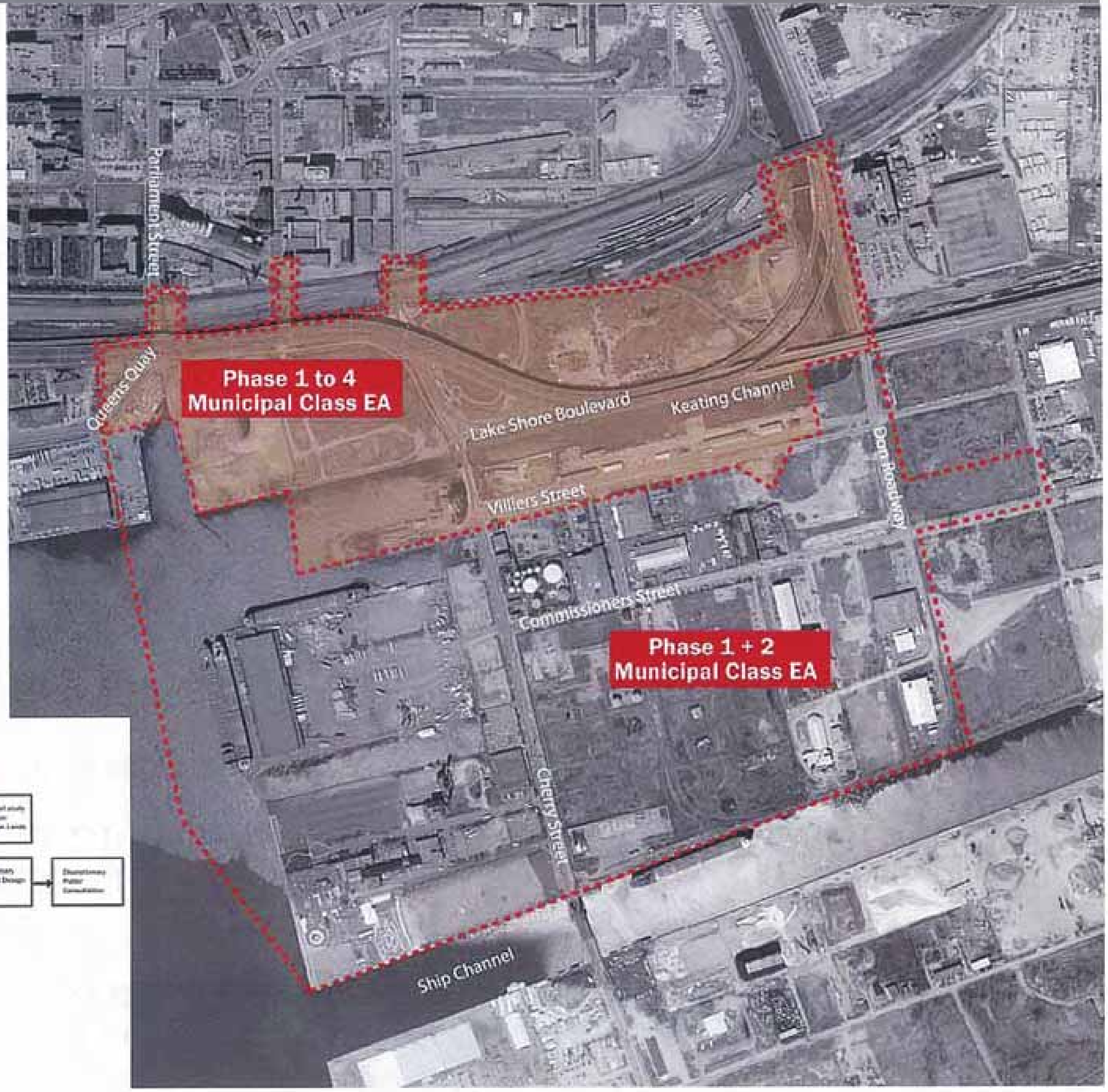
Class EA Study Area and Process

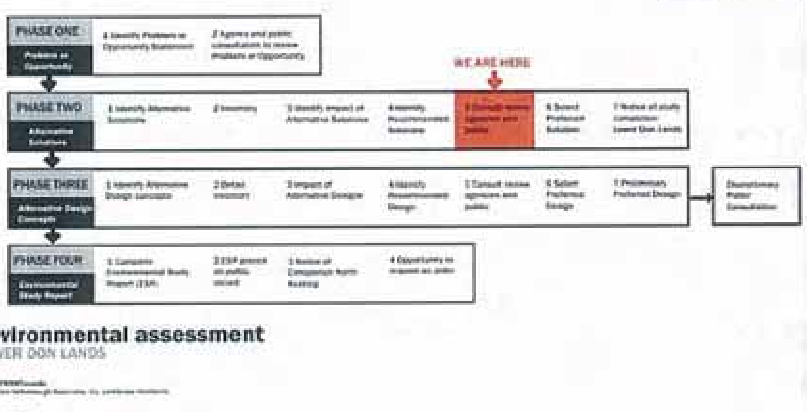
WATERFRONToronto

TORONTO

Toronto Transit Commission

Waterfront Toronto, the City of Toronto and the TTC are co-proponents for the Class EA Master Plan for Infrastructure.





Existing Conditions
Natural, Social and Cultural Environments

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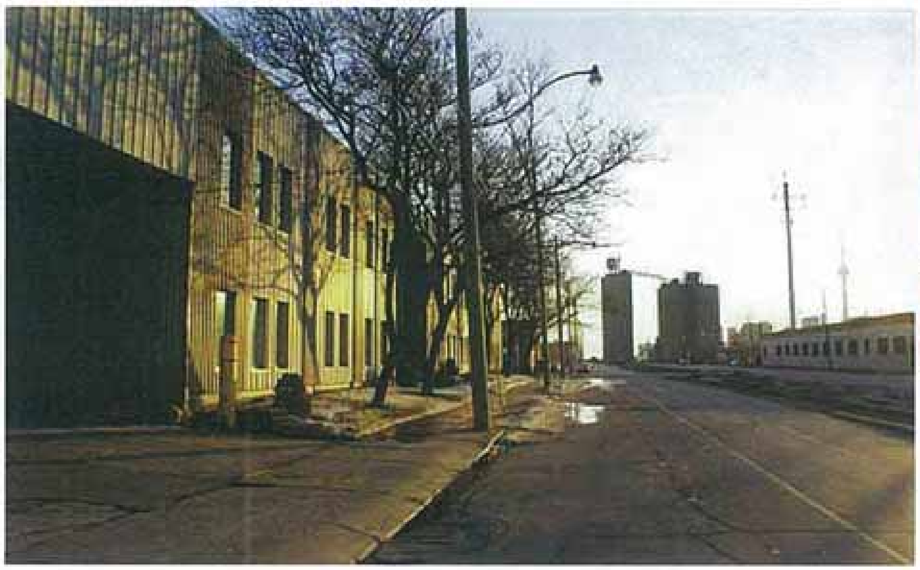
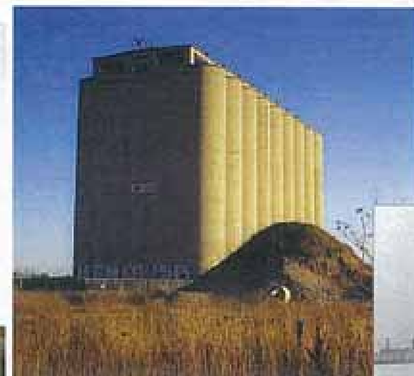


Circulation - Transportation

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Families of Corridor Alternatives

Class EA Master Plan

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Summary of Evaluation of Transportation Alternatives - Cherry Street

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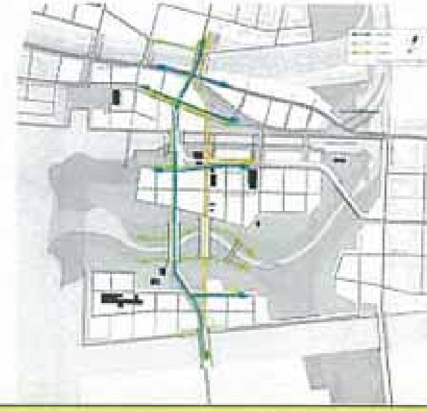
Evaluation Criteria	#1 Bundled East All modes on existing alignment	#2 Bundled West All modes on a new alignment PREFERRED	#3 Unbundled All roads on existing alignment, and new transit crossing.
			
Natural Environment	**Not Preferred**	**Preferred**	**Not Preferred**
Social Environment	**Not Preferred**	**Preferred**	**Not Preferred**
Economic Environment	**Not Preferred**	**Preferred**	**Not Preferred**
Cultural Environment	**Not Preferred**	**Preferred**	**Not Preferred**
Sustainability	**Not Preferred**	**Preferred**	**Not Preferred**
Land Use and Property	**Not Preferred**	**Preferred**	**Not Preferred**
Transportation	**Not Preferred**	**Preferred**	**Preferred**
Municipal Services	**Not Preferred**	**Preferred**	**Preferred**
Overall Preferred	**Not Preferred**	**Preferred**	**Not Preferred**
SUMMARY	The Preferred Cherry Street Planning Alternative is **#2 Bundled West (all modes on new alignment)** because it creates two main north/south streets that promote vibrant development and a block pattern that accommodates a transit hub in future development lands west of Cherry Street. It also provides enhanced multi-modal access at two locations across the Keating Channel and maximizes access to the water's edge. It minimizes disruption and property impacts to businesses, traffic and existing utilities on Cherry Street, creates economically viable land blocks in the western half of the study area, minimizes impacts to heritage structures and promotes alternative transportation use by providing a separate and continuous bicycle and pedestrian corridor. The new vehicular crossings (including footbridge) offers the greatest opportunities for streetscaping and public realm, maximizing pedestrian and bicycle mobility and offering a high level of connectivity with east/west roads through a flexible roadway network.		

Summary of Evaluation of Transportation Alternatives – Lake Shore Boulevard East

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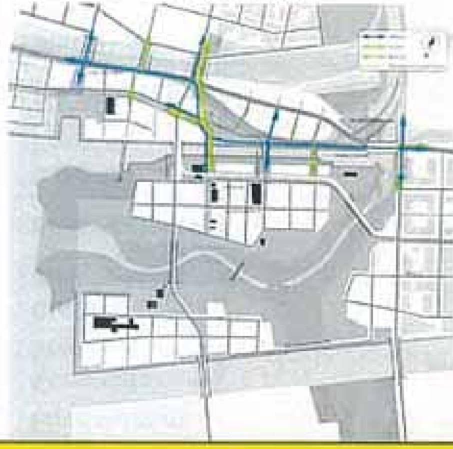
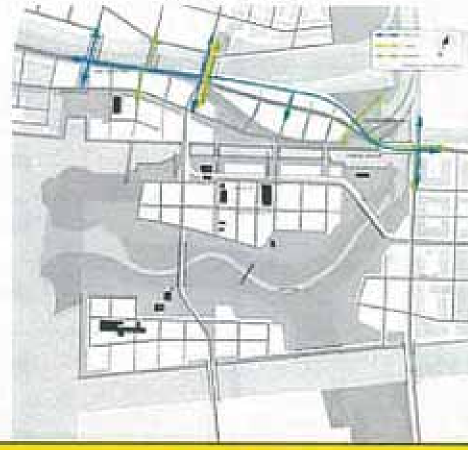
#1 Existing



#2 Rail Berm



#3 Mid-Block - PREFERRED

Evaluation Criteria	#1 Existing	#2 Rail Berm	#3 Mid-Block - PREFERRED
Natural Environment	Preferred	Preferred	Preferred
Social Environment	Not Preferred	Not Preferred	Preferred
Economic Environment	Not Preferred	Not Preferred	Preferred
Cultural Environment	Preferred	Preferred	Preferred
Sustainability	Not Preferred	Not Preferred	Preferred
Land Use and Property	Not Preferred	Not Preferred	Preferred
Transportation	Not Preferred	Preferred	Preferred
Municipal Services	Not Preferred	Preferred	Preferred
Overall Preferred	Not Preferred	Not Preferred	Preferred
SUMMARY	The Preferred Lake Shore Boulevard East Planning Alternative is **#3 Mid-Block** because it supports active uses on both sides of the street and makes the water's edge available for use by the public and pedestrians. The block sizes on both sides are developable, maximizing economic viability. It provides an urban boulevard with potential for active uses on both sides of the street that can attract pedestrian activity. It also increases ground floor activity opportunities on both sides of the street and creates an active street through the center of Keating North that can be accentuated with numerous public realm amenities. It supports a compact and walkable neighbourhood, provides for good transit connections at Cherry Street, creates a vibrant multi-modal use street and traffic can be maintained on existing Lake Shore Boulevard East during construction.		

Summary of Evaluation of Transportation Alternatives – Queens Quay

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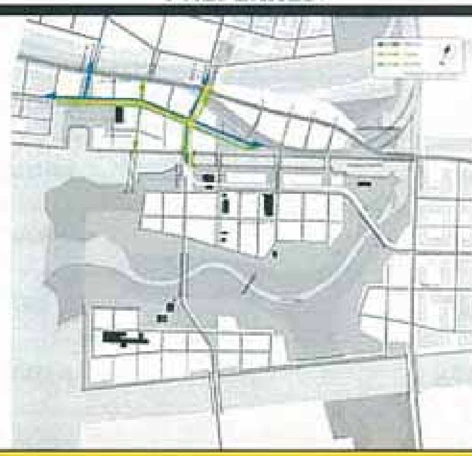
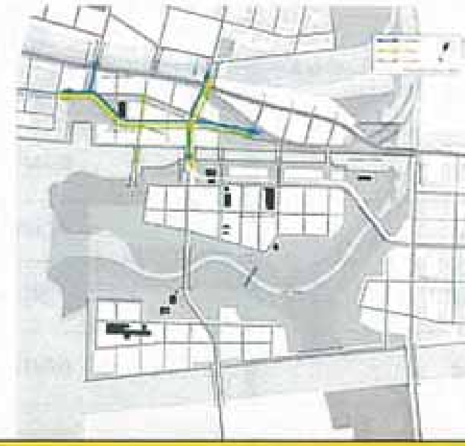
Evaluation Criteria	#1 North Alignment Easterly Extension North of the Silos PREFERRED	#2 South Alignment Easterly Extension South of Silos
		
Natural Environment	Preferred	Preferred
Social Environment	Preferred	Preferred
Economic Environment	Preferred	Not Preferred
Cultural Environment	Preferred	Preferred
Sustainability	Preferred	Not Preferred
Land Use and Property	Preferred	Not Preferred
Transportation	Preferred	Not Preferred
Municipal Services	Preferred	Preferred
Overall Preferred	Preferred	Not Preferred
SUMMARY	The Preferred Queens Quay Planning Alternative is **#1 North Alignment** because it maximizes areas for development and open space, accommodates transit through the centre of the site and supports a pedestrian, retail lined Queens Quay. It also supports a compact and walkable neighbourhood with viable block sizes.	

Summary of Evaluation of Transportation Alternatives – Don Roadway

WATERFRONToronto

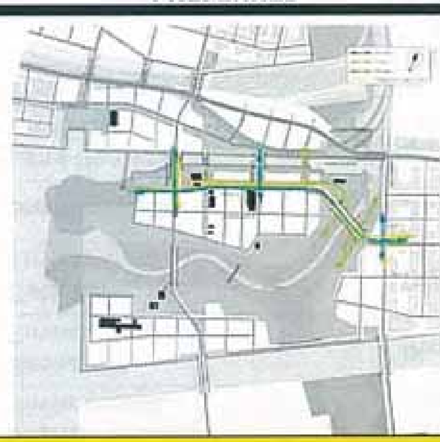
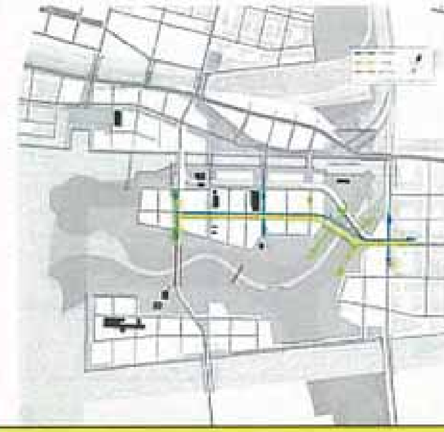
#1 Existing to Commissioners (Existing Alignment)

#2 Extend to Ship Channel with provision for Transit - PREFERRED

Evaluation Criteria	#1 Existing to Commissioners (Existing Alignment)	#2 Extend to Ship Channel with provision for Transit - PREFERRED
Natural Environment	Preferred	Preferred
Social Environment	Not Preferred	Preferred
Economic Environment	Preferred	Preferred
Cultural Environment	Preferred	Preferred
Sustainability	Preferred	Not Preferred
Land Use and Property	Not Preferred	Preferred
Transportation	Not Preferred	Preferred
Municipal Services	Preferred	Preferred
Overall Preferred	Not Preferred	Preferred
SUMMARY	The Preferred Don Roadway Planning Alternative is **#2 Extend to Ship Channel with provision for Transit** because it promotes vibrancy by improving circulation to the southern sections of Ship Channel East and West and facilitates a possible future new connection across the Ship Channel to beach area south of the Port Lands. It is consistent with transit that supports denser development and more activity in the area, maximizes opportunities for new land uses and development in the southeast quadrant of the Lower Don Lands and is compatible with public realm goals.	

Summary of Evaluation of Transportation Alternatives – Commissioners Street

WATERFRONToronto

Evaluation Criteria	#1 Villiers Alignment Northern Alignment on the Existing Villiers Street PREFERRED	#2 Mid-Block Alignment Mid-block alignment between Villiers and Commissioners Street	#3 Park Front Alignment Alignment on the existing Commissioners, which is now the edge of the Park
			
Natural Environment	Preferred	Not Preferred	Not Preferred
Social Environment	Preferred	Not Preferred	Not Preferred
Economic Environment	Preferred	Not Preferred	Not Preferred
Cultural Environment	Preferred	Preferred	Preferred
Sustainability	Preferred	Not Preferred	Not Preferred
Land Use and Property	Preferred	Not Preferred	Not Preferred
Transportation	Preferred	Not Preferred	Not Preferred
Municipal Services	Preferred	Preferred	Preferred
Overall Preferred	Preferred	Not Preferred	Not Preferred
SUMMARY	The Preferred Commissioners Street Planning Alternative is **#1 Villiers Alignment** because it is closest to the Keating Channel neighbourhood, providing greater connectivity and more potential for vibrant and mixed uses for the community. It provides direct access to Keating Channel, does not require complicated land acquisitions and reduces impacts to the existing Commissioners Street during construction of the new bridge. The orientation of the bridge crossing connects the Don Valley bikeway trail to the core development and new river areas. This alternative also provides for a compact and walkable neighbourhood and has the greatest potential to improve transit modal split because of its central location between the blocks north and south of the Keating Channel.		

Summary of Evaluation of Transportation Alternatives – Basin Street

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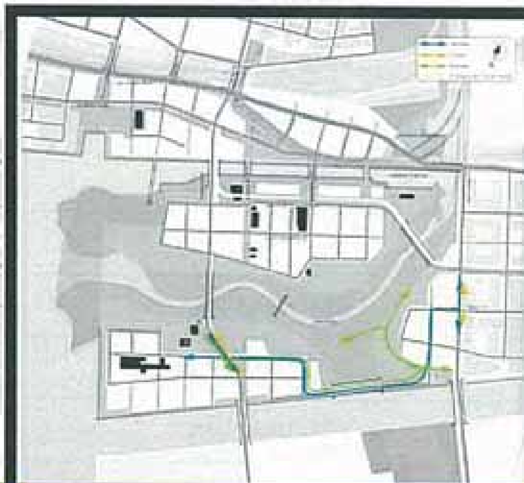
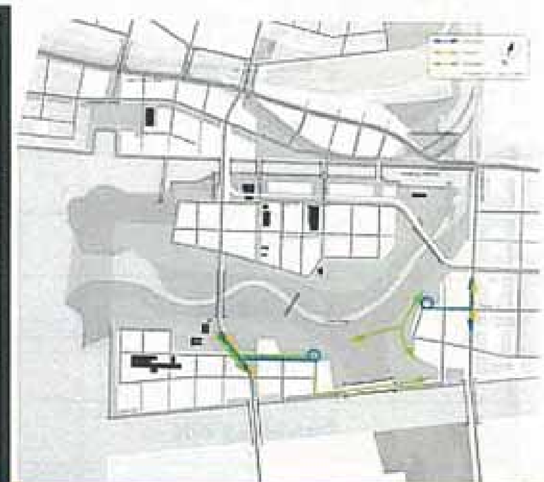
Evaluation Criteria	#1 Modified Secondary Plan Alignment	#2 Southern Alignment PREFERRED	#3 Discontinuous Alignment
			
Natural Environment	Not Preferred	Preferred	Preferred
Social Environment	Not Preferred	Preferred	Not Preferred
Economic Environment	Not Preferred	Preferred	Not Preferred
Cultural Environment	Preferred	Preferred	Preferred
Sustainability	Not Preferred	Not Preferred	Preferred
Land Use and Property	Not Preferred	Preferred	Not Preferred
Transportation	Not Preferred	Preferred	Not Preferred
Municipal Services	Preferred	Preferred	Preferred
Overall Preferred	Not Preferred	Preferred	Not Preferred
SUMMARY	The Preferred Basin Street Planning Alternative is **#2 Southern Alignment** because it does not impact the Don Mouth Naturalization area, it offers potential for the most active and vibrant uses within neighbourhoods and provides for the greatest connection of neighbourhoods in the southern half of the Lower Don Lands area. It also maximizes exposure to the water's edge in the west and at the ship channel and provides opportunities for new land uses, public realm features and great views towards the city and Lake Ontario.		

Summary of Evaluation of Transportation Alternatives – Keating Crossing

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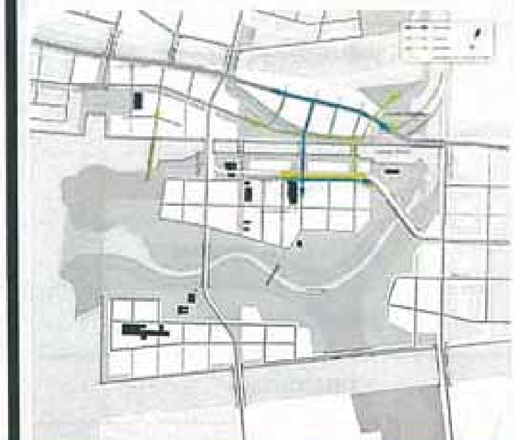
Evaluation Criteria	#1 No Crossings No New Crossings of the Keating Channel 	#2 Vehicular Heavy Two Vehicular Crossings and One Pedestrian/Bike Crossing (Trinity) 	#3 Pedestrian / Bike Heavy One Vehicular Crossing (Munition) and Two Pedestrian/Bike Crossings PREFERRED 
Natural Environment	Preferred	Not Preferred	Not Preferred
Social Environment	Not Preferred	Not Preferred	Preferred
Economic Environment	Preferred	Not Preferred	Preferred
Cultural Environment	Preferred	Not Preferred	Not Preferred
Sustainability	Preferred	Not Preferred	Preferred
Land Use and Property	Not Preferred	Not Preferred	Preferred
Transportation	Not Preferred	Not Preferred	Preferred
Municipal Services	Not Preferred	Preferred	Preferred
Overall Preferred	Not Preferred	Not Preferred	Preferred
SUMMARY	The Preferred Keating Crossing Alternative is **# 3 Pedestrian / Bike Heavy** because it provides a separate and continuous bicycle and pedestrian corridor across the Keating Channel to southerly neighbourhoods and is the most direct bicycle route to the Don River park and the Don Valley Trail System. This alternative also provides increased flexibility for the road network as a second north/south corridor which will reduce vehicular demand on Cherry Street. It provides access to development properties, increases economic viability and opportunities for new land uses along the corridor.		

Summary of Evaluation of Transportation Alternatives – Parliament Street

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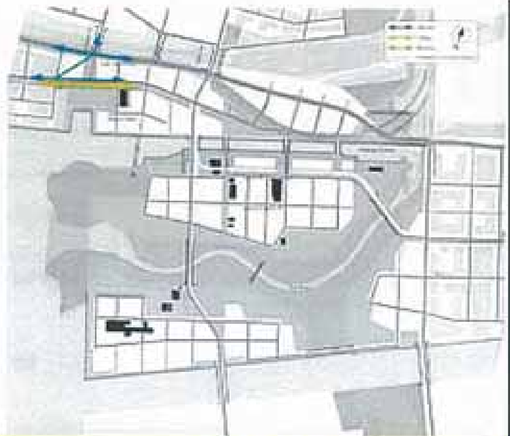
Evaluation Criteria	#1 Do Nothing Existing Alignment 	#2 Realigned Realigned Perpendicularly to Queens Quay PREFERRED 
Natural Environment	Preferred	Preferred
Social Environment	Not Preferred	Preferred
Economic Environment	Not Preferred	Preferred
Cultural Environment	Preferred	Preferred
Sustainability	Not Preferred	Preferred
Land Use and Property	Not Preferred	Preferred
Transportation	Not Preferred	Preferred
Municipal Services	Not Preferred	Preferred
Overall Preferred	Not Preferred	Preferred
SUMMARY	The Preferred Parliament Street Alternative is **#2 Realigned (Realigned perpendicularly to Queens Quay)** because it provides shorter and more direct access to the Parliament slip, which provides enhanced opportunities for active streets. This alternative creates a greater potential for a walkable street and greater accessibility to transit through the normalized intersection. The new vehicular transportation corridor also creates a more economically viable block and will allow businesses and traffic to continue with minimized disruptions.	

Summary of Evaluation of Transportation Alternatives – Portal Alternatives

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Parliament Tunnel Alternatives

Evaluation Criteria	#1 Do Nothing Existing Underpass	#2 Improve Tunnel Improve Existing Underpass PREFERRED
Natural Environment	Preferred	Preferred
Social Environment	Not Preferred	Preferred
Economic Environment	Not Preferred	Preferred
Cultural Environment	Preferred	Preferred
Sustainability	Not Preferred	Preferred
Land Use and Property	Not Preferred	Preferred
Transportation	Not Preferred	Preferred
Municipal Services	Preferred	Preferred
Overall Preferred	Not Preferred	Preferred
SUMMARY	The Preferred Alternative is **#2 Improve Tunnel** because it promotes a vibrant, mixed use community, with pedestrian access to the Parliament Street Slip. In addition, it promotes alternative transportation modes and contributes to improved public realm.	

Trinity Tunnel Alternatives

Evaluation Criteria	#1 Do Nothing No Connection under the Rail Corridor	#2 Create New Tunnel Add a New Underpass PREFERRED
Natural Environment	Preferred	Preferred
Social Environment	Not Preferred	Preferred
Economic Environment	Not Preferred	Preferred
Cultural Environment	Preferred	Preferred
Sustainability	Preferred	Preferred
Land Use and Property	Not Preferred	Preferred
Transportation	Not Preferred	Preferred
Municipal Services	Preferred	Not Preferred
Overall Preferred	Not Preferred	Preferred
SUMMARY	The Preferred Alternative is **#2 Create New Tunnel** because it provides multimodal access between the Distillery District and East Bayfront, allowing for the greatest potential for a vibrant, mixed use community. It also promotes access to the water, provides for economically viable blocks and supports and contributes to improvements to the public realm.	

Cherry Street Tunnel Alternatives

Evaluation Criteria	#1 Do Nothing Existing Underpass	#2 Improve Tunnel Widen Existing Underpass PREFERRED	#3 Build Second Tunnel Add a Second Underpass to the Existing Underpass PREFERRED	#4 Widen and Build Second Tunnel Add a Second Underpass to the Widened Underpass PREFERRED
Natural Environment	Preferred	Preferred	Preferred	Preferred
Social Environment	Not Preferred	Preferred	Preferred	Preferred
Economic Environment	Not Preferred	Preferred	Preferred	Preferred
Cultural Environment	Preferred	Not Preferred	Not Preferred	Not Preferred
Sustainability	Not Preferred	Preferred	Preferred	Preferred
Land Use and Property	Not Preferred	Preferred	Preferred	Preferred
Transportation	Not Preferred	Preferred	Preferred	Preferred
Municipal Services	Preferred	Not Preferred	Not Preferred	Not Preferred
Overall Preferred	Not Preferred	Preferred	Preferred	Preferred
SUMMARY	The Preferred Alternative is #2, #3 and #4 to improve the existing tunnel, build a second tunnel and add a second tunnel to the widened tunnel, because it will enhance multimodal access along Cherry Street to provide the greatest potential for a vibrant, mixed use community. The new transit corridor will create more economically viable blocks and a multimodal corridor promotes new land use and development. The two alternatives support a compact, walkable neighbourhood and increase space for pedestrians and bicycles.			

Preliminary Preferred Network

Class EA Master Plan

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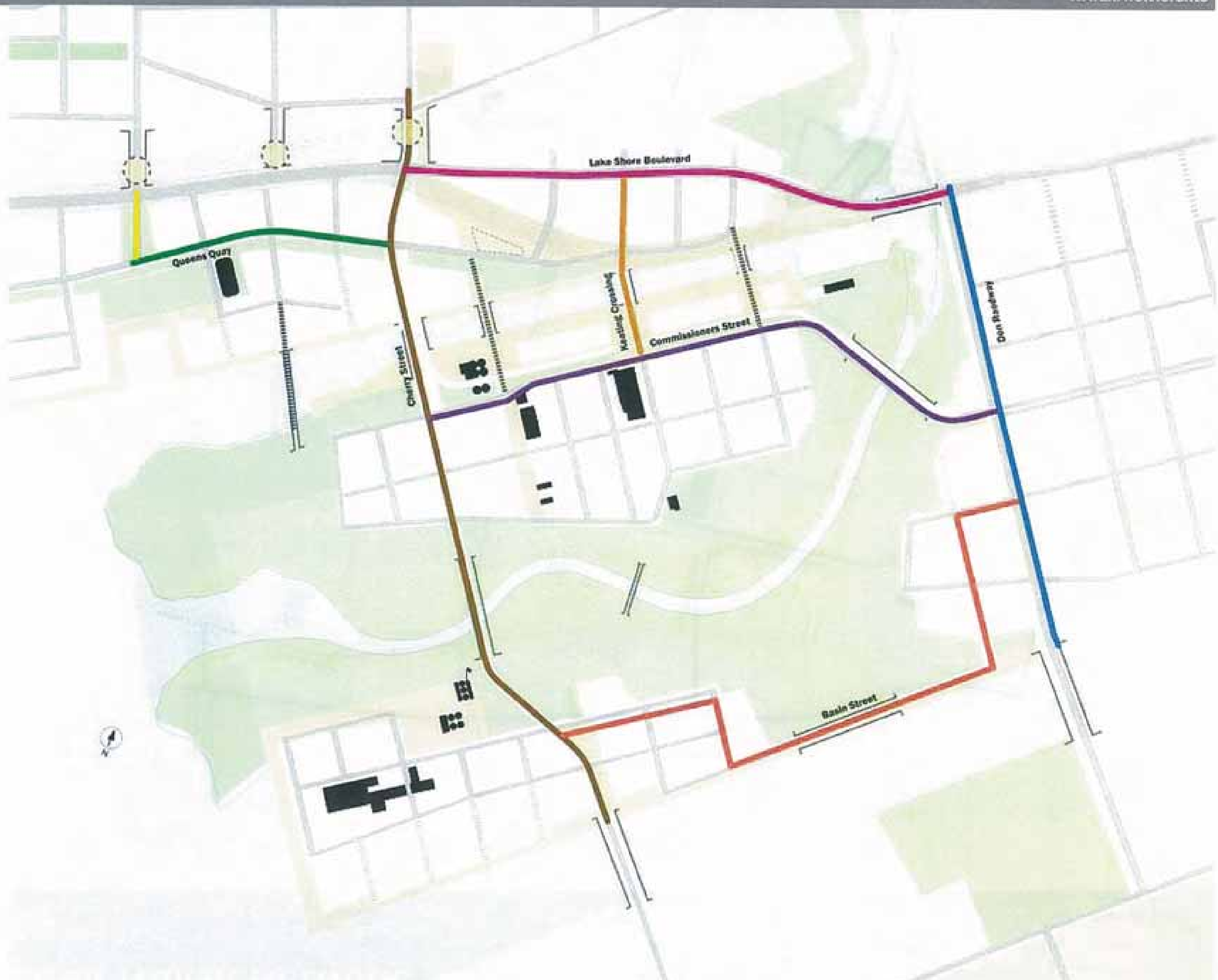

Preliminary Preferred Transit Network

Class EA Master Plan

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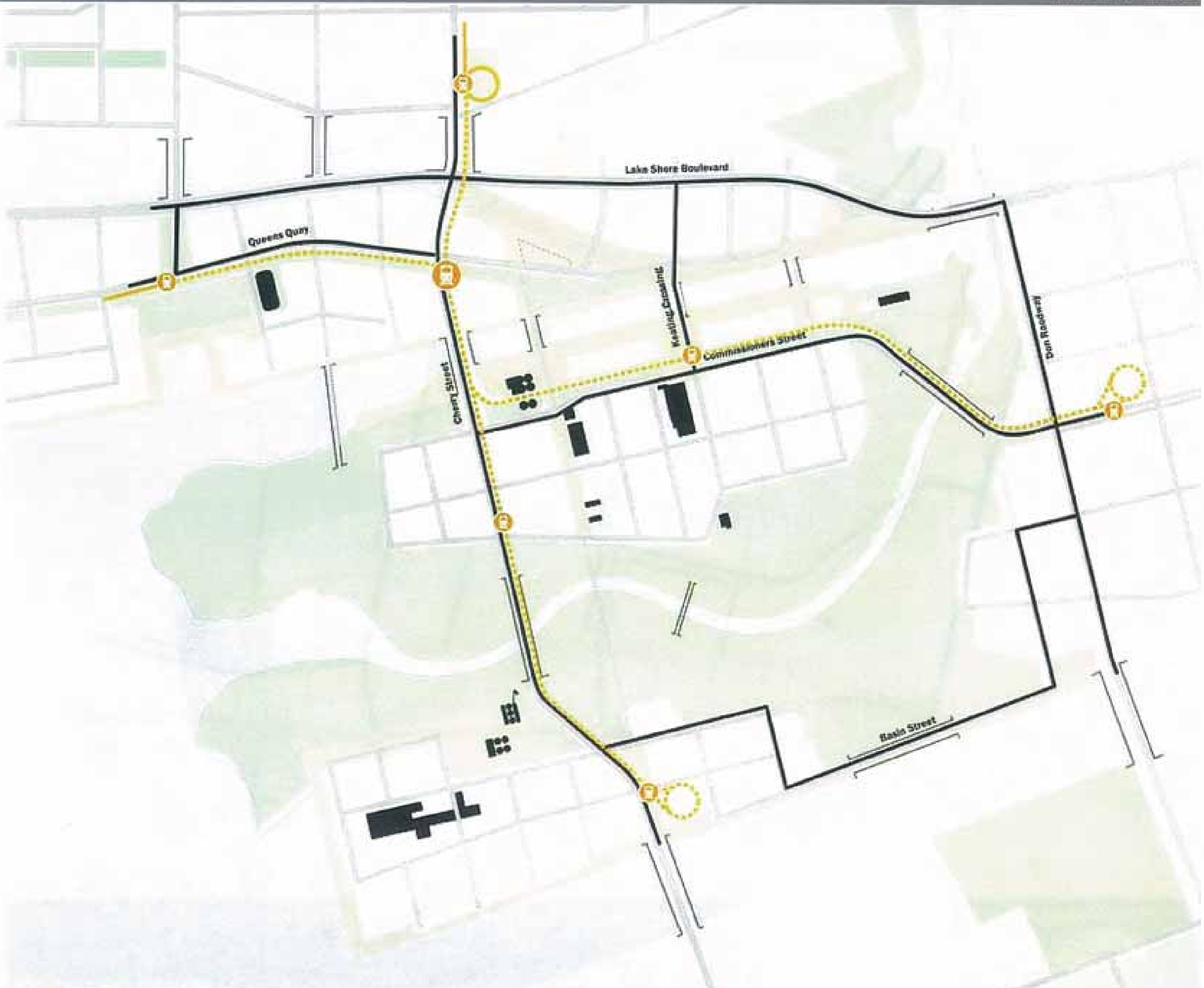

Preliminary Preferred Trail Network

Class EA Master Plan

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Stormwater

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Summary Evaluation of Stormwater Planning Alternatives

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Evaluation Criteria	Alternative #1 Do Nothing	Alternative #2A Use Oil/Grit Separators (OGS) to Manage Total Suspended Solids (TSS)	Alternative # 2B Use Detention Pond/Sediment Trap to Manage Total Suspended Solids (TSS)	Alternative #3 Integrated Treatment Train Approach to Manage Rate, Volume, Quality and Delivery of Hydrograph to Receiving Water PREFERRED
Natural Environment	Not Preferred	Feasible	Feasible	Preferred
Social Environment	Not Preferred	Not Preferred	Not Preferred	Preferred
Economic Environment	Not Preferred	Feasible	Feasible	Preferred
Cultural Environment	Preferred	Feasible	Feasible	Feasible
Sustainability	Not Preferred	Feasible	Feasible	Preferred
Land Use and Property	Not Preferred	Preferred	Feasible	Preferred
Transportation	Feasible	Feasible	Feasible	Feasible
Municipal Services	Not Preferred	Feasible	Feasible	Preferred
Overall Preferred	Not Preferred	Not Preferred	Not Preferred	Preferred
SUMMARY	The Preferred Stormwater Planning Solution is **Alternative #3** because it addresses both stormwater quality and quantity requirements and provides for potential additional enhancement of stormwater by providing multiple methods for Stormwater Management.			

Stormwater Runoff Treatment Process

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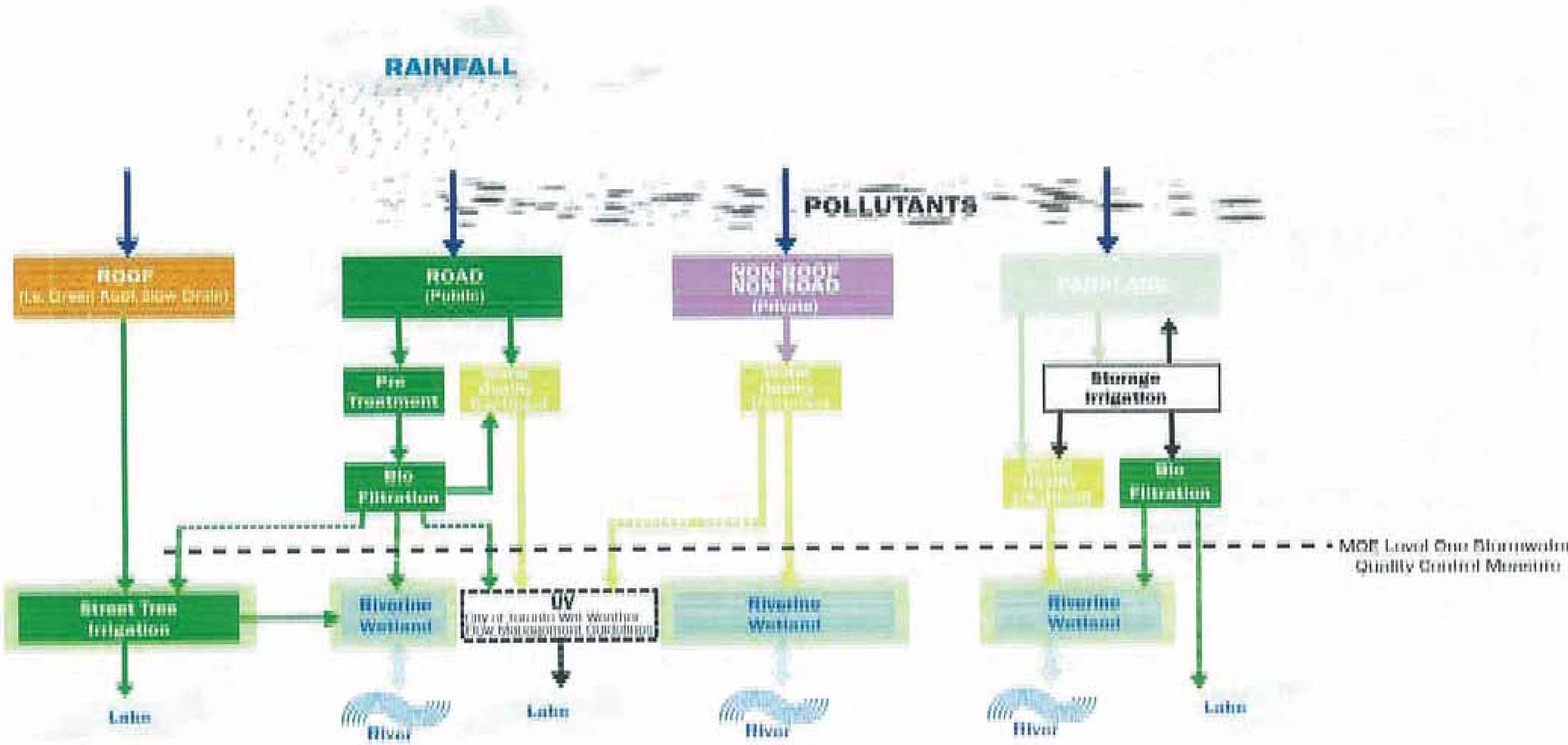

Stormwater Management Master Plan

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Infrastructure - Water and Wastewater

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Summary of Evaluation of Infrastructure Planning Alternatives – Wastewater

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Evaluation Criteria	Alternative 1: Do Nothing	Alternative 2A: Conventional Gravity Collection Systems by means of Rehab/ Reconstruct	Alternative 2B: Conventional Gravity Collection Systems by means of Rehab/ Reconstruct + New Commissioners St. Trunk Sewer	Alternative 3A: Alt 2A/B + Sewage Pumping Station (SPS) & Forcemains	Alternative 3B: Alt 3A & use of Gravity Operated Siphons in Lieu of SPS & Forcemain	Alternative 4: Vacuum Sanitary Sewage Collection System	Alternative 5: Ship Channel West Lands (Eco-Island) Serviced with On-site Sewage Treatment Facilities
Natural Environment	Not Feasible	Not Feasible	Feasible	Feasible	Preferred	Feasible	Preferred for Eco-Island
Social Environment	Not Feasible	Not Feasible	Feasible	Feasible	Preferred	Feasible	Feasible
Economic Environment	Not Feasible	Feasible	Feasible	Feasible	Preferred	Not Feasible	Feasible
Cultural Environment	Preferred	Feasible	Feasible	Feasible	Feasible	Feasible	Feasible
Sustainability	Not Feasible	Feasible	Feasible	Feasible	Preferred	Feasible	Feasible
Land Use and Property	Not Feasible	Not Feasible	Feasible	Preferred	Feasible	Not Feasible	Feasible
Municipal Services	Not Feasible	Not Feasible	Feasible	Feasible	Preferred	Not Feasible	Feasible
Overall Preferred	Not Preferred	Not Preferred	Not Preferred	Not Preferred	Preferred	Not Preferred	Not Preferred
SUMMARY	The Preferred Wastewater Planning Solution is **Alternative 3B** because it provides the greatest flexibility in addressing the short and long term servicing needs of both the Lower Don Lands. As it compatible with the new river alignment, and has the flexibility to accommodate planning and loading changes while minimizing energy input requirements.						

Preferred Wastewater Solution

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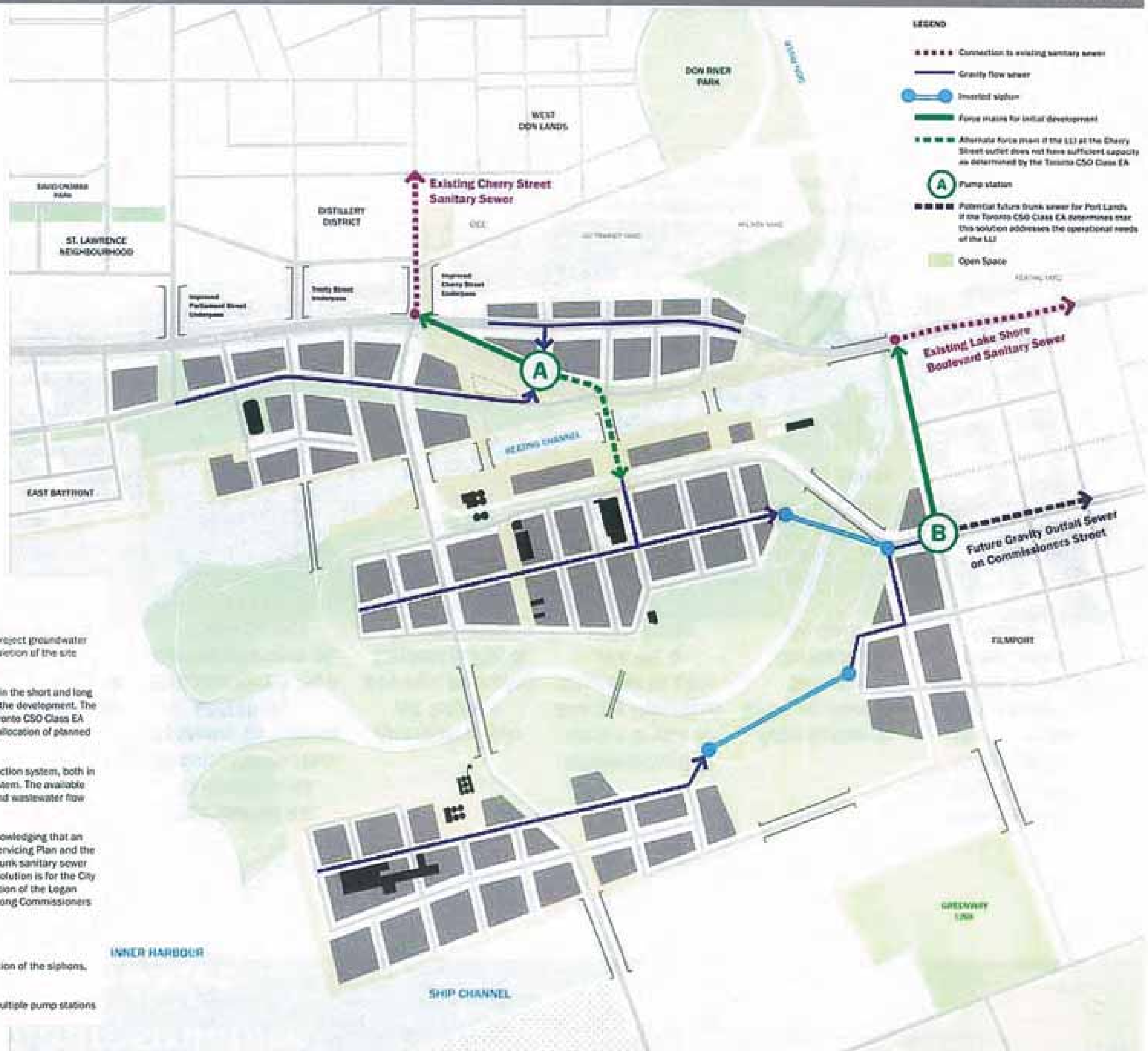

Qualifying Conditions

All wastewater infrastructure is below grade.

1. The project implementation in terms of phasing and the rate of build out may be impacted by the project groundwater management strategy. The preparation of the groundwater management strategy will follow the completion of the site geo-environmental investigations and reporting.

2. The scale of development that may contribute to the Cherry Street wastewater collection system, both in the short and long term, is conditional upon the ability of the Low Level Interceptor (LLI) to function as a sufficient outlet for the development. The ability of the LLI to function as a sufficient outlet falls within the scope of work being completed in the Toronto CSO Class EA Study. As such, the LDL team needs direction from the City of Toronto regarding the short and long term allocation of planned wastewater flows from the North Keating Lands to the LLI via the Cherry Street sanitary sewer.

3. The scale of development that may contribute to the existing Lake Shore Boulevard wastewater collection system, both in the short and long term, is conditional upon the available spare capacity within this receiving sewer system. The available spare capacity has been estimated, but additional information regarding water consumption records and wastewater flow monitoring is required from the City to ensure that the estimated spare capacity is accurate.

4. A future trunk sanitary sewer system is shown along Commissioners Street for the purpose of acknowledging that an integrated alternative solution of the Toronto CSO Class EA, the LDL Class EA Infrastructure Master Servicing Plan and the future servicing needs of the remaining Port Lands and Lake Ontario Park lands may include a new trunk sanitary sewer located along Commissioners Street. The first step in testing the need for this integrated alternative solution is for the City to determine if the long term operation of the LLI in terms of peak wastewater loadings at the connection of the Logan Avenue sanitary sewer to the LLI would benefit from the construction of a new trunk sanitary sewer along Commissioners Street.

5. If found preferable during the design stage, the shown network could be amended as follows:

a) The siphons and possibly also pump station B could be replaced by pump stations at the inlet location of the siphons, followed by force mains up to the receiving gravity flow sewer, or

b) All shown sewer lines could become common force mains and wastewater is pumped thereto from multiple pump stations that are placed at each of the properties.

Summary of Evaluation of Infrastructure Planning Alternatives – Water Supply

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Evaluation Criteria	Alternative 1: Do Nothing	Alternative 2: Conventional Servicing using MOE Guidelines for Estimating Project Potable Water Demands	Alternative 3: Conventional Servicing with Addition of Water Conservation / Efficiency Measures	Alternative 4: Addition of Non-Potable Water Systems to further Reduce Potable Water Demands 4a: Public Non-Potable Water Supply Systems	4B: Private Non-Potable Water Supply Systems PREFERRED	4C: Public & Private Non-Potable Systems
Natural Environment	Not Feasible	Feasible	Feasible	Feasible	Feasible	Preferred
Social Environment	Not Feasible	Feasible	Feasible	Feasible	Feasible	Preferred
Economic Environment	Feasible	Feasible	Preferred	Feasible	Feasible	Feasible
Cultural Environment	Preferred	Feasible	Feasible	Feasible	Feasible	Feasible
Sustainability	Feasible	Feasible	Feasible	Feasible	Preferred	Feasible
Land Use and Property	Not Feasible	Feasible	Preferred	Feasible	Feasible	Feasible
Municipal Services	Not Feasible	Feasible	Feasible	Feasible	Preferred	Feasible
Overall Preferred	Not Feasible	Feasible	Feasible	Feasible	Preferred	Feasible
SUMMARY	The Preferred Water Supply Planning Alternative is **Alternative 4B** because it represents the highest degree of water use efficiency, without having the potential disqualification factors. **Alternative 4C** may become the overall preferred in the long run. As it has benefits over Alternative 4B such as reducing the water demand from the City of Toronto's potable water system and reducing the peak flows for which the Lower Don Lands distribution system has to be designed. However, it also has risks that need to be better understood and evaluated before being selected for implementation.					

Preferred Water Solution

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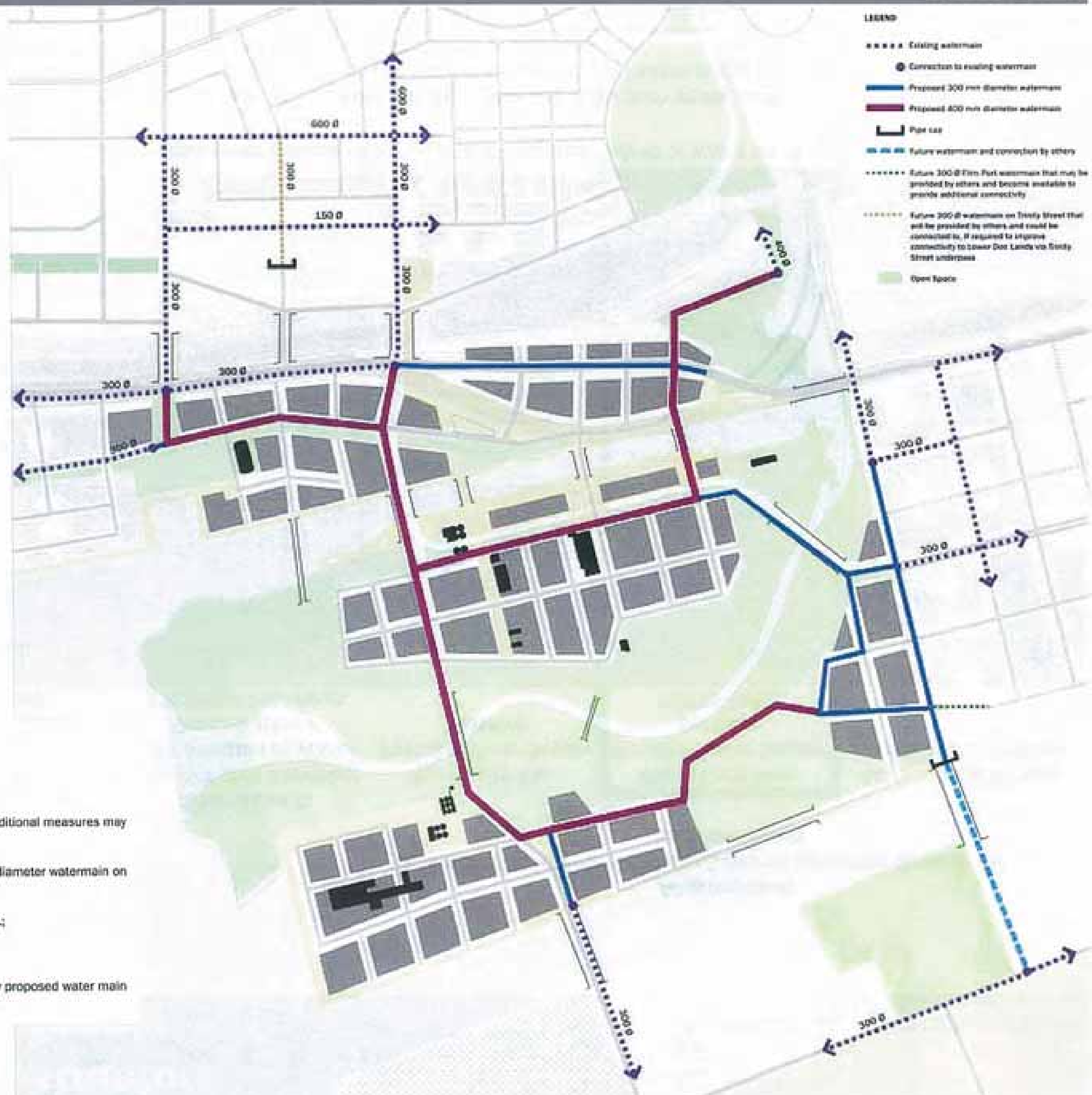

Qualifying Conditions

All water infrastructure is located below-grade.

1. Depending on irrigation requirements at the site, the final extent of which is still to be determined, additional measures may have to be taken. Such measures may entail one or more of the following:

a) Supplementing water supply from the south of the LDL by connecting the two dead ends of the 300 diameter watermain on Unwin Avenue at the former RL Hearns G.S.;

b) Increasing some of the proposed watermain diameters and/or adding more pipeline links in the LDL;

c) Addition of a separate non-potable water supply system for some or all of the irrigation needs.

2. Water demands from future development of Lake Ontario Park lands need to be quantified to verify proposed water main sizes and need for future connection of Unwin Avenue watermain to the Leslie Street watermain.

What's Next

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This Meeting presents our Recommended Alternative Solutions. After Public Meeting #2 the study team will finalize the preferred planning alternatives and finish the Master Planning process, taking into account stakeholder input from this evening.

The next step is to begin Phases 3 and 4 of the Class EA process for the Keating Precinct, which will include generating and evaluating design alternatives for transportation and infrastructure services in the areas surrounding Keating Channel.

A third Public Meeting will be held to present and seek input on the Recommended Preferred Design for the Keating Precinct in spring/summer of 2009.

You will be contacted again at that time.

Your Input is Important

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- Public participation is an important part of the study process.

- Please provide your comments to:

Andrea Kelemen, Communications and Marketing
Waterfront Toronto
20 Bay Street, Suite 1310
Toronto, ON M5J 2N8
Tel: (416) 214-1344 ext 248
Email: lowerdon@waterfrontoronto.ca
www.waterfrontoronto.ca/lowerdonlands

Thank you for attending

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TORONTO

Toronto Transit Commission

Lower Don Lands Public Forum #2
DRAFT Summary Report

St. Lawrence Hall
December 10, 2008

This report was prepared by Lura Consulting the neutral facilitation and consultation specialists for the Lower Don Lands project. It presents the key discussion points and outcomes from the December 10th 2008 public forum convened as part of the Lower Don Lands revitalization planning and Class Environmental Assessment Master Plan process. If you have any questions or comments regarding this report, please contact:

Andrea Kelemen

Waterfront Toronto

20 Bay Street, Suite 1310

Toronto, ON M5J 2N8

Tel (416) 214-1344 ext.248

Fax (416) 214-4591

Email: lowerdon@waterfrontoronto.ca

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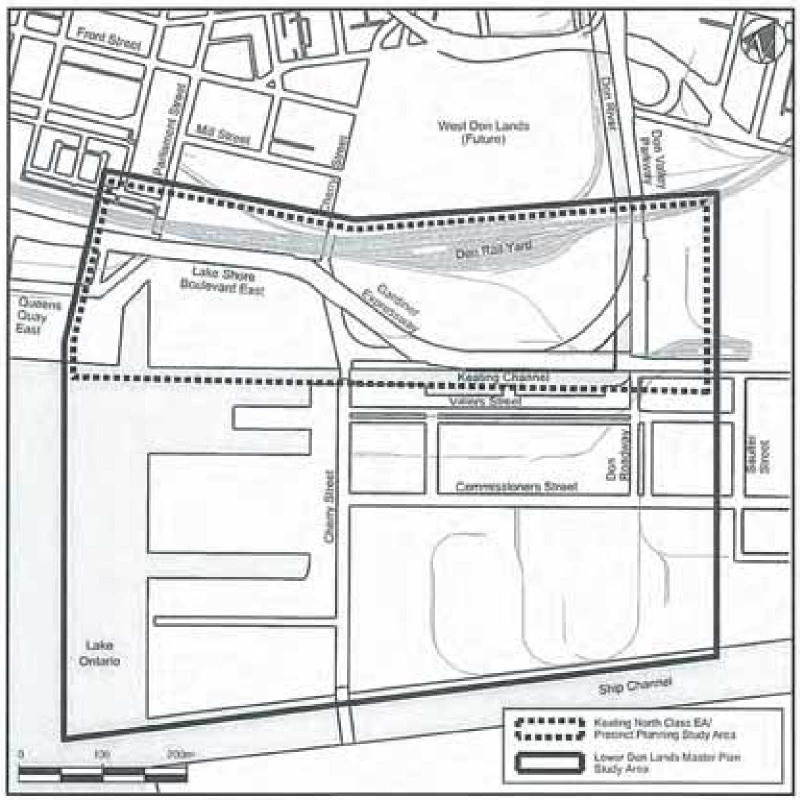
1. About Public Forum #2

Waterfront Toronto, the City of Toronto and the Toronto Transit Commission, as tri-proponents, are developing a plan to revitalize the Lower Don Lands and create a vibrant, mixed use, sustainable community that embraces and respects a newly naturalized and flood-protected mouth of the Don River.

The revitalization plan will include proposals for new neighbourhoods, community facilities and public spaces, as well as a Master Plan for transportation (including transit), water, wastewater and stormwater infrastructure. The study is being conducted in accordance with the requirements of the *Municipal Class Environmental Assessment 2000*, as amended in 2007 (Phases 1 and 2). The two key outputs of the planning process will include the:

- Lower Don Lands Infrastructure Municipal Class Environmental Assessment (EA); and
- Keating North Precinct Plan.

The Lower Don Lands study area is generally bounded by the Don rail yard and Gardiner Expressway on the north, the Parliament Street slip on the west, the Ship Channel on the south and Don Roadway on the east (see map below).



On December 10th 2008 the tri-proponents hosted the second Public Forum for the Lower Don Lands revitalization project at St. Lawrence Hall. The purpose of this second Public Forum was to seek public feedback on the emerging revitalization plans for the Lower Don Lands, with a particular focus on proposed plans for neighbourhoods, circulation, floodplain and habitat, water and wastewater, stormwater, and open space.

The Public Forum format consisted of a one-hour open house, followed by an interactive meeting that included a plenary presentation and topic-based breakout sessions.

An estimated 100 people participated in the event, of those, 71 signed in at the door (the list of participants who signed in is attached as Appendix A).

2. Open House

During the open house, participants were able to review a series of display boards that focused on several key aspects of the Lower Don Lands study including:

- The Municipal Class EA Process;
- Maps of the study area;
- Existing conditions (Natural, Social and Cultural Environments);
- Families of Corridor Alternatives;
- Summary of Evaluation of Transportation Alternatives;
- Summary of Evaluation of Stormwater Planning Alternatives;
- Summary of Evaluation of Infrastructure Planning Alternatives (Wastewater and Water Supply);
- Preferred Planning Solutions; and
- Next Steps.

The Lower Don Lands Project Team was available during the open house to answer questions and respond to feedback. The Project Team includes:

- Waterfront Toronto;
- Toronto Transit Commission;
- City of Toronto;
- Michael Van Valkenburgh Associates;
- Greenberg Consultants;
- MMM Group;
- AECOM;
- Arup; and
- Toronto and Region Conservation Authority.

Members of the Project Team speak with a participant.

3. Welcome and Introductions

To begin the plenary session of Public Forum #2, Mr. Chris Glaisek, Vice President of Planning and Design at Waterfront Toronto, welcomed participants to meeting and provided opening remarks.

Mr. Glaisek provided an overview of the scope of the meeting. He indicated that the presentation would cover the proposed block plan and design concepts for the Lower Don Lands area, whereas the EA Master Plan materials were presented on the display panels in the open house. Mr. Glaisek noted that the meeting would examine the planning concepts and interrelationships of the key plan components such as parks and open space, neighbourhoods, and transportation networks, and suggested that the Project Team is very interested in receiving public feedback on these items. He noted that this Public Forum was not intended to discuss the naturalization of the mouth of the Don River, which is the subject of a separate EA led by the Toronto and Region Conservation Authority. Mr. Glaisek also noted that that meeting would not include discussion about the Gardiner Expressway, which will be the subject of an EA in the near future. He stated the Lower Don Lands Project Team plan is starting with the assumption that the Gardiner Expressway will stay up, however the team is well aware that this may change with the EA to come.

David Dilks of Lura Consulting welcomed participants and described his role as the neutral facilitator. Mr. Dilks reviewed the agenda (see Appendix B – Public Forum Agenda) and meeting handouts which included a set of key maps and images prepared by the Project Team, as well as Worksheets which would be the focus of the topic-based breakout sessions. Mr. Dilks indicated that following the presentation, participants would have the opportunity to provide feedback on six key features of emerging revitalization plans for the Lower Don Lands, including neighbourhoods, circulation, floodplain and habitat, water and wastewater, stormwater, and open space. He indicated that comments could also be submitted in writing using the Worksheets either at the meeting or after the session by December 19th 2008.

4. Presentation

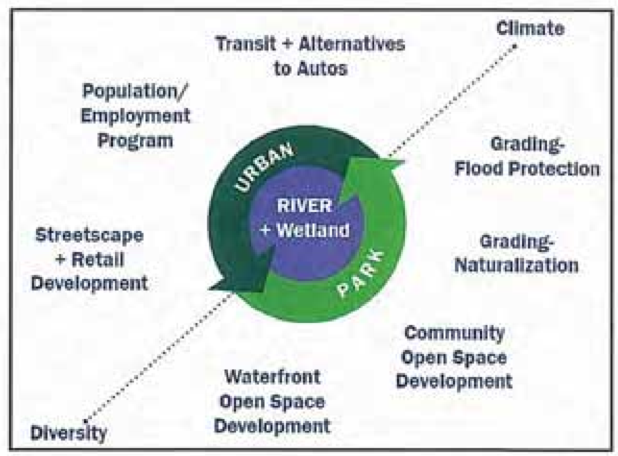
Liz Silver of Michael Van Valkenburgh Associates, and Ken Greenberg of Greenberg Consultants, provided the presentation on behalf of the Project Team (presentation slides available for download at www.waterfrontoronto.ca/lowerdonlands).

The presentation included:

- A description of the interrelated planning and design activities between this project and the Don Mouth Naturalization EA;
- The block plan concept for the Lower Don Lands;
- An explanation of how the recommended infrastructure choices shaped the block plan;
- The proposed open space system;
- The emerging Neighbourhoods Plan; and
- Next steps.

Ken Greenberg presents slides to Public Forum participants.

Throughout the presentation, the presenters stressed the Project Team's goal of achieving the right balance between river/wetland, urban and park objectives, as expressed in the accompanying diagram.



The presenters explained that the project aims to make the waterfront accessible to all and to connect nature and neighbourhoods to the surrounding area in a fully sustainable way.

The goals for creating neighbourhoods in the Lower Don Lands were articulated. These goals include taking advantage of the unique river setting, relating the new neighbourhoods to the surrounding context, fostering sustainable diversity, optimizing the size, shape, orientation of blocks, and creating real neighbourhoods. The presenters indicated that planning for the neighbourhoods also includes climate considerations such as protection from winter winds, capturing summer breezes, and hours of sun exposure.

The plan for the Lower Don Lands will emphasize land use diversity and include a range of living environments for diverse populations, employment environments for a diverse economy, retail environments to serve residents, workers and visitors, and transit to service the area.

The presentation concluded with next steps including an invitation to the next Public Forum in Spring 2009.

5. Questions and Answers

Following the presentation, Mr. Dilks asked participants if they had any questions related to the presentation. The following summarizes participants' questions and comments (identified with 'Q' or 'C') and responses from the Project Team where provided (identified with 'A'):

C: I am interested in the edges of the neighbourhoods in terms of species of animals that inhabit the area. Do you have target indicator species? I ask that you have a shortlist of these species at future meetings. We need to be biometric not just homocentric.

Q: Can you reconsider the total density you have set for the area, and the retaining of the right angle of the Keating Channel? I think the density target should be less; the target density was never really discussed with the public.

A: The discussion about density will be more detailed at our next meeting. The main criteria we are looking at here is what urban form can best support the density. We need to balance with the river and environment as we've said in the presentation. You will see the examples from other cities give you a good idea about appropriate densities.

C: I' am concerned about creating jobs for young black males, and we hope to create a heritage center at the mouth of the Don River to create jobs for at risk youth. Please consider what some communities are really going through. We ask for 20 acres at the end of the Don River for such a heritage centre.

A: I wanted to clarify that Waterfront Toronto is not precluding the type of use you have suggested; we think it would be a terrific thing, but we are not subsidizing that type of use. We are working to create non-profit housing in the area.

C: I want to thank the team for this presentation, which distils very complex and large amounts of information. I recognize that implementation is well in the future due to the economic situation. The depth of research that has gone into this will help us accommodate innovative and new technologies. It is very forward thinking.

Q: With respect to the privately owned lands in the area, such as Home Depot, is there a process by which these private land owners can move forward to develop their lands as part of the plan that has been presented? If so, will the public be involved in that?

A: We think the concepts that the Project Team has presented will provide a basis for further discussions with landowners and they will work with us going forward. It should be noted that the Stakeholder Advisory Committee (SAC) for this project includes representatives from the private landowners.

Q: Has the team given any thought to routes through the area for small water craft such as canoes or kayaks? Small water craft need a fair distance to be out on the water for a significant amount of time. You will need to think about connections to other parts of the waterfront. It would be a great opportunity for recreation.

A: The Project Team has created a marine uses plan, but we did not have time to present it at this session. We are looking at creating a storage area for canoes and kayaks on site. We are very conscious of this recreational opportunity.

C: The estimate of the number of people living on the site seems too high. I would like to know the number of people per square kilometre on site for the other case studies you have looked at. I don't think the example from British Columbia is totally sustainable, You may need to look into this further.

A: Sustainability is part of our goal statement for this project and that is why we are looking at this in a layered way. We want to create a master plan that is sustainable. As we have shown today, diversity of land use is critical to density. There needs to be residential, economic, retail, and recreational uses in the area. It is the process by which you make an area dense, not just the number that is important. You need to consider the types of housing and demographics. The area of our site is in the same ballpark size as the other examples shown in the presentation todayy.

Mr. Dilks thanked the participants for their questions and initiated the topic-based breakout sessions.

6. Topic Breakouts

Following the presentation, participants were invited to visit six topic-based breakout tables set up at the back of the meeting room. At each table, members of the Project Team were present to provide information and receive feedback. Relevant maps and diagrams were available at each breakout station.

The six topic breakouts focused on:

1. ***Neighbourhoods;***
2. ***Circulation;***

3. ***Floodplain and Habitat;***
4. ***Water and Wastewater;***
5. ***Stormwater;***
6. ***Open Space.***

For each topic, participants were asked to consider the following questions:

1. ***What feedback do you have on this feature of emerging revitalization plans for the Lower Don Lands (including how this feature relates to others)?***
    a. ***What do you like?***
    b. ***What do you suggest be done differently?***
    c. ***How does this feature relate to others?***

Participants were also encouraged to provide written comments using the provided Worksheets.

The following provides a summary of the feedback received from participants at the roundtable discussions and ensuing plenary reporting session. This summary also reflects individual feedback provided through submitted Worksheets and other written comments submitted to Waterfront Toronto following the meeting. For a compilation of all written comments received, please see Appendix C.

Participants answer questions and provide feedback during topic breakouts.

Breakout Highlights

Following the breakout sessions, a Project Team representative provided a summary of the discussion pertaining to their topic.

Stormwater

Participants at the stormwater table had a number of questions about bicycle trails and how they are placed in relation to the watercourses. Participants questioned how the pumps will move stormwater, how much sediment will be removed, where will additional trails be added, and whether the public will have access to the watercourses from the trails.

During breakouts participants write suggestions on a provided study area diagram.

Water and Wastewater

At the water and wastewater table, there was discussion of integrating water and wastewater solutions with the rest of the site. Participants asked about the technical terms and definitions. There were some comments about the phasing plans for infrastructure implementation.

Floodplain and Habitat

Participants had questions about flood frequency and how flood events should be handled, specifically with respect to sediment management, debris management, and ice management. There were questions about the habitat being influenced by sediment, as well as questions about the Keating Channel and flood flows. Safety was a concern that was brought up, especially with respect to access to water for children.

Open Space

Participants at the open space table raised questions about public access to the water. Participants also had questions about whether the open space areas can accommodate different types of recreation. It was noted that some areas should be protected and not be accessible to the public. Participants expressed the view that the design should provide for all 12 months of the year. Participants asked that the design include places for water taxis and other small water craft. There were comments about the connection to the greenway and Film Port area, as well as keeping bike lanes continuous through the area.

Circulation

The circulation table received comments about the interrelationships within the plan. There were also comments about providing for canoes and water taxis. Overall there were three (3) types of comments: 1) transit – what happens at Commissioners Road, will buses be provided, coordination with West Don Lands streetcar, pedestrian access to transit; 2) road capacity – comments that the roads being planned might be too big, and the request to think about Queens Quay and Lakeshore Blvd as one way streets; and 3) safety.

Neighbourhoods

The neighbourhoods table generally received positive feedback about the proposal plans. There were many questions about when this plan will be implemented. Comments included suggestions for programs with marine and cultural uses, requests for clarification regarding circulation plans and the existing versus proposed Cherry Street alignment. There were many questions about transit and comments about land use and interrelationships with the new neighbourhoods. Participants supported a mix of housing options. Participants were concerned about having dedicated green space and play space for area schools. Overall, participants wanted to see year round programming.

Topic 1: Neighbourhoods

What do you like?

Participants noted a variety of positive aspects of the neighbourhood plan for the Lower Don Lands. Comments included the following:

- Variety of opportunities for recreation;
- Connection to other local neighbourhoods;
- New walking/cycling link at Trinity Street;
- Suitable population density;
- Retail space;
- Mixed use;
- Density high enough to support services such as transit.

What do you suggest be done differently?

- Provide enclosed playgrounds at schools to ensure safety of students;
- Providing sensible staging areas in close proximity to the suggested water access areas;
- Allow for parking of vehicles in support of a staging area for small boats and model boaters;
- Locate industries near rail;
- There needs to be less housing density planned.

Topic 2: Circulation

What do you like?

Comments included the following:

- More bike paths;
- Extension of streetcars/LRTs in the area;
- Trinity Street portal;
- Moving Cherry Street towards the west;
- Keeping roads out of the core green area.

What do you suggest be done differently?

- Provide a simpler bike path along Cherry Street (on the west side);
- Physically separate bike lanes from vehicular traffic;
- Avoid routing the pedestrian path over the bicycle path thus reducing conflict;
- Reduce lanes on Lakeshore Blvd;
- Make Queens Quay and Lakeshore Blvd one-way streets;
- Create bike connections beyond the study area;
- Is it possible to have a transit line that goes directly from Queens Quay to Commissioners Road without running on Cherry Street?
- Provide a transit connection from the east;
- Ensure connection to the West Don Lands streetcar;
- Think about canoe-kayak connectivity to other parts of the Lower Don and the lake.

How does this feature relate to others?

- Filmport needs its own exit off of the southbound Don Valley Parkway;
- Consider relationship to north Transit City Project (LRT).

Topic 3: Floodplain and Habitat

What do you like?

Comments included the following:

- The link between the shore of Lake Ontario and the Don River valley to allow wildlife to migrate easily;
- Water quality in the harbour will improve;
- Healthy and vibrant environment for all to enjoy;
- The newly expanded south option.

What do you suggest be done differently?

- Create a "wildlife passage" over the ship channel;
- Remove or prevent debris being ejected into the harbour following a storm event;
- Encourage better habitat for marine flora and fauna;
- Reduce seaweed growth along the waterfront;
- Perform a toxic soil clean-up;
- Create a Hurricane Hazel flood strategy.

How does this feature relate to others?

- The design of the south option to the lake can integrate the need for a flood way/habitat link with the cooperation of the small boat clubs.

Topic 4: Water and Wastewater

What do you like?

Comments included the following:

- Using stormwater runoff to help irrigate trees;
- Using stormwater runoff for wetlands;
- The effort to manage water sustainability.

What do you suggest be done differently?

- Water and wastewater can be dealt with and treated using the latest technologies, such as the methods of John Todd.

Topic 5: Stormwater

What do you like?

Comments included the following:

- Using stormwater runoff to help irrigate trees;
- Using stormwater runoff for wetlands.

What do you suggest be done differently?

- Contain debris (i.e. large trees) from entering the harbour after storm events.
- Capture run-off from the Don Valley Parkway and direct it into a 3 stage wetland system.

Topic 6: Open Space

What do you like?

Comments included the following:

- The balance between open space and built space;
- The fact that there seems to be a much better link between the Don Valley open space and the open space along Lake Ontario.

What do you suggest be done differently?

- Avoid having the pedestrian path cross the bicycle path to avoid potential conflict;
- Accommodate marine uses effectively;
- Provide access for shipping and receiving;
- Include lands south of ship channel in study area.

Additional Comments and Questions

Many participants took the opportunity to express their opinions, ideas and questions about the project in general. Representative comments included the following:

Energy and Climate Change

- Request to see details on the proposed district energy system (e.g. energy needs in MW, kWh, % net by renewable source, such as solar and geothermal, lake water cooling);
- Neighbourhoods must be carbon neutral.

Connection to Nature

- Increase opportunities to be in nature in the City;
- The Port Lands is a crucial part in the City where we need to ensure connections to nature are maintained;
- Define water access for people;
- Remember human access to the water while keeping protection of animals in the forefront;
- Allow for woody areas which are natural and unmanicured;
- In the historical context, and within ecology time, the most significant aspect of this process is to bring back the watershed ecosystem to as much of the historical conditions (pre-settlement) as possible, within the urban context.

Wind

- The development of taller built structures along the waterfront from Yonge street to the Lower Don Lands area will have an adverse effect on wind speeds in the area.

By-laws and Regulations

- The RCYC would specifically ask that in the course of the development of by-laws regulating the area of the Lower Don Lands and the East Bayfront that very serious consideration be given to by-laws to ensure that they do not preclude present and possible future marine uses by restricting reasonable access to the waters edge, and that the by-laws developed do in fact encourage marine usage;

Parking

- Create central waterfront parking.

7. Next Steps

David Dilks reminded participants to hand in their Worksheets at the conclusion of the meeting or return them by the December 19th 2008 deadline. Mr. Dilks informed participants that the presentation would be available on the Waterfront Toronto website (www.waterfrontoronto.ca/lowerdonlands) and that a report on tonight's meeting would be prepared and shared with those who attended.

Mr. Glaisek thanked participants for attending the Public Forum and encouraged them to continue to provide feedback to the Project Team.

Appendix B – Public Forum Agenda

Meeting Purpose:

To seek public feedback on emerging revitalization plans for the Lower Don Lands.

6:00 pm Open House

7:00 pm Welcome and Opening Remarks

Chris Glaisek, VP Planning & Design, Waterfront Toronto

David Dilks, Facilitator, Lura Consulting

7:10 pm Project Team Presentation

Liz Silver, Michael Van Valkenburgh Associates

Ken Greenberg, Greenberg Consultants

Questions of clarification at the conclusion of the presentation.

8:00 pm Topic Breakouts

Neighbourhoods (Worksheet #1)

Circulation (Worksheet #2)

Floodplain & Habitat (Worksheet #3)

Water & Wastewater (Worksheet #4)

Stormwater (Worksheet #5)

Open Space (Worksheet #6)

8:40 pm Breakout Highlights & Closing Plenary

8:55 pm Next Steps & Closing Remarks

Chris Glaisek, Waterfront Toronto

9:00 pm Adjourn

Appendix C – Written Feedback

This appendix documents written feedback to the focus questions received from participants. The comments are from table discussions (as captured in the note-takers' notes), individual Workbsheets and post-event feedback received by Waterfront Toronto by the December 19th 2008 comment deadline.

Topic: Neighbourhoods		
What feedback do you have on this feature of emerging revitalization plans for the Lower Don Lands (including how this feature relates to others)?		
I like…	**What I suggest be done differently…**	**How this feature relates to others…**
Variety of buildings and opportunities for recreation (ex. Schools, library, community centre, parkland).	Concerned that the proposed schools have enclosed playgrounds to ensure safety of students.	Use of public space.
	We would like a large space of 20 acres dedicated to African-Canadian economic and cultural development.	
I like the fact that you are trying to connect the rather isolated Lower Don Lands neighbourhood to the other neighbourhoods and applaud your plan to improve the links under the railway berm. The idea of a new walking/cycling link at Trinity Street is excellent as are the improvements to the Cherry and Parliament Street underpasses, both of which are narrow and "dreary".		
RCYC Comments on neigbourhoods: The neigbourhood plan is generally compatible with RCYC interests (pending resolution of the Queens Quay and Cherry St. Real estate issues). The density appears to be suitable as does the generally articulated direction of the built forms. We feel this will eliminate the blight of the present LDL and add significant value to the area. We feel the retail space will help to support	RCYC Comments: The single biggest concern would be to allow for parking of vehicles in support of a staging area for small boats and model boaters. Canoes, Kayaks, and model boats do not arrive at the waters edge on bikes or by TTC, they really do require private vehicles to allow them to get close to the water. Providing sensible staging areas in close proximity to the suggested water access areas is absolutely critical to those who wish to access the harbour from	

chandlers and other providers of marine goods and services in close proximity to where they are needed, close to the water and the actual marine uses that animate the harbour.	the LDL. In respect of model boats, the issue of access could be eliminated if public storage, or a small club space, were allowed for in close proximity to the waters edge access points. A fine example of this is the Central Park Model Boat club in Manhattan. CPMBC has been in operation for over 100 years providing quiet, environmentally friendly animation to the central park pond. The LDL would be a fantastic location for such a facility. Planning should consider space for such an activity which can make sailing accessible to a very wide array of individuals as the cost of entry can be very low. The ideal location for this might be at the interface between the passive use land and the boardwalk.	
I like the fact that there will be a cluster of housing around the Keating Channel. Years ago (1992?) there was a presentation about how the Cayahuga River was "improved" but it was all waters edge boutiques and a pizza delivery boat (this got lots of laughs and chuckles from the large audience at the Ontario Science Centre[?]). Small row boats, dinghies and canoes = yes, but let's not go overboard on this. See Newsweek Magazine from 1991(?) On Waterfront Revitalization Boutiques.	There needs to be less housing density planned, think Central Park in New York City. The "Green Emerald" at the centre of the Lower Don Lands will cause property values around it to skyrocket - so lower the commitment to housing density for now and lay long range plans for an ecosystem connected from the lake to the hunterland at the Oak Ridges Moraine and beyond - the Big Green "S"	
The neighbourhood concept - mixed use. Density high enough to support services such as transit.	Lets make sure it is mid rise development south of Keating Channel.	

Topic: Circulation

What feedback do you have on this feature of emerging revitalization plans for the Lower Don Lands (including how this feature relates to others)?

I like…	What I suggest be done differently…	How this feature relates to others…
More bike paths. Dedicated lanes. Extension of streetcars / LRTs in the area. Trinity street portal.	Provide a simpler bike lane/path along Cherry Street (i.e. all on the west side). Eliminate the jog eastward where the streetcar turns. A design principle for cycling could be "safe and simple". Physically separate bike lanes from traffic (people will always park in bike lanes if they can). Follow the plan for the Central Waterfront in which the popular option was vehicles on one side, LRT, then 2 way bike paths (i.e. Martin Goodman Trail). Please avoid routing the pedestrian path over the bicycle path and reduce conflict.	
I like the idea of moving Cherry Street towards the west as this will create a new and potentially vibrant north-south street. I am very happy to see that your plans to include a full overhaul of the Cherry Street underpass so that it can easily handle transit and other traffic as well as pedestrians and cyclists.	It is not clear to me if you are intending that the streetcar loop just north of the berm (which is certainly necessary until the Cherry Street line can link to Queens Quay line) is permanent. Considering the volume of streetcar traffic I wonder if you need two loops, one north of the berm and one south. Maybe you could make the one north of the berm temporary until the Cherry Street underpass allows streetcars to go to Queens Quay and make the main loop there. This would allow people living in West Don Lands to get to the QQ loop and decide there if they wanted to get a Cherry Street streetcar or a QQ one. If the loop north of the berm were only temporary the land it takes could become parkland as soon as it could be removed.	

	I realize that you need to work on the assumption that the Gardiner will not be removed but suggest it would be helpful if you said a bit more about how the proposed road layouts north of the Keating Channel will change if it is removed. (Not too much I think). At present, there is a cycle path running immediately south of the berm from the Don River to Parliament Street. Though this runs parallel to the Marti Goodman it is actually very popular as it allows cyclist to avoid crossing Lakeshore and Queens Quay. Ideally this path would remain and be extended to Yonge Street. Cyclists who are going downtown and are coming down the Don Valley or from the Lakeshore East cycle path should not need to go as far south as the Martin Goodman trail to find a safe east-west path.	
	RCYC Comments: In the absence of a suitable new City Station agreement with Waterfront, the TPA and the City we object to the current planned extension of Queens Quay. It has a devastating effect upon our City Side operations and seriously jeopardizes the viability of the club for the first time in 150 years. Upon reaching a suitable resolution to our real estate issue we have no objections to the proposed circulation plan. The proposed TTC routes are effective if perhaps 200 meters too short to serve our likely future City Station location. While many members drive from locations across the city to access the club, many staff and Junior members and guests use, when available, public transit and bikes to access	

	the club ferry terminal. One comment would be to ensure that the traffic engineers do not create a main North South thoroughfare on Cherry street that is as dysfunctional as Queen Quay is today. The preferred Queens Quay design program shown in the QQ EA process is acceptable to the RCYC for the Cherry street corridor.	
I like that you are keeping roads out of the core green area.	The Basin Street bridge must be of an arched design to facilitate movement of water, wildlife and plant materials for an expanded south option including south of the ship channel to Lake Ontario Park.	Closing Don Roadway. Filmport needs its own exit off of the southbound Don Valley Parkway. Don Roadway must be closed not expanded to 4 lanes.
The creative approach: 1. Providing for new/interesting arterial road/transit alignments. 2. The attention to bicycle infrastructure i.e. lanes and trails 3. The commitment to transit		Consider access from the north. Relate to north transit city (LRT). E.g. Don Mills line to Pape Station, West Don Lands via Cherry Street.

Topic: Floodplain & Habitat

What feedback do you have on this feature of emerging revitalization plans for the Lower Don Lands (including how this feature relates to others)?

I like...	What I suggest be done differently...	How this feature relates to others...
I like the fact that you are creating a wide link between the shore of Lake Ontario and the Don River valley so that wildlife can migrate easily.	I am a bit worried that the ship channel is a barrier and wonder if there can be some kind of "wildlife passage" over it. Otherwise I think the only (land) link is going to be across the Don Roadway Bridge - could the bridge have a lane or level?? For wildlife?? It would be unfortunate if the ship channel (which has high concrete walls) became a barrier to wildlife mobility.	
RCYC Comment: The restoration of the flood plain and habitat of the Lower Don lands is welcomed by the RCYC as a very positive	The principal practical concern is storm water management, in particular, large debris that is frequently ejected into the	

step in the development of the Waterfront. Water quality in the harbour will improve which will encourage more marine use by sailors and our members creating a healthy and vibrant environment for all to enjoy.	harbour following a storm event. These might include such navigation hazards as whole trees that escape from the channel today. It is our understanding the new hydrological approach will prevent this from happening by reducing river velocities and also allowing for debris catchment areas further up stream near the DVP and Lakeshore Blvd intersection. We welcome such an approach. Encouraging a better habitat for marine flora and fauna is also supported by the RCYC and mirrors our efforts to act as stewards for the waters that we occupy and use on a regular basis. One note is that sailors by and large do not like seaweed or anything that encourages its growth beyond normal historic levels. In the past two decades we are very aware of a rapid increase in the growth of weed due to higher lake temperatures and increases in pollution that promote the growth of weed, particularly fertilizer run-off. Anything that reduces such effects is welcomed by all sailors using the harbour.	
I like the newly expanded south option, including lands south of the ship channel i.e. the "greenway link" - this needs to be at least 50% wider.	The two basic planning requirements to start with are: 1. toxic soil clean-up (not copying Harris era); and 2. Hurricane Hazel flood strategy (it wants to go straight out to the Lake).	The design of the south option to the lake (not to Toronto Bay) can integrate the need for a flood way/habitat link with the small boat clubs (who are willing to be flexible and move over).
The naturalised Don River into Lake Ontario.		

Topic: Water & Wastewater

What feedback do you have on this feature of emerging revitalization plans for the Lower Don Lands (including how this feature relates to others)?

I like...	What I suggest be done differently...	How this feature relates to others...
Using storm water runoff to help irrigate trees and for wetlands.		
	Water and wastewater can be dealt with, and treated using the latest technologies, such as the methods of John Todd - or local leading edge aquatic solutions people. Think Boyn Rover Project.	
The effort to manage water sustainability.		

Topic: Stormwater

What feedback do you have on this feature of emerging revitalization plans for the Lower Don Lands (including how this feature relates to others)?

I like...	What I suggest be done differently...	How this feature relates to others...
Using stormwater to help irrigate trees and for wetlands.		
	Contain debris (i.e. large trees) from harbour after storm events	
	In a conversation with the former Director of Toronto Water, several years ago: Capture run-off from the Don Valley Parkway (instead of dumping it directly into the River) and direct it into a 3 stage wetland system: 1. filter; 2. cleaning; and 3. polishing pond. See "Don Valley Parkway Stormwater Management Project: Municipal Class EA". See Wet Weather Flow Management Master Plan Overview and Implementation Plan (July 2003). NV page 10: "Water Quality;	

	water and sediment quality objectives and guidelines in area watercourses and along the Waterfront".	
The effort to use stormwater as a resource for irrigation of trees etc.		

Topic: Open Space

What feedback do you have on this feature of emerging revitalization plans for the Lower Don Lands (including how this feature relates to others)?

I like...	What I suggest be done differently...	How this feature relates to others...
	Avoid having the pedestrian path cross the bicycle path to avoid potential conflict (i.e. minimize crossings).	
I like the balance between open space and built space and the fact that there seems to be a much better link between the Don Valley open space and the open space along the lake (with the exception of the Ship Channel being a barrier).		
RCYC Comment: The RCYC is generally in favor of the proposed open space planning direction.	The most notable objection we have is the mandate for uninterrupted access to the waters edge for the public, particularly along the boardwalk. It is our opinion that design approach is detrimental to a huge number of marine uses beyond just our own. Overall it is the feeling of the marine community that the Waterfront Design process has NOT done a suitable job of accommodating Marine Uses effectively. It would seem most if not all publicly presented design schemes extoll the virtues of this boardwalk and the ability of the public to come to the waters edge and take in the sights and sounds of a vibrant waterfront community. That having been said, most schemes have cut off direct	

	access to the waterfront for specific marine uses such as ferries for yacht clubs, tour and charter boat operations and water front sailing and paddling schools. Where access has been notionally provided, access has been restricted or eliminated, the required parking has been eliminated and access for services such as shipping and receiving also appear to have been limited or eliminated. By restricting practical and useful access to the waters edge for all these marine users, the planning process runs the risk of actually eliminating and shutting out the lively activities that actually take place on the water and in turn many associated jobs and investments attached to these Marine Uses. Please reconsider the single minded pursuit of this board walk as it is considered today.	
	The Open Space concept that is the berm of Don River Park needs to be continued south of the railroad tracks, south of Lakeshore Blvd. To continue on south of the ship channel "greenway link". The Don Greenway 300m will provide a terrestrial and aquatic ecosystem link to Lake Ontario Park, to Lake Ontario and to Leslie Spit.	
The opportunity attracted by the re-naturalization of the Don River.		

Any Other Comments?
I would like to see details on the proposed district energy system (e.g. energy needs in MW, kWh, % net by renewable source, such as solar and geothermal, lake water cooling, biogassification).
I was going to cottage country on a regular basis. I did so because it helped me feel whole...it is `human nature to be in nature`. I felt very fortunate to be able to get out of the city but was also concerned for the majority who were not able to escape.

Two points troubled me. There was something not quite right about 'wasting so much TIME' and so many hours packing, in the car and traffic, entertaining in the car, entertaining when at the point of destination. It was also not fair that it was not possible for the majority to have the ability to spend time in nature as I could. About 10 years ago, I stopped the car journeys out of town and focused on finding the opportunities to be in nature that were available in the city. I rediscovered the Portlands which included Cherry Beach and, although only a small area of public beach, at least it was something -- a start. The Portlands is a crucial part in the city where one can be in nature. Vancouver's population is 500,000 and has Stanley Park which is 1,000 acres. Toronto's population is 2-1/2 million (4 times greater than Vancouver) and has the Portlands which is 1,000 acres. All must be done to ensure that the bulk of the Portlands be kept in public hands, even if that means not moving forward on a project immediately. What is now known is that accelerated Green House Gas emissions caused by fossil fuel burning is exacerbating climate change. The depletion of oil and gas resources will dictate that the minority who travel out of town will now join the majority who could not. It will now be the super-majority who are looking for places within the city to be connecting with 'nature'. The Portlands MUST play a key role in connecting people with 'nature'. QUERRIES AND COMMENTS.......... 1. Define the sacrosanct areas where nature and stable shorelines are going to be REQUIRED and desired and where recreational access is NOT. 2. Define water access for people 3. Remember human access to the water while keeping animals in the forefront. 4. Woody areas which are natural and unmanicured--wilderness. 5. Neighbourhoods anywhere must be carbon neutral and NO high rises
The RCYC is currently arranging to move City Side operations to the Milne Oil site, on Cherry street, to the South of the lifting bridge. RCYC also continues to maintain ownership of the sliver of land at the terminus of Queens Quay East. To the extent that we are a major user of the harbour, a long standing fixture of the City, and a stakeholder of multiple real estate parcels within and adjacent to the area of study in this EA, we respectfully wish to submit these comments to Waterfront Toronto. *N.B. This response will also cover comments on behalf of model boat enthusiasts in the GTA. Particularly model sail boating on the waterfront.* A member of the RCYC planning committee attended the December 2008 public hearing and collected the work sheets distributed at the meeting. This report will comment on that, and related materials. Should comments not be provided on any area of the worksheets it can be assumed the RCYC tacitly approves of the material presented and supports the efforts of the design and development team in those regards. A general note. The development of taller built structures along the waterfront from Yonge street to the LDL area will have an adverse effect on wind speeds in the area in almost all conditions. Continuing build up of structures impedes air flow from the NW directions by

obstruction. Likewise typical thermal SW breeze that is the norm for summer days will be significantly disrupted within 300 meters of the North and Eastern edges of the harbour as the breeze will blow up and over the obstructing buildings well before it reaches them. Winds from the East, the other predominant direction, will be less effected by the proposed developments. As wind speeds are reduced in these areas, related sailing activities will likely retreat from these areas as wind conditions deteriorate. Overall the RCYC is happy with the general direction of the Waterfront development. The single biggest concern we have, which we will reiterate is the loss of accommodation for marine uses through the planning and development process. We would specifically ask that in the course of the development of by-laws regulating the area of the Lower Don Lands and the East Bay front that very serious consideration be given to these by-laws to ensure that: They do not preclude present, and possible future marine uses by restricting reasonable access to the waters edge in practical and useful manners, and that the by-laws developed do in fact encourage marine usage. This specifically includes allowances for access to the waters edge and for suitable ancillary spaces to be provided adjacent to or very near to the access to the waters edge. By-laws should also be developed to ensure that land holders and land based uses set back from the waters edge cannot make frivolous and damaging objections to marine uses proposed in the future because they may block their views or other such arguments. Marine users were on the water long before anyone contemplated building housing in the area. To have the residential and commercial interests that come to inhabit the area, obstruct marine use would be a travesty.
In the historical context, and within ecology time, the most significant aspect of this process is to bring back the watershed ecosystem to as much of the historical conditions (pre-settlement) as possible, within the urban context: Cultural/Natural Strategy (CNS) Prof. Henry Regier, U of T. The point is that "the ecosystem approach (Crombie Royal Commission) is about the fact that the waters edge (aka waterfront) is not just for people, but for biodiversity, the Age of Ecology Now.
Excellent! Great progress since the last public meeting. Keep up the good work! Very few comments/suggestions because seems that everything has been considered!

Appendix 9-A4

Special Meetings

WATERFRONToronto

TORONTO

Toronto Transit Commission

WATERFRONToronto

TORONTO

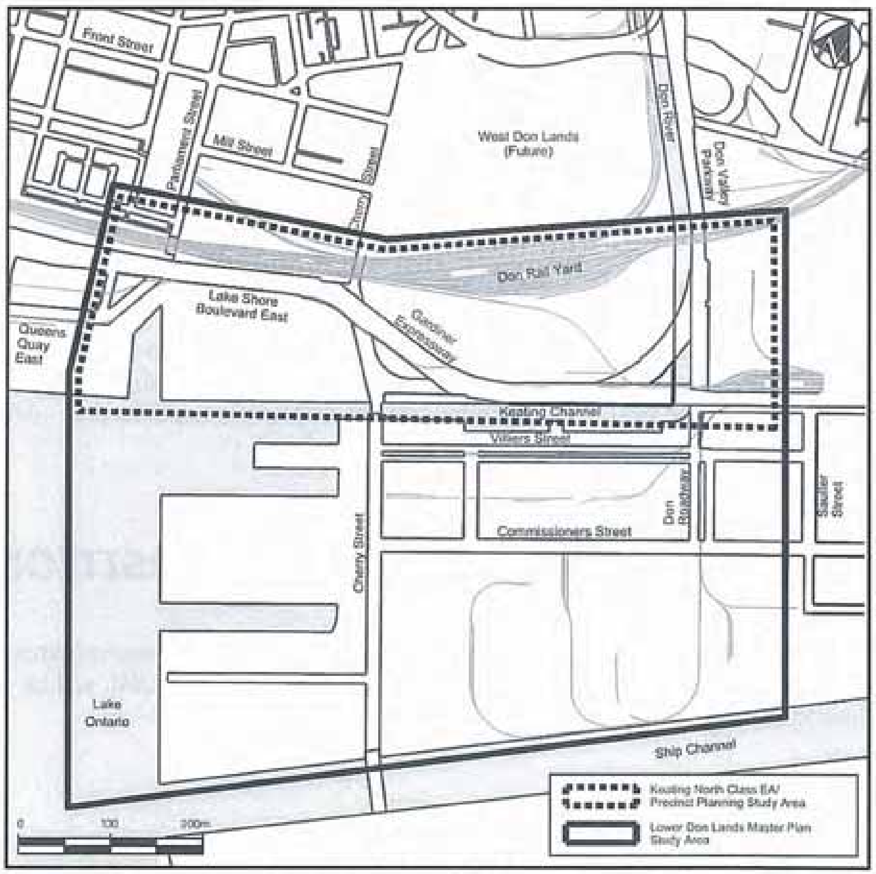
Toronto Transit Commission

Lower Don Lands Municipal Class EA and Keating North Precinct Plan Stakeholder Advisory Committee (SAC) Terms of Reference – DRAFT

1. Introduction

Waterfront Toronto (formerly Toronto Waterfront Revitalization Corporation), the City of Toronto and the Toronto Transit Commission, as tri-proponents, are undertaking a study that integrates the Municipal Class Environmental Assessment (Class EA) process with the Precinct Planning process, in the Lower Don Lands area.

A Master Plan (Phases 1 and 2) will be developed for transportation (including transit), water/wastewater and storm water management in the Lower Don Lands Area, in accordance with the Municipal Class EA 2000, as amended in 2007 The Lower Don Lands study area is shown on the adjacent map and is generally bounded by the Don rail yard and Gardiner Expressway on the north, the Parliament Street slip on the west, the shipping channel on the south and Don Road on the east.



After the Master Plan is completed, the study will continue with Phases 3 and 4 of Municipal Class EA process for the Keating North Precinct planning area for projects within this Precinct that fall under Schedule "C" of the Municipal Class EA in tandem with a Precinct Plan (land use plan) that is prepared in accordance with the City of Toronto's Central Waterfront Secondary Plan.

The Keating North Precinct area as shown on the above map is generally bounded by the Don rail yard and Gardiner Expressway on the north, Parliament Street Slip on the west, Keating Channel on the south and the Don Road/Don Valley Parkway on the east.

The Lower Don Lands study area includes the Don Mouth Naturalization and Flood Protection EA study area and will incorporate the outcome of that separate EA, which is currently underway. This study also replaces the Queens Quay EA Extension and Port Lands Transit EAs that were previously initiated by Waterfront Toronto.

An essential element of the study process will be effective communication and consultation with members of the public and stakeholders. One of the planned activities in meeting this goal is to establish a Stakeholder Advisory Committee (SAC). This document sets out the Terms of Reference for the SAC and its role in the Lower Don Lands Study.

2. Mandate

The SAC is a non-political advisory committee. Committee members are guided by these Terms of Reference and participate on the SAC at the pleasure of Waterfront Toronto, the City of Toronto and the Toronto Transit Commission.

The mandate of the SAC is to provide an ongoing mechanism for feedback and advice to the Lower Don Lands study Project Team on key aspects of the process, including:

- The problem and opportunity statement;
- Issues and opportunities to be addressed in the planning process;
- Alternative solutions and design considerations;
- Evaluation method and criteria; and
- Preferred alternative strategies and design concepts.

It is also envisioned that the SAC will provide feedback on the Project Team's proposed presentations for public forums and any other relevant matters that the Project Team refers to the SAC for comment.

The Lower Don Lands Study Project Team consists of representatives from Waterfront Toronto, the City of Toronto, the Toronto Transit Commission and the Consultant Team led by Michael Van Valkenburgh Associates.

3. DECISION MAKING

As an advisory body, the SAC should operate by consensus to the extent possible. Consensus is where participants openly discuss views and opinions, and seek to develop common ground and narrow areas of disagreement to the best of their ability. Where differing viewpoints and opinions exist, these will be noted in the SAC meeting records.

4. SAC MEMBERSHIP AND COMPOSITION

Membership in the SAC will consist of representatives from organizations that may have an interest in the Lower Don Lands Study process and outcome. It is envisioned that the SAC will be comprised of representatives of the following organizations:

- Citizens for a Safe Environment (CSE);
- Citizens for the Old Town;
- Cycling Advocate
- Distillery District;
- Gooderham & Worts Neighbourhood Association;
- Interested individuals;
- Landowners and businesses in the study area;

- Next Generation;
- St. Lawrence Neighbourhood Association
- Port Lands Action Committee;
- Task Force to Bring Back the Don;
- Toronto Environmental Alliance (TEA);
- Toronto Island Community Association;
- Waterfront Action; and
- West Don Lands Committee.

In addition, the City Councillor, MP and MPP for each of the following wards or ridings will be invited to participate in the SAC process.

- Councillor, Ward 28;
- Councillor, Ward 30;
- MPP, Broadview-Greenwood;
- MPP, Toronto Centre-Rosedale;
- MP, Broadview-Greenwood; and
- MP, Toronto Centre-Rosedale

5. SAC MEETING PROCEDURES

The following procedures will be used in convening meetings of the SAC:

i. SAC meetings will be facilitated by a third-party facilitator, Lura Consulting, to enable all members to participate fully in the discussions.

ii. Members of the Project Team will attend SAC meetings to present project-related materials and receive feedback from SAC members. Other technical advisors identified by the Project Team will attend SAC meetings as required.

iii. Meeting agendas will be prepared by the Project Team and distributed to SAC members in advance of each meeting. SAC members will be consulted on agenda items for future meetings at the conclusion of each SAC meeting.

iv. Meeting notes will be taken by a representative of Lura Consulting. Notes will be circulated to the SAC following each meeting for review and comment by members. Notes will be approved by the SAC at the following meeting.

6. ROLES AND RESPONSIBILITIES

SAC Members

As a SAC member, each participant will:

- Liaise with the organization they represent (if applicable) and bring forward advice, issues or comments from their organization to the SAC;

- Strive to operate in a consensus mode, where participants openly discuss views and opinions, and seek to develop common ground and narrow areas of disagreement to the best of their ability;
- Review all relevant project materials and provide feedback as appropriate;
- Attend and participate in a minimum of six (6) SAC meetings during the process; and
- Ensure that the results of SAC discussions are accurately recorded in the meeting records, or in additional reports that members may determine are needed.

SAC members will receive project information for review at each SAC meeting and will be provided an opportunity to comment on such material both at and following each meeting. If available, project information will be sent via email prior to SAC meetings. SAC members will also receive project information made available to the public and be invited to attend public forums.

While the SAC will provide input to the Project Team as part of the process, final decisions will rest with the Project Team.

Project Team Members

Project Team members will:

- Strive to provide accurate, understandable information to SAC members, such that they can contribute informed advice and recommendations;
- Ensure that appropriate Project Team representatives (or other resource people) are present at discussions on specific issues or components of the planning process;
- Be open, receptive, and give careful consideration to advice and ideas received from SAC members; and
- Ensure that advice, recommendations, and consensus positions from the SAC are considered at each stage of the process.

Facilitation and Secretariat

Facilitation services for the SAC will be provided by a third-party facilitator, Lura Consulting. These services will include facilitation at SAC meetings and preparation of SAC meeting records.

Secretariat services will be provided by Waterfront Toronto. These services will include organizing SAC meetings, distributing meeting notices and materials, and SAC contact list management. The point of contact for all SAC correspondence is:

Andrea Kelemen
Communications + Marketing Coordinator
Waterfront Toronto
1310-20 Bay Street
Toronto, ON M5J 2N8
Tel. (416) 214-1344 x 248
E-mail: akelemen@waterfrontoronto.ca
Website: www.waterfrontoronto.ca

7. TERM OF THE SAC

The SAC will be in effect throughout the process, which is anticipated to last approximately 14 months and conclude in 2009. Each member of the SAC will be expected to sit on the Committee for the full length of the Class EA process. SAC members are strongly encouraged to attend each meeting to ensure consistency, but may send alternates to meetings in the event of unavoidable schedule conflicts.

8. SAC Meetings

Waterfront Toronto will host SAC meetings at Waterfront Toronto – 20 Bay Street, Suite 1310.

The first meeting is May 28th at 6:00 p.m. The schedule of subsequent meetings will be discussed with the SAC at this first meeting.

Other interested parties may observe the SAC meetings; however, these parties will not be permitted to participate in the formal meeting.

9. PUBLIC FORUMS

In addition to the committee meetings, members of the SAC are encouraged to attend the public forums that will be convened as part of the process. The exact dates, topics and format for the public forums will be discussed with the committee at SAC meetings.

WATERFRONToronto   TORONTO   Toronto Transit Commission

Lower Don Lands Municipal Class EA and Keating North Precinct Plan Stakeholder Advisory Committee (SAC) Meeting #1

Wednesday May 28, 2008
6:00 p.m. – 8:00 p.m.
Waterfront Toronto, Main Boardroom

DRAFT MEETING SUMMARY

1. Welcome and Introductions

Chris Glaisek (Waterfront Toronto) welcomed the committee members to the meeting. Mr. Glaisek indicated that the purpose of this first meeting was to introduce the project context and process, introduce the Project Team and to seek feedback on the draft Problem and Opportunity Statement. Mr. Glaisek thanked the committee members for coming.

David Dilks (Lura Consulting) explained his role as the neutral facilitator for the Stakeholder Advisory Committee (SAC). Mr. Dilks noted that the committee has an important role in the process by providing feedback on key project components before they are presented to the public throughout the Lower Don Lands Municipal Class EA and Keating North Precinct Plan process.

A round of introductions followed.

Mr. Dilks briefly reiterated the purpose of the meeting and referenced the three handouts:

- Draft Stakeholder Advisory Committee (SAC) Terms of Reference
- Project Team Presentation
- Draft Problem and Opportunity Statement

2. Agenda Review and Meeting Purpose

David Dilks reviewed the meeting agenda. He indicated the key agenda items included: the role of the Stakeholder Advisory Committee; and the project team presentation.

3. Role of Stakeholder Advisory Committee (SAC)

David Dilks noted that the Terms of Reference (TOR) is a guiding document for the committee as an advisory body to the Project Team. He then briefly described each section of the document.

Mr. Dilks inquired if any organizations or interest groups had been left out of the membership section in the TOR. Committee members noted the following omissions:

- St. Lawrence Neighbourhood Association;
- Next Generation; and
- Cycling Advocate.

It was suggested that Paul Young of the South Riverdale Community Health Centre be contacted to see if that organization would like to participate on the SAC.

Mr. Dilks asked committee members for their top of mind reactions to the Terms of Reference. The following comments were raised:

Q1. What is the intended outcome of the process following the 14-month term of the SAC?

Q2. With respect to the study area map, are the study area boundaries subject to amendment early in the EA process?

Mr. Dilks noted both questions, and indicated that they would be addressed as part of the Project Team presentation.

Mr. Dilks asked members to review the Draft TOR prior to the next SAC meeting, where members will be asked to approve their TOR.

4. Project Team Presentation

Liz Silver and Gullivar Shepard (Michael Van Valkenburgh Associates, Inc.) gave the committee a PowerPoint presentation on the Lower Don Lands Municipal Class EA and Keating North Precinct Plan. Ms. Silver and Mr. Shepard made the following key points during the presentation:

- The starting point for this project is the Don Mouth Naturalization and Flood Protection Environmental Assessment (EA).
- The Framework Planning Process is the vehicle by which the Design Team can work on the design of the site as a whole, unencumbered from the regulatory requirements of the Environmental Assessment and Precinct Plans. The process is composed of the Issues Identification Study, Iterative Design Studies, Framework Plan Document and Pre-Schematic Design.
- The project schedule illustrates that many processes are going on at once (i.e. the Framework Plan, Municipal Approvals etc.) yet are all moving along together and the milestones are all lined up.
- The goal for the end of March 2009 is to have a draft Precinct Plan to the City to approve zoning.
- The Lower Don Lands Site has a rich historical past.
- The Draft Problem and Opportunity Statement reads as follows:

  Waterfront Toronto and the City of Toronto are proposing to revitalize the lands at the northeastern portion of the Toronto Inner Harbour (Keating North and the Northwest Port Lands) to create a vibrant, mixed-use, sustainable community that surrounds a newly naturalized and flood protected mouth of the Don River. In an extensive park setting, the naturalized river will be the centerpiece of a new urban estuary.

  The existing infrastructure (water, wastewater, stormwater and roads) is neither sufficient, nor configured appropriately to support the revitalization of the area and the relocation of the mouth of the Don. There is no higher order transit service to the area, and the area is poorly connected to surrounding existing and planned neighbourhoods.

There is a significant opportunity with the implementation of the Don River project to improve existing infrastructure, relocate necessary elements, and add new roads, pedestrian and cycling facilities, transit facilities, stormwater facilities, water and sewer service as part of a comprehensive revitalization project that sets a new standard for sustainable planning, design and implementation.

Ken Greenberg of Greenberg Consultants presented preliminary population and employment assumptions and objectives, which include: integration with surrounding areas; reflect Toronto's population mix; balance and integrate jobs, people, retail, culture, services; plan for transit supportive densities; provide flexibility and adaptability to change; and create vibrant communities that evolve organically.

David Pratt (Arup) continued the presentation with a discussion of the transportation network goals and objectives, and the network "families" being considered within the realm of the project. Mr. Pratt made the following key points during the presentation:

- The way we think about Cherry Street is an important urban driver for how we develop the Lower Don Lands.
- Transportation network goals and objectives for this project include: increase and improve the bicycle network; increase and improve the pedestrian network; prioritize transit; zero-growth and flexible roadway network; rationalize parking; introduce gateways; enhance and promote access to the waterfront; break the rail barrier; improve streets and the public realm; and facilitate water transportation.
- The network families for this project include: Queens Quay, Lakeshore Boulevard, Cherry Street, Commissioners Street, Don Roadway, Basin Street, and rail underpass improvements.

Questions of Clarification

The following summarizes committee members' questions (identified with 'Q') or comments (identified with 'C'), and responses from the Project Team (identified with 'A') where provided.

Q. Is Cherry Street wide enough for four lanes of traffic?
A. Yes.

Q. With respect to the potential GO Station, does the Project Team envision it being used for one stop travel to get to Union Station or to go further North to go to work?
A. It will likely be used for both.

Q. At this point in the environmental assessment process, are the study area boundaries fixed?
A. The study area boundaries are not set in stone, but they are tied to logical physical boundaries, as well as the boundaries of adjacent study areas.

Q. When do you expect to have the zoning bylaw?
A. Approximately the end of 2009.

Q. With respect to the Cherry Street discussion, my major concern is that the intersection encourages the use of Cherry Street as a thoroughfare. Cherry Street is a central public space as part of our community, and we do not wish it to be a thoroughfare. I can meet off line with David Pratt to discuss this further. Can this concern be put on the list of drivers for Cherry Street?

A. We would be happy to have further discussions on this.

C. The waterfront trail needs to be shown on the maps. Is there a guarantee that playing fields and parks will be utilized in the area?

A. The project team will have a presentation dealing specifically with playing fields and recreation in late June. We'll also discuss bike infrastructure at that time.

Q. With regards to planning applications in process for re-zoning, will these be dealt with in the context of the precinct plan?

A. The Project Team is aware of these.

Q. When will there be a precinct plan for Polson Quay area?

A. At this stage we do not have a date on when this will begin.

Q. You have presented three options as part of the Don Roadway discussion, but, during the competition last year, one of the proposals was a connection from the north end of Don Roadway to the area around Broadview (adjacent to the Clorex and BMW property). This proposal was dismissed although it was very attractive to local stakeholders. I would like to raise this option again.

A. We are still interested in that option and we'll refer to it at the June meeting.

Q. How can you adequately plan Cherry Street without making an assumption about the adjacent industrial areas etc. south of Keating Channel and the Portlands?

A. The project team will incorporate such data and use the overall Secondary Plan and City modeling, thus building on what the City has already done in the Lower Don Lands area.

Q. On slide 40 you speak to social diversity, is there anything in the Problem and Opportunity statement that captures the notions of social diversity?

A. The project team shares your concern, and we are committed to social diversity, but is it best dealt with in the precinct plan.

Q. Does that Problem and Opportunity statement only deal with the Class Environmental Assessment (EA)?

A. Yes, but we welcome input from people on the precinct plan as well. Please remember we are doing the Precinct Plan and the Class EA in tandem. The social and economic impacts can be in the evaluation criteria as part of the EA process.

Q. I heard something about an ice arena in the area? Is that true?

A. There is a long-standing plan for a regional sports complex but it is in another area of the Portlands.

5. Roundtable Discussion

Mr. Dilks asked the committee members for their comments on the draft Problem and Opportunity. The following is a summary of the comments received.

C. In the 3rd paragraph it states "add new roads", this is concerning. We do not want to encourage roads and vehicular travel. One of the goals is to create a community that does not rely on the car. The area should be dual use: regional and local.

A. We can edit the wording to clarify our intentions, since we do need to add a couple of new roads in order to improve accessibility in the area.

C. In the first paragraph, I would like the Project Team to consider using different terminology, such as "treading lightly" on the river and environs, not just "surrounding" it.

C. The third paragraph seems very basic, in that it just meets the legal requirements. I would like to see more around cycling, it should be a destination as well as a way to get around. It should mention both commuter and recreational cycling.

A. The purpose of the Problem and Opportunity statement is to set the stage for planning alternatives. It will not have too much detail, since the details are built into the design solutions. We address the opportunities as goals for the EA process.

C. I often think when we make broad statements of intent we lose aesthetics. We need to say we hope to make this ugly dirty area into a beautiful area.

A. Dually noted.

Mr. Dilks then asked if committee members had any additional comments regarding the presentation. The following is a summary of the comments received.

C. We should add the comments about social diversity to slide 39. If we want to reflect the income and ethnic diversity of Toronto we need to add something about social diversity.

C. With respect to slide 40, it states "dwelling appropriate for families". The City of Toronto used to define family dwelling very clearly, for example, ground floor apartments, is that the definition you are dealing with here? Or are those definitions too detailed?

A. Family dwellings are being redefined. Through our meetings with various stakeholder groups we are trying to develop alternative solutions, some of which will be grade relevant but we are not limiting ourselves to that. We already see many families occupying units above ground level. The Project Team is not certain what defines an appropriate family unit but we know what does not ensure a family unit (e.g. studio apartment). We want to promote diversity of housing units.

6. Next Steps and Wrap Up

Mr. Dilks concluded the meeting by indicating that this is the first in a series of stakeholder advisory committee (SAC) meetings, with the next meeting tentatively scheduled for June 25th, and a public meeting to be held in late July. Mr. Dilks reminded committee members' to review the committee Terms of Reference and to provide additional comments on the Problem and Opportunity statement by Friday June 6th, 2008 by email to Andrea Kelemen at Waterfront Toronto. Mr. Dilks then thanked committee members for attending and adjourned the meeting.

Editor's Note: The June meeting was postponed to ensure that adequate time was given between meetings to allow for meaningful feedback on behalf of the SAC and to allow the MVVA Team sufficient time in turn to respond to that feedback.

Appendix A: Attendance List

Name	Organization
Committee Members	
Dennis Findlay	Portlands Action Committee
Clay McFayden	Cycling Advocate
June Robinson	Gooderham & Worts Neighbourhood Association
Julie Beddoes	West Don Lands Committee
Sylvia Dellman	St. Lawrence Neighbourhood Association
Tom Davidson	Councillor McConnell's Office
David Jackson	Distillery District
Stephen Kaufman	Home Depot
Sharon Hewarth	Next Generation
Chris Williams	Aird & Berlis (representing Castan)
David White	Waterfront Action
John Wilson	Task Force to Bring Back the Don
Michael Kirkland	The Kirkland Partnership
Adele Freeman	Toronto Region and Conservation Authority
Waterfront Toronto and City of Toronto Staff	
Chris Glaisek	Waterfront Toronto
Brenda Webster	Waterfront Toronto
Andrea Kelemen	Waterfront Toronto
Jamie McEwan	City of Toronto
Diane Silver	City of Toronto
Kathy Thom	City of Toronto
Consultants	
David Pratt	Arup
Elizabeth Silver	Michael Van Valkenburgh Associates, Inc.
Gullivar Shepard	Michael Van Valkenburgh Associates, Inc.
Angela Wu	Michael Van Valkenburgh Associates, Inc.
Ken Greenberg	Greenberg Consultants
Steve Willis	MMM Group
Karin Wall	Totten Sims Hubicki Associates
Corrine Latimer	Totten Sims Hubicki Associates
Facilitators	
David Dilks	Lura Consulting
Patricia Prokop	Lura Consulting

WATERFRONToronto TORONTO Toronto Transit Commission

Lower Don Lands Municipal Class EA and Keating Precinct Plan Stakeholder Advisory Committee (SAC) Meeting #2

Monday November 24, 2008
7:00 p.m. – 9:00 p.m.
Waterfront Toronto, Main Boardroom

DRAFT MEETING SUMMARY

1. Welcome and Introductions

Chris Glaisek (Waterfront Toronto) welcomed the committee members to the second meeting of the SAC and thanked the committee members for taking the time to attend.

A round of introductions followed.

2. Agenda Review and Meeting Purpose

David Dilks (Lura Consulting) indicated that the purpose of tonight's meeting was to "test drive" the presentation before it is presented to the public at the December 10th, 2008 public forum. Mr. Dilks noted that the committee has an important role in the process by providing feedback on key project components before they are presented to the public throughout the Lower Don Lands Municipal Class EA and Keating North Precinct Plan process.

Mr. Dilks briefly referenced the meeting handouts:

- Stakeholder Advisory Committee (SAC) Meeting #2 Agenda
- Draft SAC Meeting #1 Summary
- Revised SAC Terms of Reference
- Project Team Presentation Slides
- Revised Problem and Opportunity Statement
- Revised Study Area Map

Mr. Dilks then briefly reviewed the meeting agenda.

3. Approval of Meeting #1 Summary and SAC Terms of Reference

Mr. Dilks asked committee members if there were any comments on the SAC Meeting #1 Summary. The committee had no comments or concerns and the summary was approved as written.

Mr. Dilks noted that the SAC Terms of Reference (TOR) had been slightly updated since Meeting #1. He then briefly described each section of the document. Mr. Dilks indicated that the map in the TOR will be updated to reflect the revised study area. He also noted that the comments regarding SAC membership raised by members at Meeting #1 were incorporated into the revised TOR.

Mr. Dilks asked committee members for any additional comments on the revised Terms of Reference. The following comments were raised:

C1. The new map needs to be clarified. There appears to be overlap with the East Bayfront Precinct. For example, where does the Parliament Street Slip fit?
A. There is a shared sense of confusion. The Lower Don Lands team will work on storm water issues as part of the Keating North Precinct Plan. The south side stays with the East Bayfront Precinct. [BRENDA PLEASE CLARIFY THE RESPONSE]

C2. There is a minor error with respect to the political constituency names for the local MPPs – ridings are Toronto Danforth and Toronto Centre.

4. Environmental Assessment Process Update

Karin Wall (Totten Sims Hubicki Associates) explained the environmental assessment process for the Lower Don Lands Municipal Class EA and Keating North Precinct Plan. Ms. Wall indicated that the Project Team consulted with the public regarding the Problem and Opportunity Statement and the evaluation criteria at the first public forum in July. The Project Team evaluated the planning alternatives in accordance with the feedback received. Ms. Wall also noted that the Project Team adjusted the study area boundary of the North Keating Precinct, by extending the boundary to south of the Keating Channel, and this revised study area will be studied in greater detail. Ms. Wall indicated that the preferred planning alternatives for all major roadways and other infrastructure will be presented at the upcoming public forum. Ms. Wall noted that the Project Team will address comments received on the preferred infrastructure alternatives following the public forum.

Mr. Dilks asked committee members if they had any other questions for Ms. Wall. The following questions and comments were raised by committee members:

Q1. When you complete the transit plan, will you put transit on the Lake Shore? Will this be considered as part of the EA?
A. No, that will not be part of this EA, but part of the Gardiner EA.

Q2. How does this project go forward with the Gardiner takedown EA about to begin?
A. There are some uncertainties with respect to the Gardiner EA, but we will arrive at a high degree of certainty for the area west of Cherry Street. That area should not be influenced by the Gardiner, whether up or down. The plans for the area east of Cherry Street may be conditional based on the outcome of the Gardiner EA. The situation does allow us to proceed with the Lower Don Lands work, since certain areas will not be affected by the Gardiner outcome.

Q3. It is recorded in the minutes from our last meeting that Cherry Street, north of the corridor, has a different nature than the rest of Cherry Street. It was recorded in the minutes that there may be a meeting with David Pratt from Arup about these differences in Cherry Street. Can we still hold this meeting since it has not occurred?
A. Yes, we will carry over that action item and plan this meeting going forward.

5. Project Team Presentation (Preview of Public Forum #2 Presentation for SAC Feedback)

Liz Silver (Michael Van Valkenburgh Associates, Inc.) and Ken Greenberg (Greenberg Consultants) gave the committee a PowerPoint presentation on the Lower Don Lands Municipal Class EA and Keating North Precinct Plan. Ms. Silver and Mr. Greenberg made the following key points during the presentation:

- This project is very interdisciplinary.
- The issues contained within the scope of this project are highly interconnected.
- The goals for neighbourhoods include:
    - Taking advantage of the unique river setting;
    - Relating to the surrounding context;
    - Fostering sustainable diversity;
    - Optimizing size, shape, and orientation of blocks; and
    - Creating real neighbourhoods.
- The project site cannot be treated as a neutral piece of land, it has a rich history.
- The Project Team is examining the micro-climate in the area, looking particularly at sun exposure and wind.
- The Project Team would like to create land use diversity in the Lower Don Lands, a mix of living, working, recreation and shopping.
- The area is ideally positioned for transit alternatives.
- Community services and amenities are needed to make it a livable neighbourhood.
- The following elements influence and comprise the Lower Don Lands design:
    - Circulation;
    - Crossings;
    - Water and wastewater infrastructure;
    - Stormwater;
    - Hydrology; and
    - Habitat and open spaces.
- The site has real importance to the city on a macro scale.

6. Roundtable Discussion

Mr. Dilks asked if committee members had any comments regarding the presentation. The following is a summary of the comments received.

Q1. Your treatment of Lake Shore implies a low level bridge. Is that correct?
A. We are looking at not elevating the bridge, it is only elevated enough to clear the flood levels.

C1. This presentation is silent on the Gardiner takedown and the connection to Keating Channel.
A. We are looking at the base plan that has the Gardiner elevated, but we can also add an image with the treatment of that area if the Gardiner comes down.

Q2. With the question about the Gardiner staying up or coming down, will tearing the Gardiner down prevent you from using it as a colonnade?
A. It is hard to believe that the City of Toronto would keep the structure up if they decided to dismantle the Gardiner.

C2. This is a very long presentation, and it is very packed with information. Maybe you should have a break in the middle? I suggest you change the font in the presentation as well, and use a pointer when you speak to specific items on the map.

C3. I have a comment about Lake Shore Boulevard. The choice of putting it in the centre of the North Keating neighbourhood would only work if it is more civilized, right now you can't cross Lake Shore safely.

A. Right now we are talking about 4 lanes of moving traffic with many intersections and pedestrian walkways.

C4. The corner of Cherry Street and Queens Quay is a huge transit hub, and there will be a lot of people waiting for buses there, thus you should pay special attention to wind there, as well as "jay-walkability".

A. That is our 100% corner from a transit perspective and there are great opportunities there especially for retailers.

C5. There is no need to take anything out from the presentation, but you may want to break it up and have a short intermission – to give people a mental break.

C6. You can leave out slides where you introduce new topics; this will take out 15 seconds for each new introductory slide. You can use different colour stripes at the top of the slides to group slides by topic or subject. Also, some of the maps all look the same, for example page 9 and page 11. These slides will look the same to the general public.

C7. Some slides are very information heavy whereas others are not. I think you need an process overview slide at the beginning of the presentation.

C8. Have a panel to show how the planning process fits into the project and show a timeline for the project as well. Please use plain English, replace words such as hydrology, habitat, or circulation with simpler words and phrases such as "wind movement". A comparative illustration or map should show a chunk of downtown Toronto in comparison to the Port Lands to make sure people know how big this area really is, or you can show another scale of comparison such as a subway stop.

Q3. Are we still looking at the bridge at the Cherry Street underpass?

A. Yes, we are still looking at that. How we get underneath the rail berm is very important. The design details will be shown in next phase of the process in the Spring, at which point we will talk to that underpass in detail.

Q4. Why are we not making transit from the Cherry Beach area continuous?

A. It is beyond the scope of this EA, but we are making a corridor that can be easily extended. Those loops can be converted to new uses easily.

C9. The EA seems to be picking up the areas under the bridges but the presentation only mentioned one of those. You need to signal that more detail will come in the Spring.

Q5. Is there a drawing that illustrates the Gardiner down?

A. We will create one.

C10. The alignment on Queens Quay looks like it goes very far north of the silos.

A. It is a schematic diagram, and more detail will come in the Precinct Plan in the next phase.

C11. To make the presentation shorter you might want to leave out the transit examples from other cities, such as Stockholm.

C12. It is okay to use a pointer during the presentation, but some people are put off by lots of jerky movements during pointer use. Use it sparingly.

C13. The revised study area map divides the area into two parts, but your presentation considers it as one part, which is confusing. Please clarify what you are talking about.

A. We are only seeking approval from Council on the northern part of the study area at this time, but we will also do a design plan for the southern area. We will explain that at the beginning of our presentation at the public forum to make it as clear as possible, but of course we need to think of the area in context.

C14. Don't just say "sometime in the future", give some sort of specific timeline such as 5 years.

C15. I agree you need a break in the presentation. I think a good break would be before the water section on page 11. Also, the colour map on page 3 should be made into a panel. That map for many will be the centre-piece of the presentation.

A. We can certainly discuss having the map as a panel.

C16. I think if you are engaged with this process you have to put in the time. We need to find a way to keep peoples' attention. I don't see the presentation needing to be shortened at all. I believe that some people would want to see more detail on habitat restoration.

A. That is part of the Toronto and Region Conservation Authority (TRCA) work and they have asked us not to go too far with that at this time.

C17. If that is the case then you need to make that clear in your presentation. I also agree that you need a resting point in the middle of the presentation.

C18. The Project Team should also have a quick question and answer period during the break in the presentation, but this should be for questions of clarification only.

C19. It is key to civilize Lake Shore Boulevard, and putting it through a neighbourhood is part of civilizing it.

C20. I thought the presentation was great and I had no problem following it. You must keep in mind that not everyone has the background to understand it fully. The public needs to understand your rationale.

A. We can put in a slide at the beginning to outline the process and the rationale.

C21. The Viva York presentation was available as a video with different chapters for different parts of the presentation on their website; I think we should consider that approach for future Waterfront Toronto meetings. That would be a great way to connect to the public. Webcasting is also another avenue.

Q5. This emerging neighbourhood map is so crucial; would you be able to hand out hard copies of the map to people at the public forum?

C22. If you do that please change the colour of the Don River from sludge brown to blue.

C23. Maybe you can make a series of transparencies to overlay the map to show transit centers, crossing and so forth.

A. We will consider a package of maps as a handout at the public forum.

C24. The emerging transit plan would also be a great handout; it would be more beneficial than the map.

Mr. Dilks thanked committee members for their comments and suggestions.

7. Next Steps and Wrap-Up

Mr. Dilks concluded the meeting by indicating that the next SAC meeting will be held in Spring 2009. The meeting will be another presentation preview for a 3rd public forum.

Mr. Dilks noted that public forum #2 will be held on Wednesday December 10th and encouraged committee members to attend. Mr. Dilks indicated that the Project Team is considering having topic breakouts as part of the public forum and requested feedback on this idea from committee members. Several committee members noted that breakouts on specific topics make sense as the proposed plan touches on many topics and themes. Mr. Dilks then thanked committee members for attending and adjourned the meeting.

Mr. Glaisek also thanked committee members for coming.

8. Action Items

#	Action Item
2.1	Waterfront Toronto to set up a meeting with David Pratt from Arup and concerned committee members about Cherry Street north.
2.2	Project Team to make suggested changes to the Power Point presentation before December 10, 2008 public forum.
2.3	Project Team to create handouts with presentation maps for the public forum on December 10, 2008

WATERFRONToronto

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Toronto Transit Commission

Lower Don Lands Municipal Class EA and Keating North Precinct Plan Technical Advisory Committee (TAC) Meeting #1

Wednesday June 4, 2008
1:00 p.m. – 3:00 p.m.
St. Lawrence Market – North Hall
92 Front Street East

DRAFT MEETING SUMMARY

1. Welcome and Introductions

Chris Glaisek (Waterfront Toronto) welcomed the committee members to the meeting. Mr. Glaisek indicated that the purpose of this first meeting was to introduce the project context and process, introduce the Project Team and to seek feedback on the Problem and Opportunity Statement. Mr. Glaisek thanked the committee members for coming.

David Dilks (Lura Consulting) explained his role as the neutral facilitator for the Technical Advisory Committee (TAC). Mr. Dilks noted that the Stakeholder Advisory Committee (SAC) met last week with a similar agenda.

Mr. Dilks briefly reminded meeting participants to sign in, and referenced the three handouts:

- Draft Technical Advisory Committee (TAC) Terms of Reference
- Project Team Presentation
- Draft Problem and Opportunity Statement

A round of introductions followed.

2. Agenda Review and Meeting Purpose

David Dilks reviewed the meeting agenda. He indicated the key agenda items included: the role of the Technical Advisory Committee; and the Project Team presentation.

3. Role of Technical Advisory Committee (TAC)

David Dilks noted that the Terms of Reference (TOR) is a guiding document for the committee as an advisory body to the Project Team. He then briefly described each section of the document.

Mr. Dilks asked committee members for their top of mind reactions to the Terms of Reference. The following comments were raised:

Q. I would like some clarity about the TAC membership. I have been invited to the sit on the TAC but I also have been identified as a member of the Project Team due to my position with the City of Toronto. How do these roles work together? What is the difference between the role of the TAC and Client Steering Committee (CSC)?

A. This committee has a very specific technical mandate, and it is good to have everyone at the table at certain points throughout the EA process. This project has three proponents: the City of Toronto; the Toronto Transit Commission (TTC); and Waterfront Toronto (WT), and we are in the process of creating a Client Steering Committee that will be composed of select members from these three parties. The CSC is intended to lead and guide the direction of the design process, whereas the TAC is intended to seek wider input from a broader audience of City members of potential issues and concerns as the EA progresses.

Q. Are you expecting all three proponents to have an opportunity to review all materials prior to release at each TAC meeting?

A. Yes, that is the plan for the future meetings.

4. Project Team Presentation

Liz Silver and Gullivar Shepard (Michael Van Valkenburgh Associates, Inc.) gave the committee a PowerPoint presentation on the Lower Don Lands Municipal Class EA and Keating North Precinct Plan. Ms. Silver and Mr. Shepard made the following key points during the presentation:

- The starting point for this project is the Don Mouth Naturalization and Flood Protection Environmental Assessment (EA)
- The Framework Planning Process is the vehicle by which the Design Team can work on the design of the site as a whole, unencumbered from the regulatory requirements of the Environmental Assessment and Precinct Plans. The process is composed of the Issues Identification Study, Iterative Design Studies, Framework Plan Document and Pre-Schematic Design.
- The project schedule illustrates that many processes are going on at once (i.e. the Framework Plan, Municipal Approvals etc.) yet are all moving along together and the milestones are all lined up.
- The goal for the end of March 2009 is to have a draft Precinct Plan to the City to approve zoning.
- The Lower Don Lands Site has a rich historical past.
- The draft Problem and Opportunity Statement reads as follows:

  Waterfront Toronto and the City of Toronto are proposing to revitalize the lands at the northeastern portion of the Toronto Inner Harbour (Keating North and the Northwest Port Lands) to create a vibrant, mixed-use, sustainable community that surrounds a newly naturalized and flood protected mouth of the Don River. In an extensive park setting, the naturalized river will be the centerpiece of a new urban estuary.

  The existing infrastructure (water, wastewater, stormwater and roads) is neither sufficient, nor configured appropriately to support the revitalization of the area and the relocation of the mouth of the Don. There is no higher order transit service to the area, and the area is poorly connected to surrounding existing and planned neighbourhoods.

There is a significant opportunity with the implementation of the Don River project to improve existing infrastructure, relocate necessary elements, and add new roads, pedestrian and cycling facilities, transit facilities, stormwater facilities, water and sewer service as part of a comprehensive revitalization project that sets a new standard for sustainable planning, design and implementation.

Ken Greenberg (Greenberg Consultants) continued the presentation with a discussion of the population and employment targets. He noted that the proposed population and employment objectives for the Lower Don Lands include: integration with surrounding areas; reflect Toronto's population mix; balance and integrate jobs, people, retail, culture, services; plan for transit supportive densities; provide flexibility and adaptability to change; and create vibrant communities that evolve organically.

David Pratt (Arup) continued the presentation with a discussion of the transportation network goals and objectives, and the network "families" being considered within the realm of the project. Mr. Pratt made the following key points during the presentation:

- The way we think about Cherry Street is an important urban driver for how we develop the Lower Don Lands.
- Transportation network goals and objectives for this project include: increase and improve the bicycle network; increase and improve the pedestrian network; prioritize transit; zero-growth and flexible roadway network; rationalize parking; introduce gateways; enhance and promote access to the waterfront; break the rail barrier; improve streets and the public realm; and facilitate water transportation.
- The network families for this project include: Queens Quay, Lakeshore Boulevard, Cherry Street, Commissioners Street, Don Roadway, Basin Street, and rail underpass improvements.

Questions of Clarification

The following summarizes committee members' questions (identified with 'Q') or comments (identified with 'C'), and responses from the project team (identified with 'A') where provided.

Q. Will all the transportation alternatives being considered overlay with the plans for the river?

A. Most of the alternatives line up nicely, and the others that do not had to be included due to the previous planning considerations for the Lower Don Lands area.

Q. With respect to slide 34, two different utility companies (Toronto Hydro and Hydro One) also have underground infrastructure in this area and consideration needs to be given to such underground infrastructure, especially since the water table there is very high, and future developments in the area will not be allowed below grade.

A. Totten Sims Hubicki Associates (TSH) has been studying the provision of municipal infrastructure for both the existing and the necessary new networks in the Lower Don Lands area. Consideration of infrastructure components and municipal servicing will be a key piece of analysis going forward. It is a part of the design team's EA and will be integrated into the design process. A costing analysis will also be completed. Infrastructure alternatives will be presented at future meetings.

5. Roundtable Discussion

Mr. Dilks asked the committee members for their reactions to the Problem and Opportunity statement that was presented. The following is a summary of the comments received.

C. There is no mention of community facilities and services. I would like to see the provision for such services included in the Problem and Opportunity statement.

A. The future mixed-use community will definitely include a wide range community services. Typically the problem statement focuses on infrastructure needs but the Precinct Plan will include provision for community facilities and services.

Q. Is the Problem and Opportunity statement specific to either the Municipal Class EA or Precinct Plan, or both?

A. We will set more specific aspirations for the Precinct Plan in tandem with the Municipal Class EA, however, the Problem and Opportunity statement is intended for the Class EA.

6. Next Steps and Wrap Up

Mr. Dilks concluded the meeting by indicating that this is the first in a series of Technical Advisory Committee (TAC) meetings, with the next meeting tentatively scheduled for June 26th. Mr. Dilks reminded committee members' to review the committee Terms of Reference and to provide any additional feedback by Friday June 11th, 2008 to Jason Diceman. Mr. Dilks then thanked committee members for attending and adjourned the meeting.

Editors Note: The TAC was great for a kick-off but determined to be too large and unwieldy for working meetings. Going forward, there will not be any TAC meetings. Instead, the project steering committee has been increased to include the relevant technical advisors from the City of Toronto and TTC as necessary. Utilities are being addressed by a utility coordinating body. Other agencies will be notified of opportunities for input as part of the public consultation process.

Lower Don Lands
Steering Committee Meetings #1-7

April 25, 2008 — **Steering Committee Meeting #1**

TS 1 – Problem and Opportunity Statement
TS 2 – Road Assumptions and Network Verification
TS 3 – Draft Employment and Population Targets

May 20, 2008 — **Steering Committee Meeting #2**

TS 4 – Preliminary Block Plan Considerations
TS 5 – Park Program

June 26, 2008 — **Steering Committee Meeting #3**

TS 1A – Revised Urban Opportunity Statement
TS 6 – Ecology Program
TS 7 – Sustainability Program
TS 8 – River Configuration (plan view)
TS 9 – Sediment Basin Concept
TS 10 – Alternative Infrastructure Solutions / Servicing Options

July 29, 2008 — **Steering Committee Meeting #4**

TS 11 – Ecology Plan
TS 12 – Park Programming
TS 13 – Planning Policy and Constraints Analysis Report

Sept 17-18, 2008 — **Steering Committee Meeting #5**

TS 11 – Ecology Plan (re-summarized in conjunction with TS 19)
TS 14 – Road Plan
TS 15 – Block Plan Configuration
TS 16 – Municipal Servicing Plan
TS 17 – River and Landform Concept
TS 18 – Bridges Functional Plan and Grading
TS 19 – Ecology Development (3D) part I

Also presented: Open Space, EA Update, Hot Topics

Nov 18, 2008 — **Steering Committee Meeting #6**

TS 20 – Highly Developed Grading
TS 21 – Massing Scheme
TS 22 – Urban Program
TS 23 – Street Character
TS 24 – Public Realm Program
TS 84 – Sustainability

Feb 18, 2009 — **Steering Committee Meeting #7**

TS 29 – Public Art, Heritage Integration
TS 30 – Desirable Building Design
TS 31 – Renderings
TS 32 – Phasing Plan

Also presented: EA Schedule Update

MEETING MINUTES / 3 PAGES / SENT BY EMAIL

Project: Lower Don Lands, MVVA # 07009.00
Meeting: **Client Steering Committee Meeting #1**
Meeting Date: 25 April 2008
Meeting Location: Waterfront Toronto, 20 Bay Street, 12-2, Toronto, Ontario
Distribution Date: 01 May 2008
Prepared by: Angela Wu, Michael Van Valkenburgh Associates, Inc. (MVVA)
Participants: Tim Laspa, City Planning
Gwen McIntosh, City Planning
Eric Pedersen, City Planning
Jane Welsh, City Planning
John Kelly, Transportation Services
Rod McPhail, Transportation Planning
Paul Murray, Gartner Lee
Ken Dion, Toronto Region Conservation Authority (TRCA)
Jamie McEwan, Waterfront Secretariat
Chris Glaisek, Waterfront Toronto (WT)
Brenda Webster, WT
Marko Prgin, TSH
Karin Wall, TSH
David Pratt, Arup
John Gladki, GHK International Consulting
Ken Greenberg, Greenberg Consulting, Inc.
Steve Willis, MMM Group Limited
Gullivar Shepard, MVVA
Elizabeth Silver, MVVA
Angela Wu, MVVA
Distribution: Participants
Michael Van Valkenburgh, MVVA
Matthew Urbanski, MVVA
Sarah Siegel, MVVA
Mike Smith, MVVA
Tim Dekker, LimnoTech
Steve Apfelbaum, Applied Ecological Services
Kelty McKinnon, Phillips Farevaag Smallenberg
Mark Laska, Great Eastern Ecology
Thomas Auer, Transsolar
David Cook, Behnisch Architects (BA)
Andrea Crumbach, BA
Henry Bardsely, RFR Engineering
David Norris, Carpenter Norris Consulting
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Attachment(s):

Client Steering Committee Meeting #1 covered:

- Technical Submission #1 – Draft Problem and Opportunity Statement

- Technical Submission #2 – Road Assumptions and Network Verification, Initial Proposed Road Route Alternative
- Technical Submission # 3 – Draft Population and Employment Targets

I. Technical Submission #1 – Draft Problem and Opportunity Statement

II. Technical Submission #2 – Roadway Alternatives

1. Gwen McIntosh noted that it would be beneficial to coordinate the Lower Don Lands project with the second phase of development of the FilmPort neighborhood. For example, the extension of Basin Street and Don Roadway should tie into the FilmPort site. There are a number of EA-related issues related to the extension of Don Roadway and commitments by TEDCO that have fallen through. *Gwen McIntosh to coordinate with Brenda Webster and get in touch with Susan McAlpine . Tim Laspa to provide history of Basin Street concepts and plans.*

2. Tim Laspa pointed out that the design team was missing Parliament Street alternatives in its family of road network options. Parliament Street was not dealt with in the East Bayfront Master Plan, and its realignment will need to be coordinated with Queens Quay.

3. Ken Dion would like to see the pedestrian bridge at Trinity Street included in the alternatives.

4. John Kelly pointed out that of the two, it would be easier to decommission Lake Shore Boulevard than to decomission the Gardiner Expressway. The Gardiner has greater capacity for taking the diverted traffic from Lake Shore. A ramp that accesses the Gardiner rom Parliament Street could function as the connection to the Gardiner.

5. John Kelly raised concerns with the Lake Shore corridor hugging development. In general, streets should not sync up against development.

6. The requirements of freight movements and their interaction with transportation issues still need to be considered. Based on the Issues Identification meeting that the design team had with TTR and Railways, priorities for TTR and Railways include:

   a. Eventually closing the Redpath Sugar Line
   b. Resolving issues around the LaFarge connection
   c. Maintaining service along the Unwin Avenue line

7. Ken Dion suggested depicting the T-intersection for access to Don Railyards.

8. Unlike the other transit lines depicted, which are all currently in stages of planning, the alternatives depicting a transit line running along the Don Roadway corridor seem unlikely—the existing Don Roadway currently does not have transit, and the Secondary Plan does not envision it eventually having transit. TTC had originally put in a line on Don Roadway in their early documentation for an EA; however it may drop out. There does not seem to be a feasible way to connect it to the Don Valley corridor. *John Kelly and Tim Laspa to provide background on Don Roadway transit questions.*

9. A representative from TTC should be added to the Client Steering Committee and included in future meetings. *Brenda Webster to invite.*

10. The City has used the ME model for supplying travel and demand forecasts. *Arup, Tim Laspa, and TTC to meet and coordinate modeling for travel and demand forecasting.*

III. Technical Submission #3 – Draft Population and Employment Targets

1. The forecast target numbers currently project a range that allows for flexibility and adaptability to accommodate the reality of designing municipal services and transportation services. These targets are aggressive around proposals for waterfront and surrounding areas. The numbers are based on the Competition Brief and will be adjusted once more information is learned. In terms of planning, they currently allow for the higher end of the curve.

2. Tim Laspa advised that the forecasts be predictable and defensible for the Master Plan EA—in terms of the EA process, the forecasts for employment, residential, and commercial need to be more locked down. A definitive set of projections will have to happen soon, as they usually go out with the first Public meeting. *John Gladki to sit down with Tom Hustler, Community Planning, and Transportation Planning to agree upon a set of targets.*

3. Eric Pedersen would like to see a full range of building types, including towers, in the alternatives. There will inevitably be a clamor for high-rises, especially along the Ship Channel and open spaces along the waterfront, so it makes sense to strategically locate the towers now in a controlled manner so that we do not end up with a neighborhood full of towers.

4. As part of the employment projections for the area, parking to accommodate the influx of people from office, industrial, retail, and other non-residential sectors needs to be taken into account in the programming of the site.

END OF MEETING NOTES

These meeting notes are recorded as understood. Please submit any changes or additions to these notes in writing to Angela Wu (awu@mvvainc.com) within ten days of receipt.

MEETING MINUTES / 3 PAGES / SENT BY EMAIL

Project:	Lower Don Lands, MVVA # 07009.00
Meeting:	**Client Steering Committee Meeting #2**
Meeting Date:	20 May 2008
Meeting Location:	Waterfront Toronto, 20 Bay Street, 12-2, Toronto, Ontario
Distribution Date:	02 June 2008
Prepared by:	Angela Wu, Michael Van Valkenburgh Associates, Inc. (MVVA)
Participants:	Leslie Coates, Parks, Forestry & Recreation Sean Harvey, Parks, Forestry & Recreation John Kelly, Transportation Services Gwen McIntosh, City Planning Lisa King, City Planning Ted Bowering, Toronto Water Paul Murray, Gartner Lee Jamie McEwan, Waterfront Secretariat Chris Glaisek, Waterfront Toronto (WT) Brenda Webster, WT Ken Greenberg, Greenberg Consultants John Gladki, GHK International Consulting Steve Willis, MMM Group Limited Elena Patarini, Arup Trent Lethco, Arup David Cook, Behnisch Architects Andrea Crumbach, Behnisch Architects Thomas Auer, Transsolar David Norris, Carpenter Norris Consulting Michael Van Valkenburgh, MVVA Gullivar Shepard, MVVA Elizabeth Silver, MVVA Angela Wu, MVVA
Distribution:	Participants Joe D'Abramo, City Planning Kerri Unger, City Planning MVVA Team FILE_NY
Attachment(s):	*MVVA Team Presentation*

I. **Executive Summary** (Michael Van Valkenburgh)

1. The pragmatic considerations that need to be taken into account are enabling and accelerating the team towards developing an informed and functioning park program and block plan. With respect to site issues and constraints, there are two kinds:

    a. Programmatically driven – What are the activities and things that create the daily life of the city that we will be building?

        i. With respect to parkland and open space, the design is trying to calibrate the impact of the wetlands requirements for this project, which was a major part of the discovery work last fall of the expectations of the Toronto Region Conservation Authority (TRCA) and what enables a successful Environmental Assessment. The coupling of wetlands with the hydrologic flooding of the floodway itself, and the expectation of acreage for wetland means that the parks are migrating towards the edges of the floodplain.

ii. The focus now is particularly on the North Keating Channel neighborhood, as decisions made in this area will inform the program of the rest of the site. How many times do we need to cross from North Keating neighborhood across the channel? Once that is established, the blocks north and south of the Keating Channel can be set, as the block plan needs to be driven by very real and quantifiable numbers.

iii. The biggest change from a year ago is the location of Lake Shore Boulevard. The design team studied a number of alternatives, but also discovered a number of immutable rules (for example, a 60m residential offset) which changes the way things can unfold in that area.

iv. The development of Parliament Slip as parkland will not only form an important bridge between what will eventually be the two neighborhoods, but also a link from the Port Lands to the mainland.

v. Because the nature of wetlands is that they are wet, flat areas without much topography, the required acreage of wetlands has imposed an exciting, dramatic order on the area. Much of the area at the center of the plan, where the river runs through, will be flat and have a tremendous ability to accommodate floodwater. Meanwhile, active parks, playfields, playgrounds, barbeque pits, gathering spaces, and picnic grounds are collected at the edge. How we create the frame where this activity and the City meet will become an extremely important idea.

b. Actual physical constraints – The different ways of understanding the capacity the site has.

i. Ken Greenberg and John Gladki have been continuing to address the concern with every meaning of the word "diversity" with respect to the plan.

ii. Behnisch, Transsolar, and Carpenter Norris, have been studying the right to light and air while accommodating the square footage requirements for architecture. Transsolar and Carpenter Norris have been balancing the relationship between energy and light. By looking at the relationship between building height, energy, and sunshine, the design team hopes to create buildings with the right conscientiousness of sustainability and effects on urban areas for people.

iii. Arup has been exploring various options for accommodating the targeted population and employment numbers. How to build a modal split is turning out to be limiting factor.

II. MVVA Team Presentation *(see attached)*

III. Comments

1. John Kelly, Transportation Services, noted that a synthesis of travel and demand forecasts and types of modal splits will need to be achieved in order to meet the levels of demand. From the

transportation side, it is still unclear if the suggested modal splits are achievable. A suggestion was made to schedule a further series of meetings with Transportation Planning & Toronto Transit Commission (TTC) in order to figure out network issues and make more informed decisions about larger issues. A representative from TTC should also be invited to future Client Steering Committee meetings.

2. Gwen McIntosh, City Planning, voiced a concern that the plan was becoming too detailed for this stage in the schedule. However, there is a level of quality and detail that the design team is trying to establish in anticipation of going to Ontario Municipal Board, which requires a higher level of detail for broader framework areas. The North Keating neighborhood is being studied under a microscope because many of the decisions made there will impact the rest of the site. Consideration needs to be given to how much flexibility should be built in given the constraints and implications of the North Keating area. A follow-up meeting between the design team and City Planning regarding Urban Design Guidelines and Zoning Bylaws was requested to further discuss land use issues, densities, and building heights.

3. Ted Bowering, Toronto Water, emphasized the public responsibility to manage stormwater. The location of urban notch parks will have a significant impact on grading and how the urban stormwater will be employed. The proposed treatment trains will ideally form a system that travels and plugs into the river seepage wetland system to better accommodate and flush out stormwater.

4. Sean Harvey, Parks, Forestry & Recreation, wondered how and where the Toronto Green Development Standard's targeted goal of increasing tree canopy by 30-40% would be met. He noted that the Sara Roosevelt Park precedent demonstrated how a dense urban park with significant canopy could be relevant to the objectives for the Lower Don Lands site. Active elements should not be precluded from places described as terrestrial. Migratory bird culture and its scenographic relationship to the islands is a major consideration and priority of TRCA's in conjunction with the Don Mouth Naturalization and Port Lands Flood Protection EA. However, a level of specificity with regard to the location of trees and bird activity has not yet been set.

5. Leslie Coates, Parks, Forestry & Recreation, commented that Commissioners Park would be a good precedent for the Lower Don Lands park program. A further meeting between the design team and Parks, Forestry & Recreation was requested to further discuss assumptions about language and vocabulary used in conjunction with park programming in Toronto historically and the evolution and reasoning behind the design iterations.

6. If anyone would like to arrange additional follow-up meetings to further discuss in greater depth issues, questions, and concerns, please direct requests to Jamie McEwan, Waterfront Secretariat, and Brenda Webster, Project Manager, Waterfront Toronto.

END OF MEETING NOTES

These meeting notes are recorded as understood. Please submit any changes or additions to these notes in writing to Angela Wu (awu@mvvainc.com) within ten days of receipt.

MEETING MINUTES / 2 PAGES / SENT BY EMAIL

Project: Lower Don Lands, MVVA # 07009.00
Meeting: **Client Steering Committee Meeting #3**
Meeting Date: 26 June 2008
Meeting Location: Waterfront Toronto, 20 Bay Street, 11.30-2.30p, Toronto, Ontario
Distribution Date: 30 June 2008
Prepared by: Angela Wu, Michael Van Valkenburgh Associates, Inc. (MVVA)
Participants: Beth McEwen, Parks, Forestry & Recreation
Mike Ronson, Toronto Transit Commission (TTC)
Tim Laspa, Transportation Planning, City Planning
Gwen McIntosh, City Planning
Kathy Thom, City Planning
Adele Freeman, Toronto Region Conservation Authority
Paul Murray, Gartner Lee
Jamie McEwan, Waterfront Secretariat
Chris Ronson, Waterfront Secretariat
Chris Glaisek, Waterfront Toronto (WT)
Brenda Webster, WT
Jason Diceman, Lura Consulting
Susan Hall, Lura Consulting
Ken Greenberg, Greenberg Consultants
Steve Willis, MMM Group Limited
Steve Apfelbaum, Applied Ecological Services
Tim Dekker, LimnoTech
Marko Prgin, Totten Sims Hubicki (TSH)
Peter Middaugh, TSH
Karin Wall, TSH
Elizabeth Silver, MVVA
Angela Wu, MVVA
Distribution: Participants
Michael Van Valkenburgh, MVVA
Matthew Urbanski, MVVA
Gullivar Shepard, MVVA
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Attachment(s): *MVVA Team Presentation*

I. Client Steering Committee Meeting 3 covered the following:

1. Technical Submission 1A – Revised Urban Opportunity Statement (handout)
2. Technical Submission 6 – Ecology Program (presented by Applied Ecological Services)
3. Technical Submission 8 – River Configuration (plan view) (presented by LimnoTech)
4. Technical Submission 9 – Sediment Basin Concept (presented by LimnoTech)
5. Technical Submission 10 – Alternative Infrastructure Solutions / Servicing Options (presented by Totten Sims Hubicki)

II. Comments

1. Ted Bowering, Toronto Water, and Greg Horgan, Technical Services, should be updated on the information presented during Totten Sims Hubicki's (TSH) presentation on the infrastructure

design for Lower Don Lands. *MVVA to distribute presentation to Ted Bowering and Greg Horgan. MVVA and Waterfront Toronto to arrange meeting with TSH, Ted Bowering and Greg Horgan for further discussion on municipal servicing issues for the project area.*

2. Toronto Region Conservation Authority (TRCA) voiced concern over the sediment trap. Although they are aware of the hydraulic constraints, TRCA would like to see a recommendation for the removal of the hydro-electric bridge.

3. TRCA would like to see the ecological systems in the Keating Channel and the Ship Channel Greenway studied in greater depth.

4. There needs to be further discussion and investigation of debris management in terms of quantity of debris to be managed and funding to build necessary structures.

5. An ecological glossary with a standardized set of nomenclature needs to be created for the Lower Don Lands project. The consistency of communication within the design team, City divisions, Waterfront Toronto, and TRCA would be greatly improved with a universal understanding of common terms. Terms need to be clearly defined and use consistently within the Environmental Assessment process. *TRCA suggested a field trip with the City of Toronto Parks, Forestry, & Recreation and MVVA team to further develop and define terms for the ecological catalog.*

6. The next step for the design team would be to tie together the ecological and park program. The relationship between the recreational uses of the park program and ecological sensitivities of the landscape, first explored in Technical Submission #5 Park Program, should be further developed. *MVVA to send out CSC 2 presentation of Park Program to interested parties not at the meeting.*

7. Gwen McIntosh, City Planning, voiced Councillor Paula Fletcher's concerns over the design for the west side of the Greenway along Don Roadway. Waterfront Toronto has expressed this concern to the design team and studies are currently being done on options for the area. Complicated grading issues at the intersection of Commissioners Street and Don Roadway will inform decisions relating to the design of the Greenway.

END OF MEETING NOTES

These meeting notes are recorded as understood. Please submit any changes or additions to these notes in writing to Angela Wu (awu@mvvainc.com) within ten days of receipt.

MEETING MINUTES / 2 PAGES / SENT BY EMAIL

Project: Lower Don Lands, MVVA # 07009.00
Meeting: **Client Steering Committee Meeting #4**
Meeting Date: 29 July 2008
Meeting Location: Waterfront Toronto, 20 Bay Street, 10am - 2pm, Toronto, Ontario
Distribution Date: 31 July 2008
Prepared by: Sarah Siegel, Michael Van Valkenburgh Associates, Inc. (MVVA)
Participants:

Leslie Coates, Parks Forestry & Recreation
Sean Harvey, Parks Forestry and Recreation
John Kelly, Transportation Services
Jamie McEwan, Waterfront Secretariat
Andrea Old, City Planning
Eric Pedersen, City Planning
Paul Ronan, Parks, Forestry & Recreation
Brian Rutherford, Parks Forestry & Recreation
Bill Snodgrass, Toronto Water
Nigel Tahair , City Planning
Jane Weninger, City Planning
Ken Dion, Toronto Region Conservation Authority (TRCA)
Adele Freeman, TRCA
Dale Leadbeater, Gartner Lee Limited (GLL)
Marc Rose, GLL
Brenda Webster, Waterfront Toronto, WT
Jason Diceman, Lura Consulting
Steve Apfelbaum, Applied Ecological Services (AES)
Doug Eppich, AES
Beth Wentzel, AES
Tim Dekker, LimnoTech
Marko Prgin, Totten Sims Hubicki (TSH)
Mike Hubicki, TSH
Karin Wall, TSH
John Gladki, GHK
Gullivar Shepard, MVVA
Sarah Siegel, MVVA

Distribution: Participants
Michael Van Valkenburgh, MVVA
Chris Glaisek, WT
Raffi Bedrosyan, WT
Bill Dawson, Toronto Transit Commission (TTC)
Don Haley, TRCA
Tim Laspa, City, Transportation
Cheryl Macdonald, City Planning
Gwen McIntosh, City Planning
Kathy Thom, City Planning
Beth McEwen, Parks, Forestry & Recreation
Jayne Naiman, Waterfront Secretariat
Chris Ronson, Waterfront Secretariat
Paul Murray, GLL
Matthew Urbanski, MVVA
Liz Silver, MVVA

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Attachment(s): *Park Programming Technical Submission*
(Including: Presentation, Dock Wall Typology Plan, and Dock Wall Typology Matrix)
Ecology and Stormwater Presentation
Planning Policy and Constraints Technical Submission

I. Client Steering Committee Meeting 4 covered the following:

1. Technical Submission 11 – Ecology Plan (presented by AES, technical submission to be distributed at a later date)
2. Technical Submission 12 – Park Programming (presented by MVVA)
3. Technical Submission 13 – Planning Policy and Constraints (handout prepared by MMM)
4. Forthcoming distribution of Draft Issues Identification book to Clients Steering Committee members.

II. Comments

Part One: Stormwater

1. Sean Harvey, Parks, Forestry & Recreation, asked about the implications for maintenance caused by the accumulation of salts and metals in the bioswale street features presented. *AES responded that the bioswale would have roughly the same lifespan as the road itself; the soil would accumulate contaminants but it would take a significant time period to require removal.*

2. Jane Weninger, City Planning, suggested of the park design team that the design consider using stormwater for the watering of street trees. It was also noted that the more of the system that is surface conveyance, the less complicated it might be, especially in coordination with utilities.

3. Paul Ronan, Parks, Forestry & Recreation, appreciated that wet weather flow is being considered so seriously. Recent changes in weather have had a serious impact on parks maintenance. Putting in the effort up front to design with consideration for this will potentially save money in the long run.

Part Two: Park Programming

1. Nigel Tahair, City Planning, and Sean Harvey, noted the need to develop a bike connection between the two parallel east / west trails (Lakeshore and Queens Quay) at Cherry Street.

2. Adele Freeman, Toronto Region Conservation Authority, suggested a meeting between Carolyn Woodland of TRCA, and Parks, Forestry & Recreation to discuss the possibility of having more park program within the floodplain. *Adele Freeman to schedule this meeting.*

3. The navigability of the Keating Channel was questioned by John Kelly, Transportation Services. Ken Dion, TRCA, relayed that only small crafts were being considered by the Navigable Waters Protection Act (NWPA). Adele Freeman stipulated that to answer this question it would be

necessary to develop the dredging and debris management program, and determine what that activity required of the Keating Channel. It was noted that maintenance of dock walls may have further requirements for navigability.

4. Bill Snodgrass, Toronto Water, wondered about the off-site alternatives to the suggested, potential location for the storm water interceptor infrastructure between the re-aligned Lakeshore Boulevard and the Wilson Rail Spur. John Kelly appreciated the identification of this location, even though locations off site are also being considered. The potential takedown of the Gardiner will impact this, but because the Wilson Rail Spur will need to remain, the roadway may be required to be raised over this area either way.

Part Three: Client Steering Committee #5

1. Adele Freeman, TRCA, suggested that in order to make the next Client Steering Committee meeting more effective, it may be useful to break up into smaller discussion groups at the meeting. It would also be useful to express beforehand the specific resolutions which need to be clarified during the meeting.

2. Client Steering Committee 5 will take place on September 17th and 18th and will cover the following Technical Submissions:

September 17th
- Technical Submission 17 - River and Landform Concept
- Technical Submission 18 - Bridges Functional Plan and Grading
- Technical Submission 19 - Ecology Development (3D)

September 18th
- Technical Submission 14 - Road Plan
- Technical Submission 15 - Block Configuration Plan
- Technical Submission 16 - Municipal Servicing Plan

END OF MEETING NOTES

These meeting notes are recorded as understood. Please submit any changes or additions to these notes in writing to Sarah Siegel (ssiegel@mvvainc.com) within ten days of receipt.

MEETING MINUTES / 11 PAGES / SENT BY EMAIL

Project:	Lower Don Lands, MVVA # 07009.00
Meeting:	**Steering Committee Meeting #5 – Day 1** **Hydrology, Stormwater, Habitat**
Meeting Date:	17 September 2008
Meeting Location:	Waterfront Toronto, 20 Bay Street, 11am - 4pm, Toronto, Ontario
Distribution Date:	26 September 2008
Prepared by:	Kerrie Harvey, Michael Van Valkenburgh Associates, Inc. (MVVA)
Participants:	Raffi Bedrosyan, Waterfront Toronto (WT) Alex Brunton, Baird & Associates Patrick Cheung, Toronto Water, City of Toronto (CoT) Leslie Coates, Parks, Forestry & Recreation (CoT) Bill Dawson, Toronto Transit Commission (TTC) Sameer Dhalla, Toronto Region Conservation Authority (TRCA) Jason Diceman, LURA Consulting Ken Dion, TRCA Robert Freedman, City Planning (CoT) Adele Freeman, TRCA Chris Glasiek, WT Annelise Grieve, Senes Consultants Don Haley, TRCA Sean Harvey, Parks, Forestry & Recreation (CoT) Steve Heuchert, TRCA John Kelly, Transportation Services (CoT) Tim Laspa, City Planning (CoT) Dale Leadbeater, Gartner Lee Limited (GLL) Gord MacPherson, TRCA Jamie McEwan, Waterfront Secretariat Beth McEwen, Parks, Forestry & Recreation (CoT) Gwen McIntosh, City Planning (CoT) Paul Murray, GLL Jayne Naiman, Waterfront Secretariat Eric Pedersen, City Planning (CoT) Chris Ronson, Waterfront Secretariat Marc Rose, GLL Bill Snodgrass, Toronto Water (CoT) Brenda Webster, WT MVVA Team
Distribution:	Participants Michael Van Valkenburgh, MVVA Matthew Urbanski, MVVA FILE_NY
Attachment(s):	*Hydrology presentation; Hydrology and Landform plan diagram; Habitat presentation; Habitat plan diagram; Stormwater presentation; Stormwater plan diagram*

I. Day 1 of Client Steering Committee Meeting 5 covered the following:

1. Technical Submission 17 – River and Landform Concept (presented under the heading "Hydrology" by LimnoTech)
2. Technical Submission 11 – Ecology Plan (presented under the heading "Stormwater" by AES and TSH)
3. Technical Submission 19 – Ecology Development (3D) part 1 (presented under the heading "Habitat" by AES)

II. Executive Summary of Day 1:

1. Hydrology:
    i. The restriction to floodwater conveyance between the CNR Bridge crossing and Lakeshore Boulevard could be addressed in a number of ways. Modeling efforts by the design team and TRCA are getting closer to a workable solution.
    ii. Alternatives and the decision making process for sediment management, operations and maintenance of the reaches, and groundwater barriers need to be outlined and included in the Don Mouth Environmental Assessment (EA).
    iii. Effects of global climate change will need to be considered in terms of impacts on hydrology and on lake levels.
    iv. Phasing plan needs to be developed in terms of sediment management, constructability, and costing.
    v. The link between hydrology and ecology needs to be described in greater detail.

2. Stormwater:
    i. The need for and location of ultraviolet (UV) treatment of treated stormwater prior to discharge into the Don River needs to be determined.
    ii. The operational and maintenance requirements for the planned source control measures (i.e. filtration) need to be fully addressed.
    iii. The need for and location of water quality monitoring stations should be investigated.
    iv. The relationship of stormwater management measures to phasing should be examined.
    v. A potential pilot project could be undertaken in the City to demonstrate the effectiveness of the planned source control measures.

3. Habitat:
    i. The structural and physical features that create opportunities for species need to be investigated.
    ii. A common nomenclature is needed.
    iii. Many stressors (such as dogs, policies, maintenance, invasive plants, etc.) will have an effect on habitat.

III. Workshop Discussion:

Hydrology
Discussion Participants:

Raffi Bedrosyan, WT
Patrick Cheung, Toronto Water
Jason Diceman, LURA Consulting
Adele Freeman, TRCA
Don Haley, TRCA
John Kelly, Transportation Services
Jamie McEwan, Waterfront Secretariat
Marc Rose, GLL
Elizabeth Tayag, TSH
Ken Greenberg, Greenberg Consulting Ltd.
Steve Willis, MMM
Dan Lautenbach, LimnoTech
Tim Dekker, LimnoTech
Kerrie Harvey, MVVA

1. Infrastructure at Lakeshore Boulevard and Keating Channel

   a. Transportation Services asked for clarification on what the impact of the Gardiner potentially being taken down would be on the new river channel hydrology. LimnoTech responded that the team is currently proceeding under the assumption that the Gardiner is staying up and further clarified that the piers of the Gardiner do currently affect flow. The current modeling efforts are addressing this issue.

   b. Transportation Services asked for clarification on what the fate of the Wilson Rail Yard might be and whether the sediment management area conflicts with it. LimnoTech responded that the sediment management area is planned to be directly south of the Yard and does not currently interfere with it. However, LimnoTech did acknowledge that shrinking the Yard would be very helpful since it would allow more flexibility in determining the footprint of the sediment management yard. Transportation Services raised the question of whether the capacity at Wilson Yard could be accommodated in some way at Keating Yard.

   c. Transportation Services asked if there was a desire to raise the bridge structures in the Keating Channel and Lakeshore Boulevard area. LimnoTech responded affirmatively since the area is quite constricted now and the bridges are a problem for conveyance. TRCA suggested contacting TEDCO to raise this issue with them.

   d. TRCA brought up the issue of the utility 'bump' and its effect on conveyance. It pointed out that the utility substation is not going to be moved, but flow could be accommodated by replacing the utility bridge with a connection that goes underneath the river.

      i. TRCA also pointed out that the 'bump' could be lowered in grade without touching the ramps from the Don Valley Parkway to the Gardiner.

ii. Waterfront Toronto asked if any cost estimates were available for this work. TRCA responded that Hydro One has estimated a cost of $10-12 million for moving the utility bridge and $60 million for moving the substation. TRCA also pointed out that the real cost would be increased due to likely hydrocarbon contamination in the area.

iii. LimnoTech raised the issue of whether moving the hydro substation could be a part of Hydro One's ongoing upgrades. TRCA replied that Hydro One is willing to look at options such as this but they would likely want WT to bear some of the cost.

iv. TRCA pointed out that moving the substation and moving the utility bridge should both be included as options in the Don Mouth Environmental Assessment (EA) and possible phasing of both of these options should be examined.

e. WT raised the issue of how potential flooding might affect the Unilever property. TRCA responded that lowering the Don Roadway and associated berming on the edge of the Unilever property might allow for more conveyance and flood protection and may not result in interference with the operations of Unilever. TRCA pointed out that Unilever wants to develop their land in the future and questioned whether a larger development scheme should incorporate this area. In previous discussions on this topic, WT and the City have said not to look at the Unilever lands as part of the plan.

f. Transportation Services suggested a way of achieving more conveyance in the Lakeshore Boulevard and Keating Channel area. It was pointed out that there is currently an empty bay where the Don Roadway passes under the rail bridge. He suggested that this empty bay could be utilized and all lanes of the Don Roadway could be shifted to the east by one lane. LimnoTech raised the issue that the ramps for the Don Valley Parkway and Gardiner would need to be moved in order for this to be an option. The MVVA team and TRCA will keep this idea in mind when evaluating options for improved conveyance through this area of the site, but will still proceed with the assumption that the Gardiner ramp alignment as currently designed will remain.

2. Sediment Management

a. TRCA asked for clarification on where the slurry pipe is routed and where it outlets. LimnoTech described the system's ability to outlet at the Shipping Channel. The footprint of the barges needs to be included when describing the total area requirements for sediment management. TRCA would like to see all options for sediment management laid out and then discuss them with the Toronto Port Authority.

b. TRCA asked how much maintenance of the sediment trap would be required if multiple storm events were to happen back-to-back. TRCA also raised the issue of the maintenance requirements of the slurry pipe. LimnoTech replied that maintenance would need to happen on an event response basis and there would likely be two side-by-side pipes to provide redundancy in the system.

c. TRCA was interested in the prospect of the sediment management being phased in at an early stage and using materials from this process to help create soil for other projects (such as Lake Ontario Park).

d. WT pointed out that a soil treatment facility is planned for 480 Lakeshore Boulevard and posed a question as to whether the sediment treatment process could make use of this facility.

e. TRCA raised the issue that it cannot proceed with the Don Mouth EA process until information about sediment management is available. LimnoTech to write a memorandum that describes the sediment management options as well as their advantages and disadvantages. This memo is to be completed with the goal of being circulated to the Don Mouth EA team before November 12th, 2008.

3. Operations and Maintenance

   a. TRCA wants a low level of maintenance for the river in the long term, and would like the river to be as naturalized as possible.

   b. TRCA raised the issue of the amount of meander that should be allowed in the riverbed. TRCA assumes that the river will have some amount of armouring associated with it, but that the river will be permitted to migrate between armoured points. LimnoTech agrees that a hard underlayment would hold together the major components of the river, while allowing some tolerance for meander. TRCA questioned what would happen if things like viewing platforms were built, but then the river meandered away from them. These types of issues will need to be addressed in the design.

   c. TRCA asked what type of barrier would be present underneath the river system to control contamination migration. LimnoTech would recommend a permeable barrier if one is needed. MMM pointed out that a barrier might not be needed at all if hotspots are remediated; the Risk Assessment will be able to address this issue. TRCA suggested that the general options of permeable, impermeable, semi-permeable, and no barrier be included in the EA.

   d. TRCA would like to see an outline of the costs and benefits of this reach approach along with a description of the likely frequency of dredging in each reach. TRCA generally likes the idea of the flexibility of the system, however pointed out that, in order to satisfy the Toronto Port Authority, a location may need to be created at the mouth where sediment can be collected and dredged.

4. Climate Change

   a. TRCA raised the question of how the design would respond to changing environmental conditions due to global climate change. LimnoTech replied that climate change would likely result in peaky hydrology and a change in lake levels. These things might best be addressed by designing for the next 30 years and then reassessing conditions and potentially regrading in order to account for any changes.

b. LimnoTech points out that flexibility in the system will be the key to being able to deal effectively with climate change.

5. Next Steps

    a. LimnoTech would like to be able to make conclusions about how hydrology will affect ecology. TRCA suggested that modeling hydrographs for a typical year might be one way to examine periods and frequencies of inundation from which conclusions about ecology could be made.

    b. The issue of phasing needs to be addressed.

<u>Stormwater</u>

1. Treatment of Runoff

    a. Runoff will be treated based upon the source of pollutants. For example, roof water will be assumed to be clean and will feed high quality wetlands and ultimately riverine wetlands. Discharge from roads will contain sediment and contaminants; therefore it will be treated separately with pre-treatment such as oil grit separators and biofiltration. Roof drainage for parts of the site will also be directed to Silva Cells which will provide water for irrigation of trees.

        i. Option A: maximizes water quantity into street tree roof zones and uses road runoff (with salt).

        ii. Option B: prevents salt inflow into street tree roof zones; by means of intercepting filtered road runoff and discharging this drainage to the storm drain servicing the public road allowance.

2. Future Forecasting

    a. Consideration should be given to the future forecasting of rainfall in the area.

    b. Climate change – will this be accounted for in the future forecasting?

    c. Don Haley (TRCA) has more information regarding the requirements. – in follow-up with Don Haley of the TRCA, there is currently no information available regarding future forecasting for Lake Ontario.

3. Naturalized Habitat

    a. Habitat Restoration Plan

    b. The difference between a naturalized and a treatment wetland needs to be clarified.

c. Currently to meet the requirements of the Don Mouth EA, high quality wetlands are proposed. This would allow for clean water to be discharged into the Don River. The high quality wetlands will not accept untreated runoff and discharge from roads, and are above the 25-100 year floodline.

d. Environment Canada does not want a harmful habitat (i.e. treatment wetland) to be created with the introduction of certain species such as fowl.

e. Riverine wetlands may accept runoff from roads and other non-roof areas which may possess pollutants.

4. Disinfection of Runoff (E. Coli treatment)

    a. The Toronto Wet Weather Flow Management Guidelines require the treatment of E. coli. to a level less than or equal to 100 counts/100 ml.

    b. If the bacteria count (E. Coli) is below the target level of 100 counts/100 ml, then is disinfection still required?

    c. Does the disinfection apply to only the first flush of runoff from a storm and not the complete storm event?

    d. The monitoring of E. coli is not a Ministry of the Environment (MOE) requirement for a Certificate of Approval (C of A). However a monitoring program is required to evaluate the performance of the disinfection to assess performance with the Toronto Wet Weather Flow Management Guidelines.

    e. Is the river part of the treatment train?

5. Recreational Use of the Don River and Access to the River

    a. It is important to consider a balance of recreational use of the waterfront areas relative to the proposed wetlands for stormwater treatment and natural environment enhancement.

    b. The current plan does incorporate features to consider wetlands as well as recreational uses.

6. Bioswales

    a. The feasibility of creating bioswales between sidewalks and roads will need to be further investigated. Any proposed system uses bioswales for treatment rather than solely for aesthetic purposes.

    b. There may be maintenance issues. Who will take ownership? The issue of maintenance of systems will need to be further investigated. Due to the location of the Lower Don Lands, jurisdiction may include the City of Toronto, TRCA, federal agencies, and local landowners.

c. Maintenance and operation needs are to be fully described by the design team.

7. Heating Systems in Buildings

   a. The feasibility of using steam from buildings to heat the roads was discussed and should be further studied.

   b. Thermal Distribution Systems will connect the District Energy centres.

8. Silva Cells

   a. Provide a reasonable alternative for protecting and irrigating street trees, but are not presumed to be a City standard at this point.

   b. Depending on where the Silva Cells are placed within the roadway section, maintenance responsibilities could either reside within Transportation Services or Parks, Forestry & Recreation's realm of jurisdiction.

   c. The EAMP Technical Memo # 2 needs to show maintenance requirements for the Silva Cells.

9. Pedestrians

   a. The design team shall check the Pedestrian Accessibility Guidelines for their requirements for the minimum unobstructed width of sidewalk.

10. Road Salt

    a. Currently, neither the City nor TRCA has a practical method to appropriately address the treatment of road salt. The City of Toronto has an existing Salt Management Plan; however, it does not eliminate the use of salt for application on roads and sidewalks. The LDL team needs to development a project salt management plan and a potential recommendation for the LDL project could be to substitute salt with alternative road de-icing media.

11. Monitoring

    a. TRCA, in cooperation with the Credit Valley Conservation and MOE, is having an internal sustainability meeting on October 6, 2008. The workshop will discuss potential changes to the MOE Stormwater Management Planning and Design Manual. In addition, there will be a public conference on October 7, 2008 to discuss sustainability issues.

    b. Currently the City is developing a scope for the monitoring of two, as yet unbuilt, sites for testing road run-off infiltration, biofiltration and the mitigation of road salt.

12. Phasing

a. It will be necessary to develop a construction phasing plan that provides for interim stormwater management treatment strategies for supplying the proposed wetlands.

Habitat

Discussion Participants:

Bill Snodgrass, Toronto Water
Ken Dion, TRCA
Gord MacPherson, TRCA
Dale Leadbeater, Gartner Lee Limited (GLL)
Brenda Webster, Waterfront Toronto, WT
Steve Apfelbaum, AES
Sean Harvey, Parks Forestry & Recreation
Beth McEwen, Parks Forestry & Recreation
Ken Greenberg, Greenberg Consultants Ltd.
Karin Wall, TSH
Liz Silver, MVVA
Sarah Siegel, MVVA

1. AES gave a review of the process AES has been going through to obtain local data and knowledge there is locally in collaboration with TRCA and others in this endeavor. AES and other members of the MVVA team have also been doing field work with TRCA to look at reference reaches to determine how elevations, substrates, and hydrology indicate habitat in other rivers, The Rouge, etc…

2. The necessity of pinning down a common vernacular in talking about habitat and species names was noted.

3. There was a discussion about integrating habitat work with the Municipal Class EA in terms of phasing the habitat creation in relation to the rest of the construction. TSH pointed out that if habitat wetlands are built too early in the process, there could be the potential that they will be damaged by later construction. Perhaps both bridges and river channel/wetlands would have to be built simultaneously in the dry.

4. There is a phasing challenge in building the seepage/high quality wetland system because it relies on clean roof water from buildings which need to be built. Can a treatment wetland receiving water from non-roadway sources become a naturalized high-quality wetland as development occurs?

5. There was a discussion about how to develop the design for individual species or species groups. AES has started to create a list, with support from local sources, of past and present species. They have begun to indicate which species they think they may be able to attract to the Lower Don Lands system.

    a. The following discussion points came out of a conversation on this topic which focused on fisheries primarily but had indications for all habitat design.

        i. There was a general agreement that the design would not want to indicate target species only. TRCA suggested targeting guilds rather than specific species. Steve Apfelbaum suggested choosing one representative species for each desired group of species. This would allow for using Habitat

Suitability Index (HSI) models for design. These models are specific to a single species, but a very useful tool in designing habitats.

ii. The question of how to determine which species/guilds/communities to design for was discussed. A flow chart could illustrate how historic, regional, current, and systemic species would all contribute to our list of potential species.

iii. How we define the habitats could be important to how we think about their design. Again, we do not want to target specific species, rather we should be thinking about what bio-physical structure will support entire communities here. The list of fisheries species would be basically the same as much of the surrounding coast. The group considered several names for the habitat classification and came up with 'Urban Coastal Wetland Complex'.

iv. There is a need to manage the public expectations of what will ultimately emerge. It was also suggested that although the focus should not be on too many of the more unlikely species, the design team should design the habitats so that they do not actually impede any potential species.

6. There was a discussion brought up by Beth McEwan and Sean Harvey of Parks Forestry and Recreation, about the balance of open space for habitat vs. recreation. How does the habitat group respond to the question of there being too much focus on habitat in the project?

   a. Gord MacPherson suggested that the one use doesn't preclude the other. The habitat function is critical to the project and needs to be given a solid foundation, so that it is resilient and able to allow for recreational opportunities.

   b. A critical question is what types of recreation can happen within the flood plain. What flood event level can start to consider what kind of activity? The flood plain extents for the regulatory event cannot be changed due to flood conveyance needs.

   c. The park area between development areas and the flood plain is very flexible in terms of upland habitat area (also in the EA). The necessity for wetland habitat sizes, buffer/transition zones, etc. will be defined more clearly as the process continues.

   d. Ken Greenberg emphasized the need to think about the open space systems overlapping and blending in order to accommodate all of the competing needs. While this concept was generally received positively, it should also be acknowledged that some things cannot overlap. Off-leash dog areas were suggested as an example of a use which cannot overlap sensitive habitat or other recreational areas. (Trinity Bellwoods Park is experiencing some conflicts with regard to this use.)

7. There was a widespread interest in having self sufficient ecologies, a dynamic equilibrium was agreed upon, however it was also suggested that the design consider the potential need for maintenance in the future. For example – the seepage wetlands have a high potential for

phragmites invasion; it would be good to have a system with the built in infrastructure to flood these wetlands so that if this invasion occurs, it can be countered easily.

8. Though we don't want to target specific species as a method of design – the project might consider electing some 'champion species' which could help get the public excited about the habitat potentials.

END OF MEETING NOTES

These meeting notes are recorded as understood. Please submit any changes or additions to these notes in writing to Kerrie Harvey (kharvey@mvvainc.com) within ten days of receipt.

MEETING MINUTES / 16 PAGES / SENT BY EMAIL

Project:	Lower Don Lands, MVVA # 07009.00
Meeting:	**Steering Committee Meeting #5 – Day 2** **Connections, Circulation, Neighbourhoods, Open Space, Infrastructure**
Meeting Date:	18 September 2008
Meeting Location:	Waterfront Toronto, 20 Bay Street, 11am - 4pm, Toronto, Ontario
Distribution Date:	29 September 2008
Prepared by:	Kerrie Harvey, Michael Van Valkenburgh Associates, Inc. (MVVA)
Participants:	Les Arishenkoff, Toronto Water, City of Toronto (CoT) Raffi Bedrosyan, Waterfront Toronto (WT) Ted Bowering, Toronto Water (CoT) John Bryson, City of Toronto Technical Services (CoT) Samir Dalha, Toronto Region Conservation Authority (TRCA) Bill Dawson, Toronto Transit Commission (TTC) Ken Dion, (TRCA) Jason Diceman, LURA Consulting Robert Freedman, City Planning (CoT) Adele Freeman, TRCA Chris Glasiek, WT Don Haley, TRCA Sean Harvey, Parks, Forestry & Recreation (CoT) Steve Heuchert, TRCA Gregory Horgan, Technical Services (CoT) Bob Kearse, Solid Waste Management (CoT) John Kelly, Transportation Services (CoT) Tim Laspa, City Planning (CoT) Jamie McEwan, Waterfront Secretariat Gwen McIntosh, City Planning (CoT) Caroline Mellor, Toronto Emergency Medical Services (EMS) Paul Murray, Gartner Lee Limited Jayne Naiman, Waterfront Secretariat Andrea Old, City Planning (CoT) Eric Pedersen, City Planning (CoT) Sherry Pedersen, City Planning (CoT) Chris Ronson, Waterfront Secretariat Mike Ronson, TTC Bill Snodgrass, Toronto Water (CoT) Nigel Tahair, City Planning (CoT) Kathy Thom, City Planning (CoT) Brenda Webster, WT MVVA Team
Distribution:	Participants Michael Van Valkenburgh, MVVA Matthew Urbanski, MVVA FILE_NY
Attachment(s):	*Connections presentation, Connections plan diagram, Circulation presentation, Circulation plan diagram, Evaluation of Cherry Street and Commissioners Street Alternatives, Response to Transportation Services' concerns, Neighbourhoods presentation, Neighbourhoods plan diagram, Open Space presentation, Open Space plan diagram, Infrastructure presentation, Infrastructure plan diagram, Dual purpose submerged storm sewer diagram, Impact on existing infrastructure*

diagram, Technical Memo – Water Supply, Technical Memo – Waste Water, Technical Memo – Stormwater Management

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I. Day 2 of Client Steering Committee Meeting 5 covered the following:

1. Technical Submission 18 – Bridges Functional Plan and Grading (presented under the heading "Connections" by RFR)
2. Technical Submission 14 – Road Plan (presented under the heading "Circulation" by Arup)
3. Technical Submission 15 – Block Plan Configuration (presented under the heading "Neighbourhoods" by Ken Greenberg)
4. Open Space (presented by MVVA)
5. Technical Submission 16 – Municipal Servicing Plan (presented under the heading "Infrastructure" by TSH)

II. Executive Summary of Day 2:

a. Connections:

i. There were several constraints related to the floating platform bridge option (including concerns with movement during regulatory events, and boat access).

ii. The possibility of having the East Bayfront stormwater treatment ponds extend along the Keating Channel would potentially restrict flow and conflict with bridge abutments.

iii. Jurisdictional issues related to the ownership of the Gardiner, the bridges, the marine wall, and underpasses will need to be outlined in detail.

iv. The Cherry Street underpass needs to be safe and inviting for pedestrians. Issues of ownership in underpass situations need to be resolved.

b. Circulation:

i. Pedestrians and bikes need to be a priority.

ii. Access and response time for Emergency Medical Services (EMS) and Toronto Fire Services needs to be studied on the one-way streets alternative.

iii. Waste collection needs to be accommodated.

iv. Grading needs to be examined more closely to reconcile transit, drainage, and the protection of historic buildings.

v. Munitions Street Bridge and pedestrian bridges may need to be included in the Class EA Master Plan for Infrastructure.

c. Neighbourhoods:

i. There was a general level of positive receptivity to the emerging Neighbourhoods concepts.

ii. Critical importance of transit oriented development
1. Land use and density relationships to transit need to be reinforced.
2. Efforts should be made to minimize parking at developments.
3. Importance of integrating transit and pedestrian and retail activity on "unbundled" Cherry Street .
4. The potential for GO transit hub needs to be elaborated.

iii. Ensuring publicness
1. The water's edges need to feel truly public.
2. Each neighbourhood needs to have something that would draw the public into the neighbourhood.
3. Quality and beauty of the neighbourhood infrastructure needs to be emphasized.

iv. Technical and service considerations
1. EMS needs to be addressed.
2. Information regarding a GO Service Yard on Commissioners Street may help scope the transit development.
3. Grading around historic structures needs to be examined.

d. Infrastructure:

i. The infrastructure requirements for both the short and long term management of groundwater need to be investigated and defined.

ii. The 'Utilidor' concept was well-received but the advantages need to be elaborated upon and the details need to be worked out.

iii. For the purpose of managing and locating the streetscape features, trees need to be the first priority, then sidewalks, then utilities.

iv. The City expressed concerns with owning and operating a non-potable water supply. If this servicing solution is to be carried forward for further consideration then issues such as risk, liability, cost recovery, operations and maintenance need to be presented in a feasibility report.

v. The team needs to focus its attention to the stormwater solutions for North Keating lands.

vi. The team needs to review alternative wastewater servicing solutions with the West Don Lands team to ensure that a coordinated approach to the assessment of alternative solutions is completed.

e. Open Space:

i. The park should be a place for all people and as such needs to carefully marry the parkland uses and the wetland uses. The choreography of the pedestrian and bike circulation is a key component to achieving this.

ii. The plan identifies five open space 'junctions' that are key in building activity bridges between the urban development and the parkland.

iii. A study that illustrates dimensional flexibility for the accommodation of playing fields and gathering spaces is needed.

III. Workshop Discussion:

<u>Circulation</u>
Discussion Participants:

Bob Kearse, City Solid Waste Management
Raffi Bedrosyan, Waterfront Toronto (WT)
Jamie McEwan, Waterfront Secretariat
John Kelly, Transportation Services
Don Haley, TRCA
Eddy Lam, Transportation Services
Gregory Horgan, Technical Services
David Pratt, Arup
Michael Thompson, TSH

1. Cherry Street

a. Concerns were expressed that dealt with the proposed realignment of Cherry Street. Specifically, participants were interested in knowing if the realignment would be pedestrian and bike friendly, and if traffic flow would have continuity.

b. Participants suggested prioritizing travel modes in the following way:
   i. Pedestrian and bike
   ii. Transit
   iii. Auto

c. Arup confirmed that the existing Cherry Street bridge would be used for pedestrians and bikes only. It was pointed out that this current bridge structure does not allow for transit.

2. Navigability of the Keating Channel

a. Participants were interested in whether boats traffic on the Keating Channel is considered in the transportation plan. Participants asked how much of the Keating Channel will remain navigable.

   b. The design intent is to allow small boats, and boats with low clearance, access to the Keating Channel. However, the group discussed the potential to remove the navigable status of the channel under the Navigable Waters Act.

3. One-way Streets

   a. Arup confirmed that the proposed streets could be narrower and one-way.

   b. Participants pointed out that the one-way streets will need to be reconciled with Emergency Medical Services (EMS) and fire safety issues.

4. Grading Issues

   a. Arup updated the participants that detailed grading is still to be completed. Soils management will be addressed as a part of this upcoming work.

   b. Participants brought up the topic of existing buildings and the desire to preserve them. Participants were concerned with how the grading will be reconciled to preserve these structures.

   c. Arup pointed out that final grading will be a challenge. Solving drainage issues, dealing with run-off, and clearances etc. will be challenging. Alignments will need to be graded to allow for drainage to the Keating Channel and Shipping Channel.

5. Integration of Roads and Utilities with Public Realm

   a. Participants expressed concerns with how the public realm will integrate with roads and utilities. The need to coordinate the implementation of public realm and infrastructure was discussed.

   b. The participants brought up the idea of seeing trees as a form of infrastructure. It was pointed out that if the City is serious about having large trees, then consideration needs to be given to soils and irrigation issues.

   c. Street trees should be understood as 'green infrastructure' and should be integrated with and given equal importance to utility infrastructure.

6. Waste Collection

   a. Participants pointed out that garbage collection vehicles need to have clear access to curbside bins.

   b. The need for loading zones and collection routes should be considered._The right-of-way may need to accommodate waste pick-up.

   c. The capacity of a vacuum waste system needs to be further studied.

7. The Gardiner Expressway

a. Participants expressed concerns that the Gardiner take down proposal could result in two competing Environmental Assessments (EA).

b. Phasing of roads and their relationship to the Gardiner will need to be examined. However, the team was asked to continue with design under the Gardiner up scheme.

c. Participants were concerned about potential traffic congestion if the Gardiner were to be taken down. WT has acknowledged that added traffic cannot be dealt with through design on this site and that the Gardiner EA will require a regional level of transportation and traffic analysis.

8. Environmental Assessment Coordination

   a. Participants wondered why the crossings at Munitions Street and the bike and pedestrian crossings of the Keating Channel are not included in the EA. The potential need for an analysis of alternative designs for these crossings was brought up.

9. Transit and Pedestrian Coordination

   a. Participants were concerned about how pedestrian and bike connections would be made across transit lines. In particular, they were interested in how the local streets would work with the LRT without signalized intersections.

   b. Maintaining access to the TTC yard was expressed as an important issue.

Neighbourhoods
Discussion Participants:

Patrick Cheung, Toronto Water
Samir Dalha, TRCA
Bill Dawson, Toronto Transit Commission (TTC)
Adele Freeman, TRCA
Robert Freedman, City Planning
Gwen McIntosh, City Planning
Caroline Mellor, Toronto Emergency Medical Services (EMS)
Eric Pedersen, City Planning
Steve Apfelbaum, AES
Doug Eppich, AES
Beth Wentzel, AES
Ken Greenberg, Greenberg Consultants Ltd.
Peter Middaugh, TSH
Elizabeth Tayag, TSH
Michael Thompson, TSH
Nate Trevethan, MVVA

1. Transit

   a. The group discussed the rationale behind the location and spacing of transit stops and their relationship to development.

b. It was explained that the current plan involves the majority of development within 400m around transit stops. The distance of 300-350m was suggested as a measure that is typically used.

c. Villiers Street is the site of several transit stops because it is the center of neighbourhoods to the north and the south of it.

d. It was pointed out that pedestrians may not want to walk south to a transit stop in order to take a northbound LRT line. Stops at Trinity and Cherry Street, north of the rail corridor, might attract some of these trips.

e. Filmport was supportive of the idea of having a transit loop located within their development.

f. Participants questioned why the modes of transit are separated on the bridges. There are several benefits to this that were discussed in the Connections discussion.

g. TTC relayed the following operational needs:

   i. There are only two streetcar yards in all of downtown Toronto. One of these yards would be located in the Port Lands.

   ii. There was some speculation that the streetcar yard could be located on Commissioners Street.

   iii. It was suggested that the TTC provide the team with conceptual diagrams for storage yards. The size requirements for the maintenance yards could impact parks and development.

2. Density of Development

   a. More density can occur along Lakeshore Boulevard, as taller buildings in this location would not create lots of shade on adjoining neighbourhoods because of the rail yards.

   b. Development clusters with retail at the base should be located in close proximity to transit.

3. Parking

   a. The group expressed interest in knowing where parking is located on the plan.

   b. Participants questioned how much parking would be located on-street.

   c. Malmo, Sweden was discussed as a precedent in terms of parking. The city initially aimed to have 0.3 parking spots per unit, but increased to 0.7 parking spots per unit.

   d. Participants expressed interest in car-share arrangements. For reference, one car-share spot replaces 10 typical parking spots.

   e. The question was raised as to whether underground parking would exist below parkland.

f. Participants were concerned over whether the road system would support an increased amount of parking associated with development.

4. The Gardiner Expressway

a. Participants were concerned about what the ramifications of the potential Gardiner takedown would be on the plan.

5. Public Safety

a. Concerns were voiced about whether there is enough roadway access for emergency vehicles to the site.

b. Clearance issues for police and fire boats on the Don River were expressed. This was discussed in the Connections discussion.

c. EMS agrees with the City that a station would be necessary in the Lower Don Lands.

d. The Blue Light Program was brought up as an idea whereby lighting does not need to be as bright at night.

e. It was agreed that a meeting was needed to explore these needs in more detail.

6. Ensuring Publicness

a. Participants questioned why the waterfront promenade along the Keating Channel is so wide.

b. Participants were concerned that the Ship Channel neighbourhood might be isolated. The opinion expressed was that each neighbourhood should have a space that draws the public from outside the neighbourhood.

c. The Lower Don Lands should have enough amenities to be self sufficient since the area is disconnected from the City.

d. The intersections of streets and the boardwalk were pointed out as important locations for public activity.

e. The goal of 20% affordable housing in the Lower Don Lands was expressed.

7. 480 Lakeshore Boulevard

a. Participants were concerned about the fate of the 480 Lakeshore site. Participants would like to know what type of development will occur here.

8. Next Steps

a. Participants expressed that they would like to see the 'soul' of the plan depicted.

b. The need for the Lower Don Lands plan to incorporate into the Central Waterfront Plan was stated.

<u>Connections</u>

Discussion Participants:

John Bryson, Technical Services, Structures and Expressways, City of Toronto
Ken Dion, TRCA
Sean Harvey, Parks, Forestry & Recreation
Jamie McEwan, Waterfront Secretariat
Gwen McIntosh, City Planning
Andrea Old, City Planning
Chris Ronson, Waterfront Secretariat
Bill Snodgrass, Toronto Water
Karin Wall, TSH
Mike Hubicki, TSH
Mike Shallhorn, TSH
Marko Prgin, TSH
Jean-Francois Blassel, RFR
Gullivar Shepard, MVVA
Kerrie Harvey, MVVA

1. Bridges

    a. Platform Bridge (C4)

        i. A number of people had concerns about the floating bridge option.

            1. City Planning asked for an example of where this approach has been used in the past. RFR replied that the only example he knows of is in a tidal situation where it does not have to deal with the same flows as a river.

            2. City Planning was concerned about what would happen to the bridge during the regulatory event. Even if the platform were moored like a boat, there were concerns from City Planning and TRCA that there would need to be a way to ensure that the platform could deal with all types of water movement and flow.

        ii. The main issues that were raised concerning fixed options for the platform bridge involved ownership and jurisdiction. MVVA was concerned about the jurisdictional space where the Gardiner is against the ship wall. Technical Services clarified that a 4m clearance is required from any structural point of the Gardiner. Technical Services also said that most construction and repairs that would be required for the Gardiner could be done from dry land; no water access should be required. TRCA stated that TEDCO owns the marine walls.

        iii. MVVA asked for clarification on required setbacks from regulatory floodlines. TRCA said that generally the setback is 10m, but MVVA should contact the Plan Review Office to get clarification on this matter.

    b. River Bridges (R1, R2, R3)

i. TRCA brought up the point that splitting the deck to allow light through and promote vegetation below the bridge has been problematic in the past. The split deck for a bridge on Highway 407 has not facilitated plant growth underneath. MVVA pointed out that the split deck design is beneficial to people passing underneath the bridge since it makes the space less foreboding. TSH added that the split deck allows for material economies. MVVA stated that the split design also allows for phasing economies, since each part could be built separately. Technical Services pointed out that there needs to be adequate clearances (at least 4m) between the split bridges in order to allow for maintenance of the structures.

c. General Bridge Comments

i. The issue of ownership of the bridges was raised by MVVA. Parks, Forestry & Recreation stated that if the bridge was connecting two parks, then it would be owned by Parks. However, it was unclear whether Parks would own bridges that connect the esplanade to the park. The question of how the ownership of the marine walls affects the ownership of the bridges needs to be examined.

ii. Technical Services expressed concern about inadvertently creating areas for the homeless under bridges. MVVA stated that this would be discouraged through not having dry land under the bridges and having a smooth deck at the bottom of the bridge to prevent attaching objects to it. John Bryson stated that the City is currently testing the use of river rock and lights under the Gardiner to discourage the homeless from taking up residence. MVVA wondered whether rivulets and open water could be placed in a manner which would ensure the presence of water under bridges.

iii. Concerns about graffiti were expressed by Technical Services. MVVA suggested that clear coat on a rough surface could be used to deter graffiti artists from defacing the bridges.

iv. TSH asked for input on alternative snow melt systems on bridges. Technical Services said that Highway 416 in Ottawa has an automatic system that sprays liquid on the bridge and will look into whether the Don Valley Parkway has one as well. The City has tested low-salt alternatives to deicing bridges; a liquid chemical can be sprayed on the road prior to a storm. These low salt alternatives could potentially enhance the longevity of the bridge.

v. Lighting on the bridges will be commented upon by the Urban Design group at the City. This group will provide comments on enhancements to streetlighting to coincide with the Clean and Beautiful City initiative. The current streetlights in Toronto are now owned by Toronto Hydro. Any enhancements above and beyond the basic streetlight will need to be paid for by the City.

vi. MVVA clarified for Parks, Forestry & Recreation that the clearance under all bridges is enough for recreational boats to have access to the Keating Channel and the Don River.

vii. Toronto Water asked for clarification on whether the river would meander through the supports. RFR replied that it would meander through the supports, but that this would be safe since the piles would be drilled down to bedrock. Toronto Water would ideally like the bridge to entirely span the meander belt. However, Toronto Water recognizes that this may not be possible due to cost concerns.

viii. Technical Services expressed concern about boat access under the bridges. Specifically, he was concerned about the Marine Response Unit being able to navigate the area. TSH spoke to the Police Unit and heard that they would put in at Lakeshore Boulevard if they needed to go upstream.

ix. Toronto Water expressed concern about how marine uses, sediment management and stormwater management interface with plans for the Keating Channel. MVVA clarified that barge-type boats would moor along the Keating Channel, but could have a docking space at Parliament Slip. Small charter boats and barge-type boats with low clearance would be able to navigate the Keating Channel. Toronto Water expressed concern over what might happen if the stormwater 'ponds' from East Bayfront were continued along the Keating Channel. Toronto Water was concerned that this would impact flow and might conflict with the bridges. MVVA explained that bridges would be built to span any such stormwater ponds. If the ponds were kept away from the narrower points of the Keating Channel, then flow may not be adversely impacted. MVVA to confirm with LimnoTech.

2. Portals

a. Cherry Street Portal (P3)

i. TSH asked for clarification on whether the existing Cherry Street underpass structure would be replaced. Technical Services stated that it would be rehabbed and not completely replaced. GO Transit owns the berm, but the City would own any structural modifications to the underpass. Technical Services said that if the current clearance in the underpass is substandard, then it does not need to be fixed when the underpass is being rehabilitated.

ii. TRCA expressed some concern over whether the pedestrian tunnels would be inviting and safe places. TSH suggested making the walls that separate the pedestrian tunnels from transit and the road out of clear plexiglass.

<u>Infrastructure</u>

Discussion Participants:

Bob Kearse, City Solid Waste Management
Raffi Bedrosyan, Waterfront Toronto (WT)
Jamie McEwan, Waterfront Secretariat
John Kelly, Transportation Services
Don Haley, TRCA
Eddy Lam, Transportation Services
Gregory Horgan, Technical Services

David Pratt, Arup
Michael Thompson, TSH

1. Need for UV Treatment of Treated Site Drainage if Discharged to the Don River

    a. No definitive answer is available at this time.

    b. City is currently working on this issue with respect to end of pipe water quality objectives relative to the water programming in proximity to the location of the planned storm outfall. As such the team needs to work with the City to reach consensus on this issue.

2. Cherry Street Sanitary Outlet

    a. TSH received information from the West Don Lands Infrastructure consultant (RV Anderson) that the Cherry Street has limited pipe capacity and the planned loadings from the new developments (West Don Lands, Lower Don Lands & East Bayfront) will exceed the capacity of the sanitary sewer. RVA advised TSH that they are planning to address the capacity issue by replacing the existing sewer with a new pipe installed at a higher gradient. A lift station at the Eastern Avenue LLI will be required.

    b. City of Toronto representatives commented that they were not aware of this servicing scenario for the Cherry Street sanitary sewer.

    c. City representatives noted that the Wet Weather Flow (WWF) condition is the primary concern with the operation of the Low Level Interceptor (LLI).

    d. City representatives noted that final site servicing plans for West Don Lands has not been submitted to the City of Toronto.

    e. TSH to follow up with RVA regarding the status of the design of the improvements to the Cherry Street sanitary sewer system.

3. Future Commissioners Street Sanitary Outlet

    a. City agreed that this option warrants further investigation as the long term servicing for the development of the LDL lands, the Lake Ontario Park lands and the Port Lands east of Don Roadway. The City will communicate this option with the consultant for the Combined Sewer Overflow (CSO) EA and will also ensure that this servicing option is considered in the completion of the future servicing study for the Lake Ontario Park lands.

4. Grading at Existing Heritage Buildings

    a. General concern was expressed with respect to grading around heritage buildings and more specifically how these heritage sites will be protected during the major storm event.

    b. The team acknowledged that these grading constraints are known and the solutions are a work in progress.

5. 'Utilidor' (Utility Corridor)

a. The utilidor concept is considered to have many benefits and there was a strong desire to see this innovative servicing solution implemented.

b. The utilidors will improve the public realm by minimizing disruptions to vehicular and pedestrian traffic, reduce damage to both roadway structure and utilities and improve the long term level of service of the roadway right of way.

c. The utilidor is an effective means of protecting the ability to implement the vacuum solid waste collection in the future.

d. Concerns raised from City regarding the inclusion of gas/water/sanitation/hydro in common conduit

    i. Risk management concerns regarding mixing of utilities in an enclosed conduit.

    ii. Need to understand the protective measures required to implement the utilidors.

e. Discussion about the location and configuration of conduit, with the presence of gravity sanitary and storm laterals and grade conflicts. Types to be further investigated:

    i. Deeper structure with man access

    ii. Shallow conduit structure with access at grade

    iii. Combination of above alternatives

f. The Toronto Public Utility Coordinating Committee (TPUCC) would be the forum in which the utilidor servicing approach would be tabled for discussion and implementation. TPUCC has not been approached to date with respect to utilities.

g. Issues to consider regarding the implementation of a utility corridor.

    i. May be difficult to reach consensus amongst the utility companies regarding cost recovery of front end costs to the design and construction of the corridor.

    ii. How the City will manage participation in utilidor by future utilities.

    iii. Possibility to construct during development for future servicing opportunities.

h. Concerns with respect to conflicts of servicing from Utilidor

    i. Minimize the number and locations of connections to service blocks/developments to minimize conflicts.

    ii. Utilidor to be located entirely on public right of way to mitigate ownership issues and future conditions.

i. City of Toronto raised the issue that moisture in utility corridors must be managed.

6. Public Realm

    a. Priority with regard to Public Realm surface infrastructure
        i. Trees
        ii. Sidewalks
        iii. Utilities

    b. Utility Corridor ensures that priority can be given to trees by occupying less subsurface space.

7. Solid Waste Management

    a. Vacuum Collection system versus Street Pickup

    b. City of Toronto noted that vacuum sanitary collection is not compatible with current program and practices – no current plans to consider on a move forward basis.

    c. The City noted that a sufficient right of way width needs to be allocated in order to facilitate planned street pick-up for solid waste management.

    d. Waterfront Toronto's desire is to protect for future implementation of vacuum solid waste collection system.

    e. The use of condo-style solid waste collection in areas that are not publicly owned should be considered.

    f. The City noted that easements in development blocks are not preferred for locating utilities that belong in the public right of way.

8. Groundwater Pumping/Quality

    a. There is a major concern with respect to the high water table and the management of groundwater.

    b. City needs to understand how site ground water will be managed in both the short and long term.

        i. Groundwater quality must meet sewer use bylaw standards for a connection to the City storm / sanitary sewer system to be approved.

    c. Opportunity to use this groundwater as a resource

        i. There is the potential that in areas of the site the groundwater will be equivalent to quality of lake water.

        ii. There are "hot spots" in the study area that will require special attention for the management of water and the City needs to know how the groundwater from this area will be managed as the flows, if directed to the sanitary sewer, could impact receiving sewers.

iii. Collection and treatment systems may be required to manage pumped groundwater.

d. General concerns regarding the depth and scope of geotechnical/geo-environmental investigations performed to date

i. More complete investigations are required to evaluate alternatives concerning cost/regulatory requirements.

9. Non-Potable Water Supply System

a. City representatives noted that the City is not set up to operate a non-potable water supply system. They are currently not in favour of operating a non-potable water supply given concerns with risk & liability and the ability to recover costs of operating the system.

b. Lake drawn non-potable water supply for irrigation
   i. Issues with Toronto Public Health regulations to be determined.
   ii. Permit to Take Water is required if water takings exceed 50,000 L / day.

c. Irrigation demand values requested – TSH noted that assumptions made regarding irrigation demands are included in the Technical Memorandum.

d. TSH noted that the concept would have to address management / operational concerns if we are going to continue to explore the feasibility of implementing this concept.

10. Hydro-One Infrastructure

a. Removal of hydro towers on Commissioners Street and Don Roadway and relocation of lines
   i. No work completed in this regard
   ii. No barriers restricting process from being initiated

b. Opportunity to bury the existing hydro lines in reconstruction of Don Roadway
   i. Additional protection measures to be considered
   ii. Space requirements for burial?

11. Stormwater Management Solutions for North Keating Lands

a. East Bay Front and West Don Lands may not have spare capacity for treatment of stormwater.

b. TSH to start investigating alternative solutions for the management of stormwater from the North Keating Lands.

12. Sanitary Sewer Crossings/Inverted Siphons

a. Ecological impacts and integration with access requirements with valley/river crossings.

b. Maintenance access requirements for siphons briefly mentioned.

c. Flow requirements for siphons – preliminary calculations are included in Technical Memo.

d. Communication with the City of Toronto is required for this alternative.

END OF MEETING NOTES

These meeting notes are recorded as understood. Please submit any changes or additions to these notes in writing to Kerrie Harvey (kharvey@mvvainc.com) within ten days of receipt.

MEETING MINUTES / 2 PAGES / SENT BY EMAIL

Project:	Lower Don Lands, MVVA # 07009.00
Meeting:	**CSC #6**
Meeting Date:	18 November, 2008
Meeting Location:	Waterfront Toronto (WT), 20 Bay Street
Distribution Date:	26 November, 2008
Prepared by:	Sarah Siegel, Michael Van Valkenburgh Associates, Inc. (MVVA)
Participants:	Chris Glaisek, WT Brenda Webster, WT Raffi Bedrosyan, WT Ken Dion, Toronto and Region Conservation Authority (TRCA) Adele Freeman, TRCA Don Haley, TRCA Marc Rose, Gartner Lee Limited (GLL) Jamie McEwan, Waterfront Secretariat, City of Toronto Chris Ronson, Waterfront Secretariat, City of Toronto Andrea Old, City Planning, City of Toronto Eric Pederson, City Planning, City of Toronto Kathryn Thom, City Planning, City of Toronto Leslie Coates, Parks and Recreation, City of Toronto Greg Horgan, City Technical Services, City of Toronto John Kelly, Transportation Services, City of Toronto Nigel Tahair, Transportation Services, City of Toronto Steve Willis, MMM Group Ken Greenberg, Greenberg and Associates John Gladki, GHK Erik Olsen, Transsolar David Norris, Carpenter Norris Consulting Mike Hubicki, AECOM
Distribution:	Participants Michael Van Valkenburgh, MVVA Matt Urbanski, MVVA FILE_NY
Attachment(s):	Presentation Massing Schemes in relation to current sky exposure planes Area Assumptions Keating Channel sections Current Flood Modeling Grading Plan Community Services and Facilities Report Site Plan Right of way arrangement plan Lower Don Lands Initial Sustainability Assessment

Discussion Points and Action Items:

Transportation

1. The issue of non-orthogonal intersections was raised as they are space intensive due to larger required turning radii. This configuration was noted for specific examination at the Queens Quay and Parliament, and Queens Quay and Cherry Street intersections.
2. A question was raised about if it might be possible to improve the alignment of the Cherry/Queens Quay/Lakeshore intersection by moving the Cherry underpass as far west as possible. The proposed alignment is guided by Gardiner Column locations as well as TTC profiles.
3. The intersection of the Harbour Lead rail and the Gardiner columns at Lakeshore Bridge was discussed. It is vastly preferable to keep the rail in its existing location and elevation. This has been maintained within the current plan.
4. 'Teaser' parking is proposed under the Gardiner as an interim animating condition. There was a suggestion that there needs to be further thought about the configuration of this proposed parking. It may not be ideal to have the parking so close to the roadway.
5. Questions were raised about other parking solutions for this area. The team is considering both above grade podium parking as well as below grade parking in the design work for the precinct.
6. There was a suggestion to move the Light Rail turn around in the Ship Channel West neighbourhood south, towards the edge of the Ship Channel. This would create an LRT stop which is closer to Cherry Beach and generally services the area south of the Ship Channel better than the current proposal.
7. Questions were raised about the on/off street bike trail configuration and continuity: *a meeting should be scheduled with Nigel Tahair (Transportation Services, City of Toronto), MVVA, and Arup to discuss the bicycle network planning.*

Parks and Public Realm

1. The connection which is being shown as a pedestrian area underneath the Gardiner establishes a potential link diagonally across the city – from the Lower Don Lands through the Distillery and through David Crombie Park to the Saint Lawrence Neighbourhood. This connection is viable whether or not the Gardiner comes down.
2. The possibility of retaining some of the Gardiner structure as an artifact was suggested as a framing device for the public way.
3. Consideration should be given to the development under the Gardiner at both its highest and lowest moments.
4. The Gardiner Colonnade space and connective North Keating Channel edge area needs to develop programming ideas through more interaction with City of Toronto Parks and Recreation. The critical aspect of this space in the plan is that it needs to receive ample light in order to be a viable public space amenity. This is achieved through attention to the sky exposure planes within the current block plan.
5. The current plan proposes the right of way for existing Cherry Street be turned into a pedestrian and bicycle focused area, a 'free zone'. This area would allow access for servicing and emergency vehicles only. The final nature of the "free zones" can remain flexible until a later date as the Right of Way will be planned for fire and emergency access.

Public Meeting

1. A question was raised about what will be shown in the Public Meeting in December. The presentation and boards will be limited to materials which the project team has previously presented to the city. The drafts of the presentation and boards will be shared with the city by November 26th.

Infrastructure and Grading

1. There are currently flooding problems at many of the rail berm underpasses. It was suggested that it would be preferable if changes to the area could improve this situation.
2. The freeboard figure for height above projected flooding at which development has to be built is 0.5m, not the 0.3m which MVVA is currently working with. The two-tier approach to the Keating Channel edges provides a second control for flood waters.
3. The proposed West Don Lands water tunnel along Cherry street needs continued coordination with the plan. There will need to be some access point at the outflow into the Keating Channel. Currently it appears that this corresponds with the park lawn proposed on the plan.
4. Ongoing coordination is necessary with other utility and district energy initiatives. There are several important utilities, existing or proposed, which cross the site.
5. A stormwater input to the Keating Channel would be beneficial to the water circulation issue. This is being considered in relationship to potential stormwater infrastructure within the space left open between the development blocks and the railway berm.
6. TRCA and Limno-Tech are looking at a water circulation solution for the Keating Channel in which the downstream weir would be able to introduce small amounts of water to the channel with enough consistency to ensure adequate water circulation.

Massing and Population Projections

1. Sky exposure planes and wind studies are ways to consider sustainability in massing. A central goal of the precinct massing is to have substantial buildings while simultaneously creating comfortable environments both inside and outside.
2. Program goals for the precinct massing are intended to remain flexible in response to future market changes.
3. Current population and employment projections have reallocated more employment north of the Keating Channel than was originally envisioned. However the total employment/residential numbers remain constant for the LDL site in its entirety. This revision makes sense from a transportation point of view. The Keating Channel is a barrier which has to be crossed. Too much commercial development further south in the plan could result in undesirable levels of traffic going over the Munition Street Bridge.
4. Maintaining the balance between employment and residential is critical. Again, the plan and massing must remain flexible to changes in this balance which may occur over time.

END OF MEETING NOTES

These meeting notes are recorded as understood. Please submit any changes or additions to these notes in writing to Sarah Siegel (ssiegel@mvvainc.com) within ten days of receipt.

March 5, 2009

Chief James Marsden
Alderville First Nation
PO BOX 46
Roseneath, ON, K0K 2X0

RE: Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment

Dear Chief Marsden:

I am Ken Dion, a Project Manager at the Toronto and Region Conservation Authority (TRCA). Since 2002, TRCA has been working with Waterfront Toronto on a number of projects which focused on eliminating flood risk, remediating extensive areas of contaminated soils and groundwater, and increasing the amount of green public space as part of the efforts to revitalize the Toronto Waterfront. Most recently we have been undertaking the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA).

The goal of this project is to transform derelict former industrial lands into a more natural river mouth for the Don, protect 230 hectares of land currently at risk to flooding to the east and south of the river, and integrate this new natural area within the developing urban fabric of the City of Toronto. Enclosed is a map of the study area and proposed new alignment of the Don River, as well as a number of newsletters that have been produced through the DMNP EA.

In March 2008, a preferred river alignment was selected following a detailed evaluation of alternative river alignments at the mouth of the Don. We have since been working with Waterfront Toronto and their consultants to further develop a conceptual design for the naturalized river mouth, based on the preferred alignment.

A component of the DMNP EA is to look at opportunities for improving the quality of habitat within the Don Narrows, which will not increase the frequency of flooding on the Don Valley Parkway to the east and Bayview Avenue to the west. The Don Narrows refers to the narrow and straightened lower reaches of the Don River that extend from the Keating Channel in the south to Riverdale Park in the north (just south of the Bloor Street Viaduct).

The planning is now approaching a key stage within the EA process; the presentation of the preliminary conceptual design, which we hope to present to the general public on Saturday May 9, 2009.

As this project is located within the area of the Toronto Purchase Specific Claim, TRCA has to date, focused our consultation efforts with the Mississaugas of the New Credit First Nation, having attended a number of their Council meetings, and providing on-going correspondence throughout the planning process.

However, we have recently received advice that our efforts to consult should have included the four other Mississauga First Nations that were signatories to the 1923 Williams Treaty's, given that the ecological improvements that are anticipated at the mouth of the Don River should provide spin-off ecological benefits that will likely propagate further upstream in the Don River.

In light of these recommendations, TRCA would like to extend an invitation to the Alderville First Nation to participate in the consultation for the Don Mouth Naturalization and Port Lands Flood Protection Project EA. We would be pleased to meet with your Council to discuss the project more fully.

If you wish to receive more information than has been provided herein, or if you have any other comments, questions or concerns about the project, please contact me at your convenience at (416) 661-6600 (ext. 5230) or by email at kdion@trca.on.ca.

Sincerely,

Ken Dion, MSc
Senior Project Manager
Watershed Management Division

Cc.: Adele Freeman, TRCA
Jamie McEwan, City of Toronto
Brenda Webster, Waterfront Toronto

March 5, 2009

Chief Irvin Knott
Curve Lake First Nation
General Delivery
Curve Lake, ON
K0L 1R0

RE: Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment

Dear Chief Knott:

I am Ken Dion, a Project Manager at the Toronto and Region Conservation Authority (TRCA). Since 2002, TRCA has been working with Waterfront Toronto on a number of projects which focused on eliminating flood risk, remediating extensive areas of contaminated soils and groundwater, and increasing the amount of green public space as part of the efforts to revitalize the Toronto Waterfront. Most recently we have been undertaking the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA).

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However, we have recently received advice that our efforts to consult should have included the four other Mississauga First Nations that were signatories to the 1923 Williams Treaty's, given that the ecological improvements that are anticipated at the mouth of the Don River should provide spin-off ecological benefits that will likely propagate further upstream in the Don River.

In light of these recommendations, TRCA would like to extend an invitation to the Curve Lake First Nation to participate in the consultation for the Don Mouth Naturalization and Port Lands Flood Protection Project EA. We would be pleased to meet with your Council to discuss the project more fully.

If you wish to receive more information than has been provided herein, or if you have any other comments, questions or concerns about the project, please contact me at your convenience at (416) 661-6600 (ext. 5230) or by email at kdion@trca.on.ca.

Sincerely,

Ken Dion, MSc
Senior Project Manager
Watershed Management Division

Cc.: Adele Freeman, TRCA
Jamie McEwan, City of Toronto
Brenda Webster, Waterfront Toronto

March 5, 2009

Chief Laurie Carr
Hiawatha First Nation
RR 2, Keene, ON
K0L 2G0

RE: Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment

Dear Chief Carr:

I am Ken Dion, a Project Manager at the Toronto and Region Conservation Authority (TRCA). Since 2002, TRCA has been working with Waterfront Toronto on a number of projects which focused on eliminating flood risk, remediating extensive areas of contaminated soils and groundwater, and increasing the amount of green public space as part of the efforts to revitalize the Toronto Waterfront. Most recently we have been undertaking the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA).

The goal of this project is to transform derelict former industrial lands into a more natural river mouth for the Don, protect 230 hectares of land currently at risk to flooding to the east and south of the river, and integrate this new natural area within the developing urban fabric of the City of Toronto. Enclosed is a map of the study area and proposed new alignment of the Don River, as well as a number of newsletters that have been produced through the DMNP EA.

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However, we have recently received advice that our efforts to consult should have included the four other Mississauga First Nations that were signatories to the 1923 Williams Treaty's, given that the ecological improvements that are anticipated at the mouth of the Don River should provide spin-off ecological benefits that will likely propagate further upstream in the Don River.

In light of these recommendations, TRCA would like to extend an invitation to the Hiawatha First Nation to participate in the consultation for the Don Mouth Naturalization and Port Lands Flood Protection Project EA. We would be pleased to meet with your Council to discuss the project more fully.

If you wish to receive more information than has been provided herein, or if you have any other comments, questions or concerns about the project, please contact me at your convenience at (416) 661-6600 (ext. 5230) or by email at kdion@trca.on.ca.

Sincerely,

Ken Dion, MSc
Senior Project Manager
Watershed Management Division

Cc.: Adele Freeman, TRCA
Jamie McEwan, City of Toronto
Brenda Webster, Waterfront Toronto

March 5, 2009

Chief Tracy Gauthier
Mississaugas of Scugog Island First Nation
22521 Island Road
Port Perry, ON, L9L 1B6

RE: Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment

Dear Chief Gauthier:

I am Ken Dion, a Project Manager at the Toronto and Region Conservation Authority (TRCA). Since 2002, TRCA has been working with Waterfront Toronto on a number of projects which focused on eliminating flood risk, remediating extensive areas of contaminated soils and groundwater, and increasing the amount of green public space as part of the efforts to revitalize the Toronto Waterfront. Most recently we have been undertaking the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA).

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However, we have recently received advice that our efforts to consult should have included the four other Mississauga First Nations that were signatories to the 1923 Williams Treaty's, given that the ecological improvements that are anticipated at the mouth of the Don River should provide spin-off ecological benefits that will likely propagate further upstream in the Don River.

In light of these recommendations, TRCA would like to extend an invitation to the Mississaugas of Scugog First Nation to participate in the consultation for the Don Mouth Naturalization and Port Lands Flood Protection Project EA. We would be pleased to meet with your Council to discuss the project more fully.

If you wish to receive more information than has been provided herein, or if you have any other comments, questions or concerns about the project, please contact me at your convenience at (416) 661-6600 (ext. 5230) or by email at kdion@trca.on.ca.

Sincerely,

Ken Dion, MSc
Senior Project Manager
Watershed Management Division

Cc.: Adele Freeman, TRCA
Jamie McEwan, City of Toronto
Brenda Webster, Waterfront Toronto

TORONTO AND REGION Conservation for The Living City

April 30, 2009

Chief Kris Nahrgang
Kawartha Nishnawbe First Nation
P.O. Box 1432
Lakefield, ON K0L 2H0

RE: Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment

Dear Chief Nahrgang:

I am Ken Dion, a Project Manager at the Toronto and Region Conservation Authority (TRCA). Since 2002, TRCA has been working with Waterfront Toronto on a number of projects which focused on eliminating flood risk, remediating extensive areas of contaminated soils and groundwater, and increasing the amount of green public space as part of the efforts to revitalize the Toronto Waterfront. Most recently we have been undertaking the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA).

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As this project is located within the area of the Toronto Purchase Specific Claim, TRCA has to date, focused our consultation efforts with the Mississaugas of the New Credit First Nation, having attended a number of their Council meetings, and providing on-going correspondence throughout the planning process.

We are in receipt of a letter from your solicitor Mr. Christopher M. Reid (dated April 3, 2009), providing a legal opinion describing the Treaty and Aboriginal rights of the Kawartha Nishnawbe First Nation with respect to traditional harvesting practices and the care and protection of archaeological, cultural and sacred sites. The map accompanying the legal opinion indicates that these rights extend to the project area for our Environmental Assessment study at the mouth of the Don River.

Given this recent information, TRCA would like to extend an invitation to the Kawartha Nishnawbe First Nation to participate in the consultation for the Don Mouth Naturalization and Port Lands Flood Protection Project EA. We would be pleased to meet with your Council to discuss the project more fully.

If you wish to receive more information than has been provided herein, or if you have any other comments, questions or concerns about the project, please contact me at your convenience at (416) 661-6600 (ext. 5230) or by email at kdion@trca.on.ca.

Sincerely,

Ken Dion, MSc
Senior Project Manager
Watershed Management Division

Cc.: Adele Freeman, TRCA
Jamie McEwan, City of Toronto
Brenda Webster, Waterfront Toronto

Summary of Meeting with Mississauagas of the New Credit First Nation Regarding

Don Mouth Naturalization and Port Lands Flood Protection Project EA

&

Lower Don Lands Precinct Plan/Master Servicing Plan EA

Monday, June 16, 2008
11:00 a.m. to 12:45 p.m.

Attendees:

Ken Dion, TRCA

Paul Murray, Gartner Lee Limited

Liz Silver, Michael Van Valkenburgh Associates

Chief LaForme, Mississauagas of the New Credit First Nation

Margaret Sault, Mississauagas of the New Credit First Nation

Karin Wall, Totten Sims Hubicki

4) Presentation of the Don Mouth Naturalization and Port Lands Flood Protection Project EA update, current status and time line (Ken and Paul) –

Issues:

a) Provided us with a new brochure on the History of the Mississaugas of the New Credit First Nation. Will be scanned and distributed to the team.
b) Raised concerns regarding selection process of identifying "Places to Grow" legislation (2006).
c) Expressed need to be consulted regarding Growth Plans and other activities within their Specific Claims Area.
d) Raised concerns of climate change, influence of river and lake levels on naturalized mouth and infrastructure. – Responded major issue being considered in the EA using hydraulic and sediment transport models and by building in adaptability in the natural design for the area.
e) Raised strong concerns regarding soils contamination – Responded that major component of project is to remediate soils through minimizing volumes of material that need to be handled, improving soil conditions and reusing locally to the extent possible to minimize dig and dump, providing barriers between returned clean material and remaining contaminated material.
f) Concerns of the long-term availability of funding to implement. – Responded that the opportunity to plan and implement now. Focus is to obtain necessary approvals and then to move into the implementation stages shortly thereafter.
g) Agreed that the original spit along the Cherry Street ROW likely played an important role in allow their ancestors to access the Toronto Islands historically and agreed that excavating the new river channel in this area represented the highest probability of encountering possible historical artifacts in the study area.

Reiterated importance of protocols that are in place to mitigate disturbance of possible artifacts and burial lands in this area during construction.

h) Raised interest in what development is being proposed for areas overlying the original sand spit outside of the proposed valley feature.

5) Liz and Karin went through original Design Competition Book to provide overview of desired objectives for the integration of the natural, urban and social landscape in the Lower Don Lands –

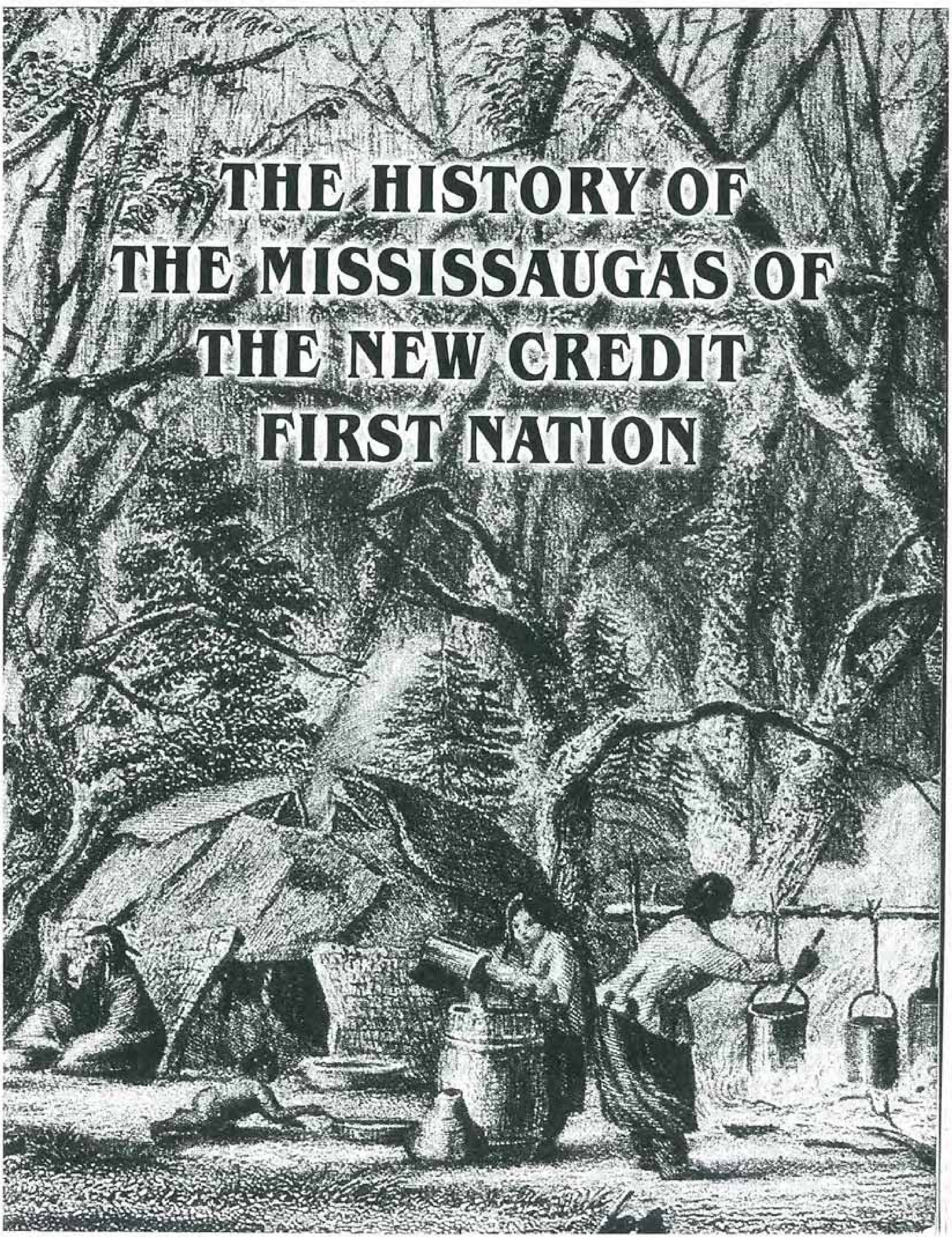
Issues:

a) Identified that Silos will be part of a Museum Design – Chief LaForme is part of a City Committee that recently agreed on this direction. City staff contact for additional details is Karen Carter at 416-397-1971.
b) Raised to our attention that a past field trip to the TO Islands with a botanist resulted in the identification of remnant plant species on the Island that are only found in proximity to First Nations settlements. ACTION – Margaret will send Liz a copy of the resulting report. The teams will examine whether there are opportunities to incorporate these plant species of historical significance in the renaturalized Don River Mouth.
c) The significance of the TO Islands was that it was a place of serenity and spiritual/physical healing for the Mississaugas of the New Credit First Nation.
d) Very pleased to see that the design encourages and promotes walking in the area.
e) Would like to see as much green space restored as possible.
f) Concerned over the paving over of green space and farm land planned for the next 30 years in the Growth Plan.
g) Identified that the Mississaugas of the New Credit First Nation would like to partner in the planning of the Lower Don Lands area with an equal standing in the decision making process as the other project partners. Asked if they could be a fourth proponent in the Lower Don Lands Study.
h) Also identified that they would like to sign an agreement specifying their role for engagement or project management throughout the planning process for the projects.
i) When asked specifically regarding their thoughts on the level of engagement we should have with other First Nations with more distant connections with the land in question, Chief LaForme responded "The Mississaugas of the New Credit First Nation are the only First Nation with a claim to this area." Chief LaForme also stated that they, "are the only people that are authorized to represent the interests of the Mississauagas of the New Credit First Nation. The involvement of other First Nations would only be triggered in the event that during construction, historical artifacts or remains belonging to other First Nations were unearthed."
j) When asked what the timing of the development would occur, we indicated that a draft Block plan and infrastructure plan will be ready for review mid-September.

6) Other Business:

a) Ken raised the issue that the 10th Anniversary of the Humber's Heritage River Designation was being planned and the Mississaugas were invited to help plan and participate in the event. ACTION – Cathy Crinnion to contact Margaret to discuss.

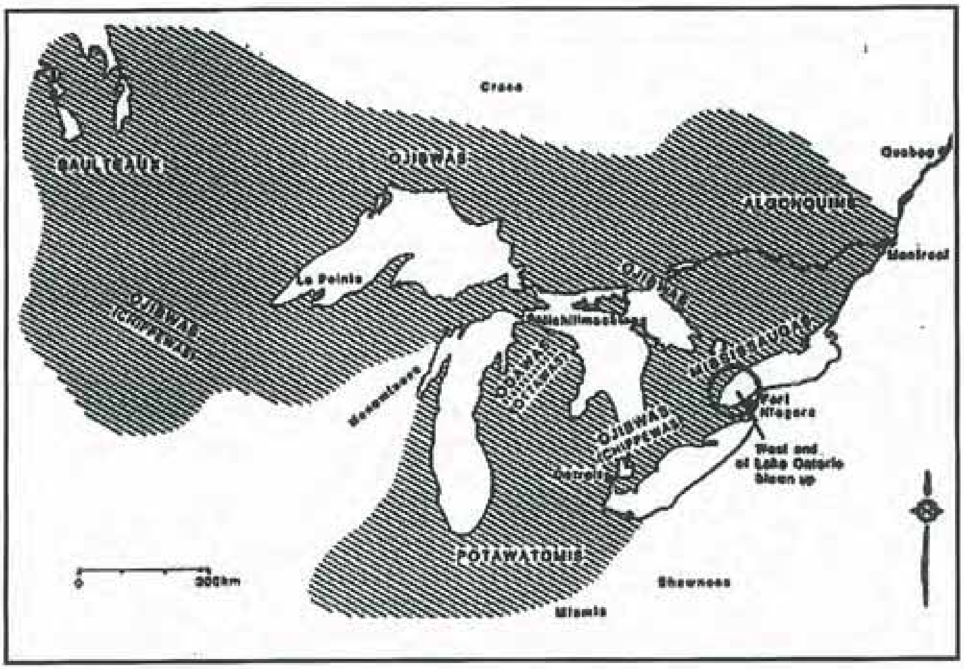
THE HISTORY OF THE MISSISSAUGAS OF THE NEW CREDIT FIRST NATION



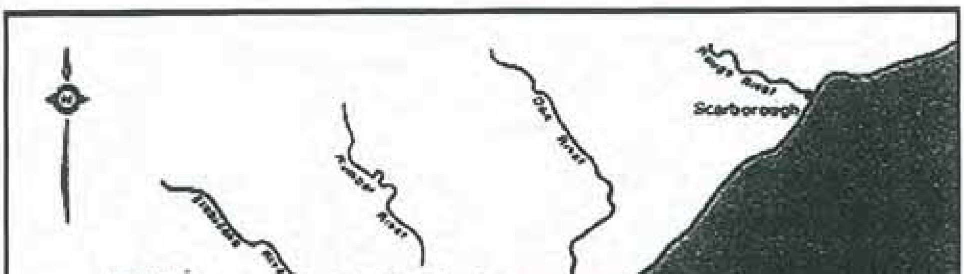
INTRODUCTION

The intent of this brochure is to outline the general history of the Mississaugas of the New Credit First Nation from the time before contact with Europeans in the early 1600s to the time of settlement in the mid-1800s, onto the present Mississaugas of the New Credit Reserve in southern Ontario. The contents of this brochure provide information on the historical way of life of ancestors of the Mississaugas of the New Credit from the 1600s to the 1800s. The historical account presented in the following pages details the relocation and settlement of ancestors of the Mississaugas of the Credit into southern Ontario, and the nature and extent of use of lands in this time period.

Gathering Wild Rice by Captain Seth Eastman. the Ojibwa harvested this staple crop in late September. In order to gather wild rice in the fall several people went out by canoe together. The individual in the stern paddled while the others collected it and then beat the kernals free into the bottom of the canoe. Courtesy of Schoolcraft, Indian Tribes of the United States. 3 (1853):62



Map 1
The lands of the Anishinabeg and related peoples, about 1800



Map 2
Sacred Feathers's World: Mississauga Place-Names at the Western end of Lake Ontario

THE MISSISSAUGA NATION IN THE EARLY 1600s

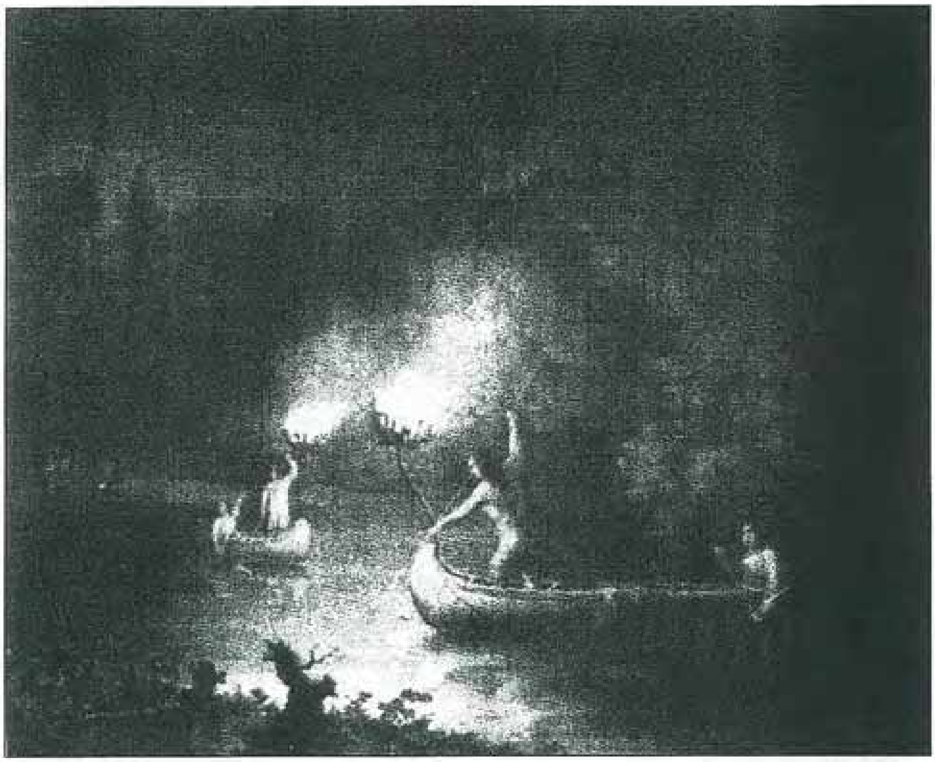
The Mississaugas of the New Credit First Nation is part of the Ojibway (Anishinabe) Nation, one of the largest Aboriginal Nations in North America. Before contact with Europeans and until the late 1600s, the Mississaugas occupied a territory situated inland from the north shore of Lake Huron, just to the west of Manitoulin Island and east of Sault Ste. Marie. The first known written record to identify and locate the Mississaugas is a 1640 account of Aboriginal occupants of the Lake Huron by the French Jesuits. In this document, the Mississaugas are identified as the Oumisagai. The name 'Mississauga' has been given two possible meanings. One interpretation suggests the name refers to the Eagle Clan of the Ojibway Nation. A second interpretation suggests the name refers to the mouth of the Mississagi River, which was an important fishing location for the Mississauga people.

Like other Anishinabe people living along the north shore of Lake Huron, the Mississaugas followed a way of life that involved mobility and recurring shifts in resource harvesting with the different seasons of the year. In winter months, the Mississaugas were spread out over the Nation territory, living in mobile groups of extended families. Family members cooperated in hunting large and small game animals, and supplemented this main source of food with ice fishing. It was customary for families to establish and move their winter hunting camps within certain ranges. However, there were no fixed boundaries to hunting lands used by family groups, and in times of need people could count on neighbouring groups to share food and other resources.

By early spring families moved to maple sugar grounds. At the end of the maple sugar harvest period, all family groups gathered at spring fisheries. These fishing locations were important social and ceremonial centres. The mouth of the Mississagi River was one of the main fishing centres for the Mississauga people. Up to three villages were established in the area totalling about one thousand persons. At this time of the year, people renewed social relationships after the long winter months, and individuals developed marriage ties. Village populations performed communal religious rites. The summer months were also the time in which the Mississaugas renewed and strengthened social, political and economic relations with other Ojibway and Anishinabe Nations in the Lake Huron region. Mississauga leaders and representatives often travellied to the Sault Ste. Marie area, which was one of the main regional gathering centres for Anishinabe in the Upper Great Lakes.

Between late spring and early fall, people followed a much more sedentary lifestyle relative to winter. The rich fisheries of Lake Huron allowed the Mississaugas to live in permanent villages throughout the summer. The main subsistence activity was fishing sturgeon, trout, and whitefish. However, in addition to fishing, the Mississaugas also practised agriculture to some extent, cultivating corn, squash, and other vegetables in family and village gardens. Summer was also the time in which people collected bark from birch trees used to construct canoes and lodges.

With the approach of fall, the Mississaugas harvested their garden produce and collected a number of wild fruits and vegetable products. A portion of collected fruits and vegetables, in particular corn and blueberries, was set aside and preserved for later consumption in winter. By late fall, village populations began to disperse along the shoreline of Lake Huron, hunting beaver and moose. After a last harvest at fall fishing locations, people broke up into extended family groups and removed to inland hunting ranges in preparation for winter.



Paul Kane's painting in 1846 of Menominee Indians spearing fish by torchlight on the Fox River in a present day Wisconsin could easily have been painted half a centruy earlier - about 1800, during the spring or fall salmon runs on the Credit River. The Mississaugas used the same fishing techniques as their fellow Algonquians on the Upper Great Lakes. Courtesy of the Royal Ontario Museum, Toronto, Canada.

Paul Kane's painting of an Ojibwa village near Sault Ste. Marie, Upper Canada, in the mid 1840's. It represents very well what Chief Wahbanosay's encampment might have looked like at eh head of Lake Ontario during Sacred Feathers's early boyhood. Courtesy of the Royal Ontario Museum, Toronto, Canada.

MOVEMENT AND SETTLEMENT INTO SOUTHERN ONTARIO

The arrival of Europeans and the establishment and growth of colonies by the early-mid 1600s brought Aboriginal Nations in eastern North America into increasingly complex political, economic and military alliances with the two main competing European Nations - France and England. Anishinabe Nations in the St. Lawrence and Ottawa River valleys and in the Upper Great Lakes, along with the Wendat (Huron) living in the Penetanguishene peninsula and Lake Simcoe area, allied themselves with French fur traders, missionaries, and the French colonial government. Meanwhile, the Five Nations Iroquois Confederacy living south of Lake Ontario, had developed similar alliances with England.

During the first half of the 1600s, Anishinabe and Iroquois had occasionally engaged in military conflicts in attempts to access territories rich in fur bearing animals, and to control important fur trade travel routes. By 1650, these conflicts had grown into full-scale regional warfare. The Iroquois destroyed villages of the Neutral, Huron and Petun Confederacies between 1649 and 1650, forcing survivors to flee to distant refuge areas. After 1650 southern Ontario became a vast hunting territory for the Five Nations Iroquois, who now threatened more distantly established Anishinabe, including the Ojibway of Lake Huron.

By the 1680s, the Anishinabe of the Upper Great lakes began to mount an organized counter-offensive against the Iroquois. In the early 1690s, the Ojibway, Odawa and Potawatomi, now politically and militarily allied as the Three Fires, initiated a series of offensives that gradually pushed the Iroquois back into their original homeland territory south of Lake Ontario. An oral tradition of these battles was kept by the Mississaugas for over 200 years. In 1904, a narrative account told by Chief Robert Paudash was recorded. This oral tradition was then published in the Ontario Historical Society Papers and Records the next year. The tradition has been validated by modern historians and historical researchers.

The oral tradition indicates that the Mississaugas played a key role in Anishinabe battles with Iroquois. It also describes how the settlement of Mississaugas into southern Ontario dates from the final removal of the Iroquois from the region. According to Chief Robert Paudash, the Mississaugas first defeated a party of Mohawks on an island in Georgian Bay named Pequahkoodebaminis (Skull Island). The Mississaugas then travelled along the Severn River to Lake Simcoe where they divided into two groups. The main group continued east to Balsam Lake, and from there down through the Trent waterway to the Bay of Quinte.

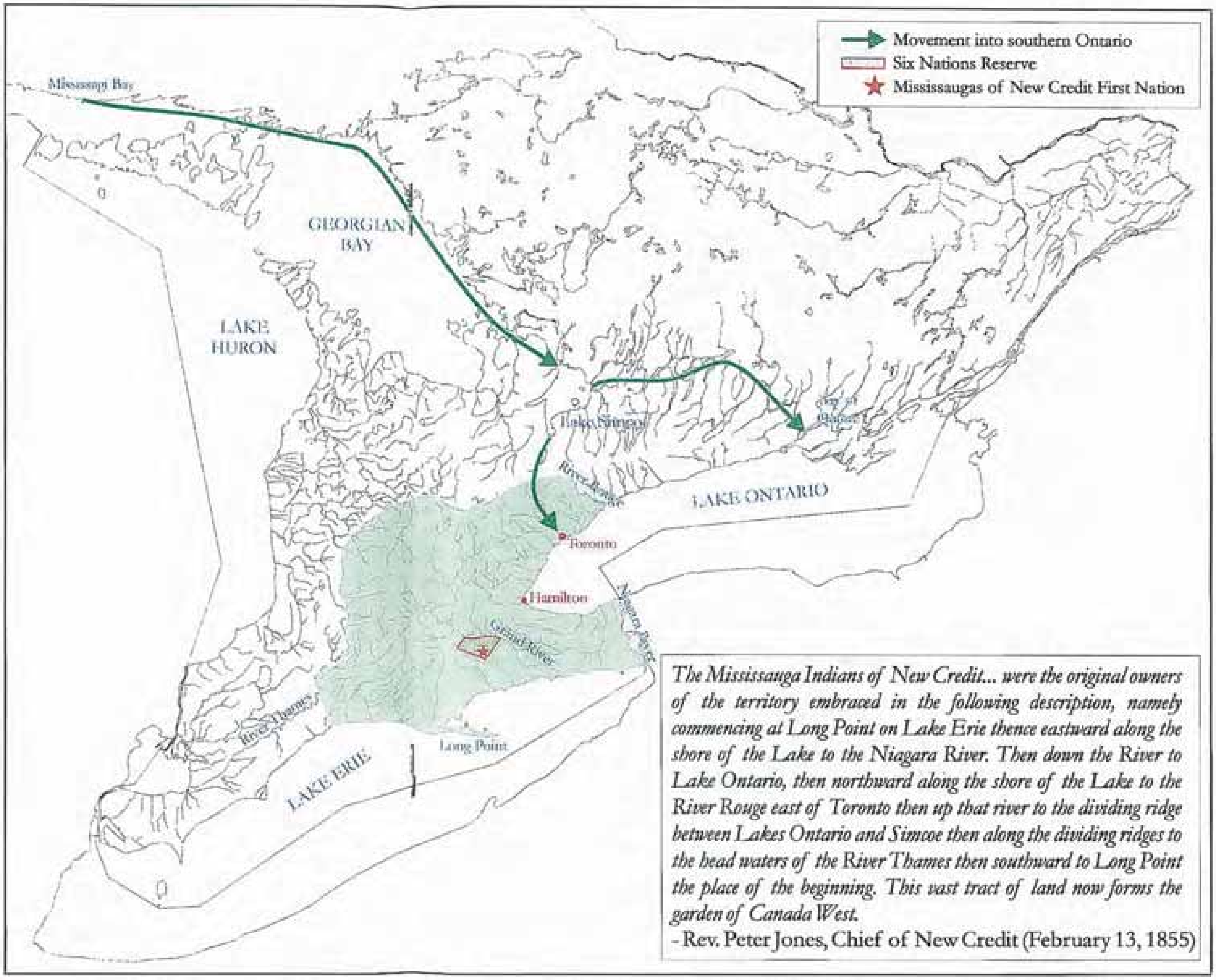
A second group of Mississaugas travelled south from Lake Simcoe along the Holland and Humber Rivers. The southern route followed by the Mississaugas, known as the Toronto Carrying Place, was an ancient and well known Aboriginal overland route linking Lake Ontario to Georgian Bay. Aboriginal peoples had long used it to avoid the long water passage via Lakes Ontario, Erie and Huron. French explorers learned of its existence from Aboriginal people in the mid-1600s. In the 1700s French traders, followed by Northwest Company traders, used this route as it proved a shorter and more efficient link between Lake Ontario and Lake Huron than any alternatives at the time.

Depiction of the Ojibwa defeat of the Iroquis. Around 1900 Mesaquab (Jonathon Yorke), an Ojibwa from the Rama Reserve, Lake Simcoe, made this representation of a rock painting that once stood on Quarry Point, Lake Couchiching. As it was "some years since the rock fell into the water," he relied exclusively on his own memory. The design was make for the lid of a birchbark box. The Ontario Provincial Museum's Archaeological Report for 1904 states: "The design is said to represent two Ojibwa warriors after the last great battle fought with the Iroquois, the central figure being a Mohawk, or Canienga. Mesaquab asserts that the Ojibwas, coming from the north, occupied the territory forsaken by their enemies.

According to Chief Robert Paudash, after the Iroquois retreated to their homeland south of Lake Ontario, the Mississaugas negotiated a peace treaty with the Mohawk Nation. Upon returning from these negotiations, the Mississaugas decided to settle permanently in southern Ontario. Although an exact date cannot be confirmed, historians generally agree that the process of southern Ontario settlement by Mississaugas occurred in about 1695.

One large group established themselves in the valley of the Otonabee or Trent River, along Lake Ontario and the St. Lawrence up to Brockville. A second group established themselves to the west, in an area between Toronto and Lake Erie. This latter group are the direct ancestors of the present Mississaugas of the New Credit First Nation.

Credit Mississauga Territory, circa 1695



The Mississauga Indians of New Credit... were the original owners of the territory embraced in the following description, namely commencing at Long Point on Lake Erie thence eastward along the shore of the Lake to the Niagara River. Then down the River to Lake Ontario, then northward along the shore of the Lake to the River Rouge east of Toronto then up that river to the dividing ridge between Lakes Ontario and Simcoe then along the dividing ridges to the head waters of the River Thames then southward to Long Point the place of the beginning. This vast tract of land now forms the garden of Canada West.

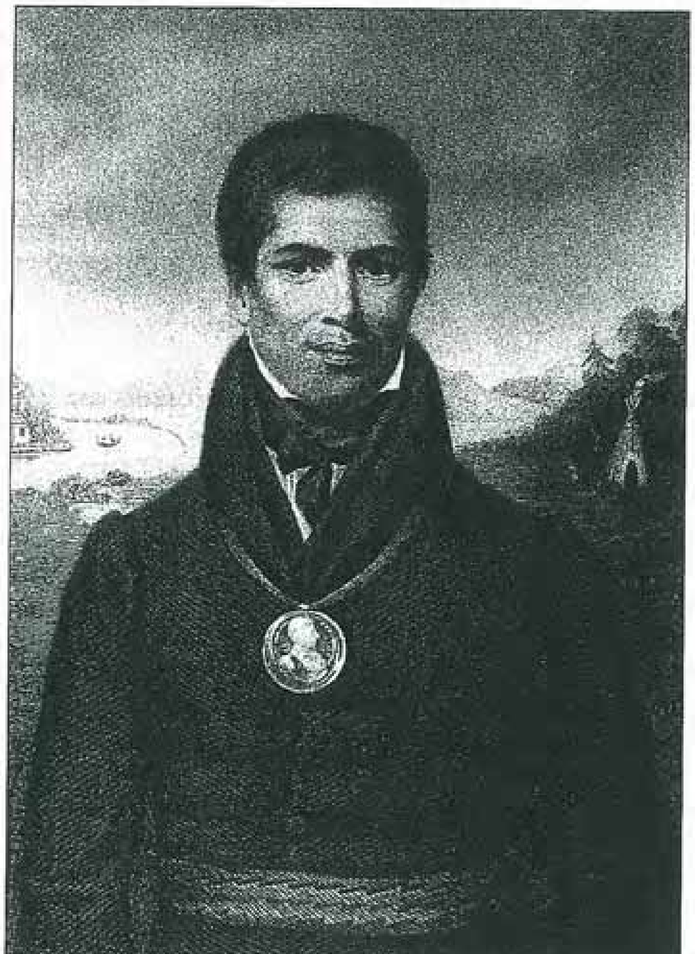
\- Rev. Peter Jones, Chief of New Credit (February 13, 1855)

THE MISSISSAUGAS OF THE CREDIT: HISTORICAL TERRITORY, RESOURCE AND LAND USE

The Mississaugas who settled in the area between Toronto and Lake Erie occupied and used a large territory in south-western Ontario throughout the 1700s and into the 1800s. In about 1720, French traders established a fur trade post at the western end of Lake Ontario. From this time onwards, the Mississaugas were regularly involved in the regional fur trade. By 1750, another French trade post had been built in the area of present-day Toronto (Fort Rouille). A practice soon developed by which French, and later English fur traders would extend credit to the Mississaugas at a particular river location. As a result, this river became known as the Credit River. By extension, the Mississaugas established in the region became known to Europeans as the Mississaugas of the Credit.

Over time, the Mississaugas of the Credit came to view the territory they occupied and used in southern Ontario as their traditional territory. In the 1800s, several detailed and consistent geographic descriptions of what was by then considered the traditional territory of the Mississaugas of the Credit were outlined in written documents. One such description was provided to the Governor General by Chiefs Joseph Sawyer and John Jones in 1844:

The extent of country owned and possessed by the River Credit Indians from time immemorial, extended as far down as the river Rouge thence up the said river Rouge to its source, thence Westerly along the dividing ridge between Lake Huron and Ontario to the head waters of the Thames thence southerly to Long Point on Lake Erie, thence down Lake Erie, Niagara River, and Lake Ontario to the place of the beginning.



Portrait of Kahkewaquonaby, Reverend Peter Jones. Peter Jones Collection, Victoria University Library, Toronto. Matilda Jones, April 1832.

In 1848 the Reverend Peter Jones, whose Mississauga name was Kah-Ke-Wa-Quo-Na-By, provided a similar description of the traditional territory of his people in the Christian Guardian.

The Reverend Peter Jones was at the time a well-known missionary and advocate not only for his people, the Mississaugas of the Credit, but also for many other Aboriginal Nations and communities in Ontario. By 1855, then as Chief of the New Credit Band, Peter Jones provided a further description of the traditional territory of the Mississaugas of the New Credit in a statement to the Indian Department. This description is quoted in an insert on the map of Credit Mississauga Territory presented in this brochure.

Between about 1695 and the mid-1820s, the Mississaugas of the Credit continued to follow a yearly cycle of movement and resource harvesting in their southern Ontario territory. This yearly seasonal cycle was generally comparable to the way of life followed by the Mississaugas on the north shore of Lake Huron.

In winter months, extended family groups were dispersed throughout the territory of the Mississaugas of the Credit. Hunting provided the major means of subsistence in winter. A number of large and small game, birds and fur bearing animals provided important sources of food and pelts for commercial trade. Deer were abundantly available, and bear were also harvested although to a lesser extent. Beaver and muskrats were important fur bearing animals whose pelts were traded in exchange for European goods. However, these fur bearing animals were also harvested for food, and their meat supplemented dietary needs of families.

In spring, families first moved to sugar bushes to tap maple trees. After the maple harvest, families congregated at the Credit River, the site of an important salmon fishery. Furs and pelts were also brought to trade posts at this time. Fishing was supplemented by hunting small game and fowl, principally ducks, geese and partridges.

Summer provided an abundance of resources for subsistence. Women planted corn and other vegetables, tended to crops and collected a variety of wild foods. Berries, mushrooms, roots, and where available, wild rice in the fall, were important wild foods that could be preserved for winter months. Fishing, supplemented by hunting, were the main economic activities engaged in by men throughout summer months. By fall, people often returned to the Credit River for salmon fishing and for obtaining credit (trade goods) from European traders prior to returning to winter hunting grounds.

Toward the end of the 1700s, growing Euro-Canadian settlement in the Lake Ontario region started to interfere with the seasonal movements and resource harvesting activities of the Mississaugas of the Credit. However, the growing villages and towns also provided some opportunities for the Mississaugas of the Credit to supply this population with food and manufactured goods through barter sales. The diary of Mrs. John Graves Simcoe (wife of the first Lieutenant-Governor of Upper Canada) details a number examples of receiving supplies of salmon, pike, geese, ducks and maple sugar from barter sales by Mississaugas of the Credit in the 1790s.

Indian Sugar Camp, engraving by J.C. McRae of a wartercolour by Seth Eastman. The women usually left for the maple sugar groves during the final muskrat hunt in the spring. The Henry Schoolcraft, Historical and Statistical Information Respecting the History, Condition and Prospects of the Indian Tribes of the United States, 6 vols.

In the 1820s, the Mississaugas of the Credit established a mission settlement on the Credit River under the direction of the Reverend Peter Jones. The mission settlement quickly developed as a successful agricultural community. Over the following years, the Credit River settlement gained considerable political importance as a regional centre where a number of Ojibway Grand Councils were held.

However, throughout this time period, the Mississaugas of the Credit continued to travel extensively for hunting and fishing. Many community members had developed close family relationships with Ojibway and other Aboriginal peoples from several First Nation communities in southern Ontario, including Muncey, Owen Sound and the Six Nations Iroquois on the Grand River. As Euro-Canadian settlement intensified along the western end of Lake Ontario, Mississaugas of the Credit travelled further inland and to more remote hunting grounds, for example, in the Muskoka area, to harvest renewable resources.

THE RELOCATION TO NEW CREDIT

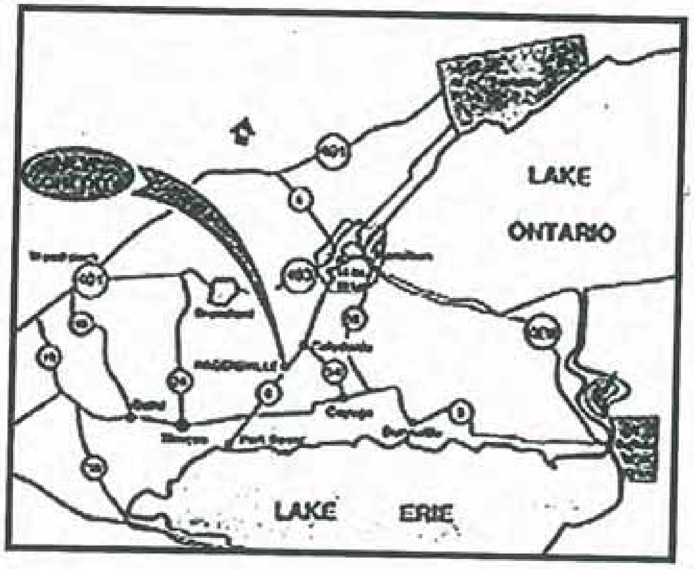
Between the late 1700s and into the 1800s a number of events would have long lasting impacts on the Mississaugas of the Credit and their land base. These events happened within broader social, political and economic changes that included the development of Euro-Canadian settlement in Mississauga territory, colonial government land grants to the Six Nations Iroquois and land purchases from the Mississaugas.

Throughout the 1700s, the Mississaugas and the Iroquois Confederacy (which after the early 1700s included Six Nations) maintained peaceful relations. In the early-mid 1700s, the Mississaugas were even admitted into the Confederacy. This formal political alliance would not last, in part because of British attempts to undermine a growing pan-Indian alliance movement. However, it is clear that friendly relations between Mississaugas of the Credit and Iroquois were maintained. At the request of the British colonial government in 1784, the Mississaugas agreed to a land grant permitting settlement of the Six Nations along the Grand River.

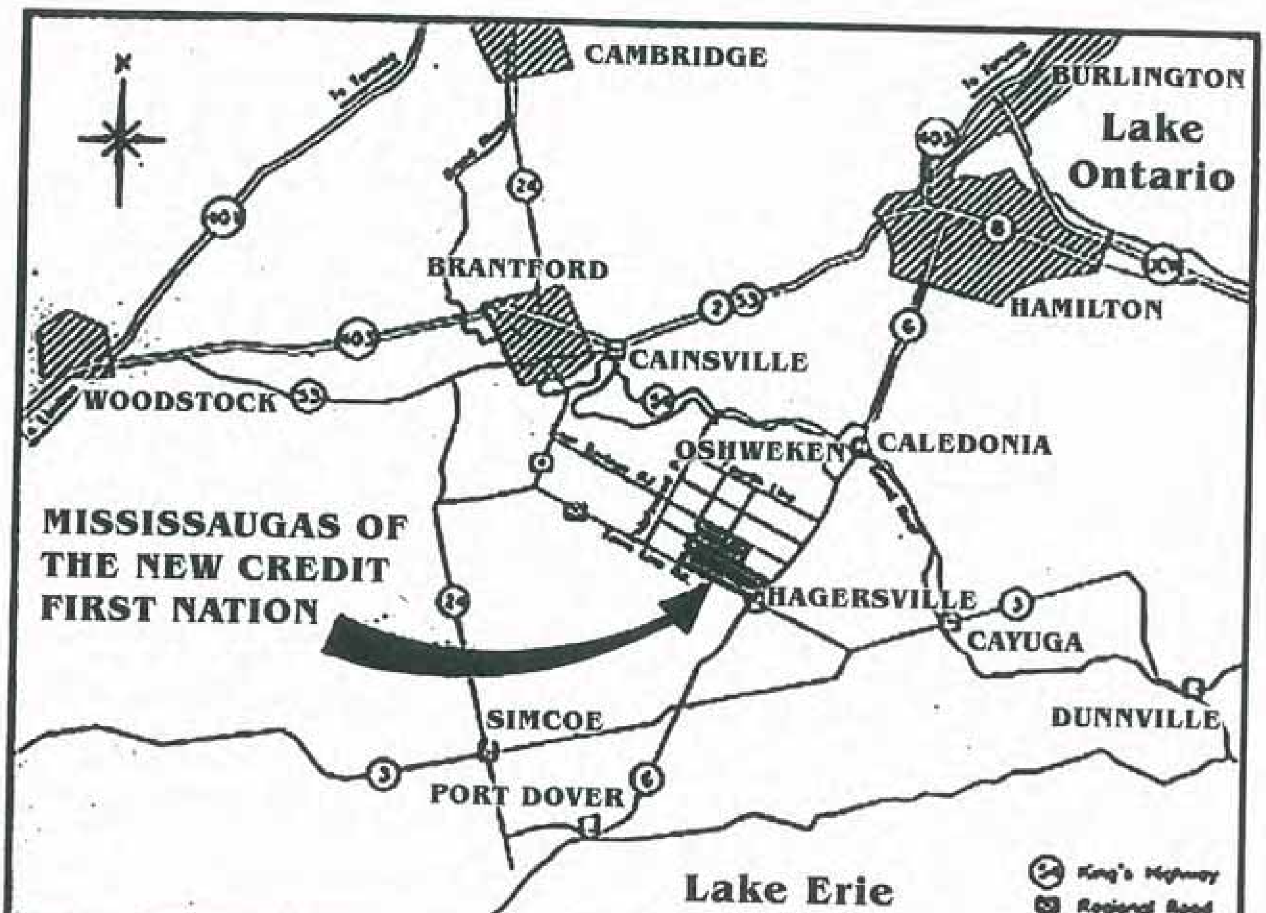
The land grant to the Six Nations was part of a series of 'land surrenders' (as the British conceived the agreements) involving the Mississaugas first in 1784, and then later between 1787 and 1805. In this time period, according to the English texts of agreements, the British colonial government 'purchased' tracts of land along the Grand River and the entire Niagara Peninsula. In 1787 and 1788 two additional large tracts of lands were purchased. The 'Toronto Purchase' covered much of what is today central metropolitan Toronto. The 'Gunshot Treaty' covered Mississauga lands north of Lake Ontario. Both of these land agreements remain controversial today. The original land purchase documents contained defects by British legal standards at the time. For example, the 1787 Toronto Purchase was not ratified by the British government until 1805, and the Gunshot Treaty was almost immediately considered invalid by colonial authorities.

The validity of these early 'land surrenders' by the Mississaugas of the Credit is also questionable on other grounds. The Mississaugas understood these agreements very differently from the colonial government. The British saw land as a commodity and thought they were purchasing land or rights to land once and for all. The Mississaugas conceived of their relationship to the land in spiritual terms. They did not believe that land could be 'sold', or that their rights to use land and access resources for food and living, could be absolutely and permanently signed away.

After 1800, the growth of Euro-Canadian settlement in the Toronto area put increasing pressure on the ability of the Mississaugas of the Credit to continue to make a living. At first, the Mississaugas of the Credit responded by seeking to protect their ability to make a living on their territory. The Mississaugas petitioned the colonial government to secure for them exclusive rights to key fisheries in 'land surrender' agreements. The text of the 1805 Toronto Purchase defined specific, exclusive rights to fisheries for the Mississaugas in the Twelve Mile Creek, the Sixteen Mile Creek, the Etobicoke River, and the Credit River. In 1829, the Mississaugas of the Credit sought further protection of their fishing rights in a petition to the Upper Canada government to secure their salmon fishery on the Credit River. Later that year, an Act of Parliament was passed confirming exclusive rights of the River Credit Mississaugas to hunt and fish along that river. The Act was confirmed again in 1835.



Yet by the early 1840s the Mississaugas of the Credit realized that their ability to make a living at their settlement on the River Credit was in jeopardy. It was becoming increasingly clear that the community would have to relocate to an area less directly disturbed by Euro-Canadian settlement. After considering several options, in 1847 the Mississaugas accepted an offer from the Six Nations to establish a new settlement on a tract of land situated in the southwest portion of the Six Nations Reserve.



A number of reasons convinced the leaders and people that this tract presented better possibilities for successful relocation relative to other options. The land was within the traditional territory of the Mississaugas of the Credit, and relatively close to the existing settlement on the River Credit. Also, the land was of superior quality compared to other tracts, and presented greater potential for agricultural development. Finally, over the years, the close ties between the Mississaugas of the Credit and the Six Nations people had resulted in a number of intermarriages. The opportunity to maintain close family ties proved an important attraction.

The relocated community became known as the Mississaugas of the New Credit First Nation. This tract of land was formally confirmed as the Mississaugas of the New Credit Reserve in 1903, which remains to this day.

MISSISSAUGAS OF THE NEW CREDIT FIRST NATION

A special thanks to Praxis Research Associates, 6352 St. Louis Drive, Ottawa Ontario for researching and writing MNCFN History.

Appendix 10-A1

Recommended Master Plan

WATERFRONToronto

TORONTO

Toronto Transit Commission

LEGEND:

BIKE PATH	FUTURE LRT LINE	NORTH KEATING PRECINCT EA TRANSPORTATION NETWORK IMPROVEMENTS
SIDEWALK		
LRT TTC TRACKS	TTC PLATFORMS	FUTURE STUDY/BY OTHERS ROAD NETWORK IMPROVEMENTS

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FEBRUARY 24, 2010

Issue	Date	By	Chkd	Appd

Client

Job Title: Lower Don Lands

Drawing Title: RECOMMENDED MASTER PLAN

Notes: FOR PLANNING PURPOSES ONLY

Scale: 1:2000

Plot ID

Drawing Status: PRELIMINARY

pag

Job No: 96135

Drawing No

Issue

Appendix 10-A2

Stormwater Management:
Lower Don Lands

WATERFRONToronto

TORONTO

Toronto Transit Commission

ECOLOGICAL DRIVERS

INTRODUCTION

The proposed stormwater management system for the Lower Don Lands Redevelopment project is driven by a vision of rainwater as a resource, not merely a waste product. As part of the development planning, several high quality wetlands and rivulets have been proposed to provide habitat for rare species as discussed in Chapter 4 (Wildlife & Habitat). These elements will require a water source that has low salt concentrations. The Don River does not have sufficiently high quality water to support the high quality wetlands desired as part of this project. One potential source of water for these wetlands was determined by the project team to be the building roofs, primarily due to the absence of road salt in the stormwater runoff from roof areas. A second use of water low in dissolved salts is street tree irrigation. Therefore, the objectives of the stormwater management system are to reliably supply water low in salt to wetlands systems and street trees, protect river and near shore lake water quality by satisfying the local guidelines for stormwater treatment from the street runoff, and incorporate the stormwater treatment system attractively into an urban development. The following is a brief description of the ecological systems that drive many of the stormwater system design decisions and their characteristics that affect the design.

High Quality Wetlands

High quality wetlands are included in the project planning as an essential element of the Don River restoration as described in Chapter 3 (Plant Communities). The planned high quality wetlands are proposed to be located above the 25-year flood elevation but within the 100-year floodplain of the Don River to prevent the infusion of sodium and chloride carried by the River during the winter and early spring from affecting the wetland soils and vegetation. This location precludes use of river floodwaters as a significant water source for the wetlands and this water must therefore come from other sources.

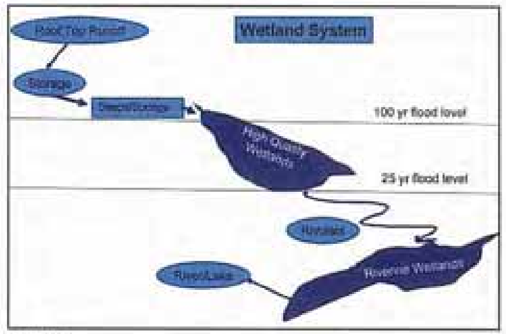


Figure 2-1
Proposed wetland system for Don River mouth

The water level in the wetland is proposed to follow a seasonal trajectory with the highest water level in the early spring and a drying down from spring through summer to late fall and then a gradual increasing water level from late fall and winter to the early spring.

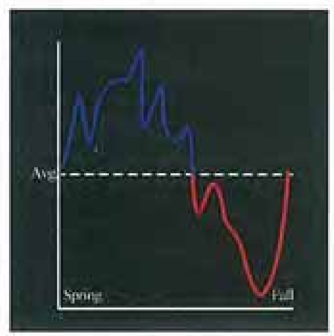


Figure 2-2
Wetland seasonal water levels

Wetland water levels are defined by the rates of precipitation, plant evapotranspiration, water evaporation, infiltration of water into the wetland soils and the surface water inflow and outflow rates. Wetland water quality is defined primarily by the inflow water contaminants especially road salt in urban wetlands.

Seeps

The water supply to the high quality wetland was proposed to enter the wetlands through controlled seeps from the sloped area bounding the 100-year flood plain. Ecologists listed several reasons for the use of seeps as discussed in Chapter 2. These reasons included improvement of water quality, ability to control the inflow rates from the underground storage reservoir and establishment of an ecotone between the upland and wetland areas.

Use of the seeps directly fed from the underground storage reservoir with a high quality water supply will also minimize the road salt input into the high quality wetlands by preventing feed water from contacting other stormwater runoff with road salt content.

Seasonal Rivulets

Outlets from the high quality wetlands are planned to be routed to the wetland elements adjoining the Don River with a perennially flowing rivulet. These rivulets will have increased flowage during the spring and fall to provide habitat and a transport element for the rare species requiring a seasonal use of the high quality wetlands (see the detailed discussion in the river restoration chapter). Team ecologists determined that a minimal flow rate of 0.001 cubic meters per second during two months in the spring and two months in the fall should be provided and that a minimum flow of 0.0001 cubic meters per second of perennial flow was needed.

The ecologists also found that rivulet flows should be clean water and not be contaminated by road salt or other typical runoff pollutants.

The Don River Mouth, Connected Wetlands, and Near Shore Lake Habitats

Although the Don River carries high loads of urban related pollutants, including elevated concentrations of salts, during most of the year, there is a desire to improve the quality of this resource and provide the highest water quality feasible for the proposed connected wetlands and near shore lake habitats. These areas can provide important habitat for a variety of targeted riverine and lacustrine species if the chemical, physical, and biological quality of those areas are maintained. These goals drive the treatment of non-roof runoff from the development area, which will be routed to these habitats.

Urban Plantings

Establishing and maintaining street trees and other vegetation is important for creating an attractive urban environment. These vegetation communities are often stressed by the nature of urban constraints, including compacted soil, insufficient quantity and quality of soil, insufficient quantity and quality of water, and restricted sunlight. A desire to minimize these stresses is an important driver for the stormwater management system design.

DESIGN CRITERIA

Governmental Regulations and Guidelines

Several documents were reviewed to determine the provincial and local guidelines for stormwater management near the mouth of the Don River. The City of Toronto's Wet Weather Flow Management (WWFM) Guidelines document, Toronto and Region Conservation Authority's stormwater management criteria, and the Ministry of Environment Stormwater Management Planning and Design Manual were the primary documents reviewed. The Ontario Provincial Water Quality Objectives (PWQO) were also reviewed to ensure that any practical measures to ensure that those objectives are met are proposed.

General principles of the WWFM Policy and Guidelines include an emphasis on managing stormwater close to where it is generated. There is a hierarchy of solutions in the Guidelines that prioritizes in the following order: (1) source controls at the lot level; (2) conveyance controls such as roadside infiltration systems; and (3) end-of-pipe controls if source and conveyance controls are not sufficient to achieve the applicable targets.

Water Quality

The primary water quality requirement reflected in all of the stormwater management guidelines is a "long term average" 80% reduction of total suspended solids (TSS). This is an appropriate target pollutant for stormwater management because most practices employed to control TSS also reduce nutrients, metals and other urban pollutants that are addressed in the PWQO.

Another important water quality requirement reflected in the guidelines is *E. coli* reduction for any stormwater discharged directly to Lake Ontario. The guidelines state that any discharge to the lake or waterfront area should be treated with ultraviolet light disinfection or equivalent treatment. City staff has indicated that filtration of runoff may qualify as equivalent treatment but that monitoring would be necessary and provisions should be made to incorporate ultraviolet light disinfection if the filtration does not prove to provide equivalent treatment.

Road deicing chemicals are a particular concern for the higher quality plant communities proposed. Therefore, measures are proposed to minimize salt delivery to those communities, especially the high quality wetland systems.

Water Quantity

Most of the water quantity guidelines prescribe achieving pre-development hydrologic conditions through infiltration, retention and detention. It is recommended that all water from a 5 mm storm be infiltrated. However, given the concerns regarding soil quality on the site, the project team has advised against deep infiltration of stormwater. Therefore, rather than permanent retention through infiltration, the goal of this project will be to pass at least the first 5 mm of runoff through filtration elements and/or street tree soil.

Given proximity of the project to Lake Ontario, stormwater detention may not provide benefits that justify the space required because stormwater flows from the largest events into the lake would quickly be assimilated without risk of posing flooding problems downstream. Guidelines also include recommendations to minimize instream erosion that often results from hydrologic modifications associated with development. The Don River geomorphologic studies described in this catalogue are designed to ensure that water flow in the river is not erosive.

Conveyance

The WWFM guidelines require that an overland flow system be designed to convey the 100 year design storm without causing flood damage. The guidelines further state that overland flow shall be conveyed through walkways, easements and within the road allowance. Velocities in the overland flow channels should be minimized, and if the public has access to the flow routes, the velocities and depths must be minimized in accordance with Table 2-1.

For conveyance of the 2 year storm, pavement encroachment by ponding on the streets may not overtop curbs, and the spread of flow into street lanes depends on the road type. For local roads, flow may spread to the crown of the street. For collector roads, flow spread must leave at least one lane free of water. For arterial roads, flow spread must leave at least one lane free of water in each direction. Additionally, flow across intersections is not acceptable for the 2 yr storm.

For conveyance of the 100 year storm, the water level should not exceed the elevation of the right of way limit for local and collector roads. Additionally, the maximum depth should be less than 0.15 m above the crown of road for the local roads, 0.1 m above the crown for the collector roads, and less than the elevation of the crown for arterial roads.

Ecological Criteria

In addition to the guidelines and regulations set by local, provincial and federal agencies, the design team has discussed additional criteria that are necessary to achieve the ecological goals of this project. These criteria are driven by specific water quality and water quantity needs of species and community assemblages that are targeted.

Permissible Depths for Submerged Objects	
Water Velocity (m/s)	Permissible Depth (m)
0.5	0.80
1.0	0.32
2.0	0.21
3.0	0.09

Note: The above values are based on a 20-kg child and concrete-lined channels.
Source: Stormwater Management Guidelines for the Province of Alberta (1999)

Table 2-1
City of Toronto WWFM guidelines for flow velocity

Water Quality

One of the primary water quality concerns regarding use of stormwater as a water supply for high quality wetlands, street trees and other sensitive plant communities is deicing chemicals. Road salt application typically introduces quantities of sodium and chloride into the environment at doses that can be detrimental to sensitive plants and animals. Therefore, it was determined that no runoff from sources that will contain deicing salt may be routed to the high quality wetlands. Only roof runoff will be routed to those communities. Salt load on street trees also should be minimized to the extent practicable, though it is expected that street trees will be exposed to some salt and therefore need to be salt tolerant species.

Water Quantity

The design team has expressed interest in creating high quality wetlands along the restored Don River mouth. Due to the high quality of water needed, these wetlands will not regularly receive river floodwaters and will not receive water from street level runoff. Therefore, they must receive adequate supply of water from rooftops within the development to support the desired wetland communities. The design team has also expressed interest in establishing small streams, or rivulets, flowing out of the high quality wetlands to support organisms that thrive in small riverine environments. Ecologists have determined that these streams need to have continuously flowing water at a rate of at least 0.001 cms during two months in the spring and two months in the fall and at least 0.0001 cms at other times. These water quantity criteria and the system necessary to achieve them are described in more detail in the following sections.

DESIGN SOLUTIONS

Water Sources

Stormwater runoff is the proposed water source for the high quality wetlands/seeps and rivulet outlets. These highly sensitive ecological elements are dependent upon a water supply with little, if any, road salt. Therefore, high quality stormwater runoff from green and impervious roof areas, which is not subject to roadway deicing salt application and which should contain lower concentrations of other pollutants compared to street runoff, was chosen as the appropriate water source for these elements. Roof runoff that is not required to satisfy water needs of the high quality wetlands will be available as a water source for street trees. Use of water low in salts to water street trees will increase the life span, health and size of the trees. Street level runoff is proposed to be treated primarily through biofiltration, as described below in accordance with local guidelines regarding stormwater water quality, and routed separately to the riverine wetlands along the Don River or Lake Ontario. This proposed separation of stormwater runoff sources is shown in Figure 2-3.

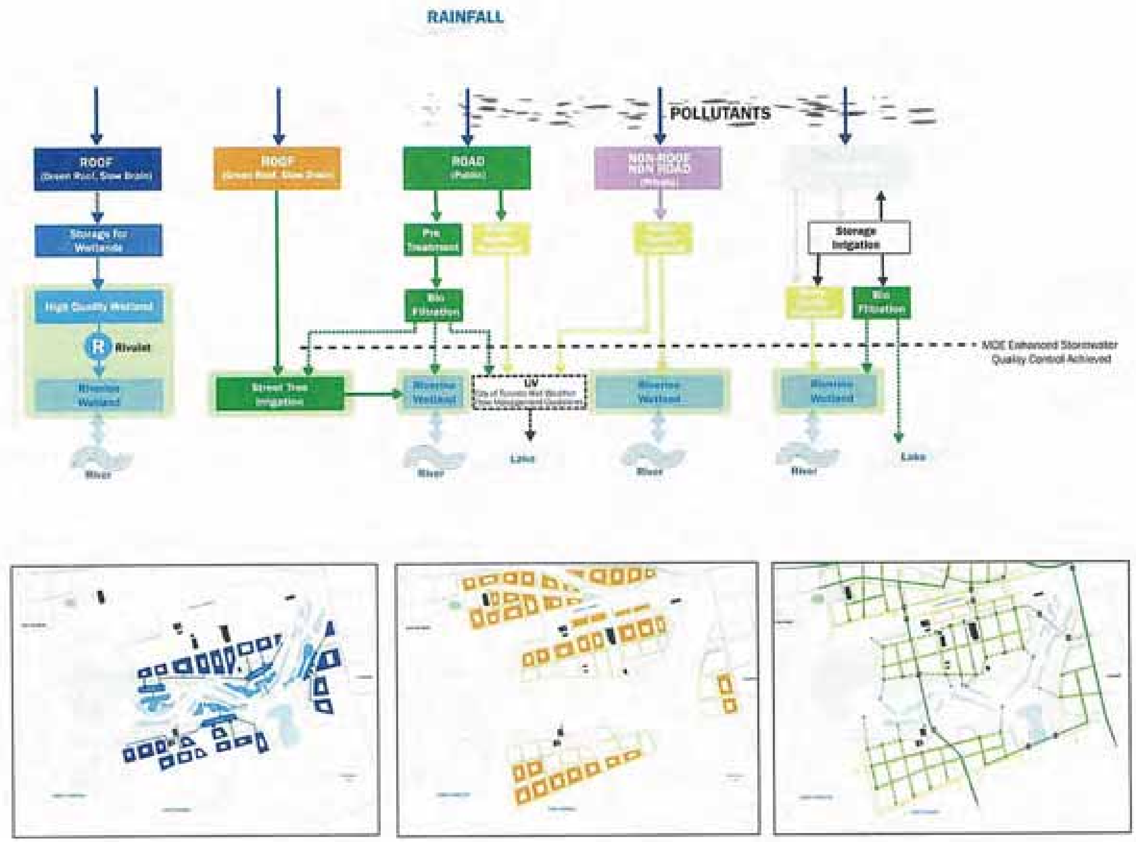


Figure 2-3
Stormwater separation scheme

Water Storage
Water storage will be required to balance the irregular precipitation event source roof stormwater runoff with the more constant and regular inflow seep requirements needed to make up water lost from wetland evapotranspiration and infiltration and to provide the spring and fall rivulet flows. Optimization of this storage volume minimizes the roof area required to provide source water needs for the high quality wetlands and associated rivulets. The water storage is proposed to be accomplished within shallow underground reservoirs constructed with interconnected storage pipes and/or cells located above the high quality wetlands. These reservoirs will be located within park areas to minimize the surface structural loadings on the storage elements. These storage reservoirs will discharge water to the high quality wetlands through a diffused outlet draining through seepage faces on the upper slope of the wetland (between the wetlands and the adjoining park areas).

Non-Roof Stormwater Treatment
A stormwater treatment and conveyance system must be incorporated into the development to manage the stormwater runoff that is not collected from building roofs. This system will need to satisfy the water quality, water quantity, and conveyance guidelines described above. The system proposed to achieve these objectives integrates biofiltration units into the streetscape. These units could be attractive planters located between the street and the main portion of the sidewalk containing engineered soil filtration media and vegetation. Water would be routed into the unit from the street through a curb inlet and would be filtered through the soil and collected in an underdrain sized to convey the 2 year storm. A riser pipe overflow structure would allow excess water to spill directly into the subsurface conveyance system when inflows to the unit exceed the filtration capacity. When the subsurface conveyance capacity is exceeded, excess water pools along the curb and eventually flows overland through the street system to the river or lake. If space is very constrained on some streets, a portion of the filtration units could be located below the sidewalk. The size of the filtration elements and subsurface conveyance is described in the following section.

Analysis

Water requirements for high quality wetland elements
The conceptual result of the analysis of roof size necessary to supply water to the high quality wetlands was presented at Client Steering Committee Meeting #5 and included recommendations that: (1) the runoff from 21,000 square meters of green roof area should be allocated for each high quality rivulet and its associated high quality wetland; (2) the high quality wetlands should receive the water as seepage; and (3) 5000 cubic meters of underground storage volume should be allocated for each rivulet's water supply to transform the irregular stormwater runoff from the roofs to a more uniform and timely water supply.

The following analysis section describes the methods and analyses done to support these recommendations and to expand the recommendations to include both impervious and green roof types as potential water sources for the high quality wetlands and rivulets.

Methodology
The analysis methodology consists of four interconnected analyses to establish (1) potential locations for high quality wetlands and seasonal flow rivulets, (2) water supply requirements for the wetlands and rivulets, (3) roof runoff potential for both green and impervious roof types as a water supply source, and (4) temporary supply storage requirements to provide the steady seasonal water needs for the rivulets with the more erratic roof runoff source water. These analyses were linked through a continuous water balance simulation model with STELLA™ (Structural Thinking Experimental Learning Laboratory with Animation as the model platform. STELLA™ is an automation tool that constructs a framework for simulating and visualizing outcomes of a particular model. It first builds the model with elements and links to variables of elements defined by the user, then frames the model within parameters defined as relationships between elements. Dynamic visualizations are realized when STELLA simulates all possible outcomes of the model based on its elements and relationships). The simulation to interconnect wetland locations, water supply requirements, roof runoff potential, and temporary supply storage was made using daily time steps over the April through October growing season.

Water Balance Analysis
The water balance analysis objectives were to (1) define the optimal underground storage to provide the most efficient use of runoff from the roof areas as supply for the high quality wetlands and rivulets and (2) define the minimum green or impervious roof areas necessary.

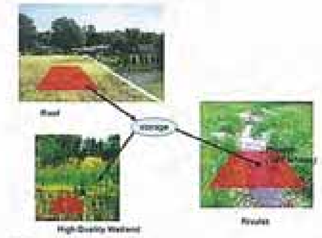


Figure 2-4

The analysis was done by first defining the Toronto daily precipitation history between 1991 and 1996 in the model (which provided years with high, typical and dry conditions) between April and October (when water demands for rivulets and wetlands would occur) and the average temperature conditions during these months (to account for evaporation potential). This precipitation information was obtained from City of Toronto data records. 1991 was used in the model for the typical year for design with 514.4 mm of precipitation compared with the dry 1994 (389.0 mm of precipitation) and the wet 1996 (742.8 mm of precipitation).

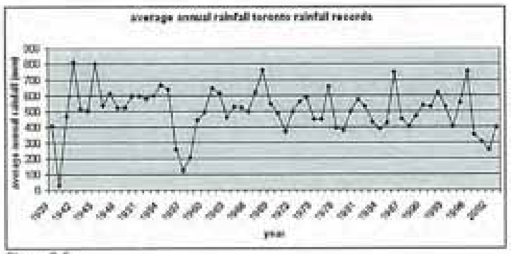


Figure 2-5

Average daily evapotranspiration for each month during the growing season including the months of April through October was defined from the Hydrometeorology Division of the Canadian Climate Center.

A numerical model was built on the STELLA™ platform to integrate water supply (roof runoff from precipitation events) with water demand (wetland and rivulet flow requirements) using a storage reservoir with a controlled outlet to balance the water supply with the water demand. Finally, numerous model scenarios were run to determine the optimal storage reservoir size and the minimum roof area required for a typical precipitation year. The model was built with many of the variables coded to be modified by the analyst and a runtime version of the model is available upon request for readers to test their ideas with the model.

Water Supply Sources

Green Roof -- The modeling using the green roof as the irrigation water source was done assuming the following roof parameters:

- Roof substrate depth = 0.1 m
- Impervious roof fraction = 0.2
- Green roof fraction = 0.8

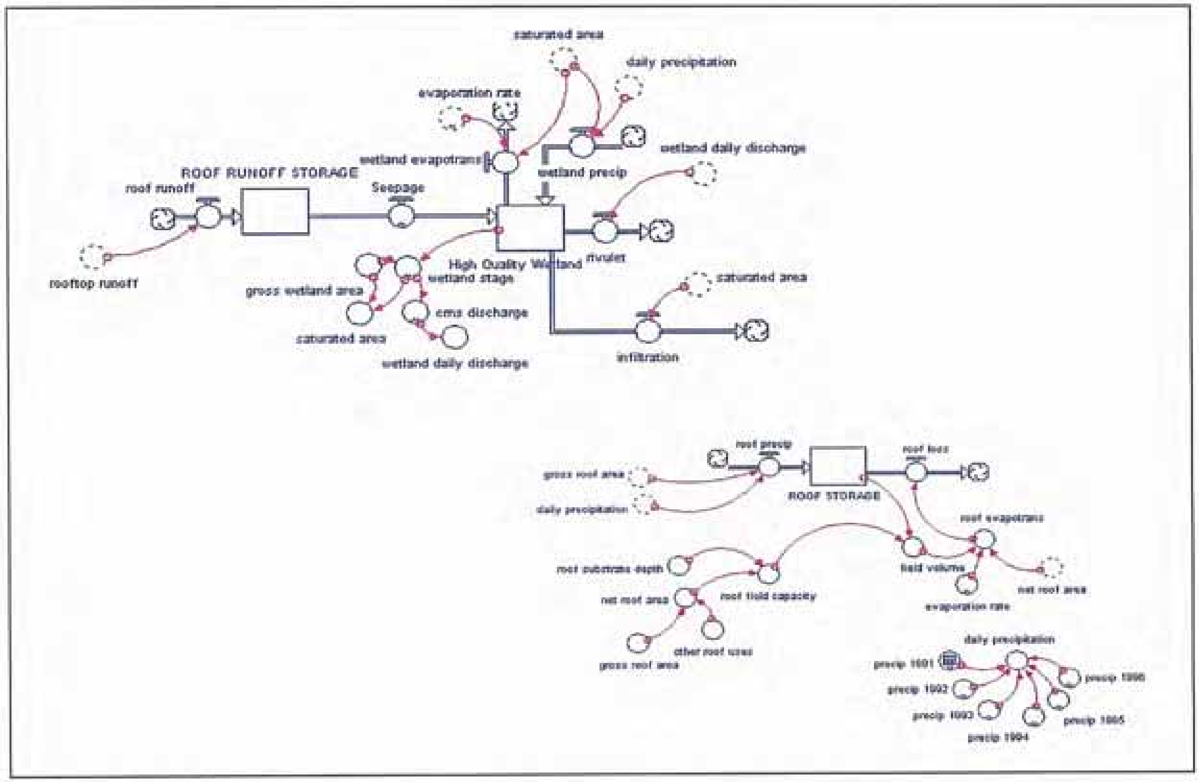


Figure 2-6
STELLA™ model schematic

Average Daily Evapotranspiration Rate (mm) for Green Roofs and High Quality Wetlands						
April	May	June	July	August	September	October
2.70	4.10	4.97	5.57	4.57	3.17	1.97

Table 2-2

The model allows the analyst to modify these values to test other possible roof configurations.

Planted area roof evaporation was consistent with Toronto planted areas; no evaporation was assumed to occur from impervious roof areas (precipitation would be transformed to runoff completely). Daily rainfall was converted to runoff by assuming that all precipitation not retained on the roof in substrate voids or immediately evaporated would runoff as wetland/rivulet source water. The substrate voids were assumed to be first saturated with precipitation before runoff would occur during a storm event. The analysis assumed that green roofs would be 80 percent planted and 20 percent impervious and the impervious roof fraction would be 100 percent impervious (readers may use the runtime model to vary these parameters and test other options). The water losses from the green roof substrate were assumed to be evaporation or evapotranspiration.

Impervious Roof -- Impervious roof modeling was done assuming a 100 percent impervious roof with all precipitation converted to runoff (no evapotranspiration). Although the present planning envisions primarily green roofs in the redevelopment area, the impervious roof option was made for comparison purposes.

Building Footing Drainage – Due to the redevelopment area's proximity to Lake Ontario, footing drains may be required for many if not all buildings because of a high water table. This footing drainage would provide an additional water source for the rivulets and high quality wetlands, especially during dry weather periods. Presently, geotechnical analysis is being done to quantify potential footing drainage flows and determine if the footing drainage would contain any contaminants that would render it unsuitable as a clean water source. The initial modeling included no source water from footing drainage. If this water supply source is deemed feasible as additional groundwater analysis is completed in the geotechnical analysis, this water source will be included in the model and will likely decrease the roof area required to support each wetland and rivulet.

Air Conditioning Condensate -- A possible source of additional clean water which was not included in the model is condensate from the rooftop air conditioning condensers. This freely available water is typically wasted and could easily be collected in the roof drainage system and may possibly provide an important dry weather water source in the summer months.

Wetlands and Rivulets Water Demand

High Quality Wetlands -- The naturalized hydrologic cycle proposed for the high quality wetland areas will result in a minimal outside water source demand by the wetlands since the decreasing water level in the wetlands during the summer and early fall is complementary to the decreasing precipitation runoff during this period. The wetlands, as analyzed, would have a permanent wet area approximately one-tenth the total wetland area, a seasonal water level fluctuation of approximately 0.3 meters and a maximum water level fluctuation of 0.7 meters based on team ecologists' recommendations. The wetlands would be at the seasonal high water level in the spring after the winter snowmelt. The wetlands were analyzed with no infiltration losses due to expected high water tables in the areas adjacent to the Don River.

Rivulets -- The minimum flow rates in the rivulets were determined by project ecologists to be 0.001 cubic meters per second (86.4 cubic meters per day) during April, May, September and October and some flow (approximately 5 to 10 cubic meters per day) during June, July and August. The analysis was done with these rates as control minima that are exceeded during wetter years and periods of regular rainfall.

Underground Water Storage and Flow Rate Control

Storage coupled with outlet rate control will be necessary to balance the irregular roof runoff flow with the seasonal water demands of the high quality wetlands and rivulets if roof water sources are to be used as the only water supply for those systems. The analysis assumed that the storage would be underground adjacent to the high quality wetlands; the seepage discharge would be controlled to limit the reservoir outflow to 0.001 cubic meters per second during April, May, September and October and 0.0001 cubic meters per second during June, July and August. The outlet control will require manually adjusting a flow regulator valve at the beginning of April, the end of May, the beginning of September and the end of October to control the flows released from the storage area; the model was coded based on this controlled operation being part of the operation and maintenance of the element.

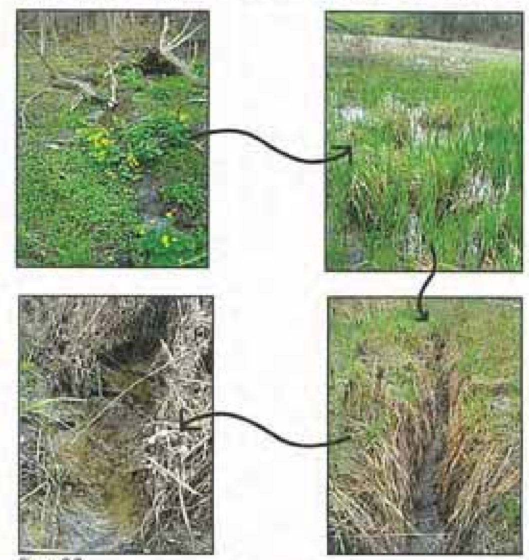
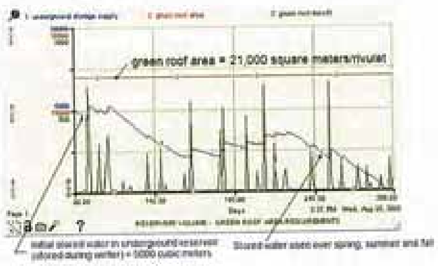


Figure 2-7
Reference seep, wetland, and rivulet

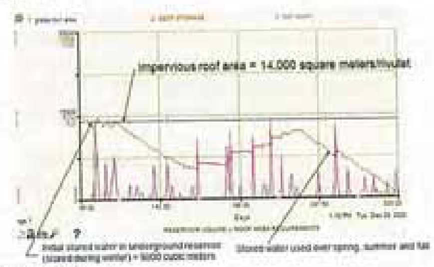
Results

Source Water – The model analysis was made by conservatively assuming that only precipitation runoff from the roof areas would be used as a water source for the high quality wetlands and rivulets. Thus, additional water supplies from either footing drain discharges or air conditioning compressor condensate was not included in this analysis. Matching precipitation supply with wetland and rivulet water demands for the typical design year condition (1991) showed that 21,000 square meters of green roof area (80% vegetated and 20 % impervious) or, alternatively, 14,000 square meters of impervious roof area should be planned to supply each high quality wetland and its associated discharge rivulet.

Figure 2-8
Modeled roof area, runoff, and storage



a) Green roof



a) Impervious roof

Underground Storage -- The water balance also showed that a 5000 cubic meter underground storage reservoir would be optimal to store winter snowmelt/precipitation from the roof areas to augment the spring/summer and fall runoff as water supply and to meter the irregular roof runoff flows to meet the seasonal relatively consistent wetland and rivulet water demands.

Wetland/Rivulet Locations -- The analysis showed that four high quality wetlands could be located within the Don River floodplain and be supplied with green roof stormwater runoff from the building roofs in their immediate vicinity. Each wetland would require a separate underground storage reservoir and could support one rivulet. The wetland and rivulet locations and characteristics are discussed in greater detail in Chapter 1 (River Restoration) of this document.

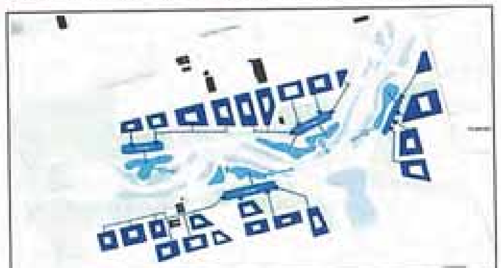


Figure 2-9 Concept Plan showing roof area nned to support wetland systems

The rivulet water demand of 0.001 cubic meters per second (cms) for 2 months in the spring and 2 months in the fall is equal to a demand of 86 cubic meters of green roof runoff volume per day. This water demand is considerably more than the high quality wetland water demand for wetlands as depicted in the conceptual plan. These wetlands of approximately 3000 square meter surface area would demand only 5 cubic meters of water daily during the driest period of the summer and would typically draw little if any water from the green roof runoff water source.

Figure 2-10
High quality wetland seasonal inflows and outflows

Conveyance and Wetland Seepage – A separate sewer element is proposed to convey roof runoff water from the roof supply buildings to the underground reservoir. This sewer element is planned to be conventional pipe. The wetland seepage outlet from the underground wetland is planned as a seepage face with a diffuser type reservoir outlet placed behind the designated seepage area to convey and distribute water from the underground reservoir to the seep. The seepage face is planned to incorporate rock and soil amendments to provide minerals and other constituents (see Chapter 1, River Restoration) as necessary for supporting the ecology of both the rivulet and wetlands.

Element Schematics

To assist in the visualization of the integration of high quality wetland and rivulet elements with a roof supply using underground water storage with an outlet seepage face, conceptual schematics were developed for the proposed system.

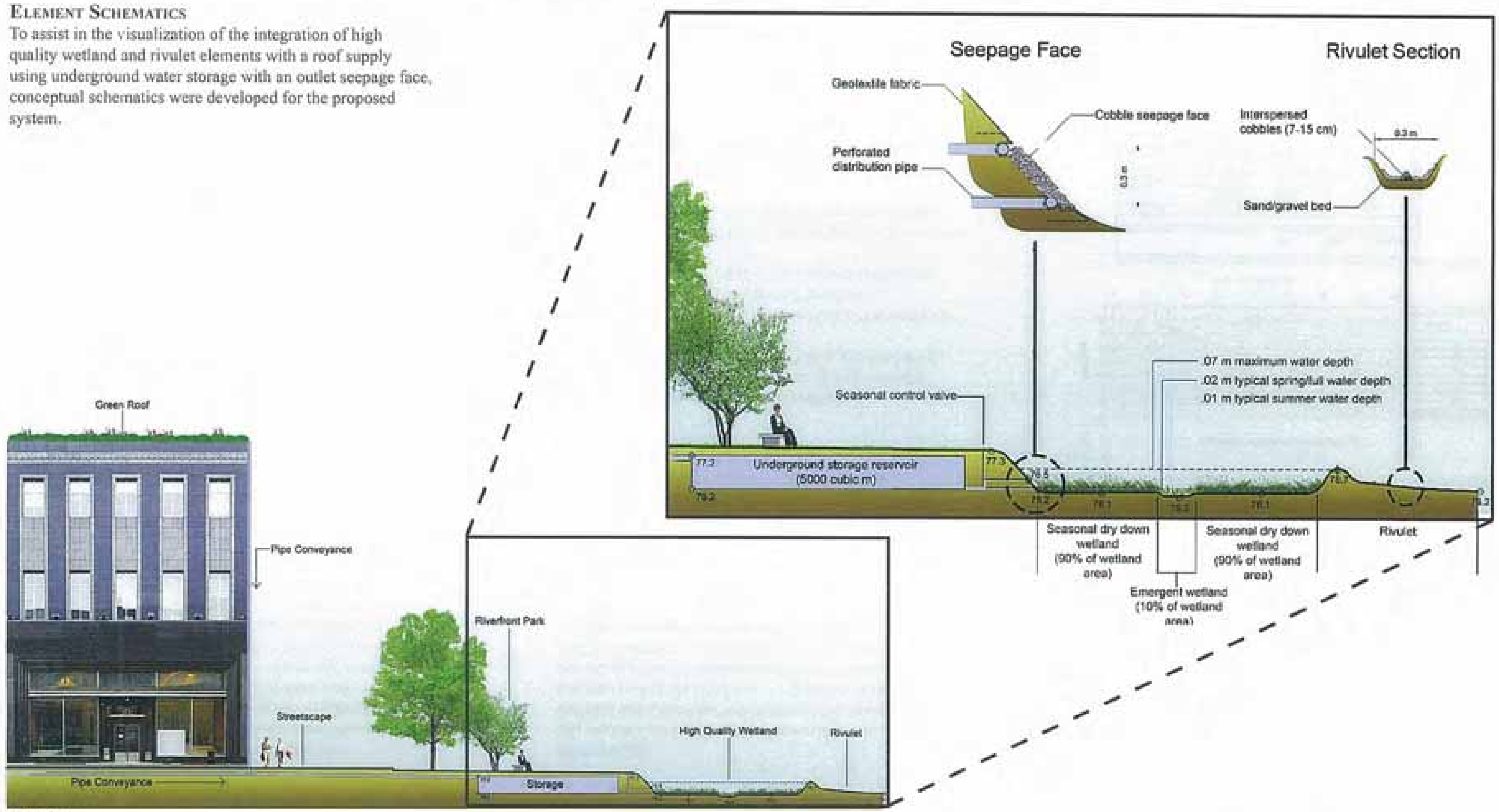


Figure 2-11
High quality wetland and rivulet

Stormwater Analysis for Street Tree Irrigation

This section describes the street tree characteristics proposed for the Lower Don River Redevelopment; irrigation water requirements for these street trees; irrigation water sources and quantities available from these sources; and temporary irrigation water storage requirements. The focus on use of roof runoff water for irrigating street trees is due to the proposed use of SilvaCellTM or similar tree rooting systems to provide sufficient tree rooting soil volume for larger and better quality trees in the streetscape. The substantial investment proposed for this tree soil cell system and the high costs of replacing unhealthy trees in the rooting system suggest that irrigation water low in salt should be used where feasible to maintain longevity of the soil to support healthy trees. A water supply which utilizes building roof runoff, which is relatively clean and unsalted, appears to be the optimal street tree irrigation source. However, limitations of water supply from the building roofs may require the use of runoff from the streetscape right of way for tree irrigation as well. Use of right of way stormwater runoff with little or no salt would be necessary to maintain the soil cell longevity.

The following sections present the relation between tree size and irrigation water requirements in Toronto and define the relation between tree size and the building roof area potential water supply for tree irrigation water. This relation is examined for both green roof and impervious roof types. Also presented is the relation between public street right of way area water supply potential and tree irrigation water requirements. The relationship is predicated on use of runoff water which contains minimal salt content, i.e. runoff that occurs after a significant spring rain event flush of salt from the street's stormwater management system and before the winter snow season begins.

Methodology

The analysis methodology consists of four interconnected analyses and a modeled interaction of the analyses. The analyses include establishing: 1) potential street tree species and their irrigation water requirements; 2) roof runoff potential for both green and impervious roof types; 3) temporary supply storage requirements to transform the water needs for streetscape trees with the more erratic roof runoff source water and 4) public right of way runoff potential for tree irrigation given the need to minimize the salt loadings into the tree soil cells from the deicing salts dissolved in the right of way runoff. These analyses were made using a continuous water balance simulation model with STELLATM as the model platform. The simulation was made using daily time steps over the April through October growing season.

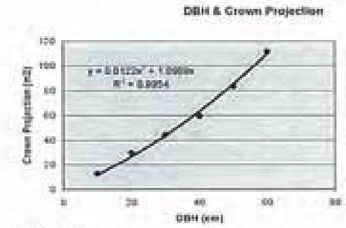
Toronto Streetscape Tree Requirements

Base data was set up for analysis using a spreadsheet process with several worksheets. These included sheets which provided:

1. Correlation of DBH (i.e. tree trunk "Diameter at Breast Height") to Crown Projection
2. Correlation of DBH to Tree Height (Deciduous Trees)
3. Correlation of DBH to Soil Volume Requirements
4. Toronto Native Trees Daily Evapotranspiration

For each of the correlations 1 through 3 above, a scatter diagram with a polynomial regression type trend line was created. These trend lines provided the equations which correlated varying mature tree sizes with evapotranspiration potential and soil volume requirements.

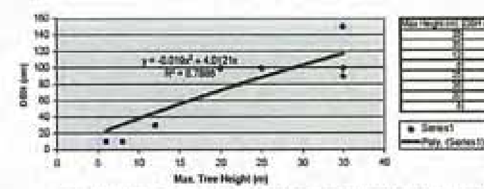
Tree Characteristics as a function of DBH -- The correlation of tree diameter at breast height (DBH) and crown projection is based on tabular data adapted from the Toronto Urban Forestry Streetscape Manual chart "Soil Volume for Trees". This is shown in Figure 2-12.



DBH (cm)	Crown Area (m2)
60	111.5
50	83.6
40	59.6
30	44.6
20	29.7
10	13

Figure 2-12

The correlation of DBH and tree height is based on data from "Tree Protection Notes Feb. 14, 2007: Oakville" (Haltonhelps.org and U. of Toronto). This relationship is shown in Figure 2-13.



(Below: Adapted From Tree Protection Notes Feb. 14, 2007: Oakville, Haltonhelps.org U. of Toronto)

Common Name	Scientific Name	Size Designation	Max. Height (m)	Max DBH (cm)
Sugar Maple	Acer saccharum	Large	[illegible]	[illegible]
White Ash	Fraxinus americana	Large	[illegible]	[illegible]
Hawthorn	Crataegus spp.	Small	[illegible]	[illegible]
Staghorn Sumac	Rhus typhina	Small	[illegible]	[illegible]
American Beech	Fagus grandifolia	Medium	[illegible]	[illegible]
Silver Maple	Acer saccharinum	Large	[illegible]	[illegible]
Norway Maple	Acer platanoides	Medium	[illegible]	[illegible]
European Buckthorn	Rhamnus cathartica	Small	[illegible]	[illegible]

Figure 2-13

The correlation of DBH and soil volume requirements is based on data from "James Urban: Growing the Urban Forest. City of Toronto, Tree Symposium: Healthy Trees for a Beautiful City". Tree size characteristics (including maximum tree height) and potential street tree species were obtained from the City of Toronto Urban Forestry Services Native Tree list.

The tree rooting soil volume, in cubic meters, is based on the formula:

Minimum Soil Volume = (DBH*0.6329) +(DBH^2*0.0014) (see Figure 2-14).

Evaporation vs Evapotranspiration -- Daily lake evaporation data was obtained from "Water Budget in Urbanizing Watersheds: Duffins Creek Watershed" prepared for Toronto and Region Conservation by Clarifica Inc. Water Resources Engineering and Science Consulting; Appendix J: "Fitted" Hamilton RGB AES Station lake evaporation data. Because the original data was "fitted", the daily evaporation rates shown are identical across the four years 1997-2000 (e.g. April 3, 1997 was the same number as April 3, 1998 and so on). The lake evaporation values were converted to pan evaporation based on the conversion factor recommended by Kohler (Kohler, M. A., T. J. Nordenson, and W. E. Fox, 1955. Evaporation from Pans and Lakes, U. S. Dept. Commerce, Weather Bureau Research Paper 38) which translates to: 1mm of lake evaporation = 1.4285714mm of pan evaporation. Additionally, pan evaporation data from 4 separate stations in the Toronto area was obtained from the Ontario Climate Centre. The data represents measurements spanning a number of years from the 1970's, 1980's and 1990's. Finally, based on Trowbridge & Bassuk, "Trees in the Urban Landscape", (John Wiley & Sons, Hoboken, NJ; published simultaneously in Canada), 2004, p.76, pan evaporation was converted to tree evapotranspiration as: 1m of pan evaporation = .20m of tree evapotranspiration.

Tree Evapotranspiration vs DBH -- Tree Evapotranspiration in Liters per Day was calculated using the formula derived from the referenced data as:

Daily Tree Evapotranspiration in liters/day = (daily average evapotranspiration rate in meters/day * tree leaf area in square meters)*1000 liters/cubic meter (See Table 2-3).

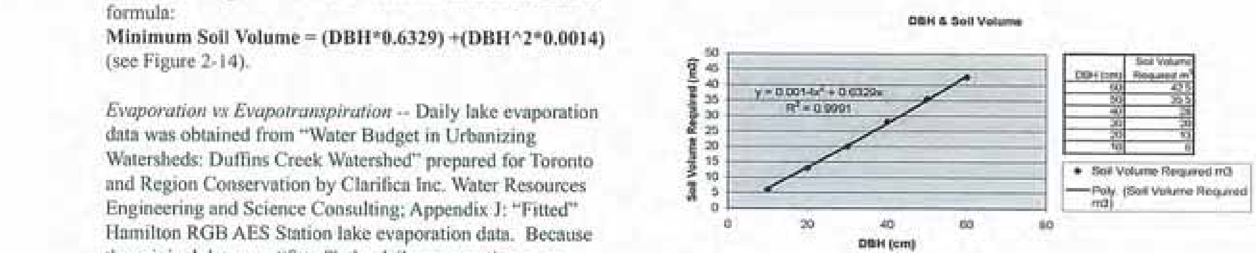


Figure 2-14

Tree data for Tree Soil Cell Design
Toronto Don Lands 07-0032

With ET in Liters per Day

Fitted Average Monthly Lake Evaporation, 1997-2000 (in mm) from Hamilton RGB AES station, Toronto, Ontario, Canada

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
mm	11.022	23.132	52.434	78.573	108.193	124.763	132.590	127.846	88.730	38.112	17.296	8.042
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
m	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
m	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Toronto Native Tree Common Name	Scientific Name	Toronto Urban Forestry Max. Height (m)	AES Size Designation	DBH Dia (cm)	Crown Projection (m2)	Leaf Area Index	Leaf Area (m2)	PE Liters per day	PE Liters per day	PE Liters per day	PE Liters per day	PE Liters per day	PE Liters per day	PE Liters per day	PE Liters per day	PE Liters per day	PE Liters per day	PE Liters per day	PE Liters per day
Red Maple	Acer rubrum	21	Large	88	191.8	4	767.4	78	182	371	571	765	912	938	763	502	270	126	57
Silver Maple	Acer saccharinum	35	Large	117	295.2	4	1180.8	120	279	571	878	1,178	1,403	1,443	1,174	773	415	194	88
Sugar Maple	Acer saccharum	35	Large	117	295.2	4	1180.8	120	279	571	878	1,178	1,403	1,443	1,174	773	415	194	88
Yellow Birch	Betula alleghaniensis	21	Large	88	191.8	4	767.4	78	182	371	571	765	912	938	763	502	270	126	57
White Birch	Betula papyrifera	21	Large	88	191.8	4	767.4	78	182	371	571	765	912	938	763	502	270	126	57
Hackberry	Celtis	11	Medium	[illegible]	[illegible]	4	[illegible]	40	94	190	[illegible]	392	471	484	[illegible]	259	139	65	[illegible]
Cockspur Hawthorn	Crataegus	11	Medium	40	74.1	4	296.4	30	71	144	[illegible]	296	[illegible]	365	[illegible]	196	105	49	[illegible]
White Ash	Fraxinus americana	30	Large	103	242.7	4	970.9	99	230	469	722	968	1,154	1,187	965	636	341	160	72
Green Ash	Fraxinus pennsylvanica	21	Large	88	191.8	4	767.4	78	182	371	571	765	912	938	763	502	270	126	57
Black Walnut	Juglans nigra	30	Large	103	242.7	4	970.9	99	230	469	722	968	1,154	1,187	965	636	341	160	72
Large-toothed Aspen	Populus grandidentata	21	Medium	73	143.6	4	574.6	59	136	278	427	573	683	702	571	376	202	95	43
Eastern Cottonwood	Populus deltoides	30	Large	103	242.7	4	970.9	99	230	469	722	968	1,154	1,187	965	636	341	160	72
Trembling Aspen	Populus tremuloides	21	Large	88	191.8	4	767.4	78	182	371	571	765	912	938	763	502	270	126	57
Black Cherry	Prunus serotina	22	Medium	79	162.5	4	650.1	66	154	314	483	648	772	794	646	425	228	107	48
White Oak	Quercus alba	35	Large	117	295.2	4	1180.8	120	279	571	878	1,178	1,403	1,443	1,174	773	415	194	88
Red Oak	Quercus rubra	25	Large	88	191.8	4	767.4	78	182	371	571	765	912	938	763	502	270	126	57
Basswood	Tilia americana	35	Large	117	295.2	4	1180.8	120	279	571	878	1,178	1,403	1,443	1,174	773	415	194	88

Table 2-3

All deciduous trees were assumed to have comparable evapotranspiration rates per unit of leaf area and the relation between DBH and leaf area was also assumed to be constant between the different deciduous tree species.

Salt Tolerance of Toronto Native Trees
A number of sources were used to determine the most appropriate tree species for use as urban street trees in areas subject to salt application. These trees are described in Chapter 2.

Irrigation Water Sources

Two water sources are proposed for streetscape tree irrigation:

1. Stormwater water runoff from green and impervious roof areas which is not subject to roadway deicing salt application and which is relatively uncontaminated
2. Treated stormwater runoff from public walks and streets which is subject to application of deicing salts during and after winter snow events.

High Quality Water Source
To reduce the salt input into the streetscape tree rooting media, only water which would not be subjected to roadway deicing salts during the winter is proposed to be used as source water for the higher quality longer life street trees. This water includes roof runoff from either impervious or green roofs within the development area and building footing drain discharges. The model was set up to utilize both water sources as source water although for the initial analysis only roof runoff was used for source water due to unknown footing drainage potential.

A daily time step was used in the analysis model, thus, a continuous daily rainfall history was used as model input for selected analysis years. The analysis included rainfall for the years 1991 through 1996 (these years provided high, typical and dry conditions). The rainfall was converted to runoff by assuming that all precipitation not retained on the roof would be runoff. The substrate voids were assumed to be first saturated with precipitation before runoff would occur during a storm event with the substrate depth being variable and initially set at 0.1 meters. The initial analysis assumed that green roofs would be 80 percent planted and 20 percent impervious and impervious roofs would be 100 percent impervious. The water losses from the green roof substrate were assumed to be evaporation or evapotranspiration using evaporation data for the Toronto area.

Because of the redevelopment area's proximity to Lake Ontario, footing drains may be required for many if not all buildings because of a high water table. This footing drainage would provide an excellent water source for street irrigation trees and should provide a dry weather water source. Presently, geotechnical analysis is being done to quantify potential footing drainage flows and if the footing drainage would contain any contaminants that would render it unsuitable for tree irrigation.

Treated Water Source
Runoff from the walks and streets within the public street rights-of-way, when not containing deicing salt, could provide an additional water source for streetscape irrigation. Initial conceptual designs indicate that the wintertime runoff, which is heavily salted, could be kept out of the tree soils. Additionally, water that passes through the biofiltration system could be used if the treatment media is flushed with initial springtime runoff to limit the amount of salt that would be transmitted to the streetscape tree soil media during the remainder of the year. Therefore, an analysis was made to quantify the adequacy of this post-flush runoff to support irrigation needs of streetscape trees by using only right of way runoff from April through the end of October as a treated water source.

The model was setup to quantify runoff water based on daily precipitation for Toronto again using daily precipitation records from 1991 through 1996.

The precipitation was transformed to runoff using the transformation equation published for the TR-55 model:

$$Q = \frac{(ROW)\left(P - 0.2 * \left(\frac{1000}{Cn} - 10\right)\right)^2}{P + 0.8 * \left(\frac{1000}{(Cn)} - 10\right)}$$

Where:
Q = street runoff per square meter of streetscape right-of-way in cubic meters per day
ROW = streetscape right-of-way area in square meters
P = daily precipitation in meters/day
Cn = composite curve number reflecting the degree of imperviousness of the ROW area

Temporary Water Storage Requirements

Temporary water storage will be required to balance the irregular precipitation event source high quality roof stormwater runoff with the more constant and regular tree irrigation requirements. Optimization of this temporary storage will minimize the roof area required to support each street tree's water needs. The voids within the tree soil cell matrix will function as one temporary water storage area. However, to limit the relatively expensive tree soil cell volume to closely match the tree rooting soil requirement, a separate online irrigation storage reservoir is proposed to hold surplus high quality roof runoff water needed for dry period water supply. This online storage reservoir would likely be incorporated as the sidewalk vaults or underground compartments between the tree island tree soil cells. The temporary storage available in the tree soil cell voids was adequate for utilization of runoff from the street and sidewalks within the rights-of-way.

Tree Sizes
Tree sizes used for the modeled analysis were ordered in increasing 10 cm increments of DBH beginning with 20 cm DBH and ending with 70 cm DBH.

Tree Soil Cell Size
The tree soil cell sizes required for various sized trees were developed through the modeling analysis. One model objective was to define the minimum size cell required for each tree, due to both the construction costs of the cells and the area requirements of the cells as a competitor for space in the limited sidewalk/green space area between the roads and buildings. The soil cells were assumed to have 30 percent void space in the soil matrix and this void space was assumed to be available for temporary tree water supply storage. The City of Toronto has defined minimum sizes for streetscape tree soil cells and these sizes were used as the base minimum in the analysis. The analysis found that all tree soil cells when a green roof was the runoff water source were larger than the Toronto minimum. Cell sizes based on irrigation criteria were approximately the same in the impervious roof option as the minimum sizes established by the City.

Irrigation Storage
Supplemental underground storage will be required to balance the irregular roof runoff flow with the tree's water needs varied according to the size of the tree soil cells. For the green roof supply, two options were evaluated: for Option 1, the supplemental storage volume was minimized with a resulting larger tree soil cell and green roof area requirement (Table 2-4); for Option 2, the supplemental storage volume was increased to decrease the tree soil cell and green roof area requirements for each street tree (Table 2-5). With Option 1, for tree soil cells less than or equal to 40 cubic meters, supplemental storage of 5 cubic meters was modeled and for tree soil cells greater than 40 cubic meters, supplemental storage of 10 cubic meters was used.

Green Roof Area Allocation for Street Tree Irrigation Supply
Option 1 – Limited Supplemental Underground Storage

Tree DBH	Tree Soil Cell Size Required	Roof Area per Tree	Supplemental Storage	For Typical Block with 5000 sq. meter roof area and 340 meter block perimeter	
(cm)	(m^3)	(m^2)	(m^3)	Trees/Block	Average Tree Spacing(m)
20	30	120	5	42	8.1
30	40	200	5	25	13.6
40	40	400	5	12	28.3
50	50	500	10	10	34.0
60	60	750	10	7	48.6
70	60	1250	10	4	70

Table 2-4

Green Roof Area Allocation for Street Tree Irrigation Supply
Option 2– Limited Tree Soil Cell Volume

Tree DBH	Tree Soil Cell Size Required	Roof Area per Tree	Supplemental Storage	For Typical Block with 5000 sq. meter roof area and 340 meter block perimeter	
(cm)	(m^3)	(m^2)	(m^3)	Trees/Block	Average Tree Spacing(m)
20	25	120	15	42	8.1
30	30	200	20	25	13.6
40	35	280	20	18	18.9
50	40	300	25	16	21.3
60	45	360	30	14	24.3
70	55	750	30	7	48.6

Table 2-5

Impervious Roof Area Allocation for Street Tree Irrigation Supply

Tree DBH	Tree Soil Cell Size Required	Roof Area per Tree	Supplemental Storage	For Typical Block with 5000 square meter roof area and 340 meter block perimeter	
(cm)	(m^3)	(m^2)	(m^3)	Trees/Block	Average Tree Spacing(m)
20	15	50	5	100	3.4
30	20	100	5	50	6.8
40	30	130	5	38	8.8
50	40	170	5	29	11.6
60	50	220	5	23	15.0
70	60	300	5	17	20.4

Table 2-6

Supplemental underground storage of 5 cubic meters was used for all soil cell sizes with the impervious roof source supply option (Table 2-6).

Roof Source Water Supply
Green Roof-- The modeling using the green roof as the irrigation water source was done assuming the following roof parameters.

- Roof substrate depth = 0.1 m
- Impervious roof fraction = 0.2 m
- Planted area roof evaporation consistent with Toronto planted areas; no evaporation from impervious roof areas.

The green roof area requirements per tree together with the average tree spacing and trees per block perimeter (trees along one side of the street around a bounded block perimeter) are tabulated in Tables 2-4 and 2-5 for the two underground irrigation storage options discussed previously.

Impervious Roof-- Impervious roof modeling was done assuming a 100 percent impervious roof with no roof evaporation prior to runoff. The impervious roof area requirements per tree together with the average tree spacing and trees per block perimeter (trees along one side of the street around a bounded block perimeter) are tabulated in Table 2-6.

Building Footing Drainage -- The initial modeling included no irrigation water from footing drainage. If this irrigation source is deemed feasible as additional groundwater analysis is completed in the geotechnical analysis, this water source will be included in the model and will likely decrease the roof area and tree soil cell size requirements.

Public Right-Of-Way Source Water Supply

The runoff from the public right-of-way was modeled using a CN of 96 reflecting an estimated 10 percent right-of-way area as pervious and 90 percent impervious. The right-of-way area and soil cell volumes required to support street trees (Table 2-7) was calculated for various tree sizes for the driest year of the years included in the precipitation history. No water was assumed to be present in the tree soil cells at the beginning of spring and street runoff from rain events occurring during the period between April 1 and the end of October was included as tree irrigation supply assuming that the March runoff would be used to flush the salt from the streets' stormwater biofiltration elements. Also no balance storage reservoir was used (vs the 5 to 10 cubic meter storage used in the roof area analysis) for temporary storage of road runoff. Not using this temporary storage element resulted in greatly increased right of way areas required to provide source water. If this temporary storage was included in the analysis, the right of way areas required to support a streetscape tree would approximate the impervious roof condition.

Tree Irrigation Schematics

To assist in the visualization of the proposed streetscape tree irrigation elements, schematic diagrams (Figures 2-15 and 2-16) were developed for both a system using roof runoff as the street tree irrigation source and a system using public right of way runoff as the street tree irrigation source. For the roof irrigation source, the required elements include:

- Building roof which receives the precipitation and converts the precipitation to runoff.
- Small water reservoir to balance the runoff with the tree cell water holding capacity.
- Tree soil cell built with a structural grid to provide the soil volume needed to sustain tree growth to a desired size and also provide water holding capacity necessary to supply the tree.
- Conveyance between the roof and the small water reservoir and between the reservoir and the tree soil cell

Table 2-7
Public right-of-way area allocation for street tree irrigation supply

Tree DBH (cm)	Soil Cell Size Required (m^3)	ROW Area per Tree (m^2)	Tree Spacing for Various ROW Widths: 20 m ROW	25 m ROW	30 m ROW	35 m ROW
20	15	330	33	26	22	19
30	25	540	54	43	36	31
40	30	780	78	62	52	45
50	40	1050	105	84	70	60
60	45	1350	135	108	90	77
70	55	1700	170	136	113	97

Note: Each tree uses the runoff from ½ the ROW width for supply assuming trees are on both sides of the street

The schematic developed for this option (Figure 2-15) shows the relation between these elements in the streetscape with representative element sizes.

Roof Irrigation Source Elements Schematic

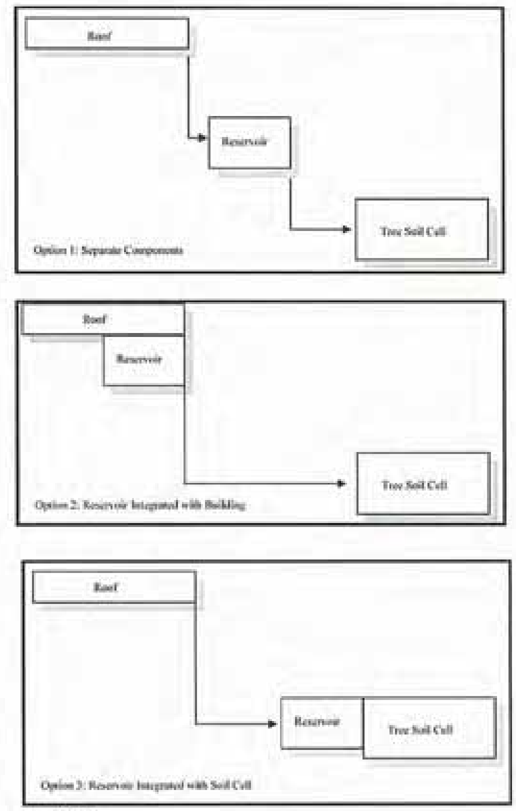


Figure 2-15

For the public right of way irrigation source, the required elements include:

- Public right of way including streets, walks and other streetscape elements which receive precipitation and convert precipitation to runoff.
- Large sediment and debris separator which captures the larger sediment and debris particles prior to runoff release to either the biofilter element or the tree soil cell.
- Valve or other mechanism to prevent salt laden winter runoff from discharging to the tree soil cell.
- Tree soil cell built with a structural grid to provide the soil volume needed to sustain tree growth to a desired size and also provide water holding capacity necessary to supply the tree.
- Conveyance between the sediment/debris separator and the tree soil cell.

The schematic developed for this option (Figure 2-16) shows the relation between these elements in the streetscape with representative element sizes.

Public Right of Way Source Elements Schematic

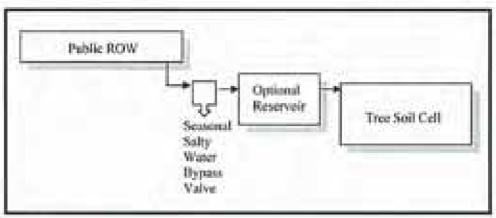


Figure 2-16

Stormwater Analysis For Treatment And Conveyance Of Non-Roof Runoff

The non-roof runoff is proposed to be treated using a filtration system previously described. The following sections describe the conceptual analysis that was conducted to determine appropriate sizing for the filtration planters and subsurface drains throughout the urban block pattern. Analyses were conducted to demonstrate that the street systems could both treat the more frequent rainfall events through filtration and convey the larger storms. The block plan and grading plan continue to evolve; therefore, several conservative assumptions were made in the analysis.

The hydrologic analysis was done using PondPack v10, a hydrologic model which incorporates SCS TR-55 methodology. The water quality analysis was conducted using the P8 Urban Catchment Model water quality model to ensure that the proposed stormwater management system will achieve the desired water quality and filtration goals. These models provide sufficient information for planning stormwater facilities. More detailed models will be developed during the design process.

For design storms, the Intensity-Duration-Frequency curves in the WWF guidelines were used to synthesize 24 hour storm magnitudes and intensity distributions. The distributions produced reflect very intense storms, very similar to the NRCS Type II distribution (see Figure 2-17). Because the synthesized distributions were nearly identical to the Type II distribution, the Type II distribution was utilized at this stage in the planning. Rainfall data received from Toronto and Region Conservation Authority for 1990 – 1998 was utilized for the continuous simulations for water quality. Temperature data was acquired from Environment Canada's National Climate Data and Information Archive and reformatted for use in the model for this same period.

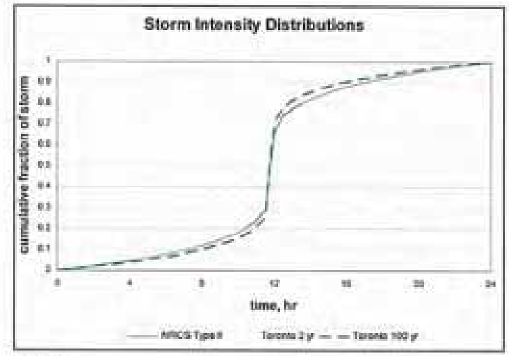


Figure 2-17
Storm Intensity Distributions Generated from the WWF IDF Curves Compared to the NRCS Type II Distribution

Water Quality

The P-8 Urban Catchment Model was used to determine the filtration basin size necessary to achieve the 80% long term average TSS removal. Because only 8 years of data was available, the current sizing is conservatively based on 80% TSS removal for the 2 yr, 24 hr storm. The model was also run with actual Toronto temperature and precipitation data for several time periods to confirm that use of the 2 yr storm is sufficiently conservative for the planning stage. A one block watershed was examined to determine the filtration area needed per block. The area of the representative block was estimated to be 8100 m2. Because the most critical rain events for water quality considerations are relatively small, it was assumed that 100% of the roof runoff for such storms is captured and routed to seepage wetlands or captured for other beneficial reuse, such as street tree irrigation. Based on the conceptual estimates of roof area and right of way area, it was assumed that 50% of the block area drains to the street system. Therefore, a 4050 m2 watershed was modeled. This area was assumed to be 90% impervious.

Figure 2-18

The runoff pollutant concentrations were assumed to be consistent with USEPA's National Urban Runoff Program (NURP) 50% characteristics.

The only treatment element modeled was a filtration bed. This treatment element would have some capacity to store water but engineered soil filtration media consisting of sand, compost, and topsoil would be utilized to ensure that water would quickly pass into the soils and be collected in an underdrain. The assumed average ponding depth was 15 cm and the infiltration rate through the soil medium was 5.1 cm/hr. This is a conservative infiltration rate for an engineered soil; to reflect some loss in hydraulic conductivity over time due to entrainment of small particles that may clog some pores.

The filtration planters could be designed as attractive landscaping elements located along a median of a road, along the side of the road and/or within courtyard areas, similar to those shown in Figures 2-18 through 2-22.

Figure 2-19

According to the P8 model, in order to achieve an 80% TSS removal for the 4.4 cm, 24 hour storm, an area of 146 m2, and a storage volume of almost 22 m3 is necessary. Providing this amount of storage also ensures that the first 5 mm of rain is captured by the system. 5 mm over the 8100 m2 watershed produces a runoff volume of 40.5 m3; above ground storage alone would account for 21.8 m3, and if the soil media has at least 35% voids and is 60 cm deep, the filtration bed void space would account for 30.7 m3. Therefore, the filtration elements should easily capture the first 5 mm of rainfall runoff for the entire 8100 m2 block. Given that a portion of the block will likely produce roof water that will be collected for beneficial reuse, less than 40.5 m3 will most likely be needed in the filtration element to capture the first 5 mm of rain.

It is likely that the width of this element will range from 1 m to 1.5 m. Table 2-8 shows the length, and percent of the length of block (assuming 90 m square block) of such an element that would meet this requirement:

Width, m	Length	% of block length
1	146	41%
1.22	120	33%
1.5	97	27%

Table 2-8
Length of filtration bed necessary for given width

This is based on the assumption that all street level runoff is directed into the infiltration element, and that all roof runoff is captured for beneficial reuse. If roof runoff is directed to the filtration element instead, it would use much of the storage volume, and the area needed to treat the total runoff volume would be approximately double.

Performance during the 4.4 cm storm may not be reflective of the performance for all storms over a period of time. Therefore, several years of actual precipitation data was modeled to determine the estimated treatment efficiency. They are shown in Table 2-9.

	% TSS removal
1991 (typical year)	95%
1994 (dry year)	97%
1996 (wet year)	97%
1990 – 1998	96%

Table 2-9
Modeled TSS removal

The results shown indicate that a design based on 80% removal of TSS during the 2 yr, 24 hr storm is probably conservative for meeting the guideline of 80% removal of TSS based on long term average. However, because long term rainfall data has not been available, reserving the suggested area for filtration is warranted at this time.

Water Quantity

To determine minimum sizing for conveyance structures, a hydrologic analysis was conducted for 2 year and 100 year storms of 1 hr, 3 hr, 6 hr, 12 hr, and 24 hr durations to determine the flow rates during the critical storms. The return frequencies of 2 and 100 yr were chosen because there are specific prescriptions in the WWF for conveyance of these flows. During the 2 year storm, water may not flow across intersections, and therefore must be conveyed in the subsurface system. Larger storm events may be conveyed partially in the streets. The following assumptions were incorporated into the analysis:

- It was assumed that the roof capture systems that feed seepage wetlands and other beneficial reuse systems are not sized for large events. Further, some blocks may not be designed to capture roof water. Therefore, all roof runoff associated with larger events was also assumed to be conveyed with the street runoff.
- It was assumed that the composite runoff curve number will be approximately 95 for the entire block, including impervious and pervious areas.
- The block was assumed to be 90 m by 90 m from center of intersection to center of intersection, which would include the half of the street right of way that drains toward the given block. The 8100 m2 block was assumed to drain to each of the four perimeter streets equally.
- The filtration beds were incorporated into the water quantity model consistent with the sizing determined through the water quality analysis described in the previous section and distributed evenly around the block. Therefore, each street was assumed to have 36 m2 of filtration bed with available ponding depth of 15 cm and an overflow stand pipe riser at 15 cm. All filtered water was assumed to be collected in the subsurface drain.
- The 100 year and 2 year storm magnitudes of various durations were estimated based on the IDF curve information in the WWF guidelines, and are summarized below, Table 2-10. Each storm was analyzed to assure that conveyance elements would convey the flows of each storm.

	1 hour	3 hour	6 hour	12 hour	24 hour
2 yr, 24 hr	2.2 cm	2.8 cm	3.2 cm	3.8 cm	4.4 cm
100 yr, 24 hr	6.0 cm	7.4 cm	8.5 cm	9.8 cm	11.3 cm

Table 2-10

- The storm was assumed to be distributed as a NRCS Type II distribution. This is conservative because the Type II distribution has very high intensity during the middle of the storm.

Figure 2-20

Figure 2-21

Figure 2-22

The conceptual block plan was used to estimate the dimensions of a relatively large block within the plan. A conceptual network of street segments around such a block is shown in Figure 2-23. This diagram also shows the largest 2 yr and 100 yr flows, which are produced by the 12 hour and 3 hour duration storms, respectively. This does not directly reflect a particular section in the plan, but it gives an idea of the quantity of flow that will be produced at junctions with varying numbers of streets draining to them.

The flow estimated in each conveyance element is shown above. If the minor storms (2 yr or less) are conveyed in the subsurface underdrain with slopes of 0.5% and Manning's roughness of 0.013, the diameter of the underdrain would need to be at least 21 cm for pipes draining only one street and 35 cm for pipes draining the entire block.

If it is conservatively assumed that the flow rates are multiples of the flow rate leaving a single block as water accumulates downstream (i.e., 0.21 cms in pipes draining 2 blocks and 0.31 cms in pipes draining 3 blocks), it is estimated that a pipe with diameter at least 46 cm would be needed to convey flows from two full blocks and 53 cm for 3 full blocks. The major storm conveyance in streets will be analyzed during the next stage of design to assure that none of the streets would experience water elevations or flow velocities in excess of the criteria outlined in the WWF Guidelines.

If roads are steeper than 0.5%, smaller conveyance elements, such as smaller pipe diameter or shallower flow in the streets, will be adequate. This will be examined further when better estimates of grades are available.

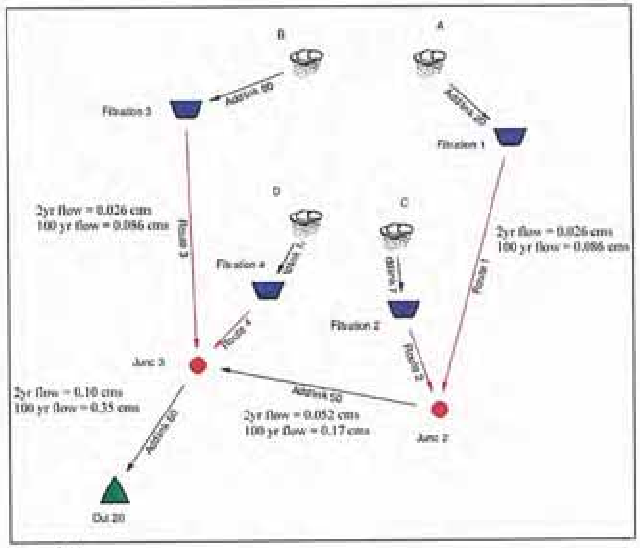


Figure 2-23
Representative street stormwater conveyance with 2 yr, 12 hr and 100 yr, 3 hr storm flows


Figure 2-24


Figure 2-25


Figure 2-26


Figure 2-27

PHASING, TIMELINES AND IMPLEMENTATION

The phasing of the stormwater treatment and reuse elements is dependent on the major construction activities required of the project. These major construction activities emphasize different work elements during five phases including: mass grading, Don River relocation and floodplain construction, initial infrastructure required to support building construction, building construction and secondary infrastructure which includes sidewalks and streetscape elements. Table 2-11 shows the stormwater treatment and reuse elements construction in terms of the major construction activities. Operation of the elements could occur after the final piece of each element was constructed.

Construction Emphasis / Stormwater Element	River Relocation	Initial Infrastructure (Streets & Utilities)	Buildings	Secondary Infrastructure (Sidewalks & Streetscape)
High Quality Wetlands/Rivulets	1) Wetland Grading	1) Conveyance Piping 2) Underground Storage Reservoir 3) Seepage Face	1) Roof Water Source	1) Wetland Topsoil 2) Wetland Planting 3) Rivulets
Street Trees/Soil Cells		1) Conveyance Piping	1) Roof Water Source 2) Water Balance Reservoir	1) Soil Cells 2) Trees
Stormwater Treatment/Reuse System		1) Conveyance Piping		1) Biofilters

Table 2-11

MARKETING

The stormwater treatment and reuse system will achieve innovative reuse of high quality stormwater runoff as part of the project's objective of viewing stormwater runoff as a resource and not a disposable waste product. The comprehensive marketing plan for the project which will include the elements using stormwater runoff is covered in detail in other sections, but generally the marketing targets include the localized Toronto entities such as the redevelopment site developers, the general public, other developers in Toronto who could use similar systems in their developments and potential site users who would purchase or lease a site in the development area. However, the marketing targets could also include the general development industry, environmental groups, professional technical organizations, such as the Canadian Society for Civil Engineers, and municipalities that would also benefit from adding these elements into stormwater management systems.

SUSTAINABLE FUNDING

Sustainable funding for the stormwater reuse and treatment elements would be required for construction, maintenance and operation of the elements and desirably monitoring of the elements functionality. Funding is discussed in detail as a separate section of this document for both the public elements and private elements associated with the stormwater management system.

OPERATIONS AND MAINTENANCE

The possible organizations which could be responsible for operating, maintaining and monitoring the stormwater reuse and treatment elements include public governmental organizations, The City of Toronto (City) and the Toronto and Region Conservation Authority (TRCA), and private entities, building and property owners.

Stormwater Reuse Elements

High Quality Wetlands/Rivulets-- Anticipated operational activities associated with the high quality wetlands and rivulets include management of water flowage into the wetland/rivulets from the underground storage reservoir. This operation would require resetting the valve regulating the water flow rates into the wetland at the beginning of April, the end of May, the beginning of September and the end of October to discharge the required water to the rivulet through the wetland. Either the City or TRCA could perform this operation. Operation of roof source water controls is expected to be minimal, but would be done by building owners with guidance by TRCA.

Maintenance of the elements associated with the high quality wetlands and rivulets would include trash removal, plant replacement and periodic mowing/burning of the wetland and rivulet vegetation. This work could be done by TRCA with assistance from local volunteer groups. A detailed discussion of the maintenance requirements for the vegetated elements is found in Chapter 3 (Plant Communities) of this document.

Maintenance of the underground storage reservoir and the conveyance pipes between the buildings and the reservoir and the reservoir and the wetlands may require occasional flushing of sediment to maintain the conveyance and storage capacity of these elements. The City would likely be best suited to perform this maintenance. Building roof drainage maintenance would be the responsibility of the building owner.

Replacement of the elements should be expected at the end of each element's design life. The design life of the conveyance pipe should be between 50 and 100 years depending on its difficulty of replacement while the underground storage could be less since it will be built in open parkland areas. During the design process, a life cycle analysis is recommended to define the optimal element service life as a function of initial and replacement costs. The wetlands and rivulets will likely require replacement or repair after major flood events if destroyed by sediment deposition.

Monitoring of the vegetation in the high quality wetlands and seasonal monitoring of rare species in the rivulets is recommended. TRCA would be a logical choice to be responsible for this work, possibly with assistance from volunteer organizations. Additionally, a stage level gage in the underground storage reservoir should be monitored on a monthly basis to ensure that adequate water supply required for the wetlands and rivulets is present. Building inspection of the roof systems should also be done annually to ensure the water source supply is operational.

Street Trees/Soil Cells-- Operations associated with street trees and soil cells are anticipated to be minimal for trees irrigated with roof runoff unless the street tree sizes or spacing exceeds the recommendations of this document; then, supplemental irrigation of the street trees may be required during extended dry periods. This operation, if required, would be the responsibility of the City.

The design life of the soil cells should be equal to or exceed the design life of the tree planted in the cell. This design life, depending on proximity or conflict with underground utilities should be a minimum of 30 years to 50 years. Maintenance would include normal tree maintenance activity such as leaf removal, trash removal and fertilization and would be done by the City. If sodic stresses appear in the trees, especially trees irrigated with storm runoff from the street right of way, remedial maintenance to lower the sodium content in the soil cell such as flushing the soils with gypsum may be necessary.

Monitoring activity should be minimal, performed by the City and could include periodic assessment of tree condition and dry period monitoring of soil cell water content. If tree conditions indicate sodic stress, monitoring of the soil cell sodium content may be necessary (with remediation measures implemented if necessary).

Stormwater Reuse/Treatment System--No operational activities are anticipated for the stormwater reuse/treatment system elements.

Routine maintenance activities anticipated will include the typical trash removal from the surface vegetated biofilters, removal of trash and large sediment from the debris collection basins and periodic trimming and replacement of dead/damaged vegetative elements. Replacement of biofilter soil and vegetation at the end of its design life will be necessary as the major maintenance activity. The maintenance is anticipated to be done by the City. If sodic stresses appear in the biofilter vegetation, remedial maintenance to lower the sodium content in the biofilter soil such as flushing the soils with gypsum may be necessary.

Anticipated monitoring includes periodic assessment of biofilter vegetation condition and monitoring of the biofilter soil sodium content. Additionally, monitoring of the inflow and outflow levels of targeted pollutants would be desirable to verify the functionality of the biofilter system. This monitoring would be under the charge of the City.

Appendix 11-A1

Evaluation of Roadway Alternative Design Concepts

WATERFRONToronto

TORONTO

Toronto Transit Commission

QQ Sections - Not required for Phase 3 because no alternatives.

Evaluation of Alternative Vertical Profiles: Queens Quay
Advantages and Disadvantages

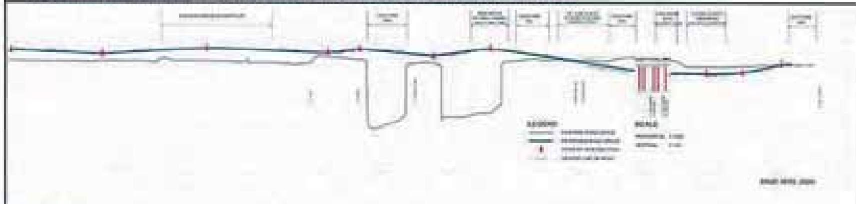
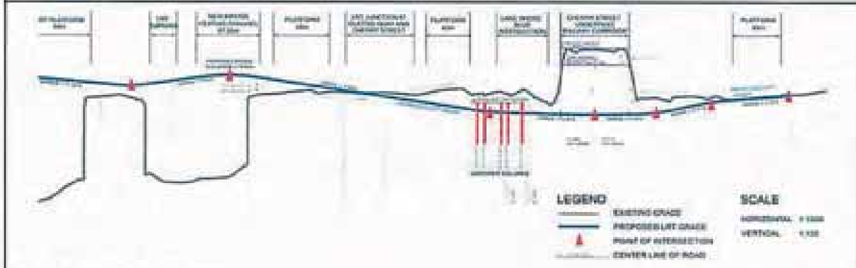
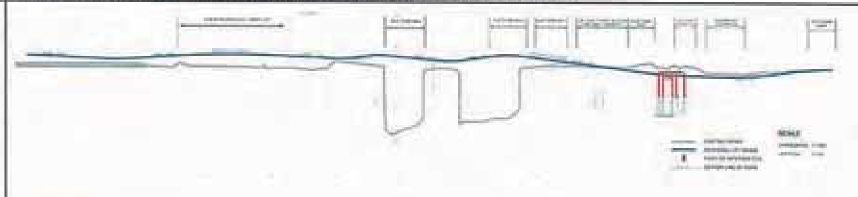
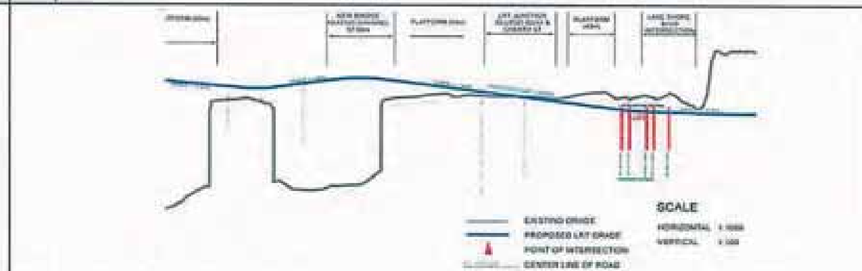
Evaluation Criteria	Alternative Profile 1 - Road and LRT - Profile maintains "saw tooth" alignment for drainage purposes	Alternative Profile 2 - Road and LRT - Profile matches existing surface as much as possible
	 Road profile	Road profile to match LRT profile. Road profile
	 Light Rail Transit (LRT) profile	 Light Rail Transit (LRT) profile
Natural Environment		
Don Mouth naturalization	No difference	No difference
New natural area	No difference	No difference
Air quality impacts	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	**Preferred**
Social Environment		
Vibrant, mixed use community	No difference	No difference
Access to water	No difference	No difference
Noise	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	**Preferred**
Economic Environment		
Economic viable blocks	No difference	No difference
Cost-effective to build	No difference	No difference
Disruption to business	No difference	No difference
	Preferred	**Preferred**

Evaluation of Alternative Vertical Profiles: Queens Quay
Advantages and Disadvantages

Cultural Environment		
Aboriginal people	No difference	No difference
Heritage structures	+ Profile matches existing surface at Victory-Soya Mills Historic Structure (CH0+500) so minimizes impact	- Profile is in fill at Victory-Soya Mills Historic Structure (CH0+500) so may impact heritage structure
Archaeology	No difference	No difference
	Preferred	
Sustainability		
WT Sustainability Framework & City Sustainability Standards	No difference	No difference
Impervious surfaces	No difference	No difference
	Preferred	**Preferred**
Land Use and Property		
New land uses and redevelopment	+ Profile maintains "saw tooth" vertical alignment along Queens Quay to meet preferred drainage and water shed goals along this corridor	- Profile does not maintain vertical alignment along Queens Quay to meet preferred drainage and water shed goals along this corridor
Public realm goals	+ "Saw tooth" vertical profile along Queens Quay improves the public realm by allowing an otherwsie flat surface to drain adequately	- The land adjacent to Queens Quay may be more prone to flooding because the vertical profile does not meet watershed and drainage goals
Property	No difference	No difference
Contaminated soils	- Profile is mainly in cut so more potential for soils to be in contamination	+ Profile has balance of cut and fill so less potential to be impacted by contaminated soils
	Preferred	
Transportation		
Walkability and promotes active transportation	No difference	No difference
Transit priority	No difference	No difference
Shift towards non-auto	No difference	No difference
Parking	No difference	No difference
Traffic operations	No difference	No difference
Rail	No difference	No difference
	Preferred	**Preferred**
Municipal Services		
Utilities	No difference	No difference
	Preferred	**Preferred**
SUMMARY	**Preferred**	

Cherry Street Sections - Not required for Phase 3 because no alternatives.

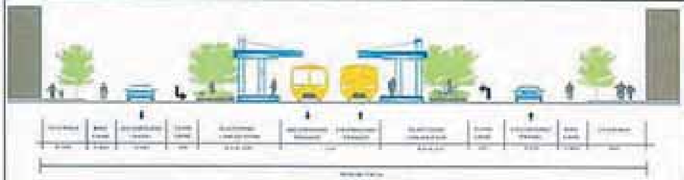
Evaluation of Alternative Vertical Profiles: Cherry Street
Advantages and Disadvantages

Evaluation Criteria	Alternative Profile 1 - Road and LRT - 1.65m structural depth for rail bridge at Cherry St  Road profile  Light Rail Transit (LRT) profile	Alternative Profile 2 - Road and LRT - 1.15m structural depth for rail bridge at Cherry St  Road profile  Light Rail Transit (LRT) profile
Natural Environment		
Don Mouth naturalization	- Profile is below the High Lake Level at railway underpass	- Profile is approximately at the High Lake Level at railway underpass but does not provide the 0.5m freeboard
New natural area	No difference	No difference
Air quality impacts	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	Preferred
Social Environment		
Vibrant, mixed use community	No difference	No difference
Access to water	No difference	No difference
Noise	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	Preferred
Economic Environment		
Economic viable blocks	No difference	No difference
Cost-effective to build	+ 1.65m structural depth of Cherry St underpass less expensive to construct - Lower road profile results in more of the Gardiner footings being exposed, but the number of exposed footings is the same - Cut at Cherry Street will impact Combined Sewer Overflow (CSO) - Larger pumps needed for areas where road profile falls below high water level	- 1.15m structural depth of Cherry St underpass more expensive to construct - Higher road profile results in less of the Gardiner footings being exposed, but the number of exposed footings is the same - Cut at Cherry Street will impact Combined Sewer Overflow (CSO)

Evaluation of Alternative Vertical Profiles: Cherry Street
Advantages and Disadvantages

Disruption to business	+ The 1.65m structural depath will mean that precast concrete planks can be used. These are easy to install and will permit the continuous operation of rail line by phasing the construction appropriately	- A 1.15m construction depth requires a structure whose installation, and configuration will interfer with the operation of the rail line during the phasing of construction
	Preferred	
Cultural Environment		
Aboriginal people	No difference	No difference
Heritage structures	- No difference - both profile alignments require the heritage switch tower to be relocated.	- No difference - both profile alignments require the heritage switch tower to be relocated.
Archaeology	No difference	No difference
	Preferred	**Preferred**
Sustainability		
WT Sustainability Framework & City Sustainability Standards	No difference	No difference
Impervious surfaces	No difference	No difference
	Preferred	**Preferred**
Land Use and Property		
New land uses and redevelopment	No difference	No difference
Public realm goals	No difference	No difference
Property	No difference	No difference
Contaminated soils	No difference	No difference
	Preferred	**Preferred**
Transportation		
Walkability and promotes active transportation	No difference	No difference
Transit priority	No difference	No difference
Shift towards non-auto	No difference	No difference
Parking	No difference	No difference
Traffic operations	No difference	No difference
Rail	+ The 1.65m structural depth requires no work on top of rail berm at Cherry Street. This meets the requirements of both GO and CN.	- The 1.15m structural depth requires work on top of rail berm at Cherry Street. This does not meet the requirements of either GO or CN.
	Preferred	
Municipal Services		
Utilities	No difference	No difference
	Preferred	**Preferred**
SUMMARY	**Preferred**	

Evaluation of Alternative Street Layouts: Villers Street
Advantages and Disadvantages

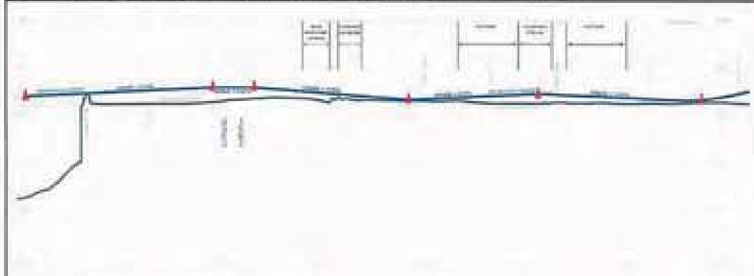
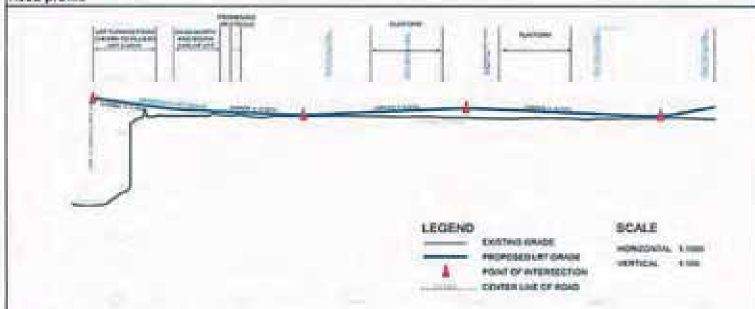
Evaluation Criteria	Alternative Section 1 - LRT on north side of Villiers Street	Alternative Section 2 - LRT in centre median on Villiers Street	Alternative Section 3 - LRT on south side of Villiers Street
			
Natural Environment			
Don Mouth naturalization	No difference	No difference	No difference
New natural area	No difference	No difference	No difference
Air quality impacts	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	**Preferred**	**Preferred**
Social Environment			
Vibrant, mixed use community	No difference	No difference	No difference
Access to water	+ LRT alignment closest to Keating Channel providing direct access	- LRT alignment further from Keating Channel providing less direct access	- LRT alignment furthest from Keating Channel providing least direct access
Noise	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred		
Economic Environment			
Economic viable blocks	No difference	No difference	No difference
Cost-effective to build	No difference	No difference	No difference
Disruption to business	+ Less disruptive to business because maintains east-west road connection to existing businesses.	- More disruptive to business because east-west street conenction is split by centre-running LRT	- Most disruptive to business because east-west street does not directly front the business south of Villiers.
	Preferred		
Cultural Environment			
Aboriginal people	No difference	No difference	No difference
Heritage structures	+ Smaller section has less impact on the Historic Essroc silos	- Wider section has more impact on the Historic Essroc silos	+ Smaller section has less impact on the Historic Essroc silos
Archaeology	No difference	No difference	No difference
	Preferred		**Preferred**
Sustainability			
WT Sustainability Framework & City Sustainability Standards	No difference	No difference	No difference
Impervious surfaces	No difference	No difference	No difference
	Preferred	**Preferred**	**Preferred**

Evaluation of Alternative Street Layouts: Villers Street

Advantages and Disadvantages

Land Use and Property			
New land uses and redevelopment	No difference	No difference	No difference
Public realm goals	+ Public realm is maximised by consolidated linear park area	- Linear park is separated into small narrower sections	+ Public realm is maximised by consolidated linear park area
Property	No difference	No difference	No difference
Contaminated soils	No difference	No difference	No difference
	Preferred		**Preferred**
Transportation			
Walkability and promotes active transportation	+ Best location for transit access to Keating Channel and area north of Keating Channel	- Central LRT is most indirect for pedestrians to access	+ Best location for transit access to development blocks south of Villiers
Transit priority	+ Best for transit priority because not interrupted by crossings of north-south streets	- Central LRT requires crossing of north south streets	- South side LRT requires crossing of north south streets
Shift towards non-auto	No difference	No difference	No difference
Parking	No difference	No difference	No difference
Traffic operations	+ Best location for LRT alignment to have least impact on traffic operations	- The location of the LRT alignment impacts traffic operations at Cherry St intersection	- The location of the LRT alignment impacts traffic operations at Cherry St intersection
Rail	No difference	No difference	No difference
	Preferred		
Municipal Services			
Utilities	No difference	No difference	No difference
	Preferred	**Preferred**	**Preferred**
SUMMARY	**Preferred**		

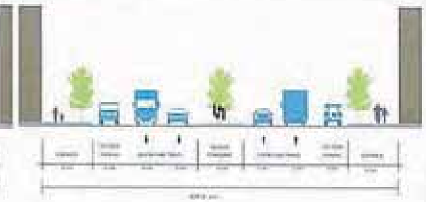
Evaluation of Alternative Vertical Profiles: Villiers Street
Advantages and Disadvantages

Evaluation Criteria	Alternative Profile 1 - Road and LRT - Vertical profile is elevated to be above various flood levels	Alternative Profile 2 - Road and LRT - Vertical profile tries to match existing ground as much as possible to minimize need for fill
	 Road profile	 Road profile
	 Light Rail Transit (LRT) profile	 Light Rail Transit (LRT) profile
Natural Environment		
Don Mouth naturalization	+ Profile meets or exceeds flood level requirements	- Profile does not match elevation of Munition Street to meet flood levels at Munition Street bridge
New natural area	No difference	No difference
Air quality impacts	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	
Social Environment		
Vibrant, mixed use community	No difference	No difference
Access to water	+ The corresponding LRT and road profiles with the grading of the adjacent public realm along the promenade allows for effective pedestrian links to waterfront.	- The corresponding LRT and road profiles with the grading of the adjacent public realm along the promenade do not allow for as effective pedestrian links to waterfront.
Noise	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	

Evaluation of Alternative Vertical Profiles: Villiers Street
Advantages and Disadvantages

Economic Environment		
Economic viable blocks	No difference	No difference
Cost-effective to build	No difference	No difference
Disruption to business	No difference	No difference
	Preferred	**Preferred**
Cultural Environment		
Aboriginal people	No difference	No difference
Heritage structures	- No difference - both profile vertical alignments impact the Essroc Silos, Bank of Montreal, and Queens Quay Foundry historic structures.	- No difference - both profile vertical alignments impact the Essroc Silos, Bank of Montreal, and Queens Quay Foundry historic structures.
Archaeology	No difference	No difference
	Preferred	**Preferred**
Sustainability		
WT Sustainability Framework & City Sustainability Standards	No difference	No difference
Impervious surfaces	No difference	No difference
	Preferred	**Preferred**
Land Use and Property		
New land uses and redevelopment	No difference	No difference
Public realm goals	+ The corresponding LRT and road profiles with the grading of the adjacent public realm along the promenade allows for effective pedestrian links to waterfront.	- The corresponding LRT and road profiles with the grading of the adjacent public realm along the promenade do nto allows for as effective pedestrian links to waterfront.
Property	No difference	No difference
Contaminated soils	+ Profile is never in cut so less potential to be impacted by contaminated soils	- Profile is close to the existing surface east of the Promenade so more potential for issues with soils if they are contaminated
	Preferred	
Transportation		
Walkability and promotes active transportation	No difference	No difference
Transit priority	No difference	No difference
Shift towards non-auto	No difference	No difference
Parking	No difference	No difference
Traffic operations	No difference	No difference
Rail	No difference	No difference
	Preferred	**Preferred**
Municipal Services		
Utilities	No impacts on existing utilities since they will be replaced to serve the new neighbourhooc	No impacts on existing utilities since they will be replaced to serve the new neighbourhooc
	Preferred	**Preferred**
SUMMARY	**Preferred**	

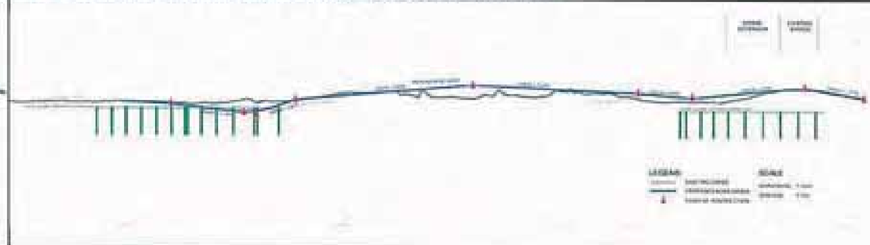
Evaluation of Alternative Street Layouts: Lake Shore Boulevard
Advantages and Disadvantages

Evaluation Criteria	Alternative Section 1 - 4 traffic lanes, off-peak parking lanes along route except on southern side between Munition Street and the Don River, a shared turning lane, and 5m sidewalks	Alternative Section 2 - 4 traffic lanes, off-peak parking lanes along entire route, a shared turning lane, and 3-4m sidewalks
	 Section 1: Parliament Street to Munition Street  Section 2: Munition Street to bridge over Don River	 Section 1: Parliament Street to Munition Street  Section 2: Munition Street to bridge over Don River
Natural Environment		
Don Mouth naturalization	+ Smaller section has smaller footprint at Don River crossing	- Wider section has larger footprint at Don River crossing
New natural area	+ Smaller section has smaller footprint on natural area	- Wider section has bigger footprint on natural area
Air quality impacts	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	
Social Environment		
Vibrant, mixed use community	+ Smaller section is more inviting for pedestrians and easier to cross	- Wider section is less inviting for pedestrians and is further to cross
Access to water	+ Smaller section at the Don river is more inviting for pedestrians and easier to cross to access the water	- Wider section at the Don River is less inviting for pedestrians and is further to cross to access the water
Noise	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	
Economic Environment		
Economic viable blocks	No difference	No difference
Cost-effective to build	+ Smaller section is less costly to construct	- Wider section is more expensive to construct
Disruption to business	No difference	No difference
	Preferred	
Cultural Environment		
Aboriginal people	No difference	No difference
Heritage structures	No difference	No difference
Archaeology	+ Smaller section has less potential impact on local archaelogy	- Wider section has more potential impact on local archaelogy
	Preferred	

Evaluation of Alternative Street Layouts: Lake Shore Boulevard
Advantages and Disadvantages

Sustainability		
WT Sustainability Framework & City Sustainability Standards	+ Smaller footprint means less traffic volumes, and less crossing distance for pedestrians	- Wider footprint means higher traffic volumes, and greater crossing distances for pedestrians
Impervious surfaces	+ Smaller footprint means less impervious surface	- Wider footprint means more impervious surface
	Preferred	
Land Use and Property		
New land uses and redevelopment	No difference	No difference
Public realm goals	No difference	No difference
Property	+ Smaller footprint requires less land take	- Wider footprint results in greater land take
Contaminated soils	+ Smaller footprint results in less potential for issues with contaminated soils	- Wider footprint results in greater potential for issues with contaminated soils
	Preferred	
Transportation		
Walkability and promotes active transportation	+ Smaller footprint means less crossing distance for pedestrians	- Wider footprint means more crossing distance for pedestrians
Transit priority	No difference	No difference
Shift towards non-auto	+ Only two-lanes in eastbound direction on Lake Shore Blvd between Munition Street and Don Roadway	- Three lanes in each direction on Lake Shore Blvd between Munition Street and Don Roadway (One lane is off-peak parking lane)
Parking	- Curbside parking lanes are provided on both sides between Parliament and Munition Streets, and on the northside between Munition Street and the Don River bridge	- Curbside parking lanes provided along entire length between Parliament Street and Don River
Traffic operations	+ The traffic capacity of the cross-section is expected to adequately handle the estimated traffic demand from the development	+ The cross-section is expected to provide more capacity than what is required to handle the estimated traffic demand from the development
Rail	No difference	No difference
	Preferred	
Municipal Services		
Utilities	No difference	No difference
	Preferred	**Preferred**
SUMMARY	**Preferred**	

Evaluation of Alternative Vertical Profiles: Lake Shore Boulevard
Advantages and Disadvantages

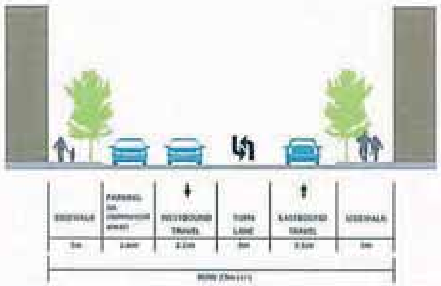
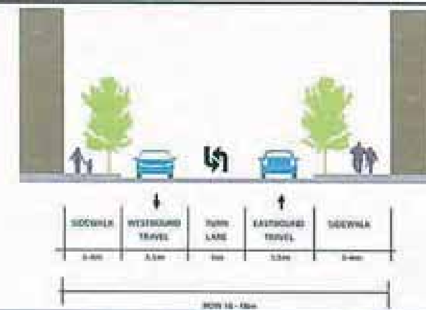
Evaluation Criteria	Alternative Profile 1 - Profile is from east of Trinity Street to bridge over Don River - 1.65m structural depth for rail bridge at Cherry St 	Alternative Profile 2 - Profile is from east of Trinity Street to bridge over Don River - 1.15m structural depth for rail bridge at Cherry St 
Natural Environment		
Don Mouth naturalization	No difference	No difference
New natural area	No difference	No difference
Air quality impacts	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	Preferred
Social Environment		
Vibrant, mixed use community	No difference	No difference
Access to water	No difference	No difference
Noise	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	Preferred
Economic Environment		
Economic viable blocks	No difference	No difference
Cost-effective to build	+ Profile allows for 1.65m deep overpass structure at Cherry Street which is cheaper to build than a narrower structure - Profile is in deep cut at Cherry Street intersection and may impact existing utilities - The elevation at Cherry Street results in some Gardiner footings being exposed, and will require remedial work - The elevation at Cherry Street is below the High Water Level and will require a water pump	- Profile allows for 1.15m deep Cherry Street overpass structure which is more expensive to build than the 1.65m deep structure + Profile has a shallower cut at Cherry Street intersection and may impact existing utilities less - Even though the higher elevation at Cherry Street means the Gardiner footings are less exposed, the same number of footings are exposed - The higher elevation is still below the High Water Level but will require a smaller water pump
Disruption to business	+ The 1.65m structural depth will mean that precast concrete planks can be used. These are easy to install and will permit the continuous operation of rail line by phasing the construction appropriately	- A 1.15m construction depth requires a structure whose installation, and configuration will interfere with the operation of the rail line during the phasing of construction
	Preferred	
Cultural Environment		
Aboriginal people	No difference	No difference
Heritage structures	No difference	No difference
Archaeology	No difference	No difference
	Preferred	Preferred

Evaluation of Alternative Vertical Profiles: Lake Shore Boulevard

Advantages and Disadvantages

Sustainability		
WT Sustainability Framework & City Sustainability Standards	No difference	No difference
Impervious surfaces	No difference	No difference
	Preferred	**Preferred**
Land Use and Property		
New land uses and redevelopment	No difference	No difference
Public realm goals	No difference	No difference
Property	No difference	No difference
Contaminated soils	- Profile is in deep cut at Cherry Street intersection and may be impacted by contaminated soils	- Profile is shallower at Cherry Street intersection but still in cut and may be impacted by contaminated soils
	Preferred	**Preferred**
Transportation		
Walkability and promotes active transportation	No difference	No difference
Transit priority	No difference	No difference
Shift towards non-auto	No difference	No difference
Parking	No difference	No difference
Traffic operations	No difference	No difference
Rail	+ The 1.65m structural depth requires no work on top of rail berm at Cherry Street. This meets the requirements of both GO and CN.	- The 1.15m structural depth requires work on top of rail berm at Cherry Street. This does not meet the requirements of either GO or CN.
	Preferred	
Municipal Services		
Utilities	- Profile is in deep cut at Cherry Street intersection and may impact existing utilities	- Profile is shallower at Cherry Street intersection but still in cut and may impact existing utilities
	Preferred	**Preferred**
SUMMARY	**Preferred**	

Evaluation of Alternative Street Layouts: Munition Street
Advantages and Disadvantages

Evaluation Criteria	Alternative Section 1 - 2 traffic lanes and 1 shared turning lane, 5m sidewalks, and on-street parking on west side in commercial areas only	Alternative Section 2 - 2 traffic lanes, 1 shared turning lane and 3-4m sidewalks
		
Natural Environment		
Don Mouth naturalization	No difference	No difference
New natural area	Wider section has bigger footprint but it is only in commcercial areas	Smaller section has smaller footprint but the difference is negligible
Air quality impacts	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	Preferred
Social Environment		
Vibrant, mixed use community	+ Short section of parking provides a buffer between pedestrians and moving traffic, and promotes an active commercial street	- There is no buffer between between pedestrians and moving traffic in commercial area
Access to water	No difference	No difference
Noise	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	
Economic Environment		
Economic viable blocks	+ Parking provides greater vehicular access in commercial areas	- No parking reduces vehicular access in commercial areas
Cost-effective to build	- Wider section to accommodate parking is more expensive to construct	+ Smaller section is less costly to construct
Disruption to business	No difference	No difference
	Preferred	Preferred
Cultural Environment		
Aboriginal people	No difference	No difference
Heritage structures	No difference	No difference
Archaeology	- Wider section has more potential to impact British American Oil site	+ Narrower section has less potential to impact British American Oil site
		Preferred

Evaluation of Alternative Street Layouts: Munition Street
Advantages and Disadvantages

Sustainability		
WT Sustainability Framework & City Sustainability Standards	+ Parking promotes greater vehicular traffic to access the street, however the parking also provides a buffer to pedestrians and helps to activate a commercial strip	- No parking results in the traffic lane directly abutting the sidewalk and may encourage greater vehicular speeds
Impervious surfaces	- Wider footprint means more impervious surface	+ Smaller footprint means less impervious surface
	Preferred	Preferred
Land Use and Property		
New land uses and redevelopment	+ Availability of parking makes the area more attractive for commercial redevelopment	- Lack of on-street parking may makes the area less attractive for commercial redevelopment
Public realm goals	+ Public realm is improved in the commercial areas by the buffer offered by on-street parking	- Lack of on-street parking in the commercial areas eliminates buffer between pedestrians and vehicle traffic
Property	- More property is required to accommodate parking	+ Less property is required because there is no parking
Contaminated soils	- All soils have potential for contamination	- All soils have potential for contamination
	Preferred	
Transportation		
Walkability and promotes active transportation	+ Wider sidewalks promote more active pedestrian areas	- Narrower sidewalks provide fewer opportunities to activate pedestrian areas
Transit priority	No difference	No difference
Shift towards non-auto	- Addition of curbside parking lane promotes auto use	+ No curbside parking may discourage auto use in this section
Parking	+ Curbside parking lane provided on west side in commercial area	- No parking provision
Traffic operations	Parking reduces traffic capacity of adjacent lane but insignificant difference due to the length of the street	Parking reduces traffic capacity of adjacent lane but insignificant difference due to the length of the street
Rail	No difference	No difference
	Preferred	
Municipal Services		
Utilities	No difference	No difference
	Preferred	Preferred
SUMMARY	**Preferred**	

Evaluation of Alternative Vertical Profiles: Munition Street
Advantages and Disadvantages

Evaluation Criteria	Alternative Profile 1 - Vertical profile meets flood levels and height clearances under Munition St bridge	Alternative Profile 2 - As per Alt 1 with steeper gradient near Lake Shore Boulevard to minimize fill
	 	
Natural Environment		
Don Mouth naturalization	+ Munition Street bridge is at a higher elevation allowing for passage of the flood, navigation, and pedestrian right of way during a range of lake levels	- Munition Street bridge is at a lower elevation and therefore more likely to interfere with flood conveyence and navigation
New natural area	No difference	No difference
Air quality impacts	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	
Social Environment		
Vibrant, mixed use community	No difference	No difference
Access to water	+ Higher elevations allow for continuous access to water along the promenade during a range of lake levels	- Lower elevations do not allow for continuous access to water along the promenade during a range of lake levels
Noise	No impact - because there are no sensitive receptors	No impact - because there are no sensitive receptors
	Preferred	
Economic Environment		
Economic viable blocks	No difference	No difference
Cost-effective to build	- Section of Munition Street north of the Keating Channel is higher in elevation and requires more fill	+ Section of Munition Street north of the Keating Channel is lower in elevation and requires less fill
Disruption to business	No difference	No difference
		Preferred
Cultural Environment		
Aboriginal people	No difference	No difference
Heritage structures	No difference	No difference
Archaeology	No difference	No difference
	Preferred	Preferred

Evaluation of Alternative Vertical Profiles: Munition Street
Advantages and Disadvantages

Sustainability		
WT Sustainability Framework & City Sustainability Standards	No difference	No difference
Impervious surfaces	No difference	No difference
	Preferred	**Preferred**
Land Use and Property		
New land uses and redevelopment	No difference	No difference
Public realm goals	+ Allows for continuous access along the Keating Channel promenade allowing for public space that is free from crossing vehicular streets	- Pedestrians would have to cross the roadway at the promenade reducing the public realm
Property	No difference	No difference
Contaminated soils	No difference	No difference
	Preferred	**Preferred**
Transportation		
Walkability and promotes active transportation	+ Munition Street bridge is at a higher elevation to allow additional clearance for pedestrians to walk, and improved light conditions under the bridge along the riverbank	- Munition Street bridge is at a lower elevation providing less vertical clearance for pedestrians to walk under the bridge along the channel and decreases the quality of the underpass
Transit priority	No difference	No difference
Shift towards non-auto	No difference	No difference
Parking	No difference	No difference
Traffic operations	No difference	No difference
Rail	No difference	No difference
	Preferred	
Municipal Services		
Utilities	No difference	No difference
	Preferred	**Preferred**
SUMMARY	**Preferred**	

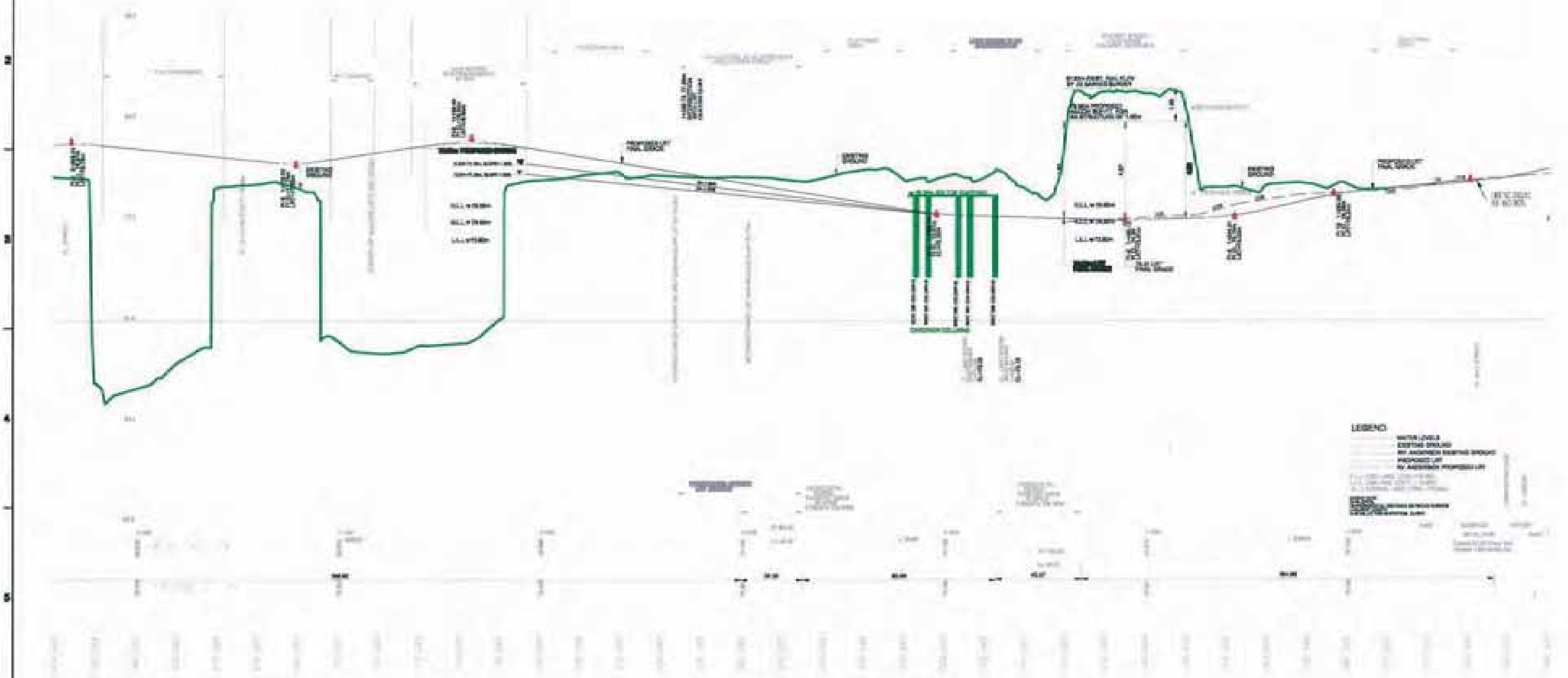
Appendix 11-A2

Street Layout and Vertical Profile Alternatives

WATERFRONToronto

TORONTO

Toronto Transit Commission



CHERRY STREET - LRT PROFILE
ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m(PART I)

ESR	JULY 06,2009	P.S.	D.P.	D.P.
Issue	Date	By	Chkd	Appd

ARUP

Client: WATERFRONT TORONTO

Job Title: Lower Don Lands

Drawing Title: CHERRY STREET - LRT PROFILE ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART I)

Key Plan

Scale at A3: AS SHOWN

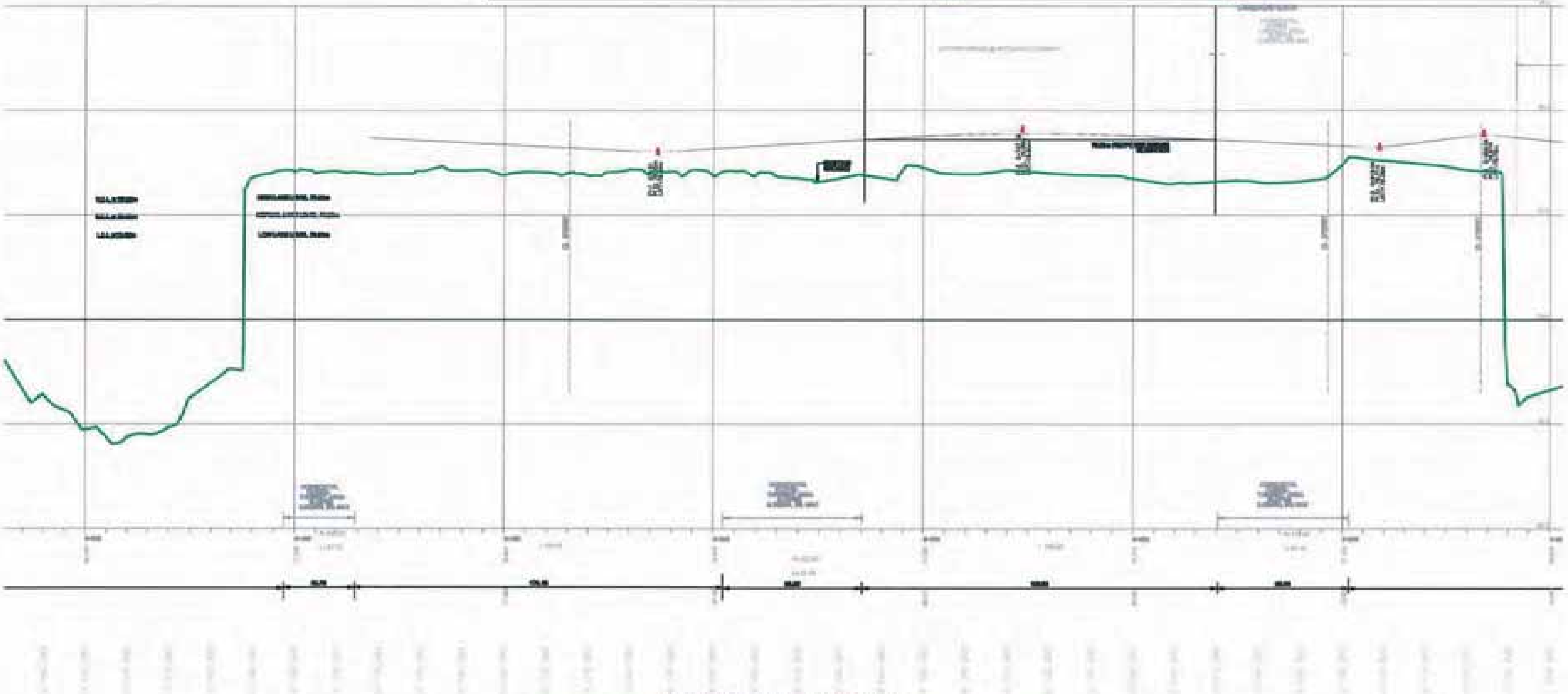
Plot ID

Drawing Status

Job No: 98136

Drawing No

Issue



CHERRY STREET - LRT PROFILE
ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.66m(PART II)

ARUP

Issue	Date	By	Chkd	Appd
ESR	JULY 06,2009	P.S.	D.P.	D.P.

Client: WATERFRONT TORONTO

Job Title: Lower Don Lands

Drawing Title: CHERRY STREET - LRT PROFILE ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.66m (PART II)

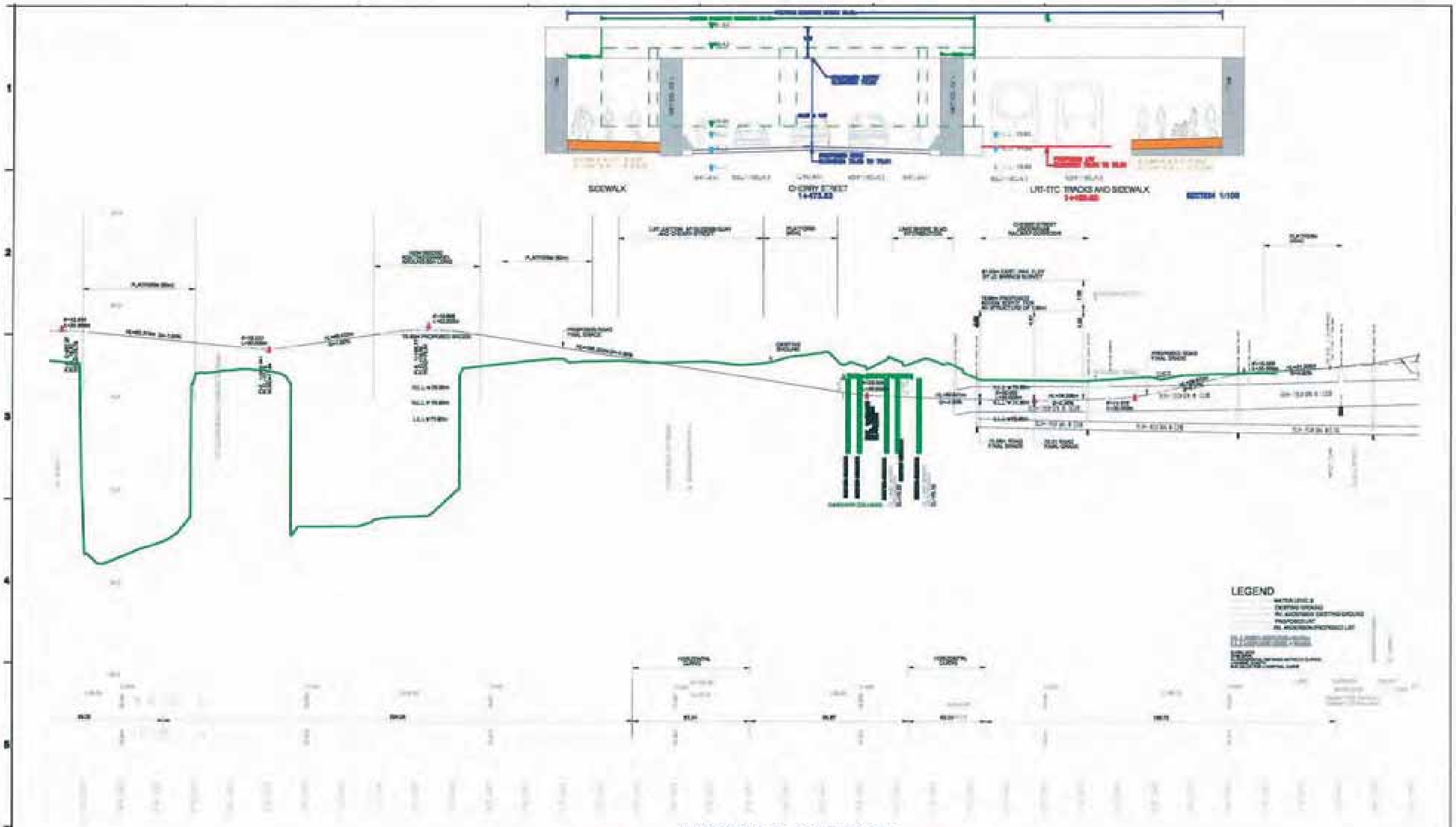
Key Plan

Scale at A3: AS SHOWN

Job No: 99135

Drawing No

Issue



CHERRY STREET - ROAD PROFILE
ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m(PART I)

ARUP

ESR	JULY 08,2009	P.S.	D.P.	D.P.
Issue	Date	By	Chkd	Appd

Client
WATERFRONT TORONTO

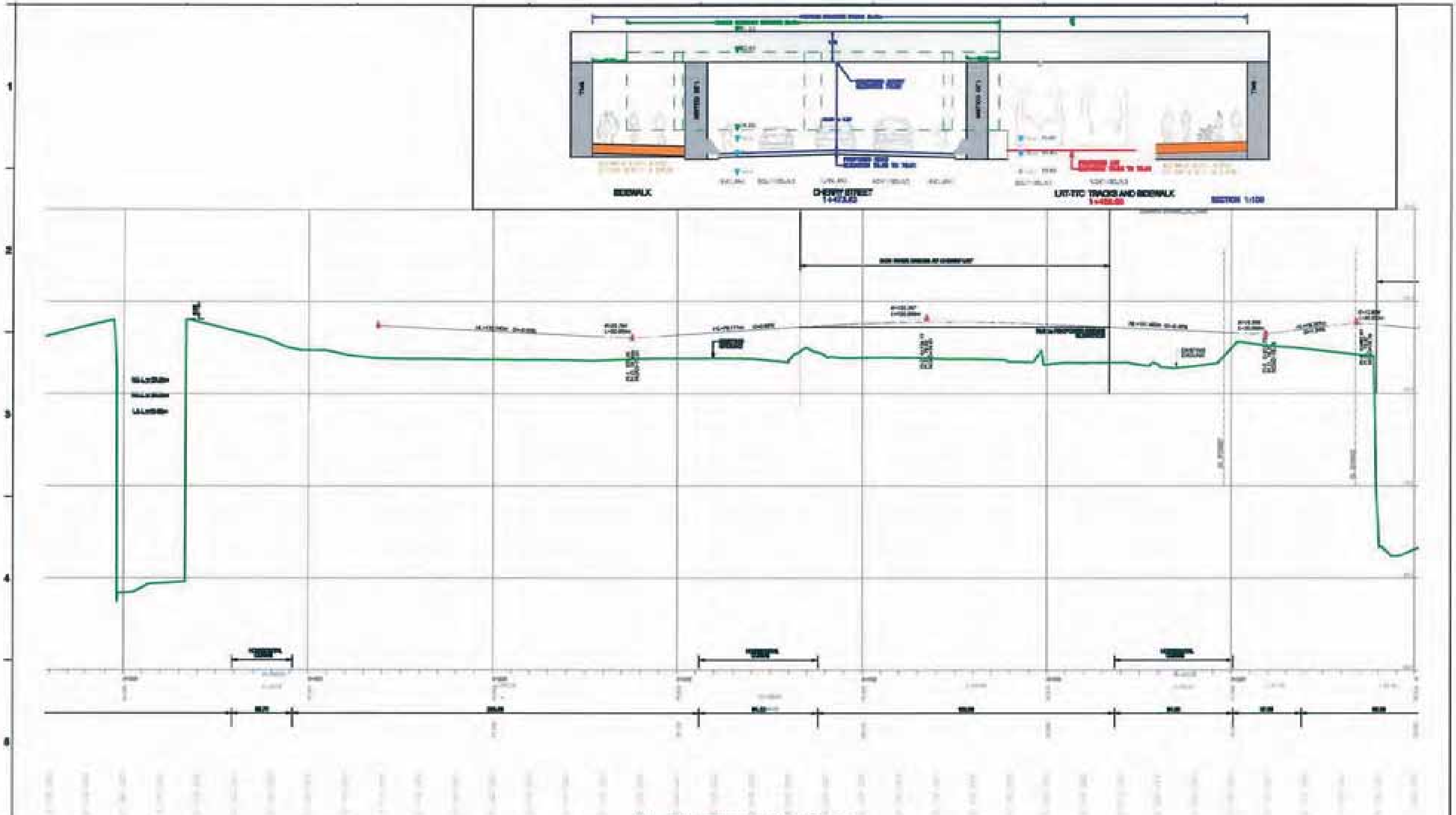
Job Title
Lower Don Lands

Drawing Title
CHERRY STREET - ROAD PROFILE
ALTERNATIVE I - UNDERPASS CONSTRUCTION
DEPTH OF 1.65m (PART I)

Key Plan

Scale at A3
AS SHOWN

Job No
98136



CHERRY STREET - ROAD PROFILE
ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m(PART II)

ARUP

Issue	Date	By	Chkd	Appd
ESR	JULY 08,2009	P.S.	O.R.	D.P.

Client: WATERFRONT TORONTO

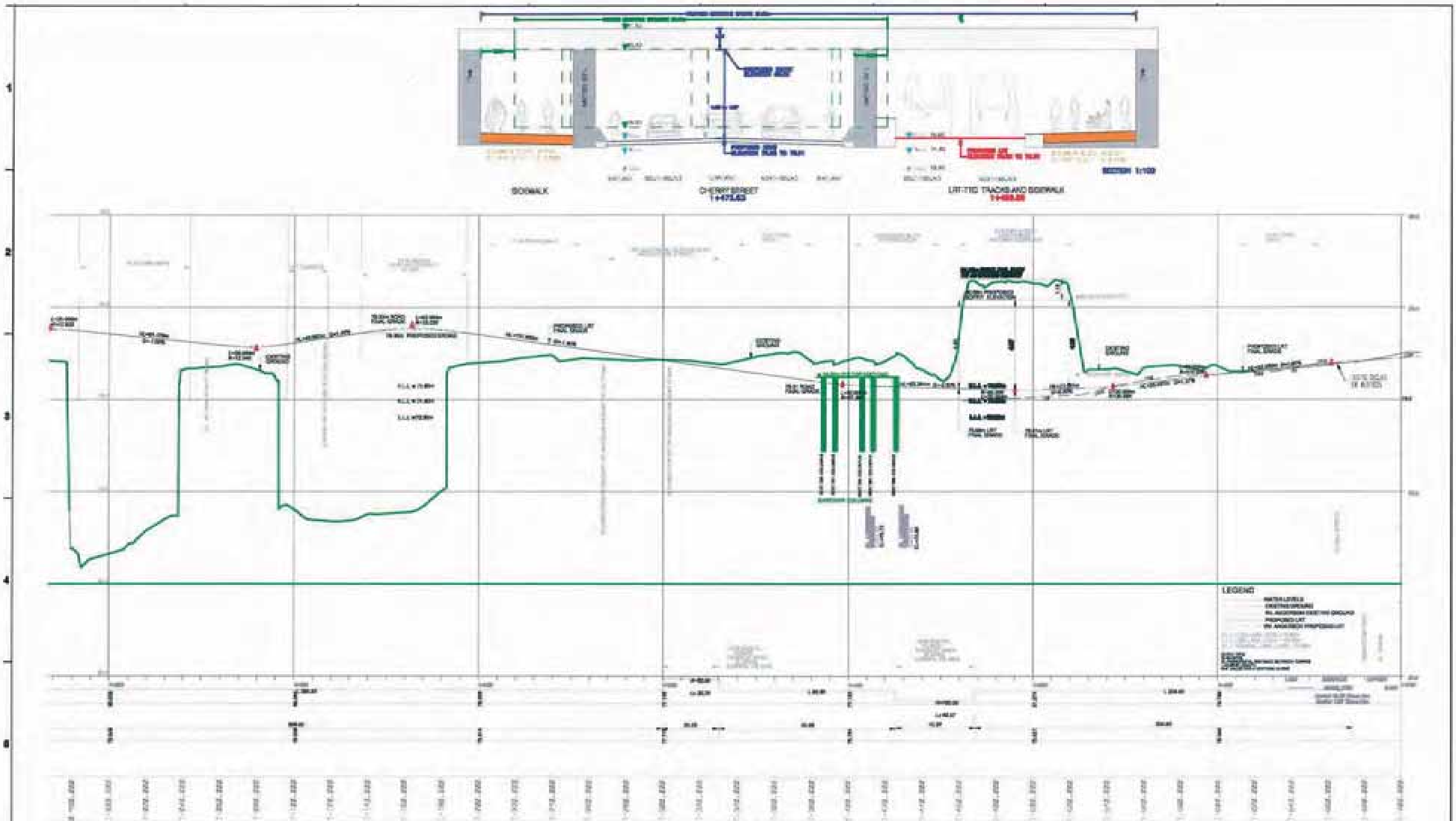
Job Title: Lower Don Lands

Drawing Title: CHERRY STREET - ROAD PROFILE ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART II)

Key Plan

Scale at A3: AS SHOWN

Job No: 96135

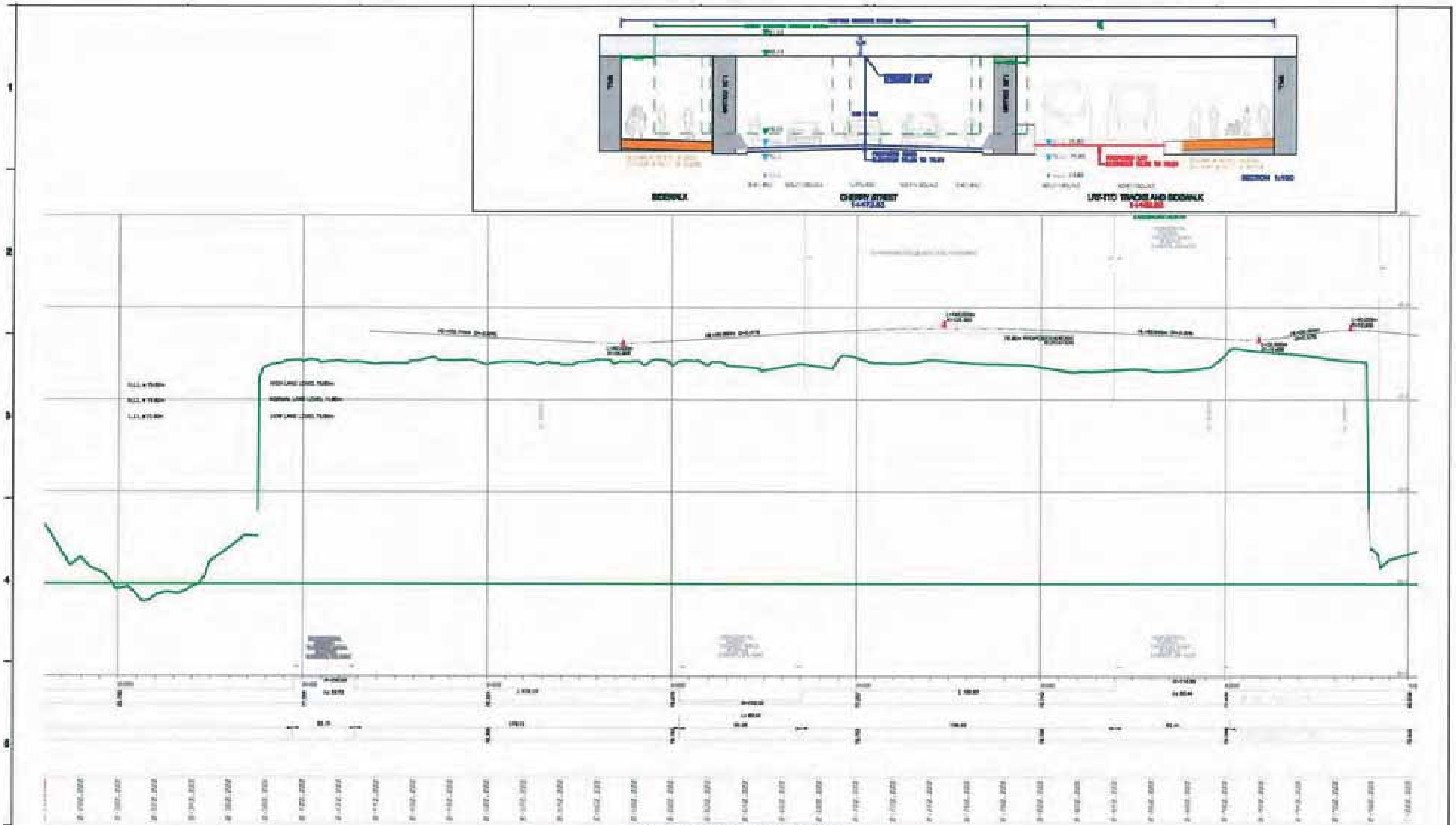


CHERRY STREET - LRT PROFILE
ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m(PART I)

ARUP	ESR JULY 08,2009 P.S. D.P. D.P.	Client: WATERFRONT TORONTO	Job Title: Lower Don Lands	Key Plan
	Issue / Date / By / Chkd / Appd		Drawing Title: CHERRY STREET - LRT PROFILE ALTERNATIVE II - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART I)	

Scale at A1: AS SHOWN

Job No: 86135



CHERRY STREET - LRT PROFILE
ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m(PART II)

ARUP

Issue	Date	By	Chkd	Appd
ESR	JULY 08,2009	P.S.	D.P.	D.P.

Client
WATERFRONT TORONTO

Job Title
Lower Don Lands

Drawing Title
CHERRY STREET - LRT PROFILE
ALTERNATIVE II - UNDERPASS CONSTRUCTION
DEPTH OF 1.65m (PART II)

Key Plan

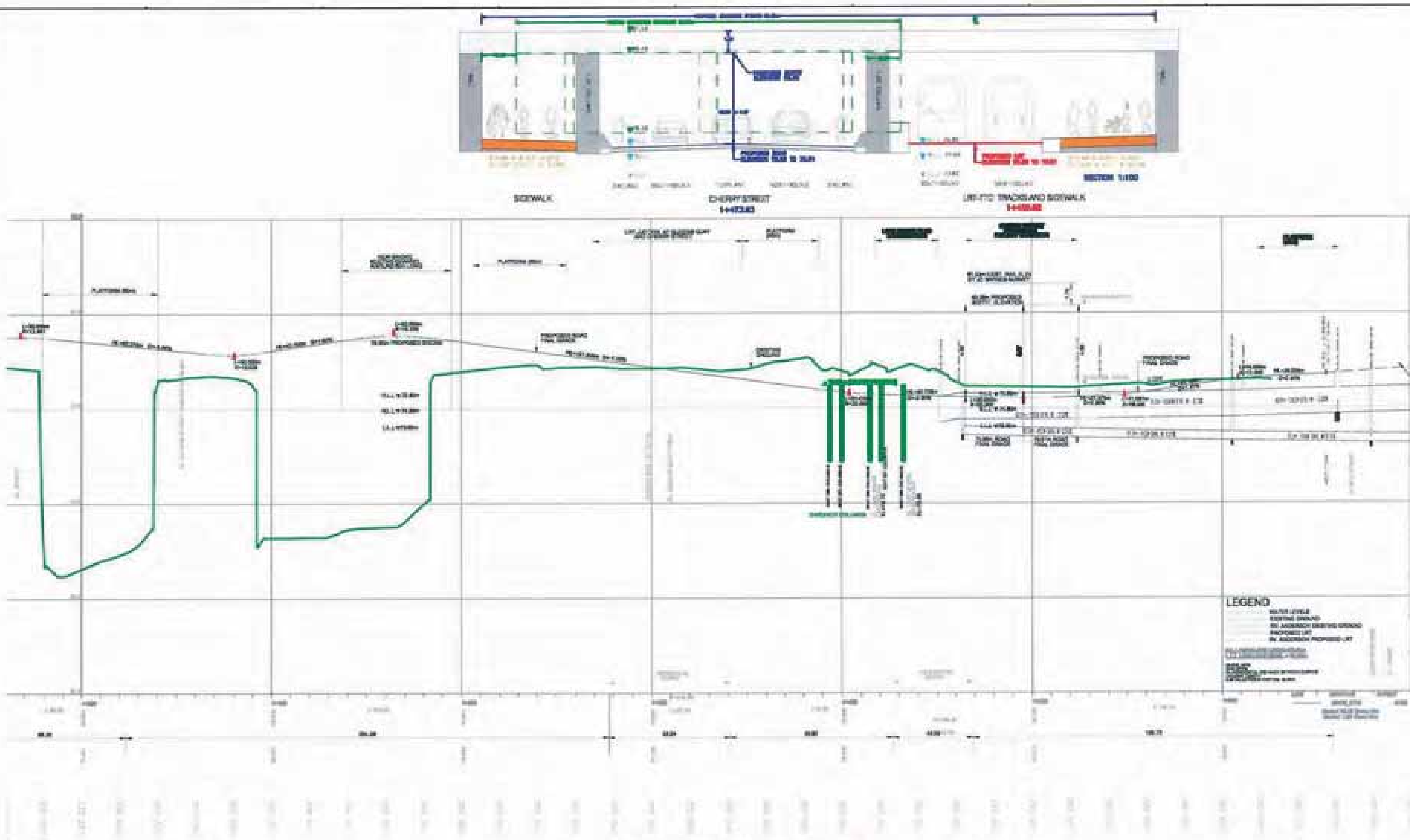
Scale at A1
AS SHOWN

Drawing Status

Job No
95135

Drawing No

Issue



CHERRY STREET - ROAD PROFILE
ALTERNATIVE II - UNDERPASS CONSTRUCTION DEPTH OF 1.85m(PART I)

ARUP

Issue	Date	By	Chkd	Appd
ESR	JULY 08,2020	P.S.	D.P.	D.P.

Client: WATERFRONT TORONTO

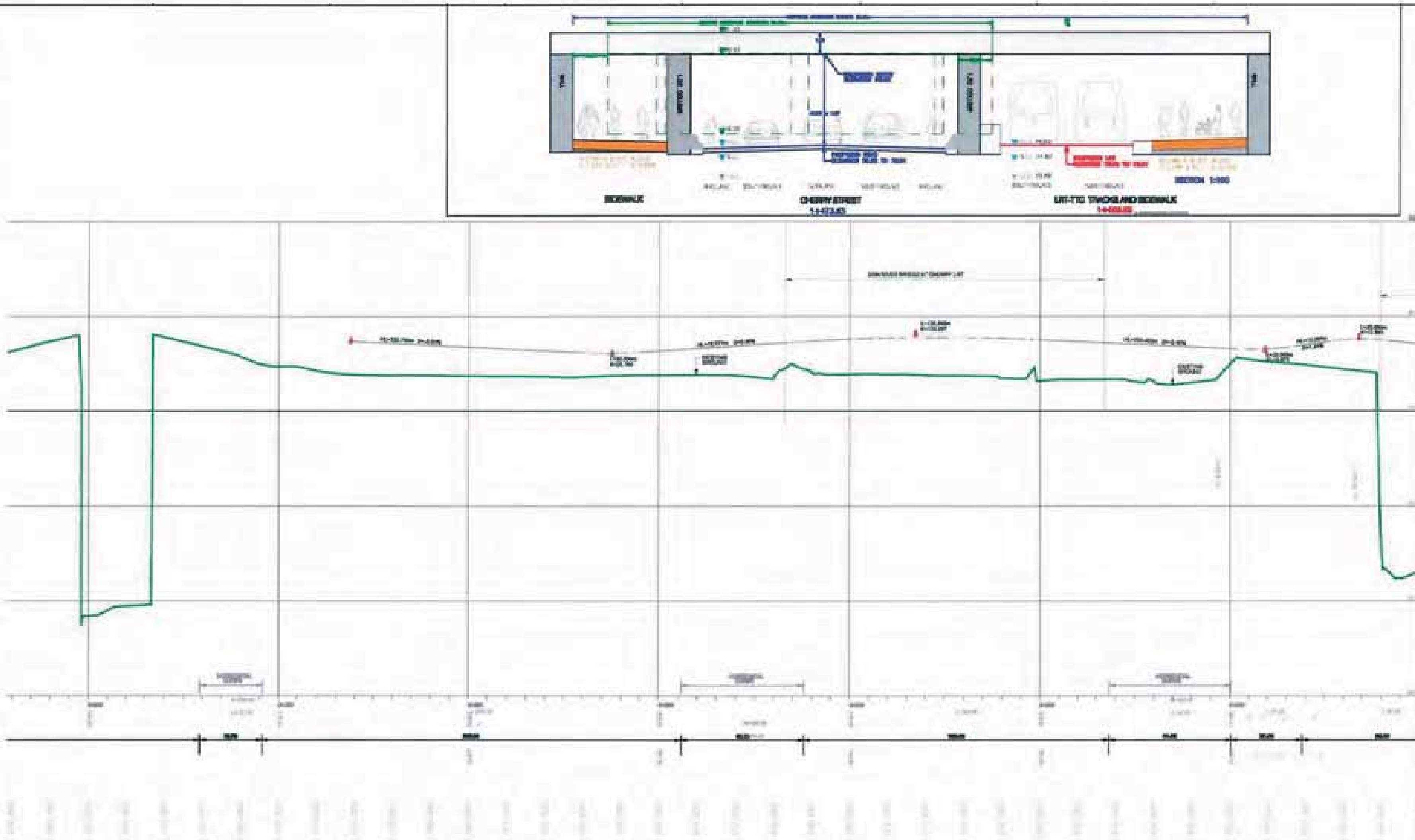
Job Title: Lower Don Lands

Drawing Title: CHERRY STREET - ROAD PROFILE ALTERNATIVE II - UNDERPASS CONSTRUCTION DEPTH OF 1.85m (PART I)

Key Plan

Scale at A3: AS SHOWN

Job No: 86135



CHERRY STREET - ROAD PROFILE
ALTERNATIVE II - UNDERPASS CONSTRUCTION DEPTH OF 1.65m(PART II)

ARUP

ESR	JULY 05,2009	P.S.	D.P.	D.P.
Issue	Date	By	Chkd	Appd

Client
WATERFRONT TORONTO

Job Title
Lower Don Lands

Drawing Title
CHERRY STREET - ROAD PROFILE
ALTERNATIVE II - UNDERPASS CONSTRUCTION
DEPTH OF 1.65m (PART II)

Key Plan

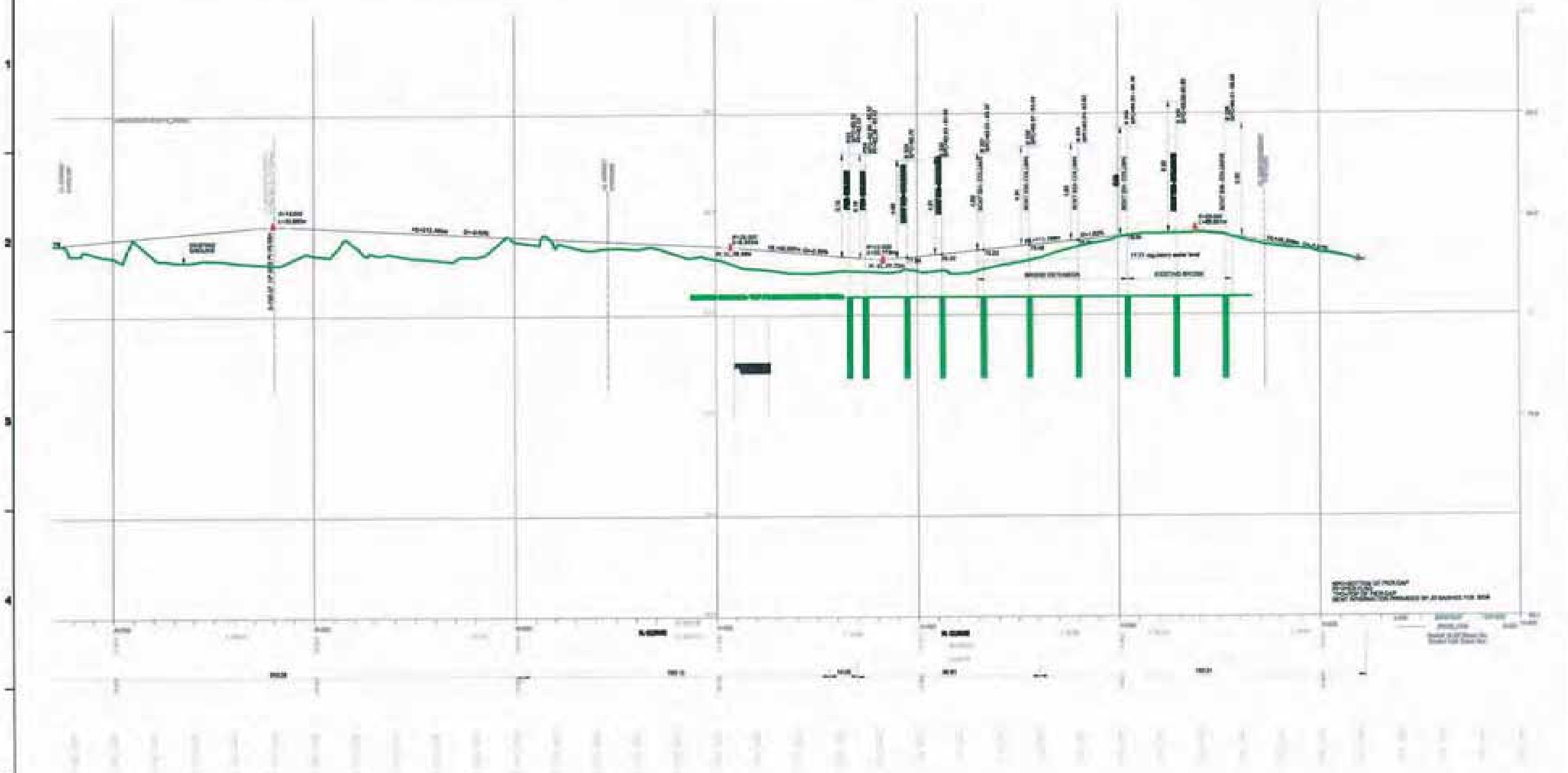
Scale at A3
AS SHOWN
Plot ID

Drawing Status

Job No
98136

Drawing No

Issue



LAKE SHORE BOULEVARD WESTBOUND - ROAD PROFILE
ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART I)

ARUP

Issue	Date	By	Chkd	Appd
ESR	JULY 06,2009	P.S.	D.P.	D.P.

Client: WATERFRONT TORONTO

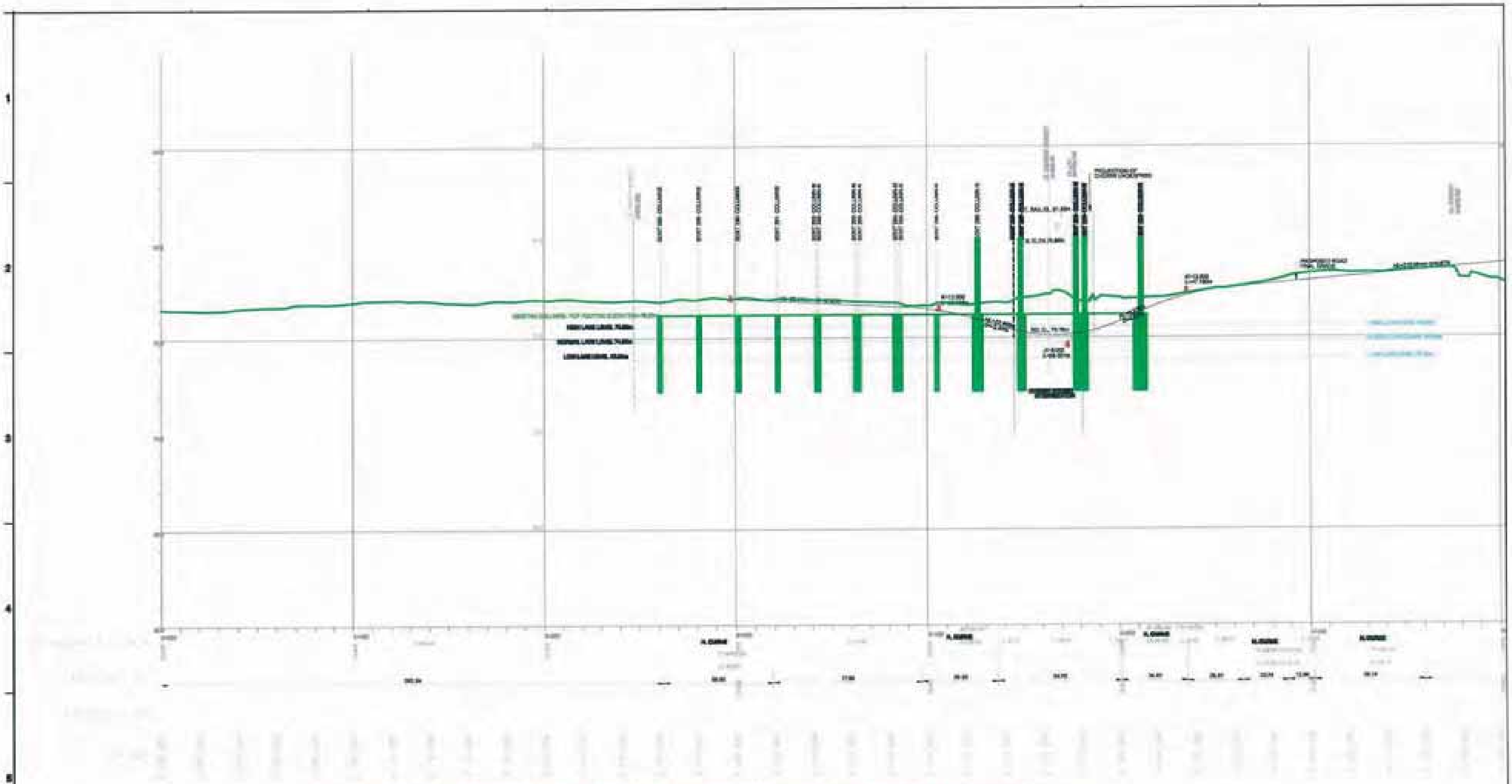
Job Title: Lower Don Lands

Drawing Title: LAKE SHORE BOULEVARD WESTBOUND - ROAD PROFILE ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART I)

Key Plan

Scale at A3: AS SHOWN

Job No: 98136



LAKE SHORE BOULEVARD WESTBOUND - ROAD PROFILE
ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART II)

ARUP

ESR JULY 08,2009 P.S. O.R. D.P.

Issue	Date	By	Chkd	Appd

Client
WATERFRONT TORONTO

Job Title
Lower Don Lands

Drawing Title
LAKE SHORE BOULEVARD WESTBOUND - ROAD PROFILE
ALTERNATIVE I - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART II)

Key Plan

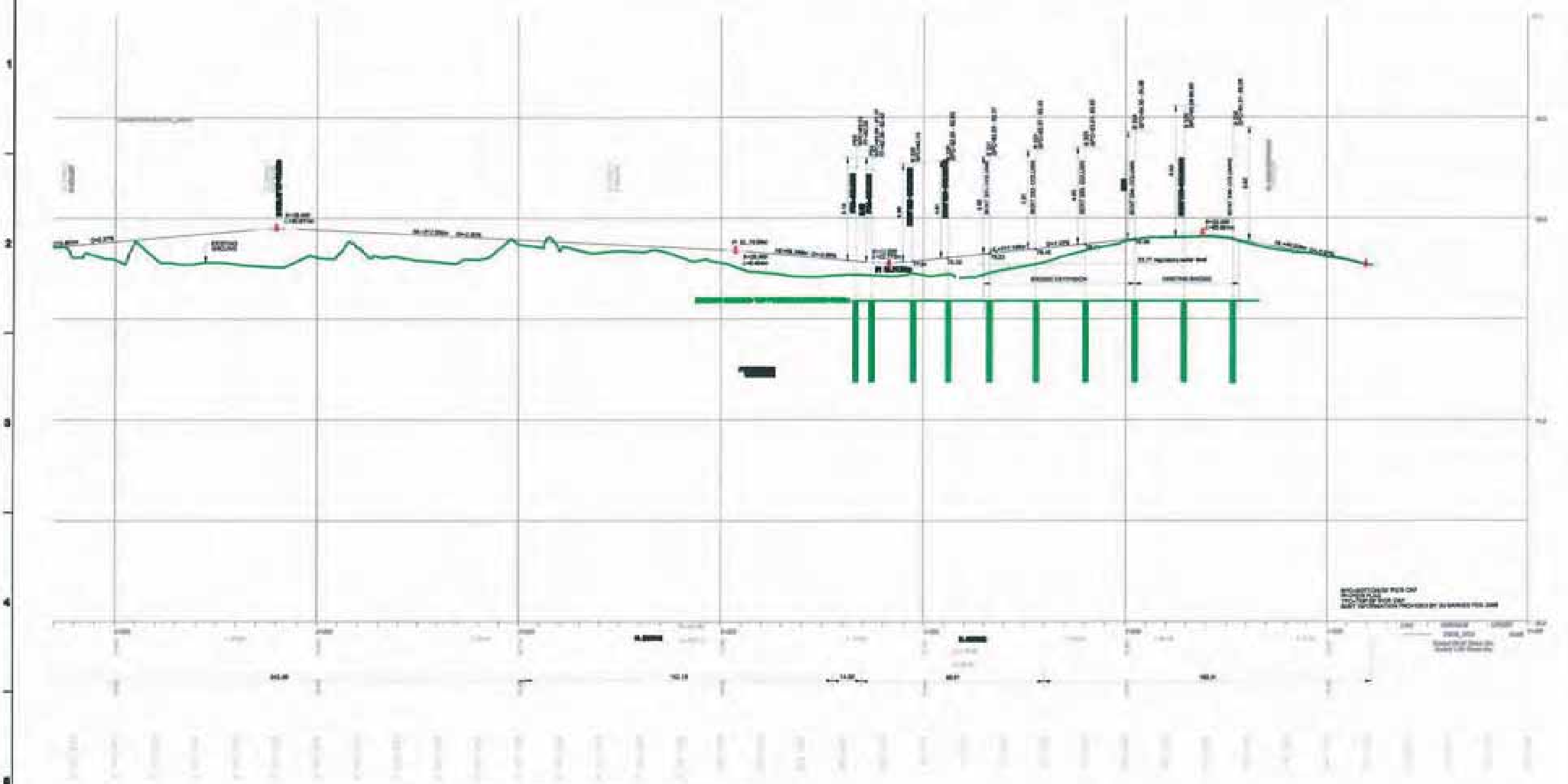
Scale at A3
AS SHOWN

Drawing Status

Job No
98135

Drawing No

Issue



LAKE SHORE BOULEVARD WESTBOUND - ROAD PROFILE
ALTERNATIVE II - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART I)

ARUP

ESR	JULY 08,2009	P.S.	D.F.	D.F.
Issue	Date	By	Chkd	Appd

Client
WATERFRONT TORONTO

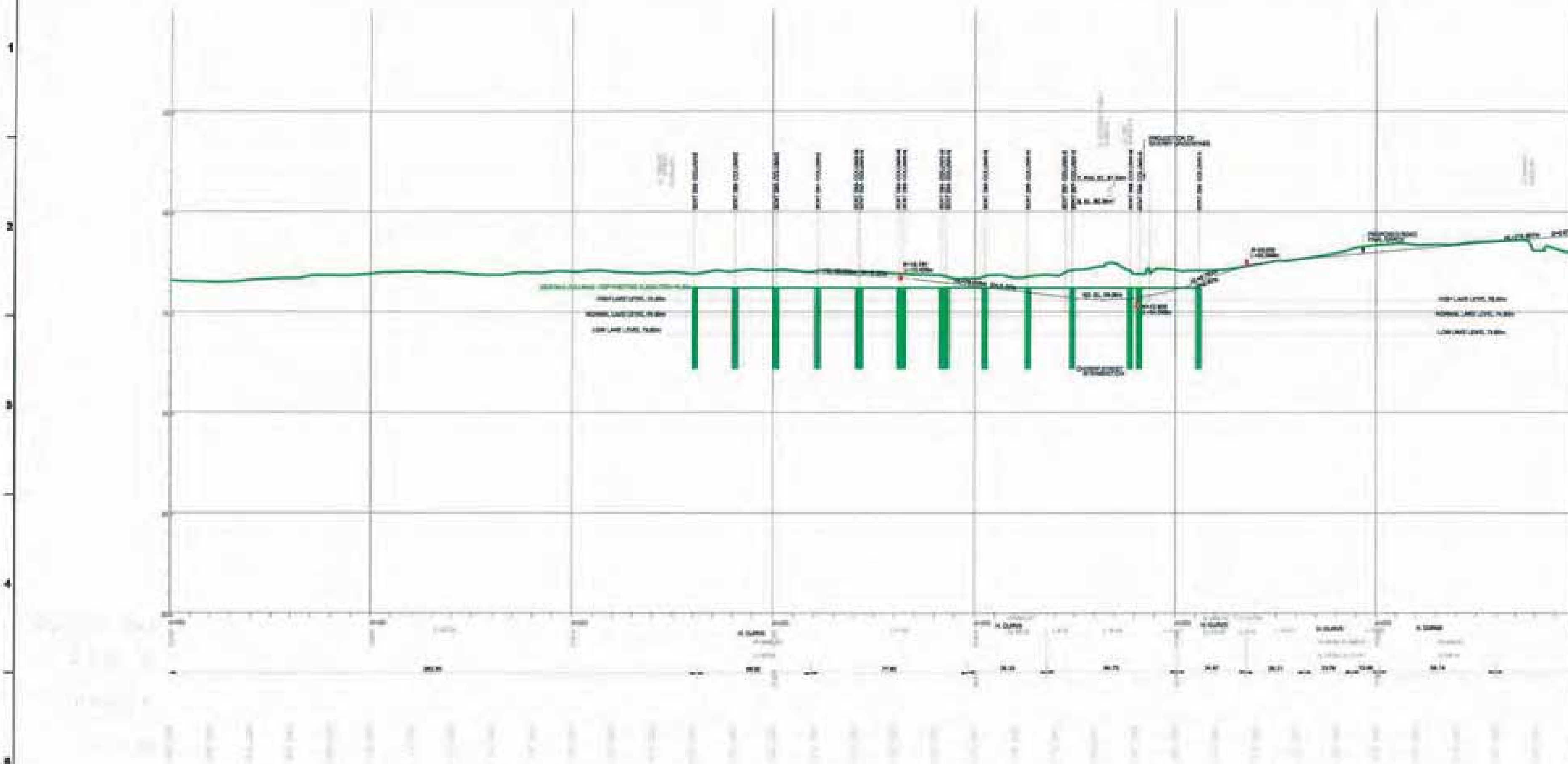
Job Title
Lower Don Lands

Drawing Title
LAKE SHORE BOULEVARD WESTBOUND - ROAD PROFILE
ALTERNATIVE II - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART I)

Key Plan

Scale at A3
AS SHOWN

Job No
96135



LAKE SHORE BOULEVARD WESTBOUND - ROAD PROFILE
ALTERNATIVE II - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART II)

ARUP

Issue	Date	By	Chkd	Appd
ESR	JULY 08,2009	P.S.	D.P.	D.P.

Client
WATERFRONT TORONTO

Job Title
Lower Don Lands

Drawing Title
LAKE SHORE BOULEVARD WESTBOUND - ROAD PROFILE
ALTERNATIVE II - UNDERPASS CONSTRUCTION DEPTH OF 1.65m (PART II)

Key Plan

Scale at A3
AS SHOWN

Plot ID

Drawing Status

Job No
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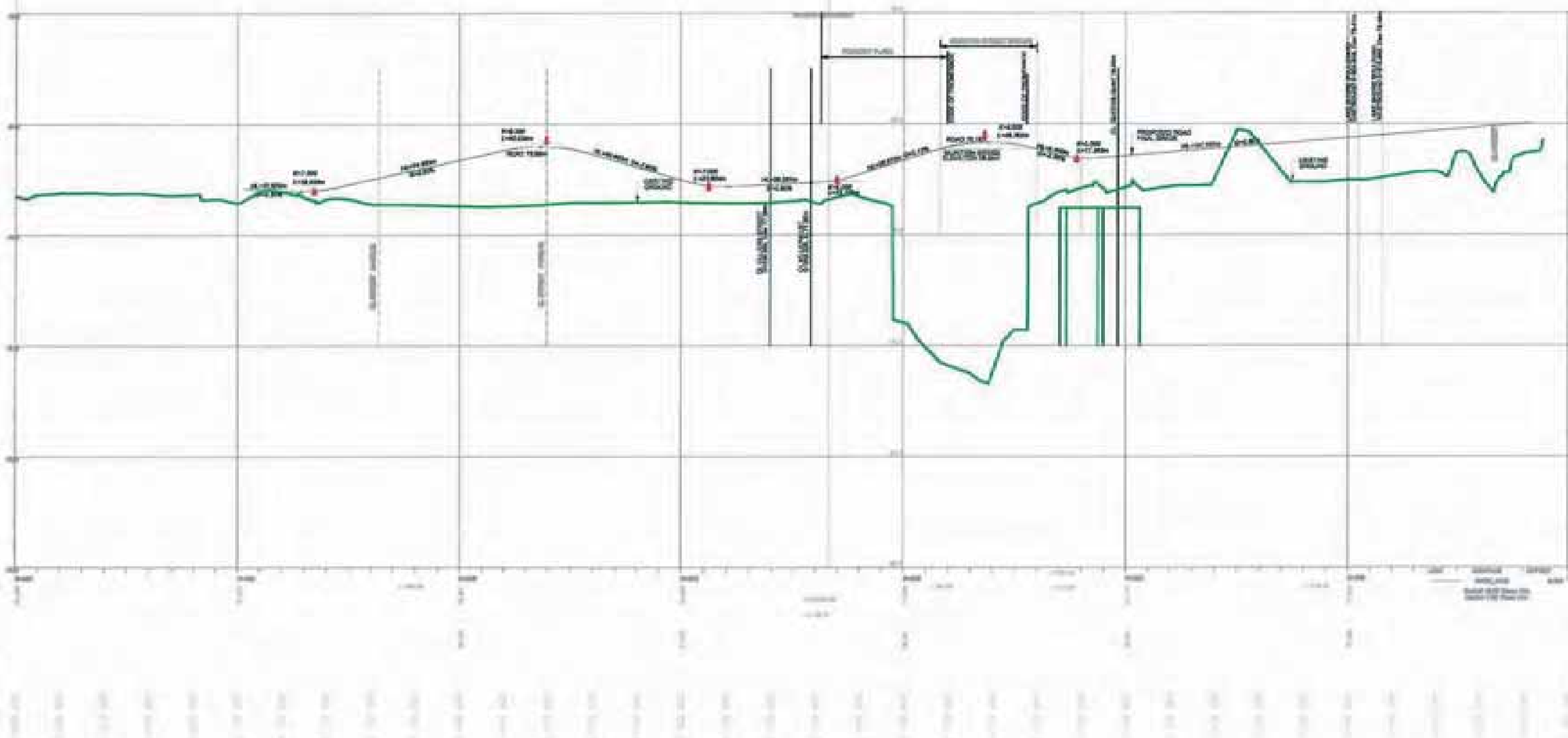
Drawing No

Issue



MUNITION STREET - ROAD PROFILE
ALTERNATIVE I

ARUP

WATERFRONT TORONTO

Lower Don Lands

Drawing Title
MUNITION STREET - ROAD PROFILE
ALTERNATIVE I

Issue	Date	By	Chkd	Appd
ESR	JULY 06,2009	P.S.	D.P.	D.P.

Scale at A3
AS SHOWN

Job No
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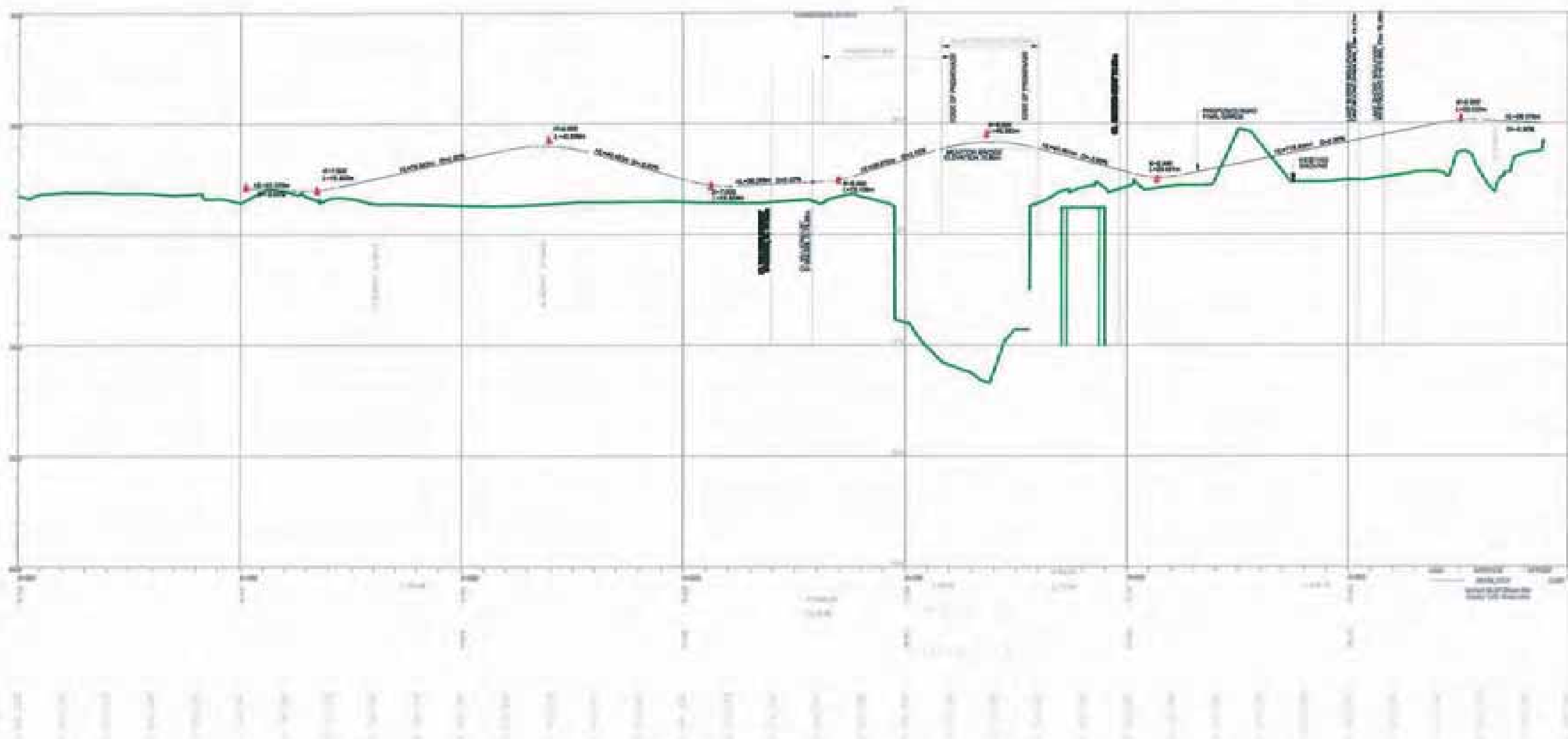

MUNITION STREET - ROAD PROFILE
ALTERNATIVE II

ARUP

ESR	JULY 06,2009	P.S.	D.P.	D.P.
Issue	Date	By	Chkd	Appd

Client
WATERFRONT TORONTO

Job Title
Lower Don Lands

Drawing Title
MUNITION STREET - ROAD PROFILE
ALTERNATIVE II

Scale at A3
AS SHOWN

Job No
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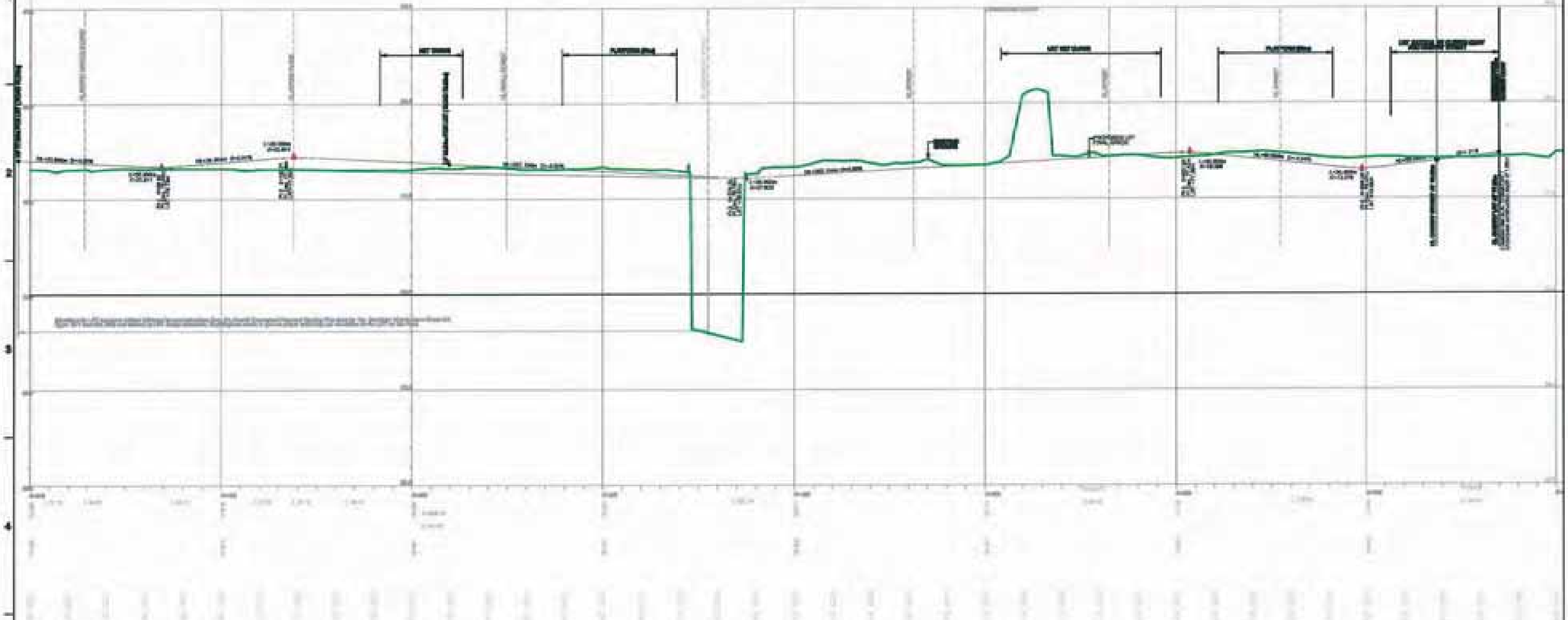
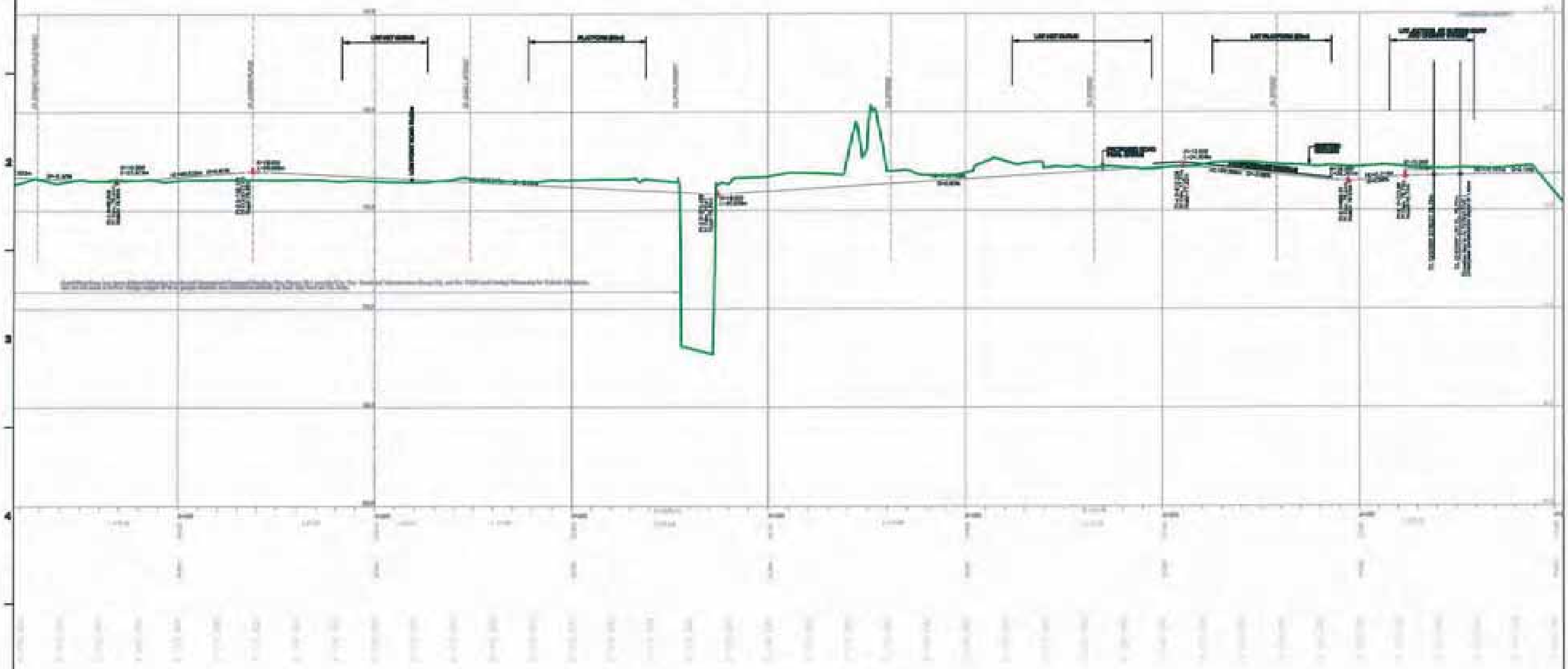


QUEENS QUAY - LRT PROFILE

ALTERNATIVE I

ARUP	ESR. JULY 06,2009 P.S. D.P. D.P. Issue | Date | By | Chkd | Appd	Client WATERFRONT TORONTO	Job Title Lower Don Lands Drawing Title QUEENS QUAY - LRT PROFILE ALTERNATIVE I	Key Plan	Scale at A0 AS SHOWN Plot ID Drawing Status Job No 98136 Drawing No Issue



QUEENS QUAY - ROAD PROFILE

ALTERNATIVE I

ARUP

ESR	JULY 08,2009	P.S.	D.P.	D.P.
Issue	Date	By	Chkd	Appd

Client

WATERFRONT TORONTO

Job Title

Lower Don Lands

Drawing Title

QUEENS QUAY - ROAD PROFILE
ALTERNATIVE I

Key Plan

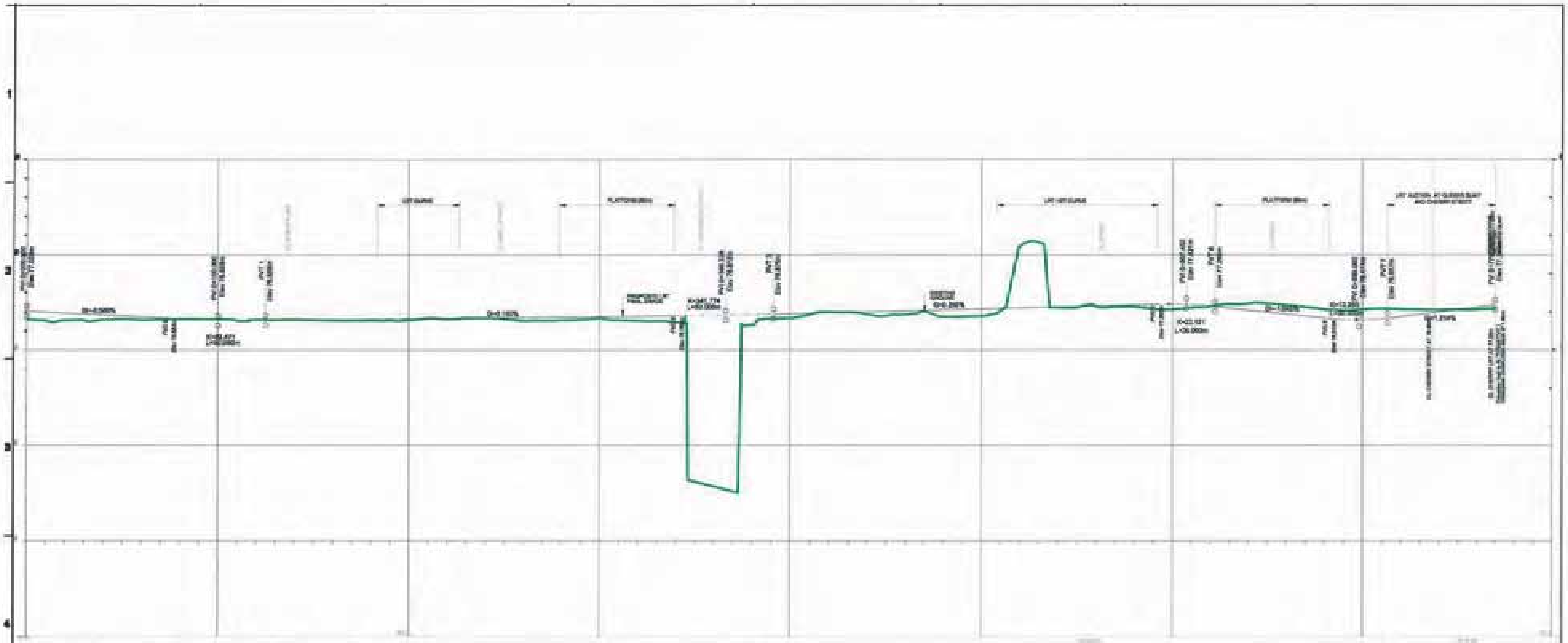
AS SHOWN

Job No

96135

Drawing No

Issue



QUEENS QUAY - LRT PROFILE

ALTERNATIVE II

ARUP

ESR.	JULY 06,2009	P.S.	D.P.	O.P.
Issue	Date	By	Chkd	Appd

Client
WATERFRONT TORONTO

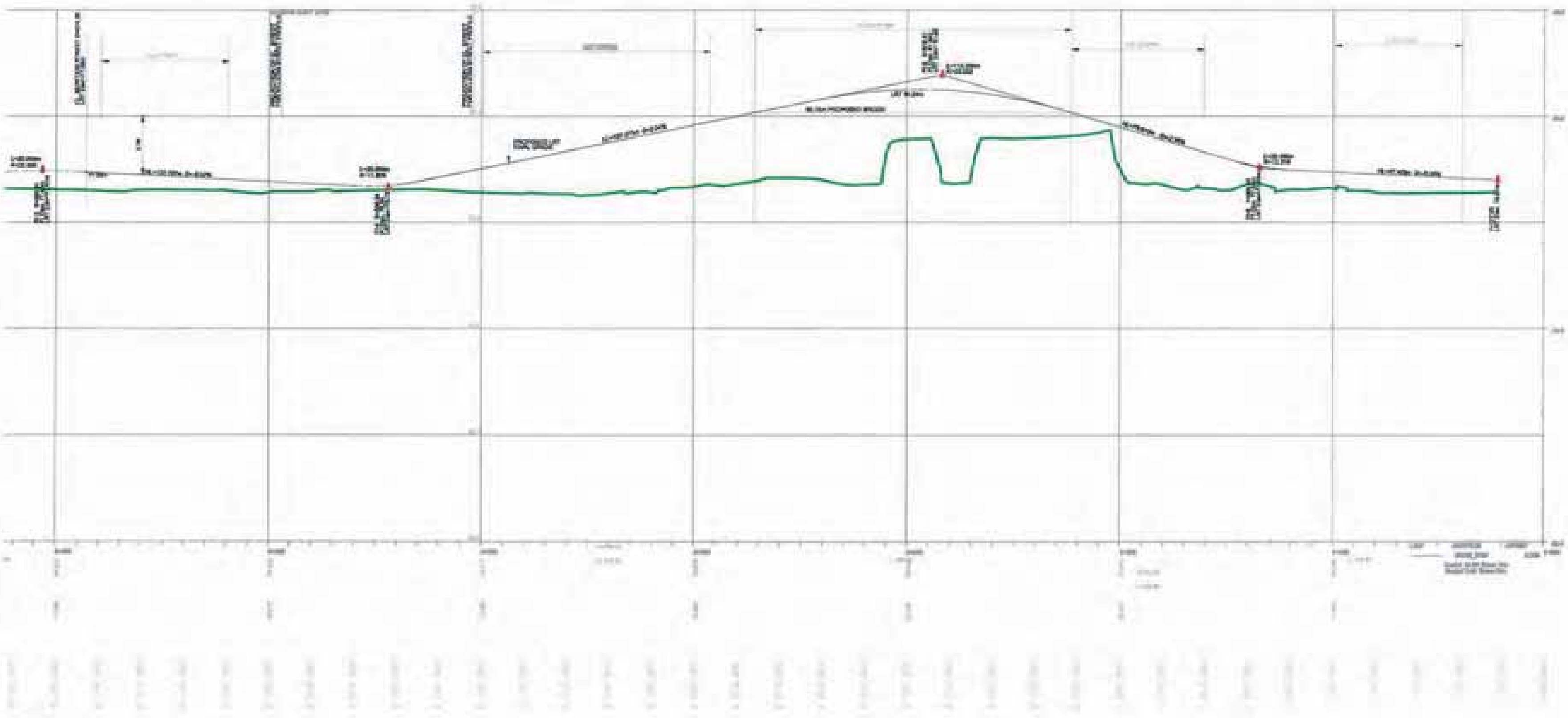
Job Title
Lower Don Lands

Drawing Title
QUEENS QUAY - LRT PROFILE
ALTERNATIVE II

Key Plan

Scale at A3
AS SHOWN

Job No
98135



VILLIERS STREET - LRT PROFILE
ALTERNATIVE I (PART I)

ARUP

EBR	JULY 06,2009	P.B.	D.P.	D.P.
Issue	Date	By	Chkd	Appd

Client
WATERFRONT TORONTO

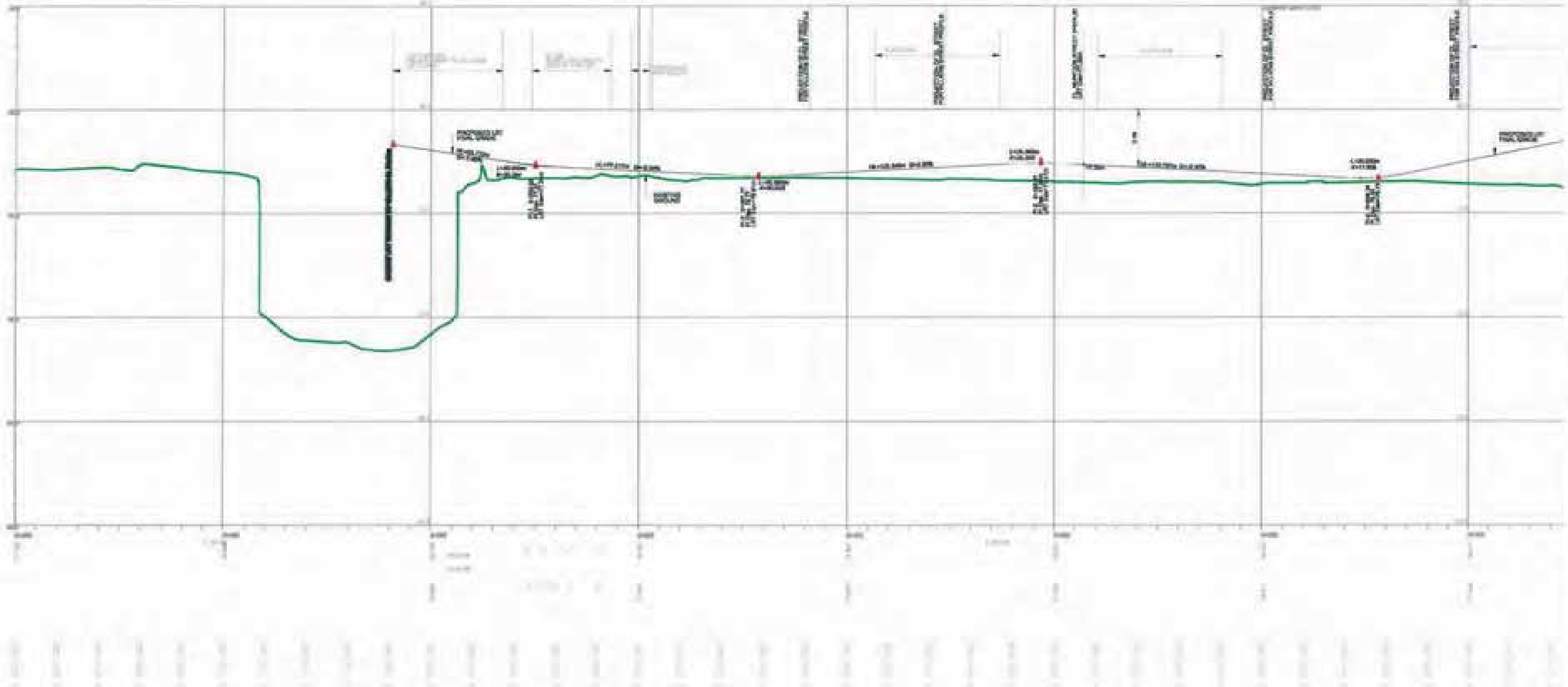
Job Title
Lower Don Lands

Drawing Title
VILLIERS STREET - LRT PROFILE
ALTERNATIVE I (PART I)

Key Plan

Scale at A3
AS SHOWN

Job No
99135



VILLIERS STREET - LRT PROFILE
ALTERNATIVE I (PART II)

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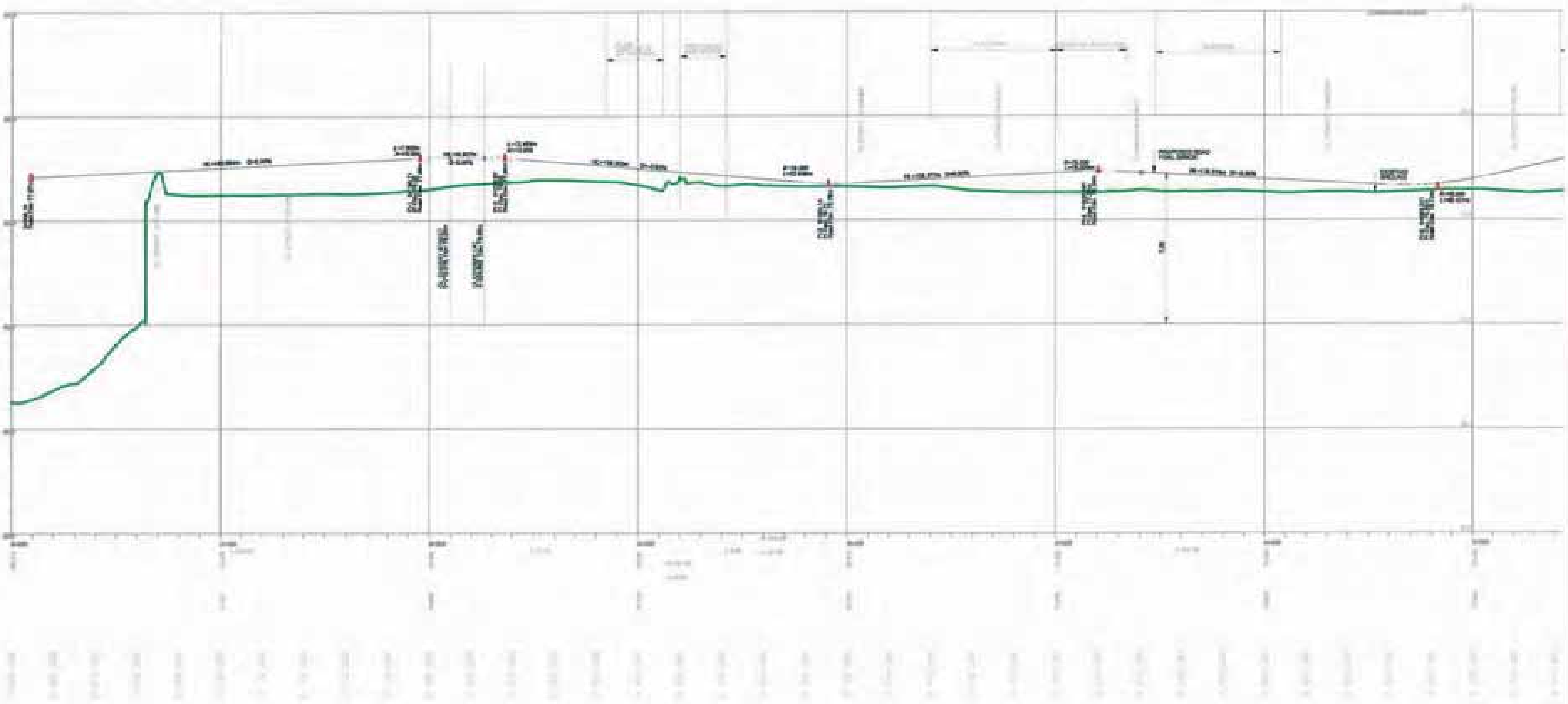
				Job No: 98136



VILLIERS STREET - ROAD PROFILE
ALTERNATIVE I (PART II)

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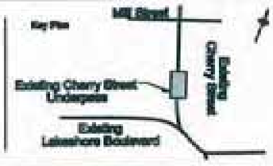

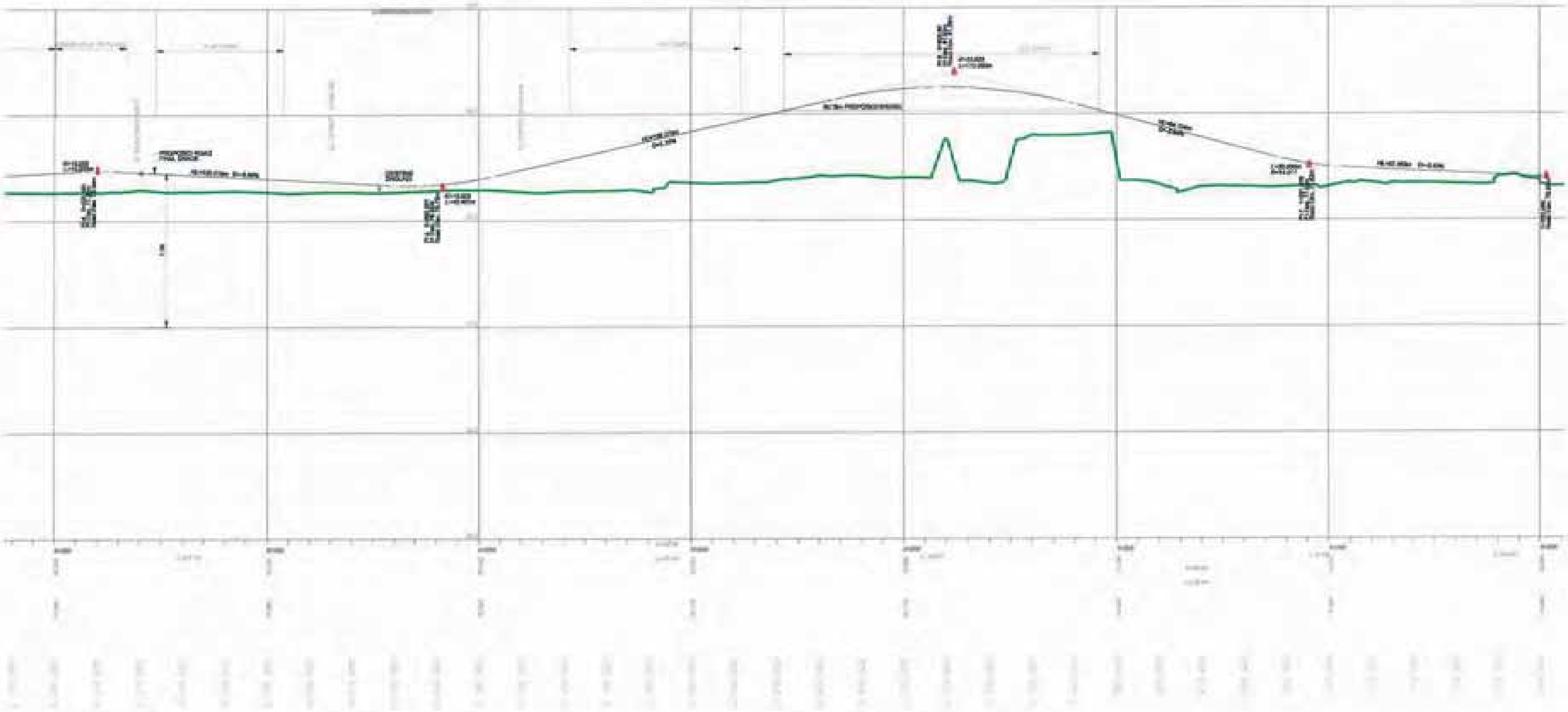

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IVE I (PART II)

VILLIERS STREET - ROAD PROFILE
ALTERNATIVE I (PART I)

ARUP		Client	Job Title	Key Plan	Scale at A3
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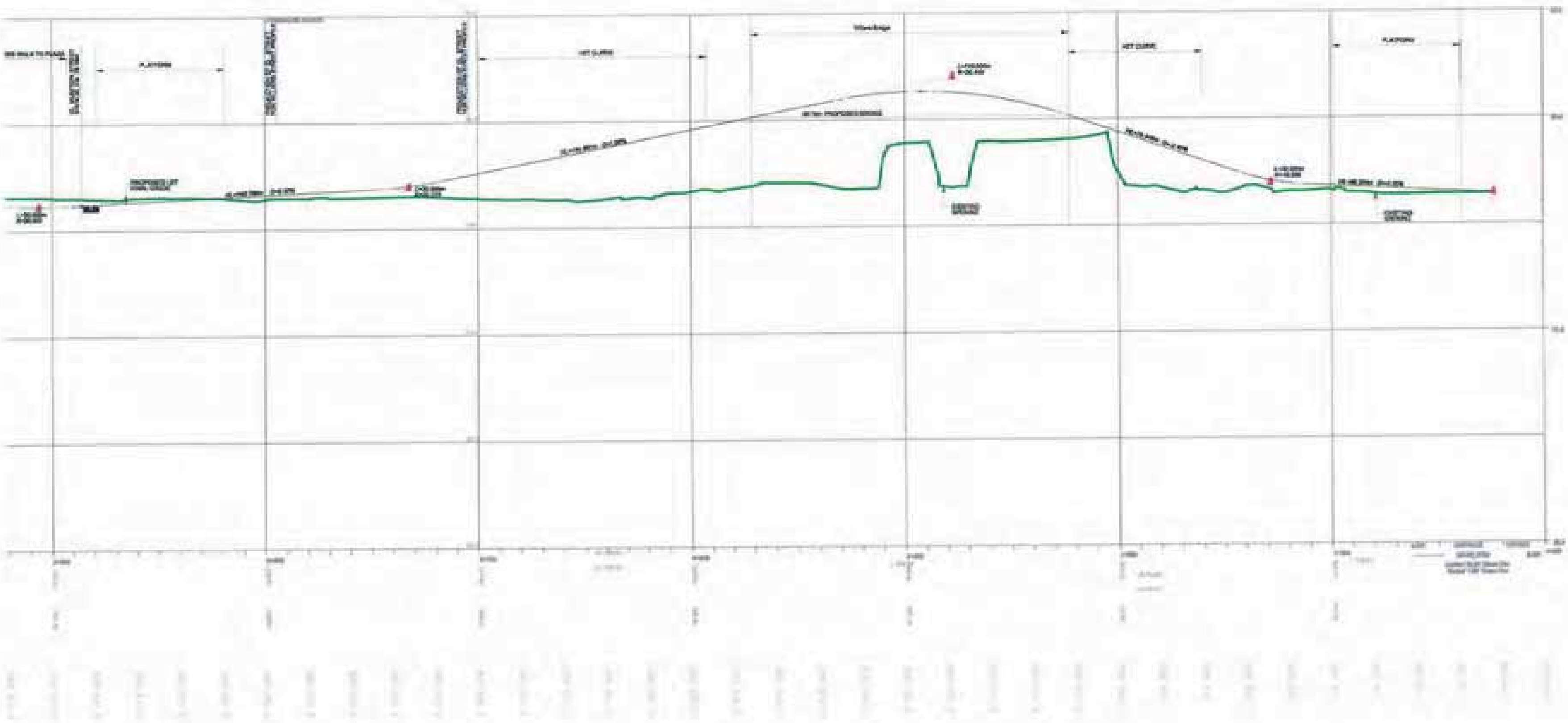
www.arup.com	Issue / Date / By / Chkd / Appd		Drawing Title	Existing Cherry Street Underpass	Job No
			VILLIERS STREET - LRT PROFILE ALTERNATIVE I (PART I)	Existing Cherry Street	96135
				Existing Lakeshore Boulevard	



VILLIERS STREET - LRT PROFILE
ALTERNATIVE II (PART I)

ARUP

Issue	Date	By	Chkd	Appd
ESR	JULY 06,2009	P.S.	D.P.	D.P.

Client
WATERFRONT TORONTO

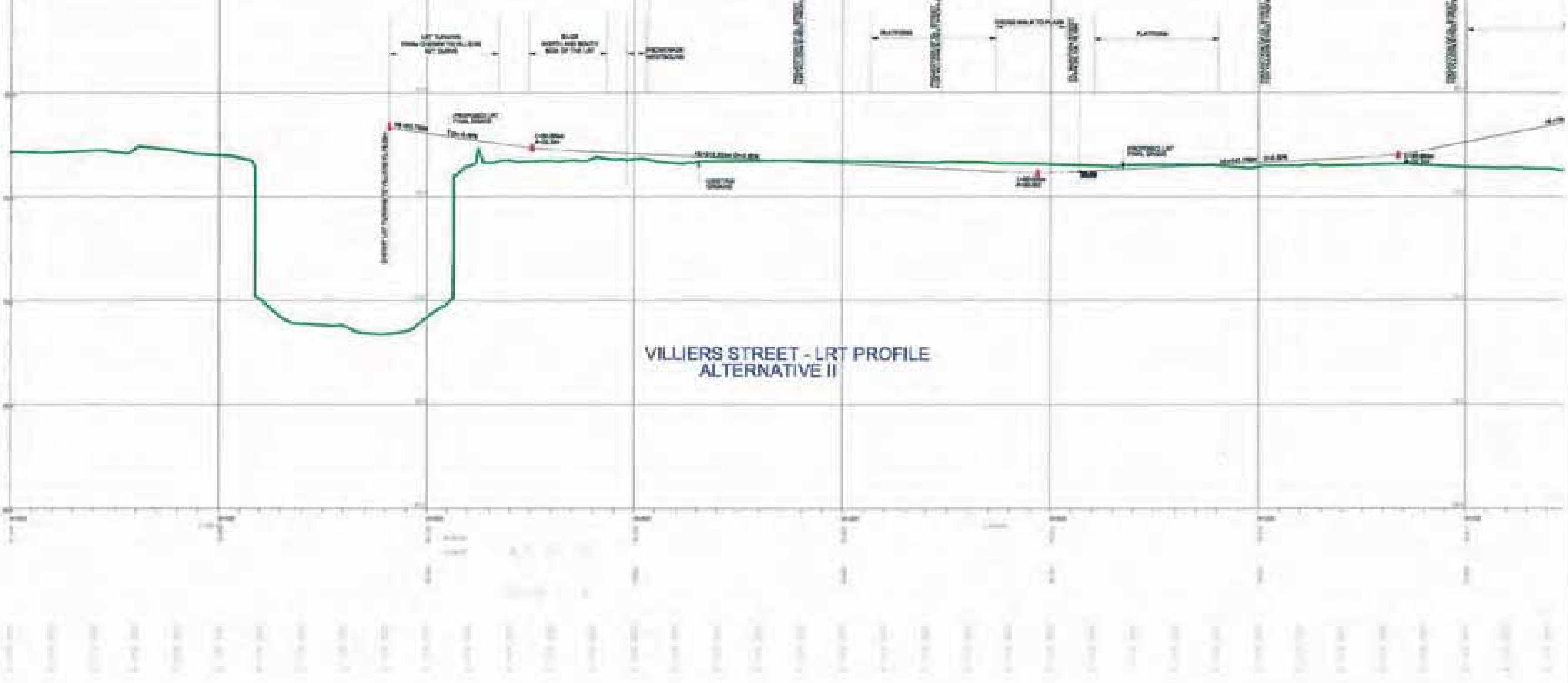
Job Title
Lower Don Lands

Drawing Title
VILLIERS STREET - LRT PROFILE
ALTERNATIVE II (PART I)

Key Plan

Scale at A3
AS SHOWN

Job No
98138



VILLIERS STREET - LRT PROFILE
ALTERNATIVE II (PART II)

ARUP

EBR	JULY 08,2009	P.S.	D.P.	D.P.
Issue	Date	By	Chkd	Appd

Client
WATERFRONT TORONTO

Job Title
Lower Don Lands

Drawing Title
VILLIERS STREET - LRT PROFILE
ALTERNATIVE II (PART II)

Key Plan

Scale at A3
AS SHOWN

Job No
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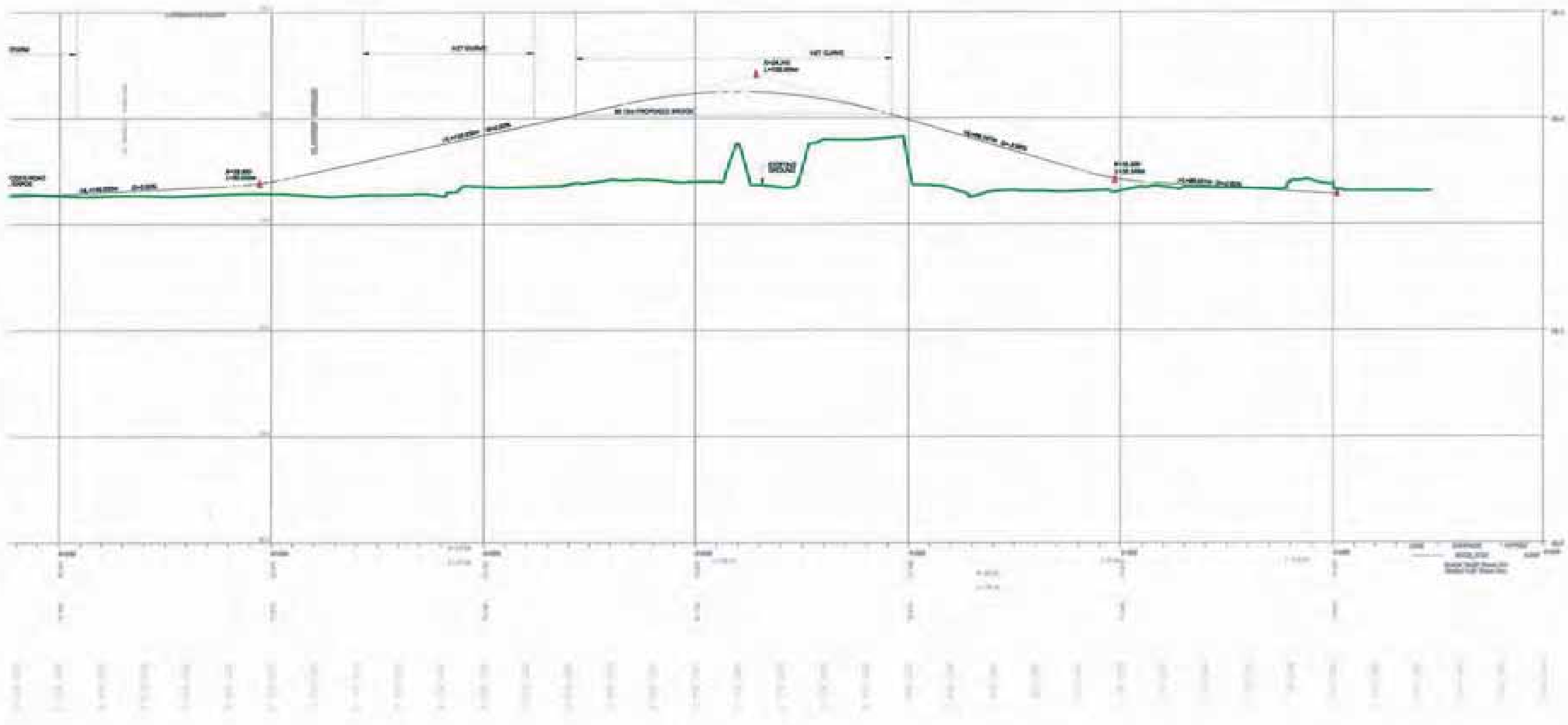

VILLIERS STREET - ROAD PROFILE
ALTERNATIVE II (PART I)

ESR	JULY 08,2009	P.S.	D.P.	D.P.
Issue	Date	By	Chkd	Appd

ARUP

Client: WATERFRONT TORONTO

Job Title: Lower Don Lands

Drawing Title: VILLIERS STREET - ROAD PROFILE ALTERNATIVE II (PART I)

Key Plan

Scale at A3: AS SHOWN

Plot ID

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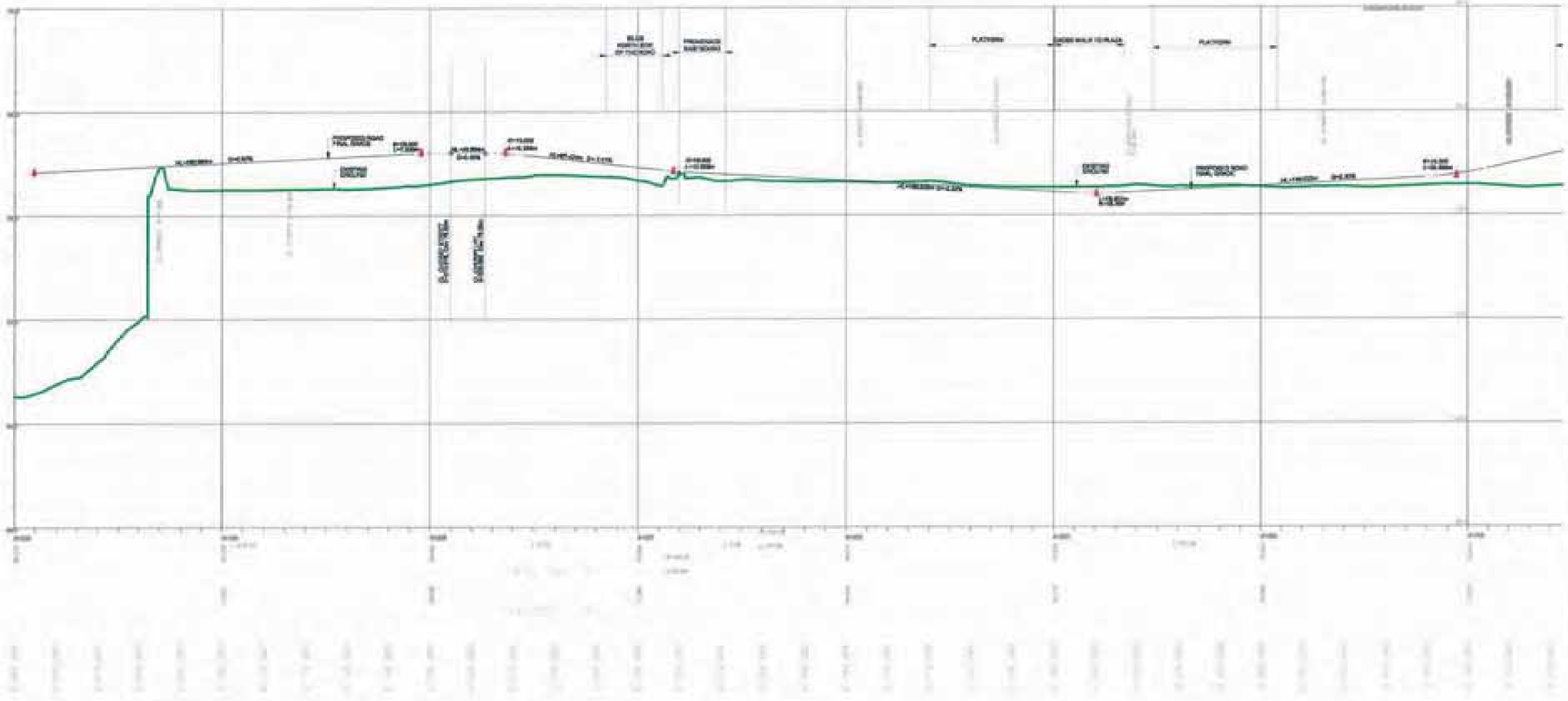
Drawing No

Issue



VILLIERS STREET - ROAD PROFILE
ALTERNATIVE II (PART II)

ARUP

Issue	Date	By	Chkd	Appd
ESR	JULY 08,2009	P.S.	D.P.	D.P.

Client
WATERFRONT TORONTO

Job Title
Lower Don Lands

Drawing Title
VILLIERS STREET - ROAD PROFILE
ALTERNATIVE II (PART II)

Key Plan

Scale at A1
AS SHOWN

Drawing Status

Job No
95135

Drawing No

Issue

Appendix 12-A1

Evaluation of Bridge Design Alternatives

WATERFRONToronto

TORONTO

Toronto Transit
Commission

Summary of Cherry Street Design Alternatives at Rail Berm

Evaluation Criteria	**Alternative 1** Replace existing bridge with a new structure accommodating both a widened road cross-section and new LRT span.	**Alternative 2** Keep the existing bridge and build a second underpass for the LRT (east of the existing bridge).	**Alternative 3** Replace existing bridge with a new structure accommodating a widened road cross-section and add a second underpass for the LRT.
Natural Environment • Don Mouth Naturalization • New Natural Area – (Wetlands)	No difference between design alternatives		
Social Environment • Vibrant, mixed use community • Access to water	No difference between design alternatives		
Economic Environment • Economically viable blocks • Cost-effective to build	+ Maximizes viability of development blocks by "bundling" transit with roadway. + Combining roadway and LRT into a single structure reduces overall costs.	+ Less costly to maintain existing structure and build separate underpass for the LRT.	- Constructing separate structures for roadway and LRT increase costs.
Cultural Environment • Aboriginal people • Heritage structures • Archaeology	No difference between design alternatives		
Sustainability • WT Sustainability Framework • City sustainability standards • Impervious surfaces	No difference between design alternatives		
Land Use and Property • New land uses • Public realm goals • Property	+ Maximizes areas available for new land uses with "bundled" transit and roadway through rail berm. + Requires least amount of property.	- Reduces area available for new land uses - Requires larger amount of property due to LRT alignment.	- Reduces area available for new land uses - Requires largest amount of property due to separate structures and LRT alignment.
Transportation • Walkability • Transit priority • Zero-growth traffic • Parking	+ Provides improved transit and roadway geometry because it keeps transit together with roadway through rail berm. + Provides best intersection configuration at Cherry Street and Lake Shore Boulevard. + Maximizes feeling of openness in portal when pedestrians share space with road and transit through rail berm.	- LRT alignment and intersection configuration at Cherry Street and Lake Shore Boulevard is not desirable. - Condition and geometric deficiencies of existing bridge are not addressed. - Reduces openness for pedestrians in narrower portal through rail berm.	- Separation of roadway and transit results in undesirable horizontal alignments and intersection configuration of Cherry Street and Lake Shore Boulevard. + Maximizes feeling of openness in portal when pedestrians share space with road and transit through rail berm.
Municipal Services Utilities	No significant difference		
Summary	**PREFERRED**	NOT PREFERRED	NOT PREFERRED

Alternative 1 is the Preferred Cherry Street Portal Design because it addresses the geometric deficiencies of the existing bridge. Keeping Cherry Street and the LRT together through the rail berm facilitates improved connections and provides preferred alignment geometrics at the intersection of Cherry Street and Lake Shore Boulevard. This alternative also minimizes impacts in West Don Lands., to the north

Legend
+ Advantage
- Disadvantage

Summary of Lake Shore Boulevard Bridge and Harbour Lead Rail Bridge Design Alternatives in Keating Channel Precinct

Evaluation Criteria	**Alternative 1** Modify and extend the existing bridges.	**Alternative 2** Reconstruct and extend the existing bridges.
Natural Environment • Don Mouth Naturalization • New Natural Area – (Wetlands)	No difference between design alternatives – both designs improve hydraulic capacity.	
Social Environment • Vibrant, mixed use community • Access to water	No difference between design alternatives.	
Economic Environment • Economically viable blocks • Cost-effective to build	+ Less costly to modify and extend the existing structures.	- More costly to reconstruct entire bridges.
Cultural Environment • Aboriginal people • Heritage structures • Archaeology	No difference between alternatives – there are no impacts to heritage structures, and both have the potential for minor impacts to archaeological resources.	
Sustainability • WT Sustainability Framework • City sustainability standards • Impervious surfaces	No difference between design alternatives – impervious surface areas are the same.	
Land Use and Property • New land uses • Public realm goals • Property	No difference between design alternatives – Neither bridge improvement will require property.	
Transportation • Walkability • Transit priority • Zero-growth traffic • Parking	+ Modifying and extending the existing bridges will have a shorter construction period, resulting in less impact to the pedestrian/cyclist, road and rail traffic.	- Reconstructing and extending the existing bridges will have a longer duration of construction because of the requirement to remove and reconstruct the existing bridge substructure components, and as such will have a greater impact to the pedestrian/cyclist, road and rail traffic.
Municipal Services Utilities	No difference between design alternatives	
Summary	**PREFERRED**	**NOT PREFERRED**

Alternative 1 is the preferred Lake Shore Boulevard Bridge and Harbour Lead Rail Bridge Design because it takes advantage of the fact that the bridges are in relatively good condition and can be modified to provide the required hydraulic capacity and roadway/rail geometrics.

Legend
+ Advantage
- Disadvantage

Summary of Keating Channel Bridge Design Alternatives in Keating Channel Precinct

Evaluation Criteria	Alternative 1 Moveable Bridges (includes lift or swing bridges).	Alternative 2 Fixed Bridges (includes standard slab-on-girder bridges or arch bridges).
Natural Environment • Don Mouth Naturalization • New Natural Area – (Wetlands)	No difference between design alternatives.	
Social Environment • Vibrant, mixed use community • Access to water	- Moveable bridges restrict pedestrian access under bridge and limit/interrupt pedestrian flow along Keating Channel, which is critical to the vibrancy of the proposed mixed use community. + Moveable bridges maximize vertical navigational clearance for ship navigation in the Keating Channel.	+ Fixed bridges will be designed to permit pedestrian passage along the Keating Channel, which is important to the vibrancy of the proposed mixed use community adjacent to the channel. - Fixed bridges have limited vertical navigational clearance but will provide access for recreational vessels, tour boats and water taxis in the Keating Channel.
Economic Environment • Economically viable blocks • Cost-effective to build	- Moveable bridges are more costly because they require an operator. - Moveable bridges have higher levels of operation and maintenance costs because they are prone to failure.	+ Fixed bridges have lower operational and maintenance costs.
Cultural Environment • Aboriginal people • Heritage structures • Archaeology	+ Moveable bridges are consistent with the cultural heritage of existing Cherry Street bridge.	- Fixed bridges are not consistent with existing Cherry Street Bridge.
Sustainability • WT Sustainability Framework • City sustainability standards • Impervious surfaces	No difference between design alternatives	
Land Use and Property • New land uses • Public realm goals • Property	No difference between design alternatives	
Transportation • Walkability • Transit priority • Zero-growth traffic • Parking	- Moveable bridges cause delay to vehicle, pedestrian/cyclist and transit traffic when bridges are in "up" position. - Moveable bridges also cause potential delays for emergency service providers when bridges are in "up" position.	+ Fixed bridges accommodate continuous and uninterrupted passage for pedestrian/cyclists, vehicles and transit. + Fixed bridges will not restrict access for emergency services.
Municipal Services Utilities	- Moveable bridges prevent utilities from being combined with bridge structure.	+ Fixed bridges provide potential to combine utilities with road on structure.
Summary	NOT PREFERRED	**PREFERRED**

Alternative 2 is the Preferred Keating Channel Bridge Design because fixed bridges reduce travel delay through the Precinct, are more compatible with providing efficient transit service through the area, are pedestrian and bicycle friendly, and are at a scale that is appropriate for future land uses adjacent to the channel. Although navigational clearances will be reduced, the proposed fixed bridges will continue to provide access for recreational vessels, tour boats, dredge barges and water taxis in the Keating Channel.

Legend
+ Advantage
- Disadvantage

Summary of the Trinity Street Footbridge Design Alternatives

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3
Natural Environment			
Don Mouth naturalization	no difference	no difference	no difference
New natural area	no difference	no difference	no difference
Air quality impacts	no difference	no difference	no difference
	Preferred	Preferred	Preferred
Social Environment			
Vibrant, mixed use community	no difference	no difference	no difference
Access to water	(+) allows boat access	(-) restricts boat access	(-) restricts boat access
Noise	no difference	no difference	no difference
	Preferred		
Economic Environment			
Economic viable blocks	no difference	no difference	no difference
Cost-effective to build	(+) large span reduces marine construction costs	(+) structural economy between span and piers	(-) short span increases structural pier requirements.
Disruption to business	no difference	no difference	no difference
	Preferred	Preferred	
Cultural Environment			
Aboriginal people	no difference	no difference	no difference
Heritage structures	(-) raising grade near dock wall will cover the wall or require reconstruction	(+) maintaining grade of dock wall maintains the relationship between historic structure and promenade	(+) maintaining grade of dock wall maintains the relationship between historic structure and promenade
Archaeology	no difference	no difference	no difference
		Preferred	Preferred
Sustainability			
WT Sustainability Framework & City Sustainability Standards	no difference	no difference	no difference
Impervious surfaces	no difference	no difference	no difference
	Preferred	Preferred	Preferred
Land Use and Property			
New land uses and redevelopment	(+) navigation passage is clearly deliniated by bridge structure	(-) does not clearly deliniate navigation routes towards the channel center	(-) navigation passage restricted by bridge structure
Public realm goals	(+) maintanins connections with martin goodman trail and promenade	(+) maintanins connections with martin goodman trail and promenade	(+) maintanins connections with martin goodman trail and promenade
Property	no difference	no difference	no difference
Contaminated soils	no difference	no difference	no difference
	Preferred		
Transportation			
Walkability and promotes active transportation	no difference	no difference	no difference
Transit priority	no difference	no difference	no difference
Shift towards non-auto	no difference	no difference	no difference
Parking	no difference	no difference	no difference
Traffic operations	no difference	no difference	no difference
Rail	no difference	no difference	no difference
	Preferred	Preferred	Preferred
Municipal Services			
Utilities	no difference	no difference	no difference
	Preferred	Preferred	Preferred
SUMMARY	Preferred		

00B050+ 01+000advantage
FF0000- 01+000disadvantage

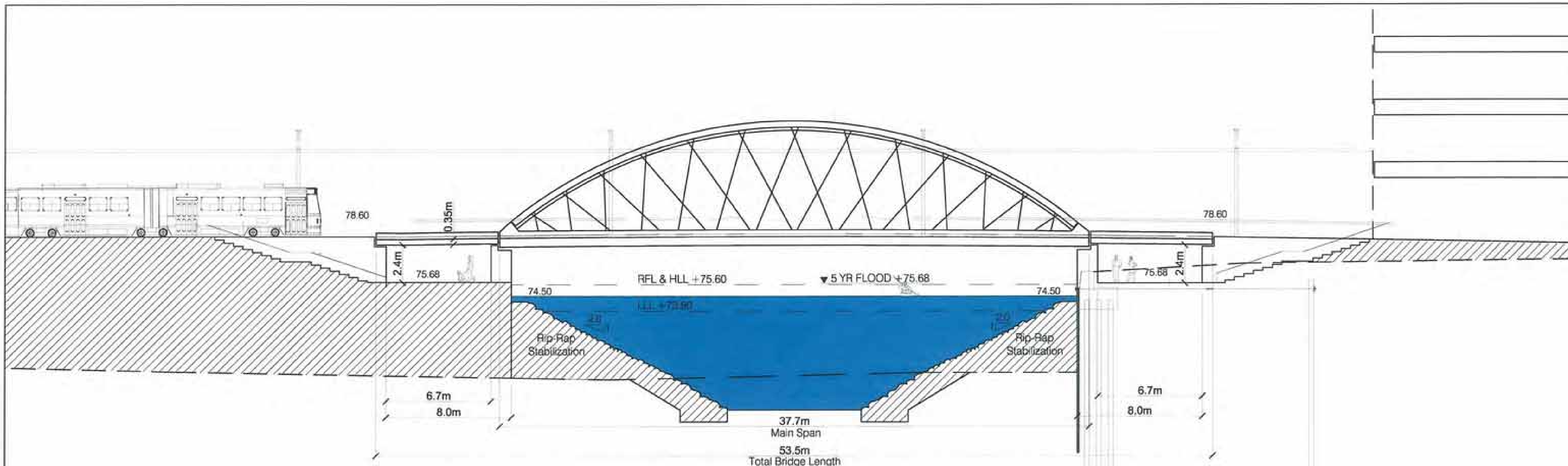
Appendix 12-A2

Keating Channel Crossing and Trinity Street Footbridge Alternatives

WATERFRONToronto

TORONTO

Toronto Transit Commission



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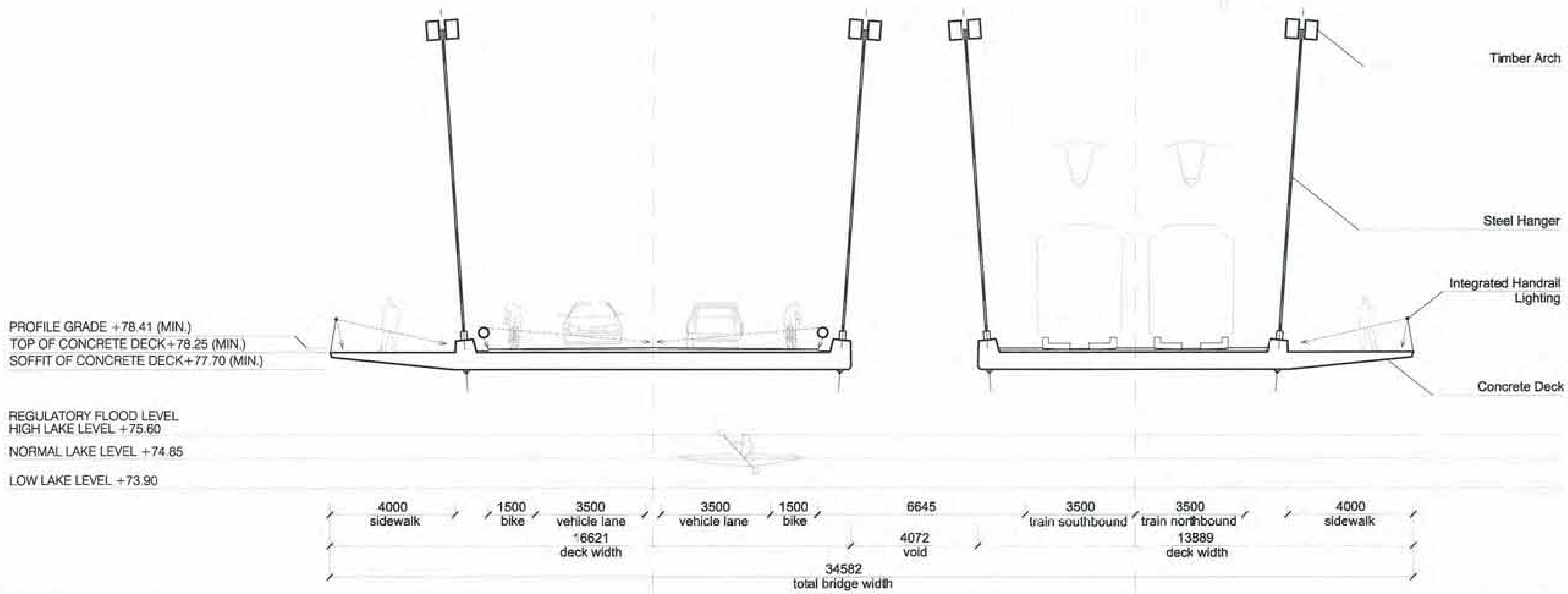
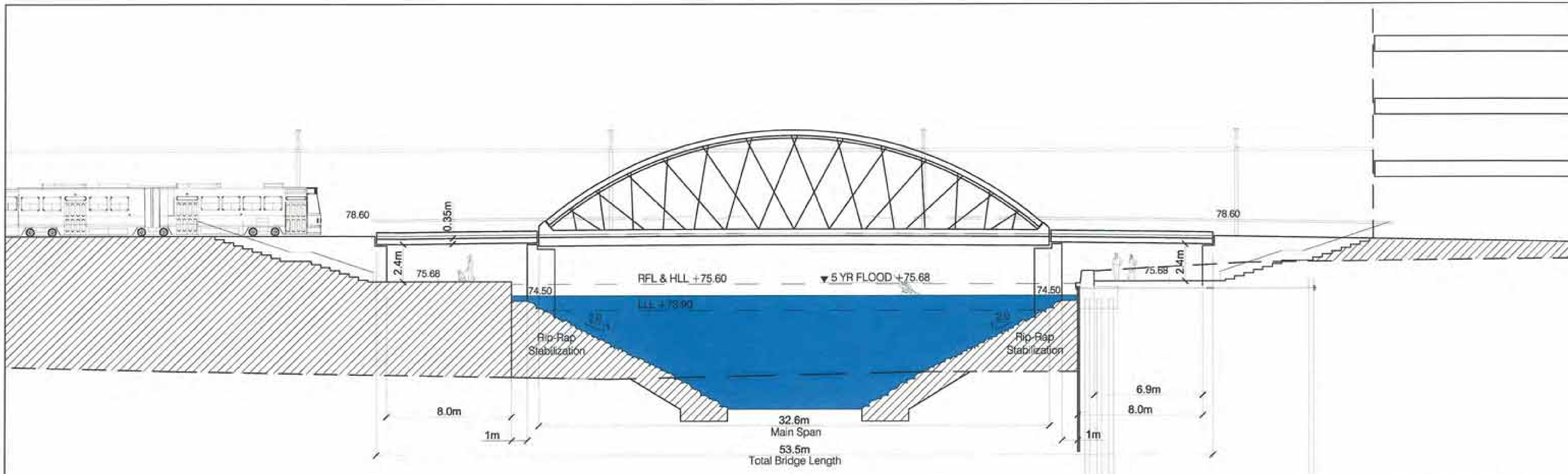


Cross Section 1/150

RFR	Toronto Lower Don Lands	MVVA	Concept Design	KC-Cherry Street Bridge - Alternative 1	-- @A3	2009-06-22	RFR-KC-Short Cherry Street Bridge	00
http://www.rfr.fr	Project	Client	Phase	Title	Scale@Format	Date	Drawing number	Revision



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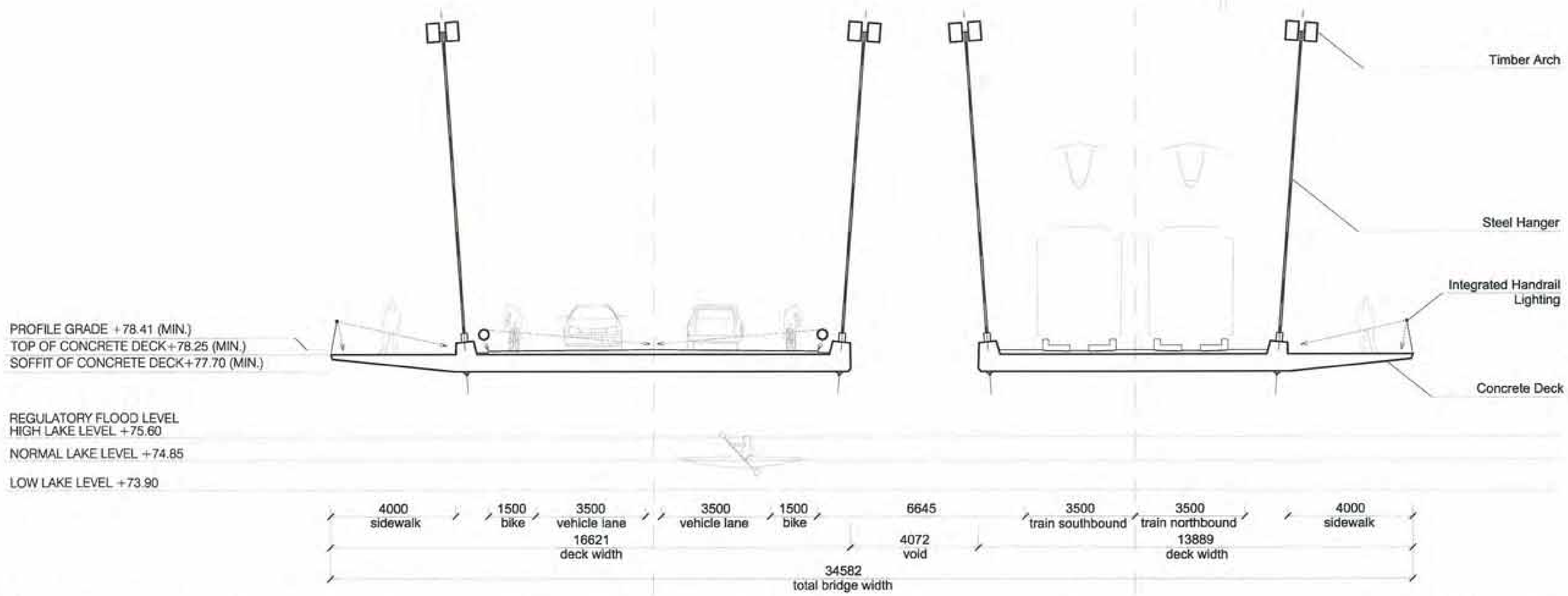
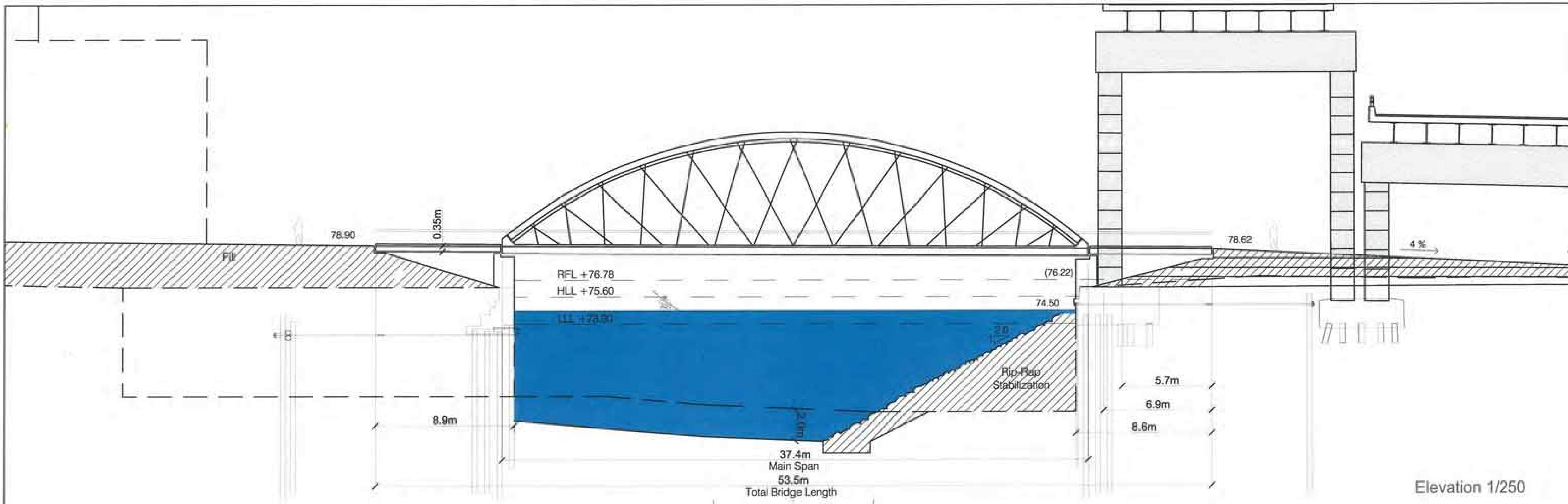
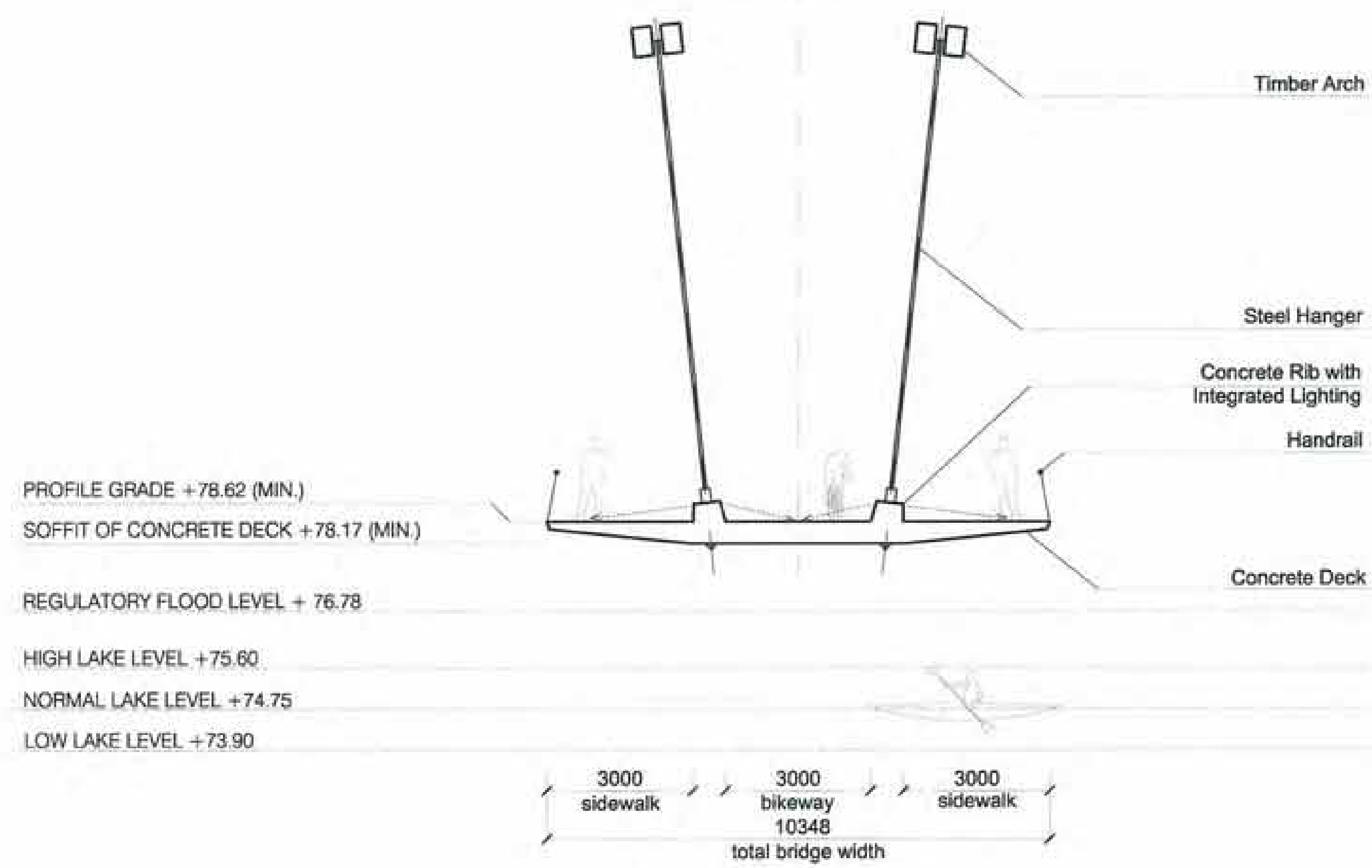


Cross Section 1/150

RFR	Toronto Lower Don Lands	MVVA	Concept Design	KC-Cherry Street Bridge - Alternative 2	-- @A3	2009-06-15	RFR-KC-Cherry Street Bridge	00
http://www.rfr.fr	Project	Client	Phase	Title	Scale@Format	Date	Drawing number	Revision

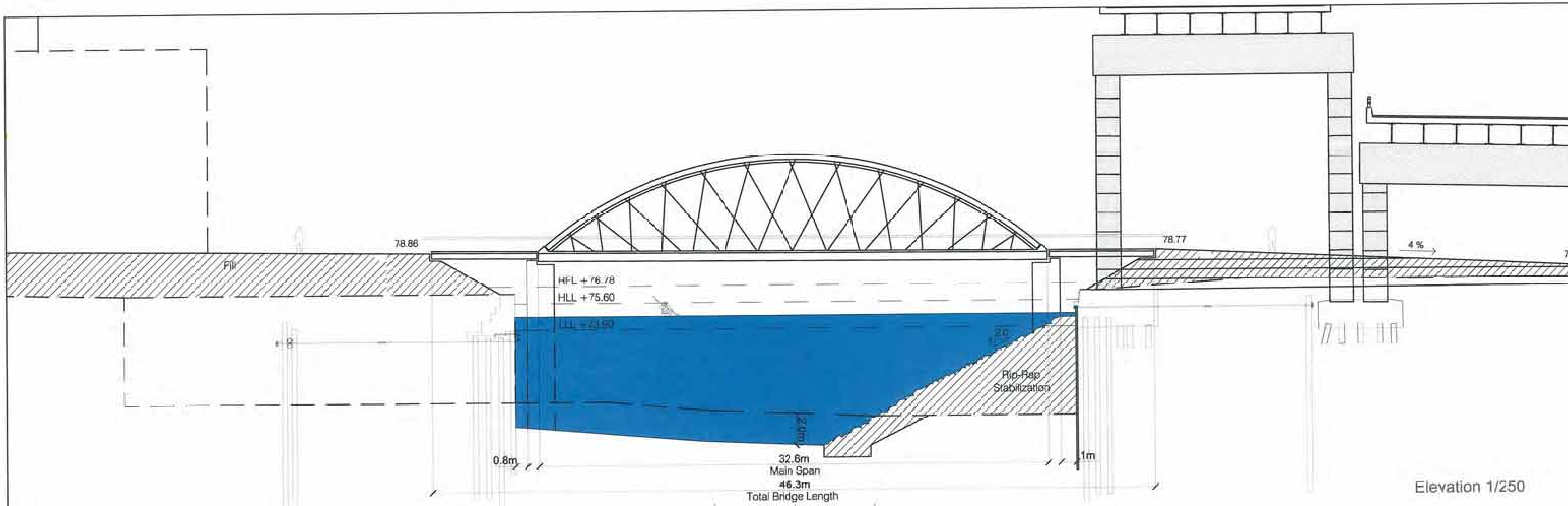


Elevation 1/250

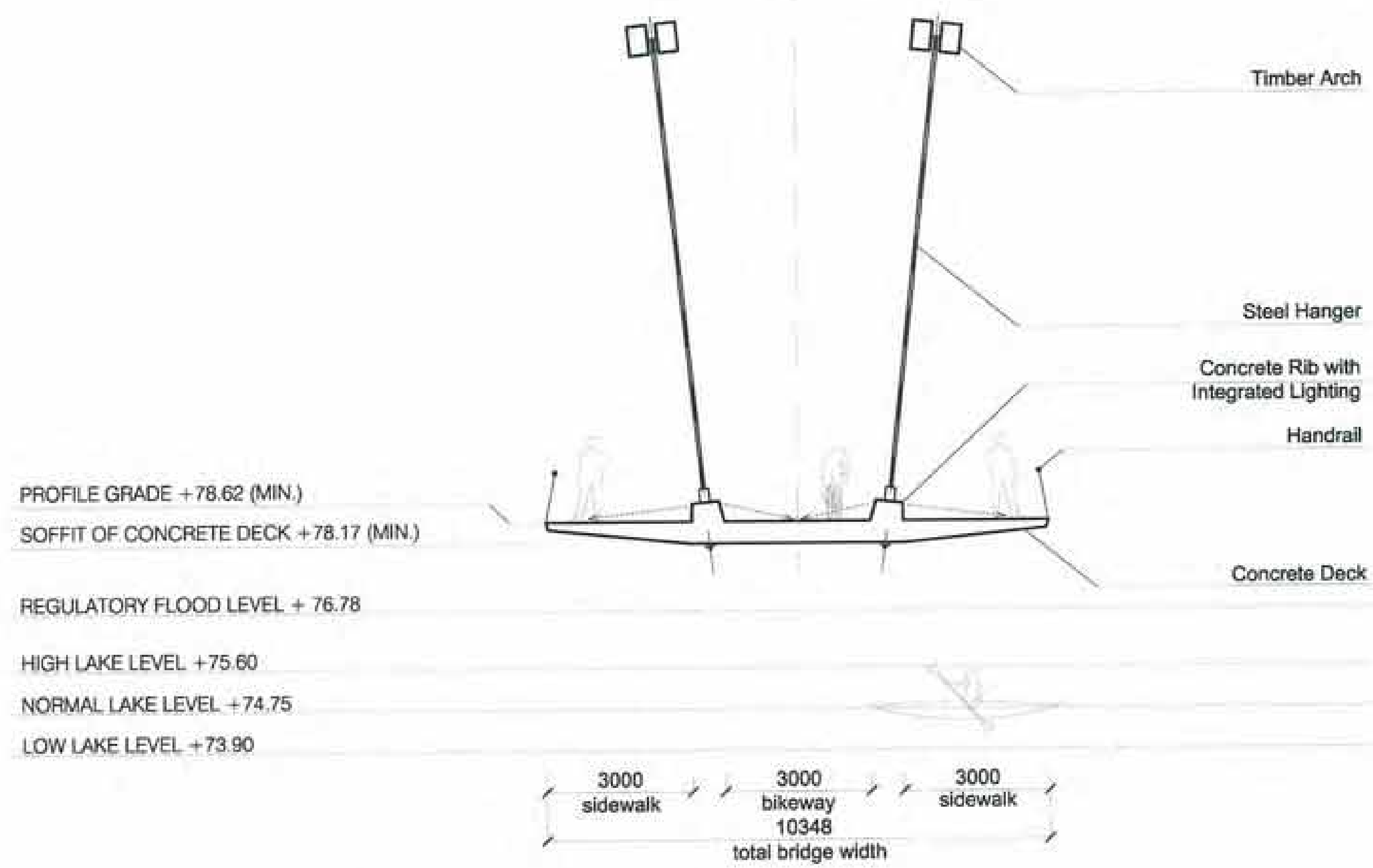


Cross Section 1/150

RFR http://www.rfr.fr	Toronto Lower Don Lands	MVVA	Concept Design	KC-Footbridge - Alternative 1	-- @A3	2009-06-22	RFR-KC-Short Footbridge	00
	Project	Client	Phase	Title	Scale@Format	Date	Drawing number	Revision



Elevation 1/250



Cross Section 1/150

RFR http://www.rfr.fr	Toronto Lower Don Lands	MVVA	Concept Design	KC-Footbridge - Alternative 2	-- @A3	2009-06-15	RFR-KC-Footbridge	00
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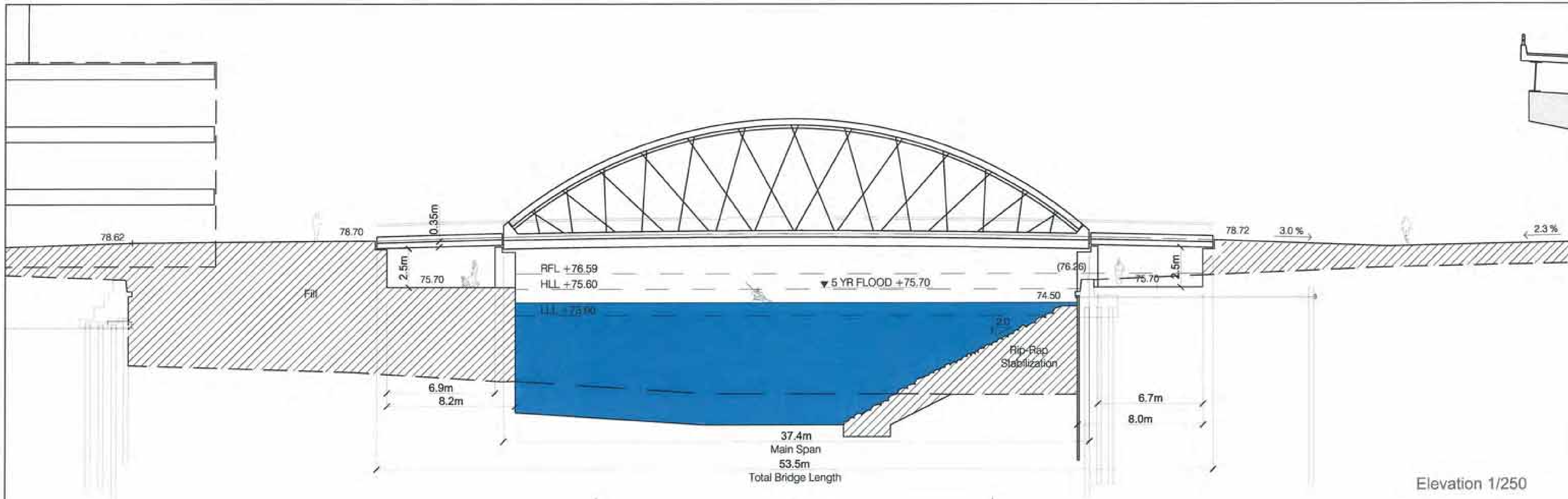
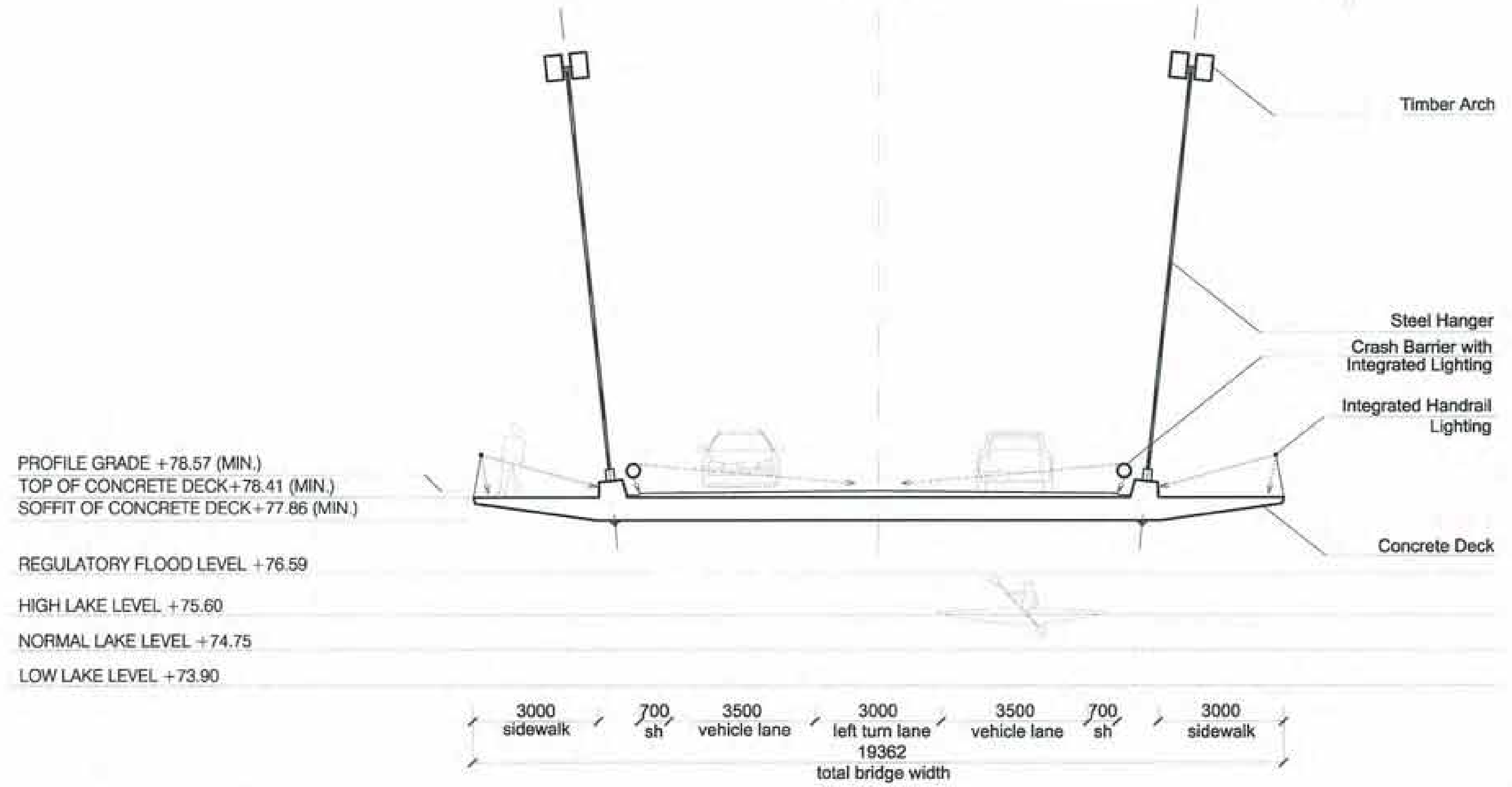


Elevation 1/250



Cross Section 1/150

RFR http://www.rfr.fr	Toronto Lower Don Lands	MVVA	Concept Design	KC-Munitions Street Bridge - Alternative 1	--@A3	2009-06-22	RFR-KC-Short Munitions Street Bridge	00
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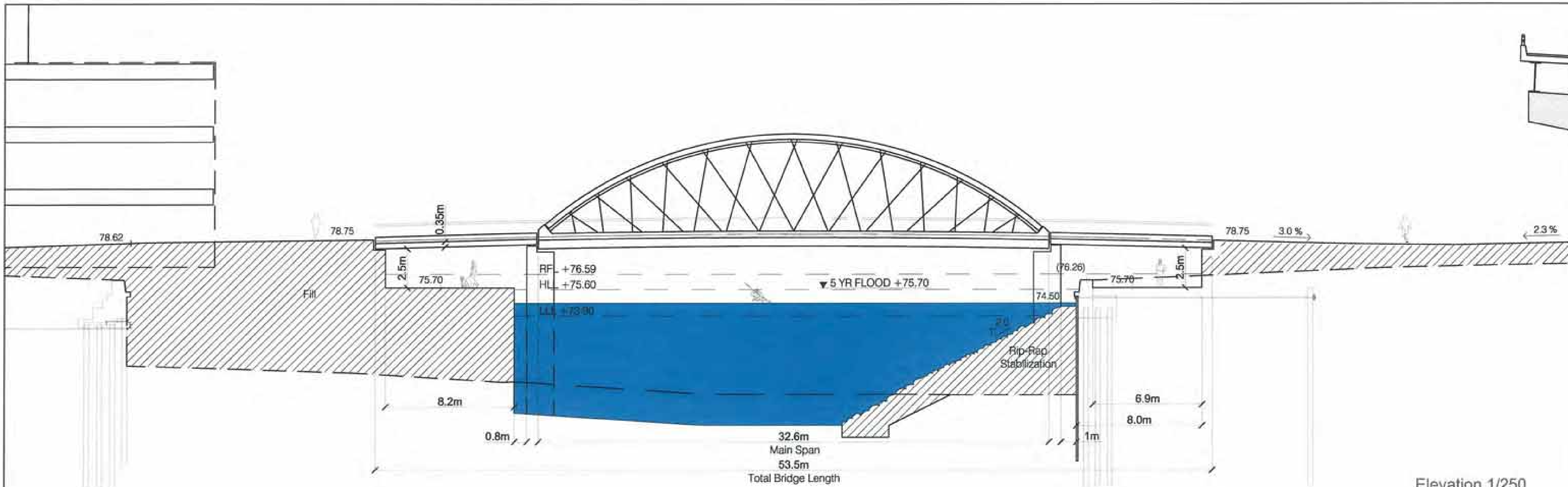
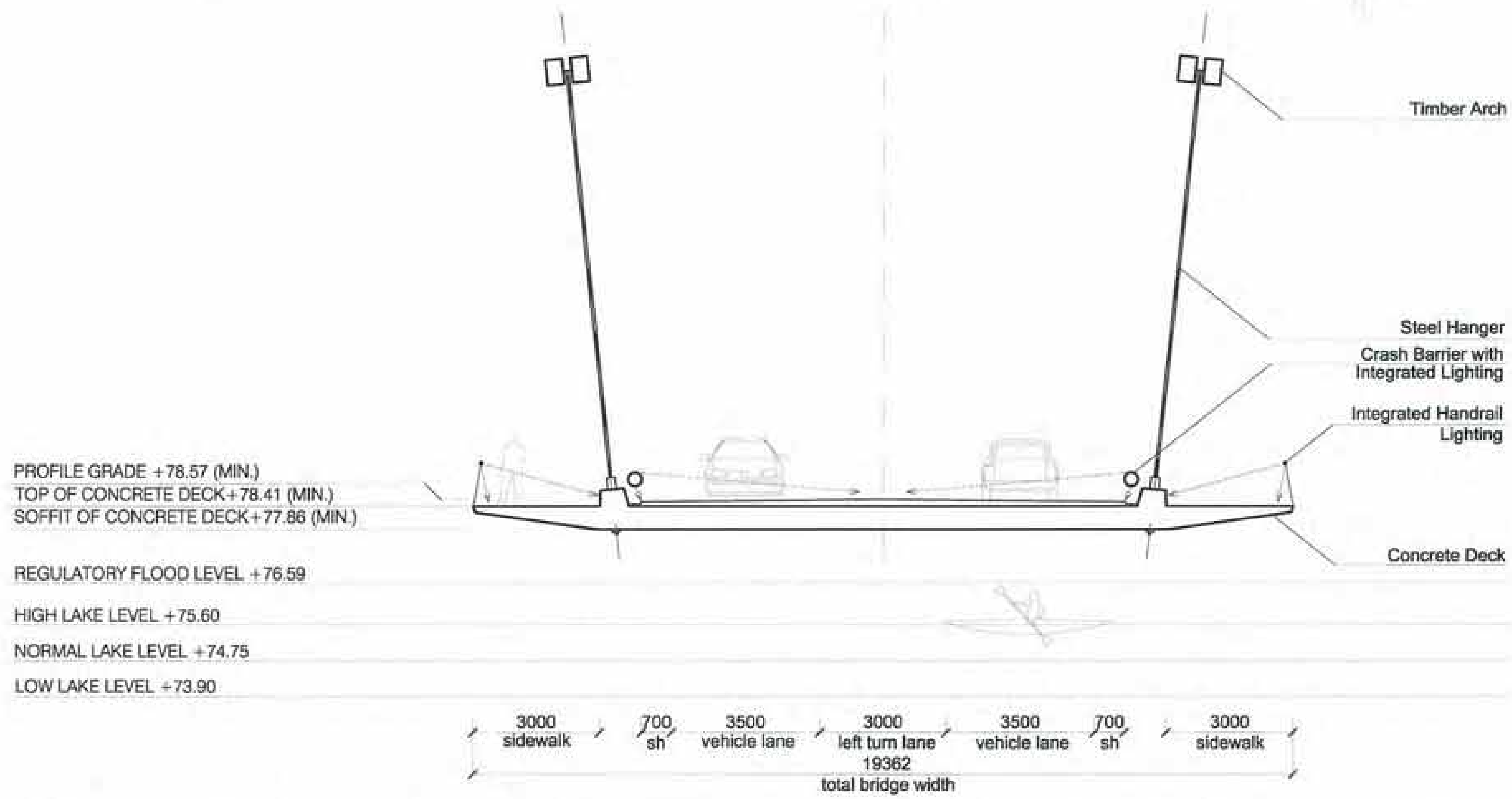
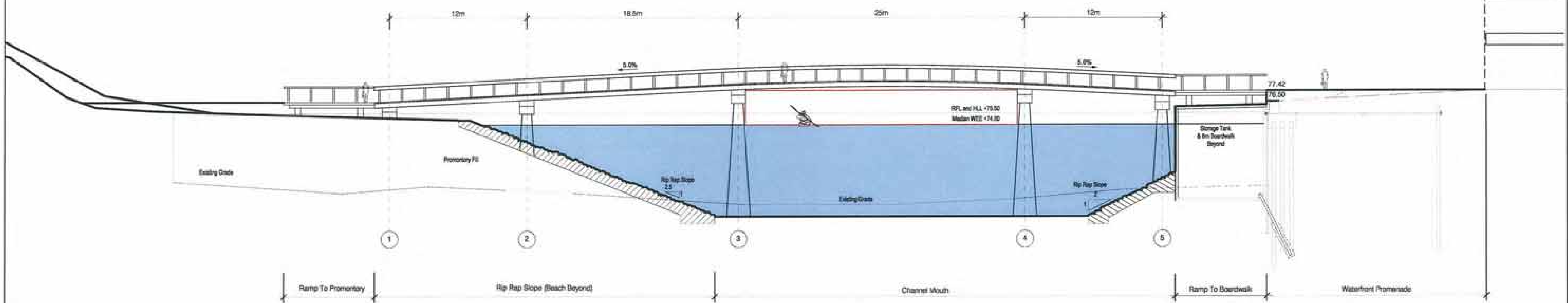


Elevation 1/250

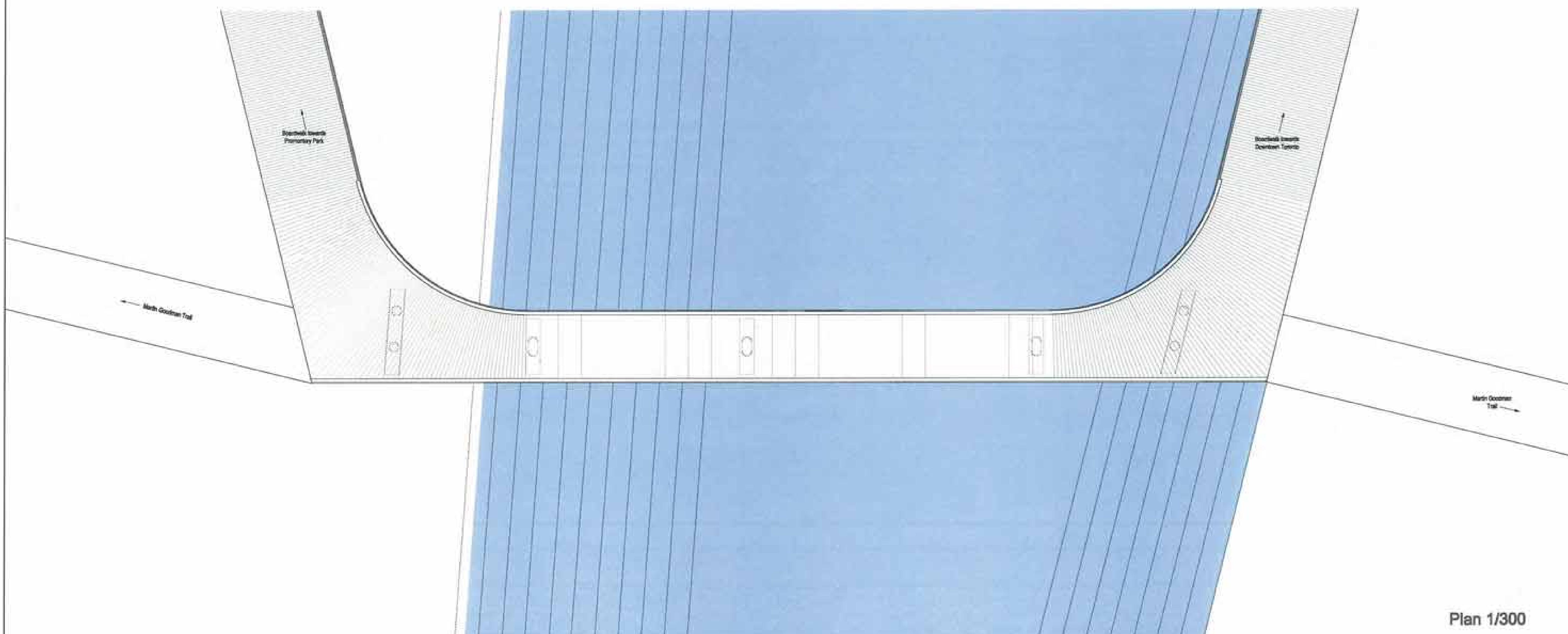


Cross Section 1/150

RFR http://www.rfr.fr	Toronto Lower Don Lands	MVVA	Concept Design	KC-Munitions Street Bridge - Alternative 2	-- @A3	2009-06-15	RFR-KC-Munitions Street Bridge	00
	Project	Client	Phase	Title	Scale@Format	Date	Drawing number	Revision

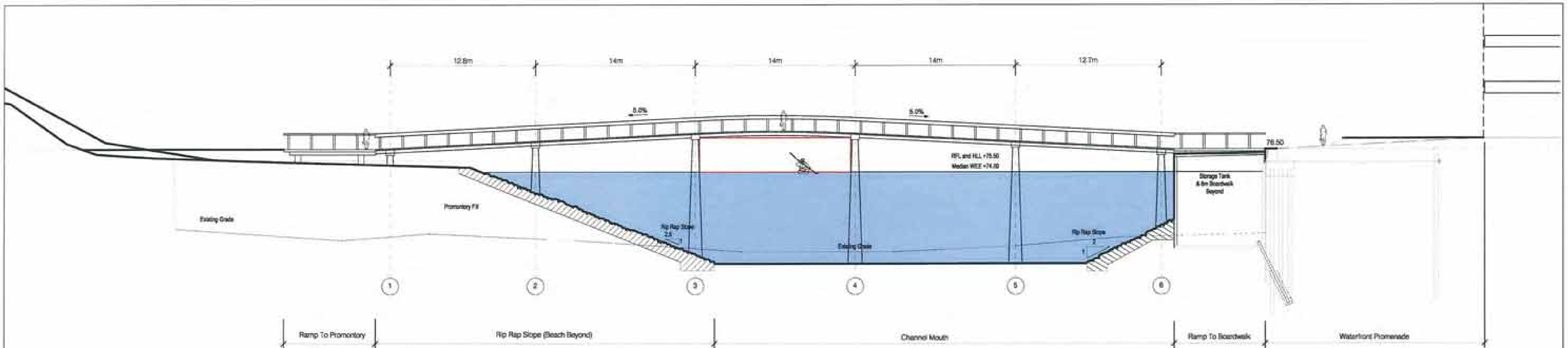


Longitudinal Section 1/300

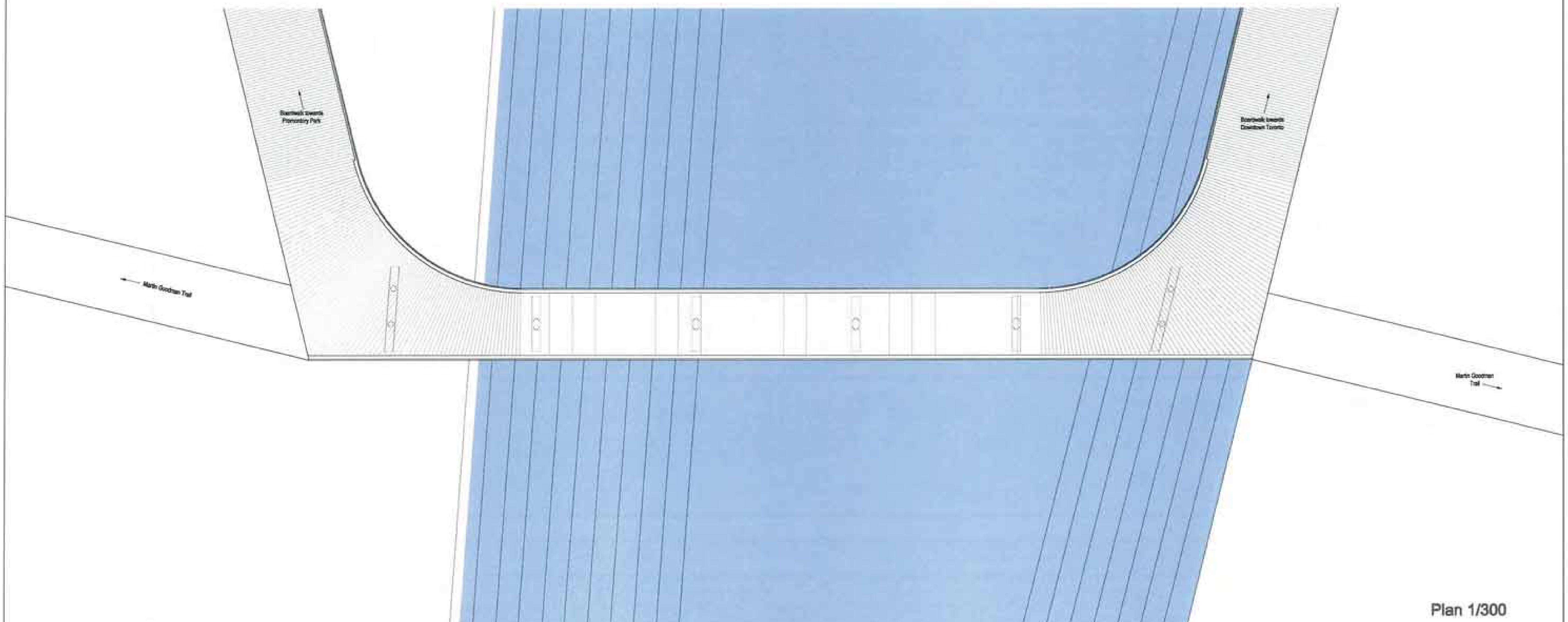


Plan 1/300

RFR http://www.rfr.fr	Toronto Lower Don Lands Project	MVVA Client	Concept Design Phase	Trinity Street Footbridge - 25m Span Slab Bridge Concept Title	--@A3 Scale@Format	2009-05-18 Date	RFR-Trinity-Option1 Drawing number	00 Revision

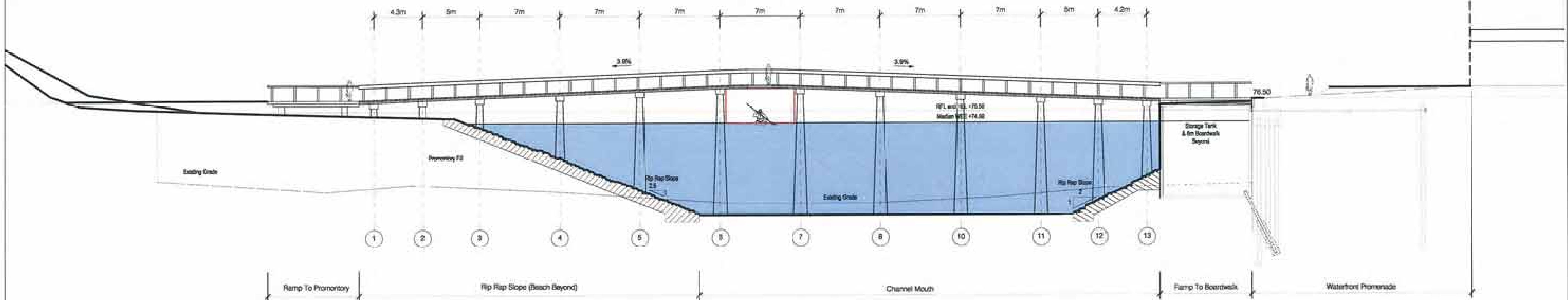


Longitudinal Section 1/300

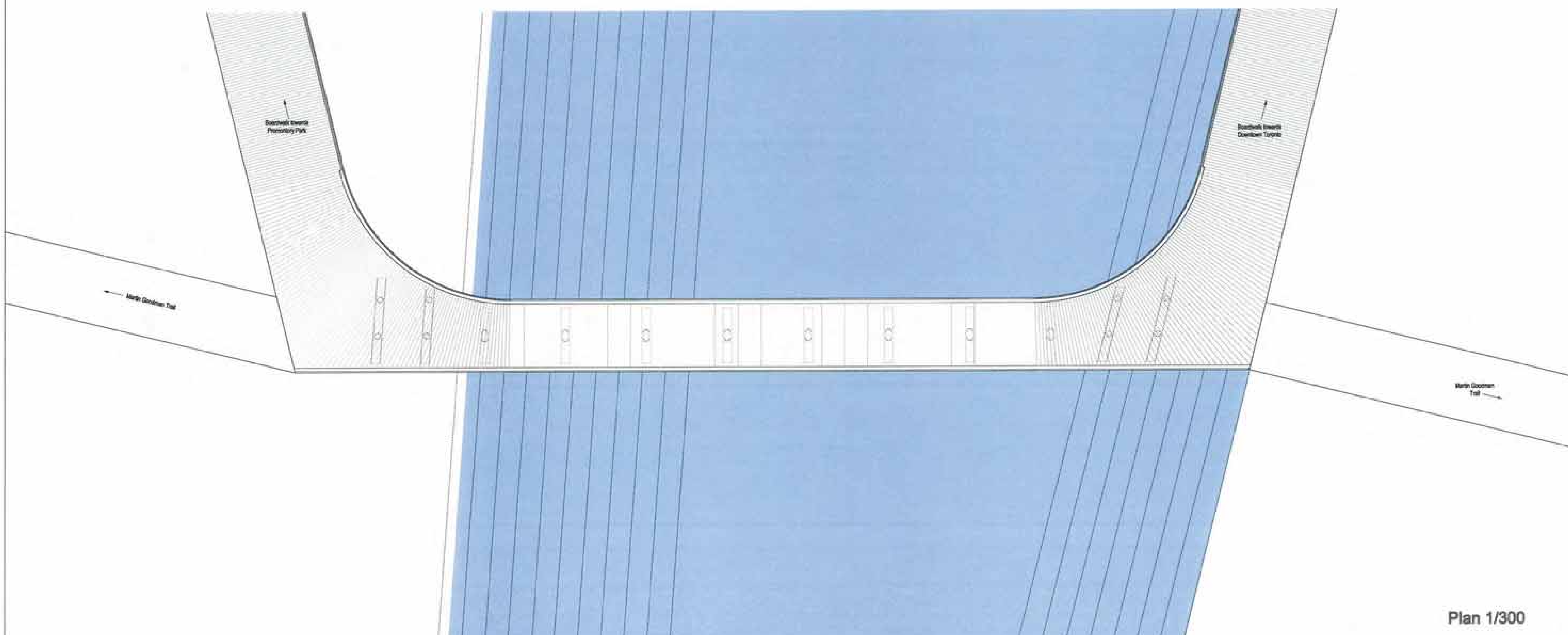


Plan 1/300

RFR http://www.rfr.fr	Toronto Lower Don Lands Project	MVVA Client	Concept Design Phase	Trinity Street Footbridge - 14m Span Slab Bridge Concept Title	-- @A3 Scale@Format	2009-05-18 Date	RFR-Trinity-Option2 Drawing number	00 Revision



Longitudinal Section 1/300



Plan 1/300

RFR http://www.rfr.fr

Toronto Lower Don Lands	MVVA	Concept Design	Trinity Street Footbridge - 7m Span Slab Bridge Concept	- - @A3	2009-05-18	RFR-Trinity-Option3	00
Project	Client	Phase	Title	Scale@Format	Date	Drawing number	Revision

Appendix 13-A1

Geotechnical Report

WATERFRONToronto

TORONTO

Toronto Transit
Commission

CONESTOGA-ROVERS
& ASSOCIATES

111 Brunel Road, Suite 200
Mississauga, Ontario L4Z 1X3
Telephone: (905) 712-0510 Fax: (905) 712-0515
www.CRAworld.com

2nd DRAFT MEMORANDUM

TO:	Marko Prgin	REF. NO.:	49148/6
FROM:	Tom Guoth/Renato Pasqualoni/Hassan Gilani/ck/1	DATE:	April 28, 2009
RE:	**Preliminary Geotechnical Assessment - Lower Dan Lands Study Area Municipal Class Environmental Assessment Toronto, Ontario**		

1.0 INTRODUCTION

Waterfront Toronto (WT) formerly known as Toronto Waterfront Revitalization Corporation in partnership with Toronto and Region Conservation Authority (TRCA) has engaged the services of Michael Van Valkenburgh Associates, Inc. (MVVA), Landscape Architects to prepare a study for transforming the lower Don lands into a sustainable urban community. The limits of the approximately 230 hectares (ha) lower Don Lands (Site or Study Area) are shown on Figure 1.

The current conceptual re-development plan for the Site includes naturalization of the mouth of the Don River, and redevelopment of the lower Don lands, which are currently under industrial/commercial use, as parklands and urban neighbourhoods. A review of the conceptual redevelopment plan presented on Figure 2 shows that the redevelopment will comprise of construction of the following major components:

- Don River Diversion;
- Bridges across the Keating Channel and diverted Don River;
- Bridges across the railway property to the north;
- Residential structures;
- Underground utilities including storm and sanitary sewers and a utility tunnel (utilidor) for other services;
- Stormwater retention/treatment systems, including two large stormwater tanks;
- Cherry Street Underpass Structure; and
- Extension of existing west shoreline at diverted mouth of the Don River and associated Shoreline protection works.

AECOM Technology Corporation (AECOM) is providing civil engineering consultancy services to MVVA for the proposed redevelopment. TRCA has engaged the services of SLR Consulting (Canada) Ltd. (SLR) for the subsurface environmental and geotechnical investigations required for planning and preliminary conceptual design of the civil works. SLR has completed a borehole investigation comprised of seventy (71) boreholes with forty six (46) boreholes completed as monitoring wells. Geotechnical sampling was carried out in thirteen (13) boreholes. For details of the investigation, the reader is referred to the SLR report 'Subsurface Investigation in Support of the Environmental Site Assessment for the Don Mouth Naturalization and Port Lands Flood Protection Project' dated March 30, 2009, hereafter referred as the 'SLR Report'.

AECOM has engaged the services of Conestoga-Rovers & Associates (CRA) to review the subsurface investigation data collected by SLR and available in other historic environmental and geotechnical investigation reports, and to prepare a geotechnical framework for the proposed development. CRA has prepared this draft preliminary geotechnical study with the following objectives:

- Summarize the subsoil and groundwater conditions across the Site; and
- Provide preliminary design and construction recommendations for the planning and preliminary conceptual design of the geotechnical components of the proposed redevelopment.

AECOM also provided the conceptual details of the following structures for CRA's review for providing preliminary geotechnical design and construction recommendations:

- Utilidor
- Cherry Street Underpass;
- Parliament Slip Underground Direct Energy Centre; and
- Shoreline Protection Works

The general and structure specific preliminary geotechnical design and construction recommendations provided in this report are intended only for the guidance of the design engineer for preparing preliminary design of the proposed redevelopment works with the understanding that detailed geotechnical investigations will be carried out for the final design once the development plans are finalized.

Identification of data-gaps and recommendations for additional geotechnical investigations are also provided, where applicable.

2.0 PREVIOUS REPORTS AND STUDIES

Previous reports and studies were reviewed concurrent to this draft preliminary geotechnical study. The relevant information, such as soil stratigraphy, groundwater table and SPT 'N' values where available from the borehole logs included in these reports, has been incorporated into this study. A list of the reviewed reports and studies is attached to this memorandum.

3.0 REGIONAL GEOLOGY AND SITE HISTORY

The Study area has been extensively modified over geological time periods by natural processes and in the recent history by human developments. The physiography and history of the Toronto Harbour has been discussed in detail in the Archaeological Master Plan of the Central Waterfront, City of Toronto, Ontario (2003)[1]. A brief geological history of the Study Area is discussed below:

[1] The Archaeological Master Plan of the Central Waterfront, City of Toronto, Ontario, (September 22, 2003), Prepared by Archaeological Services Inc., Historica Research Limited, and Cuesta Systems Inc.

General Study Area

The lands along the Toronto Central Waterfront have been developed over the last 200 years by lake-filling activities undertaken by the railways, major industries and the Toronto Harbour Commission.

The present day Toronto Islands is a series of roaming sand bars formed by the deposition of sediments that were eroded from the Scarborough bluffs and transported by the Lake Ontario currents. By the early 1800s, the largest of these bars had grown nearly 9 kms extending south west into the lake through Ashbridge's Bay and the marshes of the lower Don River forming a natural harbour between the lake and the mainland. The east-west bar/spit was attached to the mainland by a slender north-south isthmus bisected by the mouth of the Don River. The eastern side of the isthmus bordered a marshland extending into Ashbridge's Bay. The bar was breached west of the isthmus by a storm in 1852 (another storm in 1858 widened the breach) dividing the bar into Fisherman's Island and Toronto Islands, respectively. An outline of the isthmus and bar, east of the breach, is shown on Figure 3. In 1880s, the Federal Government constructed a breakwater, comprising two lines of sheet piling in-filled with rock, along the western side of the isthmus to protect it from erosion and to create a roadway to Fisherman's Island.

Development of Toronto's waterfront intensified during the second half of the nineteenth century. The lakefilling operations carried out during this period generally used the 'crib and fill' technique. The fill used comprised of sewage, municipal waste, construction debris and material dredged from the harbour bottom. Starting in 1912, the land to the east of isthmus was reclaimed from the Ashbridge's Bay marshland by filling timber cribs with dredged sand from the Lake bottom. The fill operations continued for a number of years until the sand spit and the portion of the bar at the southern end of the spit (Fisherman's Island) were completely modified.

Toronto Harbour Commission extended the Toronto Shoreline southwards by constructing a headwall between the Don River and Bay Street. The headwall construction started in 1916, and the process was completed in 1926 when the water lots west of Bay Street in front of the Harbour Square were filled, creating Lakeshore Boulevard in the process.

Don River Mouth Area

In the late 19th century, a public works program[2] was started to straighten the lower part of the Don River south of the Winchester Street Bridge. The project was called the Don Improvement Project. The goal of the project was to alleviate floods in the lower Don that were periodically washing out bridges, and to create additional wharf space for the Toronto Harbour. When it was completed, the river was directed into Ashbridge's Bay marsh, heavily polluted by local industry, to flush the bay of the poor water. The breakwater was also breached in 1893 to improve the sanitary conditions in the marshland. However the flow of river water introduced raw sewage being discharged in the Don River into the bay, worsening an already bad situation. The Keating Channel was then proposed as a method of directing the dirty river water into the harbour to disperse it more rapidly. Initially the channel was planned to go from the northeast corner of the inner harbour east towards Leslie Street and join up with the Coatsworth Cut. However, the portion east of the Don River was never completed and it was closed in 1916. The channel was completed in 1922 after 8 years of construction. The completed channel now runs from the harbour east to the mouth of the river, a distance of about 800 metres.

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[2] www.wikepedia.org

Based on the above history and the Quaternary Geology Map[3] P.2204, the Study Area is mainly comprised of fill deposits underlain by, marsh soils, lake bed sediments, geologically recent river deposits in the Don River floodplain, and a probable veneer of Sunnybrook Till along the northern limits of the Study Area. The soil overburden is further underlain by bedrock.

Notes on Map P.2204 show that the bedrock in the Toronto area consists of approximately 250 m thick Georgian Bay Formation dipping to the southeast at about 5 m/km. The Georgian Bay Formation deposited in shallow seas about 450 million years ago consists of shale interbedded with dolomitic siltstone and minor limestone. Based on the bedrock contours shown on Map 102[4], the bedrock within the Study Area is expected to be at a depth of 12 m along its north western corner increasing to 35 m depth in the buried Don River valley.

4.0 FIELD AND LABORATORY WORK PROGRAMS

The drilling work program comprised of a total of seventy one (71) environmental and geotechnical boreholes (BH-101 to BH-172) at the grid-pattern locations shown on Figures 3 and 4. The drilling work started on September 22, 2008 was completed by SLR on March 11, 2009. A copy of the SLR report has been provided to CRA for review and preparing this memorandum. Out of 71 boreholes 46 were equipped with stand-pipe style monitoring wells. The SLR borehole logs are included in Appendix D of the SLR report.

Geotechnical testing comprising Cone Penetration Tests (CPT) and Standard Penetration Tests (SPT) were carried out in 13 boreholes. The SPT appear to have been carried out as per ASTM D1586. The CPT appears to have been carried out by replacing the SPT split-spoon sampler with a steel cone. The CPT and SPT values have not been plotted on the logs but have been summarized separately in Appendix E of the SLR report.

The boreholes have generally been advanced to depths of 6 m to 9 m below the existing grades (bgs), except three boreholes BH115, BH126 and BH155, which were advanced to depths of 16.6 m, 14.5 m and 18.1 m bgs, respectively. These refusal depths have been inferred by SLR as the bedrock depth. Presence of bedrock was not confirmed by SLR using diamond coring techniques. However, the borehole logs show only those depths up to which soil sampling was carried out. The deeper portions of the boreholes advanced to contact the bedrock have not been shown on the borehole logs.

5.0 EXISTING SUBSURFACE CONDITIONS

The subsoil conditions shown on the SLR borehole logs are consistent with the published Site geology and the previous geotechnical and environmental investigations. The boreholes generally encountered fill and waste materials overlying silt, silty sand, and clayey silt. The depths of the three boreholes (BH115, BH126 and BH155) terminated on auger refusal also correspond to the published bedrock depths in the area. The borehole locations are shown on Figure 2 and 3. Stratigraphic cross-sections prepared by CRA using the SLR borehole information and the previous borehole data from past investigations are presented on Figures 5a to 5d.

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[3] Sharpe, D. R., 1980: Quaternary Geology of Toronto and Surrounding Area; Ontario Geological Survey Preliminary Map P.2204. Geological Series Scale 1:100,000 Compiled 1980.

[4] Preliminary Map 102 (1961), Metropolitan Toronto Bedrock Contours, Ontario Department of Mines.

Details of the subsurface conditions encountered in the SLR boreholes are summarized below. It must also be noted that the interpreted subsurface conditions apply to the borehole locations only, and that the subsurface conditions could vary across short distances at locations between the boreholes, especially for an area that has been subjected to intense human development in the last 200 years.

Based on the above discussion and a review of the SLR borehole logs discussed in the following sections, the stratigraphy in the Study Area can be summarized to comprise the following geological units in an increasing order of depth:

- Heterogeneous Man-made (Fill) Deposits;
- Native soil overburden
  - Lake bed sediments comprising silt/clay/sand/sand and gravel materials interbedded with peat deposits (approximately western half of the Study Area);
  - Marshland (sand and silt interbedded with peat) Deposits (approximately eastern half of the Study Area);
  - Sand/silt deposits in the Don River floodplain area; and
  - Sunnybrook Till (likely present in the northern portion of the Study Area only); and
- Bedrock of Georgian Bay Formation.

SLR has identified hydrocarbon odours and elevated soil vapour concentrations within the fill and native soil deposits.

The soil stratigraphy shown on the SLR borehole logs is discussed in the following Sections. The environmental quality of the Site soils and groundwater are presented under separate cover.

5.1. FILL DEPOSITS

A layer of fill deposits was encountered at the ground surface at all borehole locations, which extends to depths ranging from about 1m to 8 m below ground surface (bgs). The composition of fill varies considerably from borehole to borehole, and includes bricks, cinder, and asphalt fragments, gravel, sand, silt, organics in a sand, gravel or silt matrix.

The SPT 'N' values recorded in the fill deposits ranged from split spoon penetration refusal at/near the ground surface to values of less than 10 with increase in depth. The higher SPT "N" at or near the ground surface can be attributed to the presence of gravel at the ground surface or surface compaction under surface loads such as vehicular traffic.

Ignoring the ground surface SPT 'N' values which are typically high, boreholes by others in the northern portion of the Study Area have shown SPT 'N' values of generally less than 8 with values as low as 1 in the fill deposits.

5.2 NATIVE SOIL DEPOSITS

5.2.1 MARSH AND LAKEBED DEPOSITS

The SLR borehole logs show that the fill deposits at all borehole locations are underlain by probable native marsh, and lakebed sediments. These deposits are comprised of sands, silts, plastic clays and gravel and are interbedded with peat layers.

The SPT "N" values recorded in these deposits range from 2 to 12 up to a depth of about 6 to 8 m bgs, generally increasing to a range of 20 to more than 50 below these depths. The SLR field logs indicate presence of coarse sand and/or gravel layers generally below 6 to 8 m depths.

The SPT 'N' values shown on the borehole logs by others shows that these values typically range from 1 to 12 with occasional higher values in the lakebed sediment/river alluvium stratum interbedded with peat deposits.

5.2.2 FLOODPLAIN SAND DEPOSITS

Underlying the fill deposits, the Thurber boreholes advanced on the west bank of the Don River, identify 5 m to 20 m (Thurber borehole 05-3) thick sand deposits interbedded with silt layers.

The SPT 'N' values in these deposits range from 3 to 22 with an increasing trend with depth. The trend in SPT values indicates loose conditions at/near the surface of the deposits changing to compact conditions with depth.

5.2.3 GLACIAL TILL DEPOSITS

A review of the Agra and Thurber boreholes shows that below the fill and/or river floodplain deposits, 1 to 6 m thick glacial till layer overlies the bedrock. The till has generally been described as clayey silt and silt.

The SPT 'N' values shown on the boreholes generally range from 15 to 45, with occasional low values of below 10 at/or near the till layer surface. These SPT 'N' values indicate that the till layer is generally in a stiff to hard state of consistency with a firm to stiff layer crust.

5.3 BEDROCK

Bedrock was not confirmed at any SLR borehole location. Based on the field logs, three boreholes BH115, BH126 and BH155 were advanced to auger refusal depths of 16.6m, 14.5 m and 18.1 m, respectively. These depths inferred to be the bedrock surface correspond well with the published bedrock depths in the Study Area, which are shown on geological cross-sections, Figures 5a to 5d.

The bedrock depths confirmed by Agra and Thurber at their borehole locations are also shown on the geological cross-sections.

5.4 GROUNDWATER CONDITIONS

SLR has summarized the groundwater level measurements in Table 2 of their report. A review of the Table 2 shows that the groundwater is shallow across the Site and is 0.2 m to 2.6 m below exiting grades corresponding to elevations ranging from 74.02 m to 76.4 m. The lower groundwater elevations have generally been measured in the boreholes located close to the existing dock walls. The observed groundwater table elevations are shown on Figures 5a to 5d.

Due to the surrounding Lake Ontario, and generally permeable nature of the geologically recent surface soils, the long term groundwater elevation can be assumed to follow the lake water levels, which based on the information available on the Canadian Hydrographic Service website[5] are known to fluctuate between elevations 73.8 m to 75.8 m.

Localized groundwater levels, as already indicated by the SLT monitoring results, can be above the lake water level due to localized soil conditions, during periods of wet weather or in response to extreme weather events.

6.0 DISCUSSION AND RECOMMENDATIONS

The recent history of the Study Area indicates that the eastern half of the area has been reclaimed from the Ashbridge's Bay marsh and the western half has been reclaimed by lake filling operations. The depth of fill should therefore be expected to be variable and relatively excessive in both these portions except the central north-south strip of land; the historical footprint of the isthmus. Records such as bathymetric surveys of the marsh/lake at the time of filling can provide a better estimate of fill thickness across the Site at the locations in between the boreholes.

Due to shallow groundwater conditions and thick fill deposits underlain by marshy and lake-bottom unconsolidated soils, the heavy-duty structures will likely require to be founded in bedrock. SLR investigation did not confirm or investigate the engineering quality of the bedrock in the Study Area. Determination of reliable engineering properties of the overburden and bedrock is therefore essential to preparing preliminary designs. The geotechnical parameters provided in this memo are based on literature review and our experience with bedrock of the Georgian Bay formation.

The drilling techniques used by SLR for borehole installation were not conducive to conducting Standard Penetration Tests (SPTs), and as a result only four boreholes reported SPT results. Other boreholes were installed using direct push methods for environmental sampling, with subsequent Cone Penetration Tests (CPTs) to obtain geotechnical strength data. This makes data interpretation between boreholes less consistent; and bedrock was not confirmed by coring at any of the borehole locations.

CRA has submitted a work plan and cost estimate through its draft letter dated March 31, 2009 for the proposed bedrock investigation south of the Keating Channel. Based on the SLR data provided, it is recommended that the additional contingency borehole investigation presented in the March 31, 2009 letter be implemented to confirm the soils conditions, acquire additional SPT results, complete additional testing of soil index properties and confirm bedrock. This would include the installation of an additional 6 boreholes, 3 of which would be taken down to confirm bedrock by coring.

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[5] www.waterlevels.gc.ca/C&A

Additional geotechnical data, including borehole installations and additional laboratory testing, will be required to provide more refined and focussed geotechnical recommendations once the redevelopment of the site is advanced beyond the conceptual stage, and proposed building/structure footprints and loadings are determined.

The following discussions and recommendations must be considered preliminary in nature. These recommendations must be reviewed, revised and supplemented, based on the additional detailed geotechnical investigations, as the planning stages of the proposed development are further advanced.

6.1 GEOTECHNICAL CONSIDERATIONS

The subsoil conditions at the Site consist of relatively thick fill deposits containing construction debris and organics (sewage, municipal waste) placed over geologically recent unconsolidated lakebed sediments/marsh deposits. The following geotechnical concerns must be considered for planning and design of a development on such subsoil conditions:

1. Foundation support - potential of bearing capacity failure of the shallow soil strata under imposed loadings;
2. Subsidence - consolidation of the fill waste and natural unconsolidated soils interbedded with peat under imposed loadings resulting in excessive total and/or differential settlements of the structures founded on shallow foundations, and down drag affecting the load carrying capacity of deep foundations;
3. Long-term Site grade changes;
4. Impacted soil and groundwater. The extent and management strategy for any environmental impact should be considered. Measures required should consider the need to manage impacted soils, sediment and groundwater through the construction phase and the operational phase. A risk assessment of the impact will provide further guidance on the management of the impacted materials. Based on the SLR soil analytical results, it should be expected that some volume of soils and sediment would require excavation and removal to a MOE approved landfill as part of the construction. Other on-Site or in-situ treatments could be considered, or other engineering controls designed, as appropriate. If the groundwater is contaminated, then the water would have to be treated prior to discharge to either sanitary or storm sewers. The treatment system depends on the type of contaminants present and the amount of pumping required (detailed discussion presented under separate cover); and
5. Potential for methane gas generation from peat and or municipal waste/sewage inclusions in the fill deposits.

6.1.1 FOUNDATION SUPPORT

The issues of foundation support and ground subsidence relate to geotechnical properties of the subsoil strata. The existing fill across the Site is typically comprised of heterogeneous materials consisting of organic and inorganic materials, potentially with greatly varying shear strength and compressibility/settlement characteristics. The potential of excessive total and/or differential settlements under new imposed loadings therefore can not be ruled out. Due to the variation in the fill material properties and its thickness, it is impractical to predict its bearing capacity, and anticipated settlement magnitude. The fill is underlain by unconsolidated lakebed sediments and/or marsh soils. The unconsolidated sediments and the marsh deposits are interbedded with peat layers adding to the potential of unanticipated settlements.

The relatively shallow groundwater conditions across the Site also make the option of shallow foundations technically and economically unfeasible, as extensive dewatering will be required to attain dry condition for the construction purposes.

Another point which must be considered for the proposed bridge foundations is that except for the diverted Don River sites, the bridges are proposed across the shipping channels. The dock walls are not likely designed for additional lateral loads which would be exerted by shallow bridge foundations.

Based on the geotechnical issues discussed above, floating type or shallow foundations are generally not considered suitable for the Study Area. For lightly loaded structures such as storage sheds etc., and if some settlement is acceptable, then consideration can be given to constructing these flexible structures on the existing fill after using ground improvement techniques as discussed in Section 6.2. Ground improvement techniques can also be used for low bearing structures (subject to post-improvement comprehensive confirmatory geotechnical investigations), roadways and parking areas. Geotechnical recommendations for floor slabs are provided in Section 6.3.

Based on the above discussion it is recommended that all structural elements such as bridge piers/abutments, and building walls/columns must be supported on deep foundations in order to transmit the structure loads to a competent stratum underlying the weaker overlying materials. Recommendations for deep foundations are discussed in Section 6.4.

6.1.2 LONG-TERM SITE GRADE CHANGES

It should be noted that the above measures (ground improvement in localized areas and structures founded on deep foundations) will result in a stable building structure surrounded by a settling ground surface as the underlying landfill/alluvium/lacustrine deposits consolidate, and therefore some land surface regrading works should be expected as part of the routine maintenance works. Settlements will be more significant where new loads are added, such as fills brought in to raise Site grades.

6.1.3 PEAT AND FILL GASES

Peat and sewage/municipal waste produce methane and carbon dioxide that can be hazardous to humans. Methane can ignite and explode if allowed to accumulate in a confined space. Therefore gas barriers will be required, along with suitable active and/or passive gas extraction and removal measures, for any structure constructed on fill material. Special care must be taken that the fill and peat gases do not enter the building through underground utility penetrations, as these gases tend to follow paths along utility trenches.

6.2 GROUND IMPROVEMENT TECHNIQUES

Ground improvement techniques as discussed in the following sections can only be considered for lightly loaded floor slabs, lightly loaded non-human occupancy structures such as storage yards, sheds, and landscaped and pavement (parking and roads) areas. The improvement techniques described below require further analysis if they are to be considered as viable options. The services of a contractor specializing in these techniques should be obtained early in the design process.

6.2.1 DEEP DYNAMIC COMPACTION

Deep dynamic compaction (DDC) methods have the advantage that ground over a large area can be cost effectively improved in a relatively short time period. For this Site, DDC methods can be used to densify soils under slabs-on-grade, paved areas and in general across the Site to reduce potential of future differential settlements.

The method involves increasing the density of the surface soils by dropping a heavy mass of 100 to 300 kN (10 to 30 tons) on to the surface from a height of 15 m (50 ft) to 30 m (100 ft). The high energy impact of the falling mass creates a print on the ground surface and causes shock waves transmitted through the soil to a considerable depth. The shock waves result in compaction or rapid consolidation and an increase of shear strength of the soils. This method works best on sand and silty sands, with a maximum effective densification of about 9 m (30 ft) in thickness, however for clayey soils the depth of improvement can be significantly less than 9 m. The actual depth of improvement will be limited by the type and distribution of the fill materials. Other methods for surface compaction can also be considered, such as rapid impact compactors. A specialist contractor should be consulted to determine the DDC methods most applicable and cost-effective for the Site.

When the soils are densified by DDC, some lowering of the Site grades of the treated areas should be expected, which may require raising the grades to the preexisting grades using compacted fill, if required.

6.2.2 IMPACT® AGGREGATE PIERS

A proprietary system known as the Impact® rammed aggregate pier (IMPACT RAP) system can be considered for ground improvement across the Study Area. This system does not require pre-drilling thus avoiding hole wall stability and high groundwater table issues, and is therefore suitable for construction in high groundwater table Study Area conditions. IMPACT RAPs can be installed up to 15 m depth using the following generalized procedure:

1. A mandrel and tamper foot is driven into the ground using static force augmented by dynamic energy. A sacrificial cap prevents soil from entering the tamper foot and mandrel during driving. The driving process displaces soils laterally densifying the existing soils; and
2. After driving to the design depth, aggregate is placed in the hole through the hollow mandrel. Partially withdrawing and redriving mandrel and the tamper results in a compacted aggregate layer at the bottom of the hole. The process is repeated until the design levels are achieved.

The above process results in densification and reinforcement of poor soils, and makes the soil suitable for support of shallow foundations, slabs, tanks and other structures.

6.2.3 ENGINEERED FILL

The option of engineered fill can also be considered if suitable natural soils are readily available and disposal of waste material replaced with engineered fill soils is considered as an option.

For the engineered fill option, the existing fill soils/materials to a depth of at least 1.5 m below the design subgrade level will be removed and replaced with natural inorganic soils placed in thin loose lifts up to 200 mm thick and compacted to a minimum 95 to 100 percent standard Proctor (ASTM D 698) maximum dry density (SPMDD). Groundwater control would be required during the installation of engineered fill.

6.3 SLAB-ON-GRADE/FLOOR SLAB DESIGN PARAMETERS

Due to the reasons discussed above, the existing fill materials are not considered suitable for support of a slab-on-grade, and floors designed as structural slabs supported by a grade beam-pile system are recommended.

For the lightly loaded structures, not meant for human occupancy, it is recommended that the floor slab (on-grade and structural) be supported by a 200 mm thick OPSS Granular A material. The granular base for slab-on-grade should be compacted to 100 percent SPMDD.

If a capillary moisture barrier is desired, a 19 mm clear stone layer, 150 mm thick should be provided as base of the slab-on-grade. The 19 mm clear stone should be compacted by vibration to a dense state. The clear stone base should be covered with a plastic membrane, in order to avoid contamination with fresh concrete.

The above recommendations can be used for base/leveling course of the structural floor slabs.

Perimeter drainage for slab-on-grade structures is not required provided the finished floor level in the structure is at least 200 mm above the finished exterior grade level. The finished exterior grade must be at least 1 m higher than the long term high groundwater level.

For structural floor slabs placed below the ground water table such as subsurface parking structures, permanent groundwater control and water proofing measures will require to be provided.

6.4 DEEP FOUNDATIONS

Different types of deep foundations are discussed in the following sections. The types discussed do not constitute a comprehensive list of the deep foundation types. Other types can also be considered, subject to suitability to the Site soil and ground conditions and availability of a local contractor.

Driven and cast-in-place pile foundations are suitable for heavy structures such as bridges, multi-storey building and other heavy structures. Micro-piles and helical piers can be considered for lightly loaded of floating type structures such as utilidors, and single lightly-loaded storey structures.

6.4.1 CONVENTIONAL PILE FOUNDATIONS

Different types of piles such as pre-cast driven piles or cast-in-place augered piles can be used, depending on the subsoil conditions and the technologies favored by the local piling contractors.

Pre-cast driven steel pipe or HP piles are suitable for the Site conditions where caving in materials in an unsupported hole and obstructions caused by the construction debris (likely present in the fill materials) may occur. It is recommended that pipe piles with a minimum wall thickness of 12 mm and minimum 300 mm diameter should be used. The heavy wall thickness provides resilience to piles during driving to bypass construction debris without excessive deformation. The pipe piles should be filled with non-shrinkable concrete after driving.

Steel piles equipped with rock shoes should be driven to refusal in the underlying bedrock. As an approximation, 20 to 30 blows per 25 mm (1 inch) of penetration over the last 150 mm of driving should be considered as refusal when driven by a 4,500 m-kg (30,000 ft-lbs) to 7,000 (50,000 ft-lbs) pile driving hammer. A specialist piling contractor should review these recommendations. The end bearing piles should penetrate the bedrock by at least 0.3 m.

Auger-cast piles are constructed by augering to the required bearing depth, using a continuous flight hollow-stem auger in a continuous downward movement. Soil travels upward as the auger rotates, keeping the flights full of soil cuttings. Once the required depth is achieved, concrete is pumped under pressure through the interior of the hollow stem auger to the pile tip. The auger is slowly withdrawn and concrete is continuously pumped, ensuring there is no open, unsupported hole at any location in the vertical profile. Due to the shallow groundwater conditions, a concrete head of at least 3 m should be maintained inside the hollow stems, at the time of concreting, in order to avoid voids and neck formation. The auger-cast piles are typically nominally reinforced with steel bars, which are lowered into the wet concrete. The steel reinforcement comprises a steel reinforcing bar cage extending to the tip of the pile.

The preliminary allowable axial end bearing capacity of a driven or auger cast concrete pile can be estimated as 5,000 kPa. The uplift resistance in soil overburden can be estimated as 25 kPa, provided that less than 20 percent of the pile-length soil overburden is comprised of peat deposits. The uplift resistance of pile embedded in sound rock can be estimated as 4,000 kPa. These bearing capacity and uplift resistance values are based on the assumption that pre-cast driven or cast-in-place concrete piles will be set at least 0.3 m into the sound bedrock for compressive loads and at least 1 m for tensile loads. It must also be ensured that the computed preliminary pile tensile and compressive capacities do not exceed the structural capacity of the pile. These recommended capacities are preliminary and must be confirmed by detailed structure-specific geotechnical investigation extending into the bedrock, especially for the bridge and other heavy-duty structures. A suitable number of tensile and compressive load tests must be carried out on the driven and cast-in-place piles in accordance with ASTM D3689, D1143 and/or D7283. For the driven piles the allowable loads should be confirmed by dynamic pile analysis and testing carried out in accordance with ASTM D4945. It is recommended that 100 percent of the cast-in-place piles be tested for structural integrity using low-strain methods (ASTM D 5882).

6.4.2 MICRO-PILES

Micro-piles can be used as an alternative of conventional piles for supporting lightly loaded structures planned for human occupancy, or other settlement-sensitive structures.

Micro-piles are small diameter, bored, grouted in place piles incorporating steel reinforcement. Micro-piles can be used to withstand axial loads and/or lateral loads, either for the support of structures or stabilization of soil masses. Micro-piles often contain high capacity steel elements that occupy up to 50 percent of the borehole volume. Therefore the steel element is the primary load bearing component, and can develop high capacities, while the grout serves to transfer the load from the steel to the soil. Diameters are usually in the range of 100 to 250 mm with lengths of up 20 to 30 m and capacities from about 300 to 1,000 kPa.

Micro-piles are generally proprietary systems, and therefore if considered, a specialist design-build contractor should be retained to review the subsoil data and provide micro-pile capacities in compression and uplift.

6.4.3 HELICAL PIERS

Helical Pier Foundation System installed by a specialist contractor is another option given the very thick fill materials and high ground water at the site. This installation technique is vibration free and does not require any dewatering. Lightly loaded structures such as utilidors can be supported on screw anchors founded on a stratum where the adequate torque is achieved.

Since the Helical Pier Foundation System is a proprietary system, it is recommended that the piers be designed and installed by experienced specialist contractors. The allowable bearing capacity should be confirmed by the installer. The present SLR subsurface investigation is not structure specific; therefore additional geotechnical investigations will be required.

For initial planning purposes a single helical pier with a series of 250 mm, 300 mm and 350 mm helix combination can typically be designed for allowable pile bearing capacity of 100 kN. For allowable uplift capacity, a specialist design-build contractor should be retained to review the subsoil data. All anchors should be torqued to the required capacity. The anchor installation should be conducted in the presence of the Geotechnical Engineer to confirm that the anchors have been locked in at the appropriate torque specified by the installer. Due to the possible variation of the soils, some of the piles may be longer or shorter than expected.

To provide for increased lateral stability and reduction of down-drag force of the piles, we recommend that the shaft be installed inside a PVC casing (minimum 100 mm diameter) and the interior of the casing grouted on completion. The minimum pile spacing (centre to centre) is three times the diameter of the largest helix.

The pile stability, pile head and pile cap details should be designed and checked by an experienced Structural Engineer and reviewed by the Geotechnical Consultant for the soil - structure interaction aspects.

6.4.4 DOWN-DRAG CONSIDERATIONS

The pile capacities discussed above are provided on the assumption that the existing Site grades will be maintained and no additional fill will be placed to raise the grades. If fill is placed to raise the grades, it may cause consolidation of the fill and underlying unconsolidated sediments. This consolidation will cause down-drag and must be deducted from the computed/tested pile capacity determined using the recommendations provided in the above sections. CRA can perform a detailed analysis of the drown-drag effect, once the final grades and structure loadings are known.

6.5 PAVEMENT DESIGN

6.5.1 EPSUBGRADE PRARATION

The pavement subgrade will likely consist of the existing fill deposits, which should be improved using the densification techniques provided in Section 6.2, or other suitable methods. As part of subgrade preparation, the proposed pavement areas should be stripped of any topsoil, organic soils or any other uncompactable existing surficial fill material. The exposed pavement subgrade should be compacted in-place to 95 percent standard Proctor maximum dry density (ASTM D698).

Immediately prior to the placement of pavement granular courses, the subgrade should be thoroughly proof-rolled with a heavy rubber tired vehicle (such as a grader or loaded dump truck). The intent of this proofrolling is to detect zones of unsuitable materials and to improve bearing characteristics of the subgrades. If "pumping" or "heaving" is observed, consideration should be given to increasing the thickness of the asphalt structure granular courses. Following proofrolling, the subgrades should be exposed minimally to construction traffic and adverse weather conditions to reduce its potential degradation.

It is recommended that the preparation of the subgrade be carried out under warm, dry weather conditions, and construction traffic traveling over the subgrade soils be reduced to a minimum.

The long-term performance of the pavement structure is highly dependent on the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved.

6.5.2 DRAINAGE

Control of surface water is a factor in achieving good pavement life. Grading adjacent to pavement areas should be designed so that surface water is not allowed to pond adjacent to the outside edges of the pavement. Also, the finished pavement surface and the underlying subgrade should be free of depressions and sloped (preferably at a minimum gradient of 2 percent) to provide effective drainage towards the edge of road. For the clayey subgrade, finger (stub) perforated subdrains wrapped in filter cloth placed radially at drainage structures such as catch basins should be considered for efficient drainage of the infiltration passing through the pavement structure.

6.5.3 PAVEMENT STRUCTURE

Specific traffic loads and intensity are not available at this stage of the project. However, based on a review of preliminary development plans, it is understood that the traffic after the redevelopment will essentially comprise bicycles and passenger cars, with occasional heavy duty truck. For the purposes of preliminary design, the pavement structures have been designed for AASHTO structural numbers of 3.6 and 2.8 for heavy duty and light duty pavements, respectively. These structural numbers were selected from Table 4.7 of AASHTO Guide for Design of Pavement Structures (1993), which lists the recommended structural numbers for low volume roads based on traffic and subgrade conditions. An asphalt layer coefficient of 0.42 and aggregate base layer coefficient of 0.14 was used to calculate the individual layer thickness. A drainage coefficient of 1.0 was used.

For the estimated structural numbers and the site subgrade conditions, the preliminary bituminous concrete and aggregate base thickness provided in Table 1 may be used for the design of the proposed heavy duty and light duty pavement areas. Should traffic loading conditions vary significantly from the above assumptions, the pavement component thicknesses should be re-evaluated.

Ground improvement techniques discussed in Section 6.2 and/or placement of a geogrid (Terrafix BX 1100, Layfield Egrid 2020, or equivalent) over the prepared subgrade will help reduce the differential settlement of road areas.

6.6 EARTHQUAKE CONSIDERATIONS

The 2006 Ontario Building Code (2006 OBC) requires the assignment of a Seismic Site Class for calculations of earthquake design forces and the structural design based on a two percent probability of exceedance in 50 years. According to the 2006 OBC, the Seismic Site Class is a function of soil profile, and is based on the average properties of the subsoil strata to a depth of 30 m below the ground surface. The 2006 OBC provides the following three methods to obtain the average properties for the top 30 m of the subsoil strata:

- Average shear wave velocity;
- Average Standard Penetration Test (SPT) values (uncorrected for overburden); or
- Average undrained shear strength.

The geotechnical investigations for the proposed development comprised of boreholes extending to a maximum depth of 18.1 m (BH155) bgs. Therefore a Seismic Site Class can not be assigned based on the limited geotechnical investigation. For preliminary planning purposes, a Seismic Site Class 'C' can be used for structures supported on deep foundations bearing into the bedrock. For structures founded on shallow foundations, a preliminary Site Class 'E' can be used. The Seismic Site Class should be determined in accordance with the 2006 OBC at the time of detailed geotechnical investigations, which may result in a higher seismic Site Class. Due to the presence of bedrock within 30 m depth it is recommended that a seismic investigation comprising measurement of shear wave velocities to a depth of 30 m be utilized for this purpose. Multichannel Analysis of Surface Waves (MASW) is a relatively quick and economical method for this application.

6.7 SITE SERVICING - UTILIDOR

It is understood that utilidor is under consideration for the underground utilities. Utilidor is a utility corridor built underground or aboveground to carry utility lines. Utilidors are typically used when due to the shallow groundwater table and/or other reasons, the burial below the frost line is not feasible, and/or where utility poles are considered too unsightly.

Based on the preliminary drawings provided by AECOM, the Site utilidor will comprise a 4 m high and 4 m wide concrete chamber, and will generally be placed under a ground cover of 0.6 m, which may be increased to 1.5 m at two-way streets with no parking spaces. The bottom of the 4 m high chamber will be placed at elevations ranging from 73 m to 74 m. The Site utilidors will contain thermal distribution mains, watermain, vacuum waste removal piping, natural gas main, electrical cabling, Communications (TV/Data) cabling, tunnel instrumentation cabling and tunnel lighting.

6.7.1 UTILIDOR BASE SUPPORT

For the buried utilidor the major issue will be controlling differential settlement, rather than bearing capacity issues as the buried utilidor may actually unload the soils. In order to avoid differential settlements, the utilidor structure will need to be supported satisfactorily in order to prevent differential settlement and movements. Excessive movements could cause cracking and damage to the structure. Sufficient support to the structure could be provided by one of the following methods.

1. Placement of an engineered fill pad beneath the structure to provide uniform support. The engineered fill pad would need to be sufficiently wide and deep to provide uniformity and strength to support the structure. The width of the pad would likely be 1 or 2 m wider than the width of the utilidor structure and the depth of the pad would depend on the quality and density of the existing fill. The pad would need to consist of clean earth fill materials, generally free of organics, and placed in thin lifts and compacted thoroughly;
2. Use of deep foundations to support the structure such as micro piles or helical piles. The big issue with piles is the spanning requirements from pile to pile. The box culverts may either have to be heavier or may have to be used in conjunction with a concrete cradle base. The typically tighter spacing of micro piles and helical piles will help reduce the design sectional properties of the box culvert or concrete cradle. Subject to further analyses and investigations, a simpler solution of two rows of micro pile/helical piers can be considered along with a granular load transfer platform with a heavy-duty geogrid wrap;
3. The piles would need to penetrate through unsuitable fill materials and any weak and organic native layers that may be present, and should be founded within competent native soils/bedrock; and
4. Use of ground improvement techniques to support the structure such as IMPACT® aggregate piers as discussed in Section 6.2.2.

All the above options will require a detailed subsurface investigation along the utilidor alignment to determine the engineering properties of the earth fill materials and to assess the possibility of utilizing the existing fill to support the structure, and to determine depth of a suitable bearing stratum.

6.7.2 BUOYANCY EFFECTS

Groundwater level at the Site is relatively shallow, and is expected to fluctuate with the lake levels. Therefore the buoyancy effects of the water table on the utilidor structure will need to be considered. A high water table acting on the underside of the structure will impose uplift forces on the structure that will need to be considered in the design of foundation elements and of the concrete structure itself. For the engineered fill or ground improvement options, the utilidor may require anchors or tie-downs to stabilize the structure.

6.7.3 WATERPROOFING

Depending on the founding elevation of the structure and local groundwater levels, it may be necessary to provide a waterproofing membrane on the walls and base of the utilidor structure and all concrete joints may need to be provided with water stops to prevent water infiltration into the structure. Infiltration/collection trenches, sumps and pumping equipment, may be necessary to manage any groundwater that enters the structure.

In order to provide more Site-specific geotechnical details and recommendations regarding the design and construction of the proposed utilidor, additional boreholes would be required along the alignment of the proposed structure. The most appropriate and cost effective foundation support option for the structure can be better assessed with more geotechnical information regarding the fill quality, relative density, and layer thickness including the condition and consistency of the underlying native soils.

6.7.4 CORROSION PROTECTION

A review of the 46 monitoring well development results summarized in Table 3 of the SLR report shows that the Redox potential readings of the groundwater ranges from -276 milli-Volts (mV) to 273 mV, and is mainly comprised of negative values containing only six positive values. The groundwater also has high conductivity, ranging from 0.16 milli-Siemens/cm (mS/cm) to 4.03 mS/cm, with most of the values higher than 1 mS/cm.

Based on the above results, the Site groundwater conditions can be considered highly corrosive for the buried steel structures/utilities. Appropriate corrosion protection measures must therefore be utilized for the buried steel structures such as pipe piles, and steel utility pipes through cathodic protection or other means. The preventive measures should be installed in accordance with the manufacturer's recommendations.

It is recommended that sulphate (SO_4) content in groundwater and soil samples should also be measured to determine the potential of sulphate attack on buried concrete structures. In the interim, concrete in contact with the Site soils and groundwater should be made with sulphate resisting cement.

6.8 SPECIFIC STRUCTURES - GEOTECHNCIAL CONSIDERATIONS

6.8.1 CHERRY STREET UNDERPASS

Based on the Draft Technical Memorandum dated February 10, 2009 by AECOM and Arup Civil Design Teams, the existing Cherry Street underpass structure located under the Union Station Rail Corridor is about 80 years old. The redevelopment of the West and Lower Don Lands will include an addition of a Light Rail Transit (LRT) line immediately east of Cherry Street. The following two options are under consideration by the Arup and AECOM Design Team for the Cherry Street underpass structure:

- Alternative 1 -Roadway and LRT: A new underpass structure with wider opening for Cherry Street, LRT tracks, bicycle lanes and pedestrian sidewalks; or

- Alternative 2 - LRT Only: The existing roadway underpass structure will be maintained, and a new structure for the proposed LRT tracks would be constructed to the east of the existing roadway structure.

The Cherry Street underpass is located immediately north of the Keating Channel and Study Area, therefore no boreholes were installed in its close proximity during the environmental and geotechnical investigations by SLR. A review of the Golder Associates Ltd., environmental borehole logs, BH1 and BH2, drilled close to the underpass structure near its southeast end, shows that at least 5 m of fill should be expected below the rail embankment. A review of the bedrock topography map shows that the bedrock is expected to be at an elevation of about 66 m, about 10 m below the Cherry Street road elevation in the existing underpass structure. The groundwater table in the Golder boreholes is shown to be about 1.5 m below the grades existing at the time of their investigation.

The literature review[1] shows that the existing underpass is located near the historical Don River mouth in the general Ashbridges Bay marshland area, and was reclaimed by filling operations in the early twentieth century. Separation of grades for rail and road was the final major filling operation in the area. Due to interruptions to the road traffic for long hours during rail operations, the rail was placed on an approximately 4 m to 6 m high embankment between Bathurst Street and the Don River. Generally, the embankments were constructed by dumping fill from rail cars travelling on rails supported on temporary wooden trestles. The fill used to raise the grades was obtained from borrow pits located in Scarborough and from harbor dredging operations.

Based on the above literature-based description of the embankment fill placement, it can be assumed that the fill was likely placed without a consistent compaction effort, and the wooden trestles built to support the rail cars are buried in the embankment. In view of the underpass area history, potential presence of deep fill deposits and shallow groundwater conditions, the underpass structure will likely be supported on deep foundations bearing into the bedrock. A preliminary conceptual design can be based on the recommendations provided in Sections 6.2 to 6.4. The following preliminary geotechnical recommendations are also provided for the proposed underpass structure:

1. A detailed geotechnical investigation be carried out at the underpass structure location to determine, but not necessarily limited to the following:
   - Type of foundations of the existing underpass structure;
   - Subsurface soil, bedrock and groundwater conditions across the proposed structure footprint;
   - Nature and degree of compactness of the existing embankment soils;
   - Presence of wood trestles in the embankment, and
   - Most suitable type of foundation(s) for the underpass structure along with its bearing capacity, and consideration for differential settlements between the existing and new underpass structure, if Alternative 2 is selected for construction.
2. The presence of wood trestles in the embankment within the proposed underpass right-of-way must be confirmed. If present, then consideration should be given to underpinning the existing rail lines, because the removal of the wood trestles may cause loosening of the embankment soils resulting in unforeseen settlements of the existing rail lines. If underpinning is required, a specialist contractor should conduct the underpinning operations. The geotechnical engineer should review the proposed underpinning methodology prior to its installation. Underpinning operations should also be performed under the supervision of the geotechnical engineer to provide verification that the base of the underpinning is founded on competent stratum; and

3. The road/LRT, pedestrian span floor slabs must be designed against buoyancy effects corresponding to the high lake level.

6.8.2 PARLIAMENT SLIP UNDERGROUND DIRECT ENERGY CENTRE

A review of the schematics for the development of an underground Direct Energy Centre (DEC) shows that the proposed Direct Energy Centre (DEC) redevelopment appears to include earth infilling of the northern half of the Parliament Slip, constructing new shoreline walls, and constructing the proposed underground DEC straddling the newly filled area and the existing property to the east.

The existing Parliament Slip is approximately 200 m long and 70 m wide at the opening. The sea walls are linear and constructed of tieback reinforced sheet piles. The east and north side of the existing slip were constructed prior to 1954, with the west side being constructed in the 1950s. The slip has historically been used as a ship dock, with a large silo operation on the east side. The silo operation also operated several large above ground storage tanks. Historical railway spurs were noted on each side of the slip.

Existing soil conditions are expected to include soft sediment at the base of the Slip and loose saturated fill materials on each side. Fill materials are likely to include a mixture of soil, construction rubble and waste. In general, the construction of the proposed underground DEC is considered technically feasible. However, several technical issues would have to be resolved, including:

1. The proposed underground DEC will straddle across new and existing fill soils, and as a result the design will have to consider the potential for differential settlement. The structures could be placed on deep foundations bearing in the bedrock. A preliminary design of deep foundations can be carried out using the recommendations provided in Section 6.4;
2. It should be noted that the construction of the underground DEC will likely encounter existing structures such as the sea walls and foundations for the historical silos and associated buildings;
3. The underground DEC will need to be provided with suitable groundwater control measures. The groundwater control could consist of water tight design including adequate water proofing membranes and backup collection drains and sumps, or perimeter and sub-floor draining systems connected to sumps for lowering of the water table. Waterproofing designs will minimize the amount of water to be managed which may be particularly advantageous where impacted groundwater is encountered; and
4. Buoyancy of the structures must be considered in the design.

6.8.3 STORMWATER TANKS

A few underground stormwater tanks are proposed to be constructed as part of the Site development. The tanks will comprise hollow concrete boxes. The tanks located south of the Keating Channel and north of Lakeshore Boulevard/east of Cherry street will generally be 6 m wide, 6 m deep and 43 m to 141 m long. The tank proposed to be located along the redeveloped Parliament Slip will be 8 m wide, 5 m deep and 270 m long. Based on the cross-sections A-A and B-B, the following two alternative are under consideration for the Parliament Slip stormwater tank:

- Section A-A: Founding the stormwater tank on the lake side of Keating Channel and Parliament Slip on the lake bed at a depth of about 3 m below the lake level. The tank is shown to be protruding above the lake level by about 2 m; and
- Section B-B: Founding the stormwater tank on the landside of the dock wall along Keating Channel and Parliament Slip. The tank will be founded at depth of 7.6 m below the existing grades with 1 m of soil cover of the tank.

Similar to the utilidor structure, the major issue for the stormwater tank structures will be differential settlements rather than soil bearing capacity and buoyancy effects when the stormwater tanks are partially or fully empty. It is therefore recommended that the stormwater structures be supported on deep foundations bearing into and tied to the bedrock. Although for option 2 (Section B-B) the buoyancy forces are expected to be less than that for Section A-A, it is recommended that for either option, the structures be founded on and tied to deep foundations designed for maximum uplift pressures corresponding to the high lake level, and for conditions when the tanks are empty. Recommendations provided in Section 6.7 for the Utilidor Structure can be used for design of stormwater tank foundations.

6.8.4 SHORELINE PROTECTION WORKS

The 'Dockwall Typologies Matrix' drawings provided by AECOM shows that fifteen (15) alternative are under consideration for protecting the shoreline around the redeveloped Don River mouth and for protection/reinforcement of the existing dock walls. The proposed alternatives can be divided into the following categories:

- Stone Revetments constructed at slopes of 2 Horizontal to 1 Vertical (2H:1V) to 5H:1V with toe of the slope anchors - Alternatives W1a, W1b, W1f, W3c;
- Stone Revetment contained by precast concrete gravity wall – Alternative W1e;
- Steel sheet piles tied to anchor block with the anchor block itself anchored to the 'hard bottom' through battered piles. Backfill to be either sloping stone revetment backfill at 3H:1V or horizontal earth backfill - Alternatives W1c, W2, W4a and W4c;
- Steel pipe piles either embedded in the 'hard bottom' or tied to anchor block anchored to the 'hard bottom' through battered piles. Backfill to be either sloping stone revetment backfill at 3H:1V or horizontal earth backfill Alternatives W1d, W3a and W6;
- Existing wall reinforcement with rock anchors – Alternative W3b;
- Cellular sheet pile walls embedded in the lake bottom, encapsulating the existing dockwalls – Alternative 4b; and
- New Pier Open Structure to comprise a reinforced concrete deck supported on caissons bearing into the 'hard bottom'.

A review of the above options shows that the alternatives under consideration can be divided into the following three categories;

1. Sloping stone revetments with toe support anchors;
2. Sloping stone revetments supported at the toe by gravity retaining wall; and
3. Steel sheet or pipe piles designed for lateral resistance either through direct embedment or indirectly through a anchor block anchored in place by batter embedded piles.

It is likely that the below lake-level portions of the stone revetments will be either built by dumping the earthfill from the land or by dumping the fill from a barge. In either case the dumped soil is expected to form a slope equal to its angle of internal friction. It is recommended that only cohesionless soils should be used to develop the stone revetments. Alternatives W1a and W1b show revetments comprising an earthfill at 5H:1V, and a rockfill 2H:1V, respectively. These slopes appear acceptable for preliminary conceptual design purposes. Detailed global and veneer slope stability analyses will be required prior to finalizing the design of the revetment slopes. The global stability of the revetment slopes will not only depend on the geotechnical properties of the slope fill but also depend on the geotechnical properties of the existing lake bed at the revetment locations.

For a revetment supported by a gravity wall, in addition to the considerations above, the soil bearing capacity of the lake bed bearing stratum will need to be determined.

For sheet and pipe pile options, due to the presence of peat and other deleterious materials in the soil overburden and relatively shallow bedrock, it is recommended that the lateral resistance and pull out support should be obtained by embedment in the bedrock. Preliminary design can be carried out using the recommendations and parameters provided in Section 6.4.

For the detailed design, site-specific geotechnical investigations should be carried out to determine the geotechnical characteristics of the soil overburden for global slope stability, to determine the suitable bearing stratum, and to confirm the depth to sound bedrock along with its geotechnical properties.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 EXCAVATION

The OHSA regulations required that where workmen must enter an excavation deeper than 1.2 m, the excavation must be suitably sloped and/or braced in accordance with the OHSA requirements. OHSA specifies maximum slope of the excavations for four broad soil types as summarized in the following table:

Soil Type	*Base of Slope*	*Maximum Slope Inclination*
1	Within 1.2 m of bottom	1 horizontal to 1 vertical
2	Within 1.2 m of bottom of trench	1 horizontal to 1 vertical
3	From bottom of excavation	1 horizontal to 1 vertical
4	From bottom of excavation	3 horizontal to 1 vertical

OHSA Section 226 defines the four soil types as follows:

Type 1 soil:
(a) is hard, very dense and only able to be penetrated with difficulty by a small sharp object;
(b) has a low natural moisture content and a high degree of internal strength;
(c) has no signs of water seepage; and
(d) can be excavated only by mechanical equipment.

Type 2 soil:
(a) is very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;
(b) has a low to medium natural moisture content and a medium degree of internal strength; and
(c) has a damp appearance after it is excavated.

Type 3 soil:
(a) is stiff to firm and compact to loose in consistency or is previously excavated soil;
(b) exhibits signs of surface cracking;
(c) exhibits signs of water seepage;
(d) if it is dry, may run easily into a well-defined conical pile; and
(e) has a low degree of internal strength.

Type 4 soil:
(a) is soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;
(b) runs easily or flows, unless it is completely supported before excavating procedures;
(c) has almost no internal strength;
(d) is wet or muddy; and
(e) exerts substantial fluid pressure on its supporting system. O. Reg. 213/91, s. 226 (5).

Based on the above discussions in our opinion the soils at the Site above the groundwater and if properly dewatered (see Section 8.2) can be classified as Type 3 soils as these are previously excavated soils. If affected by groundwater seepage, these Site soils must be considered as Type 4 soils. The very soft clayey soils identified at deeper depths in some of the GLR and others boreholes, must also be considered Type 4 soils. The highest number soil type identified in an excavation must govern the excavation slopes from top to bottom of the excavation.

If the above recommended excavation side slopes can not be maintained due to lack of space or any other reason, the excavation sides must be supported by an engineered shoring system. The shoring system should be designed in accordance with Canadian Engineering Foundation Manual (4th edition) and the Occupational Health and Safety Act and Regulations for Construction Projects.

Based on our experience with similar soils, the following soil parameters can be used for preliminary design of an engineered shoring system:

Soil	*Bulk Density* γ *(kN/m³)*	*Angle of Internal Friction*	*Coefficient of Lateral Earth Pressure*		
			Ka	*Ko*	*Kp*
Fill Deposits	20	26	0.39	0.56	2.56
Sand (floodplain) Deposits	19	28	0.36	0.53	2.77
Native Clayey Silt/Silt Till Very stiff to hard	22	32	0.31	0.47	3.25
Lakebed sediments Silt/Clay/Sand – interbedded with Peat	19	24	0.42	0.59	2.37

Due to shallow groundwater conditions, the water level should be assumed at the ground surface in the design of shoring systems.

7.2 DEWATERING

The groundwater levels across the Site are relatively shallow, and the earth fill materials are generally sandy in nature i.e., pervious. For the excavations extending below the groundwater table, lowering the groundwater table to below the structure invert may be required. Excavations carried out up to 0.3 m below the water table can likely be managed by pumping using filtered sumps, however, excavations carried out deeper could encounter significant amounts of water seepage and other techniques such as deep wells or well points may need to be considered. A dewatering specialist should be consulted as soon as detailed design and additional geotechnical information is available. The dewatering system should be designed to fulfill the following requirements:

- The stability of the sides and bottom of the excavation must be maintained at all times during the construction, and fluctuations in the groundwater table which may cause excavation instability must be avoided;
- Effective filters must be provided to prevent migration of soil fines and subsequent loss of ground;
- Adequate pumping and standby pumping must be provided;
- Pumped water must be discharged such that it will not interfere with the excavation;
- The groundwater table must be maintained at least 1.0 m below the base of the progressively rising backfill during its placement, to prevent 'pumping' of the base due to the construction traffic/ compaction effort;
- Adequate monitoring of groundwater levels by observation standpipes must be provided; and
- On completion of construction activities, the dewatering system must be gradually shut down to prevent the creation of transient critical exit gradient conditions, which may result in migration of fines.

For the relatively large sized and deep excavations, a Ministry of Environment Permit to Take Water may be required, which must be obtained prior to commencing dewatering activities.

Deep excavations that are not properly dewatered will be unstable and prone to slope and basal heave failures. The contractor should determine a suitable dewatering system based on the field conditions at the time of construction. It is recommended that the geotechnical engineer review and approve the dewatering methodology proposed by the contractor prior to its installation. Surface run-off should be directed away from the open excavations. The design, equipment, installation, maintenance and removal of water control methods during excavation and backfill operations should be the responsibility of the contractor.

It should be noted that extensive dewatering could cause settlement to occur in the fill and soft loose soils.

In order to estimate permeability of the Site strata for design of dewatering systems, it is recommended that Single Well Response Test (SWRT) should be carried out in the monitoring wells installed at the Site.

7.3 DON RIVER DIVERSION EXCAVATION AND DEWATERING

It is understood that the Don River Diversion section geometry will be based on a hydraulic engineering study. For the planning study purposes, the excavation and dewatering recommendations provided in Sections 7.1 and 7.2 can be used.

7.4 EXCAVATION EQUIPMENT

Based on the borehole logs, conventional excavating equipment can be used for typical construction excavations when properly dewatered. For excavation below groundwater table such as that for Don River diversion, draglines may be required. It should be noted that fill material contain construction debris. Sheet piles of breakwater are also likely present. The sheet piles and construction debris may cause difficulty and delay in the excavation activities. It is recommended that these issues should be discussed in the project contract documents.

It is also recommended that a test dig be carried out at the time of tendering in the presence of potential bidders for the job/components of the job to better determine the spatial distribution and size of obstructions likely to be present in the fill deposits, and to confirm the groundwater dewatering requirements.

8.0 LIMITATIONS

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to CRA at the time of preparation. No portion of this report may be used as a separate entity; it is intended to be read in its entirety. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review our recommendations when the drawings and specifications are complete, or if the proposed construction should differ from that mentioned in this report.

It is also important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments are based on the results obtained at the borehole locations only. It is, therefore, assumed that these results are representative of the subsoil conditions across the site. Should any conditions at the site be encountered which differ from those found at the borehole locations, we request that we be notified immediately in order to permit a reassessment of our recommendations.

We trust that the above noted report suits your purposes at this time. However, should you have any questions or concerns, please feel free to contact the undersigned at your convenience.

SUMMARY OF PREVIOUS STUDIES AND REPORTS

Planning Reports

1. Port Lands Estuary - Toronto Waterfront Revitalization Corporation prepared by MVVA Team; and
2. Draft Lower Don Lands Infrastructure Master Plan (February 2009).

Geotechnical Reports

1. Geotechnical Investigation for Proposed Restoration of the East Bank of The Don River Between Lakeshore Boulevards and the CNR Bridge, dated June 10, 1996 prepared by AGRA Earth and Environmental; and
2. Geotechnical Investigation Lower Don River West Remedial Flood Protection Project, City of Toronto dated November 18, 2005 prepared by Thurber Engineering Limited.

Environmental Reports

1. "Final Factual Report, Soil and Groundwater Investigation, 54 Commissioners Street", dated April 2008, prepared by CH2M Hill and submitted to the Toronto Waterfront Revitalization Corporation;
2. "Final Factual Report, Soil and Groundwater Investigation, 281 Cherry Street", dated April 2008, prepared by CH2M Hill and submitted to the Toronto Waterfront Revitalization Corporation;
3. "Final Factual Report, Soil and Groundwater Investigation, 10 Munition Street", dated April 2008, prepared by CH2M Hill and submitted to the Toronto Waterfront Revitalization Corporation;
4. "Final Factual Report, Phase II Environmental Site Assessment, 309 Cherry Street ROWs, 54 Commissioners Street", dated April 2008, prepared by CH2M Hill and submitted to the Toronto Waterfront Revitalization Corporation;
5. "Factual Report, Supplemental Phase II Environmental Site Assessment, Site 58 -150 Commissioners Street", dated April 2008, prepared by CH2M Hill and submitted to the Toronto Waterfront Revitalization Corporation;
6. "Factual Report, Supplemental Phase II Environmental Site Assessment, Site 52W - 105 Villiers Street", dated April 2008, prepared by CH2M Hill and submitted to the Toronto Waterfront Revitalization Corporation;
7. "Factual Report, Supplemental Phase II Environmental Site Assessment, Site 52E - 165 Villiers Street", dated April 2008, prepared by CH2M Hill and submitted to the Toronto Waterfront Revitalization Corporation;
8. "Factual Report, Supplemental Phase II Environmental Site Assessment, Site 52C - 155 Villiers Street", dated April 2008, prepared by CH2M Hill and submitted to the Toronto Waterfront Revitalization Corporation; and
9. "Draft Report on Phase II Environmental Site Assessment - 480 Lakeshore Boulevard East, Toronto, Ontario", dated August 2006, prepared by Golder Associates Ltd., and submitted to the Toronto Waterfront Revitalization Corporation.

Appendix 14-A1

Summary of Stormwater Design Alternatives in Keating Channel Precinct

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Summary of Stormwater Design Alternatives in Keating Channel Precinct

Evaluation Criteria	**Alternative 1** All land uses (development blocks, open space/parks and roads) have individual systems for treating stormwater including Total Suspended Solid (TSS) removal and disinfection.	**Alternative 2** All land uses have individual site systems for TSS removal but there is a common facility used for disinfection.	**Alternative 3A** All land uses share a common facility for all stormwater treatment (i.e., TSS removal and disinfection), but the facilities are only designed to service Keating Channel Precinct. Facilities are optimized to meet the required water quality targets.	**Alternative 3B** All land uses share a common facility for all stormwater treatment (i.e., TSS removal and disinfection), but the facilities are only designed to service Keating Channel Precinct. Facilities are sized based on available space.	**Alternative 4A** All land uses share common TSS removal and disinfection systems and the facilities are designed to be integrated with facilities for adjacent neighbourhoods (i.e., EBF and WDL). Facilities are optimized to meet the required water quality targets.	**Alternative 4B** All land uses share common TSS removal and disinfection systems and the facilities are designed to be integrated with facilities in adjacent neighbourhoods. The facilities are optimized to meet the required water quality targets. Facilities are sized based on available space.
Natural Environment • Don Mouth Naturalization • New Natural Area – (Wetlands)	No difference to Don Mouth Naturalization because Keating Channel Precinct (i.e., proposed improvements) are north of Villiers/Commissioners Street					
Social Environment • Vibrant, mixed use community • Access to water	- The most amount of land is lost within each land use, to provide individual systems.	- Some land is lost within each land use to provide individual systems for TSS removal.	Is a viable option for Keating Channel Precinct but requires more land in "larger picture" of adjacent neighbourhoods, – creates some redundancy and limits total space available for mixed use, vibrant communities. + Good water quality targets	Is a viable option for Keating Channel Precinct but requires more land in "larger picture" of adjacent neighbourhoods, – creates some redundancy and limits total space available for mixed use, vibrant communities. - Water quality targets are lower.	+ This alternative maximizes use of space and provides good water quality targets - Keating Channel Precinct stormwater functioning is dependent on work of others in adjacent studies.	+ This alternative ensures that Keating Channel Precinct stormwater is dealt with appropriately, regardless of outcome of adjacent studies and supports mixed use, vibrant community.
Economic Environment • Economically viable blocks • Cost-effective to build	- Least cost-effective to build multiple systems for each land use for TSS removal and disinfection.	- Not cost-effective to build multiple systems for each land use for TSS removal.	Is acceptable for Keating Channel Precinct but not most cost-effective way to manage stormwater (i.e., each neighbourhood has their own system).	Is acceptable for Keating Channel Precinct but not most cost-effective way to manage stormwater (i.e., each neighbourhood has their own system).	Is most cost-effective to build but has a higher level of risk when Keating Channel stormwater approvals are dependant on outcome of adjacent studies.	+ This alternative is cost-effective to build because it is integrated with stormwater treatment in adjacent neighbourhoods, includes natural processes and confirms appropriate water quality targets, independent of adjacent studies.
Cultural Environment • Aboriginal people • Heritage structures • Archaeology	No difference between alternatives to cultural environment – no impacts.					
Sustainability • WT Sustainability Framework • City sustainability standards • Impervious surfaces • Water Quality Improvement	Will meet partial sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. - Will not achieve technical sustainability and other engineering aspects due to having separate UV treatment facilities for disinfection.	Will meet partial sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. Will achieve partial technical sustainability and other engineering aspects with common facility for UV treatment.	Will meet sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. Will achieve partial technical sustainability and other engineering aspects with common facility for UV treatment.	Will meet sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. Will achieve partial technical sustainability and other engineering aspects with common facility for UV treatment.	Will meet sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. + Will achieve technical sustainability and other engineering aspects with common facility for UV treatment.	Will meet sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. + Will achieve technical sustainability and other engineering aspects with common facility for UV treatment.
Land Use and Property • New land uses • Public realm goals • Property	- Has the greatest property impacts within each land use.	- Has property impacts within each land use.	Has minor property impacts.	Has minor property impacts.	Has minor property impacts.	Has minor property impacts.
Transportation • Walkability • Transit priority • Zero-growth traffic • Parking	N/A					
Municipal Services Utilities	No difference - All alternatives are capable of servicing the Keating Channel Precinct adequately and all utility impacts can be mitigated					
Summary	NOT PREFERRED	NOT PREFERRED	NOT PREFERRED	NOT PREFERRED	NOT PREFERRED	**PREFERRED**

Alternative 4B is the Preferred Stormwater Design because it maximizes efficiencies with adjacent stormwater treatment facilities and land uses, is most compatible with the City of Toronto's goals for stormwater management in the waterfront area, it uses less land in each separate neighborhood because integrated facilities' are used. The Preferred Stormwater Design includes:

- Tying into the proposed tank in East Bayfront EA to service lands west of Cherry Street;
- Locating LDL tanks adjacent to the West Don Lands tanks (at the rail berm north of Lake Shore Boulevard), to service lands east of Cherry Street (north of the Keating Channel); and sharing pumping and UV treatment facilities; and
- Using either a new tank (permanently) to service lands north of Villiers Street (south of Keating Channel) or servicing this part of Keating North (temporarily) with oil grit separators until designs are confirmed for lands south of Villiers Street, in the Lower Don Lands study area. The decision to build something permanent or temporary for lands on the north side of Villiers Street (in Keating Channel Precinct) will be made through discussions with the City prior to implementation.

Legend
+ Advantage - Disadvantage

STORMWATER MANAGEMENT BMP SELECTION MATRIX FOR LOWER DON LANDS CLASS EA - OPPORTUNITIES AND CONSTRAINTS

UPSTREAM → DOWNSTREAM

Development Blocks (Privately Controlled)

Source Controls

BMP	Potential	Opportunity / Constraint
Retention - Green Roof		
Rainwater Harvesting for Toilet Flushing Demands		
Rainwater Harvesting for Street Tree Irrigation Needs		
Control of Fertilizers		
Retention - Absorbent Landscaping (rain gardens, bio filters)		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Filter Strips		
Sand Filtration Systems		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits		Infiltration not feasible given soil contamination issues
Pervious Pavements		
Retention for Site Irrigation		

Conveyance Controls

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)		
Catchbasin Filters		
Pervious Catchbasins		Infiltration not feasible given soil contamination issues
Pervious Pipes		Liner required to prevent infiltration to contaminated soil conditions
Storm Sewers		
Sand Filters (use roadway fill materials as filter medium for water quality treatment)		Liner required to prevent infiltration to contaminated soil conditions
Street Trees (Silva Cells)		Roof water could be routed through these systems prior to discharge to the street tree silva cells
OGS - Oil Grit Separator		Considered end of pipe solution for this application

End of Pipe Controls — Sedimentation

BMP	Potential	Opportunity / Constraint
Oil Grit Separators		Feasible for block areas less than 5.0 ha
Infiltration Basins		Infiltration not feasible given soil contamination issues
Dry Ponds		Land area requirements unacceptable
Wet Ponds		Land area requirements unacceptable
Constructed Wetlands		Land area requirements unacceptable
Screening Facilities		Source of conveyance controls provide this function
In-line or Off-line Shallow Underground Tanks		End of pipe integrated solution with EBF and WDL provides this function
In-line or Off-line Deep Underground Tanks/Tunnels		End of pipe integrated solution with EBF and WDL provides this function
High Rate Treatment Devices/Storage in Receiving Waters by Displacement		No specific need for this application identified
Real Time Monitoring		No specific need for this application identified

End of Pipe Controls — Pre-Disinfection Filtration

BMP	Potential	Opportunity / Constraint
Provisional Filtration Systems for Optimizing Operation of UV Treatment Facility		Individually operated disinfection systems not desirable from cost/ quality control perspective

End of Pipe Controls — Disinfection

BMP	Potential	Opportunity / Constraint
Disinfection: a) UV Treatment		Individually operated disinfection systems not desirable from cost/ quality control perspective
Disinfection: b) Sand Filtration		Individually operated disinfection systems not desirable from cost/ quality control perspective

Development Blocks (WATERFRONToronto)

Source Controls

BMP	Potential	Opportunity / Constraint
Retention - Green Roof		
Rainwater Harvesting for Toilet Flushing Demands		
Rainwater Harvesting for Street Tree Irrigation Needs		
Control of Fertilizers		
Retention - Absorbent Landscaping (rain gardens, bio filters)		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Filter Strips		
Sand Filtration Systems		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits		Infiltration not feasible given soil contamination issues
Pervious Pavements		
Retention for Site Irrigation		

Conveyance Controls

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)		
Catchbasin Filters		
Pervious Catchbasins		Infiltration not feasible given soil contamination issues
Pervious Pipes		Liner required to prevent infiltration to contaminated soil conditions
Storm Sewers		
Sand Filters (use roadway fill materials as filter medium for water quality treatment)		Liner required to prevent infiltration to contaminated soil conditions
Street Trees (Silva Cells)		Roof water could be routed through these systems prior to discharge to the street tree silva cells
OGS - Oil Grit Separator		Considerd end of pipe solution for this application

End of Pipe Controls — Sedimentation

BMP	Potential	Opportunity / Constraint
Oil Grit Separators		Feasible for block areas less than 5.0 ha
Infiltration Basins		Infiltration not feasible given soil contamination issues
Dry Ponds		Land area requirements unacceptable
Wet Ponds		Land area requirements unacceptable
Constructed Wetlands		Land area requirements unacceptable
Screening Facilities		Source of conveyance controls provide this function
In-line or Off-line Shallow Underground Tanks		End of pipe integrated solution with EBF and WDL provides this function
In-line or Off-line Deep Underground Tanks/Tunnels		End of pipe integrated solution with EBF and WDL provides this function
High Rate Treatment Devices/Storage in Receiving Waters by Displacement		No specific need for this application identified
Real Time Monitoring		No specific need for this application identified

End of Pipe Controls — Pre-Disinfection Filtration

BMP	Potential	Opportunity / Constraint
Provisional Filtration Systems for Optimizing Operation of UV Treatment Facility		Individually operated disinfection systems not desirable from cost/ quality control perspective

End of Pipe Controls — Disinfection

BMP	Potential	Opportunity / Constraint
Disinfection: a) UV Treatment		Individually operated disinfection systems not desirable from cost/ quality control perspective
Disinfection: b) Sand Filtration		Individually operated disinfection systems not desirable from cost/ quality control perspective

STORMWATER MANAGEMENT BMP SELECTION MATRIX FOR LOWER DON LANDS CLASS EA - OPPORTUNITIES AND CONSTRAINTS

UPSTREAM → DOWNSTREAM

Development Blocks (WATERFRONTornto)

Source Controls

BMP	Potential	Opportunity / Constraint
Retention - Green Roof		
Rainwater Harvesting for Toilet Flushing Demands		
Rainwater Harvesting for Street Tree Irrigation Needs		
Control of Fertilizers		
Retention - Absorbent Landscaping (rain gardens, bio filters)		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Filter Strips		
Sand Filtration Systems		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits		Infiltration not feasible given soil contamination issues
Pervious Pavements		
Retention for Site Irrigation		

Conveyance Controls

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)		
Catchbasin Filters		
Pervious Catchbasins		Infiltration not feasible given soil contamination issues
Pervious Pipes		Liner required to prevent infiltration to contaminated soil conditions
Storm Sewers		
Sand Filters (use roadway fill materials as filter medium for water quility treatment)		Liner required to prevent infiltration to contaminated soil conditions
Street Trees (Silva Cells)		Roof water could be routed through these systems prior to discharge to the street tree silva cells
OGS - Oil Grit Separator		Considerd end of pipe solution for this application

End of Pipe Controls

Sedimentation

BMP	Potential	Opportunity / Constraint
Oil Grit Separators		Feasible for block areas less than 5.0 ha
Infiltration Basins		Infiltration not feasible given soil contamination issues
Dry Ponds		Land area requirements unacceptable
Wet Ponds		Land area requirements unacceptable
Constructed Wetlands		Land area requirements unacceptable
Screening Facilities		Source of conveyance controls provide this function
In-line or Off-line Shallow Underground Tanks		End of pipe integrated solution with EBF and WDL provides this function
In-line or Off-line Deep Underground Tanks/Tunnels		End of pipe integrated solution with EBF and WDL provides this function
High Rate Treatment Devices/Storage in Receiving Waters by Displacement		No specific need for this application identified
Real Time Monitoring		No specific need for this application identified

Pre-Disinfection Filtration

BMP	Potential	Opportunity / Constraint
Provisional Filtration Systems for Optimizing Operation of UV Treatment Facility		Individually operated disinfection systems not desirable from cost/ qualitiy control perspective

Disinfection

BMP	Potential	Opportunity / Constraint
Disinfection: a) UV Treatment		Individually operated disinfection systems not desirable from cost/ qualitiy control perspective
Disinfection: b) Sand Filtration		Individually operated disinfection systems not desirable from cost/ qualitiy control perspective

Public Park Land and Open Space

Source Controls

BMP	Potential	Opportunity / Constraint
Retention - Green Roof		
Rainwater Harvesting for Toilet Flushing Demands		
Rainwater Harvesting for Street Tree Irrigation Needs		
Control of Fertilizers		
Retention - Absorbent Landscaping (rain gardens, bio filters)		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Filter Strips		
Sand Filtration Systems		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits		Infiltration not feasible given soil contamination issues
Pervious Pavements		
Retention for Site Irrigation		

Conveyance Controls

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)		
Catchbasin Filters		
Pervious Catchbasins		Infiltration not feasible given soil contamination issues
Pervious Pipes		Liner required to prevent infiltration to contaminated soil conditions
Storm Sewers		
Sand Filters (use roadway fill materials as filter medium for water quility treatment)		Cost benefit questionable given opportunities to achieve drainage objectives with other bmps
Street Trees (Silva Cells)		
OGS - Oil Grit Separator		Considerd end of pipe solution for this application

End of Pipe Controls

Sedimentation

BMP	Potential	Opportunity / Constraint
Oil Grit Separators		Generally other bmps would be more cost effective. Maybe considered for spill control
Infiltration Basins		My be feasible for areas next to lake or river if engineered soils imported
Dry Ponds		
Wet Ponds		
Constructed Wetlands		
Screening Facilities		Source of conveyance controls provide this function
In-line or Off-line Shallow Underground Tanks		End of pipe integrated solution with EBF and WDL provides this function
In-line or Off-line Deep Underground Tanks/Tunnels		End of pipe integrated solution with EBF and WDL provides this function
High Rate Treatment Devices/Storage in Receiving Waters by Displacement		No specific need for this application identified
Real Time Monitoring		Consider need if disinfection systems are warranted

Pre-Disinfection Filtration

BMP	Potential	Opportunity / Constraint
Provisional Filtration Systems for Optimizing Operation of UV Treatment Facility		Designs should provide ability to implement if UV treatment is proposed

Disinfection

BMP	Potential	Opportunity / Constraint
Disinfection: a) UV Treatment		
Disinfection: b) Sand Filtration		May be feasible for management of surfaces draining to lake/ river

Public Road

BMP	Potential	Opportunity / Constraint
Retention - Green Roof	Red	Not Generally Applicable
Rainwater Harvesting for Toilet Flushing Demands	Red	Not Generally Applicable
Rainwater Harvesting for Street Tree Irrigation Needs	Red	Roadway runoff quility not deemed suitable for irrigation
Control of Fertilizers	Green	
Retention - Absorbent Landscaping (rain gardens, bio filters)	Yellow	Structural measures may be required to limit width and impact on Road Allowance width
Filter Strips	Yellow	Application will increase the width of the Road Allowance
Sand Filtration Systems	Yellow	Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits	Red	Infiltration not feasible given soil contamination issues
Pervious Pavements	Yellow	
Retention for Site Irrigation	Red	Roadway runoff quility not deemed suitable for irrigation

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)	Yellow	Structural measure may be required to limit width and impact on Road Allowance width
Catchbasin Filters	Red	Infiltration not feasible given soil contamination issues
Pervious Catchbasins	Red	Infiltration not feasible given soil contamination issues
Pervious Pipes	Yellow	Liner required to prevent infiltration to contaminated soil conditions
Storm Sewers	Green	
Sand Filters (use roadway fill materials as filter medium for water quility treatment)	Yellow	Liner required to prevent infiltration to contaminated soil conditions
Street Trees (Silva Cells)	Green	Located in boulevard but receives irrigation supply from roof areas from adjacent
OGS - Oil Grit Separator	Green	Locate such that contributing drainage are is less than 5.0 ha

GO TO END OF PIPE CONTROLS FOR STORMWATER MANAGEMENT FACILITY

Stormwater Management Facility

BMP	Potential	Opportunity / Constraint
Retention - Green Roof	Green	
Rainwater Harvesting for Toilet Flushing Demands	Green	
Rainwater Harvesting for Street Tree Irrigation Needs	Green	
Control of Fertilizers	Green	
Retention - Absorbent Landscaping (rain gardens, bio filters)	Yellow	Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Filter Strips	Green	
Sand Filtration Systems	Yellow	Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits	Red	Infiltration not feasible given soil contamination issues
Pervious Pavements	Yellow	
Retention for Site Irrigation	Green	

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)	Green	
Catchbasin Filters	Green	
Pervious Catchbasins	Red	Infiltration not feasible given soil contamination issues
Pervious Pipes	Yellow	Liner required to prevent infiltration to contaminated soil conditions
Storm Sewers	Green	
Sand Filters (use roadway fill materials as filter medium for water quility treatment)	Red	Cost benefit questionable given opportunities to achieve drainage objectives with other bmps
Street Trees (Silva Cells)	Green	
OGS - Oil Grit Separator	Red	Considerd end of pipe solution for this application

BMP	Potential	Opportunity / Constraint
Oil Grit Separators	Red	End of pipe contributing areas are greater than 5.0 ha. OGS considered o
Infiltration Basins	Red	Infiltration not feasible given soil contamination issues
Dry Ponds	Red	Land area requirements unacceptable
Wet Ponds	Red	Land area requirements unacceptable
Constructed Wetlands	Red	Land area requirements unacceptable
Screening Facilities	Yellow	Consider for design of major storm inlets and storm pumping station
In-line or Off-line Shallow Underground Tanks	Green	
In-line or Off-line Deep Underground Tanks/Tunnels	Green	
High Rate Treatment Devices/Storage in Receiving Waters by Displacement	Green	
Real Time Monitoring	Green	

BMP	Potential	Opportunity / Constraint
Provisional Filtration Systems for Optimizing Operation of UV Treatment Facility	Green	

BMP	Potential	Opportunity / Constraint
Disinfection: a) UV Treatment	Green	
Disinfection: b) Sand Filtration	Yellow	

Legend

Green	Potential component of SWM treatment train
Yellow	Conditional component of SWM treatment train process
Red	No potential as component of SWM treatment train process

AECOM

(Rev 0)

Project No: 109446

Date: April 23, 2009

Appendix 15-A1

Functional Plan

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As developments proceed, the appropriate services/transportation facilities will be in place to accommodate growth, as determined by the phasing, scope and pace of the developments.

This functional plan is for the purposes of the EA only. As implementation proceeds to Phase 5 of the EA process, detailed designs and construction drawings of the various transportation elements will be prepared for approval by the City of Toronto and other relevant agencies.

LEGEND:

- BIKE PATH
- SIDEWALK
- LRT TTC TRACKS
- FUTURE LRT LINE
- TTC PLATFORMS
- NORTH KEATING PRECINCT EA TRANSPORTATION NETWORK IMPROVEMENTS
- ON STREET PARKING
- FUTURE STUDY/BY OTHERS TRANSPORTATION NETWORK IMPROVEMENTS

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160 Bloor Street East
Toronto, Ontario M4W 1B9
Tel +(416)515 0915 Fax +(416)515 1835
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March 22, 2010

Issue	Date	By	Chkd	Appd

Client

Job Title
Lower Don Lands

Drawing Title
NORTH KEATING PRECINCT
FUNCTIONAL PLAN

Key Plan
FOR PLANNING PURPOSES ONLY

Scale
1:1000

Plot ID

Drawing Status
PRELIMINARY

pag

Job No
96135

Drawing No

Issue

Appendix 15-A2

Preliminary Stormwater Management Memo

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Toronto Transit Commission

Date:	June 18, 2009
To:	Michael Thompson, AECOM-Whitby Peter Middaugh, AECOM-Whitby
From:	Mike Gregory, AECOM-Kitchener
Project Number:	109446, Task 5
Subject:	**Lower Don Lands Development** **Preliminary Stormwater Management (North Keating Channel)**
Distribution:	Ray Tufgar, AECOM-Kitchener

The purpose of this memo is to document the conceptual design of stormwater management (SWM) facilities in the North Keating Channel drainage area.

1. INTRODUCTION

The criteria used to develop the preliminary SWM servicing plan for the Lower Don Lands (LDL) development are based on the following reference documents:

- Toronto Wet Weather Flow Management Guidelines (November 2006) ;
- Toronto Green Development Standard (January 2007); and
- Ontario Ministry of the Environment (MOE) Stormwater Management Planning and Design Manual (March 2003).

1.1 Water Quantity Targets

Water quantity controls are intended to control runoff flows and volumes in order to mitigate downstream flooding/erosion impacts due to development on adjacent properties and receiving watercourses. However, the LDL site directly discharges into Lake Ontario or into the mouth of the Don River and therefore will not impact any downstream properties or infrastructure. As a result, SWM quantity controls will not consider the attenuation of peak post-development flow rates to pre-development values as is normally required by the City of Toronto and Toronto Region Conservation Authority (TRCA).

The relationship of the LDL site with adjacent developments is described in Section 1.4.

Quantity controls in the LDL development will be designed to manage stormwater runoff under the following conditions:

- Minor system flows resulting from rainfall events equal to or less than the local 2-year design storm event will be collected in a storm sewer system and conveyed to a treatment facility and then discharged to the receiving watercourse or waterbody; and
- Major system flows resulting from capacity exceedances of the storm sewer system will be conveyed via an overland surface flow route to the receiving watercourse or waterbody (i.e., subject to maximum overland flow depth and velocity requirements).

1.2 Water Balance Targets

Water balance controls refer to the capture and management of stormwater runoff at or near its source in an attempt to preserve the natural or pre-development hydrologic conditions (i.e., surface runoff, infiltration, and evapotranspiration). Water balance is typically assessed on a seasonal or annual basis, rather than for individual design storm events. Facilities for water balance controls include lot-level runoff volume source controls such as green roofs, bioretention cells, permeable pavement, soakaway pits, grass channels, dry swales, street tree plantings/tree clusterings, and rainwater harvesting systems (i.e., rain barrels and cisterns). For the LDL development, the water balance target is a minimum of 5 mm of onsite retention.

1.3 Water Quality Targets

Water quality treatment controls are intended to reduce total loading and/or peak concentration of targeted pollutants and are often categorized as: source, conveyance and end-of-pipe controls. Source controls include the lot level SWM features described under water balance above. Conveyance controls include SWM measures along roadways and pathways such as infiltration basins/galleries, exfiltration trenches, vegetated filter strips, bio-swales, sediment traps, and oil/grit separator (OGS) units. End of pipe controls typically include SWM detention facilities such as underground tanks or surface ponds designed to address any water quality targets.

The targeted pollutants embodied in Toronto’s Wet Weather Flow Management Guidelines and Green Development Standard are primarily Total Suspended Solids (TSS) and bacteria. Many local pollutants of concern (i.e., nutrients, metals, and toxic chemicals) are often associated with sediment particles and therefore TSS acts as a surrogate indicator. Pollutants such as oils/grease and chlorides are not closely correlated to TSS.

Total Suspended Solids (TSS)

Suspended solids include particulate matter that is held in suspension by the turbulent energy in water. TSS comprises the fraction of settleable solids in stormwater runoff and generally does not include particles smaller than 1 micron or particles larger than 10 mm. Colloids, dissolved solids, and floatables are not included in TSS measurements. Measurement units are expressed by the dry weight of suspended solids per unit volume of sample (i.e., mg/L).

For the LDL development, the target is 80% TSS annual average removal efficiency from all runoff leaving the site. This long-term average removal corresponds to the “enhanced protection” designated in the MOE Stormwater Management Planning and Design Manual. As noted above TSS acts as a surrogate indicator for many water quality parameters and therefore removing TSS facilitates the removal of other pollutants.

The primary removal mechanism for TSS is sedimentation which is often accommodated through gravity settling in storage facilities (i.e., surface storage detention facilities or underground tanks). Gravity settling occurs primarily within the permanent pool under quiescent conditions, but can also occur within the live storage component during wet weather events depending on the release rate of the outlet control structure. The rate of sedimentation is dependent on the pond/tank size and configuration, whereby the plug-flow treatment process is improved with a high length/width ratio. Sedimentation rates can be increased by mechanical means (e.g., hydrodynamic separators such as inclined plates) or by chemical means (e.g., injection of coagulants such as alum to induce flocculation).

Bacteria

Waterborne human pathogens (e.g., viruses, bacteria, and protozoa) are microorganisms that can lead to intestinal diseases through ingestion. Bacteria are the largest group of pathogens and *Escherichia coli* (E. coli) is commonly used as an indicator bacterium strain for SWM water quality control purposes. Measurement units are expressed by the number of colony forming units (CFU) per 100 ml of sample.

The LDL development features direct discharge of stormwater to Lake Ontario and therefore the following E. coli targets from the Toronto Wet Weather Flow Management Guidelines are to be achieved during the swimming season (i.e., June 1 to September 30):

- 1000 CFU/100mL during wet weather events; and
- 100 CFU/100mL during dry weather periods.

The guidelines further require that disinfection treatment (i.e., ultraviolet light radiation or equivalent) be provided for stormwater runoff that directly discharges to Lake Ontario or Waterfront areas. While ultraviolet (UV) disinfection is specifically mentioned, other forms of disinfection may include:

- Sedimentation: Traditional sedimentation can remove significant amounts of bacteria and increasing the retention time to 24 hours or more can achieve up to 90% removal efficiency. The addition of chemical coagulants (e.g., alum) could further increase the treatment efficiency.
- Chemical: Chlorination and ozonation. Implementation costs for stormwater application could be cost-prohibitive however. The impacts of residual chlorine levels and chlorine compounds would also be an issue.
- Filtration: Bio-filters incorporating soil/peat mixtures have been successfully used to remove bacteria in stormwater applications. The addition of anti-microbial agents can further increase the treatment efficiency.
- Other methods such as extended drying/sun exposure and plasma-pulse technology have been shown to be effective at reducing bacteria.

Disinfection is less effective at treating pathogens that are bound to sediment. While there is no explicit target for peak TSS concentrations in stormwater runoff, the TSS must be kept low enough for bacterial disinfection to be effective. For example, higher sediment concentrations increase the UV control requirements, requiring more lamps and power to achieve the treatment targets. Further, since bacterial survival is prolonged by sediment adsorption as well as anoxic conditions in a settling tank, some form of sludge removal and regular tank cleaning operations are typically required.

Other Pollutants

The water quality targets identified include pollutants such as oils/grease and chlorides that are not attached to sediment. The installation of OGS units at critical source areas (e.g., roadways and parking areas) will address oil and grease as well as reduce trash and floatables from entering the collection system and settling tank.

High chloride concentrations are particularly harmful to vegetation and potentially toxic to aquatic species. Winter operations (i.e., application of deicing materials) can be modified to reduce chloride loadings from critical source areas. In addition, runoff source area segregation can be implemented such that surfaces that typically do not contribute chlorides (e.g., rooftops) become candidates for rainwater harvesting systems for use with landscape irrigation.

1.4 Study Area and Relationship to Adjacent Developments

The North Keating Channel area of the LDL development is shown on **Figure 1-1**. The total drainage area for North Keating is 26.15 ha, including:

- West of Cherry Street area (NK1) with a contributing area of 12.24 ha; and
- East of Cherry Street area (NK2) with a contributing area of 13.91 ha.

The figure illustrates the relationship with adjacent developments including East Bay Front (EBF), West Don Lands (WDL) and the South Keating Channel area (SK). The conceptual components of the SWM facilities plan for North Keating are shown on Figure 1 and described in detail in Section 2.

To reduce operation and maintenance requirements, the City desires to coordinate SWM facilities between the EBF, WDL and LDL developments. At this time, the following shared facilities are anticipated:

- Minor system flows from EBF and NK1 will be managed in a water quality treatment facility proposed at the Parliament slip, with discharge into Lake Ontario;
- Minor system flows from WDL and NK2 will be managed in a water quality treatment facility proposed along the southern edge of the Canadian National rail yard east of Cherry Street, with discharge into the Don River; and
- Major system flows from WDL and the northern portion of NK2 will be managed by a deep tunnel system discharging directly into Lake Ontario.

2. MODELING METHODOLOGY

A computer model was developed to facilitate the conceptual design of SWM facilities in the North Keating Channel drainage area. A recent version of the U.S. Environmental Protection Agency's StormWater Management Model (SWMM) was used to simulate various aspects of the proposed development including:

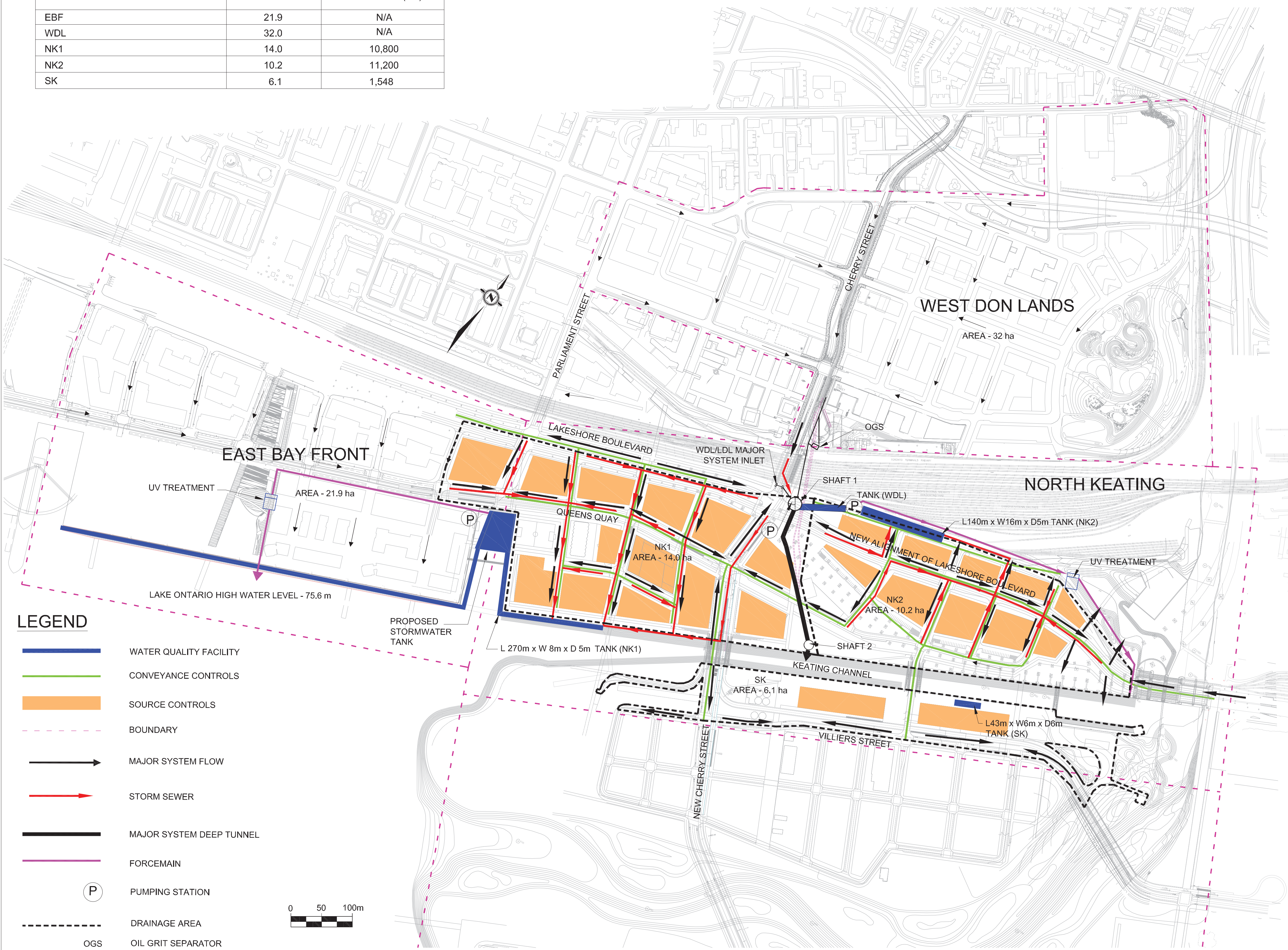
- Hydrology, the generation of stormwater runoff from the various catchment surfaces in response to rainfall;
- Hydraulics, the conveyance/routing of stormwater through the major/minor collection system and storage/attenuation within facilities; and
- Water Quality, the generation of pollutants (TSS in this case) from the various catchment surfaces and subsequent routing/deposition in the collection system and treatment facilities.

SWMM is public-domain software and available for download, along with detailed documentation, at http://www.epa.gov/ednnrmrl/models/swmm/. For this assessment, SWMM Version 5 (Build 5.0.015, dated April 2009) was used. This software was selected for its ability in evaluating and optimizing the conceptual design with respect to the targets identified in Section 1.

At this time, the model represents the conceptual design of the North Keating Channel storm sewer collection system and pre-treatment settling tanks. Implicit assumptions have been introduced into the model to represent source and conveyance controls. These will later be refined as the design progresses to explicitly represent facilities such as green roofs, bioretention cells, street tree plantings/clusterings, and rainwater harvesting systems (i.e., rain barrels and cisterns). For water quality, the model is currently being used to estimate the long-term sediment removal efficiency in the pre-treatment settling tanks and will further be adapted to represent the disinfection chamber and other water quality treatment facilities (including conveyance controls) as the design is refined.

AECOM

STUDY AREA	DRAINAGE AREA (ha)	WATER QUALITY VOLUME AVAILABLE (m^3)
EBF	21.9	N/A
WDL	32.0	N/A
NK1	14.0	10,800
NK2	10.2	11,200
SK	6.1	1,548



2.1 Hydrologic Model

The hydrologic module of SWMM was used in this study to simulate the surface runoff and abstraction characteristics of land surfaces (i.e., evapotranspiration, infiltration, and surface storage) in response to meteorological inputs. It is a dynamic computer model that uses a non-linear reservoir approximation to represent overland flow. The hydrology module requires input data that describes the characteristics of local rainfall, overland flow, land use, and soil properties. Results include flow hydrographs for subcatchment areas that can be used as input to the hydraulic routing model. The model can be applied to individual design storm events or used for continuous simulation.

As noted in Section 1, existing pre-development conditions were not modeled since the LDL site does not impact downstream properties or infrastructure. The preliminary subcatchment or "hydrologic unit" boundaries for the entire proposed LDL development are shown on **Figure 2-1**. The subcatchment name is shown in the middle of each polygon, along with the primary land use and an arrow indicating the idealized drainage flow path.

Table 2-1 gives a description of hydrologic units in the North Keating area, including the location, the predominant land use, hydraulic load point (i.e., the drainage outlet defined by the hydraulic model junction into which computed flow hydrographs are input), contributing area, and the catchment it is located within. There are a total of 86 hydrologic units with an average size of 0.30 ha (0.75 ac). Land use categories that were used in the SWM assessment of the North Keating Channel area are listed in **Table 2-2**.

Table 2-2 Summary of contributing drainage areas (by land use category)

	Area	
Land Use Category	**(ha)**	**(%)**
Development Block	13.247	51%
Existing Building	0.338	1%
Light Rail Transit	0.932	4%
Open Space	2.400	9%
Roadway/Expressway	9.231	35%
Total:	**26.148**	**100%**

At this stage of the project (i.e., conceptual design phase) drainage details for the Gardner Expressway have not been determined. For this assessment, it was assumed that all drainage from the Expressway will be directed to the North Keating Channel system. This represents a conservative case, since ground-level sub-catchments in the North Keating Channel area are occluded by the more impervious Expressway surface.

The hydrologic model was developed using lumped parameters in which average representative values were determined for each hydrologic unit. The calculation of area-weighted values is described in detail below for the various hydrologic parameters, which are grouped as follows:

- Overland flow parameters, which describe the slope and length characteristics of shallow, surface runoff;
- Surface cover parameters, which describe the imperviousness, roughness, and depression storage characteristics;
- Soil parameters, which characterize the infiltration properties of the underlying surface soil layers; and

Table 2-1
Lower Don Lands Development (North of Keating Channel)
Hydrologic Units - Proposed Conditions

Hydrologic Unit	Location	Land Use	Hydraulic Load Point	Area (ha)	Catch-ment
D-03	Small St.	Roadway	Small010	0.096	NK1
D-04	Queens Quay	Roadway	Small010	0.021	NK1
D-05	Queens Quay	LRT	Small010	0.057	NK1
D-07	Small St.	Roadway	Small010	0.070	NK1
D-09	Queens Quay	LRT	Parlmnt010	0.278	NK1
D-10	Queens Quay	Roadway	Parlmnt010	0.105	NK1
D-11	KC0	Dev'pt Block	Small010	0.751	NK1
D-12	Parliament St.	Roadway	Parlmnt010	0.109	NK1
D-13	Queens Quay	Roadway	Parlmnt010	0.123	NK1
D-14	KC1	Dev'pt Block	Parlmnt010	0.570	NK1
D-17	Parliament St.	Roadway	Parlmnt020	0.075	NK1
D-18	Multi-use field	Open Space	A020	0.615	NK1
D-19	un-named block	Dev'pt Block	A010	0.679	NK1
D-20	KC10	Dev'pt Block	A010	0.554	NK1
D-21	un-named street	Roadway	A020	0.149	NK1
D-22	Victory-Soya Mills	Existing Bldg.	A020	0.338	NK1
D-23	KC6	Dev'pt Block	A020	0.411	NK1
D-24	KC11	Dev'pt Block	Trinity010	0.476	NK1
D-25	KC8	Dev'pt Block	B010	0.675	NK1
D-26	un-named street	Roadway	Trinity020	0.154	NK1
D-27	KC7	Dev'pt Block	B020	0.701	NK1
D-28	Trinity St.	Roadway	Trinity020	0.102	NK1
D-29	Queens Quay	Roadway	A030	0.116	NK1
D-30	un-named street	Roadway	A030	0.057	NK1
D-31	KC2	Dev'pt Block	A030	0.533	NK1
D-34	Trinity St.	Roadway	Trinity030	0.060	NK1
D-35	KC3	Dev'pt Block	Trinity030	0.560	NK1
D-36	Queens Quay	Roadway	Trinity030	0.108	NK1
D-37	Queens Quay	LRT	Trinity030	0.154	NK1
D-39	Queens Quay	Roadway	WCherry020	0.089	NK1
D-40	un-named street	Roadway	B030	0.067	NK1
D-41	KC4	Dev'pt Block	B030	0.598	NK1
D-43	Lakeshore Blvd. (new)	Roadway	ECherry030	0.110	NK2
D-44	Cherry St.	Roadway	ECherry030	0.295	NK2
D-45	Cherry St.	LRT	ECherry030	0.203	NK2
D-47	Cherry St.	Roadway	ECherry020	0.086	NK2
D-48	Cherry St.	LRT	ECherry020	0.070	NK2
D-50	Cherry St.	Roadway	WCherry010	0.124	NK1
D-51	Cherry St.	LRT	ECherry010	0.171	NK2
D-53	KC9	Dev'pt Block	Park010	0.929	NK2
D-54	Channel lawn	Open Space	C010	0.993	NK2
D-55	Queens Quay	Roadway	C010	0.235	NK2
D-56	KC5/Park Pavilion	Dev'pt Block	C010	0.912	NK2
D-58	KC17	Dev'pt Block	ECherry030	0.505	NK2
D-59	Lakeshore Blvd. (new)	Roadway	ECherry030	0.511	NK2
D-60	KC12	Dev'pt Block	C030	0.419	NK2
D-61	Service Road	Roadway	C040	0.033	NK2
D-62	Service Road	Roadway	NMuntns040	0.087	NK2
D-63	KC13	Dev'pt Block	NMuntns030	0.473	NK2
D-64	Service Road	Roadway	C030	0.050	NK2
D-65	Lakeshore Blvd. (new)	Roadway	C030	0.247	NK2
D-66	un-named street	Roadway	C020	0.062	NK2
D-67	KC18	Dev'pt Block	NMuntns020	0.748	NK2
D-69	un-named street	Roadway	C010	0.024	NK2
D-70	Queens Quay	Roadway	C010	0.060	NK2

Table 2-1
Lower Don Lands Development (North of Keating Channel)
Hydrologic Units - Proposed Conditions

Hydrologic Unit	Location	Land Use	Hydraulic Load Point	Area (ha)	Catch-ment
D-71	Gardiner Colonnade	Open Space	C010	0.034	NK2
D-72	Munitions St.	Roadway	NMuntns010	0.019	NK2
D-73	Promenade	Open Space	NMuntns010	0.064	NK2
D-74	Munitions St.	Roadway	NMuntns020	0.116	NK2
D-75	KC19	Dev'pt Block	D010	0.673	NK2
D-76	un-named street	Roadway	D010	0.090	NK2
D-77	Lakeshore Blvd. (new)	Roadway	D020	0.185	NK2
D-78	Munitions St.	Roadway	NMuntns030	0.063	NK2
D-79	KC14 and KC15	Dev'pt Block	E020	0.727	NK2
D-80	Service Road	Roadway	E030	0.116	NK2
D-81	Service Road	Roadway	E020	0.045	NK2
D-82	KC16	Dev'pt Block	E020	0.283	NK2
D-83	Lakeshore Blvd. (new)	Roadway	E020	0.163	NK2
D-84	KC20	Dev'pt Block	E010	0.649	NK2
D-86	Queens Quay	Roadway	E010	0.075	NK2
D-87	KC21	Dev'pt Block	E010	0.422	NK2
D-88	Lakeshore Blvd. (new)	Roadway	E020	0.633	NK2
D-89	Pedestrian/Bike access	Open Space	Trinity010	0.047	NK1
D-90	Pedestrian/Bike access	Open Space	B020	0.096	NK1
D-91	Pedestrian/Bike access	Open Space	A010	0.048	NK1
D-92	Water's edge promenade	Open Space	Tank-NK1	0.091	NK1
D-93	Water's edge promenade	Open Space	Tank-NK1	0.412	NK1
Gardiner Expressway					
D-01	Gardiner Expressway	Roadway	Small020	0.180	NK1
D-02	Gardiner Expressway	Roadway	Parlmnt020	0.440	NK1
D-5	Gardiner Expressway	Roadway	A040	0.299	NK1
D-32	Gardiner Expressway	Roadway	Trinity040	0.351	NK1
D-33	Gardiner Expressway	Roadway	Trinity040	0.333	NK1
D-42	Gardiner Expressway	Roadway	B040	0.366	NK1
D-57	Gardiner Expressway	Roadway	ECherry030	0.735	NK2
D-68	Gardiner Expressway	Roadway	D010	0.659	NK2
D-85	Gardiner Expressway	Roadway	D010	0.937	NK2
			Total Study Area (ha):	**26.148**	
			West of Cherry St. Area, NK1 (ha):	**12.241**	
			East of Cherry St. Area, NK2 (ha):	**13.907**	

- Additional abstraction parameters, which describe the depression storage characteristics of surface features (i.e., typically source controls such as detention/retention facilities, or large natural surface depressions) that are not explicitly represented in the hydraulic model.

For the North Keating Channel area, two development scenarios were investigated:

- Green Development: This represents the "best case" development scenario that accounts for source and conveyance controls by including allowances in all development blocks for landscaping (generally 10% of each development block footprint) and green roofs (generally one-third of rooftop areas). In addition, 5 mm of onsite retention is represented in the hydrologic model, which is consistent with the water balance target for this project.
- Grey Development: This represents the "worst case" development scenario without source or conveyance controls, reflective of traditional high-density development. No green roofs were considered, all land surfaces were assumed to be paved with impermeable materials, and no onsite retention was represented in the hydrologic model.

Overland Flow Parameters

Representative overland flow paths were identified for each hydrologic unit. The overland flow path length and slope parameters were determined using GIS-based tools, with the slope taken as the grade difference of the land surface along the overland flow path. Overall, the average (i.e., weighted by the area of each hydrologic unit) length and slope is 108 m and 0.8 percent, respectively. Overland flow path lengths were divided into the subcatchment area to give a characteristic width of overland flow, which is a SWMM input parameter.

Surface Cover Parameters

In order to reflect the unique hydrologic properties within each subcatchment, a variety of surface cover types were defined. The surface cover types used in this study are summarized by area in **Table 2-3** and described as follows:

- Natural Vegetation: Medium to heavy natural vegetation.
- Grass/Turf Landscaping: Grass/turf, light vegetation, garden, or landscaped areas.
- Bare Soil: Un-vegetated soil or loose granular materials.
- Green Roof: Building structures with vegetated roof.
- Regular Roof: Building structures with regular roof.
- Permeable Pavement: Permeable paved surfaces. No porous pavement areas are recommended in the North Keating Channel area at this time. If this should change, an underdrain system would likely be required.
- Impermeable Pavement: Regular, non-porous paving materials.
- Water: Open water surface. There are no SWM ponds are planned in the North Keating Channel.

Table 2-3 Summary of contributing drainage areas (by surface cover type)

	Area	
Surface Cover Type	**(ha)**	**(%)**
Natural Vegetation	0.214	0.8%
Grass/Turf Landscaping	2.509	9.6%
Bare Soil (No Vegetation)	0.169	0.6%
Green Roof	3.929	15.0%
Regular Roof	9.041	34.6%
Permeable Pavement	0.000	0.0%
Impermeable Pavement	10.287	39.3%
Water	0.000	0.0%
Total:	**26.148**	**100%**

Characteristic hydrologic properties were assigned to each surface cover type as shown in **Table 2-4**, based on literature values and similar SWM studies throughout North America. For each surface cover type, the following hydrologic parameters are given:

- Overland flow roughness factors, expressed as Manning's "n" value for both impervious and pervious fractions;
- Initial abstractions (i.e., depression storage losses) for both impervious and pervious fractions;
- Percentage of impervious cover, including any land surface that has been compacted or is covered with a layer of material such that it substantially reduces or prevents the infiltration of stormwater runoff into the ground;
- Subarea routing is a SWMM simulation parameter that designates the internal routing of runoff between pervious and impervious areas (in this case, "Pervious" was selected to indicate a portion of runoff from impervious areas can be discharged onto pervious areas);
- Percent routed indicates the portion of runoff that is routed between subareas; and
- The final column indicates the fraction of impervious area that has no depression storage.

Table 2-4 Summary of hydrologic properties (by surface cover type)

	Manning's "n"		Dep. Storage (mm)		%			% Imperv.
Surface Cover Type	Imperv-ious	Pervious	Imperv-ious	Pervious	Imperv-ious	Subarea Routing	% Routed	Without Storage
Natural	0.015	0.450	2.0	9.0	5	Pervious	50	10
Grass	0.015	0.300	2.0	6.5	5	Pervious	50	10
Bare Soil	0.015	0.150	2.0	4.0	5	Pervious	50	10
Green Roof	0.015	0.350	2.0	20.5	15	Pervious	20	10
Regular Roof	0.015	0.150	2.0	4.0	95	Pervious	10	25
Perm. Paved	0.015	0.150	32.5	34.5	75	Pervious	20	15
Imperm. Paved	0.015	0.150	4.0	6.0	95	Pervious	10	20
Water	0.015	0.015	2.0	2.0	100	Outlet	n/a	0

Previous studies in southern Ontario have suggested that a typical rooftop garden has the capacity to retain 14 mm of rainfall through evapotranspiration and interception storage. This was represented as an initial abstraction and included in the depression storage term in Table 2-4, such that green roof areas were assigned an equivalent pervious depression storage of 20.5 mm (6.5 mm for the depression storage of grass surface cover plus 14 mm of additional evapotranspiration and interception storage).

The spatial scale of hydrology processes is an important consideration in any modeling exercise. The level of hydrologic detail can be defined by the degree of subcatchment delineation. That is, the lowest level of detail might feature large subcatchments (e.g., 10 ha and greater) that span a range of land use categories. The highest level of detail might feature small subcatchments (e.g., 0.1 ha and lesser) that are defined according to specific surface cover types. An intermediate level of detail was used in this study, such that subcatchments were defined according to the land use categories defined in Table 2-2 and each subcatchment spans the range of surface cover types in Table 2-4.

These scale effects are used to distinguish "lumped" versus "distributed" parameter modeling. With lumped modeling, average representative parameters are used to characterize the hydrologic response of each subcatchment. With distributed modeling, subcatchments are explicitly delineated by surface cover type, and therefore each subcatchment is represented by separate and distinct hydrologic properties, such as those listed in Table 2-4.

Defining lumped hydrologic properties for each land use category is appropriate for master planning purposes; however a higher level of hydrologic detail is necessary for the LDL design. In this analysis, the proportion of surface cover types within each subcatchment was defined, allowing average area-weighted hydrologic properties to be calculated and used as input to the SWMM model. A distributed modeling approach may be investigated for the analysis of source and conveyance controls as the design progresses. This can be achieved by subdividing existing hydrologic unit boundaries into the specific surface cover types listed in Table 2-4 and extended to include additional classifications to represent cistern/rainwater harvesting areas, bioretention cells, street tree plantings/tree clusterings, and infiltration facilities.

Table A-1 in the Appendix shows the calculation of the surface cover parameters for the Grey Development scenario. The top part of the table lists the various surface cover types and the global hydrology parameters that were discussed above. The bottom part of Table A-1 shows the percent of surface cover type for each hydrologic unit on the left. When these proportions are cross-multiplied by the global parameters at the top, the resulting area-weighted surface cover parameters are calculated and shown on the right part of the table. The bottom row calculates the area-weighted average values. The imperviousness for all subcatchments in the North Keating Channel area is 95%.

Table A-2 in the Appendix shows the calculation of the surface cover parameters for the Green Development scenario. This table is presented in the same format as Table A-1 described above. As expected, the pervious roughness factors and depression storage depths are much larger compared to the Grey Development scenario. Further, the routing of impervious areas onto pervious surfaces is greatly increased while imperviousness is significantly decreased, a reflection of the primary intent of low impact development design. The overall imperviousness for the North Keating Channel area under the Green Development scenario is 73%, including:

- 73.3% in the NK1 area West of Cherry Street; and
- 72.8% in the NK2 area East of Cherry Street.

Soil Parameters

Soil parameters were determined for the Green-Ampt infiltration method based on soil texture properties as presented in **Table 2-5**. Since geotechnical borehole profiles have not yet been prepared for the North Keating Channel area, soil textures and their distribution throughout the study area were estimated as follows:

- Sandy gravel, assumed to underlie 10% of the NK1 and NK2 areas;
- Loamy sand, assumed to underlie 20% of the NK1 and NK2 areas; and
- Silty sand and silty sand fill, assumed to underlie 70% of the NK1 and NK2 areas.

Table 2-5 Summary of soil parameters

Soil Texture	Capillary Tension (mm)	Saturated Hydrualic Cond. (mm/hr)	Initial Moisture Deficit	NK1/NK2 Propor-tion by Area
Sandy gravel	50	240	34%	10%
Loamy sand	60	60	30%	20%
Silty sand	120	15	22%	70%

Characteristic hydrologic properties were assigned to each soil texture as shown in Table 2-5, based on literature values and similar SWM studies throughout North America, including:

- Capillary tension, a measure of how tightly water is held within the soil pore space;

- Saturated hydraulic conductivity, a measure of how quickly the water can move vertically; and
- Initial soilwater deficit, a volumetric fraction of water within the soil pore space under initially dry conditions.

Additional Abstraction Parameters

For the Green Development scenario, 5 mm of onsite retention was represented in the model, which is consistent with the water balance target for this project. This was treated as a hydrologic abstraction and included as an additional depression storage term (i.e., on top of the values presented in Table 2-4). An equivalent storage depth of 5 mm was applied to each subcatchment except those within a Roadway land use. Based on long-term rainfall observations in the Toronto area, approximately 55 percent of all rainfall events have a depth of 5 mm or less. Retention of the first 5 mm of surface runoff on roadway surfaces would present a frequent safety risk to vehicular traffic and was therefore not included in this scenario. Further, the additional abstraction provided by green roofs in the development blocks was included in the calculation of the 5 mm onsite retention total.

For the Grey Development scenario, 5 mm of onsite retention was not represented in the model and therefore no additional abstractions were considered.

Rainfall

Rainfall statistics for the local design storm events were derived for this study based on results from an analysis of Atmospheric Environment Service (AES) hourly data at the Bloor Street weather station in Toronto for the period of record from 1937-2003. Return period statistics were determined for various intervals from 5 minutes to 24 hours. Rainfall durations less than one hour were taken from December 2005 AES published values for the period of record 1940-2003. The statistics for the various intervals were then fitted to a 24-hour SCS storm distribution.

Design storm events were selected based on rainfall statistics that describe the frequency of rainfall depths over a specified duration. The design storm events and corresponding rainfall depths include:

- 25mm/4-hour duration: This is the City standard "Water Quality" design storm event, defined as a small, frequent storm representing 25 mm of rainfall over a short duration. Based on long-term rainfall observations in the Toronto area, 90-95 percent of all rainfall events occurring between April 1 and October 31 have a total rainfall depth of 25 mm or less. The water quality treatment efficiency of proposed SWM facilities is based on volumetric control of the Water Quality event. The 25 mm rainfall depth was fitted to a hyetograph shape using a 4-hour "Chicago" distribution, at the request of Toronto Water on a similar recent study in the Don River watershed.
- 1.5-year return period/24-hour duration: 45.1 mm of rain that was fitted to a hyetograph shape using a 24-hour "SCS" storm distribution. This storm event was selected in order to be consistent with the Credit 6.1 criteria for the Leadership in Energy and Environmental Design (LEED) "Green Building" rating system.
- 2-year return period/24-hour duration: 48.3 mm of rain (24-hour SCS storm distribution). This storm event was selected for the design of the collection system pipe sizes.
- 5-year return period/24-hour duration: 58.7 mm of rain (24-hour SCS storm distribution). This storm event was selected to assess the collection system performance for events that exceed its design capacity. Events larger than the 5-year storm were not evaluated at this conceptual design stage.

In addition to the design storm events listed above, the local average year rainfall was selected in order to represent long-term average annual conditions. This rainfall was applied using continuous simulation to help assess the typical operations (i.e., hydraulic performance and water quality treatment) of the collection system, source/conveyance controls, and end-of-pipe facilities.

A statistical analysis of rainfall data measured at Toronto Pearson Airport indicated that 1991 best represented an "average" representative year for modeling purposes (XCG Consultants Ltd., July 25, 2001 Memo). Rainfall input comprised Pearson data (with a 5-minute recording interval) for the period April through October 1991, including the following monthly totals:

- April, 145.0 mm
- May, 86.6 mm
- June, 23.2 mm
- July, 122.4 mm
- August, 63.4 mm
- September, 68.6 mm
- October, 53.4 mm

The total rainfall over the period April through October 1991 was 562.6 mm.

Evaporation

Evaporation was not considered in the hydrologic model for these design storm events.

For the average year rainfall, evaporation data were input as a daily abstraction rate for each calendar month, including the following values during the simulation period:

- April, 1.1 mm/day
- May, 2.0 mm/day
- June, 4.9 mm/day
- July, 5.2 mm/day
- August, 4.9 mm/day
- September, 3.3 mm/day
- October, 2.3 mm/day

This represents a total potential evaporation of 725.4 mm over the period April through October. The total potential evaporation for all months matches the reported annual lake evaporation rate of 813 mm/yr.

2.2 Hydraulic Model

The hydraulic module of SWMM was used in this study to simulate flow routing through conveyance structures (i.e., overland flow paths, culverts and pipes) and in storage facilities (i.e., manholes, infiltration galleries, and surface depressions). It is a dynamic computer model that accounts for the conservation of mass and momentum using the Saint-Venant equations for gradually varied unsteady flow.

The hydraulic model schematic for the area West of Cherry Street is shown on **Figure 2-2** and the area East of Cherry Street is shown on **Figure 2-3**. These figures show the subcatchment boundaries in black and the collection system in red.

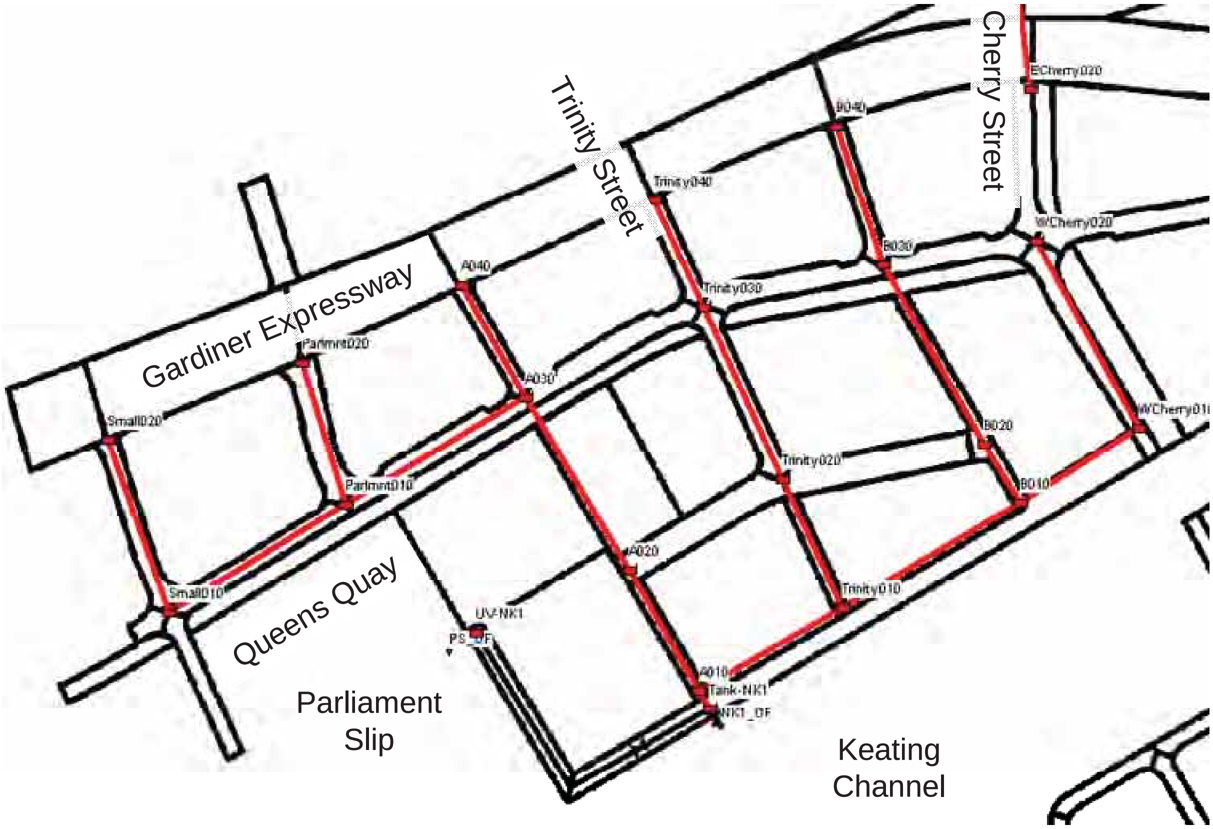


Figure 2-2 Schematic of hydraulic model, west of Cherry St. (NK1 area)

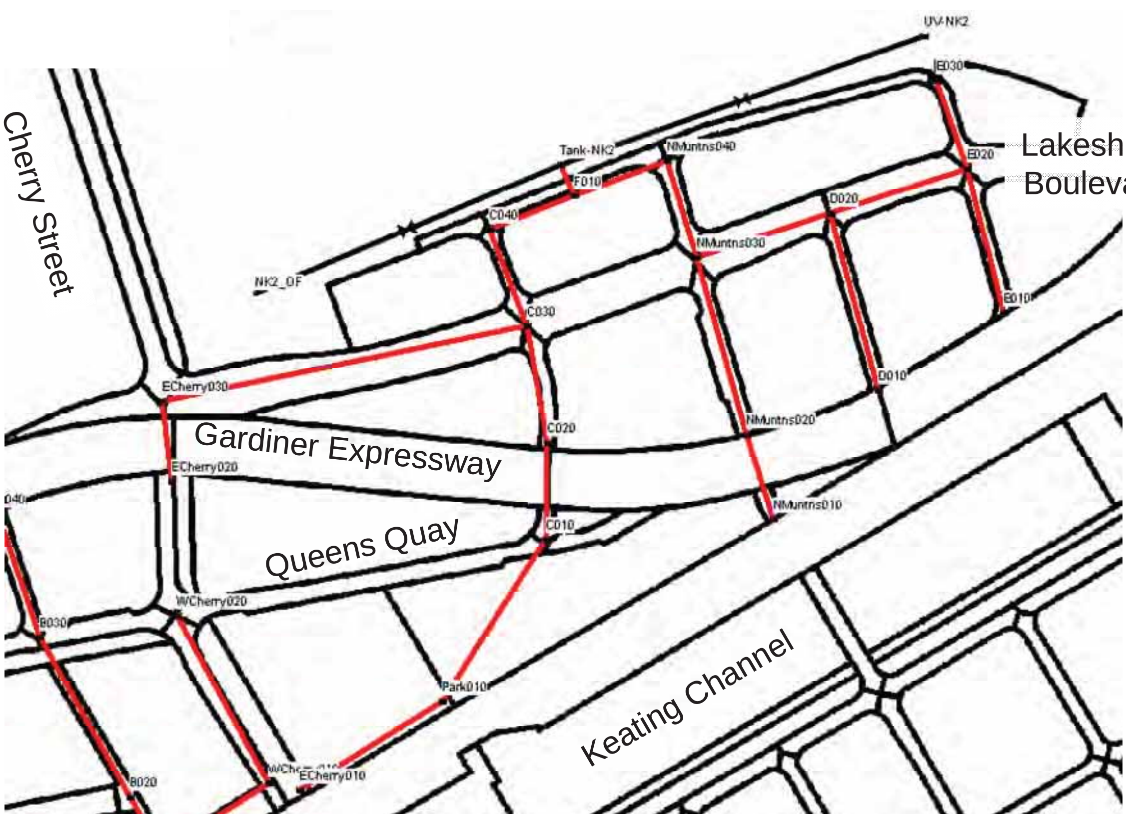


Figure 2-3 Schematic of hydraulic model, east of Cherry St. (NK2 area)

Surface runoff in the West of Cherry Street (NK1) area is collected by a storm sewer network that is generally conveyed in a southerly direction towards the waterfront. The outfall pipe is 900-mm in diameter and is located at the southern end (i.e., at the water's edge promenade) of the unnamed street between Trinity Street and Parliament Street. This pipe discharges into a junction box at the upstream end of the proposed stormwater pre-treatment tank, represented by model junction Tank-NK1.

Surface runoff in the East of Cherry Street (NK2) area is collected by a storm sewer network that is generally conveyed in a northerly direction towards the Canadian National rail yard. The outfall pipe is 900-mm in diameter and is located along an unnamed street to the west of Munitions Street. This pipe discharges into a junction box at the upstream end of the proposed stormwater pre-treatment tank, represented by model junction Tank-NK2.

Model Junctions

The hydraulic model includes a total of 43 junctions and the input data are shown in **Table A-3** in the Appendix. For each junction, the table shows the name, location, mapping coordinates, invert elevation and manhole rim elevation. The next column indicates whether surface storage was represented in the model. If yes, storage in the junction was assigned as follows:

- Uniform surface area of 1.1 m^2 (i.e., based on a standard manhole diameter) from the manhole invert to the rim elevation; and
- Variable surface area corresponding to the inundation area up to 1 m above the manhole rim elevation.

Surface storage was represented in this manner in order to track surface flooding depths (i.e., when the computed hydraulic gradeline (HGL) exceeds the manhole rim elevation) for the larger rainfall events. The next column in Table A-3 shows the maximum flow depth, a required input parameter in SWMM. This value is the difference between the ground and invert elevation if surface storage is not represented in the model. If surface storage is represented, an additional 1 m depth above the rim elevation is included in the value.

The final two columns in the Table A-3 are used to describe the controlling initial water surface elevation and the corresponding depth of flow at each junction. The initial water surface elevation in both the NK1 and NK2 pre-treatment tanks is 74.0 m. The design High Water Level (HWL) in Lake Ontario is an elevation of 75.5 m. A recent analysis by LimnoTech (memo dated December 24, 2008) reviewed Toronto Harbour daily historical water surface elevations (WSEs) from 1906 through 2006 and stated the following:

> *Based on the analysis of available recorded and synthetic data sets analyses, using WSEs of 75.5 metres for high lake level, 74.7 metres for median lake level and using 74.0 metres for a pre global climate change low lake level is reasonable.*

A minimum pipe cover depth of 1.5 m is provided throughout the NK1 collection system, and 1.2 m throughout the NK2 collection system. The lowest manhole rim elevation is located at the existing Cherry Street railway underpass, and corresponds to the minimum depth of cover in the NK2 system. The pipe invert elevation at both NK1 and NK2 outfalls is 72.0 m and the bottom of the respective junction boxes are at elevation 70.0 m, which is coincident with the bottom elevation of the pre-treatment tanks.

The proposed pre-treatment tank dimensions that were evaluated include:

- Tank NK1 (West of Cherry), 180-m long 4-m wide 5-m deep (3,600 m^3 storage volume); and
- Tank NK2 (East of Cherry), 140-m long 6-m wide 5-m deep (4,200 m^3 storage volume).

For both tanks, the top 1 m represents the available active or "live" storage volume for water quality treatment, including 720 m^3 and 840 m^3 of live storage capacity for NK1 and NK2 respectively. The bottom 4 m represents the permanent pool storage component (i.e., an initial water surface elevation of 74.0 m and thus a large portion of the collection system is submerged). The SWMM program allows simulation of both dynamic particulate settling in the active storage volume and quiescent settling in the permanent pool storage components.

The disinfection chamber would be located at the downstream end of each pre-treatment tank; adjacent to the Parliament Slip in the West of Cherry area (represented by model junction UV-NK1), and adjacent to the Canadian National rail yard in the northeast corner of the site in the East of Cherry area (represented by model junction UV-NK2). Gravity discharge from the pre-treatment tank into the disinfection chamber is currently proposed via a 380-mm (15-in) diameter orifice in both tanks. Further design considerations to be addressed at a later date include ensuring the peak outflow rate and peak TSS concentrations are appropriate for the proposed disinfection devices, which may include ultraviolet (UV) treatment or plasma pulse technology.

Model Conduits

The hydraulic model includes a total of 36 conduits representing a total length of 2,840 m. The distribution of modeled pipes is shown in **Table 2-6** and the input data are shown in **Table A-4** in the Appendix. For each conduit, the table shows the name, inlet (i.e., upstream) and outlet (i.e., downstream) model junction names, pipe length, pipe diameter, roughness coefficient (i.e., Manning "n" coefficient), and upstream and downstream invert elevations. All pipes were circular shape, and a Manning "n" coefficient of 0.013 was assumed for all conduits, based on an assumed reinforced concrete pipe material.

Table 2-6 Size distribution of collection system pipes

Diameter (mm)	Length (m)
300	220
375	285
450	555
525	605
600	190
675	480
750	275
825	125
900	105
Total	**2,840**

The hydraulic model accounts for local headloss separately from the headloss due to pipe friction (i.e., Manning's "n" value) which is calculated over the length of the conduit. Local losses are applied as a discrete headloss at the upstream and downstream ends of each pipe. Pipe headloss coefficients account for energy losses at the pipe ends and can be significant (i.e., exceed pipe friction losses), particularly in the shorter lengths. The entrance loss coefficient k_{ent} generally ranges between 0.3 and 0.5, and an average value of 0.4 was assumed for all pipes in this study. The exit loss coefficient k_{exit} was determined based on the plan-view orientation of the downstream pipe, generally:

- Straight-through flow (i.e., 0 bend), k_{exit} = 0.1;
- 45 flow bend, k_{exit} = 0.3; and
- 90 flow bend, k_{exit} = 0.5.

The other loss coefficient k_{other} was determined based on unique discharge conditions. In this case, discharge into the pre-treatment tank was assigned a loss coefficient of 1.0.

Pipes slopes were calculated from the pipe inverts and lengths shown in Table A-4. Manhole drops were included in the collection system design based on pipe alignment, including:

- Straight-through flow (i.e., 0 bend), drop = 30 mm;
- 45 flow bend, drop = 80 mm; and
- 90 flow bend, drop = 150 mm.

The final column in Table A-4 shows the theoretical full-flow velocities based on Manning s equation and an assumed free outfall. Values less than 0.6 m/s are highlighted in yellow.

The sizing of the collection system was based on providing sufficient capacity to convey flows for two conditions under the Green Development scenario, including:

- No surface flooding resulting from the 2-year/24-hour design storm event; and
- All flows pass through the pre-treatment tanks for the 1.5-year/24-hour design storm event.

Flows that exceed the design storm capacity for the larger events (i.e., surface overflows or pre-treatment tank bypasses) are discharged into the Keating Channel in the NK1 area, and into the deep tunnel shaft in the NK2 area. In both cases, tank bypass occurs via a 2-m wide weir in the outfall junction box when the hydraulic gradeline exceeds the crest elevation of 75.5 m, which is coincident with the Lake Ontario design high water level.

2.3 Water Quality Model

The water quality module of SWMM was used to simulate the generation of TSS loadings from each subcatchment, including pollutant buildup during dry weather periods and washoff during rainfall events. The TSS pollutographs were subsequently routed through the collection system and the deposition of particulate solids in the pre-treatment settling tanks was simulated.

The North Keating Channel model currently includes TSS; additional water quality constituents could be added later. The process for simulating TSS loading into the collection system first requires the categorization of surface cover types to generate the pollutant loads. Next, the appropriate parameters need to be assigned to the buildup and washoff functions that determine the pollutant loadings from each surface cover type. The only source of TSS represented in the model is from surface washoff. That is, contributions from groundwater or infiltration/inflow sources were not considered.

The same surface cover types that were defined for the surface cover parameters for the hydrology model were used to represent TSS loadings. TSS loadings for each subcatchment were determined according to the mixture of cover types that were shown in Table A-2.

No local TSS measurements were available to calibrate the buildup and washoff functions. Therefore, parameters were estimated from the range of values reported in the literature and adjusted until the overall average annual TSS loading rate compared well with published values for high-density urban development.

The buildup of TSS that accumulates within each land use category was represented using the power function option in SWMM. With this function, the pollutant buildup is expressed by a rate that increases proportionally by the number of preceding dry weather days until a maximum accumulation mass is achieved. Input parameters for the power buildup function include:

- Maximum buildup, expressed as a limiting mass per unit subcatchment area;
- Buildup rate constant, expressed as a mass per unit area per day; and
- Time exponent.

The buildup rate constant (1.9 kg/ha/day) and time exponent (1.5) were applied equally to all surface cover types. The maximum TSS buildup values were defined individually by cover type, including:

- Natural: 1,200 kg/ha
- Grass: 600 kg/ha
- Bare: 6,000 kg/ha
- Green Roof: 600 kg/ha
- Regular Roof: 1,200 kg/ha
- Permeable Pavement: 4,800 kg/ha
- Impermeable Pavement: 4,800 kg/ha

SWMM has the capability to reduce the amount of accumulated pollutants during dry weather periods due to street cleaning operations, for example. Street sweeping practices are not currently represented in the North Keating Channel model and thus yield conservative results.

The buildup of accumulated TSS becomes available for washoff into the collection system. Washoff of TSS was represented using the Event Mean Concentration (EMC) option in SWMM. With this option, the pollutant washoff is expressed as a constant washoff pollutant concentration in mass per liter. During wet weather events, these concentrations are sustained until the accumulated buildup mass is depleted at which time washoff ceases. The washoff EMC rates were defined individually by surface cover type, including:

- Natural: 200 mg/L
- Grass: 100 mg/L
- Bare: 600 mg/L
- Green Roof: 100 mg/L
- Regular Roof: 200 mg/L
- Permeable Pavement: 500 mg/L
- Impermeable Pavement: 500 mg/L

SWMM has the capability to reduce washoff loads for a given pollutant and land use category as a result of water quality treatment practices. At this time, the treatment efficiency of proposed end-of pipe facilities was evaluated. The reduction of TSS loads due to source/conveyance controls is currently not represented in the present North Keating Channel model.

As of June 2009, the latest version of SWMM does not yet include the particulate settling capability that was available in previous versions. As a result, an earlier version was used (Version 4.4, Release H, executable dated May 2001) in order to determine the annual average TSS removal efficiency of the proposed system. The routed flow hydrographs and TSS pollutographs from the SWMM5 model were used as input to the SWMM4 model of the pre-treatment tanks.

Two options are available in SWMM for simulating particulate settling, including:

- Particle size distribution, which applies Newton's law of gravity and Stokes law of settling to determine settling velocities for the various size fractions; and
- Settling velocity distribution, where actual velocity measurements are input for the various size fractions.

The particle size distribution option requires input data describing the equivalent particle diameter and the corresponding specific gravity for each size fraction. Generally, the smaller fraction of TSS is comprised of organic particles with lower specific gravity (e.g., 1.15) compared to the larger mineral-based particles with a higher specific gravity (e.g., 2.65). Average daily temperatures for each month are also required as input. The application of Newton's and Stokes law to determine settling velocities assumes spherical, non-cohesive particles. Further, flocculation (i.e., coalescence of smaller particles to form larger agglomerated particles that settle faster) is not considered in the calculation.

Because of the idealized settling characteristics inherent in the particle size distribution option, measured settling velocities are preferred. However, there are no local stormwater settling velocity measurements available and empirical data from other regions must be used. Local measurements of particle size distributions from stormwater runoff are available and these were used as a basis of comparison in this assessment.

Table 2-7 compares various particle size distributions in stormwater runoff from urban areas and these distributions are plotted in **Figure 2-4**. The sources of information used to compile the values include:

- U.S. Environmental Protection Agency, 1983; Final Report, Results of the Nationwide Urban Runoff Program (NURP): Various stormwater particle size distributions were averaged for nearly two dozen urban sites across the U.S.
- Ontario Ministry of the Environment (MOE), 2005; Synthesis of Monitoring Studies Conducted Under the StormWater Assessment Monitoring and Performance Program (SWAMP): Figure 4.7 in the report (page 47) shows the particle size distributions for 5 sites within the greater Toronto area (Table 2-7 and Figure 2-4 below show the values for the finest and coarsest particle size distributions).
- Ontario Ministry of Environment and Energy (MOEE), 1994; Stormwater Management Practices Planning and Design Manual: Table 3.3 in the report (page 89) shows the size fractions and average settling velocity distributions that were apparently derived from the NURP study.

The median particle size, d_{50}, for each distribution is:

- NURP: d_{50} = 8 µm (i.e., microns)
- SWAMP (finest distribution): d_{50} = 3 µm
- SWAMP (coarsest distribution): d_{50} = 8 µm
- MOEE: d_{50} = 95 µm

It is evident that the particle sizes reported in the NURP and SWAMP studies are similarly distributed, however the MOEE particle sizes are consistently an order of magnitude larger than those measured in the NURP and SWAMP studies.

Table 2-7 Stormwater particle size distributions

Particle Size (microns)	% Finer Than	Particle Size (microns)	% Finer Than
NURP (average of all sites)		**SWAMP (finest distribution)**	
1	2%	0.6	10%
2	14%	1	20%
3	23%	1.6	30%
4	29%	2.3	40%
5	35%	3.2	50%
6	41%	5	60%
7	46%	7.7	70%
8	51%	11	80%
9	53%	21	90%
10	56%	700	100%
11	58%	**SWAMP (coarsest distribution)**	
12	60%	1	10%
13	62%	2.2	20%
14	63%	3.7	30%
15	65%	5.3	40%
20	71%	7.9	50%
25	75%	11	60%
30	78%	15	70%
35	80%	24	80%
40	82%	43	90%
50	84%	700	100%
60	87%	**MOEE**	
80	89%	20	20%
100	91%	40	30%
150	94%	60	40%
200	95%	130	60%
300	97%	400	80%
500	99%	4000	100%

In discussion with Toronto Water staff, it was explained that the larger particle sizes are reflective of the flocculation effect described above. It was further noted that the corresponding settling velocities (that were shown in Table 3.3 of the 1994 MOEE report and repeated below in **Table 2-8**) are reflective of the actual flocculant settling characteristics and should be used as the basis for design of SWM facilities.

Table 2-8 Stormwater settling velocity distribution (MOEE, 1994)

	Average Velocity	
% Finer Than	(m/s)	(ft/hr)
20%	0.00000254	0.030
30%	0.00001300	0.154
40%	0.00002540	0.300
60%	0.00012700	1.500
80%	0.00059267	7.000
100%	0.00550333	65.000

It is worth noting that the MOEE settling velocity distribution forms the basis for the water quality storage volume requirements in the current MOE Stormwater Management Planning and Design Manual (March 2003, Table 3.2). The MOE design criteria for suspended solids removal efficiencies specify storage volume requirements per hectare for various levels of protection (e.g., 80% TSS removal for “enhanced protection”).

Figure 2-4 Comparison of stormwater particle size distributions

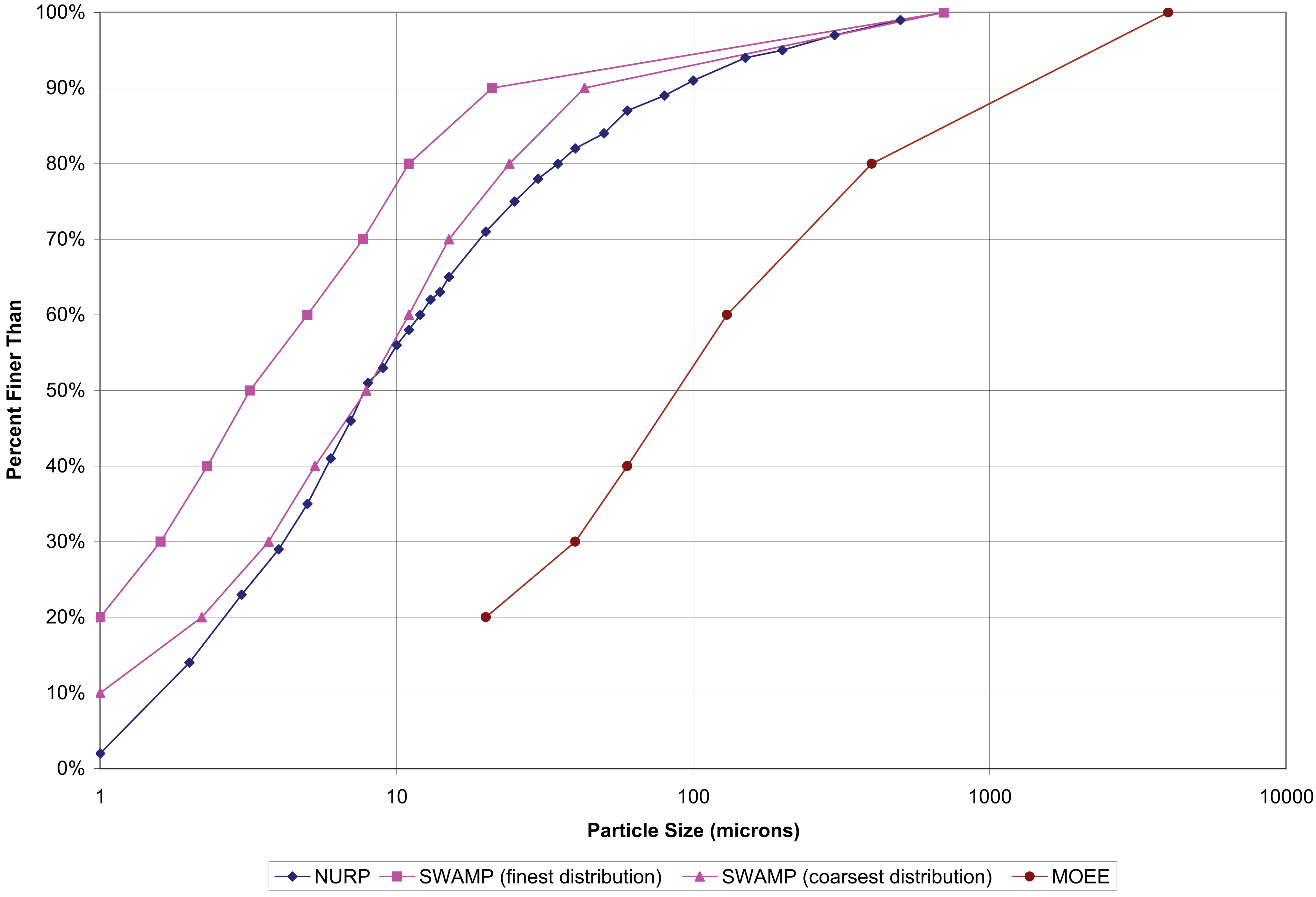


Table 3-1
Lower Don Lands Development (North of Keating Channel)
Runoff Volume Summary - Grey Development Scenario

Storm Event	Precipitation (mm)	Evaporation		Infiltration		Surface Storage		Surface Runoff			
		(mm)	%	(mm)	%	(mm)	%	(mm)	%	Coeff.	Volume (m^3)
West of Cherry											
25mm/4-hour	25.0	0.0	0%	3.3	13%	2.2	9%	19.6	78%	0.78	2,394
1.5-year/24-hour	45.1	0.0	0%	5.3	12%	2.2	5%	37.6	83%	0.83	4,602
2-year/24-hour	48.3	0.0	0%	5.6	12%	2.2	5%	40.6	84%	0.84	4,965
5-year/24-hour	58.7	0.0	0%	6.1	10%	2.2	4%	50.4	86%	0.86	6,174
Avg Rainfall Year	562.6	144.3	26%	64.0	11%	0.0	0%	354.5	63%	0.63	43,392
East of Cherry											
25mm/4-hour	25.0	0.0	0%	3.3	13%	2.3	9%	19.4	78%	0.78	2,696
1.5-year/24-hour	45.1	0.0	0%	5.4	12%	2.3	5%	37.4	83%	0.83	5,202
2-year/24-hour	48.3	0.0	0%	5.7	12%	2.3	5%	40.4	84%	0.84	5,614
5-year/24-hour	58.7	0.0	0%	6.2	11%	2.3	4%	50.2	86%	0.86	6,987
Avg Rainfall Year	562.6	150.0	27%	63.6	11%	0.0	0%	349.1	62%	0.62	48,554

Notes:
1. All water balance depths have been rounded to the nearest decimal place, runoff volumes rounded to the nearest cubic meter.
2. Design storm event results are for 36-hour simulation.
3. Evaporation was not simulated for design storm events.
4. The average rainfall year selected was 1991, using Pearson Airport 5-min data for the period April 1 through October 31.
This rainfall record ends with a dry period in which surface storage water is reduced to zero by evaporation.

Table 3-2
Lower Don Lands Development (North of Keating Channel)
Runoff Volume Summary - Green Development Scenario

Storm Event	Precipitation (mm)	Evaporation		Infiltration		Surface Storage		Surface Runoff			
		(mm)	%	(mm)	%	(mm)	%	(mm)	%	Coeff.	Volume (m^3)
West of Cherry											
25mm/4-hour	25.0	0.0	0%	8.8	35%	2.3	9%	14.0	56%	0.56	1,711
1.5-year/24-hour	45.1	0.0	0%	15.8	35%	2.3	5%	27.0	60%	0.60	3,309
2-year/24-hour	48.3	0.0	0%	16.9	35%	2.3	5%	29.2	60%	0.60	3,571
5-year/24-hour	58.7	0.0	0%	20.0	34%	2.3	4%	36.4	62%	0.62	4,461
Avg Rainfall Year	562.6	132.2	23%	180.7	32%	0.0	0%	249.8	44%	0.44	30,584
East of Cherry											
25mm/4-hour	25.0	0.0	0%	8.9	36%	2.2	9%	13.9	56%	0.56	1,939
1.5-year/24-hour	45.1	0.0	0%	16.0	35%	2.2	5%	26.9	60%	0.60	3,742
2-year/24-hour	48.3	0.0	0%	17.1	35%	2.2	5%	29.0	60%	0.60	4,039
5-year/24-hour	58.7	0.0	0%	20.3	35%	2.2	4%	36.3	62%	0.62	5,045
Avg Rainfall Year	562.6	131.1	23%	183.7	33%	0.0	0%	247.9	44%	0.44	34,480

Notes:
1. See footnotes in Table 3-1.

3. RESULTS

The model described in the previous section was applied to the various storm events and land use scenarios. Results are summarized for the following performance indicators:

- Hydrology: water balance and runoff volumes;
- Hydraulics: peak flood stages and flow rates; and
- Water quality: treatment volumes and TSS removal efficiencies in the pre-treatment tanks.

3.1 Hydrology Results

The water balance and runoff volume calculations for the North Keating Channel area are shown in **Table 3-1** (Grey Development scenario) and **Table 3-2** (Green Development scenario). In these tables, the unit-area depth and proportion of the hydrologic components are listed for each storm event, which satisfy the water balance given in **Equation 3-1**:

Precipitation = Evaporation + Infiltration + Surface Storage + Surface Runoff **Equation 3-1**

Results are shown for both the West of Cherry (NK1) and East of Cherry (NK2) areas. Evaporation was not simulated for the design storm events. As a result, the surface storage amounts are constant for each event since evaporation is the only means for reducing water that has accumulated in the surface depressions. Evaporation is represented in the average year rainfall simulation and since the rainfall record ends with a dry period, water held in surface depressions is depleted through evaporation and therefore the final surface storage value is zero.

The final set of columns in the tables show additional surface runoff quantities. The proportion of surface runoff in the water balance equation is more popularly known as the volumetric runoff coefficient. The total volume of surface runoff in cubic meters is shown in the final column. This value is used later in the water quality results section to asses the treatment volume in the disinfection chamber.

Table 3-3 shows the difference in hydrologic components for the Green Development scenario compared to the Grey Development scenario (i.e., a negative number indicates a smaller quantity under the Green Development scenario and a positive number indicates a larger quantity under the Green Development scenario). As expected, infiltration amounts are much larger and, consequently, surface runoff amounts are much smaller for Green compared to Grey Development.

Table 3-3 Water balance and runoff volume comparison (Green vs. Grey Development)

Storm Event	Evaporation		Infiltration		Surface Storage		Surface Runoff			
	Δ (mm)	%	Δ (mm)	%	Δ (mm)	%	Δ (mm)	Δ (m^3)	Coeff.	%
West of Cherry										
25mm/4-hour	n/a - Evaporation not simulated for design storm events		5.5	166%	0.1	5%	-5.6	-682	-0.22	-29%
1.5-year/24-hour			10.5	197%	0.1	5%	-10.6	-1,293	-0.23	-28%
2-year/24-hour			11.3	201%	0.1	5%	-11.4	-1,394	-0.24	-28%
5-year/24-hour			13.9	227%	0.1	5%	-14.0	-1,714	-0.24	-28%
Avg Rainfall Year	-12.1	-8%	116.7	183%	n/a		-104.6	-12,808	-0.19	-30%
East of Cherry										
25mm/4-hour	n/a - Evaporation not simulated for design storm events		5.6	168%	-0.1	-6%	-5.4	-757	-0.22	-28%
1.5-year/24-hour			10.6	199%	-0.1	-6%	-10.5	-1,460	-0.23	-28%
2-year/24-hour			11.5	203%	-0.1	-6%	-11.3	-1,575	-0.23	-28%
5-year/24-hour			14.1	228%	-0.1	-6%	-14.0	-1,942	-0.24	-28%
Avg Rainfall Year	-18.9	-13%	120.1	189%	n/a		-101.2	-14,075	-0.18	-29%

Results are fairly consistent between the West and East of Cherry Street areas, given their similar surface cover characteristics. The volumetric runoff coefficient is consistently reduced by approximately 30% under the Green Development scenario, as follows:

- Grey Development: Runoff coefficient ranges from 0.78 to 0.86 for the design storm events, and 0.63 and 0.62 for the average year rainfall, respectively for the NK1 and NK2 areas;
- Green Development: Runoff coefficient ranges from 0.56 to 0.62 for the design storm events, and 0.44 for the average year rainfall in both the NK1 and NK2 areas.

3.2 Hydraulic Results

Table 3-4 summarizes the peak computed water surface elevations throughout the North Keating Channel area for the Grey Development scenario. Junction names and locations are given along with the corresponding ground elevation from the conceptual grading plan. Peak stages are tabulated for the various storm events along with the corresponding depth below ground, rounded to the nearest 0.1 m. Surface flooding occurrences are indicated by a negative depth below ground and highlighted in the table.

Peak stages for the average year rainfall are consistently between the range of the 2-year and 5-year design storm events. While this may not seem intuitive, it is worth reiterating that this rainfall record was chosen based on rainfall totals, without consideration of the rainfall intensities of individual storm events. Peak stages for the average year rainfall result from the July 22, 1991 event, in which 37 mm of rain fell in a 1-hour period under dry antecedent conditions (i.e., no rain in the previous 2.5 days, 4 mm in the previous 7 days).

The number of surface flooding occurrences is counted at the bottom of the table, as follows:

- 25mm/4-hour event: 1 location
- 1.5-year/24-hour event: 7 locations
- 2-year/24-hour event: 8 locations
- 5-year/24-hour event: 14 locations
- Average year rainfall: 10 locations

Table 3-5 summarizes the peak computed water surface elevations throughout the North Keating Channel area for the Green Development scenario and is presented in the same format as Table 3-4. Similar to the Grey Development scenario, peak stages for the average year rainfall are consistently between the range of the 2-year and 5-year design storm events. The number of surface flooding occurrences has been reduced significantly, that is:

- 25mm/4-hour event: no locations
- 1.5-year/24-hour event: 1 location
- 2-year/24-hour event: 2 locations
- 5-year/24-hour event: 10 locations
- Average year rainfall: 4 locations

3.3 Water Quality Results

The proposed sizes for the water quality facilities are as shown:

NK1 – 180m Long x 4m Wide x 5m Deep (1.18X MOE req t): 92.6% average annual TSS removal
NK2 – 140m Long x 6m Wide x 5m Deep (1.21X MOE req t): 93.0% average annual TSS removal

AECOM

Table 3-4
Lower Don Lands Development (North of Keating Channel)
Peak Stage Results Summary - Grey Development Scenario

Junction Name	Location	Ground Elevation (m)	25mm/4-hr Peak Stage (m)	25mm/4-hr Depth Below Gnd (m)	1.5-yr/24-hr Peak Stage (m)	1.5-yr/24-hr Depth Below Gnd (m)	2-yr/24-hr Peak Stage (m)	2-yr/24-hr Depth Below Gnd (m)	5-yr/24-hr Peak Stage (m)	5-yr/24-hr Depth Below Gnd (m)	Average Year Peak Stage (m)	Average Year Depth Below Gnd (m)
West of Cherry Street												
Small020	Small St./Lakeshore Blvd.	77.2	75.53	1.7	76.37	0.8	76.58	0.6	77.12	0.1	76.86	0.3
Small010	Small St./Queens Quay	77.0	75.52	1.5	76.37	0.6	76.58	0.4	77.03	**0.0**	76.84	0.2
Parlmnt020	Parliament St./Lakeshore Blvd.	76.7	75.47	1.2	76.32	0.4	76.53	0.2	76.75	**0.0**	76.68	0.0
Parlmnt010	Parliament St./Queens Quay	76.5	75.47	1.0	76.30	0.2	76.49	0.0	76.71	**-0.2**	76.64	**-0.1**
A040	un-named St./Lakeshore Blvd.	78.5	76.15	2.3	76.22	2.3	76.43	2.1	76.72	1.8	76.68	1.8
A030	un-named St./Queens Quay	77.8	75.46	2.3	76.20	1.6	76.36	1.4	76.62	1.2	76.53	1.3
A020	un-named St.	76.7	75.44	1.3	76.11	0.6	76.23	0.5	76.48	0.2	76.38	0.3
A010	Water's edge promenade	76.0	75.43	0.6	75.99	0.0	76.05	**0.0**	76.16	**-0.2**	76.12	**-0.1**
Trinity040	Trinity St./Lakeshore Blvd.	78.7	75.46	3.2	76.31	2.4	76.50	2.2	77.59	1.1	77.01	1.7
Trinity030	Trinity St./Queens Quay	77.8	75.46	2.3	76.28	1.5	76.44	1.4	77.40	0.4	76.90	0.9
Trinity020	Trinity St./un-named St.	76.7	75.45	1.3	76.16	0.5	76.26	0.4	76.73	**0.0**	76.51	0.2
Trinity010	Trinity St./Water's edge promenade	76.0	75.44	0.6	76.05	**0.0**	76.10	**-0.1**	76.22	**-0.2**	76.17	**-0.2**
B040	un-named St./Lakeshore Blvd.	78.8	75.61	3.2	76.41	2.4	76.61	2.2	77.49	1.3	77.10	1.7
B030	un-named St./Queens Quay	78.8	75.58	3.2	76.40	2.4	76.59	2.2	77.42	1.4	77.06	1.7
B020	un-named St./un-named St.	76.7	75.47	1.2	76.28	0.4	76.40	0.3	76.79	**-0.1**	76.70	0.0
B010	un-named St./Water's edge promenade	76.1	75.46	0.6	76.16	**-0.1**	76.21	**-0.1**	76.34	**-0.2**	76.28	**-0.2**
WCherry020	Cherry St./Queens Quay	78.8	76.37	2.4	76.39	2.4	76.39	2.4	76.41	2.4	76.40	2.4
WCherry010	Cherry St./Water's edge promenade	78.6	75.85	2.8	76.21	2.4	76.24	2.4	76.35	2.3	76.29	2.3
Tank-NK1	water quality pre-treatment tank	76.0	75.40	0.6	75.79	0.2	75.81	0.2	75.86	0.1	75.84	0.2
East of Cherry Street												
ECherry030	Cherry St./Lakeshore Blvd.	75.5	75.54	**0.0**	75.79	**-0.3**	75.81	**-0.3**	75.88	**-0.4**	75.82	**-0.3**
ECherry020	Cherry St./Gardiner Expressway	77.5	75.54	2.0	75.79	1.7	75.81	1.7	75.88	1.6	75.82	1.7
ECherry010	Cherry St./water's edge promenade	76.0	75.93	0.1	76.12	**-0.1**	76.14	**-0.1**	76.20	**-0.2**	76.16	**-0.2**
Park010	channel lawn/water's edge promenade	76.0	75.92	0.1	76.13	**-0.1**	76.16	**-0.2**	76.25	**-0.3**	76.20	**-0.2**
C040	un-named St./un-named St.	82.0	75.52	6.5	75.87	6.1	75.90	6.1	75.99	6.0	75.94	6.1
C030	un-named St./Lakeshore Blvd.	79.8	75.53	4.3	75.86	3.9	75.88	3.9	75.99	3.8	75.94	3.9
C020	un-named St./Gardiner Expressway	78.0	75.57	2.4	76.04	2.0	76.06	1.9	76.33	1.7	76.15	1.8
C010	un-named St./Queens Quay	76.8	75.77	1.0	76.19	0.6	76.21	0.6	76.78	0.0	76.46	0.3
NMuntns040	Munitions St./un-named St.	82.0	75.53	6.5	75.96	6.0	76.00	6.0	76.15	5.8	76.08	5.9
NMuntns030	Munitions St./Lakeshore Blvd.	81.9	75.55	6.4	76.10	5.8	76.14	5.8	76.37	5.5	76.26	5.6
NMuntns020	Munitions St./Queens Quay	78.6	75.56	3.0	76.09	2.5	76.14	2.5	76.38	2.2	76.26	2.3
NMuntns010	Munitions St./water's edge promenade	76.0	75.56	0.4	76.06	**-0.1**	76.09	**-0.1**	76.18	**-0.2**	76.13	**-0.1**
D020	un-named St./Lakeshore Blvd.	80.3	75.77	4.5	76.32	4.0	76.38	3.9	76.66	3.6	76.55	3.8
D010	un-named St./Queens Quay	77.4	76.19	1.2	76.97	0.4	77.24	0.2	77.55	**-0.1**	77.48	**-0.1**
E030	un-named St./un-named St.	79.0	75.90	3.1	76.39	2.6	76.43	2.6	76.72	2.3	76.58	2.4
E020	un-named St./Lakeshore Blvd.	78.7	75.88	2.8	76.37	2.3	76.41	2.3	76.68	2.0	76.55	2.2
E010	un-named St./Queens Quay	76.2	75.91	0.3	76.36	**-0.2**	76.40	**-0.2**	76.53	**-0.3**	76.46	**-0.3**
F010	un-named St./inlet to water quality trt tank	82.0	75.50	6.5	75.82	6.2	75.85	6.2	75.94	6.1	75.89	6.1
Tank-NK2	water quality treatment tank	82.0	75.47	6.5	75.70	6.3	75.71	6.3	75.76	6.2	75.73	6.3
			Surface Flooding Occurrences:	**1**		**7**		**8**		**14**		**10**

Notes:

1. This represents the "worst case" development scenario, without source or conveyance controls and 95% impervious.
2. Surface flooding occurrences are highlighted and marked in bold.

Table 3-5
Lower Don Lands Development (North of Keating Channel)
Peak Stage Results Summary - Green Development Scenario

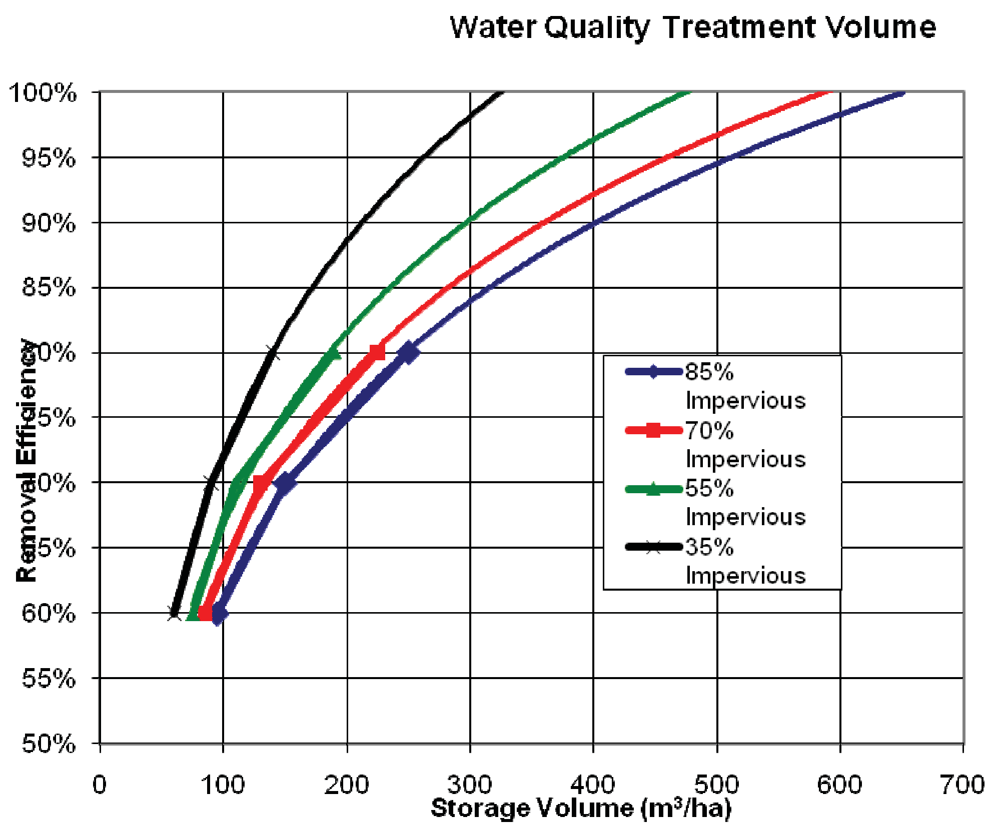
Junction Name	Location	Ground Elevation (m)	25mm/4-hr Peak Stage (m)	25mm/4-hr Depth Below Gnd (m)	1.5-yr/24-hr Peak Stage (m)	1.5-yr/24-hr Depth Below Gnd (m)	2-yr/24-hr Peak Stage (m)	2-yr/24-hr Depth Below Gnd (m)	5-yr/24-hr Peak Stage (m)	5-yr/24-hr Depth Below Gnd (m)	Average Year Peak Stage (m)	Average Year Depth Below Gnd (m)
West of Cherry Street												
Small020	Small St./Lakeshore Blvd.	77.2	75.14	2.1	75.60	1.6	75.80	1.4	76.69	0.5	76.19	1.0
Small010	Small St./Queens Quay	77.0	75.08	1.9	75.60	1.4	75.79	1.2	76.68	0.3	76.18	0.8
Parlmnt020	Parliament St./Lakeshore Blvd.	76.7	75.04	1.7	75.60	1.1	75.79	0.9	76.63	0.1	76.18	0.5
Parlmnt010	Parliament St./Queens Quay	76.5	74.99	1.5	75.59	0.9	75.78	0.7	76.57	**-0.1**	76.14	0.4
A040	un-named St./Lakeshore Blvd.	78.5	76.15	2.3	76.14	2.4	76.15	2.3	76.53	2.0	76.16	2.3
A030	un-named St./Queens Quay	77.8	74.87	2.9	75.57	2.2	75.75	2.1	76.41	1.4	76.05	1.8
A020	un-named St.	76.7	74.82	1.9	75.55	1.2	75.71	1.0	76.24	0.5	75.97	0.7
A010	Water's edge promenade	76.0	74.81	1.2	75.53	0.5	75.67	0.3	76.05	**0.0**	75.89	0.1
Trinity040	Trinity St./Lakeshore Blvd.	78.7	75.13	3.6	75.59	3.1	75.80	2.9	76.86	1.8	76.24	2.5
Trinity030	Trinity St./Queens Quay	77.8	75.06	2.7	75.58	2.2	75.77	2.0	76.72	1.1	76.16	1.6
Trinity020	Trinity St./un-named St.	76.7	74.87	1.8	75.56	1.1	75.73	1.0	76.40	0.3	76.05	0.7
Trinity010	Trinity St./Water's edge promenade	76.0	74.82	1.2	75.54	0.5	75.69	0.3	76.11	**-0.1**	75.93	0.1
B040	un-named St./Lakeshore Blvd.	78.8	75.10	3.7	75.58	3.2	75.79	3.0	76.65	2.1	76.16	2.6
B030	un-named St./Queens Quay	78.8	75.06	3.7	75.58	3.2	75.78	3.0	76.61	2.2	76.14	2.7
B020	un-named St./un-named St.	76.7	74.93	1.8	75.57	1.1	75.75	1.0	76.36	0.3	76.08	0.6
B010	un-named St./Water's edge promenade	76.1	74.84	1.3	75.56	0.5	75.73	0.4	76.20	**-0.1**	76.02	0.1
WCherry020	Cherry St./Queens Quay	78.8	76.37	2.4	76.39	2.4	76.39	2.4	76.42	2.4	76.40	2.4
WCherry010	Cherry St./Water's edge promenade	78.6	75.85	2.8	75.86	2.7	75.86	2.7	76.24	2.4	76.06	2.5
Tank-NK1	water quality pre-treatment tank	76.0	74.79	1.2	75.49	0.5	75.61	0.4	75.81	0.2	75.73	0.3
East of Cherry Street												
ECherry030	Cherry St./Lakeshore Blvd.	75.5	74.89	0.6	75.61	**-0.1**	75.68	**-0.2**	75.81	**-0.3**	75.72	**-0.2**
ECherry020	Cherry St./Gardiner Expressway	77.5	74.89	2.6	75.62	1.9	75.68	1.8	75.81	1.7	75.72	1.8
ECherry010	Cherry St./water's edge promenade	76.0	74.97	1.0	75.72	0.3	75.89	0.1	76.06	**-0.1**	75.93	0.1
Park010	channel lawn/water's edge promenade	76.0	74.96	1.0	75.68	0.3	75.78	0.2	76.05	**0.0**	75.91	0.1
C040	un-named St./un-named St.	82.0	74.84	7.2	75.59	6.4	75.71	6.3	75.90	6.1	75.81	6.2
C030	un-named St./Lakeshore Blvd.	79.8	74.85	5.0	75.59	4.2	75.68	4.1	75.88	3.9	75.79	4.0
C020	un-named St./Gardiner Expressway	78.0	74.86	3.1	75.63	2.4	75.71	2.3	75.97	2.0	75.82	2.2
C010	un-named St./Queens Quay	76.8	74.89	1.9	75.66	1.1	75.76	1.0	76.06	0.7	75.88	0.9
NMuntns040	Munitions St./un-named St.	82.0	74.86	7.1	75.63	6.4	75.76	6.2	76.01	6.0	75.89	6.1
NMuntns030	Munitions St./Lakeshore Blvd.	81.9	75.02	6.9	75.67	6.2	75.86	6.0	76.17	5.7	76.03	5.9
NMuntns020	Munitions St./Queens Quay	78.6	75.04	3.6	75.68	2.9	75.90	2.7	76.17	2.4	76.05	2.6
NMuntns010	Munitions St./water's edge promenade	76.0	75.05	1.0	75.71	0.3	75.93	0.1	76.09	**-0.1**	76.03	**0.0**
D020	un-named St./Lakeshore Blvd.	80.3	75.34	5.0	75.90	4.4	76.12	4.2	76.47	3.8	76.34	4.0
D010	un-named St./Queens Quay	77.4	75.77	1.6	76.35	1.1	76.64	0.8	77.49	**-0.1**	77.41	**0.0**
E030	un-named St./un-named St.	79.0	75.42	3.6	75.98	3.0	76.21	2.8	76.53	2.5	76.40	2.6
E020	un-named St./Lakeshore Blvd.	78.7	75.41	3.3	75.97	2.7	76.19	2.5	76.47	2.2	76.34	2.4
E010	un-named St./Queens Quay	76.2	75.43	0.8	75.98	0.2	76.21	**0.0**	76.44	**-0.2**	76.34	**-0.1**
F010	un-named St./inlet to water quality trt tank	82.0	74.84	7.2	75.58	6.4	75.67	6.3	75.85	6.2	75.77	6.2
Tank-NK2	water quality treatment tank	82.0	74.82	7.2	75.54	6.5	75.60	6.4	75.71	6.3	75.67	6.3
	Surface Flooding Occurrences:			**0**		**1**		**2**		**10**		**4**

Notes:

1. This represents the "best case" development scenario, with source or conveyance controls and 73% impervious.
2. Surface flooding occurrences are highlighted and marked in bold.

The results show that the TSS removal efficiency will be greater than 90% removal efficiency with the available size for the water quality facility. Figure 3-1 shows the extension of the MOE Table 3.1 in order to achieve the water quality treatment volume. It should be noted, that it is not expected that 100% removal efficiency will ever be achieved. However, the removal efficiency will approach the 100% value with a large enough treatment volume.

Figure 3-1: MOE Water Quality Treatment Volume



4. CONCLUSIONS

- Hydrology – the green development scenario reduces the runoff volume due to the capture of stormwater runoff prior to entering the propose SWM tank. The grey development scenario has increased discharge from the contributing drainage area. The Grey development scenario will affect the proposed size of the end of pipe facility.
- Hydraulics – the use of the green development scenario was able to reduce the frequency of surface flooding occurring due to the retention of runoff.
- Water Quality – the proposed sizes for water quality treatment will exceed the MOE criteria for 80% removal efficiency and meet the required treatment level for UV treatment.

Appendix

Model Input Summary Tables

TABLE A-1 - Surface Cover Parameter Calculations

Project: **Lower Don Lands Development (North of Keating Channel)**
Job No.: **109446 (Task 5)**
Scenario: **Proposed Conditions - Grey Development Scenario**

Surface Cover Type	Manning's "n" Imperv-ious	Manning's "n" Pervious	Dep. Storage (mm) Imperv-ious	Dep. Storage (mm) Pervious	% Imperv-ious	Subarea Routing	% Routed	% Imperv. Without Storage
Natural	0.015	0.450	2.0	9.0	5	Pervious	50	10
Grass	0.015	0.300	2.0	6.5	5	Pervious	50	10
Bare	0.015	0.150	2.0	4.0	5	Pervious	50	10
GrnRoof	0.015	0.350	2.0	20.5	15	Pervious	20	10
RegRoof	0.015	0.150	2.0	4.0	95	Pervious	10	25
PrmPave	0.015	0.150	32.5	34.5	75	Pervious	20	15
ImpPave	0.015	0.150	4.0	6.0	95	Pervious	10	20
Water	0.015	0.015	2.0	2.0	100	Outlet	n/a	0

Code	Surface Cover/Land Use Description
Natural	Medium to heavy natural vegetation
Grass	Grass/turf, light vegetation, garden, or landscaped areas
Bare	Unvegetated soil or loose granular materials
GrnRoof	Dev'pt block with green roof
RegRoof	Dev'pt block with regular roof, incl. sidewalk, landscaping, etc.
PrmPave	Permeable paved surfaces (with underdrain)
ImpPave	Impermeable paved surfaces (i.e., roadways, parking, LRT)
Water	Open water surface

Hydrologic Unit Name	Percent By Surface Cover Category Natural	Grass	Bare	GrnRoof	RegRoof	PrmPave	ImpPave	Water	Total	% Imperv-ious	% Routed	% Imperv. Without Storage	Manning's "n" Imperv-ious	Manning's "n" Pervious	Dep. Storage (mm) Imperv-ious	Dep. Storage (mm) Pervious
D-03							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-04							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-05							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-07							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-09							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-10							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-11					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-12							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-13							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-14					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-17							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-18							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-19					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-20					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-21							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-22					75		25		100.0	95.0	10.0	23.8	0.015	0.150	2.5	4.5
D-23					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-24					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-25					90		10		100.0	95.0	10.0	24.5	0.015	0.150	2.2	4.2
D-26							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-27					90		10		100.0	95.0	10.0	24.5	0.015	0.150	2.2	4.2
D-28							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-29							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-30							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-31					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-34							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-35					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-36							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-37							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-39							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-40							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-41					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-43							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-44							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-45							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-47							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-48							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-50							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-51							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-53					90		10		100.0	95.0	10.0	24.5	0.015	0.150	2.2	4.2
D-54							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-55							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-56					75		25		100.0	95.0	10.0	23.8	0.015	0.150	2.5	4.5
D-58					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-59							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-60					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-61							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-62							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-63					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-64							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-65							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-66							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-67					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-69							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-70							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-71							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-72							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-73							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-74							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-75					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-76							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-77							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-78							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-79					90		10		100.0	95.0	10.0	24.5	0.015	0.150	2.2	4.2
D-80							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-81							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-82					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-83							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-84					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0

TABLE A-1 - Surface Cover Parameter Calculations

Project: Lower Don Lands Development (North of Keating Channel)
Job No.: 109446 (Task 5)
Scenario: Proposed Conditions - Grey Development Scenario

Surface Cover Type	Manning's "n" Imperv-ious	Manning's "n" Pervious	Dep. Storage (mm) Imperv-ious	Dep. Storage (mm) Pervious	% Imperv-ious	Subarea Routing	% Routed	% Imperv. Without Storage
Natural	0.015	0.450	2.0	9.0	5	Pervious	50	10
Grass	0.015	0.300	2.0	6.5	5	Pervious	50	10
Bare	0.015	0.150	2.0	4.0	5	Pervious	50	10
GrnRoof	0.015	0.350	2.0	20.5	15	Pervious	20	10
RegRoof	0.015	0.150	2.0	4.0	95	Pervious	10	25
PrmPave	0.015	0.150	32.5	34.5	75	Pervious	20	15
ImpPave	0.015	0.150	4.0	6.0	95	Pervious	10	20
Water	0.015	0.015	2.0	2.0	100	Outlet	n/a	0

Code	Surface Cover/Land Use Description
Natural	Medium to heavy natural vegetation
Grass	Grass/turf, light vegetation, garden, or landscaped areas
Bare	Unvegetated soil or loose granular materials
GrnRoof	Dev'pt block with green roof
RegRoof	Dev'pt block with regular roof, incl. sidewalk, landscaping, etc.
PrmPave	Permeable paved surfaces (with underdrain)
ImpPave	Impermeable paved surfaces (i.e., roadways, parking, LRT)
Water	Open water surface

Hydrologic Unit Name	Percent By Surface Cover Category: Natural	Grass	Bare	GrnRoof	RegRoof	PrmPave	ImpPave	Water	Total	% Imperv-ious	% Routed	% Imperv. Without Storage	Manning's "n" Imperv-ious	Manning's "n" Pervious	Dep. Storage (mm) Imperv-ious	Dep. Storage (mm) Pervious
D-86							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-87					100				100.0	95.0	10.0	25.0	0.015	0.150	2.0	4.0
D-88							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-89							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-90							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-91							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-92							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-93							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-01							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-02							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-5							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-32							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-33							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-42							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-57							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-68							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-85							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
Area-wtd Avg:	**0.0**	**0.0**	**0.0**	**0.0**	**49.6**	**0.0**	**50.4**	**0.0**	**100.0**	**95.0**	**10.0**	**22.5**	**0.015**	**0.150**	**3.0**	**5.0**

TABLE A-2 - Surface Cover Parameter Calculations

Project: Lower Don Lands Development (North of Keating Channel)
Job No.: 109446 (Task 5)
Scenario: Proposed Conditions - Green Development Scenario

Surface Cover Type	Manning's "n" Imperv-ious	Manning's "n" Pervious	Dep. Storage (mm) Imperv-ious	Dep. Storage (mm) Pervious	% Imperv-ious	Subarea Routing	% Routed	% Imperv. Without Storage
Natural	0.015	0.450	2.0	9.0	5	Pervious	50	10
Grass	0.015	0.300	2.0	6.5	5	Pervious	50	10
Bare	0.015	0.150	2.0	4.0	5	Pervious	50	10
GrnRoof	0.015	0.350	2.0	20.5	15	Pervious	20	10
RegRoof	0.015	0.150	2.0	4.0	95	Pervious	10	25
PrmPave	0.015	0.150	32.5	34.5	75	Pervious	20	15
ImpPave	0.015	0.150	4.0	6.0	95	Pervious	10	20
Water	0.015	0.015	2.0	2.0	100	Outlet	n/a	0

Code	Description
Natural	Medium to heavy natural vegetation
Grass	Grass/turf, light vegetation, garden, or landscaped areas
Bare	Unvegetated soil or loose granular materials
GrnRoof	Dev'pt block with green roof
RegRoof	Dev'pt block with regular roof, incl. sidewalk, landscaping, etc.
PrmPave	Permeable paved surfaces (with underdrain)
ImpPave	Impermeable paved surfaces (i.e., roadways, parking, LRT)
Water	Open water surface

Hydrologic Unit Name	Percent By Surface Cover Type: Natural	Grass	Bare	GrnRoof	RegRoof	PrmPave	ImpPave	Water	Total	% Imperv-ious	% Routed	% Imperv. Without Storage	Manning's "n" Imperv-ious	Manning's "n" Pervious	Dep. Storage (mm) Imperv-ious	Dep. Storage (mm) Pervious
D-03							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-04							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-05							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-07							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-09							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-10							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-11				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-12							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-13							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-14				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-17							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-18		80					20		100.0	23.0	42.0	12.0	0.015	0.270	2.4	6.4
D-19				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-20				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-21							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-22		10			75		15		100.0	86.0	14.0	22.8	0.015	0.165	2.3	4.5
D-23				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-24				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-25		10		30	60				100.0	62.0	17.0	19.0	0.015	0.225	2.0	9.2
D-26							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-27		10		30	60				100.0	62.0	17.0	19.0	0.015	0.225	2.0	9.2
D-28							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-29							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-30							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-31				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-34							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-35				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-36							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-37							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-39							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-40							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-41				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-43							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-44							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-45							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-47							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-48							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-50							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-51							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-53		10		30	60				100.0	62.0	17.0	19.0	0.015	0.225	2.0	9.2
D-54	10	80	10						100.0	5.0	50.0	10.0	0.015	0.300	2.0	6.5
D-55							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-56	5	20		25	50				100.0	52.5	22.5	17.5	0.015	0.245	2.0	8.9
D-58				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-59		10					90		100.0	86.0	14.0	19.0	0.015	0.165	3.8	6.0
D-60				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-61							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-62							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-63				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-64							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-65		15					85		100.0	81.5	16.0	18.5	0.015	0.173	3.7	6.0
D-66							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-67				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-69							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-70							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-71		80					20		100.0	23.0	42.0	12.0	0.015	0.270	2.4	6.4
D-72							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-73		80					20		100.0	23.0	42.0	12.0	0.015	0.270	2.4	6.4
D-74							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-75				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-76							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-77		5					95		100.0	90.5	12.0	19.5	0.015	0.158	3.9	6.0
D-78							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-79		10		30	60				100.0	62.0	17.0	19.0	0.015	0.225	2.0	9.2
D-80							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-81							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-82				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-83		10					90		100.0	86.0	14.0	19.0	0.015	0.165	3.8	6.0
D-84				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9

TABLE A-2 - Surface Cover Parameter Calculations

Project: Lower Don Lands Development (North of Keating Channel)
Job No.: 109446 (Task 5)
Scenario: Proposed Conditions - Green Development Scenario

Surface Cover Type	Manning's "n" Imperv-ious	Manning's "n" Pervious	Dep. Storage (mm) Imperv-ious	Dep. Storage (mm) Pervious	% Imperv-ious	Subarea Routing	% Routed	% Imperv. Without Storage
Natural	0.015	0.450	2.0	9.0	5	Pervious	50	10
Grass	0.015	0.300	2.0	6.5	5	Pervious	50	10
Bare	0.015	0.150	2.0	4.0	5	Pervious	50	10
GrnRoof	0.015	0.350	2.0	20.5	15	Pervious	20	10
RegRoof	0.015	0.150	2.0	4.0	95	Pervious	10	25
PrmPave	0.015	0.150	32.5	34.5	75	Pervious	20	15
ImpPave	0.015	0.150	4.0	6.0	95	Pervious	10	20
Water	0.015	0.015	2.0	2.0	100	Outlet	n/a	0

Code	Description
Natural	Medium to heavy natural vegetation
Grass	Grass/turf, light vegetation, garden, or landscaped areas
Bare	Unvegetated soil or loose granular materials
GrnRoof	Dev'pt block with green roof
RegRoof	Dev'pt block with regular roof, incl. sidewalk, landscaping, etc.
PrmPave	Permeable paved surfaces (with underdrain)
ImpPave	Impermeable paved surfaces (i.e., roadways, parking, LRT)
Water	Open water surface

Hydrologic Unit Name	Percent By Surface Cover Type: Natural	Grass	Bare	GrnRoof	RegRoof	PrmPave	ImpPave	Water	Total	% Imperv-ious	% Routed	% Imperv. Without Storage	Manning's "n" Imperv-ious	Manning's "n" Pervious	Dep. Storage (mm) Imperv-ious	Dep. Storage (mm) Pervious
D-86							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-87				30	70				100.0	71.0	13.0	20.5	0.015	0.210	2.0	8.9
D-88		15					85		100.0	81.5	16.0	18.5	0.015	0.173	3.7	6.0
D-89	10	60	10				20		100.0	23.0	42.0	12.0	0.015	0.270	2.4	6.4
D-90	10	60	10				20		100.0	23.0	42.0	12.0	0.015	0.270	2.4	6.4
D-91	10	60	10				20		100.0	23.0	42.0	12.0	0.015	0.270	2.4	6.4
D-92	10	60	10				20		100.0	23.0	42.0	12.0	0.015	0.270	2.4	6.4
D-93	10	60	10				20		100.0	23.0	42.0	12.0	0.015	0.270	2.4	6.4
D-01							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-02							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-5							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-32							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-33							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-42							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-57							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-68							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
D-85							100		100.0	95.0	10.0	20.0	0.015	0.150	4.0	6.0
Area-wtd Avg:	**0.8**	**9.6**	**0.6**	**15.0**	**34.6**	**0.0**	**39.3**	**0.0**	**100.0**	**73.0**	**15.9**	**19.1**	**0.015**	**0.197**	**2.8**	**7.5**

Table A-3
Lower Don Lands Development (North of Keating Channel)
Proposed Conditions - Modeled Junctions

Junction Name	Location	Co-ordinates X (datum)	Co-ordinates Y (datum)	Invert Elevation (m-datum)	MH Rim/ Surface Elevation (m-datum)	Surface Storage Modeled (Y/N)	Maximum Flow Depth (m)	Initial Water Surface Control	Initial Flow Depth (m)
West of Cherry Street									
Small020	Small St./Lakeshore Blvd.	315,890.096	4,833,936.231	74.700	77.2	Y	3.500	Tank-NK1	0.000
Small010	Small St./Queens Quay	315,921.216	4,833,847.584	74.265	77.0	Y	3.735	Tank-NK1	0.000
Parlmnt020	Parliament St./Lakeshore Blvd.	315,989.486	4,833,976.247	74.200	76.7	Y	3.500	Tank-NK1	0.000
Parlmnt010	Parliament St./Queens Quay	316,012.068	4,833,903.251	73.810	76.5	Y	3.690	Tank-NK1	0.190
A040	un-named St./Lakeshore Blvd.	316,071.411	4,834,015.634	76.000	78.5	Y	3.500	Tank-NK1	0.000
A030	un-named St./Queens Quay	316,104.495	4,833,957.867	73.345	77.8	Y	5.455	Tank-NK1	0.655
A020	un-named St.	316,157.536	4,833,869.641	73.015	76.7	Y	4.685	Tank-NK1	0.985
A010	water's edge promenade	316,193.772	4,833,807.148	72.250	76.0	Y	4.750	Tank-NK1	1.750
Trinity040	Trinity St./Lakeshore Blvd.	316,170.140	4,834,059.222	74.700	78.7	Y	5.000	Tank-NK1	0.000
Trinity030	Trinity St./Queens Quay	316,195.872	4,834,004.606	74.490	77.8	Y	4.310	Tank-NK1	0.000
Trinity020	Trinity St./un-named St.	316,236.834	4,833,916.380	74.160	76.7	Y	3.540	Tank-NK1	0.000
Trinity010	Trinity St./water's edge promenade	316,267.293	4,833,849.685	73.080	76.0	Y	3.920	Tank-NK1	0.920
B040	un-named St./Lakeshore Blvd.	316,264.667	4,834,097.558	74.300	78.8	Y	5.500	Tank-NK1	0.000
B030	un-named St./Queens Quay	316,288.299	4,834,026.137	74.030	78.8	Y	5.770	Tank-NK1	0.000
B020	un-named St./un-named St.	316,340.290	4,833,934.235	73.700	76.7	Y	4.000	Tank-NK1	0.300
B010	un-named St./water's edge promenade	316,358.670	4,833,903.776	73.460	76.1	Y	3.640	Tank-NK1	0.540
WCherry020	Cherry St./Queens Quay	316,367.072	4,834,038.741	76.300	78.8	Y	3.500	Tank-NK1	0.000
WCherry010	Cherry St./water's edge promenade	316,419.588	4,833,942.112	75.790	78.6	Y	3.810	Tank-NK1	0.000
Tank-NK1	water quality treatment tank	316,198.678	4,833,798.582	70.000	76.0	N	6.000	Tank-NK1	4.000
UV-NK1	water quality treatment device	316,079.288	4,833,837.081	70.000	76.0	N	6.000	UV-NK1	0.000
PS_OF	Parliament Slip outfall	316,065.634	4,833,827.103	70.000	76.0	N	6.000	Lake HWL	5.500
NK1_OF	North Keating Area 1 bypass outfall	316,204.864	4,833,788.574	70.000	76.0	N	6.000	Lake HWL	5.500
East of Cherry Street									
ECherry030	Cherry St./Lakeshore Blvd.	316,358.499	4,834,162.450	73.325	75.5	Y	3.175	Tank-NK2	0.675
ECherry020	Cherry St./Gardiner Expressway	316,364.284	4,834,116.169	73.588	77.5	Y	4.912	Tank-NK2	0.412
ECherry010	Cherry St./water's edge promenade	316,437.177	4,833,937.985	73.695	76.0	Y	3.305	Tank-NK2	0.305
Park010	channel lawn/water's edge promenade	316,519.327	4,833,988.895	73.365	76.0	Y	3.635	Tank-NK2	0.635
C040	un-named St./un-named St.	316,545.939	4,834,260.798	72.338	82.0	Y	10.663	Tank-NK2	1.662
C030	un-named St./Lakeshore Blvd.	316,567.922	4,834,205.260	72.638	79.8	Y	8.162	Tank-NK2	1.362
C020	un-named St./Gardiner Expressway	316,579.493	4,834,138.152	72.843	78.0	Y	6.157	Tank-NK2	1.157
C010	un-named St./Queens Quay	316,578.336	4,834,082.615	73.010	76.8	Y	4.790	Tank-NK2	0.990
NMuntns040	Munitions St./un-named St.	316,647.758	4,834,300.137	72.325	82.0	Y	10.675	Tank-NK2	1.675
NMuntns030	Munitions St./Lakeshore Blvd.	316,665.113	4,834,244.600	72.640	81.9	Y	10.260	Tank-NK2	1.360
NMuntns020	Munitions St./Queens Quay	316,694.039	4,834,142.780	72.985	78.6	Y	6.615	Tank-NK2	1.015
NMuntns010	Munitions St./water's edge promenade	316,709.081	4,834,094.185	73.165	76.0	Y	3.835	Tank-NK2	0.835
D020	un-named St./Lakeshore Blvd.	316,741.478	4,834,270.054	73.030	80.3	Y	8.270	Tank-NK2	0.970
D010	un-named St./Queens Quay	316,769.246	4,834,168.235	73.495	77.4	Y	4.905	Tank-NK2	0.505
E030	un-named St./un-named St.	316,802.800	4,834,346.419	73.615	79.0	Y	6.385	Tank-NK2	0.385
E020	un-named St./Lakeshore Blvd.	316,820.156	4,834,295.509	73.300	78.7	Y	6.400	Tank-NK2	0.700
E010	un-named St./Queens Quay	316,840.983	4,834,213.360	73.705	76.2	Y	3.495	Tank-NK2	0.295
F010	un-named St./inlet to water quality trt tank	316,594.534	4,834,280.468	72.025	82.0	Y	10.975	Tank-NK2	1.975
Tank-NK2	water quality treatment tank	316,587.129	4,834,298.165	70.000	82.0	N	12.000	Tank-NK2	4.000
UV-NK2	water quality treatment device	316,795.858	4,834,371.873	70.000	82.0	N	12.000	UV-NK2	0.000
NK2_OF	North Keating Area 2 bypass outfall	316,412.236	4,834,224.241	70.000	82.0	N	12.000	Lake HWL	5.500

Table A-4
Lower Don Lands Development (North of Keating Channel)
Proposed Conditions - Modeled Conduits

Conduit Name	Model Junctions Inlet	Model Junctions Outlet	Length (m)	Diam./ Depth (m)	Roughness Coefficient (Manning "n")	U/S Invert El. (m)	D/S Invert El. (m)	Headloss Coefficient Kent	Headloss Coefficient Kexit	Headloss Coefficient Koth	Slope	Material	Full-flow Velocity (m/s)
West of Cherry Street													
Small020_010	Small020	Small010	95	0.450	0.013	74.700	74.415	0.4	0.5	0	0.30%	Conc	0.9
Small010_Par010	Small010	Parlmnt010	105	0.525	0.013	74.265	73.840	0.4	0.1	0	0.40%	Conc	1.2
Parlmnt020_010	Parlmnt020	Parlmnt010	80	0.450	0.013	74.200	73.960	0.4	0.5	0	0.30%	Conc	0.9
Parlmnt010_A030	Parlmnt010	A030	105	0.675	0.013	73.810	73.495	0.4	0.5	0	0.30%	Conc	1.2
A040_030	A040	A030	65	0.375	0.013	76.000	75.025	0.4	0.1	0	1.50%	Conc	1.9
A030_020	A030	A020	100	0.750	0.013	73.345	73.045	0.4	0.1	0	0.30%	Conc	1.3
A020_010	A020	A010	70	0.750	0.013	73.015	72.280	0.4	0.1	0	1.05%	Conc	2.3
Trinity040_030	Trinity040	Trinity030	60	0.450	0.013	74.700	74.520	0.4	0.1	0	0.30%	Conc	0.9
Trinity030_020	Trinity030	Trinity020	100	0.525	0.013	74.490	74.190	0.4	0.1	0	0.30%	Conc	1.0
Trinity020_010	Trinity020	Trinity010	65	0.525	0.013	74.160	73.230	0.4	0.5	0	1.43%	Conc	2.1
Trinity010_A010	Trinity010	A010	85	0.900	0.013	73.080	72.400	0.4	0.5	0	0.80%	Conc	2.1
B040_030	B040	B030	80	0.450	0.013	74.300	74.060	0.4	0.1	0	0.30%	Conc	0.9
B030_020	B030	B020	100	0.450	0.013	74.030	73.730	0.4	0.1	0	0.30%	Conc	0.9
B020_010	B020	B010	30	0.450	0.013	73.700	73.610	0.4	0.5	0	0.30%	Conc	0.8
WCherry020_010	WCherry020	WCherry010	120	0.300	0.013	76.300	75.940	0.4	0.5	0	0.30%	Conc	0.7
WCherry010_B010	WCherry010	B010	70	0.375	0.013	75.790	73.490	0.4	0.1	0	3.29%	Conc	2.8
B010_Trinity010	B010	Trinity010	105	0.600	0.013	73.460	73.110	0.4	0.1	0	0.33%	Conc	1.2
A010_Tank-NK1	A010	Tank-NK1	10	0.900	0.013	72.250	72.000	0.4	0.5	1	2.50%	Conc	1.5
East of Cherry Street													
ECherry010_Pk010	ECherry010	Park010	100	0.375	0.013	73.695	73.445	0.4	0.25	0	0.25%	Conc	0.8
ECherry020_030	ECherry020	ECherry030	45	0.300	0.013	73.588	73.475	0.4	0.5	0	0.25%	Conc	0.6
ECherry030_C030	ECherry030	C030	215	0.675	0.013	73.325	72.788	0.4	0.5	0	0.25%	Conc	1.1
Park010_C010	Park010	C010	110	0.450	0.013	73.365	73.090	0.4	0.25	0	0.25%	Conc	0.9
C010_020	C010	C020	55	0.525	0.013	73.010	72.873	0.4	0.1	0	0.25%	Conc	0.9
C020_030	C020	C030	70	0.525	0.013	72.843	72.668	0.4	0.1	0	0.25%	Conc	0.9
C030_040	C030	C040	60	0.825	0.013	72.638	72.488	0.4	0.5	0	0.25%	Conc	1.1
C040_F010	C040	F010	65	0.825	0.013	72.338	72.175	0.4	0.5	0	0.25%	Conc	1.1
NMuntns010_020	NMuntns010	NMuntns020	50	0.375	0.013	73.165	73.015	0.4	0.1	0	0.30%	Conc	0.8
NMuntns020_030	NMuntns020	NMuntns030	105	0.525	0.013	72.985	72.670	0.4	0.1	0	0.30%	Conc	1.0
NMuntns030_040	NMuntns030	NMuntns040	55	0.750	0.013	72.640	72.475	0.4	0.5	0	0.30%	Conc	1.1
NMuntns040_F010	NMuntns040	F010	50	0.750	0.013	72.325	72.175	0.4	0.5	0	0.30%	Conc	1.1
D010_020	D010	D020	105	0.525	0.013	73.495	73.180	0.4	0.5	0	0.30%	Conc	1.0
D020_NMuntns030	D020	NMuntns030	80	0.675	0.013	73.030	72.790	0.4	0.5	0	0.30%	Conc	1.1
E010_020	E010	E020	85	0.600	0.013	73.705	73.450	0.4	0.5	0	0.30%	Conc	1.1
E030_020	E030	E020	55	0.300	0.013	73.615	73.450	0.4	0.5	0	0.30%	Conc	0.7
E020_D020	E020	D020	80	0.675	0.013	73.300	73.060	0.4	0.1	0	0.30%	Conc	1.2
F010_Tank-NK2	F010	Tank-NK2	10	0.900	0.013	72.025	72.000	0.4	0.5	1	0.25%	Conc	0.5

Notes:
1. All entrance losses at k= 0.4. Exit losses depend on pipe alignment: 0-deg = 0.1, 45-deg=0.25, 90-deg = 0.5.
2. Manhole drops based on pipe alignment: 0-deg = 0.03m, 45-deg=0.08m, 90-deg = 0.15m.
3. Theoretical full-flow velocities based on Manning's equation and assumed free outfall, values less than 0.6 m/s are highlighted in yellow.

Appendix 16-A1

Public Information Centre #3

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Toronto Transit Commission

The Don of a New Community

Come learn about plans to revitalize the mouth of the Don River and the communities that will surround it.

Public Forum #3 Invitation

You are invited to attend our open house and view presentations on proposed plans for a naturalized Don River mouth and for a new sustainable community in the Lower Don Lands.

Date: Saturday, May 9, 2009
Time: 10 a.m. – 3 p.m. (light lunch provided)
Location: St. Lawrence Hall, The Great Hall 157 King Street East (southwest corner at Jarvis Street)

New Mouth for the Don

The Don River is one of Toronto's great assets and the centrepiece of major revitalization initiatives on the waterfront. Toronto and Region Conservation is conducting an Environmental Assessment for the Don Mouth Naturalization and Port Lands Flood Protection Project on behalf of Waterfront Toronto. This project is creating plans for a healthier, more naturalized river outlet to the lake, while at the same time, removing the risk of flooding to urban land to the east and south of the river.

New Lower Don Lands Community

Waterfront Toronto, the City of Toronto and the Toronto Transit Commission are conducting the Lower Don Lands Infrastructure Municipal Class EA Master Plan and the Keating Channel Precinct Plan. The objective of this plan is to create a vibrant, mixed use, sustainable community that embraces and respects a newly naturalized and flood-protected mouth of the Don River.

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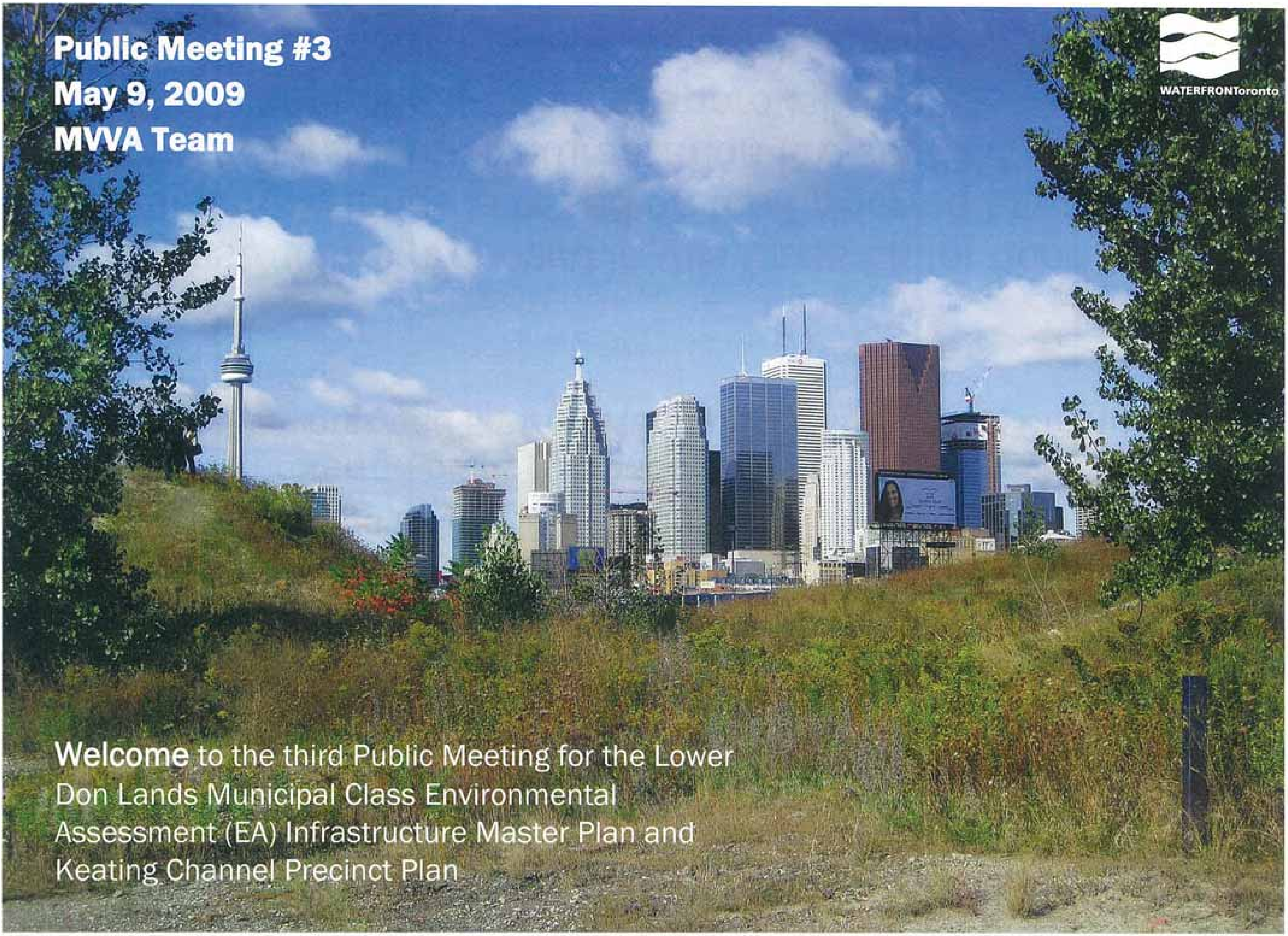
For more information visit
www.waterfrontoronto.ca/lowerdonlands or
contact Andrea Kelemen at 416-214-1344 ext. 248 or
lowerdon@waterfrontoronto.ca.


Public Meeting #3
May 9, 2009
MVVA Team
WATERFRONToronto
Welcome to the third Public Meeting for the Lower
Don Lands Municipal Class Environmental
Assessment (EA) Infrastructure Master Plan and
Keating Channel Precinct Plan

Purpose of Open House #3

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The main purpose of this Open House is to present and seek input on the:

- Evaluation of transportation and infrastructure design alternatives in the Keating Channel Precinct; and
- The preferred plans for roads, transit, bridges, water, wastewater and stormwater facilities in Keating Channel Precinct.

Infrastructure proposed in this Class EA for flood vulnerable lands is based on the Preferred Alternative of the Don Mouth Naturalization Project (DMNP) EA and is dependent upon its approval.

Class EA Study Area and Process

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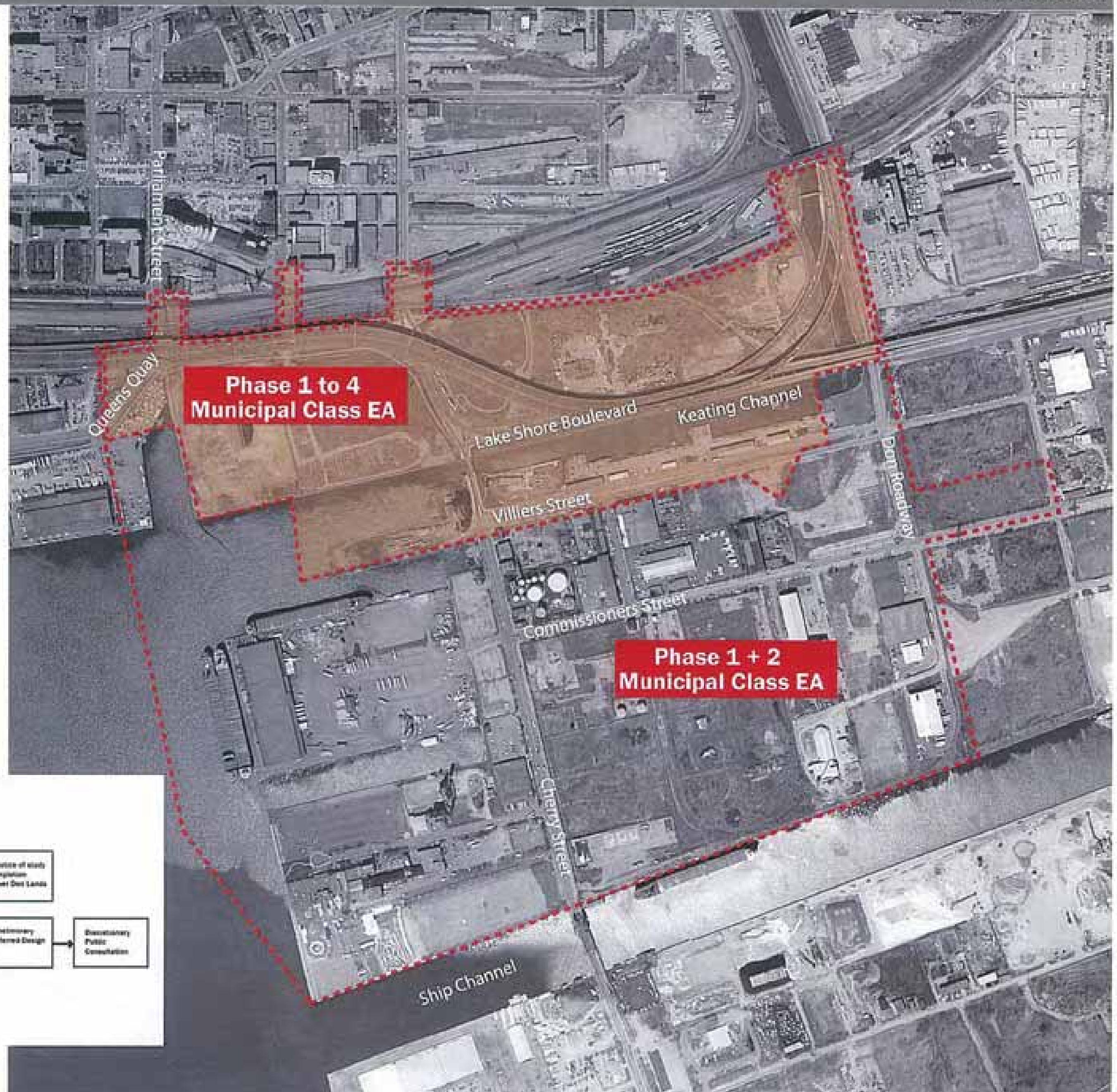
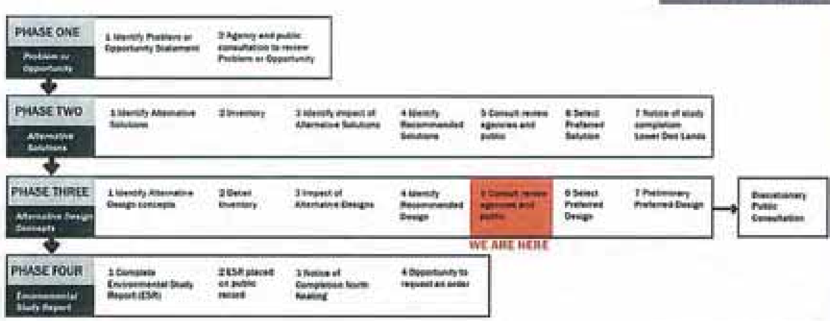
Toronto Transit Commission

Waterfront Toronto, the City of Toronto and the TTC are co-proponents for the Class EA Master Plan for Infrastructure.





Transportation Master Plan

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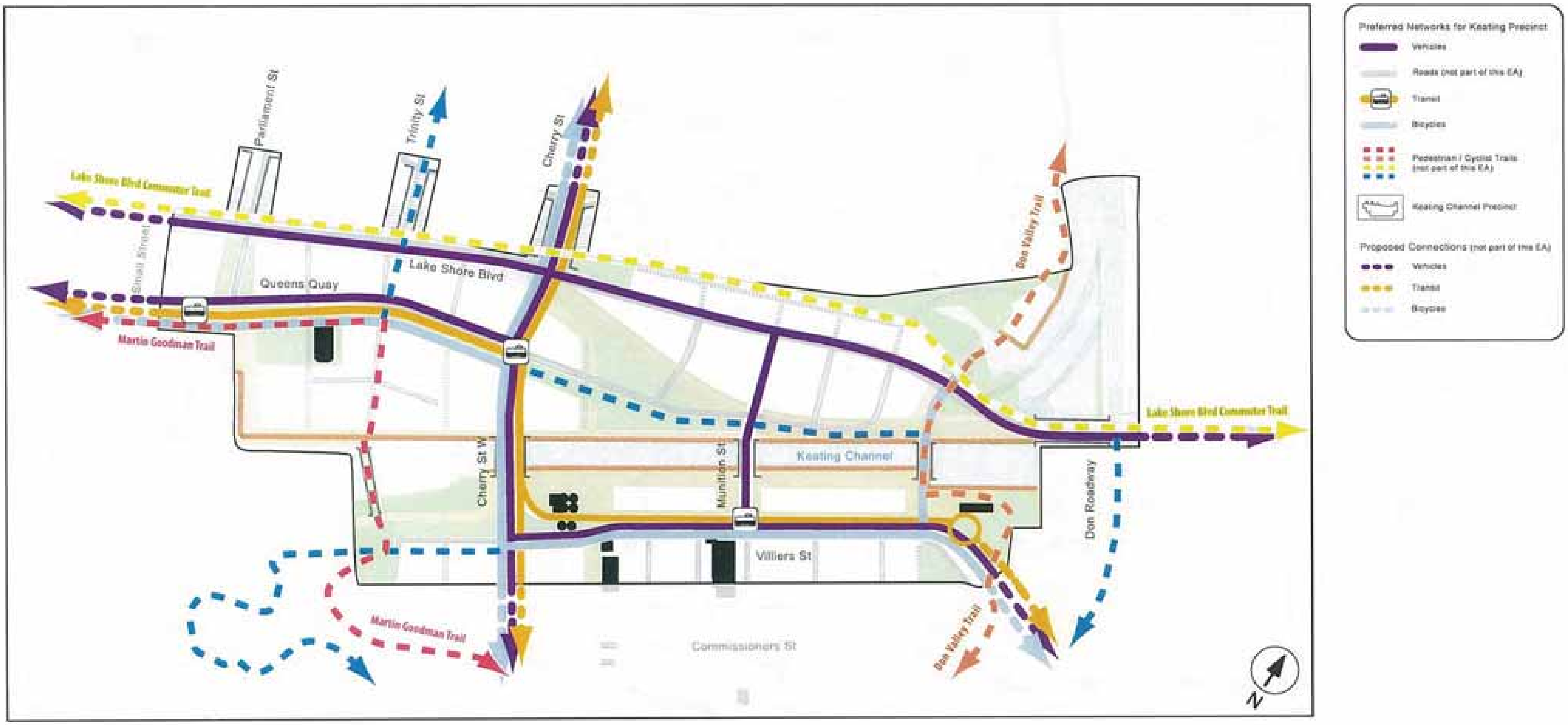
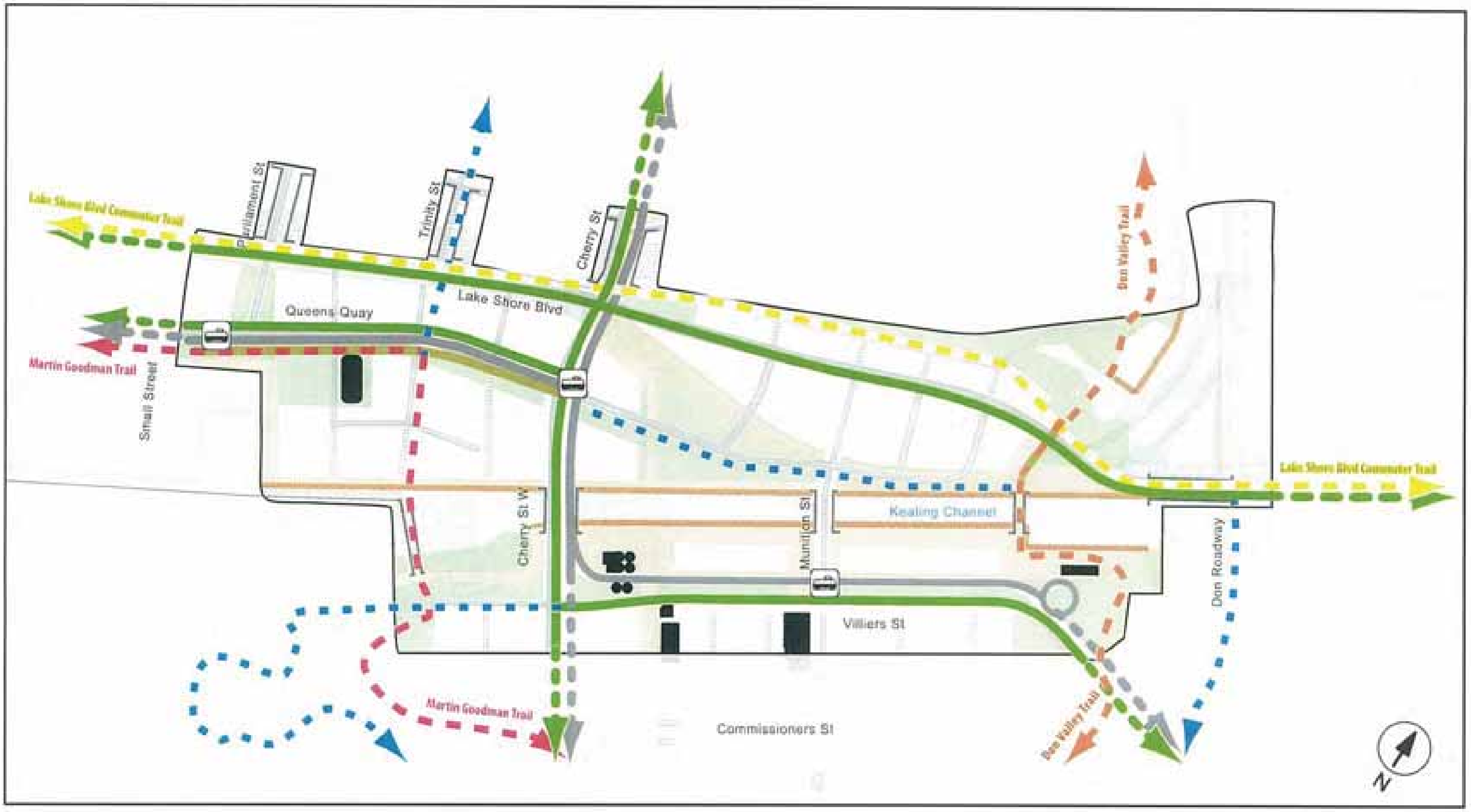


Proposed Pedestrian Network

WATERFRONToronto



Part of this EA

- Proposed Sidewalks
- Proposed Off-Street Shared Bicycle / Pedestrian Trail
- Proposed Transit Lines and Stops
- Keating Channel Precinct

Not Part of this EA

- Proposed Future Sidewalks
- Minor Roads with Sidewalks
- Off-Street Shared Trails
- Major Off-Street Shared Trails
- Proposed Future Transit

Proposed Bicycle Network

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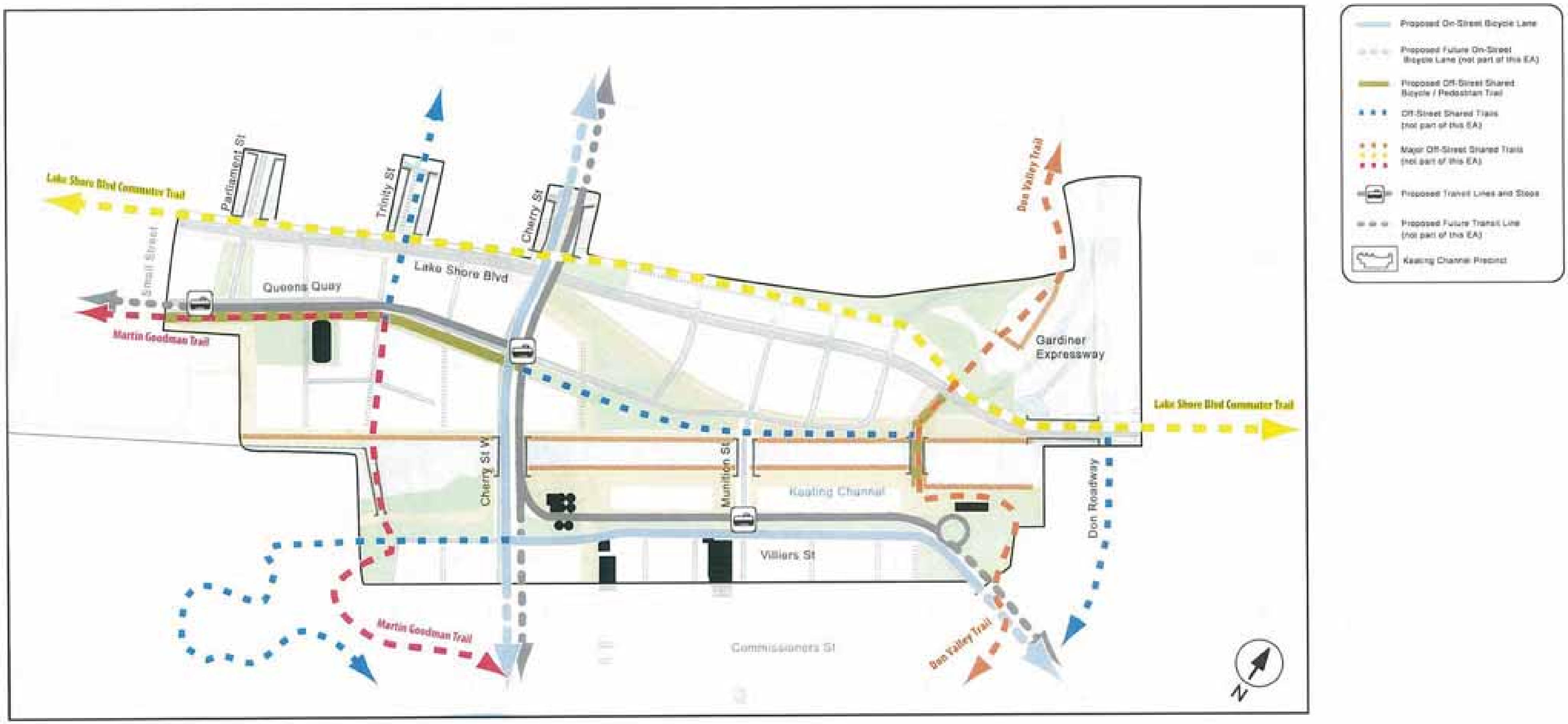
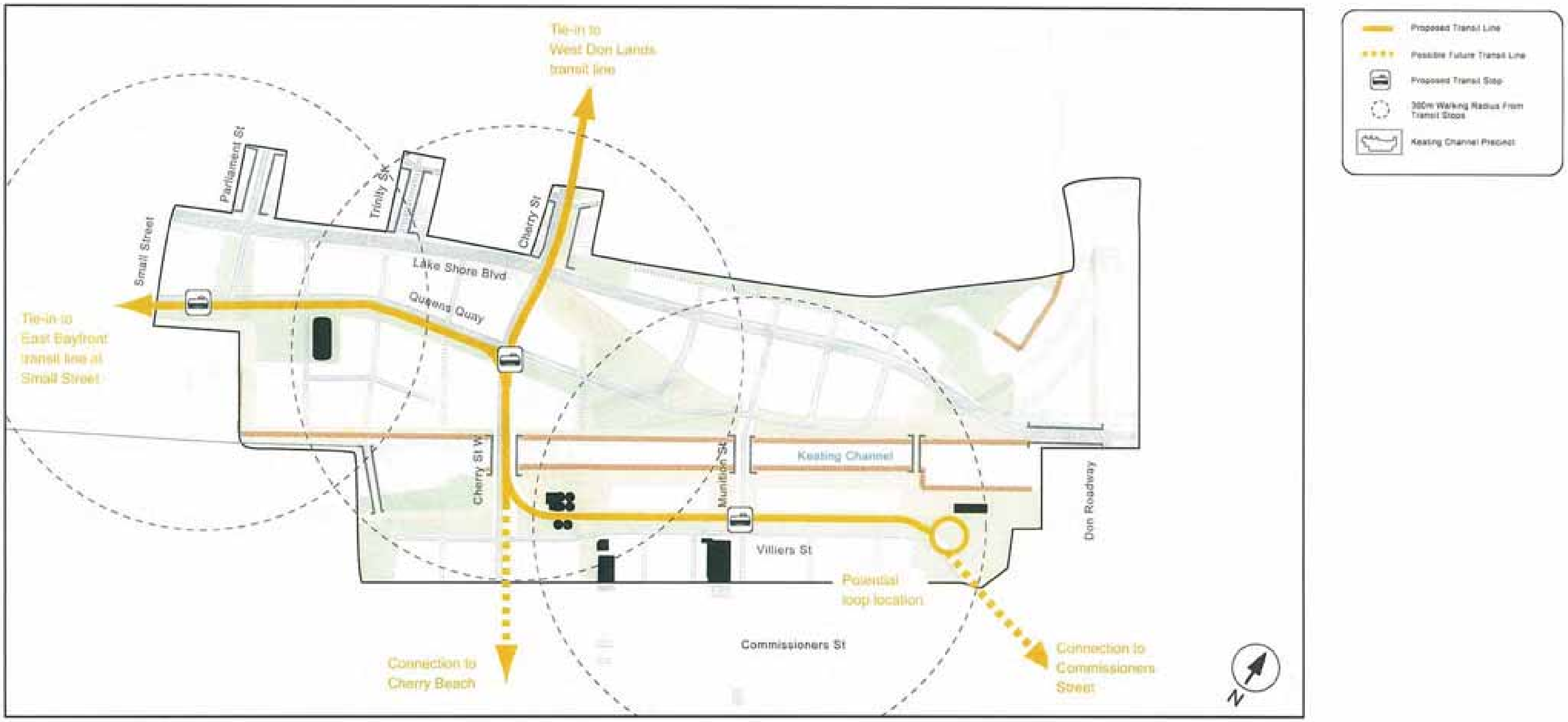


Proposed Transit Network



Proposed Road Network

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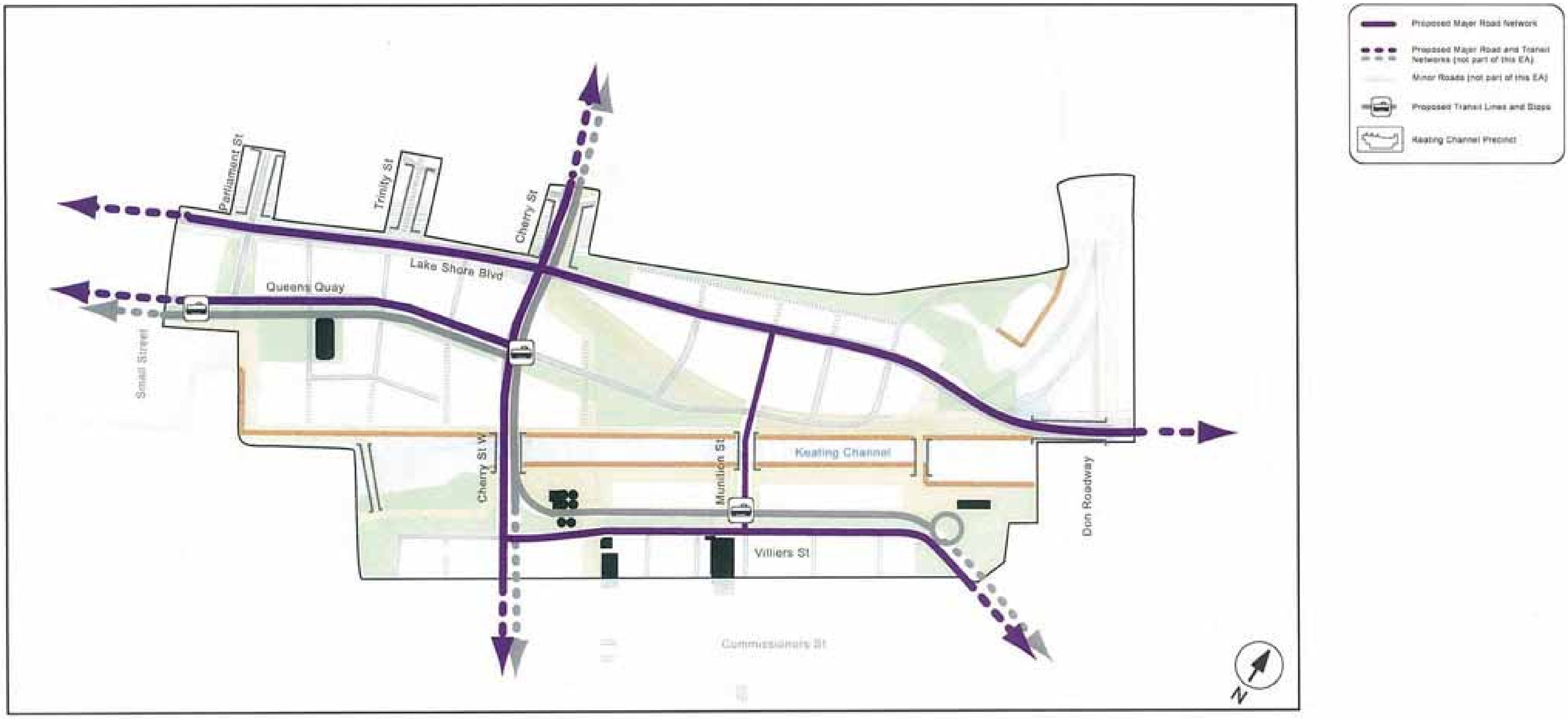

Queens Quay - Preferred Street Layout and Profiles

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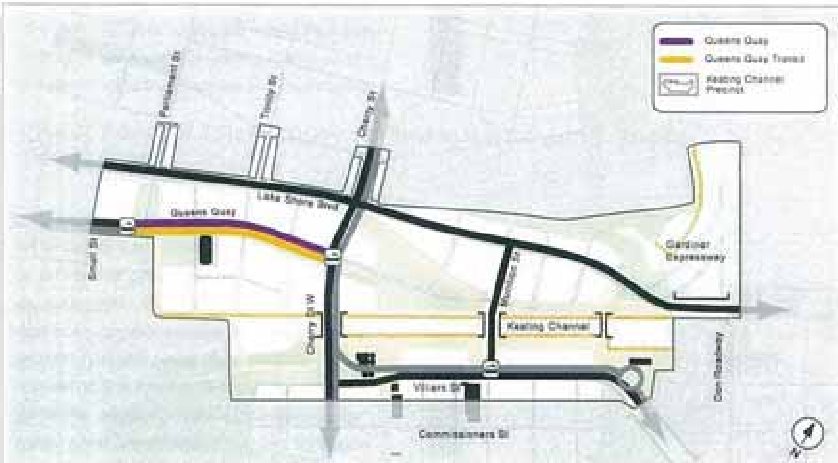
Queens Quay

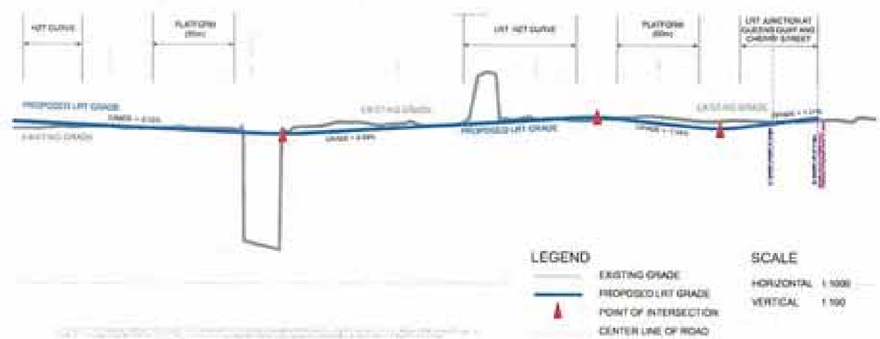


Road Profile

Street Layout: West of Cherry Street

Queens Quay, between Parliament Street and Cherry Street, will have two lanes for vehicular traffic, one parking lane on the north side of the street, and a shared turning lane at intersections. A two-way Light Rail Transit (LRT) line runs along the south side of the street in dedicated transit lanes. Pedestrian and cyclist amenities include 4 - 6 m wide sidewalks as well as an off-road bicycle and pedestrian path (Martin Goodman Trail) just south of the LRT line.

Light Rail Transit (LRT) Profile



Cherry Street - Preferred Street Layout and Profiles

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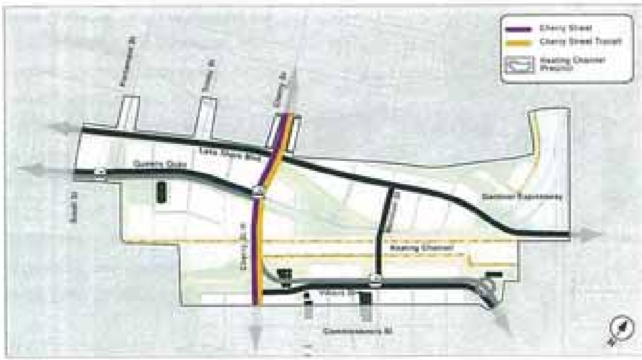
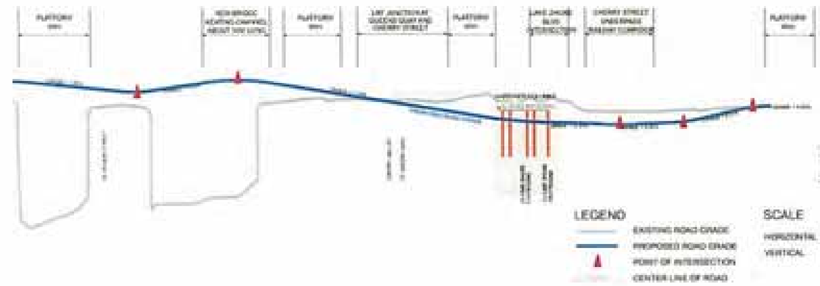
Cherry Street

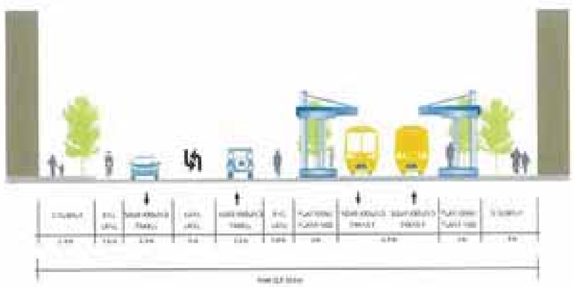


Road Profile

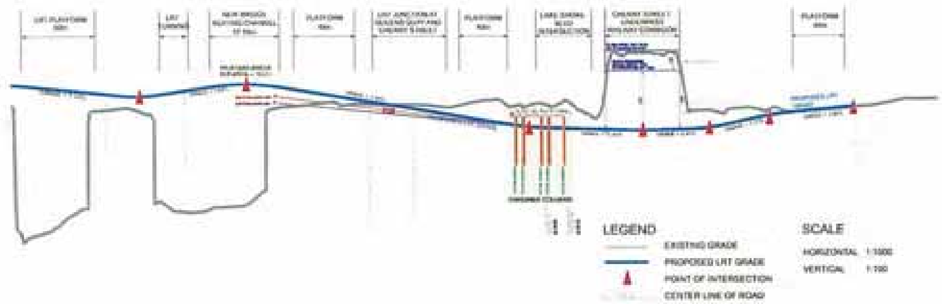


Street Layout: Mill Street to Lake Shore Boulevard

Cherry Street, between Mill Street and Lake Shore Boulevard, will have two lanes for vehicular traffic, a turning lane at intersections and no parking. A two-way Light Rail Transit (LRT) line runs along the east side of the street in dedicated transit lanes. On-street bicycle lanes are provided on either side of the vehicular travel lanes. There are 3 - 4m side-walks on both sides of the street.



Light Rail Transit (LRT) Profile



Street Layout: Lake Shore Boulevard to Villiers Street

Between Lake Shore Boulevard and Villiers Street another 3 - 4m sidewalk is added between the bi-cycle and LRT lanes. In addition, a wide pedestrian-only street runs behind the development along the eastern edge of Cherry Street.

Villiers Street - Preferred Street Layout and Profiles

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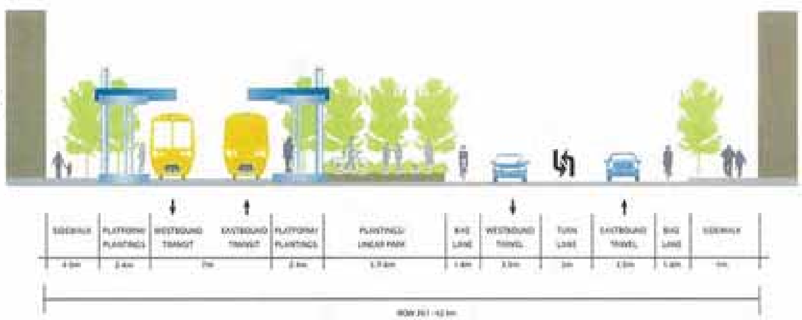
Villiers Street

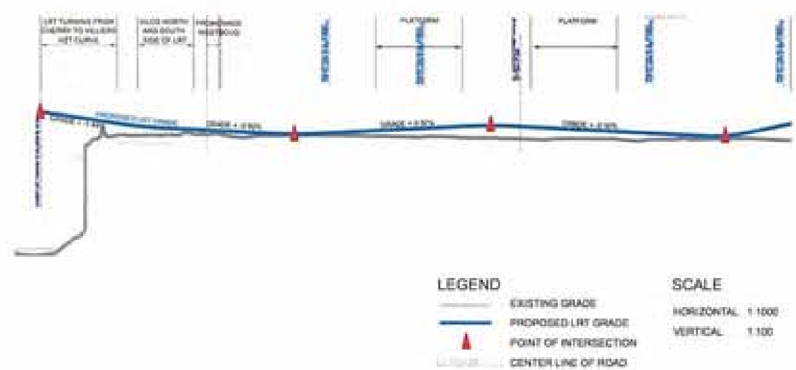
Road Profile

Street Layout

Villiers Street runs east-west within the Keating Channel Precinct. On the north side of the street there are two-way dedicated Light Rail Transit (LRT) lanes. Two lanes of vehicular traffic and one shared turning lane, along with two on-street bicycle lanes are separated from the LRT by a wide, landscaped linear park. For pedestrians there are also 4 - 5m wide sidewalks on both sides of the street.



Light Rail Transit (LRT) Profile



Lake Shore Boulevard- Preferred Street Layout and Profiles

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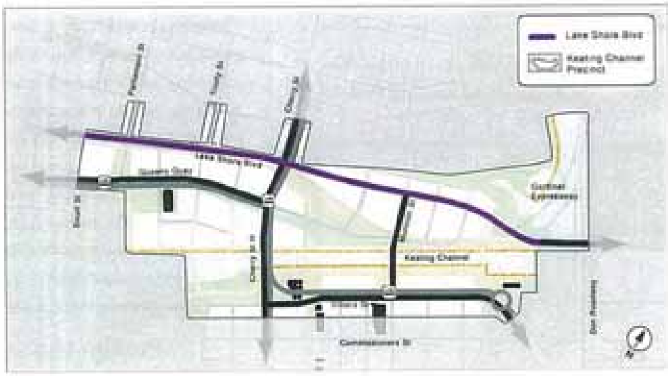
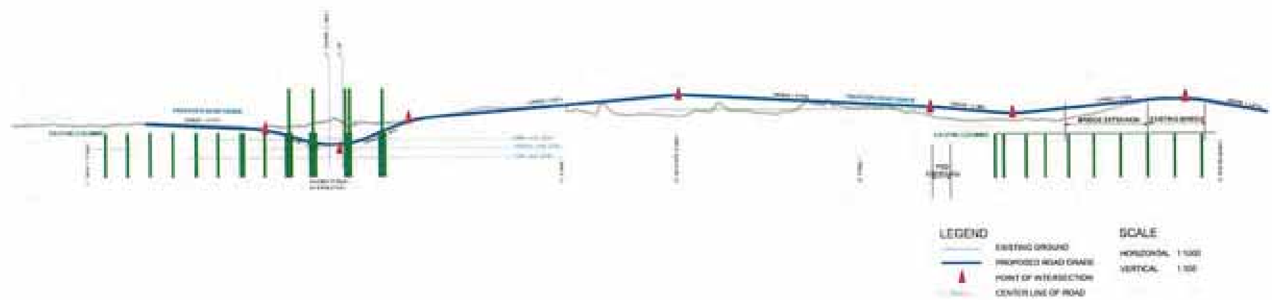
Lake Shore Boulevard



Road Profile



Street Layout 1: Parliament Street to Munition Street

Lake Shore Boulevard runs east-west within the Keating Channel Precinct and serves high traffic volumes. Between Parliament Street and Munition Street it has four lanes of vehicular traffic as well as a median that becomes a turning lane at intersections. On-street parking is provided on both sides of the street during off-peak hours. During peak-hour traffic these lanes become travel lanes. There are 3 - 4m wide sidewalks on both sides of the street.

Street Layout 2: Munition Street to Bridge Over Don River

Between Munition Street and Don Roadway, Lake Shore Boulevard narrows to four lanes of vehicular traffic with only one off-peak parking lane on the north side of the street. The median also remains, becoming a shared turning lane at intersections. For pedestrians there are 3 - 4m wide sidewalks on both sides of the street.

Munition Street - Preferred Street Layout and Profiles

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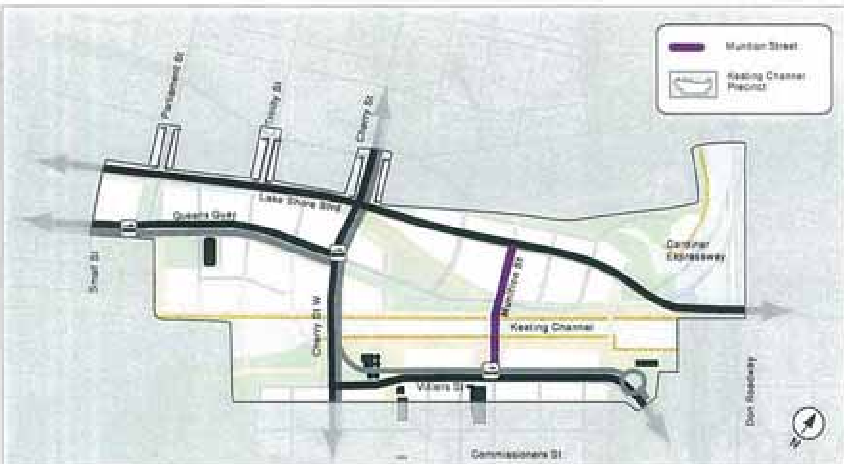
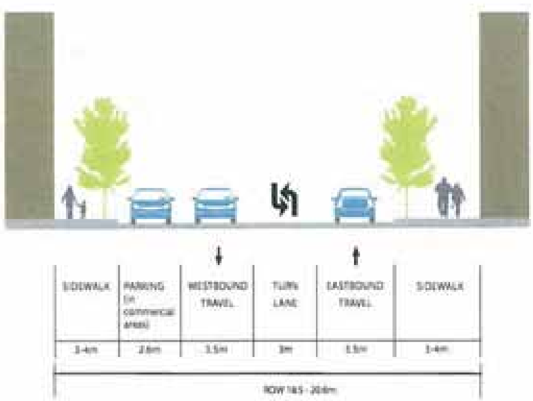
Munition Street



Road Profile

Street Layout

Munition Street, between Lake Shore Boulevard and Villiers Street, will have two lanes for vehicular traffic, one parking lane on the west side of the street in commercial areas, and a shared turning lane at intersections. Pedestrian amenities include 3 - 4 m wide sidewalks on both sides of the street.



Circulation: Crossings and Underpasses

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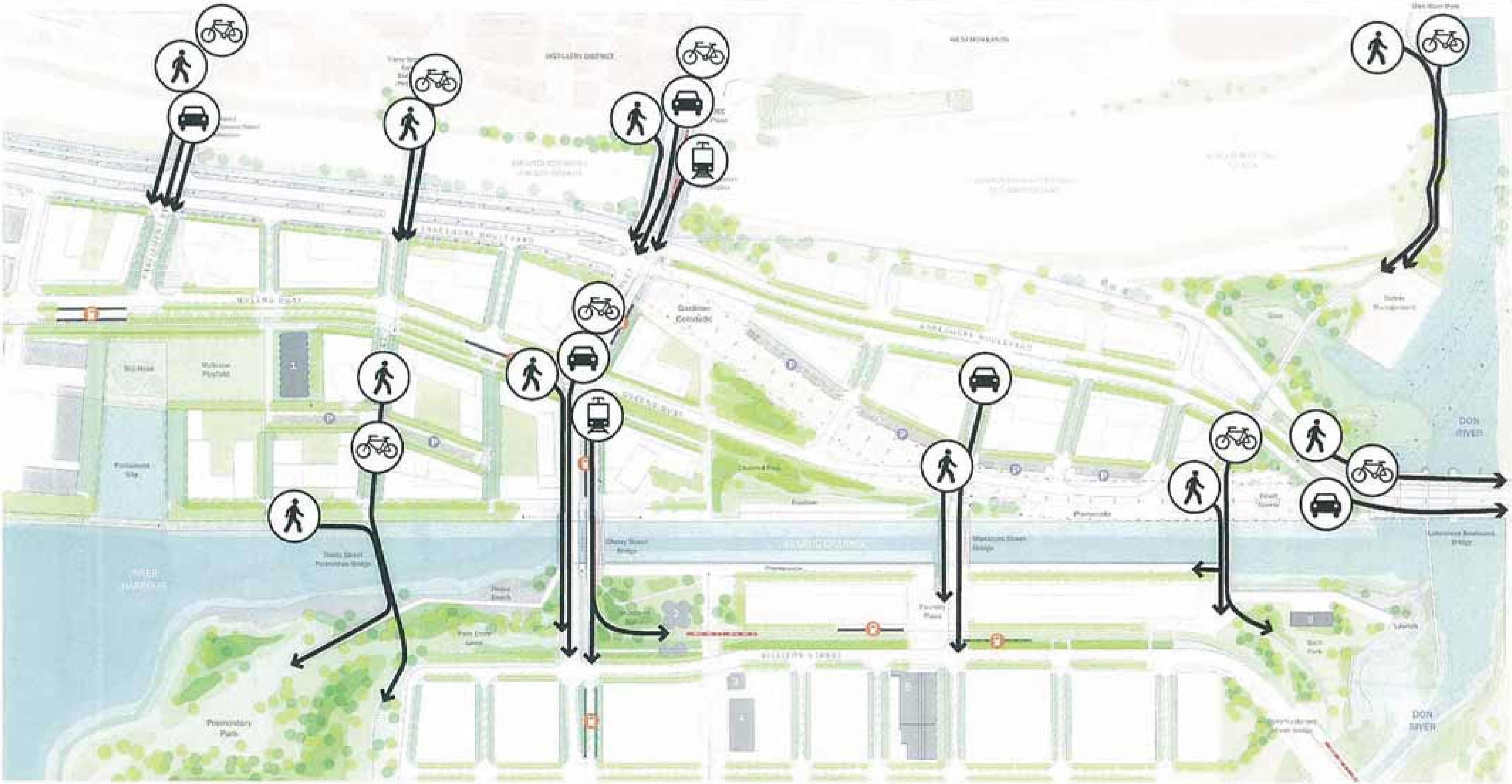


Keating Channel Precinct
Bridge Design Alternatives and Preferred Plan – Keating Crossings

The bridge design alternatives at Keating Channel were dealt with as one group.

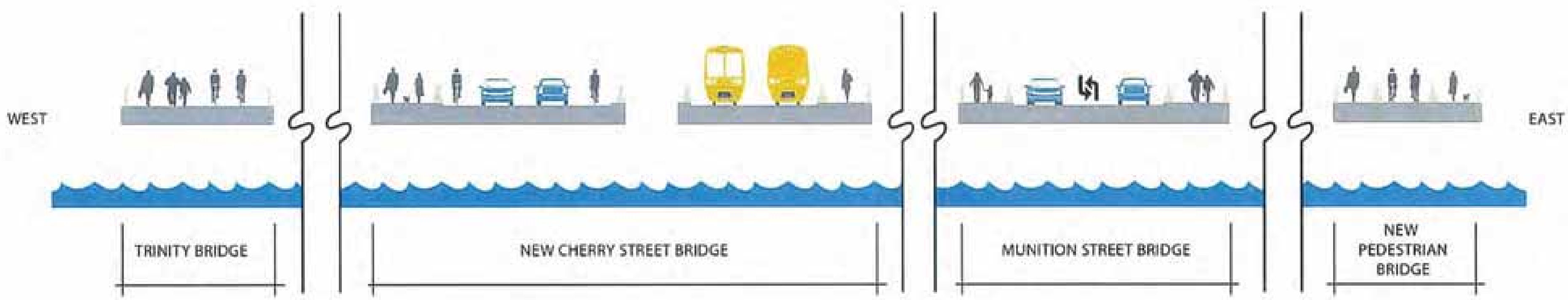
Design alternatives for the bridges at Keating Channel are "Movable" versus "Fixed" bridges. Movable bridges could include lift or swing bridges. Fixed bridges could include standard slab-on-girder bridges or arch bridges.

The main advantage of movable bridges is that they maximize navigational clearances. The disadvantages are that they create delay in traffic flow through the precinct and can delay emergency access to the area. Movable bridges are also considerably more costly to construct, operate and maintain than fixed bridges.

Navigability in the Keating Channel is impacted most significantly by the construction of a weir at the east end of the Keating Channel. Therefore, maximizing vertical clearances by providing movable bridges across Keating Channel does not really improve navigability in the area – as it is ultimately restricted at the east end of the channel. Furthermore, the Keating Channel Precinct and adjacent land uses are being designed to include public access to the waters edge and pedestrian and cyclist friendly activities. Future land uses do not require ship (or large vessel) access to the area.

Fixed bridges are preferred because they reduce travel delay through the Precinct, are more compatible with providing efficient transit service through the area, are pedestrian and bicycle friendly, and are at a scale that is appropriate for future land uses adjacent to the channel. Although navigational clearances will be reduced, the proposed fixed bridges will continue to provide access for recreational vessels, tour boats and water taxis in the Keating Channel.

KEATING CHANNEL CROSSINGS



*Details of evaluation are provided in hand out materials

Keating Channel Precinct
Bridge Design Alternatives and Preferred Plan – Keating Crossings

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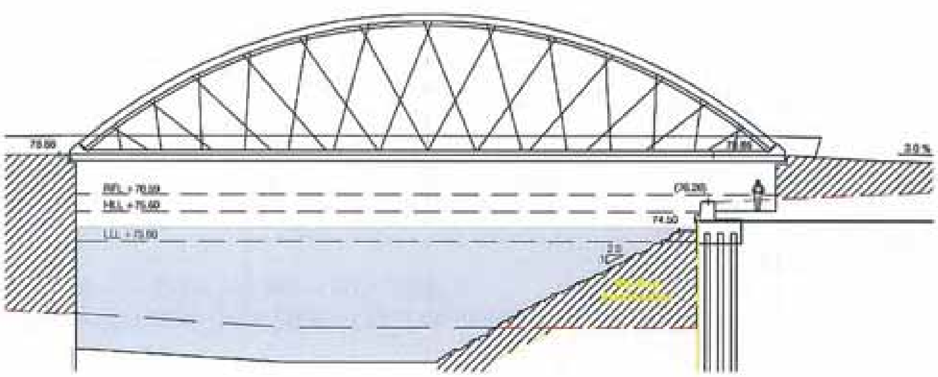
"Standard" versus "Arch" Bridges

Arch bridges are preferred, because they are more aesthetically pleasing, and have reduced deck thickness, allowing for increased boat clearance and flood conveyance in the channel as well as pedestrian circulation underneath the bridges.

The Preferred Design for the bridges over Keating Channel are arch type bridges that accommodate pedestrian and cyclist traffic at widths that are compatible with adjacent road, transit and trail networks.



Keating Channel Precinct
Bridge Design Alternatives and Preferred Plan – Lake Shore Boulevard

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The existing bridges on Lake Shore Boulevard and the Harbour Lead rail line at the Don River are in good condition. However hydraulic improvements are needed to provide improved flood protection and the roadway bridge needs geometric adjustments to accommodate the future profile and cross-section of the new Lake Shore Boulevard. The design alternatives for the bridges include either modifying and extending the existing bridges or reconstructing them. Because the bridges are in relatively good condition, and because its location (in plan and profile) is constrained by other structures in the immediate area (i.e., the Gardiner Expressway piers), the preferred plan is to modify and extend the existing bridges.

Design Alternatives for Lake Shore Boulevard Bridge and Harbour Lead Rail Bridge at Don River

Alternative 1	Alternative 2
Modify and extend existing bridges.	Reconstruct and extend existing bridges.
PREFERRED*	NOT PREFERRED*

The preferred design includes:

- Adding three new cells for improved hydraulic capacity, on the west end of the existing bridges;
- Making profile improvements to maximize hydraulic clearance and tie into the new Lake Shore Boulevard;
- Modifying the existing bridge deck cross-section to accommodate a bicycle path on the north side and a pedestrian sidewalk on the south side of the roadway;
- Removing several sections of the existing shorewall on the north side of the Keating Channel and the west side of the Don River; and
- Constructing steel sheet pile enclosures around the existing Gardiner Expressway pier bents.

*Details of evaluation are provided in hand out materials

Keating Channel Precinct

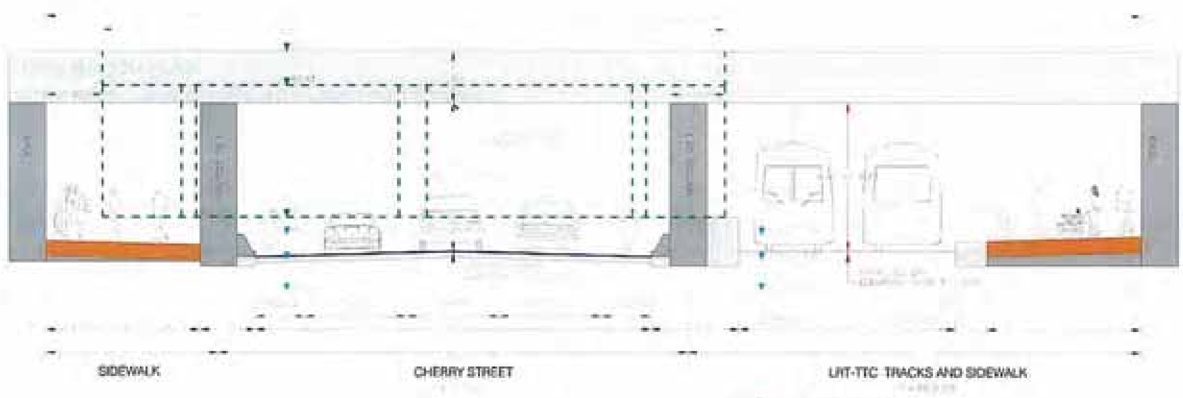
Bridge Design Alternatives and Preferred Plan– Cherry St. at Rail Berm

The widening of Cherry Street and the addition of LRT services provide an important connection to neighbourhoods north of the Keating Channel Precinct, including West Don Lands and the Distillery District, and are critical to the redevelopment of the area. The existing bridge on Cherry Street at the railway berm is 80 years old and requires widening to accommodate a left-turn lane for southbound traffic, bicycle lanes, sidewalks and LRT.

Design Alternatives for Cherry Street Bridge at Rail Berm

Alternative 1	Alternative 2	Alternative 3
Replace existing bridge with a new structure accommodating both a widened road cross-section and new LRT span.	Keep the existing bridge and build a second underpass for the LRT (east of the existing bridge).	Replace existing bridge with a new structure accommodating a widened road cross-section and add a second underpass for the LRT.
PREFERRED*	NOT PREFERRED*	NOT PREFERRED*

Alternative 1 is the preferred alternative because it addresses the deficiencies of the existing bridge. Keeping Cherry Street and the LRT together through the rail berm facilitates improved connections and provides preferred alignment geometrics at the intersection of Cherry Street and Lake Shore Boulevard south of the rail berm while minimizing impacts in West Don Lands, to the north.



Keating Channel Precinct
Bridge Design Alternatives and Preferred Plan– Trinity Street

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Trinity Street currently ends north of the rail berm, at Mill Street in the Distillery District.

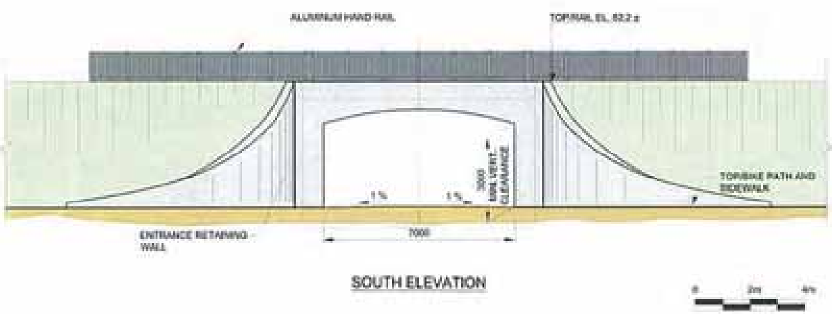
The proposed plan includes providing a new tunnel connection under the rail berm for pedestrians and cyclists to access Keating Channel Precinct. The new underpass is not for vehicular traffic.

The new underpass provides multimodal access between the Distillery District and East Bayfront, allowing for the greatest potential for a vibrant, mixed-use community. It also promotes access to the water and contributes to improvements to the public realm.

A new bridge is also proposed for the Trinity Street trail and bicycle path across the Keating Channel.

The new bridge will connect the Central Waterfront Boardwalk and the Martin Goodman Trail from the East Bayfront lands into the Keating Channel Precinct.

Trinity Street Underpass



Trinity Street Trail at Keating Channel

Stormwater

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Keating Channel Precinct Stormwater Design Alternatives

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RECAP - Preferred Planning Alternative from PIC #2
Treatment Train Approach

NEW - Design Alternatives for Keating Channel Precinct PIC #3

Alternative 1	Alternative 2	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
All land uses (development blocks, open space/parks and roads) have individual systems for treating stormwater including Total Suspended Solid (TSS) removal and disinfection.	All land uses have individual site systems for TSS removal but there is a common facility used for disinfection.	All land uses share a common facility for all stormwater treatment (i.e., TSS removal and disinfection), but the facilities are only designed to service Keating Channel Precinct. Facilities are optimized to meet the required water quality targets.	All land uses share a common facility for all stormwater treatment (i.e., TSS removal and disinfection), but the facilities are only designed to service Keating Channel Precinct. Facilities are sized based on available space.	All land uses share common TSS removal and disinfection systems and the facilities are designed to be integrated with facilities for adjacent neighbourhoods (i.e., EBF and WDL). Facilities are optimized to meet the required water quality targets.	**All land uses share common TSS removal and disinfection systems and the facilities are designed to be integrated with facilities in adjacent neighbourhoods. The facilities are optimized to meet the required water quality targets. Facilities are sized based on available space.**
NOT PREFERRED*	NOT PREFERRED*	NOT PREFERRED*	NOT PREFERRED*	NOT PREFERRED*	**PREFERRED***

Alternative 4B is the Preferred Stormwater Design because it maximizes efficiencies with adjacent stormwater treatment facilities and land uses, is most compatible with the City of Toronto's goals for stormwater management in the waterfront area, it uses less land in each separate neighborhood because integrated facilities are used.

The Preferred Stormwater Design includes:

- Tying into the proposed tank in East Bayfront EA to service lands west of Cherry Street;
- Locating LDL tanks adjacent to the West Don Lands tanks (at the rail berm north of Lake Shore Boulevard), to service lands east of Cherry Street (north of the Keating Channel), and sharing pumping and UV treatment facilities; and
- Using either a new tank (permanently) to service lands north of Villiers Street (south of Keating Channel) or servicing this part of Keating North Channel (temporarily) with oil grit separators until designs are confirmed for lands south of Villiers Street, in the Lower Don Lands study area. The decision to build something permanent or temporary for lands on the north side of Villiers Street (in Keating Channel Precinct) will be made through discussions with the City prior to implementation.

* Details of evaluation are provided in hand out materials

Keating Channel Precinct – Preferred Stormwater Design

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Infrastructure - Water and Wastewater

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Preferred Design – Wastewater

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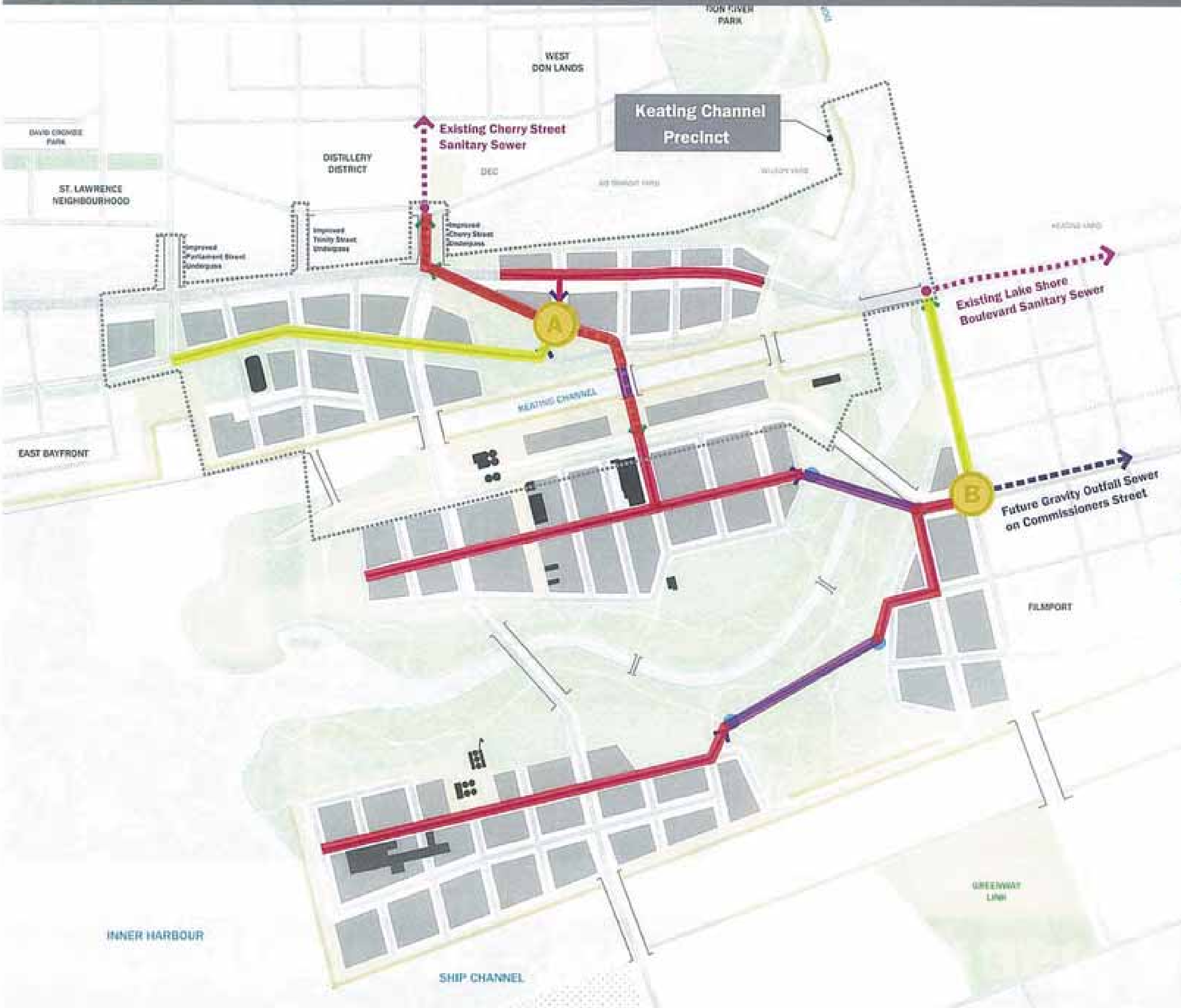

LEGEND

- Connection to existing sanitary sewer
- Gravity flow sewer
- Inverted siphon
- Force mains for initial development
- Alternate force main if the LLI at the Cherry Street outlet does not have sufficient capacity as determined by the Toronto CSO Class EA
- (A) Pump station
- Potential future trunk sewer for Port Lands if the Toronto CSO Class EA determines that this solution addresses the operational needs of the LLI
- Open Space

Wastewater Infrastructure	EA Schedule	Alternatives
Pipework on existing road	A	
Pipework on new road	B	
New water crossing: (trenchless) (open cut)	A B	
Sewage pumping station	B	

Preferred Design – Water Supply

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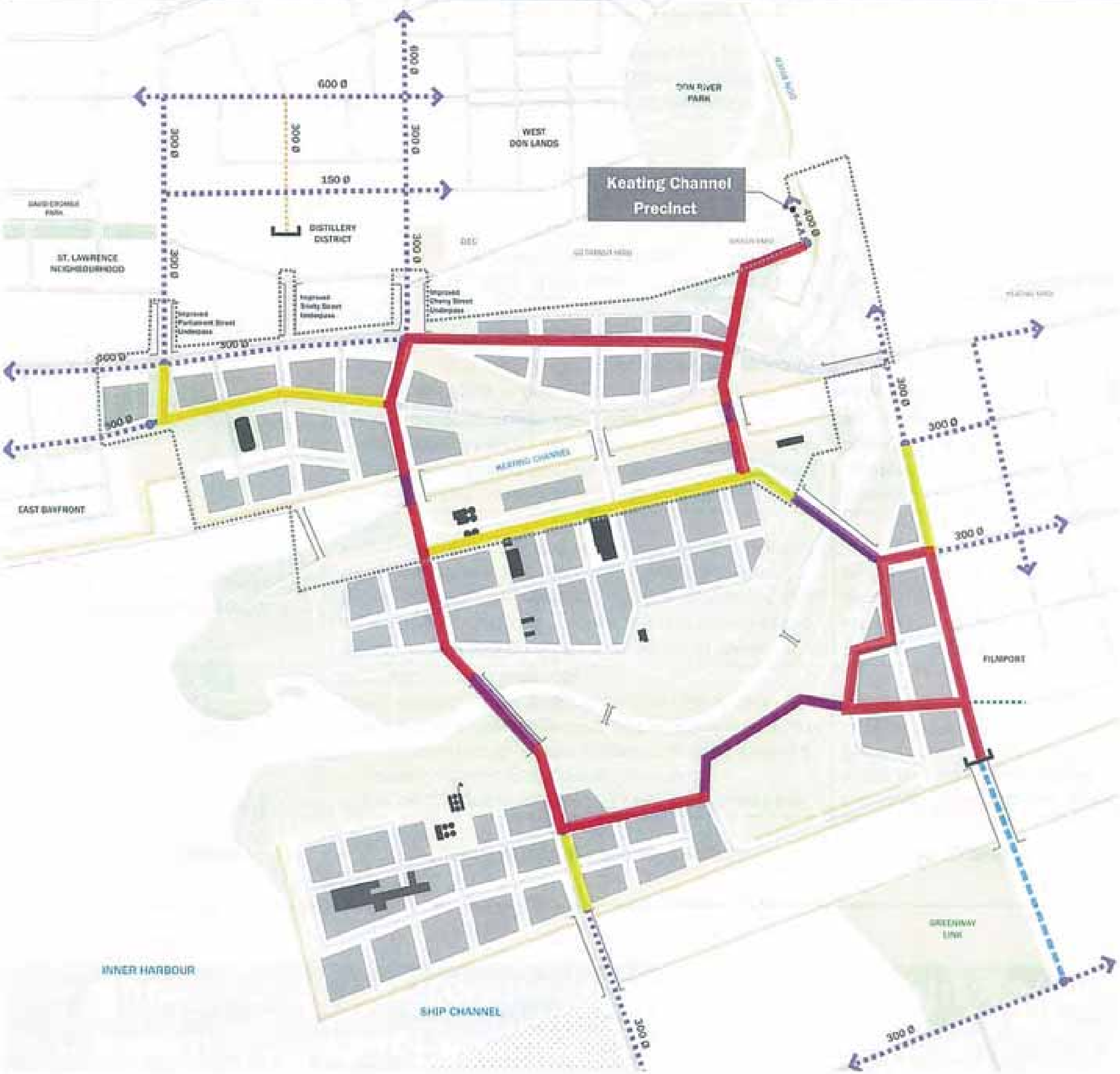

LEGEND

- Existing watermain
- Connection to existing watermain
- Proposed 300 mm diameter watermain
- Proposed 400 mm diameter watermain
- Pipe cap
- Future watermain and connection by others
- Future 300 Ø Film Port watermain that may be provided by others and become available to provide additional connectivity
- Future 300 Ø watermain on Trinity Street that will be provided by others and could be connected to, if required to improve connectivity to Lower Don Lands via Trinity Street underpass

Wastewater Infrastructure	EA Schedule	Alternatives
Pipework on existing road	A	
Pipework on new road	B	
New water crossing: (trenchless) (open cut)	A B	

Keating Channel Precinct
Summary of Environmental Impacts and Mitigation

Theme	Potential Environmental Impact	Proposed Environmental Mitigation	Net Impact
Natural Environment •Don Mouth Naturalization •New natural area (wetland)	Preferred designs in the Keating Channel Precinct are consistent with the goals of the Don Mouth Naturalization Study. Some vegetation will be removed where roads on new alignments (Cherry Street and Lake Shore Boulevard) are built. There is no significant vegetation in the study area.	Landscaping is proposed on all major arterials, as shown in the roadway cross-sections. In addition, the development of Keating Channel Precinct includes new vegetation, open space and park areas.	Overall net improvement
Social Environment •Vibrant, mixed use community •Access to water	Improvements to the social environment at the water's edge along Keating Channel is a key component of the redevelopment. The preferred designs for roads, transit, water, wastewater and stormwater support a vibrant mixed use community and improve access to the water's edge.	Access to the water's edge in the study area will be temporarily impacted during construction. Access to areas south of the study area (i.e., Cherry Beach etc.) will be maintained via Cherry Street during construction.	Overall net improvement
Economic Environment •Economically viable block sizes •Cost-effective to build	The new infrastructure designs and layout will accommodate blocks that are viable for redevelopment. Cost-effectiveness has been taken into consideration in the evaluation of design alternatives. Impacts will occur to docking facilities and ship navigation along the Keating Channel and at the future park promenade (south of the Keating Channel Precinct).	Changes in land use (from existing industrial to future residential/commercial) will reduce the need for ship access to the area. All approvals required by Toronto Port Authority will be obtained during detail design and prior to construction.	Overall net improvement
Cultural Heritage •Traditional uses of land by Aboriginal people •Heritage structures •Archaeology	Some impacts may occur to heritage structures. There is also some potential for archaeological resources to be impacted during construction.	Impacts to heritage buildings will be confirmed and minimized where possible, during detail design. Appropriate processes and approvals for removal of heritage structures will be obtained through City of Toronto's Heritage Department and Ministry of Culture prior to construction (as required). Archaeological monitoring during construction is recommended.	Overall net impact is minimal
Sustainability •WT's Sustainability Framework •City's sustainability standards •Impervious surfaces	The proposed works support WT's Sustainability Framework and the City's standards for sustainability while reducing impervious surfaces and enhancing water quality.	Erosion and sediment controls will be in place and monitored to ensure that construction activities do not impact surface water negatively during construction .	Overall net improvement

Keating Channel Precinct
Summary of Environmental Impacts and Mitigation (continued)

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Environmental Criteria	Potential Environmental Impact	Proposed Environmental Mitigation	Net Impact
Land Use and Property •New land uses •Public realm goals •Property	Land uses will change from industrial/vacant to mixed use, residential and commercial/employment communities that include large areas of open space, public realm features and a new school. Some private property will be impacted although most property is publically owned. Property owners are generally supportive of redevelopment of area.	Access to existing private properties will be maintained during construction.	Overall net improvement
Transportation Services •Walkability •Transit priority •Zero-growth traffic •Parking	The new transportation network and road designs include improved transit, pedestrian and bicycle facilities that promote non-auto modes and service compact and walkable neighborhoods. Some temporary (full or partial) road closures will be required during construction (i.e., on Cherry Street at the railberm and on Lake Shore Boulevard at the Don River bridge). Pier bents on Gardiner Expressway will also be impacted by the Lake Shore Boulevard alignment.	Road closures required during construction will be signed and adjacent landowners, business, residents and emergency service providers will be notified in advance. Details of construction staging and traffic impacts during construction will be confirmed during detail design.	Overall net improvement
Municipal Services •Sustainable design technology •Utilities	New services support future land uses and densities using sustainable design technology. Impacts to existing services and utilities will occur.	Extent of impacts to existing utilities will be confirmed during detail design. Affected parties will be consulted with and agreement will be reached on utility relocations prior to construction.	Overall net improvement
Stormwater •Wet Weather Flow Master Plan •Toronto GREEN Development Standard •Improved flood protection •Natural processes for cleaning water •Potential changes in extreme precipitation and water flow	Proposed works are compatible with the goals of the City's Wet Weather Flow Master Plan, and provide improved flood protection and accommodate potential changes in extreme precipitation and water flow. New, natural processes (i.e., use of roof runoff for street trees) are introduced and the treatment train approach cleans stormwater before entering Lake Ontario.	Erosion and sediment control measures will be in place and monitored during construction. Appropriate actions will be taken in the event of an extreme storm during construction.	Overall net improvement

The overall net impacts of the proposed improvements to roads, transit, stormwater, water and wastewater, as identified in the Lower Don Lands Master Plan and Keating Channel Precinct Plan improve environmental conditions in the study area.

What's Next

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After Public Meeting #3 the study team will finalize the preferred designs for road, transit, bridge, stormwater, wastewater and water supply systems, and finish Phases 3 and 4 of the Municipal Class EA process for Keating Channel Precinct, taking into account stakeholder input from this meeting.

The next step is to document the study in an Environmental Study Report (ESR) for Keating Channel Precinct. The ESR will be available for a formal public review period, currently scheduled for fall 2009.

You will be contacted again at that time.

Your Input is Important

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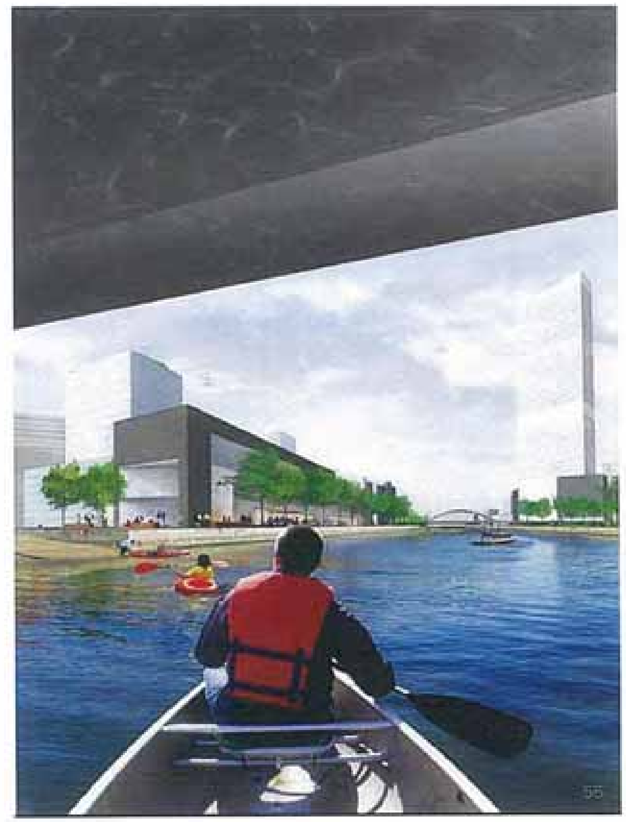
Public participation is an important part of the study process.

Please provide your comments to:

Andrea Kelemen
Communications and Marketing
Waterfront Toronto
20 Bay Street, Suite 1310
Toronto, ON M5J 2N8
Tel: (416) 214-1344 ext 248
Email: lowerdon@waterfrontoronto.ca

www.waterfrontoronto.ca/lowerdonlands



Thank you for attending

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TORONTO

Toronto Transit Commission

Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan
Don Mouth Naturalization and Port lands Flood Protection Project

Public Forum #3
Summary Report

St. Lawrence Hall
May 9, 2009

This report was prepared by Lura Consulting, the neutral facilitator and consultation specialist for the Lower Don Lands project. It presents the key discussion points and outcomes from the May 9th 2009 public forum convened as part of the Lower Don Lands Keating Channel Municipal Class Environmental Assessment (EA) and Precinct Plan process, and the Don Mouth Naturalization and Port Lands Flood Protection Project. If you have any questions or comments regarding this report, please contact:

Andrea Kelemen

Waterfront Toronto

20 Bay Street, Suite 1310

Toronto, ON M5J 2N8

Tel (416) 214-1344 ext.248

Fax (416) 214-4591

Email: lowerdon@waterfrontoronto.ca

LURA

Table of Contents

1. About Public Forum #3

New Mouth for the Don

The Don River is one of Toronto's great assets and the centrepiece of major revitalization initiatives on the waterfront. Toronto and Region Conservation is conducting an Environmental Assessment for the Don Mouth Naturalization and Port Lands Flood Protection Project on behalf of Waterfront Toronto. This project is creating plans for a healthier, more naturalized river outlet to the lake, while at the same time, removing the risk of flooding to urban land to the east and south of the river.

New Lower Don Lands Community

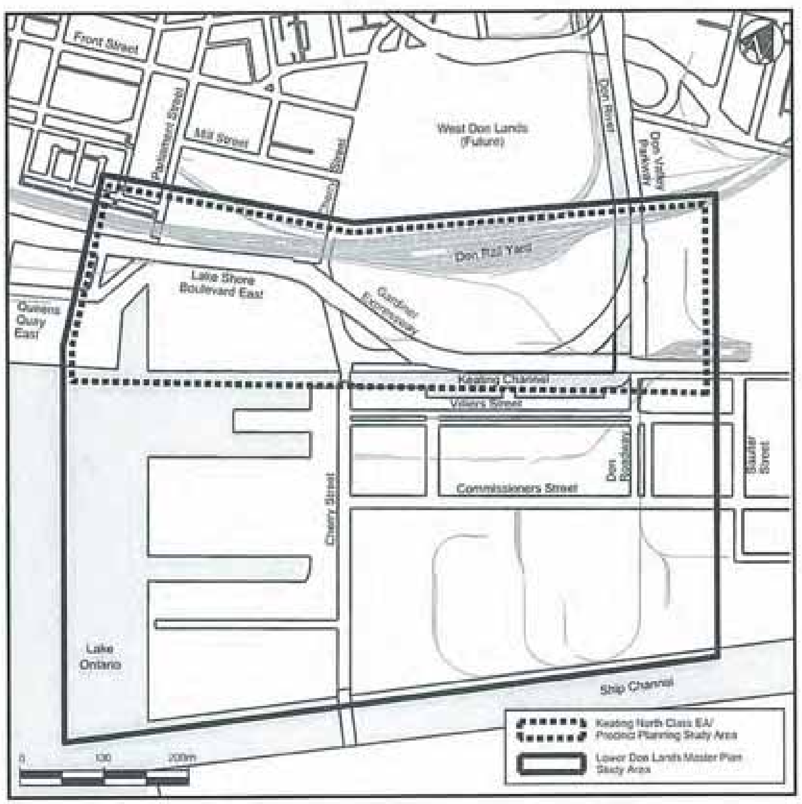
Waterfront Toronto, the City of Toronto and the Toronto Transit Commission are conducting the Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan. The objective of this plan is to create a vibrant, mixed use, sustainable community that embraces and respects a newly naturalized and flood-protected mouth of the Don River.

The Lower Don Lands study area is generally bounded by the Don rail yard and Gardiner Expressway on the north, the Parliament Street slip on the west, the Ship Channel on the south and Don Roadway on the east (see diagram below).

Public Forum #3 – May 9th, 2009

On Saturday, May 9th 2009, Waterfront Toronto, the City of Toronto, and Toronto and Region Conservation hosted a joint public meeting for the two projects:

- the Lower Don Lands: Keating Channel Municipal Class Environmental Assessment (EA) and Precinct Plan, and
- the Don Mouth Naturalization and Port Lands Flood Protection Project.



The May 9th public meeting was the third in a series of public sessions held as part of the Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan. The purpose of this third Public Forum was to present and seek feedback on:

- the Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan; and
- the preliminary concept design for the Don Mouth Naturalization and Port Lands Flood Protection Project.

The meeting format consisted of a one-hour open house starting at 10:00 am, followed by an interactive session that included two presentations, each followed by a question and feedback period. The open house continued following the presentations and adjourned at 3:00 pm. An estimated 200 people participated in the event, of those, 154 signed in at the door (the list of participants who signed in is attached as Appendix A).

2. Open House

During the open house, participants were able to view a series of display boards that focused on several key aspects of the Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan process, and the Don Mouth Naturalization and Port Lands Flood Protection Project, including:

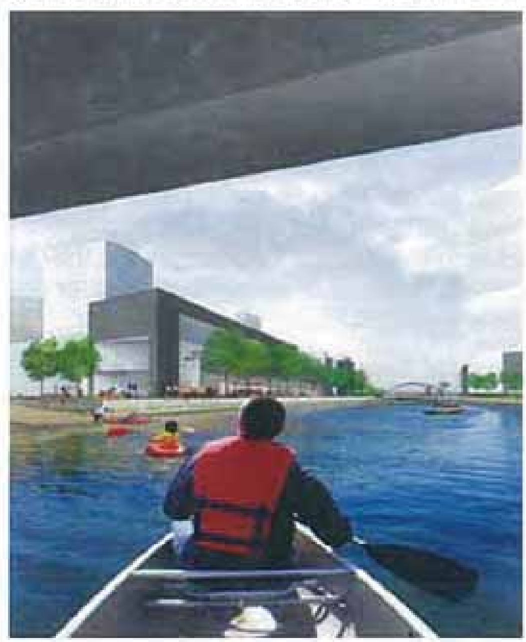
- The Purpose of the Open House;
- Class EA Study Area map;
- Class EA Process;
- Circulation: Crossings and Underpasses;
- Bridge Design Alternatives and Preferred Plan for Keating Crossings, Lake Shore Boulevard, Cherry Street and Trinity Street;
- Stormwater Planning and Design;
- Water and Wastewater Infrastructure;
- Summary of Environmental Impacts and Mitigation; and
- Next Steps.

In addition, participants were able to visit four topic-based discussion tables, including:

- Flood protection/hydrology/sedimentation;
- Naturalization;
- Public Realm and Circulation; and
- Built Form, Microclimate and Neighbourhoods.

At the discussion tables, project team members from both projects were available to discuss proposed plans with participants. In addition, models developed to simulate flooding and sediment conditions were available for viewing on laptop computers at the flood protection/hydrology/sedimentation table.

The City of Toronto also provided display materials relating to the Don River and Central Waterfront Combined Sewer Overflow Study as part of the open house.



3. Welcome and Introductions

Mark Wilson, Chair of Waterfront Toronto, welcomed participants to the Public Forum. He indicated that the meeting was bringing together two major streams of work for the Lower Don Lands area, as embodied in the Keating Channel Municipal Class EA and Precinct Plan process, and the Don Mouth Naturalization and Port Lands Flood Protection Project. Mr. Wilson stated that the project proponents are striving to create an iconic new community and river environment in the Lower Don. He explained that Waterfront Toronto and the City of Toronto want to invest in ecological restoration, open spaces and a new community that embodies sustainability. He stated that the objective is to complete all the EA work in 2009 and start on the implementation within three years. Mr. Wilson concluded by stating that he is very excited about the two projects and can't wait to see the results.

Chris Glaisek, Vice President of Planning and Design, Waterfront Toronto, explained that the two presentations being delivered at the meeting would present core components of an exciting new vision for the Lower Don Lands. He noted the key question being addressed is: How do you naturalize the Don River and build a new sustainable community around it? Mr. Glaisek indicated that the overall goal is to make urban development harmonious with the naturalization of the Don River. He noted that the new proposed Lower Don Lands plans offer a rich overlay of systems including parks, wetlands, streets, connections, neighbourhoods, and public transit, making this the most integrated and complex urban scheme that has been produced in Toronto. Mr. Glaisek explained that there are a number of other studies going on in Toronto waterfront and Lower Don Lands area, including the Gardiner Expressway EA, the Queens Quay Revitalization EA, and various transit EAs. He stressed the importance of linking new plans for the Lower Don Lands with those that will emerge from these other EAs and studies.

Adele Freeman, Toronto and Region Conservation (TRC), provided an introduction to the Don Mouth Naturalization and Port Lands Flood Protection Project. She noted that TRC has been very pleased to work with Waterfront Toronto on the Lower Don Lands projects. Ms. Freeman explained that in 2001, TRC was identified to lead the project to renaturalize the mouth of the Don and plan for flood protection. She indicated that the aim of the project is to naturalize the river and provide appropriate flood protection for a new sustainable urban community surrounding the Don. She noted that the Don Mouth project team has completed some high level confirmatory studies in the three spill zones to ensure the plans being proposed will meet flood protection goals.

Nicole Swerhun and David Dilks, Co-Facilitators, explained the format for the Public Forum. In addition to encouraging participant feedback during the interactive session, they invited participants to submit written comments using the Participant Workbook at the meeting or following the Public Forum – by Monday, May 25th.

4. Presentations

Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan

Ken Greenberg of Greenberg Consultants, and Michael Van Valkenburgh of Michael Van Valkenburgh Associates provided the presentation on the Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan (presentation slides available at www.waterfrontoronto.ca/lowerdonlands).

The presentation included:

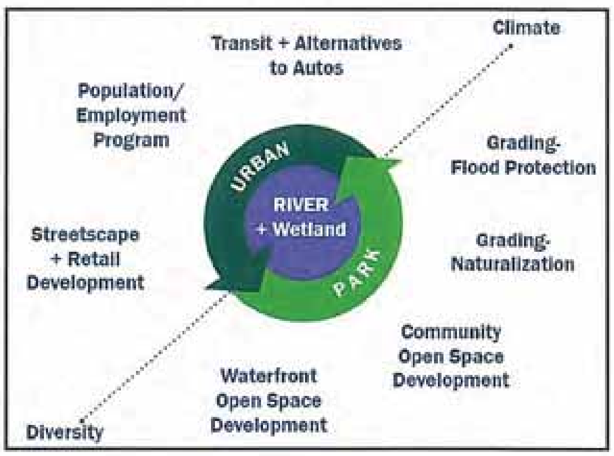
- A description of the concept of sustainability and how this provides the foundation for the project;
- A recap of the Class EA planning process;
- A summary of participant feedback from the December 10th 2008 Public Forum;
- The geographic and historical context for the Lower Don Lands;
- Plans for the public realm and open spaces;
- Plans for neighbourhoods;
- Preferred transit network;
- Plans for connections and circulation;
- Plans to maximize sunlight in major open spaces;
- Plans for reshaping the Keating Channel for new urban purposes;
- Proposed use of renewable energy (solar and wind);
- Stormwater harvesting;
- The creation of mixed use neighbourhoods;
- Community services and amenities;
- Proposed built form;
- Zoning and Urban Design Guidelines; and
- Next steps.

Throughout the presentation, the presenters stressed the Project Team's goal of achieving sustainability and the right balance between the river/wetlands, urban and park objectives, as expressed in the diagram below.

The presenters explained that the project aims to turn the Lower Don Lands into a beautiful place in the center of Toronto, as well as a model for sustainable community development.

The presenters noted that the presence of the river creates unique needs for the infrastructure development and design. The most significant constraints create opportunities for design innovation. The team is planning a unique riverine context for the new community, with a great park system that will embody flood protection and naturalization features.

The presentation concluded with next steps, which included the preparation of the recommended plan for submission to Toronto City Council in summer or fall 2009.



Don Mouth Naturalization and Port Lands Flood Protection Project

Paul Murray, AECOM, provided the presentation on the Don Mouth Naturalization and Port Lands Flood Protection Project (presentation slides available at www.waterfrontoronto.ca/lowerdonlands).

The presentation included:

- A review of the project goals and objectives;
- A description of the study area;
- A discussion of the hydrology of the Don Mouth;
- Overview of river characteristics and the three regulatory flood spill zones;
- An illustrative model of existing conditions;
- The process for creating a valley feature in the Lower Don Lands;
- Sediment and debris management;
- Naturalization of the Don Mouth;
- Terrestrial and aquatic habitat types;
- Fish habitat restoration;
- Management of contaminated soils;
- Soil data collection;
- Navigation risk assessment;
- Integration with the Keating Channel EA and Precinct Plan; and
- Next Steps.

Mr. Murray explained that Toronto and Region Conservation and the project team have been working for over 4 years on the Don Mouth Naturalization and Port Lands Flood Protection Project. He noted that the goal is to create a naturalized river that is situated within the context of a revitalized urban environment while providing flood protection up to the regulatory flood requirements. Mr. Murray stated that the team's preferred alternative is option 4WS, and noted that the team has subjected this alternative to several studies, including hydrology, sediment and debris, management of contaminated soils, and risk analysis of the shipping lane. Mr. Murray explained that the shape of the valley that contains the river can control the floodwaters, and that the team is proposing to armour the valley, create stable slopes, create landforms, and modify the channel north of Lake Shore Boulevard. He explained that sediment and debris will need to be removed from the river annually, and the team is also proposing a sediment management area.

Mr. Murray went on to discuss naturalization, noting that there are three types of habitat envisioned in the area: terrestrial open space, wetland habitat and aquatic habitat. The team will work to reduce the presence of invasive species, and accommodate migratory birds, small mammals, and native fish species. Mr. Murray added that the team hopes to start construction in 2011 or 2012, once the EA studies are fully completed.

5. Questions and Feedback

Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan

Following the Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan presentation, Mr. Dilks asked participants if they had any questions or feedback related to the presentation. The following summarizes participants' questions and comments (identified with 'Q' or 'C') and responses from the project team where provided (identified with 'A'):

C: Thank you very much. I am happy with what I am hearing. I suggest that you make room for urban farming in your plan, including the production, processing and selling of farm products.

A: That is a fantastic idea, and it makes cities so alive. The project team will consider this in their plans. Jane Jacobs say "the best plans are the ones that liberate others people's plans". We want to have a plan rich in possibilities to allow all these things to happen and allow places for these things to happen.

C: There have been several attempts to bring street systems down from Lake Shore Boulevard and Don Valley Parkway into the Port Lands. There is still pressure to put roads in the wrong place. I think the team should close the Don Roadway south of Commissioners Street and not have a bridge over the river. I think the Don Roadway should not go south of Commissioners Street; it should not be the gateway to the Lower Don Lands, and Cherry Street should be the gateway.

A: We will also focus on small roads in the Lower Don Lands area. We will have generous park systems. We will have more use of Lake Ontario Park and we will need to accommodate access for more people visiting the site as well as for emergency access. We don't want to have one bridge closed due to maintenance and not having an additional bridge to use. We will try to avoid placement of large roads near the river.

Q: The underpasses should be upgraded. Are we looking for something like Bay Street and York Street?

A: The team is looking at improving connections at Parliament and Cherry. We hope to have better quality underpasses than what you currently see at York Street and Bay Street. We are looking for spaces for pedestrians and cyclists to move safely and effectively through the area.

C: I want to congratulate the Team for a job well done. I have some suggestions about the industrial grain silos and the Gardiner Expressway. I think the grain silos are blocked by a set of buildings. You should open up the area, and maybe use the silos as an observation point. I suggest that the Gardiner Expressway may be left up and used as a historical observation area.

Q: I would like to see access for small watercrafts. The thing about the plan that strikes me is: How will you allow for connectivity for small crafts? They need protected waters. The Keating Channel is a few minute paddle from one end to the other. Maybe you can allow for connectivity to the river and other areas, which can allow for short portages with a kayak? Maybe even consider artificial protection of the west shore of the development area?

A: There is a very complicated series of analyses going on right now about water transport, and how water will be coming and going through the area. It is extremely challenging. We are looking at a way to have a connection at the end of the Keating to the Don River; it is a very critical accommodation. We need to keep in mind low water levels and flooding as well.

Q: There should be some consideration for the period of great change including the decline of the combustion engine and the aging population. Will the park be accessible for people who can't walk or cycle? Have you considered a small mobility transportation system?

A: It is crucial to consider these changes you are talking about. The suggestion made is a great idea and we will take it into consideration.

Q: I have owned property in the area for 30 years. I have seen many plans come and go, and I hear the same things about pathways, boats, benches and so on. I am floored by the detail of research you have done. I am tired of hearing these promises and not seeing anything materialize. How real is this? Will this happen? When will construction start?

A: These plans will be implemented. This plan is going forward as the result of an EA process. It will become the plan for the City of Toronto for this area. The details of this plan are never guaranteed and the community still needs to continue to advocate with all levels of government and support Waterfront Toronto in getting it done. We will send our plan to the Ministry of Environment for approval this fall. We hope get a final approval in a year from this fall. We are also looking into ways of securing funding.

Don Mouth Naturalization and Port Lands Flood Protection Project

Following the Don Mouth Naturalization and Port Lands Flood Protection Project presentation, Ms. Swerhun asked participants if they had any questions or feedback related to the presentation. The following summarizes participants' questions and comments (identified with 'Q' or 'C') and responses from the project team where provided (identified with 'A'):

C: I think you presented a wonderful plan. One thing we need to emphasize is nature in the city. We need to allow deer to move through the valley to access the lake. Can you bring up slide #37 again? On the other side of the Don Narrows is an opportunity to allow access for wildlife; we can even plan for larger mammals like deer. Can we create a linkage or wildlife corridor to join up with the Don greenway south of the Lake Shore?

A: That is a good point. We have to consider the flood capacity of the channel narrows first and then move on to considerations for wildlife corridor features. We will look at it but flooding is the priority.

Q: I wanted to come here on my bike today, but the path was flooded. Are there any flood controls on the upper part of the Don?

A: We have lots of flood control challenges through the Don River system. There are more concerns further north, but this project does not solve those issues. The City's Wet Weather Flow initiative will attempt to deal with those areas.

Q: I enjoyed looking at the flood model. What if Lake Ontario was to increase its water levels? How will this impact the design you are proposing?

A: The long-range climate change projections for the Great Lakes illustrate that the water levels will actually get lower. This will help improve flood protection but the ecology of the area will be negatively impacted. Nothing we have planned assumes the water levels in the lake will be higher.

Q: What is a research shaft? Also, what happens if in the future the debris management cannot continue and debris builds up? What will happen in the area?

A: There will be sewage overflow tunnels installed throughout the area by the City. The shaft we are proposing will prevent the sewage from going into the lake and it will improve water quality. We are suggesting a location for the tunnel. There will also be long-term sediment management in place. Most of the debris is currently being used in other areas of the city; it is mostly woody debris and is used for ecological purposes or goes to the landfill. It is not stored in the debris area for long. It gets removed from that site quickly. It is an annual event.

C: I am concerned about the water quality. I heard that the Wet Weather Flow plan needs to happen first. I am concerned about the costs and financial sustainability, as well as big pipes up stream releasing wastewater into the Don River.

A: The solutions being proposed as part of this project are not solutions for the water quality issue in the Don River, but they will allow for some improvements; the water quality issue is watershed wide. We need to acknowledge that other strategies and projects are going on. The economy is part of a sustainability framework, and we are trying to minimize costs over time. We have to manage issues here but the overall watershed affects water quality in the Lower Don Lands.

Q: Does the City support the project? They need to pull their weight in the areas north of this study area as well.

A: The City supports this project. The Wet Weather Flow management plan is part of the solution.

6. Written Comments

During the open house, participants had the opportunity to provide written comments using the Participant Workbooks. Participants were able to hand in these workbooks at the end of the open house on May 9th, or send in their comments by May 25, 2009 to Waterfront Toronto.

Participants were asked to consider the following questions in providing written feedback:

Lower Don Lands: Keating Channel Municipal Class EA & Precinct Plan

1. Are you comfortable with the draft plans presented? Why or why not?
2. What opportunities for refinements, if any, would you suggest?

Don Mouth Naturalization & Port Lands Flood Protection

1. Are you comfortable with the draft plans presented? Why or why not?
2. What opportunities for refinements, if any, would you suggest?

Any other comments?

The following provides a summary of the written feedback received from participants through submitted workbooks and other written comments submitted to Waterfront Toronto following the meeting. For a compilation of all verbatim written comments received, please see Appendix C.

Summary of Written Comments

Lower Don Lands: Keating Channel Municipal Class EA & Precinct Plan

Question #1: Are you comfortable with the draft plans presented? Why or why not?

Overall, participants were supportive of the plans presented by the project team. They noted a variety of positive aspects of the plan for the Lower Don Lands and Keating Channel. Comments included the following:

- The Project Team did a great job in creating a innovative, balanced and comprehensive plan;
- Mixed-used zoning is excellent;
- Detailed thought on a wide variety of modalities (e.g. sunlight, wind, storm water, etc.);
- A range of competing requirements have been taken into account; and
- Well thought out transit plans, pedestrian and cycling plans.

Question #2: What opportunities for refinements, if any, would you suggest?

Participants suggested the following enhancements to the plan:

- Increase natural areas and green spaces;
- More information on the impacts on Leslie Street;
- More information on energy reduction measures (e.g. number of windmills and where they will be situated);
- The historic silos could be reused as giant compost facilities;
- Include urban agriculture;

- Consider access for seniors and people with disabilities;
- Create a wildlife migration corridor; and
- Provide enhanced access for small watercrafts.

Don Mouth Naturalization & Port Lands Flood Protection

Question #1: Are you comfortable with the draft plans presented? Why or why not?

Overall, participants were supportive of the plans presented by the project team. Comments included the following:

- The flood models are very good;
- Working toward net gain scenarios in all climatic conditions; and
- Will add beauty and nature in the City.

Question #2: What opportunities for refinements, if any, would you suggest?

Participants had very few suggestions for improvement. Suggestions included:

- The entire watershed must be addressed with respect to water quality and flooding;
- Include planning for interpretation and educational opportunities; and
- Dredge river south of Riverdale Park Bridge to allow for the use of canoes and kayaks.

Additional Comments and Questions

Overall, participants were very pleased and impressed with the two presentations and associated plans. Some participants took the additional opportunity to express their opinions, ideas and questions about the two projects in the "additional comments" section of the comment workbooks. Representative comments included the following:

Construction Materials

- Asphalt used for road construction deteriorates and dissolves into the drinking water supply. If pavers could be used throughout the City, Waterfront Toronto might win some awards in the future.

Noise

- Consider performing a noise study in the area, especially for the Island Airport.

Economy

- It would be wise to have an expert property insurance specialist sitting in on some of the discussions with the project team.
- Divide the implementation timeline into 2 year phases with budget dollars set aside accordingly, this may be more practical in terms of saleability to other stakeholders and investors.

Health

- Build a local health clinic to service the new development.

Bicycle Storage

- Some sort of bicycle storage lockers might be desirable for public use.

7. Closing Remarks and Next Steps

The Co-Facilitators reminded participants to hand in their comment workbooks at the conclusion of the meeting or return them by the May 25th 2009 deadline. They informed participants that the presentations would be available on the Waterfront Toronto website (www.waterfrontoronto.ca/lowerdonlands) and that a report on the meeting would be prepared and shared with those who attended.

Mr. Glaisek thanked participants for attending the Public Forum and thanked them for their support. He encouraged them to continue to provide feedback on both projects. Mr. Glaisek concluded by stating that this is one of the largest civil works projects going on in Canada, and that big changes are in store for the Lower Don Lands area.

Appendix A – Participant List

Organization, Participant	Participant
AECOM, Corinne Latimer	A.M.
AECOM, Karin Wall	Alex Rocha
AECOM, Marc Rose	Alina Gildiner
AECOM, Marko Prgin	Antoine Belaieff
AECOM, Michael Thompson	Ben Dactiis
AECOM, Mike Huedley	Blair Falzoner
AECOM, Paul Murray	Bob Hutton
AECOM, Peter Middaugh	C. Ciavarella
AES, Beth Wentzel	Cam Miller
AES, Sman Iennhardt	Chris Killam
Arid & Berlis LLP, Rob Dolan	Christopher Coverrieri
Arup, David Pratt	Corey Trowersy
Arup, Olivia Ryan	David Glen
Beach Photo Club, John Wallace	Donna Milakic
Beach Triangle Residents Association/Gardiner Lake Shore Task Force, Chris Blythe	Douglas Graydon
City of Toronto, Bill Snodgrass	Ed Sherer
City of Toronto, City Planning, Denise Graham	Edmund Carlson
City of Toronto, City Planning, Tim Laspa	Emily Greenleaf
City of Toronto, Eddy Lam	Fredelle Bruiq
City of Toronto, Jamie McEwan	G. Blanchette
City of Toronto, John Kelly	Gary Smies
City of Toronto, Mayor's Office, John Piper	H. Black
City of Toronto, Parks, Forestry & Recreation, Jennifer Tharp	H. Malec
CNC, Davidson Norris	Hans Riekko
Don Watershed Regeneration Council, Moyra Haney	HR McMann
Friends of the Lower Don Lands (FOLD), Dalton Shipway	Ian Bailey
Gooderham & Worts Neighbourhood Association, Anne Hume	Jack Brannigan
Gooderham & Worts Neighbourhood Association, Bruna Nota	James Clark
Gooderham & Worts Neighbourhood Association, Jane Robinson	Janice Durst
Gooderham & Worts Neighbourhood Association, Judith Lowther	Jason Neill
Gooderham & Worts Neighbourhood Association, Penelope Tyndale	Jeff Evenson
Gooderham & Worts Neighbourhood Association, Victor Razgaitis	Jim Dalziel
Halcrow Yolbes, Anthony Guadaynoh	Jim Robertson
Humber Heritage Committee, John Miles	John Guido
IBI Group, Laurence Lui	John MacMillan
ICMC, John Hopkins	John Meng
Kac Consulting, Jerry Crawford	Karen Hutton
Leaside Property Owners' Association, Agnes Vernes	Kelly Greenberg
Lura Consulting, Dave Dilks	L. Uricek
Lura Consulting, Patricia Halajski	Lars Henriksson
MMM Group, Steve Willis	Lloyd Leadbeater

Organization, Participant	Participant
MVVA, Gullivar Shepard	Luisa Horteninos
MVVA, Kerrie Harvey	Lynda Martin
MVVA, Michael Van Valkenberg	M. Howe
MVVA, Sarah Siegel	M.A. Trowersy
MVVA, Tim Delker	Margot W.
Pantherra Building Corporation, Adriana Cotovio	Mary Heiberg
Pantherra Building Corporation, Norbert Cotovio	Matt Cabarge
Riverdale Historical Society, Gerald Whyte	Michael McMahon
Rocket Riders, David Fisher	Michael T. Smith
Rouge Valley, Lois James	N. Uricek
Ryerson University, Charles Middleton	Nicole Swerhun
Ryerson University, Melanie Panitch	Onil Bhattacharnya
SENES, Anneliese Crievc	Ray Barton
St. Lawrence Neighbourhood Association, Ronny Yaron	Rob Galea
Task Force to Bring Back the Don, Bryan Bertie	Ross Cheney
Task Force to Bring Back the Don, John Wilson	Russ McLeod
Toronto and Region Conservation Authority (TRCA), Adele Freeman	Sarah Orr
Toronto and Region Conservation Authority (TRCA), Deb Martin-Dawns	Scott Payette
Toronto and Region Conservation Authority (TRCA), Don Haley	Shan Dhingra
Toronto and Region Conservation Authority (TRCA), Ken Dion	Sharon Howarth
Toronto and Region Conservation Authority (TRCA), Michelle Vandewel	Stephen D. Sword
Toronto Transit Commission (TTC), Mike Runson	Steve Scheinent
Waterfront Action, David White	Stig Harvor
Waterfront Toronto, Amanda Flude	Sylvia Pelman
Waterfront Toronto, Brenda Websler	Tero Konttin
Waterfront Toronto, Chris Glasiek	Tom Hopkins
Waterfront Toronto, John Campbell	Tracy Ehl
Waterfront Toronto, Kevin Bechard	Tyler Greenleaf
Waterfront Toronto, Mark Wilson	W. Gola
Waterfront Toronto, Michelle Noble	Zac J. Zachariassen
Waterfront Toronto, Raj Bedroysan	
Waterfront Toronto, Robert Siddall	
West Don Lands Committee, Cindy Wilkey	
York University, Leo Panitch	

Appendix B – Public Forum Agenda

AGENDA

Meeting Purpose:

- To present and seek feedback on the Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan; and
- To present and seek feedback on the preliminary concept design for the Don Mouth Naturalization and Port Lands Flood Protection Project.

Refreshments and a light lunch provided

10:00 am	**OPEN HOUSE**
11:00	**Welcome & Opening Remarks** Mark Wilson, Chair, Waterfront Toronto Chris Glaisek, VP Planning & Design, Waterfront Toronto Adele Freeman, Director, Watershed Management, Toronto and Region Conservation
11:10	**Agenda Review** Nicole Swerhun & Dave Dilks, Facilitators
11:15 pm	**PRESENTATION: Lower Don Lands Keating Channel Municipal Class EA and Precinct Plan** Michael Van Valkenburgh, Michael Van Valkenburgh Associates, Inc. Ken Greenberg, Greenberg Consultants, Inc. *Plenary: Questions of Clarification and Discussion (12:00 – 12:20 pm)*
12:20	**PRESENTATION: Don Mouth Naturalization & Port Lands Flood Protection** Paul Murray, Gartner Lee Limited *Plenary: Questions of Clarification and Discussion (1:05 – 1:25 pm)*
1:25	**OPEN HOUSE continued…**
3:00	**Adjourn**

Appendix C – Written Feedback

This appendix documents verbatim written feedback from participants. The comments are from individual workbooks and post-event feedback received by Waterfront Toronto by the May 25th 2009 comment deadline.

Lower Don Lands: Keating Channel Municipal Class EA and Precinct Plan

Questions #1: Are you comfortable with the draft plans presented? Why or why not?

Brilliant – this plan will be for Toronto what the cathedrals were for Medieval Europe!

Yes. It's very comprehensive. Would like more information on energy reduction and clarification on the images shown in the presentation. How many windmills and where will they be situated? Excellent component – "Aging in Place"

Very impressive.

Generally yes.

I am extremely pleased with the concept plans presented by Waterfront Toronto at the May 9/2009 meeting. For me, I get almost as much pleasure from the process of working towards a goal as from the "goal" itself. I've enjoyed taking part in the process by attending most of the public meetings and having my say. Based on the May 9th presentation, I think all parties who were involved in the process can be proud of the draft plans presented at the meeting.

No - not enough width of flow channel south to ship channel.
Not enough info of impacts over Bay and Leslie St.
Need a panel Board for this.
South of ship channel – there needs to be connection terrestrial and aquatic through Lake Ontario Park.
Get rid of the 3 high rise buildings – they do not belong.
Worry about wet weather flow from upper Don.
Not enough discussion or data.
Do not like the combined over outflow storage tanks.
We have no plans to correct CSOs.

Transportation seems well thought out.
Mixed-use zoning is excellent.
Please work to keep T&T in new development.
Detailed timelines from time of project approval to project completion would be nice.

Yes, besides Parliament St., a balanced and comprehensive approach seems in place.

Yes – also, we are struck by the similarities to the Puerto Madero development in Buenos Aires.

Very detailed, comprehensive and diverse. However: it may still be a challenge to stave off undue reliance on the car (for those coming from afar) and looking for parking spaces! Proposed high quality, interconnected transit routes imperative and must be a priority.

Yes. The level of detailed thought on a wide variety of modalities (e.g. sunlight, wind, storm water, etc.) and the creativity of the design teams are breathtaking.

Appreciate the attention to sun and wind and water use and enjoyment in the plans.

The integration of working drawings is excellent and the whole presentation is an enormous optimistic boost.

Yes! The range of competing requirements all seem to have been taken into account. Cutting edge planning.

Yes! The plans are well thought out considering all the difficulties of renewing the area. I like the transit plans, pedestrian and cycling plans.

Yes, very exciting!

The Zoning Amendment Application filed with the City of Toronto for the Silo Site is to bring the current zoning by-law into conformity with the New City of Toronto Official Plan and the Central Waterfront Secondary Plan to permit mixed use residential and commercial uses up to a density of 112,000 square metres (1,205,597 square feet) of combined gross floor area in buildings of a variety of heights.

The design concept prepared by the Kirkland Partnership contemplates two options. One with the existing Victory Soya Silo structure retained and the other with the Silos removed. The option retaining the silo contemplates a new mixed use building with a substantial tower position tower positioned at the corner of the harbour and the mouth of the Don River. The second tower is positioned along the Trinity Street extension/corridor. Under the application the proposed extension of Queens Quay East breaks into a divided highway around the Silo structure and the planned right of way width incorporates transit routes. In addition a new flatiron building to the immediate east of the silo structure is proposed. The second option considers the demolition of the silo structure which would be traversed by the Queens Quay extension. In the second option the maximum building height is consolidated in a substantial sentinel tower north of the future extension of Queens Quay. Secondary Buildings south of the future extension of Queens Quay East are featured on the south side of the Queens Quay extension.

The preferred alternative of the Municipal Class EA realigns the extension of Queens Quay north of the existing Silo structure.

Our client's consultants remain concerned with your preferred alternative for the extension of Queens Quay north of the existing Silo Structure because in their opinion it does not leave sufficient depth and proportion for a below grade parking structure on the northern development block. More detailed design plans are required to assess this alternative further. Although the split right of way concept of the Zoning By-law Amendment Application was included in the alternatives considered under the Class EA our consultants have been provided with the detailed reasons as to why this option was dismissed. The consultants also remain concerned with the conceptual placement of one major tower adjacent to the eastern side of the Silo Structure and do not consider this the most appropriate location within our client's 5.2 acre site.

Our clients appreciate that effort which has gone into the background work for the Keating North Precinct Plan but until they are actually provoded with a draft precinct plan and draft zoning by-law they reserve comment on this ancillary undertaking.

Question #2: What opportunities for refinements, if any, would you suggest?

Remove the horrible DVP to Gardiner ramps.

How will feet and wheels be managed on foot/cycle paths?

Less urban development and increase natural areas.

Urban planning, like politics, is the art of the possible. With planning well underway, it may be time to insert a component in those meetings on the political/financial trajectory of the project. I appreciate the sensitivities of this, but this element must be managed or we only be left with pretty pictures and consultant fees. Again. Public consultation and advocacy is essential for a plan of this scale to move forward. To marshal this, two things are necessary: acknowledgement of the political/financial path as equally important and practical as soil studies and agency coordination. And informing the public/supporters of the status and strategy of Waterfront Toronto and TRCA in this regard.

Is it possible the historic silos could be reused as giant compost facilities? Given the fact they were originally designed to warehouse grain the reality of converting them into compost facilities should be very feasible. Secondly ever time the obnoxious gas odour discussion comes up is it possible that the escaping gas could be captured and turned into a heat source for burning and heating something like a community walk snow melt application, or maybe there is enough gas to operate some outdoor overhead burners. It might be worth putting it out as a contest to a university challenge to explore this further. This should be a good project for winning over the future generation. The silo can offer good potential for some kind of immediate use and revenue stream if adequately thought through. This should be part of the engineering challenge.

I might suggest the committee look at this aspect soon as a practical solution to the green garbage problem the city already has. I cannot see leaving them in their present condition for ever. The functionally of this asset could definitely be realized to the community. There is no shortage of green garbage that could be diverted into these silos. They also need to be refurbished on the exterior too. They have no charm and no appeal. Historical designated industrial sites of that size should have something desirable going for them.

I have two suggestions for possible improvements to the draft plans.

a)Victory Soya Mills Site:

The Soya Mills are a fine reminder of our former waterfront industrial heritage. The retention of these silos as part of an enhanced cultural site would benefit the City and serve as a magnet for drawing the public to the waterfront throughout the year. The current draft plans for the site could be improved by improving the visibility of the site from the harbour by moving the building at the corner of the Parliament Slip and Keating Channel to another location or transferring its density to another building further east. Opening up this corner would allow visitors to the silos to have a clear view of the harbour (particularly if an observation deck were placed on top of the silos) as well as allowing sailors on boats in the harbour to have a good view of the silo site. Just think of the visual impact from the harbour if the silos were illuminated with LED lighting.

b)Gardiner Expressway in the vicinity of the promenade along the north side of the Keating Channel just east of the Munitions Street bridge:

As an additional reminder of our past history, I would suggest retaining one section of the elevated Gardiner at this location. The concrete pillars and roof of this one section could be incorporated into a site for a cafe and restaurant. I envision cafes on the ground level adjacent to the promenade, a restaurant on a 2nd floor built halfway up the concrete expressway supports and a rooftop cafe that has a view of the whole lower Don Lands site. The rooftop cafe and 2nd story restaurant could be serviced by an aesthetically pleasing elevator(s).

I love suggestion on urban agriculture and produce available to public.

Transportation for seniors and handicapped – i.e. wheel transportation entry to various areas.

More information on fish habitat and the River function.

Wildlife migration corridor.

I have concerns the lack of retail along the Keating Channel will make it a "dead" space, particularly in the winter.

Seeing more details about changes if the Gardiner is moved would be nice.

Would be nice to see if GO station is built, where it would go.

Parliament St. rail underpass should be designed similar to the plan for Scarlett Rd. at the C.P. underpass between St. Clair Ave. W. & Dundas St. W., which is including space for future streetcars even though no streetcar service is planned to go under the C.P. line on Scarlett. Likewise, Parliament isn't planned to have service, but tracks exist north of King and could become a future route, so space should be included in the new underpass.

The light standards (i.e. posts) are really far below the cool elegance of the overall design concept.

Definitely pursue urban farming/local work opportunities.

Encourage ongoing interpretive walks re: port/ "industrial" history and natural ecology features of area through Heritage Toronto, Toronto Field

Naturalists, as plans progress and publicize some to general public to familiarize them from precinct(s).

I am interested in seeing more detailed modeling of the way people circulate through the open spaces and how this interacts with ecological planning for resident and migratory wildlife (including in the aquatic realm). I am interested in seeing the uses that are anticipated for the bridge over the south end of the Greenway along the north side of the Ship Channel. This would be a good opportunity for a light touch – a boardwalk-type bridge for pedestrian and bike traffic, but not cars, transit, etc.

Would like to see an artist's rendering of a winter scene; skating areas, etc.

"Aging in place" is valued, but a sense of "cost of living" would be appreciated range.

Water taxes, small-craft passageways – where do they fit in?

Urban agriculture - farming.

Sustainability: food (local); nature preservation

Job creation in farming – using local waste; selling local produce; hot house: using extra energy production.

While this cannot be mandated there is some need to incorporate the necessary potential infrastructure in the basic plan so as to allow others to bring and grow their plans.

Time enough for refinements, though I hope there will be provision for a health clinic in the area for residents and workers.

Ensure zoning to allow for proper density (8+ floors).

Ensure family sized units in residencies, schools, daycares and retirement homes to have an age diverse area. The commercial areas along Cherry and Villiers looks good.

There is a need for the draft precinct plan and the draft zoning by-law to be coordinated and presented with the City of Toronto who is co-proponent in these undertakings. Until this is done the proposals remain relatively conceptual.

Our clients would appreciate a better understanding of the location details of the Queens Quay east extension and the proposed funding and costing for this Municipal Class EA particularly with respect to the potential extension of Queens Quay East through their lands.

Don Mouth Naturalization and Port Lands Floor Protection

Questions #1: Are you comfortable with the draft plans presented? Why or why not?

Extraordinary.

Yes – the flood control plan sounds very challenging!

The images on the role of nature and clarification are very good.

The flood control animation images are amazing and make the project easy to visualize.

Generally yes.

The science and statistical calculations I have no doubt been well researched by accounts based on the information available today. Having made this statement it would be good to see some of the reports generated to show the flows and the maintenance.

I might suggest an added feature to deal with a huge 200 year downfall or an ice jam blockage.

Why not install 3 – 8' diameter pipes under the bottom channel armour liner system. The pipes could be outfitted with a booster chamber with massive super charged force main pumps.

In the event they are ever required they could increase the flow of the river substantially.

The approximate increased discharge could be in the order of ______ m3.

If a suitable screening device can be installed and reasonably maintained.

The pumps would be switched on 4 times a year for ongoing maintenance reliability.

Tokyo has a somewhat similar problem and has done this to avoid flooding. This might overcome a problem raised in the comments section under Item 1.
I combined Page 3 and 4 issues.

Fairly comfortable, as I don't know much about the technical requirements.

Yes.

Still need confirmation of commitments to these significant interdependent initiatives.
Looking forward to Fall '09 Presentation.

Yes. Again the creativity and detailed consideration of the many critical issues is commendable. I am very interested in aquatic and terrestrial habitat features that take advantage of the varying water levels when river or lake changes create microclimatic make opportunities. Your team seems to be looking at all these opportunities – working toward net gain scenarios in all climatic conditions.

Good work.

Absolutely yes. This makes a lot of sense and I have a feeling this will be a beautiful part of the city.

Yes.

Our clients support the ambitious undertakings for the removal of the flood plain within the Central Waterfront.
Our recommendation is that to ensure public confidence in the undertaking that there be a clearly communicated business plan presented as to the manner in which the funding of these capital works will proceed.

Question #2: What opportunities for refinements, if any, would you suggest?

A number of other studies are currently underway in regards to this redevelopment as shown on the presentation. Until those studies are fully completed it is difficult to comment at this time. I suggest as the studies become available they be uploaded for further review and the refinements may come then.

Cut CSOs.

Nothing in particular.

Very clearly – entire watershed must be addressed (as noted) re: water quality, flood mitigation.

Planning for interpretation and educational opportunities – especially given the groundbreaking nature of the work being done – should start as early as possible.

Don Narrows – big challenge! (continued problems) You seem to be aware and take the possible measures.

Dredging River south of Riverdale Park Bridge so could be used for canoes, kayaks, etc.

At present, our clients will continue to monitor the process.

Any other comments?

First class presentations, kudos to ALL INVOLVED for simplifying the complex technologies involved!

Congratulations to Waterfront Toronto, TRCA and MVVA and all their partners for superb presentations of wonderful plans. This could be the best thing to happen to Toronto in all its history. It's probably cheaper than rescuing the auto industry. Give Adele Freeman the Order of Canada.

Talk to Greater Toronto Airport Authority. They have several innovative programs that encourage factories and utilities in Airport region to share energy resources. For example one factory may produce waste heat. A neighbour enterprise may need heat. The Airport Authority facilitates the mating of these two enterprises for mutual benefit and not energy savings to community. I can supply name of project.

The preceding and following comments are driven from a business perspective of observations.

As a concept a vision given the broad diversity of overlapping dynamics that are challenging but this is what makes it exciting. Think of the following comments as business plan strengths and weaknesses.

1. The committee would be well served to have an expert property insurance specialist sitting in on some of the discussions. In light of recent biblical tragedies in the US and elsewhere globally I suspect having an insurance expert input from the outset would be advisable. It may force a close rethink of the options available. Vegetative green roofs while recently trendy do pose a fire hazard element if not maintained. – THIS IS VITAL

2. There are a number of timeline issues that would appear to be in need of some more input. I might suggest that 2 – 20 years to build out most of the infrastructure would be required. If it can be further broken down into 2 year phases with budget dollars set aside accordingly it might be more practical in terms of saleability to other stakeholders and investors.

Ideally I would start with the Don River Re-development with some sort of budget perspective / timeline would be involved on that aspect of the project first.

3. What synergies or challenges does the adjacent Toronto Island airport offer or present. Airborne noise might be a factor in window design and/or HVAC duct systems conversely creating a ferry link to the area may yield some desirable financial attractiveness In any case I would be curious to see the noise impact diagram showing the noise level db line configuration.

4. What sort of business group working committees can be set up to explore niche business opportunities? Maybe this is well underway.

5. While the use of asphalt roads will be with us for some decades to come – the reality is they deteriorate and dissolve into the drinking water supply. Most motorists never stop for a moment to think about the consequences of laying down a road. It likely won't gain much traction as an idea but if pavers could be used throughout the Toronto Waterfront committee might win some awards in the future on this score alone.

6. Some sort of bicycle storage lockers might be desirable that the public can get access to. A number of users would like to use the area recreationally if they could leave their bicycles in some convenient lockup area that is protected from the elements. This could be introduced early in the process to create a revenue stream. A full blown public storage facility is not necessary to meet this demand. Just a dedicated facility for bicycles.

Interesting to hear it actually said out loud that water levels in the Great Lakes are lowering. A scary long-term prospect! (We are witnessing water levels lowering in Georgian Bay.) Congratulations on the whole effort!

Why a streetcar and not a bus up Cherry St.? Solar/thermal? Health Clinic?	
Our clients will continue to participate in the stakeholder process and review the Environmental Study Reports when they are released.	

Appendix 16-A2

Special Meetings

WATERFRONToronto

TORONTO

Toronto Transit Commission

WATERFRONToronto

TORONTO

Toronto Transit Commission

Don Mouth Naturalization and Port Lands Flood Protection Project & Lower Don Lands Municipal Class EA and Keating Channel Precinct Plan Joint Stakeholder Meeting

Stakeholder Advisory Committee (SAC) Meeting #3

Tuesday, April 21st 2009
4:00-8:00pm
Waterfront Toronto, Main Boardroom

MEETING SUMMARY

1. Welcome and Opening Remarks

Chris Glaisek (Waterfront Toronto) welcomed the committee members to the joint stakeholder meeting, which brought together stakeholder representatives from the advisory committees for the:

- Don Mouth Naturalization and Port Lands Flood Protection Project; and
- Lower Don Lands Municipal Class EA and Keating Channel Precinct Plan.

2. Agenda Review, Meeting Purpose & Introductions

A round of introductions was carried out.

David Dilks (Lura Consulting) indicated that the purpose of the joint meeting was to gather feedback on the two study presentations, both in terms of content and as vehicles for public communication, before they are presented to the public at the May 9th 2009 public forum.

Mr. Dilks requested that members of the Lower Don Lands Stakeholder Advisory Committee (LDL SAC) submit any comments on the minutes of the previous LDL SAC Meeting #2 to Waterfront Toronto through Andrea Kelemen.

Co-facilitator Nicole Swerhun confirmed that all committee members had received copies of the two presentations. Ms. Swerhun then briefly reviewed the meeting agenda, noting that the format would largely mirror that of the upcoming public forum.

3. Don Mouth Naturalization & Port Lands Flood Protection Project – Presentation

Brenda Webster (Waterfront Toronto) introduced the presentation by acknowledging the excellent work of both project teams, which are now working together on this unique "river building and city building" initiative.

Adele Freeman, Don Haley and Deborah Martin-Downs from Toronto and Region Conservation (TRCA) presented PowerPoint slides on the Don Mouth Naturalization and Port Lands Flood Protection Environmental Assessment (EA). The following key points were made during their presentation:

- The project goal is "To establish and sustain the form, features, and functions of a natural river mouth within the context of a revitalized City environment while providing flood protection up to the Regulatory Flood."
- Additional technical studies and conceptual designs have been completed since the last meeting.
- The plan includes 8 Flood Protection Measures:
    - East Bank Flood Protection Landform
    - Removal of Utility Bridge
    - Channel Modification & Sediment Basin
    - Bridge Widening & Weirs at Lakeshore Blvd.
    - River Valley Formation
    - Overflow Levee
    - Greenway Wetland and Floodway
    - Keating Channel Floodway

- Two parallel and integrated hydraulic studies were conducted; one by Limno Tech sub to Michael Van Valkenburgh Associates, Inc. for WT and one by Barid sub to AECOM for TRCA Investment in these parallel efforts was prudent to allow for peer review and confirmation of conclusions.
- Sediment and debris will continue to be an important issue that requires a sophisticated management strategy.
- One option is to pull sediment through pipes to a dewatering facility south of the spillway and to then ship the sediment for use in Tommy Thomson Park.
- All planned structures will be built to allow potential floods to pass underneath.
- The naturalization assumptions are:
    - Design to provide a mix of aquatic, wetland, and upland communities;
    - Wetlands will be fed primarily by lake, not river, as well as roof water;
    - A range of wetland access controls will be considered to reduce the presence of invasive species; and
    - Vegetation communities are expected to be highly disturbed following very large flood events.
- Next steps will include:
    - Developing plans for adaptive management; and
    - Creating a Soil and Groundwater Management Master Plan as part of the remediation strategy.

In conclusion, Mr. Haley acknowledged that unlike many other EAs, practically all aspects of this project proposal are positive with minimal concerns or need for impact mitigation measures. He spoke to the challenge of incorporating flexibility into the final plan to address unknowns that may arise.

4. Roundtable Discussion – Feedback on Don Mouth Presentation

Ms. Swerhun asked if committee members had any comments regarding the presentation. The following is a summary of the questions (Q) and comments (C) received. Answers (A) are included where provided.

Q1. I like the first slides. Consider reusing old railway bridges. For Hydraulics slides 17-20 it would be good to show where this cross section is located on a bigger map. It would be helpful to show a side-by-side image of the regulatory flood existing conditions versus with improvements, like in the newsletter. Could you clarify if the sediment is toxic or not?

A. The sediment is relatively clean and can be used beneficially.

C1. In the Landscape Communities slides, you should show a bigger picture of thicket swamp; people have a bad connotation of the word "swamp".

C2. Maybe you could make all thumbnail photos larger.

C3. Overall I think it looks fabulous. I wish we could have it ready for next summer. This is one of the best things that has ever happened to this city. Concerning the two models used, you could explain what the questions are being addressed by each model. For new people you should explain what a 2 yr flood is, what a regulatory flood is, etc. You might want to use the term "lengthen" for the bridge rather than "widen". You could also clarify what "underground infrastructure" is by giving examples.

C4. A lot of the words used are not in the public vocabulary. Maybe you could provide a glossary of terms. The flood protection measure (slide 13) could be clarified further using more pictures. Where is the valley stretch in slide 17-20? Again, this needs a bigger map. You may want to mention what kind of storm we most commonly experience. Some people might be interested in the names of the modeling technologies used. For the description of the dredging machine, move the picture up earlier in the slides. Provide pictures of infrastructure vaults. "Morphology" is an example of a term that is not understood by the public. Improve the use of colours to make them more obvious. I agree on the need for bigger pictures. There are many specifics included in the Sediment Management Area slide 28-30. Starting around slide 41, the headings need to change to match the content. "New river mouth" seems like a new term. In Next Steps you could explain what is planned for 2009 onward, e.g. submitting the EA to whom and when, and what will happen next.

A. We could explain terms earlier in the presentation.

Q2. Could you explain how contaminated soil will be remediated? People will be concerned about water going through exposed industrial toxins in the land.

A. Waterfront Toronto has a request for proposals going out at the end of April. In May Waterfront Toronto will be hiring a ground water management staff person. In summary, we plan to excavate down deeper than the riverbed. Soil will be taken out and cleaned. We will be conducting studies on the groundwater. We will be applying engineered controls in the riverbed, using naturalized materials whenever possible to protect the bed from scouring. It will be a very challenging and detailed job, but those are the basics of our plan.

A. Our key objective is to isolate the ecosystem from any contaminated materials and to ensure there is no conduit for leaching.

Q3. What is the cost of remediation? Is there a possible showstopper depending on what we find?

A. We know it is contaminated similar to related sites, e.g. the West Don Lands. Remediation technologies and their costs change from year to year. We know we will need to separate each type of contaminated material and process each with appropriate technologies. We are using conservative business case numbers.

Q4. What is happening with the special policy area (SPA) designation and the Province? The SPA has been in place for many years. The City is tolerating an increased risk. The SPA creates a real grey area for developers. You need some messaging to address the SPA question.

A. The situation is like that in the West Don Lands. Until the flood protection is in place, the SPA still applies. There is no guarantee it will be removed in the next 5-10 years.

A. An SPA typically encompasses a set of land use planning policies for developed areas that are in flood plains. They allow for continued redevelopment, while minimizing risks. We need to eliminate the flooding risk and then apply for an Official Plan amendment to remove the restrictions. The process for doing this has yet to be defined.

Q5. I see the Gardiner still exists in the slides. You should explain how the Gardiner take down relates and explain how the rerouting of Lake Shore might work.

A. TRCA is in conversation with the Gardiner EA Team. Our outcomes inform the Gardiner EA as a new base condition for their design options. We'll add this point to the presentation.

Q6. It would be great to provide people with more visuals. You could have more photos on laptops during the open house. Maybe you could provide CD-Roms with more details. I'd like to see more renderings from other angles.

A: There will be four topic-focused tables at the open house where imagery can be viewed and discussed in detail.

C5. I found it difficult to follow both the graph and flooding rendering at the same time in the video. When presenting try to make sure what you are saying matches with what is presented in the slide, for example when you say sediment is a "major issue" it would be good to show a picture of a big pile of sediment and maybe include the cost. The important difference between lake water and river water in this context needs to be explained.

C6. Maybe the number of slides can be reduced.

C7. I liked the many detailed slides. They were really good and explained a lot.

C8. The colours were not showing up very well. Maybe they could be made more brilliant.

C9. I don't think you need to worry about overwhelming participants. People who show up are very interested. In terms of the notices, make sure event times are more clearly advertised.

Ms. Swerhun thanked committee members for their comments and suggestions.

5. Lower Don Lands Municipal Class EA and Keating Channel Precinct Plan – Presentation

Brenda Webster (Waterfront Toronto) introduced the second presentation, explaining that the focus is currently on the Keating Channel Precinct Plan, rather than the whole of the Lower Don Lands (LDL). Ms. Webster also spoke to the useful feedback received at the December public forum. She also mentioned that the team views "sustainability" as a foundation for the plan, because it is integrated into all aspects of the project.

Ken Greenberg (Greenberg Consultants) and Gullivar Shepard (Michael Van Valkenburgh Associates, Inc.) gave the committee a PowerPoint presentation on the Lower Don Lands Municipal Class EA and Keating North Precinct Plan. Mr. Greenberg and Mr. Shepard made the following key points during the presentation:

- The unique river and wetlands context is at the heart of the plan.
- Over all LDL planning has included open space, neighbourhoods, transit, water and rail crossings and built form.
- Building massing aims to minimize shadows onto major open spaces.

- The Keating Channel Precinct is the gateway for future development of the Lower Don Lands and the entire Port Lands.
- Vehicular, transit and pedestrian traffic are currently "squeezed" by the rail corridor.
- This is a keystone site which will allow for stronger north-south connections between existing and newly developing communities.
- The Keating block pattern, crossings and portals, water and wastewater infrastructure, and coordinated adjacent servicing infrastructure are key facets of the proposed plan.
- The goal for sustainability is to approach a carbon neutral development in the long term.
- Proposed Zoning Bylaws and Urban Design Guidelines severely restrict tower locations and footprints to avoid the "wall of condos" affect. Midrise buildings will be used to achieve density targets.
- Wind mitigation and massing is designed to minimize winter winds while taking advantage of summer breezes.
- The plans recommend mixed use neighbourhoods for sustainable land use that include shopping, working and living, with local community services and amenities and transit stops within a five minute walk.
- The plan aims to accommodate diversity and aging in place.
- Options for small boat programming are addressed in part through channel wall design.
- Three core open spaces are proposed:
    - Channel mouth;
    - Channel narrows; and
    - Head of Channel.
- The Don Valley Trail and Martin Goodman Trail would continue through the area as part of the Port Lands Bike Trail Network.
- Next steps include:
    - Public Meeting to present recommended Precinct Plan elements;
    - Prepare recommended plan for submission to Toronto City Council;
    - Statutory Public Meeting for the proposed implementing bylaws (e.g. Zoning);
    - Council considers Precinct Plan, Infrastructure Class EA Master Plan and Zoning Bylaw.

6. Roundtable Discussion – Feedback on Lower Don Lands Presentation

Mr. Dilks asked if committee members had any comments regarding the presentation. The following is a summary of the questions (Q) and comments (C) received. Answers (A) are included where provided.

Q1. I'd like assurance the LDL does not become a self-enclosed community. Crossing the Keating Channel is key to knitting the areas together. We need to give people a reason to go there beyond biking and looking at the water. There needs to be retail and entertainment, restaurants, commercial opportunities that serve the needs of young people.

A. These issues are addressed in the plan. We will emphasize these points more in our presentation.

C1. Some slides (e.g. #26) are a blur of arrows. We need clear explanation and time to understand what they mean. Some people may have concerns when they see proposals for tall towers. You need to explain how towers will affect people living north of Keating. "Rip rap revetments" is a new word that needs explanation.

C2: The logo on slide #5 does not need to be repeated again. You need to acknowledge that some people don't like tall buildings. I think midrises are more sustainable then high-rises. The term "solar access" could just be phrased as "daylight" or "not shadows". You should consider vertical wind generation as well. You should speak to the business case and as well as how this is an option for making a better future.

C3: I found slide #28 to be confusing. Slide #31 By-laws could probably be explained more simply. On slide 30 dealing with the private realm, maybe the colours could be better explained. Overall there is too much text and too much detail. Concerning the local schools, we need to ensure communities can use the whole complex. I did not see any community centres or playgrounds. There need to be public washrooms too.

Q2. Is there a plan to have a bridge to a Cherry St GO station?

A: It is not up to Waterfront Toronto, but our plan does provide for the option of access to a GO station.

C4. I'm okay with tall towers, which are more efficient than sprawling housing. There should be a goal for 100% green construction and operation, for example putting wind farms on the roof.

C5. The Project Team should look at the Melbourne river walk as an example to learn from. Built form can seem arbitrary so it is good to explain the thinking behind it. There needs to be explanation that sustainability is dependent on intensification, e.g. the efficient use of infrastructure and what's needed to pay for amenities.

C6. It's good that some of the public concerns are addressed in the presentation materials. You need to make sure to hit the right key points for each slide. You could also present with more enthusiasm.

C7. The proposed plan is very exciting with all the public space that is included. I feel like we are being listened to. I appreciate the focus on sustainability and the inclusion of low cost housing. We know climate change and peak oil are realities that we need to plan for. The high-rise spacing is an improvement over what we have west of Younge Street. Use the term "sunlight" rather than "solar". I also would like to see wind power on buildings.

A. To clarify, green power such as wind power is not precluded in our plan. The Green Energy Act and Green Standards support such efforts, but we cannot regulate developers to require them

Q4. On slide #41, would that be an office tower?

A. That tower could be work or living, not necessarily an office.

Q5. Is the Keating Channel Precinct plan separate from the LDL EA?

A. They are related but separate.

Q6. Have you considered crime prevention through environmental design?

A: No, not explicitly. We should review the design through that lens.

Q7. Does this plan require or depend on any industrial relocation?

A: In Keating Channel north, no.

Q8. On slide #29 when you address the hours of sunlight in the public realm, are those total hours or continuous?

A: The model is based on total hours of sunlight on March 21st.

Q9. How would you implement the design guidelines?

A: The zoning envelopes give us that sunlight performance.

Q10: On the 2nd slide it is hard to see the red boundaries. On slide #7 looking at the grey grid I cannot see any streets – it is just a grey blur.

A: This slide is trying to show area size not the grid.

Q11. On slides #9-12 I can't see any of the details.

A: We may need to reference that these details are available for viewing on the boards.

C8. On the Built Form slide you need to apply more contrast in the orange colour. On slide #24 Circulation, the tiny underpass graphic is worth its own slide. The arrows on the transit slide made sense to me. Slide #43 was great for dealing with concerns about a "wall of condos". These slides don't show that you are keeping the east-west commuter bike route, which of course you need to do. On slide #64 you wrote "Queens Quay" but you need to state East or West. There needs to be a slide that addresses commuter bike lanes. You may also want to consider using the language of "bike ways".

C9. You need to address the issue of cost. Be up front and explain that development fees cannot pay for all of this. Maybe tell the story of other parks e.g. Millennium Park. We need to give people an idea how this could really happen and the important role of government.

A: We could show a new slide comparing conventional development vs. Waterfront Toronto's plans so far vs. this project.

C10. The densities seem right for transit. There is a mythology that traditional homes (like in Corktown) are more sustainable than towers. We need to see the thinking behind how this will get done.

C11. You need to clarify why lake water is better than river water. I support the need for schools to be shared facilities for all generations to use. I am concerned about special infrastructure that might be needed for mixed use buildings, e.g. different sewers for business vs. residential.

A. The City has a single standard for all sewers.

C12. Rather than "Nexus" and "portal" you should use plain language like "tunnel".

C13. Stakeholders talk to each other and we are concerned about financing prospects for this project. Maybe we could help mobilize public support. I want my taxes spent this way. It is truly a wonderful opportunity and we would like to get involved.

7. Next Steps and Wrap-Up

Ms. Swerhun concluded the meeting by summarizing how the May 9th public forum would follow the same format as tonight, with modifications to the slides based on the committee's feedback and suggested additions. She explained there would be less time for open discussion but definitely some opportunity for those who wished to speak to the whole room. There will also be break out tables.

There was brief discussion about providing more time for plenary discussion and an open question period, about how celebratory the event should be.

Ms. Swerhun and Mr. Dilks then thanked committee members for attending.

Mr. Glaisek and Ms. Webster also thanked committee members for coming and for their feedback.

Appendix A: Attendance List

Name	Organization
Committee Members	
Sharon Howarth	Next Generation
Jane Robinson	GWNA
Dennis Findlay	Portlands Action Committee
David Fisher	Transit Advocate
Clay McFayden	Cycling Advocate
Julie Beddoes	West Don Lands Committee
Sylvia Pellman	St. Lawrence Neighbourhood Association
Tom Davidson	Councillor McConnell's Office
David Jackson	Distillery District
Stephen Kauffman	Home Depot
Robert Sherrin	St. Lawrence Neighbourhood Association (SLNA)
Chris Williams	Aird & Berlis (representing Castan)
David White	WaterfrontAction
John Wilson	Task Force to Bring Back the Don
Suzana Spratley	Royal Canadian Yacht Club (RCYC)
Anna Prodanou	Toronto Island Community Association (TICA)
Robert Deunani	Aird & Berlis LLP
Cindy Wilkey	West Don Lands Committee/Corktown Business & Residents Association
Waterfront Toronto	
Chris Glaisek	Waterfront Toronto
Brenda Webster	Waterfront Toronto
Amanda Flude	Waterfront Toronto
Michelle Noble	Waterfront Toronto
Sheri DeCarlo	Waterfront Toronto
Toronto and Region Conservation	
Moyra Haney	Toronto and Region Conservation
Adele Freeman	Toronto and Region Conservation
Don Haley	Toronto and Region Conservation
Deborah Martin-Downs	Toronto and Region Conservation
City of Toronto Staff	
Kathy Thom	City of Toronto
Jennifer Tharp	City of Toronto
Consultants	
David Pratt	Arup
Elizabeth Silver	Michael Van Valkenburgh Associates Inc.
Kerrie Harvey	Michael Van Valkenburgh Associates Inc.
Guliver Shepard	Michael Van Valkenburgh Associates Inc.
Ken Greenberg	Greenberg Consultants
Steve Willis	MMM Group
Karin Wall	AECOM
Mark Pran	AECOM
Paul Murray	AECOM
Michael Thompson	AECOM
Marc Rose	AECOM
Facilitators	
David Dilks	Lura Consulting
Jason Diceman	Lura Consulting
Nicole Swerhun	

AECOM
300 Water Street, Whitby, ON, Canada L1N 9J2
T 905.668.9363 F 905.668.0221 www.aecom.com

Minutes of Meeting

Date of Meeting:	April 9, 2009
Project Number:	109446 (42-97007) — Start Time: 11:00 am
Project Name:	Lower Don Lands, North Keating Precinct EA
Location:	Waterfront Toronto Offices, 20 Bay Street
Regarding:	Cherry Street Subway and Trinity Street Pedestrian Underpass, Union Station Rail Corridor
Attendees:	Brenda Webster, Waterfront Toronto Richard Hindle, MVVA Adam Snow, GO Transit Steve Donald, AECOM/GO Transit David Pratt, Arup Marko Prgin, AECOM Mike Shallhorn, AECOM
Not Present:	John McTaggart, CN Rail
Distribution:	Gullivar Shepard MVVA, Attendees

PLEASE NOTE: If this report does not agree with your records of the meeting, or if there are any omissions, please advise, otherwise we will assume the contents to be correct.

Purpose: The purpose of the meeting was to clarify issues relating to the Cherry Street – Union Station Rail Corridor Subway with the design team and the owners/operators of the rail lines impacted by the proposed reconstruction of the structure. Also, the meeting allowed GO Transit to explain the operational and functional requirements of the rail lines carried by the structure.

	Action
1. Cherry Street – Union Station Rail Corridor Subway	
1.6 BW provided an overview of the Keating North component of the Lower Don Lands project, stressing the importance of the Cherry Street subway to the area transportation network.	
1.2 MP, DP and MS provided an overview of the proposed improvements, the identified issues and constraints, and the alternatives under consideration for the Cherry Street subway, all as summarized in the Technical Memorandum dated March 18, 2009. The consultants advised that subsequent to issuing the Technical Memorandum, the 'LRT Only' improvement alternative has been screened out due to an unacceptable horizontal alignment and related property issues.	Info
1.3 Structure Type; SD advised that GO has several concerns related to Structural Alternative No. 2 and the use of structural steel through plate girder (TPG) superstructures, including: • TPGs constrain GO's ability to adjust the layout/horizontal alignment of the track system in the future; • The 2° horizontal curve of the existing track layout and the location of a switch to the Don Yard within the footprint of the new bridge will necessitate widened TPGs, affecting track spacing. SD will summarize and confirm GO's concerns related to the TPG superstructure alternative in writing by April 21st.	SD
1.4 Construction Staging; SD advised that there are several constraints which will impact construction staging and the ability to implement track diversions, including: • There are 3 mainline tracks of CN's Kingston Subdivision and 2 tracks of CN's Bala Subdivision at the site, all carrying both passenger and freight traffic, as well as 3 tracks servicing the Don Yard and Harbour Lead (SD provided copies of a plan drawing illustrating the track layout); • The switch to the Don Yard located within the footprint of the new bridge; • Track switches and ladders located east and west of Cherry Street; and • Maintenance of the 60 kph operating speed.	

	On the basis of the foregoing constraints, staged construction utilizing track diversions is not anticipated to be feasible. 'Construction under rail traffic' utilizing temporary spans may be required. Alternatively, a combination of 'construction under rail traffic' and limited/track specific diversions and weekend closures may be feasible. AECOM will conduct a preliminary review of construction staging alternatives. SD will summarize and confirm the foregoing constraints in writing by April 21st.	AECOM SD
1.5	Construction Schedule; In response to a question from AS, the consultants advised that the earliest start of construction would be in 2 years. SD advised that a redesign of the rail infrastructure in the area of Cherry Street, including new track alignments, ladders and switches is presently in process. SD anticipates that based on current plans for improvements to the area rail infrastructure, the Cherry Street Tower will be redundant in 2 years. AS noted the potential heritage value of the tower building and equipment.	Info
	A brief discussion regarding the merits of coordinating the construction of the new Cherry Street subway with the planned improvements to the rail infrastructure did not identify any synergies.	Info
1.6	Vertical Clearance; SD anticipates that 4.8 m should be acceptable to the railway companies. He noted that 4.7 m has been accepted for a recent project at Sheppard.	Info
1.7	GO Platform at Cherry Street; AS advised that a platform at Cherry Street is unlikely due to the proximity to Union Station.	Info
1.8	Wilson Yard; AS advised that GO has interest in utilizing the Wilson Yard, which is currently owned by TEDCO and utilized by both CN and CP.	Info
1.9	Harbour Lead; SD advised that both CN and CP operate trains on the Harbour Lead, however the TTR is the appropriate authority for discussions and decisions regarding issues such as extension of the bridge over the Don River, modification of the vertical alignment of the Harbour Lead west of the Don River bridge and the vertical clearance under the Gardiner.	AECOM/Arup

1.10 CN Rail Involvement/Input; SD will confer with John McTaggart of CN Rail and advise with regards to CN's level of involvement in the study. SD

1.11 Ballast Depth; SD confirmed that direct fixed track will not be acceptable at the Cherry Street subway due to reduced operating speeds and constraints on future adjustments to the vertical alignment of the tracks. However, consideration may be given to steel ties which would facilitate a 150 mm reduction in the minimum required ballast depth (from 400 mm required for timber ties to 250 mm). SD to review with GO and CN and advise/confirm. SD

1.12 Private Development Impacts; Brenda Webster to inquire about development north of the Cherry Street subway in the Distillery District and provide AECOM/MVVA with any available plans for new buildings. BW

2. Trinity Street Pedestrian Underpass

2.1 MP and MS provided an overview of the new pedestrian underpass proposed in the vicinity of Trinity Street. A preliminary drawing is currently under development and will be forwarded to AS and SD upon completion. AECOM

2.2 Construction Type/Staging; SD noted that implementation of track diversions to facilitate staged construction of the pedestrian underpass will not be feasible due to track geometry and operational constraints similar to those discussed for Cherry Street. It is anticipated that a structure consisting of precast concrete box units installed during a series of weekend track closures will be the most feasible alternative. AECOM

2.3 Underpass Length and Location/Alignment; SD advised that the underpass should extend beyond the limits of the railway right-of-way. The location of the south portal/retaining walls should be checked in this regard. SD also advised that the underpass should be located/aligned to avoid conflicts with any existing track switches in the area. AECOM

2.4 Existing Underground Infrastructure; SD noted that there is an extensive network of existing underground signal and telecommunication cables, as well as gas lines for operating truck switches, within the rail corridor. All existing truck infrastructure must be maintained in operation during construction.

Next Meeting: None scheduled

Meeting Adjourned At: 1:00 pm

Notes Taken By: M. Shallhorn and R.Hindle

Date Minutes Prepared: April 15, 2009

Appendix 16-A3

Correspondence Received

WATERFRONToronto

TORONTO

Toronto Transit Commission

THE
Toronto Terminals Railway
COMPANY LTD

November 20, 2008

Arup
160 Bloor Street East
Suite 205
Toronto, Ontario
M4W 1B9

Attention: Priscilla Solis, Civil Designer

Further to your email of Friday, November 14th, 2008 regarding a proposed new alignment for Lakeshore Boulevard relative to an existing track beneath the Gardiner Expressway's east and westbound ramps.

The track in question is known as the Harbour Lead and is used for movements, including dimensional loads, to and from the Marine Terminal at Cherry St.

The standard horizontal clearance requirement, on tangent track, for structures beside a railway track is 8' - 4 ¼" from the centre line of track – 8'6" (8.5') for sake of argument.

At this location the track is comprised of three compound curves of 16° 15', 14 ° and 19° 30'. Each degree of curvature requires an additional inch of clearance. At Column PS 4 an additional 16 and ¼ inches or 1.35' would be required for horizontal clearance.

This means a minimum of 9.9' (8.5 + 1.35) from centre line of track would be required for a horizontal clearance. For your information the horizontal clearance from the Lead to column PN 1, as measured perpendicular from gauge, is approximately 11.4'.

With respect to vertical clearance requirements all structures over the railway require a minimum clearance distance of 22'- 0" from top of rail, for non-electrified lines.

Attached for your future reference is a copy of the Railway's Standard Clearance diagram.

You may also wish to forward your proposal to a Mr. G. Alan Kearsey, Property Manager, City of Toronto Economic Development Corporation (TEDCO), Metro Hall, 55 John Street, 7th Floor, Toronto Ontario M5V 3C6, who is responsible for the property on which the Harbour Lead is situated.

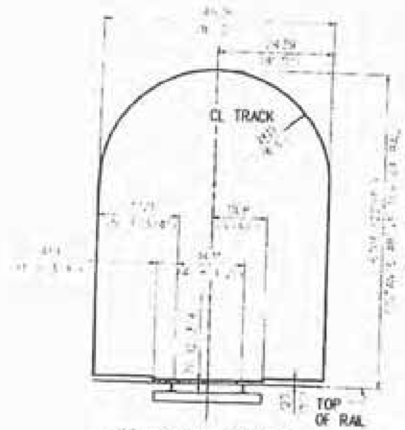
As discussed on Monday, November 17th, 2008, your solicitation of our comments after the design of the new alignment of Lakeshore Boulevard has been finalized would be appreciated.

Regards

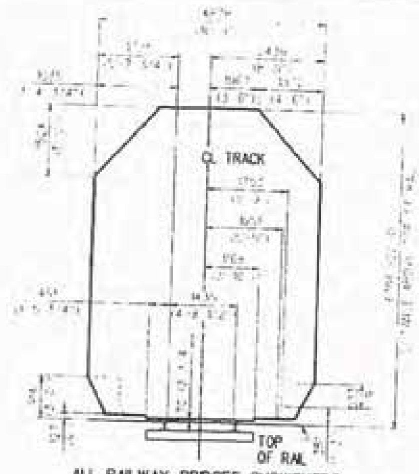
B. Logan

Bob Logan
Engineering Officer
Toronto Terminals Railway

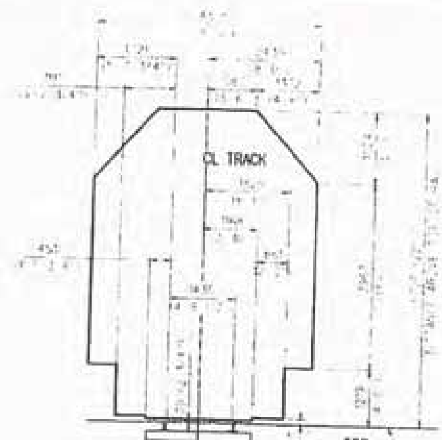
Cc: G. Alan Kearsey, C.P.M. Sr. Property Manager TEDCO



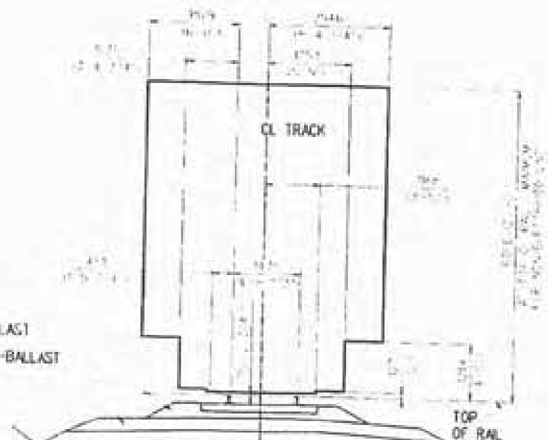
ALL RAILWAY TUNNELS
CANADA ONLY



ALL RAILWAY BRIDGES, SNOWSHEDS,
AND OVERHEAD TIMBER BRIDGES
CANADA ONLY



INDUSTRIAL SIDINGS
CANADA ONLY



ALL STRUCTURES OVER OR BESIDE THE RAILWAY TRACKS
EXCEPT RAILWAY BRIDGES, SNOW SHEDS AND OVERHEAD TIMBER BRIDGES
CANADA ONLY

No. Date	Revision
Standard / Norme	TRACK CLEARANCE AND TRACK SPACING REQUIREMENTS
Drawn / Dessin: NC · Checked / Vérification: VC	Approved / Approbation
Office of Chief Engineer / Bureau de l'ingénieur en Chef	CN
Date: 2005 DEC 16	Plan Number / Dessin numéro: TS – 3003

SHEET 1 OF 2

Ministry of the Environment

Central Region
Technical Support Section

5775 Yonge Street, 8th Floor
North York, OntarioM2M 4J1

Tel.: (416) 326-6700
Fax: (416) 325-6347

Ministère de l'Environnement

Région du Centre
Section d'appui technique

5775, rue Yonge, 8ième étage
North York, Ontario M2M 4J1

Tél. : (416) 326-6700
Téléc. : (416) 325-6347

Ontario

January 26, 2009

File: EA 05-03-05

Karin Wall, MCIP, RPP
AECOM
2000 Argentia Road, Plaza II, Suite 220
Mississauga, ON L5N 1V8

RE: **Lower Don Lands Infrastructure Municipal Class Environmental Assessment**
Waterfront Toronto
Master Plan
Technical Support Section Comments

Dear Ms. Wall:

The Ministry of the Environment (MOE), Central Region Technical Support Section has received your Notice of Commencement for the above noted Environmental Assessment (EA).

It is our understanding that this study involves creating a master plan for transportation, water/wastewater and stormwater for the Lower Don study area. This response acknowledges that the study is following the approved environmental planning process for a Master Plan project under the *Municipal Engineers Association Municipal Class Environmental Assessment* (Class EA).

Based on the information submitted, we have identified the following issues of concern with respect to the proposed undertaking:

- Ecosystem Protection and Restoration
- Surface Water
- Groundwater
- Dust and Noise
- Servicing and Facilities
- Contaminated Soils
- Mitigation and Monitoring
- Class EA Process
- First Nations Consultation

We are providing the following general comments to assist you and your project team members in effectively addressing these issues:

Ecosystem Protection and Restoration

- Any impacts to ecosystem form and function must be avoided where possible. The EA Document should describe any proposed mitigation measures and how project planning will protect and enhance the local ecosystem.

- All natural heritage features should be identified and described in detail to assess potential impacts and to develop appropriate mitigation measures. Our records confirm that the following sensitive environmental features are located within or adjacent to the study area:

  - Rare Species of flora or fauna
  - Watercourses

- We recommend consulting with the Ministry of Natural Resources (MNR), Fisheries and Oceans Canada (DFO) and your local conservation authority to determine if special measures or additional study will be necessary to preserve and protect these sensitive features.

Surface Water

- The EA Document must include a sufficient level of information to demonstrate that there will be no negative impacts on the natural features or ecological functions of any watercourses within the study area. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g. spills, erosion, and pollution) are mitigated as part of the proposed undertaking. The MOE Guideline B-6, *Evaluating Construction Activities Impacting on Water Resources* should be used to plan and construct this project.

- Additional stormwater runoff from new pavement can impact receiving watercourses and flood conditions. Quality and quantity control measures to treat stormwater runoff should be considered for all new impervious areas and, where possible, existing surfaces. MOE's *Stormwater Management Planning and Design Manual* (2003) should be referenced in the EA Document and utilized when designing stormwater control methods. We recommend that a Stormwater Management Plan should be prepared as part of the Class EA process that includes:

    - Strategies to address potential water quantity and erosion impacts related to stormwater draining into streams or other sensitive environmental features, and to ensure that adequate (enhanced) water quality is maintained
    - Watershed information, drainage conditions, and other relevant background information
    - Future drainage conditions, stormwater management options, information on erosion and sediment control during construction, and other details of the proposed works
    - Information on maintenance and monitoring commitments

Groundwater

- The status of, and potential impacts to, any well water supplies should be addressed. If the project involves groundwater takings or changes to drainage patterns, the quantity and quality of groundwater may be affected due to drawdown effects or the redirection of existing contamination flows. In addition, project activities may infringe on existing wells such that they must be reconstructed or sealed and abandoned. Appropriate information to define existing groundwater conditions should be included in the EA Document.

- If the potential construction or decommissioning of water wells is identified as an issue, the EA Document should refer to Ontario Regulation 903, Wells, under the *Ontario Water Resources Act*.

- Potential impacts to groundwater-dependent natural features should be addressed. Any changes to groundwater flow or quality from groundwater taking may interfere with the ecological processes of streams, wetlands or other surficial features. In addition, discharging contaminated or high volumes of groundwater to these features may have direct impacts on their function. Any potential effects should be identified, and appropriate mitigation measures should be recommended. The level of detail required will be dependent on the significance of the potential impacts.

- Any potential approval requirements for groundwater taking or discharge should be identified in the EA Document. In particular, a Permit to Take Water (PTTW) under the *Ontario Water Resources Act* will be required for any water takings that exceed 50,000 litres per day. A PTTW application must be accompanied by an assessment of potential effects as noted above, and may require a higher level of detail than what is provided in the EA Document. Please note that when significant long-term water taking is proposed, the maximum rate identified in the EA Document must not be exceeded in any subsequent PTTW applications. For more information on the application and approval process, we suggest you refer to the MOE *Permit to Take Water Manual* (April 2005).

Dust and Noise

- The EA Document should consider the potential impacts of increased dust and noise levels on residential or other sensitive land uses resulting from this project during construction and operation. The EA Document should explore all potential measures to mitigate significant noise impacts during the assessment of alternatives. If dust suppressants are proposed to be used, we recommend the use of non-chloride based compounds to protect water quality.

Servicing and Facilities

- Any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste must have a Certificate of Approval before it can operate lawfully. Please consult with the Environmental Assessment and Approvals Branch to determine whether a new or amended Certificate of Approval will be required for any proposed infrastructure.

- We recommend referring to MOE's "D-Series" guidelines – *Land Use Compatibility* to ensure that all applicable Ministry procedures are followed in planning for any infrastructure or facilities related to wastewater, pipelines, landfills or industrial uses.

Contaminated Soils

- If the removal or movement of soils may be required, appropriate tests to determine contaminant levels from previous land uses or dumping should be undertaken. If the soils are contaminated, you must determine how and where they are to be disposed of, consistent with *Part XV.1 of the Environmental Protection Act (EPA)* and Ontario Regulation 153/04, Records of Site Condition, which details the new requirements related to site assessment and clean up. We recommend contacting the MOE Toronto District Office for further consultation if contaminated sites are present.

- The location of any underground storage tanks should be included in the EA Document. Measures should be identified to ensure the integrity of these tanks and to ensure an appropriate response in the event of a spill. The MOE Spills Action Centre must be contacted in such an event.

- Any current or historical waste disposal sites should be identified in the EA Document. The status of these sites should be determined to confirm whether approval pursuant to Section 46 of the *Environmental Protection Act* may be required for land uses on former disposal sites.

- The EA Document should identify any underground transmission lines in the study area. The owners should be consulted to avoid impacts to this infrastructure, including potential spills.

Mitigation and Monitoring

- Design and construction reports and plans should be based on a best management approach that centres on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas.

- All waste generated during construction must be disposed of in accordance with MOE requirements.

- Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met. Mitigation measures should be clearly referenced in the EA Document and regularly monitored during the construction stage of the project. In addition, we encourage you to conduct post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly. The construction and post-construction monitoring plans should be documented in the EA Document.

Class EA Process

- There are several different approaches that can be used to conduct a Master Plan, examples of which are outlined in Appendix 4 of the Class EA. The EA Document should clearly indicate the selected approach for conducting the plan, in particular by identifying whether the levels of assessment, consultation and documentation are sufficient to fulfill the requirements for Schedule B or C projects. Please note that any Schedule B or C projects identified in the plan would be subject to Part II Order Requests under the *Environmental Assessment Act*, although the plan itself would not be.

- The EA Document should provide clear and complete documentation of the planning process in order to allow traceability of decision-making. It must also demonstrate how the consultation provisions of the Class EA have been fulfilled, including documentation of all public consultation efforts undertaken during the planning process. Additionally, it should identify all concerns that were raised and how they have been addressed throughout the planning process. You should include copies of any comments submitted on the project by interested stakeholders, and your responses to these comments.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment. The EA Document should include a level of detail (e.g. hydrogeological investigations, terrestrial and aquatic assessments) such that all potential impacts can be identified and appropriate mitigation measures can be developed. Any supporting studies conducted during the Class EA process should be referenced and included as part of the EA Document.

- Please include in the EA Document a list of all subsequent permits or other approvals that may be required for the implementation of the preferred alternative, including Permits to Take Water, Certificates of Approval or other ministerial approvals, approval under the *Canadian Environmental Assessment Act* (CEAA), and conservation authority permits.

- Please note that MOE guidelines and other information related to the issues noted above are available at www.ene.gov.on.ca under the publications link. We encourage you to review all the available guides and to reference any relevant information in the EA Document.

First Nations Consultation

- Please note that as part of the required stakeholder and agency consultation, you are advised to contact the Ministry of Aboriginal Affairs and the Department of Indian and Northern Affairs to determine potentially affected Aboriginal communities in the project area. Please refer to the website www.ene.gov.on.ca/envision/env_reg/ea/english/General_info/GRTList.htm for a list of appropriate government contacts.

- Once identified, you are advised to provide notification directly to the Aboriginal communities who may be affected by the project and provide them with an opportunity to participate in any planned public consultation sessions and comment on the project.

Submissions

- To facilitate the review of this project, please submit the following:
  - Copies of any PIC materials and handouts
  - A draft copy of the EA Document a minimum of 30 days prior to filing for initial comments
  - A copy of the Notice of Completion and final EA Document once completed

Thank you for the opportunity to comment on this project. Should you or any members of your project team have any questions, please feel free to contact me at 416-326-4839.

Yours truly,

Shannon McNeill
Environmental Resource Planner and EA Coordinator
Air, Pesticides and Environmental Planning

c. Rod Adams, Toronto District Office, MOE
Central Region EA File
A & P File

Toronto Port Authority
Administration Portuaire de Toronto

60 Harbour Street, Toronto, Ontario, Canada M5J 1B7
Tel/Tél: 416.863.2000 • Fax/Télécopieur: 416.863.4830 • www.torontoport.com

Kenneth Dion MSc
Senior Project Manager
Toronto and Region Conservation Authority
5 Shoreham Drive
Downsview, Ontario M3N 1S4
416-661-6600 ext. 5230
Fax: 416-667-6278

Dear Mr. Dion:

With regards to the Environment Assessment for the "Don Mouth Naturalization and Port Lands Flood Protection Project" that the Toronto Region and Conservation Authority is undertaking on behalf of Waterfront Toronto, please find below the concerns of the Toronto Port Authority.

1) Removal of the Hydraulic Function of the Keating Channel

The Keating Channel was purposely designed and built in the early 1900's for the capture of suspended particulate matter and floating debris. The design of the Keating Channel means that the majority of the dredging required for the harbour of the Toronto is done in the Keating Channel with no "delta" formation into the inner harbour. The dredgate is then transported by barge to the Leslie Street Confined Disposal Facility for approved disposal. There are more than 400 metric tonnes of floating debris that are annually removed from the Keating Channel and which are currently, easily managed, then dried on the adjacent working dockwall and finally removed. "Clamshell dredging" using the current equipment will not be possible with the construction of permanent bridges along the proposed new path of the lower Don River.

The proposed redesign of the lower Don River will need to address the issues of particulate control / removal, and floating debris management.

2) Introduction of the Don River to the Ship Channel

The Ship Channel is generally a closed system allowing for the safe and unimpeded movement of ship traffic. The addition of a "storm" overflow into the Ship Channel will potentially introduce several safety concerns.

The proposed redesign of the lower Don River will need to address the issues of particulate control / removal, floating debris management, and ship operational control with the introduction of a cross-current in the narrow channel.

3) Navigation within the Inner Harbour

With the introduction of new shoreline contours at the mouth of the Don River, commercial and recreational vessels will need to pay particular attention while in this area. The formation of a shallow "delta" area is probable and will require the addition of navigation aids, the updating of charts, and the education of boaters. Ships berthing at Berths 282-283 and 291-294 will need to exercise caution due to the new shoreline contours.

The proposed redesign of the lower Don River will need to address the issues of particulate control / removal, and safety / navigation of commercial and recreation boat traffic.

4) Introduction of Toxic Substances into the Harbour of Toronto

The new path of the lower Don River will disturb areas that were heavily used and polluted by the petro-chemical industry for decades. This could lead to the leaching of toxins in the harbour of Toronto.

The proposed redesign of the lower Don River will need to address the issues of the leaching of toxins into the harbour of Toronto.

5) Relocation of the Works Yard

The Keating Channel serves as the headquarters for the Toronto Port Authority's Works and Marine Services Department. All of the vessels that the Toronto Port Authority utilize for dredging, harbour debris management, the placement of navigational aids, and other tasks are berthed in the Keating Channel.

The proposed redesign of the lower Don River will need to address the issue of re-location of the Toronto Port Authority's Works and Marine Services Department and equipment.

6) Financial Impact on the Toronto Port Authority

The re-alignment of the lower Don River will also cease commercial shipping and cargo operations at Berths 351-358 and 361-368, and could negatively impact on operations around Berths 282-283, 291-294, 311, 412-416, 421, 455-456 and 461-465.

7) Ownership of Water Lots

The water lots within the Keating Channel and in the areas proposed for lakefilling and creation of new shoreline are under the ownership of the Toronto Port Authority. As such, it will be necessary to address the issue of interest in these waterlots.

8) **Environmental Assessment Obligations by the Toronto Port Authority**

The Toronto Port Authority is subject to the specific requirements of the *Canada Port Authority Environmental Assessment Regulations* with respect to federal environmental assessments. Under the present federal act and regulations, the proposed project is not likely to trigger the requirement of an assessment under the Canada Port Authority regulations. However, there are other regulations, authorizations and licences from the Toronto Port Authority which this project may be subject.

Authorization will be required by the Toronto Port Authority, under *Port Authorities Operations Regulations* to the Canada Marine Act, to divert the flow of a river or stream, cause or affect currents, cause silting or the accumulation of material or otherwise reduce the depth of the waters of the port. This authorization would require due diligent considerations of the proposed work and the Toronto Port Authority would require a proponent for such work to undertake an environmental impact study to address the Port Authority's concerns.

From the cursory description of the proposed project, it appears that it will also be subject to authorization by the Toronto Port Authority for construction works over, or in, the water. This authorization will review several aspects of this project under our jurisdiction during the construction phase and deal with issues such as navigation; environmental protection of the waters of the port and harbour of Toronto; and, marine security and safety.

In summary, although the Toronto Port Authority is not a Responsible Authority as defined in the Canadian Environmental Assessment Act, it is in possession of specialist or expert information and knowledge that is necessary to conduct the environmental assessment of the project. It has an interest in the project and would like to be kept informed throughout the environmental assessment process and in order to properly assess authorization application.

Should you have any questions, please do not hesitate to contact us.

Yours very truly,

Toronto Port Authority
per:

Angus Armstrong
Harbour Master

cc: Mr. K. A. Lundy, P.Eng.; Toronto Port Authority

April 9, 2009 CFN 40670

BY MAIL AND EMAIL (bwebster@waterfrontoronto.ca)

Ms. Brenda Webster
Waterfront Toronto
20 Bay Street, Suite 1310
Toronto, Ontario, M5J 2N8

Dear Ms Webster:

Re: Response to the Draft Lower Don Lands Infrastru[illegible] Master Plan [illegible] the Draft Keating Channel Precinct Plan
Lower Don Lands Municipal Class EA and K[illegible]g North Precinct Plan
Municipal Cass Environmental Assessme[illegible]chedule C
Waterfront and Don River Watershed, City [illegible]ronto

TRCA staff received the draft Lower Don Lands Infrastructu[illegible] Plan and the draft Keating Channel Precinct Plan on March 13, 2009. The pu[illegible]e of this letter is [illegible]ovide Waterfront Toronto with our comments on the both draft plans.

Staff understands that Waterfront Toronto is [illegible]elopi[illegible]mework [illegible] for the study area, a Master Plan for Municipal Infrastructure (including tra[illegible]ortation[illegible] wastew[illegible] and stormwater), and a Precinct Plan for the first ph[illegible]e develop[illegible]t.

TRCA staff has compl[illegible]e review[illegible]he draft p[illegible] and have identified several key concerns presented in Comm[illegible]1 of Append[illegible]. Other de[illegible]d comments are provided in Appendix A. Staff are available to disc[illegible]these comm[illegible] with you in [illegible]ter detail. In your next submission, please provide a cover letter [illegible] outlin[illegible] of our c[illegible]ments have been addressed using the numbering scheme prov[illegible] have any questions, please contact me at extensio[illegible] email [illegible]iston@trca.on.[illegible]

You[illegible]ly,

Beth W[illegible]on, H. BA, MCIP, [illegible]
Manager, [illegible]ironmental Asse[illegible]nents
Planning an[illegible]velopment

BY EMAIL

cc:	Waterfront T[illegible]	Raffi Bedrosyan (rbedrosyan@waterfrontoronto.ca)
	City of Toronto	Jamie McEwan (jmcewan@toronto.ca)
	MVVA	Liz Silver (esilver@mvvainc.com)
	TRCA	Carolyn Woodland, Director, Planning and Development
		Adele Freeman, Director, Watershed Management
		Deb Martin-Downs, Director, Ecology
		Steve Heuchert, Manager, Development Planning and Regulation
		Ken Dion, Senior Project Manager, Lower Don
		Don Haley, Senior Project Manger, Engineering
		Renée Afoom, Planner II, Environmental Assessments

	the channel up to the top of bank in the Don Narrows from the CN Railway – Kingston Crossing up to Riverdale Park. b. Page 2-12 Section 2.7: Paragraph 5 – Sentence 3 – The Keating Channel is re[illegible]d but cut off from the redirected river mouth flows ***during normal conditions***. c. Page 2-12: Second to last paragraph - The preferred alternative is DRA[illegible] d. Page 2-13 Section 2.7: Paragraph 3 – "…protection features, and s[illegible]ent, [illegible] ***and*** debris management,…." e. Page 2-13. The report should create a new section 2.8 regard[illegible] [illegible]RCA's Valley a[illegible] [illegible]eam Corridor Management Program, especially with respect to ideal buff[illegible] [illegible]m valley top of bank [illegible] Regulatory Flood plus 0.5m and 10m structural development setba[illegible]	
Draft LDL Infrastructure Master Plan: Section 3:		
3.	a. Page 3-15, Section 3.3(a), should also note that existing in[illegible]ructur[illegible] [illegible]ot in the right place to accommodate sediment control facility and other infrastructu[illegible] [illegible] to support realigned mouth of Don River.	
Draft LDL Infrastructure Master Plan: Section 4:		
4.	a. Page 4-19 – Fish Community – Paragraph 1: [illegible]CA [illegible] [illegible]tensive add[illegible] [illegible]l fish records for Keating and Don River since 2003. b. Page 4-21 – Tables 4-2 and 4-3 – TRCA – AECO[illegible] [illegible]ENES [illegible] [illegible]de this [illegible] information. c. Page 4-21 – Vegetation Comm[illegible] [illegible] Paragraph [illegible] Ca[illegible] [illegible]whe[illegible] [illegible] the number of vegetation communities for the area. [illegible] [illegible]ourc[illegible]s of the r[illegible] [illegible] area in the [illegible]ource report likely extends greatly beyond the limits [illegible]e LDL Stu[illegible] [illegible]rea (ie. L[illegible] Ontario Park, Don Valley up to Riverdale Park, TTP, Toronto Isl[illegible]). Ensure wh[illegible] [illegible]eferencing [illegible] of communities that the #'s are representative of the s[illegible] [illegible]area. d. Page 4-22 – Flora & Wild[illegible] [illegible]esourc[illegible] [illegible]ommen[illegible] Vegetation Communities. e. Page 4-23 – Landscape Co[illegible] [illegible] Paragra[illegible] [illegible]ould be "Lower Don River West Remedial Flood Prote[illegible] [illegible]t" or LD[illegible] This section sho[illegible] also indicate that the DMNP EA will improve terrestri[illegible] [illegible]aquati[illegible] [illegible]tat co[illegible] [illegible]ns at the mouth of the Don, and the instream aquatic habitat condi[illegible] within the Do[illegible] [illegible]rows, [illegible]h should improve linkages with the Don Valley and ORM. f. Pag[illegible]5 – Flooding – "…. [illegible] spill to [illegible] extent that the valley allows." There is no valley south of Queen [illegible]et. It is essentially [illegible]oad, w[illegible] low-lying expanse of lakefill, possessing no valley containme[illegible] [illegible]f the Regulatory [illegible]d. The FPL being constructed to the west of the Don, north of the CN Kingston [illegible]division will ess[illegible]ially extend the valley wall southward to the CN elevated tracks. This is currentl[illegible] [illegible]yet complet[illegible] The intent of the DMNP EA is to construct a new containing valley system that will c[illegible] [illegible] up to [illegible]Regulatory Flood in the Don out to the Inner Harbour. g. Page 4-25 – Water [illegible] [illegible] Paragraph: The worst water quality in the Ship Channel is located near the CSOs in the T[illegible] Basin. Adjacent to the LDL Study area, particularly near Cherry St crossing, water quality is not nearly so poor in the Ship Channel. h. Figure 4-2: Should be corrected for parcel 333 – Bunge which is now in TWRC ownership.	

	x. Page 4-67 – Bicycle Network – 2nd paragraph: Proposed off-road route on Lake Shore east of Don River, is an existing bike route and has been for several years. Not sure about Carlaw. It should be confirmed which routes have been established since the 2001 Study. y. Page 4-67 – Heavy Rail – last sentence: There are two rail yards immediate[illegible] of Lake Shore Blvd area. The more northerly is owned by GO Transit (called the Don Yard) i[illegible] exclusively by GO Trains during the off-peak hours during the late-morning and early afte[illegible] he second yard is called the Wilson Yard, which is owned by TEDCO. It is understood [illegible] GO [illegible] it is interested in acquiring the Wilson Yard. TRCA is not aware whether that transa[illegible] has gone [illegible] ugh, however in 2008, it was observed that TEDCO was investing heavily in up[illegible] g the railbed a[illegible] ils of the Wilson Yard. Previously, it was used as temporary storage [illegible] ght cars. z. The Kingston Subdivision (CN's east west line) is a comb[illegible] n of GO Transit, freight a[illegible]. The Bala Subdivision (GO Transit) and Belleville Subdivisio[illegible]) travels east from Union Statio[illegible] n north along the west bank of Don River. Bala is primarily [illegible] zed by G[illegible] s with occasional [illegible] ght trains along the Belleville Subdivision. TRCA can provide a [illegible] iled [illegible] y study for the area. aa. Page 4-68 – Heavy Rail – Paragraph 2: The railway spur to R[illegible] oes not have 10 trains per week – that spur is currently only used to store R[illegible] h Sugar freight [illegible]. The Spur coming from the CN Kingston Subdivision and down across to t[illegible] le of the Don [illegible] and into the Keating Yard has the 10 trains per week. Currently, these trains [illegible] to [illegible] idge's Bay [illegible] ment Plant, and two other operators in the Port Lands. bb. Page 4-68 – Heavy Rail – Last sentence: Some [illegible] e spurs [illegible] rt Lan[illegible] within the study area have been recently decommis[illegible] e. along th[illegible] on R[illegible] way [illegible] Ship Channel and then west along the Ship Channel) . [illegible] nap [illegible] own is ou[illegible] cc. Figure 4-25: LLI has bee[illegible] gned sou[illegible] hrough th[illegible] est Don Lands but reconnects to original alignment before cros[illegible] he river. dd. Page 4-78 – first parag[illegible]: Should inc[illegible] discussion [illegible] the underground oil-filled pipes cross over the Don on a utility bridge [illegible] ween t[illegible] on cros[illegible] and the transformer substation on the west side of the Don. The u[illegible] pipes [illegible] uth on the east bank of the Don along the Don Road[illegible] ome o[illegible] derground cables also veer to the north of the utility bridge on the west[illegible], and tr[illegible] unde[illegible] elevated CN tracks. (Marko can provide the specific names of the tr[illegible] mer station, n[illegible] er of c[illegible], and alignment). The DMNP EA identifies that the utility brid[illegible] l need to be remo[illegible]. The D[illegible] P EA currently assumes that the hydro substation will remain [illegible] ace, though this m[illegible] change [illegible] e DMNP EA progresses. ee. Page 4-79 [illegible] eology: There is [illegible] e information available soon on the location of bedrock. There are also aband[illegible] and decommis[illegible] ed oil pipelines up the Don Roadway and DVP, Lake Shore Blvd and Commissio[illegible], as well as [illegible] nsive functioning utilities throughout the entire area.	
Draft LDL Infrastructure Master [illegible] Secti[illegible]		
5.	a. Regarding the crossi[illegible] herry Street, Lake Shore Boulevard, Commissioners Street, Keating Channel, Trinity Street, [illegible] Basin Street, the evaluation of alternatives must include confirmation that all preferred alternatives are capable of providing crossings over the Don River, Keating Channel or	

DRAFT

be lowered to allow for flood conveyance between the CN bridge and Lake Shore - raising the Don Roadway north of Lake Shore is not a viable option.

m. The DMNP EA has identified a need for a flood protection landform to be con[illegible]ed east of the Don Roadway between Lake Shore Boulevard and the elevated CN railway em[illegible]ent. This may have implications on grading, infrastructure, etc...

n. On page 5-99, Table 5.2 Evaluation Criteria: the Natural Environmen[illegible]udes consistency with the DMNP EA. However, there is no discussion as to what tha[illegible]ans. T[illegible]ecific issues related to the DMNP EA related to transportation have been ide[illegible]ed in the poin[illegible]ve. Those specific conditions (criteria) must be met in order for an alte[illegible] to be considere[illegible]er in the LDL Class EA.

o. Page 5-85: Consideration of Other Processes: The EA [illegible]ed on the assumption that the [illegible]rdiner remains in place. What accommodation has been ma[illegible] allow for th[illegible]rdiner to come d[illegible]?

p. Page 5-92: Features of Alternative Solutions: Add "e) 2-14[illegible]derg[illegible] slurry conveyance pipes with vertical risers every 100m along the west side of the Do[illegible]y". There should be some mention that TEDCO is also undertaking a [illegible] of the Don Roa[illegible] as it relates to the needs for the Film Port build out.

q. Section 5.2.3 Evaluation of Alternatives:

- For all street crossings over water bodie[illegible] is not c[illegible] to how [illegible]arious alternatives stack up to the specific [illegible]ia for the D[illegible] EA. [illegible] specific discussion is required for each cr[illegible]
- There is no disc[illegible] on the [illegible] Street B[illegible]e over the Keating Channel.
- There is no di[illegible]sion on the ne[illegible] to accom[illegible]date pipes along the Don Roadway.

Draft LDL Infrastructure Master Plan: [illegible]tion 6:

6.

a. Page 6-111 – Table Main [illegible]ia: [illegible]t sh[illegible]ld include more specific conditions to be in conform[illegible] DMNP [illegible] example: in[illegible]ure crossings of the naturalized areas should b[illegible] that re[illegible] maintenance, replacement and/or upgrades of the infrastructure will n[illegible]

- require future d[illegible]bance [illegible]turalized areas, flood and ice jam protection infrastructure, and sediment an[illegible]bris ma[illegible]ement infrastructure,
- [illegible]ce underground [illegible]astructure in possible sediment management areas (where [illegible]ing will occur) [illegible]r
- incr[illegible] the risk o[illegible]osing any underlying contaminated soils and groundwater to the natura[illegible] envi[illegible]ent above.

b. Page 6-117 – Qualify[illegible]itions: No discussion of possible utilidors or comparable technology/approach to [illegible]dress the DMNP EA criteria for infrastructure crossings above.

c. Page 6-118 – Constraints for Waste Water (as above in Page 6-111)

	infrastructure setback. d. Section 9: Master Plan – discussion of the road and infrastructure components should include the compliance with DMNP EA conditions, including the proposed slurry conve[illegible] system that is required. e. Figure 9-9, 9-10 and 9-11 should be labeled.	
Draft Keating Channel Precinct Plan		
9.	a. Page 11 - Should also reference TRCA Valley and Stream Corridor Manageme[illegible]ogram as a defining policy to address in the Precinct Plan. b. Page 15 - Proposal to narrow Keating Channel in the eas[illegible] fill with large revetme[illegible] not been modeled through DMNP EA at this time. Hydraulic m[illegible]g confirmation is required [illegible] ensure whether such actions are appropriate. Preliminary a[illegible]sment sugges[illegible] given the anticip[illegible] flow velocities through the Keating Channel up to the Regul[illegible] Flood, i[illegible]d require revetme[illegible]o have a mean diameter of 1.5m to remain stable (which is [illegible]ired [illegible]sure dockwalls do not fail under flood events). c. Page 15 - Recommendation that the reve[illegible]lacements in K[illegible]g Channel provide more irregular side slopes (cross-sectionally) an[illegible]re meander[illegible]rm other than a submerged V-shaped configuration in planform within K[illegible]ng C[illegible] This reco[illegible]ndation is subject to the DMNP EA hydraulic modeling results as to w[illegible]er this i[illegible] or not. d. Page 23 - Again discuss in m[illegible]tail specific [illegible]uire[illegible] of [illegible] Valley and Stream Corridor Management Program. e. Page 28 - Figure 21 - [illegible] our disc[illegible]on, these [illegible] splits have not yet been confirmed by both modeling teams. R[illegible]mend more [illegible]hic depict[illegible] of relative flow split values - would not want to be held to such h[illegible]'s at this tim[illegible] f. Page 32 - Figure 24 - N[illegible]ourh[illegible] passi[illegible]awn space in sediment and debris management area - that s[illegible]hanged - [illegible]ctive industrial yard. g. Page 3[illegible]C24 - l[illegible]d in area where Keating Channel is proposed to be filled towards the e[illegible]he viability [illegible] has n[illegible]een confirmed through the hydraulic models for the DMNP EA. h. Pa[illegible]5 and 40 - Figures [illegible]nd 38 [illegible]een wetland area shown north of the weir upstream of Lake Sho[illegible] not appropriate - [illegible] is part [illegible] sediment management area. Similarly, eastern portion of Bloc[illegible] or KC24) has not [illegible]n determined to be viable hydraulically (as per comments on Page 33) i. Page 38 - Fig[illegible]32 - Ice she[illegible] in Keating Channel would likely destroy proposed light standards in the water. P[illegible]ed wa[illegible]rea in Keating Channel is problematic. Concrete would be prone to algae and zebr[illegible]wth (forming slippery and or sharp conditions). Lack of a railing in the water, sharp 5m [illegible] would represent a public safety hazard. j. Page 39 - Second paragraph - comments Lake Shore below Gardiner as a grand public space - Contingent on Gardiner remaining. Should this offer only one idea given uncertainty of the Gardiner	

	q. Page 61 - Recommend adding details of the sediment and debris management infrastructure components (as referenced from the DMNP EA). r. Page 65 - First Paragraph - Text states that land use west of Cherry and no[illegible] Keating Channel is not influenced by DMNP EA, assuming that the Preferred Alternative is a[illegible]ed as anticipated. This is not quite true. Development of this area, still must conform wit[illegible]ydraulic conveyance clearance issues for all crossings, must meet the structural/in-wate[illegible]onveyance impediment issues required by the DMNP EA, and must have ade[illegible]te grad[illegible] ensure remains outside of the SPA. In the second paragraph, these conditio[illegible]ust also be m[illegible] areas east of Cherry Street in the Keating Channel. Also, stormwater ma[illegible]directed (if applica[illegible] to the Keating Channel to assist in ensuring that water quality [illegible]rculation objectives are [illegible] s. Page 66 - Municipal Planning Approvals - TRCA perm[illegible]quired.	

Latimer, Corinne

From: Finan, Haya [FINANHA@tc.gc.ca]
Sent: Wednesday, August 06, 2008 11:16 AM
To: Lower Don
Subject: Lower Don Lands Municipal Class EA and Keating North Precinct Plan Class EA - TC NEATS 13676
Attachments: Annex A Navigable Waters Protection Act Application Addresses.doc; TC Application Form.pdf; TC Application Guide.pdf

Thank you for your letter regarding the above referenced environmental assessment.

We have reviewed the information, and note the following:

Transport Canada is responsible for the administration of the Navigable Waters Protection Act, which prohibits the construction or placement of any "works" in navigable waters without first obtaining approval. If any of the related project elements or activities may cross or affect a potentially navigable waterway, you are requested to prepare and submit an application in accordance with the requirements as outlined in the attached Application Guide. Any questions about the NWPA application process should be directed to Kelly Thompson, NWP Officer at (519) 333-6330.

Please note that certain approvals under the Navigable Waters Protection Act or Railway Safety Act trigger the requirement for a federal environmental assessment under the Canadian Environmental Assessment Act. You may therefore wish to consider incorporating CEAA requirements into your provincial environmental assessment.

<<Annex A Navigable Waters Protection Act Application Addresses.doc>> <<TC Application Form.pdf>> <<TC Application Guide.pdf>>

Please contact me should you wish to discuss this further.

Regards,
Haya Finan
Environmental Officer
Environment and Engineering
Transport Canada - Ontario Region (PHE)
4900 Yonge Street, North York, ON M2N 6A5
p: 416-952-0475
f: 416-952-0514
e: finanha@tc.gc.ca
P Please consider the environment before printing this email.

Annex A Navigable Waters Protection Act Application Addresses

To apply for approval of works or for additional inquiries about the Navigable Waters Protection Act or Program, please contact the appropriate office below.

NWP Regional Office - South Western Ontario

Navigable Waters Protection Program
100 Front Street South,
Sarnia, ON N7T 2M4

NWPA Prescott Office - Eastern Ontario

Navigable Waters Protection Program P.O. Box 1000
401 King St. W
Prescott, ON K0E 1T0

NWPA Parry Sound Office - North Eastern Ontario

Navigable Waters Protection Program
28 Waubeek St.
Parry Sound, ON P2A 1B9

NWPA Kenora Office - North Western Ontario

Navigable Waters Protection Program P.O. Box 649
1100 3rd Ave. S
Kenora, Ontario P9N 3X6

NWP Winnipeg Office - Manitoba

Navigable Waters Protection Program Freshwater Institute
501 University Crescent
Winnipeg, MB R3T 2N6

NWP Prince Albert Office - Saskatchewan

Navigable Waters Protection Program
125 - 32nd Street West
Prince Albert, SK S6V 7H7

NWP Edmonton Office - Alberta

Navigable Waters Protection Program
4253 - 97th Street
Edmonton, AB T6E 5Y7

Navigable Waters Protection Act
Request for Project Review

Is this the first time you are requesting a review for this project?

Yes ☐ No ☐

[illegible]

Name of Proponent/Owner:		
Mailing Address:		
Street Address (if different than above):		
City/Town:	Province/Territory:	Postal Code:
Tel. No. (Residence):	Tel. No. (Work):	Tel. No.: (Other)
Fax No:	E-mail Address:	
Name of Contractor/Agency/Consultant (if applicable):		
Mailing Address:		
Street Address (if different than above):		
City/Town:	Province/Territory:	Postal Code:
Tel. No. (Residence)	Tel. No. (Work):	Tel No. (Other)
Fax No:	E-mail Address:	

[illegible]

Name of Nearest Community (*City, Town, Village*):	Municipality / District / County:
Legal Description (Lot, Concession, Township, Section, Range):	Name of Primary Watercourse (River, Lake, Bay)
Access Road to Proposed Work Site (e.g., *route number, highway series number or street name/number if urban area, etc.)*	
Topographic/Chart No. (if applicable)	Water lot Lease or Permit (if applicable)
Description of shoreline, if applicable *(i.e., ground type, vegetation, slope, other) Note: Enclose photographs:*	Description of watercourse *Note: Enclose photographs:*
Average width and depth of waterway at the project site:	Type of navigation (recreational/commercial):

[illegible]

What is the proposed project? *(dock, dam, bridge, aquaculture site, etc.)* Note: Detailed description of work must be attached.	
Proposed Start Date:	Proposed Completion Date:
Status of the Project (circle): New Existing Addition Repair	Is the work permanent or temporary?

[illegible]

Attach the following documents/information:

- Detailed project description with construction schedule
- Detail of any temporary works and method of construction activities
- Property ownership status (if you are not the owner, attach a letter of permission from the owner)
- Map or chart to show location of project (6 copies)
- Sketch or drawing of project, including side and top view and showing dimensions of the project (6 copies)
- Survey plan or sketch with dimensions indicating the location of existing buildings, shoreline structures, property lines, high and low water marks, and adjacent properties
- Current photographs of the proposed work site (photos of open water period where possible)
- A list of any equipment that may be used during the project

Date:	**Signature:**

[illegible]

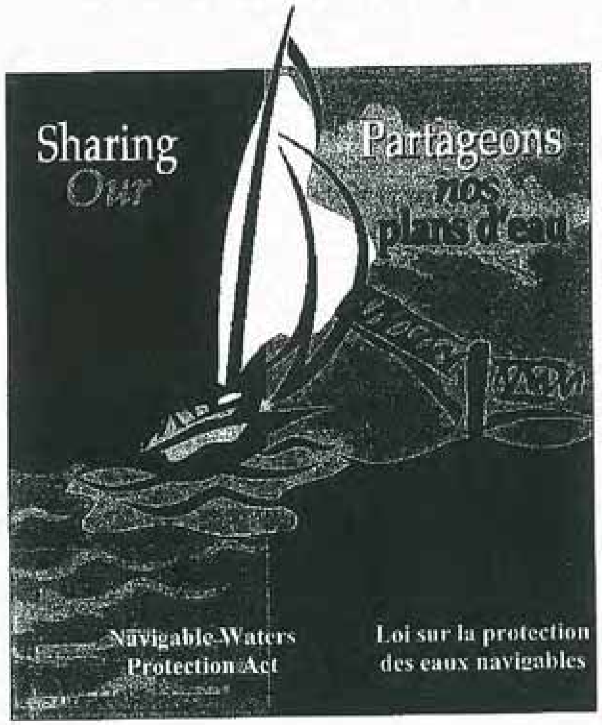
Transport Canada
Marine

Transports Canada
Maritime

Ontario Region
&
Prairie & Northern Region

NAVIGABLE WATERS PROTECTION ACT

APPLICATION GUIDE



Navigable Waters Protection
201 Front Street North
Suite 703
Sarnia, Ontario, N7T 8B1

Phone (519) 383-1865 Fax (519) 383-1989

Canada

APPLICATION GUIDE CHECKLIST

Before returning your application form, the following **must** be included otherwise your application will not be processed:

- ☐ Name of property owner & description of the project site
- ☐ Complete mailing address of the property owner
- ☐ Plot or survey plan with project shown & adjacent landowners
- ☐ Map or chart with arrow to show location of project
- ☐ Plan view of the project (with dimensions)
- ☐ Side view of project (with dimensions)
- ☐ Location for disposal of dredge spoils (if applicable)
- ☐ Name of the contractor/firm doing the work (if applicable).

APPLICATION GUIDE

INTRODUCTION

The Navigable Waters Protection Act (NWPA) revised Statutes of Canada, 1985, is one of the oldest pieces of federal legislation. It first became law on May 17, 1882. The principle objective is to protect the public right of navigation by prohibiting the building or placement of any "work" in, upon, over, under, through, or across a navigable water without the authorization of the Minister of Transport. The jurisdiction of the legislature begins at the high water mark. Therefore structures that are between low and high water marks will require approval under the NWPA. The administration of the NWPA was recently transferred to Transport Canada.

Important Notice

An approval granted by the Minister is neither a general approval of construction nor an authorization in respect of any law, excepting the Navigable Waters Protection Act. An authorization may also be required from the Minister under the Fisheries Act; you should contact the Department of Fisheries & Oceans for such a determination. In addition, contact should also be made with local municipal, provincial and other government offices to determine if other approvals will be required for the proposal.

What is a Navigable Waterway?

A navigable water is any body of water capable of being navigated by floating vessels of any description for the purpose of transportation, commerce or recreation. This includes both inland and coastal waters. The authority to determine the navigability of a waterway and consequently the requirement for an application under the NWPA, rests with the Minister of Transport or his/her designated representative.

Examples of Some Types of "Works" Requiring Authorization

- any bridge, boom, dam, causeway, wharf, dock, boathouse, intake, outfall, etc.;
- dredging; dumping of fill, retaining wall, groyne, breakwater;
- submarine or overhead cables, tunnel, pipeline;
- aquaculture facilities;
- any other device, structure, or thing whether similar in character to the above or not.

Permit Process

There are basically two types of processes followed in reviewing an application under the Act:

- **Formal Approval**
  The formal approval process is followed when NWPA officials determine that your work or project poses a substantial interference with navigation. Under the requirements of the Act all bridges, booms, dams, and causeways must be processed by formal approval.

- **Letter of Exemption**
  The exemption process is followed when NWPA officials determine that your work or project does not pose a substantial interference with navigation.

How to Make an Application

1. Application Form - Complete, sign and date the enclosed application form.

2. Site Location - Obtain 6 copies of a map or topographic chart of your area. Please include enough details to simplify the location of the proposed project. If not already shown, add the following:

- Name of the waterbody in which the project is located;
- Location of the proposed project (draw an arrow showing the exact location of the site on the map);
- Approximate latitude and longitude of the project

3. Plot Plan - One (1) copy of your plot or survey plan, showing adjacent property owners (include names), with the location of the proposed work clearly indicated.

4. Plan View (6 copies) - The plan view shows the proposed project as if you were looking straight down on it from above. Provide these drawings, to scale or dimensioned, containing sufficient detail to clearly show your proposed project, including:

- Any existing works presently on your property or adjacent properties such as docks, slipways, breakwaters etc.;
- Existing shorelines;
- Dimensions (length, width, etc.) of the project All dimensions should be from the ordinary high water mark.. See sample sketches for further details;
- Average water depth around the project;
- Scale of drawing.
- North arrow.

5. Profile View or Section View (6 copies) - The profile view is a scale drawing that shows the side, front, or rear of the proposed structure as it would look if you were standing to the side of it; the section view is a scale drawing that shows the proposed structure as it would look if sliced internally for display. Clearly show the following:

- Dimensions of the project, including width, height etc. See the sample sketches for further details;
- The ordinary high water mark (O.H.W.M.) and high water mark (H.W.M.);
- Existing and proposed ground contours;
- Height above the bed of the waterway;
- The type of construction material to be used;
- Scale;

Other information

a) If any information is missing, your application may be delayed; therefore please ensure that your application, plans, etc. are complete.

b) Please be advised that it is recommended that applications for approval under the NWPA be made well in advance of the anticipated start-up date, to allow Coast Guard officials to do a complete investigation and possible environmental assessment of your project, which may take several months.

c) Advise whether you have received or applied for a waterlot lease or permit, and if so, with whom you have applied and when.

d) Provide a proposed construction schedule, advising when you plan on starting the project.

e) If you are not the upland owner, provide the owners consent in writing.

f) Provide an environmental assessment or study if one has been prepared.

Where to Make an Application

In accordance with the map below, please submit applications for approval to the addresses listed on Annex A "Navigable Waters Protection Act Application Addresses".

Ontario Region & Prairie & Northern Region
NWP PROGRAM – AREA OFFICES

Latimer, Corinne

From: Info [info@waterfrontoronto.ca]
Sent: Monday, May 26, 2008 4:26 PM
To: Brenda Webster
Cc: Lower Don
Subject: FW: Notice of Study Commencement - Lower Don Lands Municipal Class EA and Keating North Precinct Plan
Attachments: Lower Don_ EG NOTES.pdf; Full page fax print_EG.pdf; TSSA booklet.pdf; 1 2007- 2008 CG.034.612.Third Party Requirements in the Vicinity of Natural Gas Facilities.pdf; pic18467.jpg; pic06334.gif; pic26500.jpg; pic19169.gif; Lower Don Lands Study Area Map.JPG

-----Original Message-----
From: Diana Beaulne [mailto:Diana.Beaulne@enbridge.com]
Sent: Wednesday, April 23, 2008 2:07 PM
To: Info
Subject: Fw: Notice of Study Commencement - Lower Don Lands Municipal Class EA and Keating North Precinct Plan

(See attached file: Lower Don_ EG NOTES.pdf)(See attached file: Full page fax print_EG.pdf)(See attached file: TSSA booklet.pdf)(See attached file: 1 2007-2008 CG.034.612.Third Party Requirements in the Vicinity of Natural Gas Facilities.pdf)

Attached is your completed Enbridge Markups for the project noted above.
Regards,

Diana Beaulne
Markup Administrator
Enbridge Gas Distribution Inc.
500 Consumers Rd
4th, Floor, Post A2, VPC
North York, Ontario
M2J 1P8

Tel: 416-495-5520
FAx: 416-758-4373

markups@enbridge.com

utilitycirculations@enbridge.com

Diana Z. Beaulne
Markup Administrator
Enbridge Gas Distribution Inc.
500 Consumers Rd.
North York, Ontario
M2J 1P8

diana.beaulne@enbridge.com
Tel # 416 495-5520
Fax# 416 758-4373

----- Forwarded by Diana Beaulne/GAS/Enbridge on 04/23/2008 02:06 PM -----

Diana
Beaulne/GAS/Enbridg
e
04/11/2008 08:18 AM

To
mark-ups@enbridge.com

cc

Subject
Fw: Notice of Study Commencement - Lower Don Lands Municipal Class EA and Keating North Precinct Plan

Diana Z. Beaulne
Markup Administrator
Enbridge Gas Distribution Inc.
500 Consumers Rd.
North York, Ontario
M2J 1P8

diana.beaulne@enbridge.com

Tel # 416 495-5520
Fax# 416 758-4373

----- Forwarded by Diana Beaulne/GAS/Enbridge on 04/11/2008 08:18 AM -----

Michael McGivery/GAS/Enbridge
04/11/2008 08:16 AM

To: Diana Beaulne/GAS/Enbridge@Enbridge
cc:
Subject: Fw: Notice of Study Commencement - Lower Don Lands Municipal Class EA and Keating North Precinct Plan

Thanks Diana!

Michael McGivery
Supervisor, Special Projects
Distribution Planning
Cell: 416-434-7920
Office: 416-495-5065
Pager: 416-347-5753
Fax: 416-758-4374

michael.mcgivery@enbridge.com

----- Forwarded by Michael McGivery/GAS/Enbridge on 11/04/2008 08:16 AM -----

"Info" <info@waterfrontoronto.ca>
04/04/2008 11:49 AM

To: "Info" <info@waterfrontoronto.ca>
cc:
Subject: Notice of Study Commencement - Lower Don Lands Municipal Class EA and Keating North Precinct Plan

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(Embedded image moved to file: pic06334.gif)

Notice of Study Commencement - Lower Don Lands Municipal Class EA and Keating North Precinct Plan

April 3, 2008

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Waterfront Toronto (formerly Toronto Waterfront Revitalization Corporation) and the City of Toronto, as co-proponents, are undertaking a study that integrates the Municipal Class Environmental Assessment (Class EA) process with the Precinct Planning process, in the Lower Don Lands area.
A Master Plan will be developed for transportation (including transit), water/wastewater and storm water management in the Lower Don Lands Area, in accordance with the Municipal Class EA 2000, as amended in 2007 (Phases 1 and 2). The Lower Don Lands study area is shown on the above plan and is generally bounded by the Don rail yard and Gardiner Expressway on the north, the Parliament Street slip on the west, the shipping channel on the south and Don Road on the east.
After the Master Plan is completed, the study will continue with Phases 3 and 4 of Municipal Class EA process in the Keating North Precinct area. The Schedule "C" Class EA for this area will be integrated with the Precinct Planning process in accordance with the Planning Act and Section A.2.9 of the Municipal Class EA. The Keating North Precinct area as shown on the above plan is generally bounded by the Don rail yard and Gardiner Expressway on the north, Parliament Street Slip on the west, Keating Channel on the south and the Don Road/Don Valley Parkway on the east.

The Lower Don Lands study area includes the Don Mouth Naturalization EA study area and will incorporate the outcome of that separate EA, which is currently underway. This study also replaces the Queens Quay EA Extension and Port Lands Transit EAs that were previously initiated by Waterfront Toronto.

Public consultation is a key component of this study. The proposed consultation plan provides for public forums at multiple points in the study. Further advertisements will be posted when public forum dates are scheduled.

During the Class EA and as part of the planning process, Waterfront Toronto and the City of Toronto will be collecting comments and information regarding this project from the public in accordance with the requirements of the Ontario Environmental Assessment Act and the Planning Act.

If you wish to receive further information or would like to be added to the project mailing list, please contact:

Andrea Kelemen
Waterfront Toronto
20 Bay Street, Suite 1310
Toronto, ON M5J 2N8
Telephone: (416) 214-1344 ext. 248
Fax: (416) 214-4591
Email: lowerdon@waterfrontoronto.ca
Website: www.waterfrontoronto.ca

To unsubscribe please click here.

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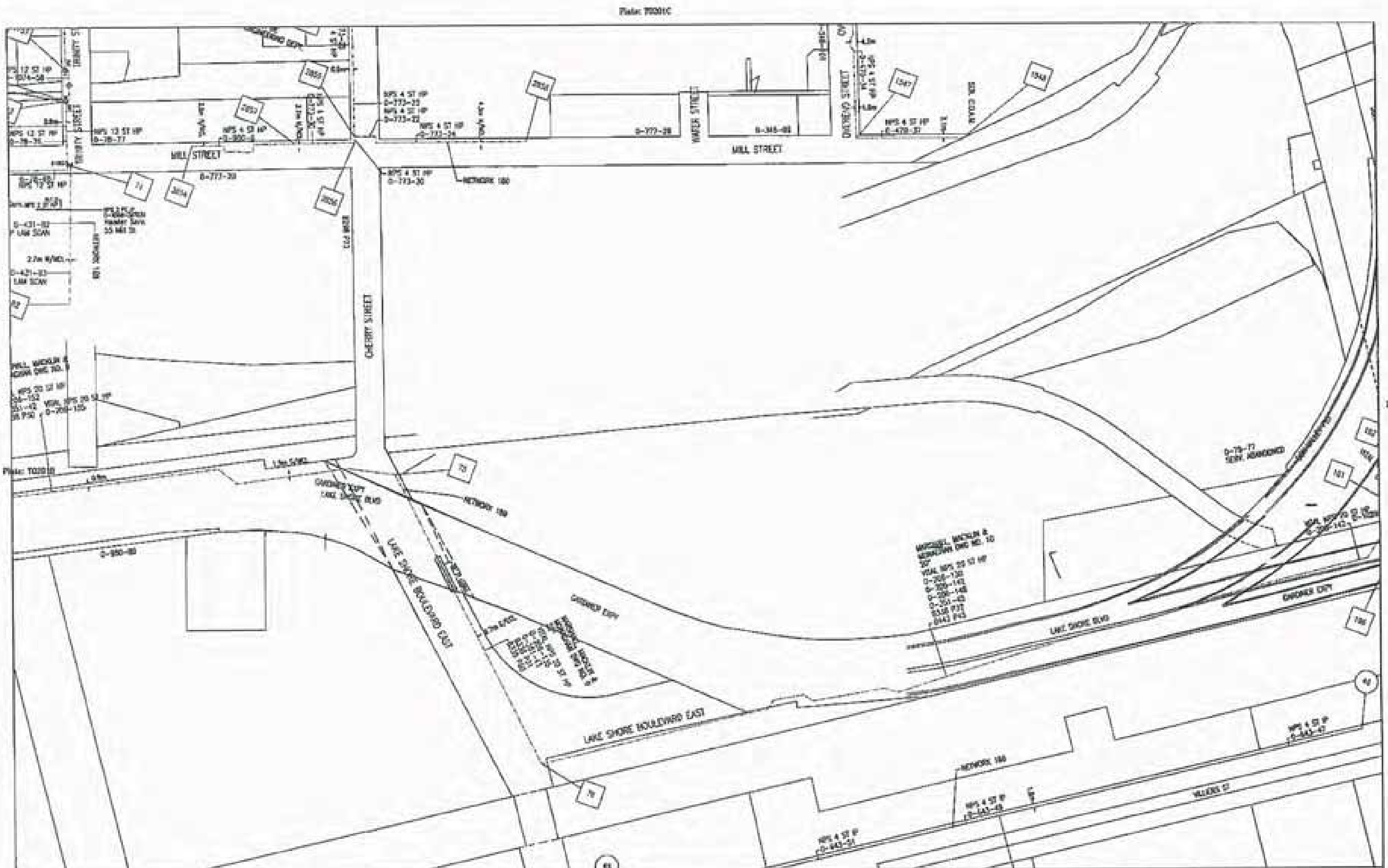
(See attached file: Lower Don Lands Study Area Map.JPG)



Network Numbers and Pressure Types:
180-XP 180-IP 180-HP

ENBRIDGE

Atlas Plate Record		
Plotted By: Gillgya	Date of Last Revision: 2006 Jan 04	Date Plotted: 2006 Jan 08
	Revised By: Dab	
Scale: 1:1000	Region: Area 10 - Metro	Plate Number: T0201D

Enbridge Gas Distribution Inc.
500 Consumers Rd.
North York, ON, M2J 1P8
Canada
www.enbridge.com/gas

Diana Beaulne
Tel 416-495-5520
Fax 416-758-4374
diana.beaulne@enbridge.com
mark-ups@enbridge.com

ENBRIDGE

EGD File Number: 60314

To Whom It May Concern,

Re: Notice of Study Commencement - Lower Don Lands Municipal Class EA and Keating North Precinct Plan

Please find attached a copy of your drawing(s) on which we have marked our existing/proposed underground plant and have made the following determinations:

☒ **GENERAL LOCATION**

- Please refer to the attached drawings for information on our existing or proposed gas plant. The information provided is for **GENERAL LOCATION ONLY**. You must re-submit your detailed drawings for sign off by Enbridge Gas Distribution.

☐ **NO-CONFLICT**

- We have **NO OBJECTION** to your proposed plant as indicated. Please refer to the attached drawings for information on our existing or proposed gas plant. GAS MAINS MUST BE FIELD LOCATED. Before digging, please call ONTARIO ONE CALL. 48 hours in advance at 1-800-400-2255 for free gas locates service.
- See **"Third Party Requirements"** booklet for definitions, requirements & contact information.
- Test Holes are required to determine actual depth where infrastructure crosses gas plant.

☐ **CONFLICT**

- We have an **OBJECTION** to your proposed plant as indicated. Please refer to the attached drawings for information on our existing or proposed gas plant. Review your proposal and make changes to your plant to satisfy these requirements.
- See **"Third Party Requirements"** booklet for definitions, requirements & contact information.
- If relocation of our plant is required, contact Manager of Special Projects:

☐	Central Region: Carmelo Tancioco	416-758-7956
☐	Eastern Region: Ian Taylor	613-742-4637
☐	Niagara Region: Martin Goddard	905-641-4815

☐ **NEB PERMIT REQUIRED**

- An application form needs to be filed when crossing or working within 30 m of the right-off-way of the NEB regulated natural gas pipeline.
- Find enclosed booklet containing information and permit application form.
- If you want to discuss NEB permit process contact the Enbridge Gas Distribution Land Dept.:
  Chuck Reaney: 416-753-6929

☐ **VITAL MAIN**

- You are working within 3 m of a Vital Main Pipeline. A representative of the company must be contacted three (3) days prior to commencement of work. A member of our field force must be present while excavation of the main takes place and prior to backfilling. Alternatively please contact the Enbridge Gas Distribution Damage Prevention Dept: 1(866) 922-3622.
- See **"Third Party Requirements"** booklet for definitions, requirements & contact information.

For Enbridge Internal Use:

☐ **PILING & SHORING - SPECIAL PROJECTS REVIEW REQUIRED**

☐ **EXCAVATION, REPAVING OR GRADING - SPECIAL PROJECTS REVIEW REQUIRED**

Yours,

Diana Beaulne

April 23, 2008

Diana Beaulne

Diana Beaulne
2008.04.23
13:54:50 -04'00'

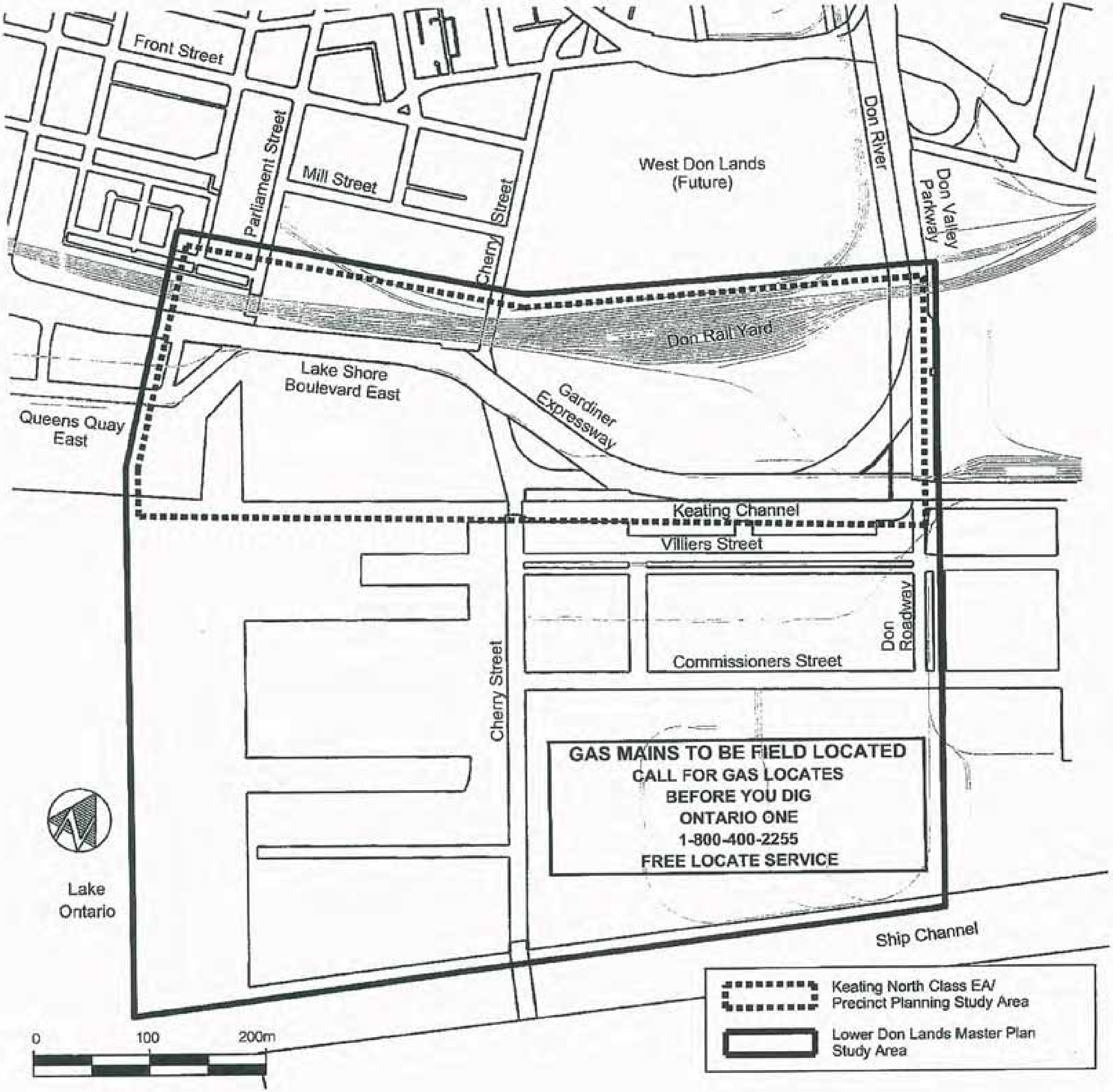
N

Network Numbers and Pressure Types:

ENBRIDGE

Atlas Plate Record

Plotted By:	Date of Last Revision:	Date Plotted:
	Revised By:	2007 Aug 03
Scale:	Region:	Plate Number:
	Area 10 - Metro	



Front Street
Parliament Street
Mill Street
Cherry Street
West Don Lands
(Future)
Don River
Don Valley Parkway
Don Rail Yard
Lake Shore Boulevard East
Gardiner Expressway
Queens Quay East
Keating Channel
Villiers Street
Don Roadway
Commissioners Street
Cherry Street
GAS MAINS TO BE FIELD LOCATED
CALL FOR GAS LOCATES
BEFORE YOU DIG
ONTARIO ONE
1-800-400-2255
FREE LOCATE SERVICE
Lake Ontario
Ship Channel
Keating North Class EA/ Precinct Planning Study Area
Lower Don Lands Master Plan Study Area
0
100
200m

Definitions

Boundary Limits means the volume of soil contained by vertical planes placed 1 metre each side of the centre line of the pipeline.

Contractor or Excavator means the individual, partnership, corporation, public agency or other entity that dig, bore, trench, grade, excavate or break ground with mechanical equipment or explosives in the vicinity of a pipeline.

Gas Company means the individual, partnership, corporation, public agency, or other entity that operates the pipeline system.

Gas line or Pipeline means those facilities operated by a Gas Company through which gas is conveyed and includes pipe, components, and appurtenances attached to the pipe such as valves and fittings.

Locate means identification on the ground of the position of the pipeline based on records or electronic locating equipment.

Mechanical Equipment means any powered excavator, earth mover, earth piercing equipment or any other device that may damage the pipeline.

1.0 General Conditions

1.1 All work shall be carried out in accordance with:

(a) the *Occupational Health and Safety Act* (OHSA) and Regulations which apply under this Act, including regulations for construction projects; and

(b) the *Technical Standards and Safety Act* and Regulations which apply under this Act.

1.2 The procedures described herein are prepared in the interest of safety to the general public, the workers carrying out the excavation, and the prevention of damage to gas lines and property.

2.0 Notification

2.1 a) Prior to excavation the contractor responsible for the work shall contact the "Ontario One Call" at the telephone or facsimile numbers listed in Table 1 below, or local Gas Company or the equivalent in the service area, as the case may be, and request locates of the gas lines in the areas where excavation will be taking place. The contractor must receive the locates as described in Section 3.0 prior to commencing any excavation.

b) If removing asphalt but not road base, or removing sidewalk but not curb, a locate is not required.

Table 1: Ontario One Call

Toronto Area	Toll Free - Outside Toronto Area
Tel: (905) 709 - 1717	Tel: 1-800-400-2255
Fax: (905) 709 - 1711	Fax: 1-800-400-8876

Call Two Working Days Before You Dig

Enbridge Consumers Gas ....Ontario One Call

Union Gas ....Ontario One Call

Kitchener Utilities...Ontario One Call

Utilities Kingston........................(613) 546-1181, Ext. 2000 or 2010

Natural Resource Gas (NRG) ....(519) 773-5321
(Aylmer area, south of London)

Six nations Natural Gas ....(519) 445-4213
(South of Brantford area)

Note: If you are planning to excavate in an area not serviced by any of the above gas utilities please contact the local municipality before excavating.

2.2 The notification shall provide the location where the work will take place, the expected time when the work will begin, the scope of the work, the expected duration, the name, address and telephone number of the contractor, and the name of the contractor's site representative.

2.3 Except in emergency situations, requests for stakeouts or locate information should be made at least 48 hours in advance (two working days).

2.4 Except in cases of emergency, or where the response for the location request has been agreed with the excavator or in extremely remote rural areas, Gas Companies will make every reasonable effort to respond to notification requests and provide locates where applicable within 48 hours (two working days) of the notification.

3.0 Locates

3.1 The locate, using labelled stakes, flags, and/or high visible paint marks, should indicate the centre line of the gas line in the defined area of the proposed excavation.

3.2 When requested, a diagram describing the locate information in 3.1 should be provided to the contractor's site representative if present at the time of locate; otherwise, sent to the person who requested the

locate. The diagram should indicate in clear legible terms the locate information and may be qualified by words regarding scale or orientation.

3.3 Where no gas lines are in the defined area of the proposed excavation a verbal confirmation may be provided to the contractor by the Gas Company. Written confirmation will be provided on request.

4.0 Locate Boundaries/Accuracy

4.1 The excavator must not work outside of the area covered by the "Stakeout Information" without obtaining a further stakeout.

4.2 Locate accuracy should be considered to be 1 metre on either side of the surface centre line locate unless the locate instructions specifically indicate other boundary limits.

4.3 Gas lines are usually found within 1.5 metres of the surface. Where the Gas Company knows that the gas line is deeper than 1.5 metres, the Gas Company must so indicate to the excavator. However, this information does not permit the excavator to use mechanical equipment to dig within the boundary limits to locate the gas line.

4.4 Where the gas line cannot be located using the procedures described in Section 6.0, the contractor must contact the Gas Company and the Gas Company must assist with the locate.

5.0 Duration

5.1 Stakes or markings may disappear or be displaced. Old stakeouts should not be used. Where delays occur beyond the specified period stated in 5.2 or where the stakeout markings become unclear, a new locate must be requested by the contractor.

5.2 Where a locate is valid for a specified period of time the deadline must be indicated on the locate form or diagram.

6.0 Initial Exposure

6.1 At no time, with the exception of 2.1 (b), should a contractor or their sub-contractors use mechanical equipment within the boundary limits of the locate without first digging hole(s) to determine the gas line's exact centre line and depth of cover.

6.2 Test holes should in general be excavated by one of the following methods:

a) mechanical equipment could be used immediately outside of the boundary limits and then hand dug laterally until the gas line is found; or

b) i) hand excavation between the boundary limits of the locate in cuts of at least 0.3 metre (1foot) in depth,

ii) mechanical equipment could then be used to widen the hand dug trench to within 0.3 metre (1 foot) of the depth of the hand excavation,

iii) repeat step (i) and (ii) until the pipeline is located,

iv) with prior agreement of the Gas Company, machines using vacuum, water or air as the cutting method may be used to locate and expose pipelines as an alternative to hand digging.

6.3 a) concrete saws, jackhammers, hand tools or other similar equipment may be used to break concrete or asphalt on a road or sidewalk surface.

b) With the exception of 2.1 (b), 6.2 (a) and (b), mechanical equipment should only be used to remove broken asphalt or concrete.

c) Concrete below the road surface layers should not be removed without consultation with the Gas Company which may have gas lines encased therein.

6.4 Additional test holes should be dug where:

a) alignment changes are identified by Gas Company representatives, or

b) changes in elevation are identified by Gas Company representatives.

7.0 Excavating After Test Holes Are Completed

7.1 Where test holes in an area have been completed and the gas line located excavation using mechanical equipment may take place provided the following procedures are used:

a) wherever possible, mechanical excavating equipment should be operated parallel to the direction of the gas line when the excavation is within 1 metre of the gas line; and

b) mechanical equipment must not be used closer that 0.3 metre (1 foot) to the gas line;

c) excavation within 0.3 metre (1 foot) of the gas line must be carried out by hand equipment and tools;

d) where the proposed excavation is closer than 0.3 metre (1 foot) to the gas line, the line shall be exposed:

i) by mechanical equipment up to 0.3 metre (1 foot) above the gas line,

ii) by hand equipment and tools within 0.3 metre (1 foot) of the top of the line.

e) as an alternative to hand equipment and tools, with prior agreement of the Gas Company, machines using vacuum, water or air systems as the cutting method may be used to locate and expose the pipeline.

7.2 Guidelines for blasting close to gas pipelines must be obtained from the local Gas Company.

7.3 Guidelines for pipelines needing support must be obtained from the local Gas Company.

8.0 Backfilling

8.1 Where trenches are to be backfilled, the following requirements should be followed:

a) backfilling should be performed in such a manner as to provide firm support under the pipe; and

b) trench must be backfilled with clean fill or granular material free of material injurious to the pipe coating and pipe; the Gas Company must be contacted for the selection of other backfill material; and

c) where flooding of trenches is done to consolidate the backfill, care must be exercised so that the pipe is not floated from its firm bearing on the ditch bottom.

9.0 Abandoned Gas Lines

9.1 Where a line is found during excavation that was not located by the Gas Company, but within the area covered by the locate, never assume the line is abandoned. The Gas Company should be notified immediately to determine if the line is abandoned.

9.2 Abandoned gas lines are defined as lines which have been disconnected and purged in accordance with the CSA Z662 Standard. Excavations in the vicinity of abandoned gas lines shall not be subject to the guidelines in Section 7.0.

10.0 Colour Coding

10.1 Markings on stakes, streets and sidewalks must be yellow.

11.0 Procedure Where Damage Occurs

11.1 If damage to the coating or pipe occurs and no gas is escaping, leave the pipe exposed and contact the Gas Company. In most cases, utilities will not charge excavators for coating repairs.

11.2 If gas is escaping, shut off vehicles or equipment, remove or extinguish all ignition sources, barricade the area off, keep public and workers away. No attempt should be made to control the escaping gas.

11.3 Notify the Fire Department, Police and Gas Company.

12.0 Acts and Regulations

A copy of the relevant sections of the *Technical Standards and Safety Act* and the Ontario Regulation on Oil and Gas Pipeline Systems are attached as Appendix 1.

Appendix 1

Sections of the *Technical Standards and Safety Act*:

Offences

37. (1) Every person who,

(a) contravenes or fails to comply with any provision of this Act, the regulations or a Minister's order;

(b) knowingly makes a false statement or furnishes false information under this Act, the regulations or a Minister's order;

(c) contravenes or fails to comply with a term or condition of an authorization;

(d) contravenes or fails to comply with an order or requirement of an inspector or obstructs an inspector,

is guilty of an offence and on conviction is liable to a fine of not more than $50,000 or to imprisonment for a term of not more than one year, or to both, or, if the person is a body corporate, to a fine of not more than $1,000,000. 2000, c. 16, s. 37 (1).

Duty of director or officer

(2) Every director or officer of a body corporate has a duty to take all reasonable care to prevent the body corporate from committing an offence under subsection (1). 2000, c. 16, s. 37 (2).

Offence

(3) Every director or officer of the body corporate who has a duty under subsection (2) and who fails to carry out that duty is guilty of an offence and on conviction is liable to a fine of not more than $50,000 or to imprisonment for a term of not more than one year, or to both. 2000, c. 16, s. 37 (3).

Separate offence

(4) Where a person contravenes any of the provisions of this Act, the regulations, a Minister's order or any notice or order made under them on more than one day, the continuance of the contravention on each day shall be deemed to constitute a separate offence. 2000, c. 16, s. 37 (4).

Administrative penalty

(5) A person against whom an administrative penalty has been levied by a designated administrative authority or, in the absence of such authority, by the Minister does not preclude a person from being charged with, and convicted of, an offence under this Act for the same matter. 2000, c. 16, s. 37 (5).

Time limit

(6) No proceeding in respect of an alleged offence under this Act may be commenced after two years following the date on which the facts that gave rise to the alleged offence were discovered. 2000, c. 16, s. 37 (6).

41. Every contractor and employer shall take all reasonable precautions to ensure that they and their agents and employees comply with this Act, the regulations or a Minister's order.

Sections of the Oil and Gas Pipeline Systems Regulation:

Ascertaining pipeline locations

9. (1) No person shall dig, bore, trench, grade, excavate or break ground with mechanical equipment or explosives without first ascertaining from the licence holder the location of any pipeline that may be interfered with.

(2) The licence holder shall provide as accurate information as possible on the location of any pipeline within a reasonable time in all the circumstances.

No interference with pipeline

10. No person shall interfere with or damage any pipeline without authority to do so.

Appendix 2

Procedures for using hydro-excavation machines to locate and expose pipelines as an alternative to hand digging.

The following procedures shall be followed at all times when excavating with hydro-excavation technology within 1 m of gas plants.

1. Obtain locates prior to commencement of work. Only a competent, qualified worker shall operate hydro-excavation equipment.
2. The maximum water pressure to be used at any time during excavation shall be 17250 kPa (2500 psi). Below a depth of 45 cm (18") the water pressure shall be reduced to a maximum of 10350 kPa (1500 psi).
3. The wand shall never remain motionless during excavation. Aiming directly at the plant shall be avoided at all times.
4. A distance of 20 cm (8") shall be maintained between the end of the pressure wand nozzle and the plant and/or the subsoil. The nozzle shall never be inserted into the subsoil while excavating above the plant.
5. Only use hydro-excavation equipment and nozzles that have been specifically designed for use around buried gas lines or other reasonably expected underground gas plant.
6. A device capable of stopping the excavation on demand, such as a trigger or valve, shall be installed on the wand.
7. If heated water is used during excavation, the temperature of the water shall never exceed 115 F° (45 °C).
8. If damage to gas plant occurs while using hydro-excavation technology or any other method of excavation, the excavator shall contact the gas utility.

Third Party Requirements

In the Vicinity of

Natural Gas Facilities

- General Requirements
- Support of Gas Pipelines
- Blasting Requirements
- Pile Driving or Compaction Requirements
- Heavy Equipment Operation in the Vicinity of Gas Pipelines

October 2007

APPENDIX "A"

REGIONAL CONTACT LIST

ENBRIDGE GAS DISTRIBUTION 500 Consumers Road North York, ON M2J 1P8	Markups	mark-ups@enbridge.com
	Mail to:	Distribution Planning
	Ontario One Call Locates:	1 (800) 400-2255
	Damage Prevention:	1 (866) 922-3622
	Emergency:	**1 (866) 763-5427**
ENBRIDGE GAS STORAGE P. O. Box 520 3595 Tecumseh Road Mooretown ON NON 1M0	Ontario One Call Locates:	1 (800) 400-2255
	Engineering Dept.:	1 (519) 862-6015
	Emergency:	**1 (800) 255-1431**
GAZIFÈRE 706 Boulevard Greber, Gatineau QC J8V 3P8	Locates:	1 (800) 663-9228
	Planning Dept.:	1 (819) 771-8321 X-2449
	Emergency:	**1 (819) 771-8321**
ST. LAWRENCE GAS COMPANY LTD. 33 Stearns Street, P.O. Box 270 Massena, NY. 13662	Locates:	1 (315) 769-3511
	Planning Dept.:	1 (315) 769-3516 x 174
	Emergency:	**1 (315) 769-3511**

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6.3 EQUIPMENT MOVING ALONG THE PIPELINE

Heavy equipment may be operated parallel to existing pipelines provided that a minimum offset of 1.0 m is maintained on pipeline sizes less than NPS 12 and 2.0 m on pipelines NPS 12 and larger unless otherwise directed by Enbridge Gas Distribution.

Only lightweight rubber tired equipment shall be operated directly over existing gas pipelines unless a minimum pipe cover of twice the pipe diameter or 1.0 m (whichever is greater) can be verified.

When working directly over existing gas pipelines, all equipment movements shall be transverse to the staked location rather than parallel to it.

6.4 COMPACTION EQUIPMENT RESTRICTIONS

Mechanical equipment shall not be operated within 0.3 m of the pipeline.

Hand held compaction equipment shall be used within 1.0 m of the sides or top of all gas pipelines.

Heavier compaction equipment may be used once the pipe cover equals the greater of twice the diameter or 1.0 m.

6.5 GENERAL VEHICLE EXTERNAL LOADING RESTRICTIONS

For most vehicles, other than heavy construction equipment discussed above, external loading will not be factor because the standard Enbridge Gas Distribution pipeline cover requirements provide sufficient protection.

In cases where extreme loading is likely to occur, the following table provides vehicle load restrictions based on the depth of cover of pipe. If the loads exceed these, or if there are additional concerns, the contact name listed in the permit application should be contacted to specify required precautions and/or perform any loading calculation.

Since the depth of cover is important, if the depth is questionable, the pipeline should be located by hand. During wet weather conditions, increasing the amount of cover should be considered due to the rutting over the main.

Table No. 7		
Weight / Axle Maximum Allowable Load (kg)		
Cast Iron (CI)	Steel (ST)	Plastic (PE)
12,000	12,000	7,000

Vehicle Load Restrictions Based on Minimum Depth of 0.6 m.

6.0 HEAVY EQUIPMENT OPERATION IN THE VICINITY OF GAS PIPELINES

6.1 GENERAL

This information is presented as a guideline to cover precautions necessary when heavy construction equipment (gross weight greater than 10 tonnes) is to be operated in the vicinity of buried pipelines where no pavement exists or where grading operations are taking place.

Prior to any crossing, the location of the gas plant must first be located by an Enbridge Gas Distribution representative.

The excavator/constructor is responsible for confirming the location and depth of the gas plant by having test holes excavated as necessary with respect to the local conditions but not more than 50 m intervals.

6.2 EQUIPMENT MOVING ACROSS THE PIPELINE

Crossing locations for heavy equipment are to be kept a minimum.

The crossing locations shall be determined between the Enbridge Gas Distribution representative and the excavator/constructor. The crossing location shall be based on the following:

- Nature of the construction operations
- The types and number of equipment involved
- Pipeline material and depth

Once the predetermined crossing locations have been established, heavy equipment must be restricted to crossing at these locations only. It is the responsibility of the excavator/constructor to inform their personnel of the crossing location restrictions.

Gas plants shall be protected from possible damage at crossing locations at all times. The protection can be provided by constructing berms over the staked lines unless minimum cover of twice the pipe diameter or 1.0 m (whichever is greater) has been verified.

Equipment shall be operated at "dead slow " speeds when crossing pipelines to minimize impact loading.

1.0 DEFINITIONS

Terms used in the following Guideline are defined as follows unless otherwise specified:

Company	- Enbridge Gas Distribution Inc. or any of its representatives
LDC	- Local Distribution Company
Contractor or Excavator	- Any individual, partnership, corporation, public agency or other entity that dig, bore, trench, grade excavate or break ground with mechanical equipment or explosives in the vicinity of a gas pipeline or related facility.
Facility	- Defined as any Enbridge Gas Distribution Inc. Company Pipeline (main or service), regulator station or storage facility and their related components
Pile	- Any vertical or slightly slanted structural member introduced or constructed in the soil in order to transmit loads and forces from the superstructure to the subsoil; the structural member can also be used as a component of a retaining wall system
Pile Driving	- The placement of piles carried out by gravity hammer, vibratory hammer, auguring, pressing, screwing or any combinations of the above methods
Surface Blasting	- An operation involving the excavation of rock foundations for various types of structures, grade construction for highways or railroads, canals (trenches) for water supply or collection purposes.
Tunnel Blasting	- Operations involving the piercing of below ground (generally horizontal) opening in rock.
Blaster	- The person or persons responsible for setting the charges and performing the blast.
Applicant	- The owner of the proposed work
Compaction	- Any vibration generating operation which will result in a potential increase of the density of soils or controlled backfill materials. The means to increase the density may be static or dynamic
Engineer, Independent blasting consultant	- A Professional Engineer who is registered as a member of the Professional Engineers of Ontario (PEO) and a holder of Certificate of Authorization (C of A)
Construction Operations	- Activities associated with excavation, blasting, piling or compaction
Vicinity	- A horizontal distance of 30 meters, or less, from any Enbridge Gas Distribution Inc. natural gas facility (above-ground or below-ground)

2.0 GENERAL REQUIREMENTS

2.1 WORK IN THE VICINITY OF GAS PIPELINES

All work in the vicinity of gas pipelines must be approved by Enbridge Gas Distribution (the "Company").

All work within 30.0 metres of an NEB operated pipeline right-of-way must have the approval from Enbridge. This is a requirement of all NEB pipelines, which are under the jurisdiction of the National Energy Board, and follows the NEB Pipeline Crossing Regulations.

A stake out of the gas pipeline must be requested prior to any Construction. Call Ontario One Call at 1-800-400-2255 or 905-709-1717 at least 48 hours in advance of the proposed work.

Mechanical equipment shall not be operated within 0.3 m of the pipeline. Hand Excavation shall be performed when locating and digging within 0.3 m of the pipeline.

Mechanical excavation is not permitted within 3.0 m of the NEB or Vital pipelines without the approval of Enbridge.

Hand held compaction equipment shall be used within 1.0 m of the sides or top of all gas pipelines.

Spoil from excavation shall not be piled on the gas pipeline. This blocks access to the gas pipeline in the event that maintenance or operations activities are required on the pipeline.

The gas pipeline must be inspected for damage before backfilling the excavation.

It is the excavator's responsibility, under Section 18 and 19 of the Energy Act to ensure the gas pipeline(s) is not undermined or endangered in any way.

2.2 SUPPORT OF PIPELINES REQUIRED AT ALL TIMES

It is the responsibility of the Contractor to ensure that existing underground plant is properly supported.

Precautions must be taken to support underground plant at all times and to prevent damage to gas pipelines due to excavation activities. Inadequate support damages underground plant and can result in the escape of natural gas, constituting a hazard to persons and property.

When excavation is necessary over, under, near or parallel to underground Gas plant, the support is the responsibility of the excavator. The methods of support

5.6 SOIL TYPES

(Occupational Health and Safety Act

And Regulations for Construction Projects)

(1) For the purposes of this Part, soil shall be classified as Type 1, 2, 3, or 4 in accordance with the descriptions set out in this section.

(2) **Type 1 Soil**

a) is hard, very dense and only able to be penetrated with difficulty by a small sharp object;
b) has a low natural moisture content and a high degree of internal strength;
c) has no signs of water seepage; and
d) can be excavated only by mechanical equipment.

(3) **Type 2 Soil**

a) is very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;
b) has a low to medium natural moisture content and a medium degree of internal strength; and
c) has a damp appearance after it is excavated.

(4) **Type 3 Soil**

a) is stiff to firm and compact to loose in consistency or is previously excavated soil;
b) exhibits signs of surface cracking;
c) exhibits signs of water seepage;
d) if it is dry, may run easily into a well-defined conical pile; and
e) has a low degree of internal strength.

(5) **Type 4 Soil**

a) is soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;
b) runs easily or flows, unless it is completely supported before excavating procedures;
c) has almost no internal strength;
d) is wet or muddy, and
e) exerts substantial fluid pressure on its supporting system.

Table No. 6

MAXIMUM VIBRATION INTENSITIES EXPECTED FROM PILE DRIVING IN DRY AND WET SAND AND CLAY

Particle Velocity in/s

E/D	DRY SAND	WET SAND	CLAY
0.10	0.02	0.03	------
0.22	0.04	0.06	0.01
0.30	0.05	0.08	0.02
0.40	0.07	0.11	0.04
0.50	0.08	0.13	0.04
0.60	0.10	0.18	0.05
0.70	0.11	0.20	0.06
0.80	0.13	0.23	0.08
0.90	0.16	0.27	0.09
1.00	0.18	0.29	0.10
2.00	0.33	0.59	0.30
3.00	0.56	0.88	0.58
4.00	0.70	1.10	0.89
5.00	0.88	1.40	1.10
6.00	1.05	1.85	1.80 Acceptable
7.00	1.10	2.01	2.01 *Unacceptable*
8.00	1.40	2.30	2.40
9.00	1.75	2.80	3.10
10.00	1.85	2.90	3.40

Particle Velocity mm/s

E/D	DRY SAND	WET SAND	CLAY
0.10	0.43	0.74	------
0.22	0.97	1.50	0.25
0.30	1.27	1.27	0.43
0.40	1.75	2.80	0.66
0.50	2.06	3.30	1.02
0.60	2.54	4.57	1.27
0.70	2.80	5.08	1.52
0.80	3.30	5.84	1.96
0.90	4.06	6.86	2.29
1.00	4.57	7.37	2.54
2.00	8.38	14.99	7.62
3.00	14.22	22.35	14.73
4.00	17.78	27.94	22.61
5.00	22.35	35.56	27.94
6.00	26.67	46.99	45.72 Acceptable
7.00	27.94	50.80	50.80 *Unacceptable*
8.00	35.56	58.42	60.96
9.00	44.45	71.12	78.74
10.00	46.99	73.66	86.36

vary from case to case depending on the characteristics of the excavation, adjacent soil and the pipeline material. Failure to provide proper support will render the excavator responsible for all consequential damage or loss. (**Refer to Section 3.0, Support of Gas Pipelines,** for details on supporting the gas pipeline.)

2.3 ENCROACHMENT

Permanent awnings and roof structures are prohibited above gas pipelines within the public right-of-way, or within the Company's right-of-way. Enbridge Gas Distribution will not accept responsibility for any damages to the encroaching structure within the public right-of-way, or within the Company's right-of-way, if it is necessary for the maintenance or operation of the existing underground plant or to install new underground facilities in the future.

2.4 TREE PLANTING

For pipelines regulated by the NEB and Vital Mains (identified as critical pipelines), trees or large shrubs must have a minimum lateral clearance between the edge of the root ball or open bottom container and adjacent edge of the existing pipeline of not less than 2.5 m (8 feet).

For all other pipelines, a minimum clearance of 1.2 m (4 feet) horizontally must be maintained between the edge of the root ball or open bottom container and adjacent edge of the existing gas pipeline

In cases where 1.2 m (4 feet) clearance cannot be maintained, a minimum clearance of 0.6 m (2 feet) can be permitted provided a root deflector is installed on the sides of the root ball adjacent to the gas pipeline.

Final location of the trees must be confirmed with Enbridge Gas Distribution to avoid interference with the existing gas pipelines.

Root Deflectors

A root deflector is a mechanical barrier placed between tree roots and pipelines to prevent damage to the pipelines. A root deflector can be made from 1/4-inch rigid plastic, fiberglass or a non-degradable material. As the root tip of a tree travels out from the root ball the tip will contact the barrier, unable to penetrate to the barrier, the root will turn.

Root deflectors must be installed 0.6 meters (2 feet) from the pipeline on the side of the tree facing the pipeline and must extend 1.2 meters (4 feet) from the center of the tree trunk, parallel to the pipeline, at both directions; or the deflector must circle the tree.

Root deflectors usually have a collar to keep the top of the deflector at ground level, and they should extend down to the bottom of the root-ball as shown in Figure 2.4.

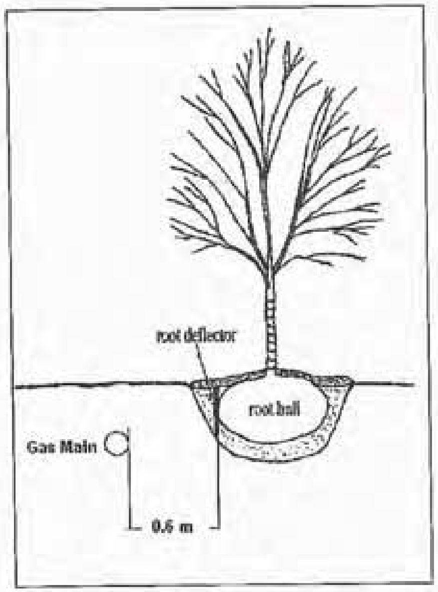


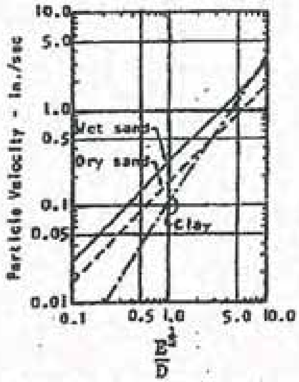
Figure 1
Root Deflector

2.5 MINIMUM CLEARANCE FROM OTHER STRUCTURES

The following clearances must be maintained between the outside wall of the gas pipeline and other underground structures:

Horizontal	-	0.6 m minimum
Vertical	-	0.3 m minimum
Vertical	-	0.6 m minimum for pipelines 16 inches in diameter and larger

GROUND VIBRATIONS FROM PILE DRIVING
(Figure 2)



$\frac{E^{\frac{1}{2}}}{D}$

NOTE: E is the rated energy of the pile hammer in ft-lbs. D is the distance of the pile tip from point of reference in ft.

Maximum vibration intensities expected from pile driving in wet sand, dry sand, and clay

GROUND VIBRATIONS FROM PILE DRIVING AND THE EFFECT OF GROUND VIBRATIONS (after Liu and Wiss, 1974)

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No operations shall be permitted within a standoff distance of 1.5 meters from the pipeline or other natural gas facility unless approved by Enbridge Gas Distribution.

Auguring of the soil up to the base of the pipeline may be required in order to avoid deviation of the piles within a distance of 1.5 m from the pipeline.

All operations must comply with the Provincial Occupational Health and Safety Act and Regulations for Construction Projects as well as all applicable Company specifications, standards and guidelines.

Leak surveys (flame ionization) shall be conducted at any time following the higher vibration intensities or displacements notwithstanding any delays or costs incurred by the contractor or authority responsible for the proposed work.

5.5 POST PILING OR COMPACTION OPERATIONS

A summary of all operations including pile driving and compaction logs, vibration control, seismographs and other pertinent information shall be provided to Enbridge Gas Distribution by the Contractor responsible for the proposed work no later than 5 business days after work has been completed.

On completion of the daily operations, and approximately 30 days after the end of the operations, Enbridge Gas Distribution shall conduct a leak survey (flame ionization) of the pipeline. The resulting damages will be repaired at the expense of the Contractor responsible for the proposed work.

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Excavations for permanent structures (i.e. pools, root cellars, septic tanks etc.) must be at least 10.0 m from the limit of the existing right-of-way of the NEB pipeline.

Any work performed within 30.0 meters of an NEB pipeline right-of-way must be approved by Enbridge.

2.6 MINIMUM COVER REQUIREMENTS (Table No. 1)

	Location	Minimum cover (m)
Mains	Below traveled surfaces (roads), Road Crossings, General, Rights-of-way (roads)	1.2/0.9 *
	Water crossings	1.5
	Controlled Access Highways crossings, Below base of rails (cased)	1.7
	Rights-of-way (railroads), Drainage, Irrigation Ditches	1.0
Services	Private property	0.3
	Streets and Roads	0.45
	Wet Gas Areas @ Main/Building	1.2 / 0.9

* 1.2m is required for Transmission Lines 0.9m is required for Distribution Lines

2.7 POINTS OF THRUST

Precautions must be taken when working in the immediate vicinity of points of thrust. Points of thrust occur at pipeline fittings such as Elbows (45° or 90°), End Caps, Weld Tees, Reducer Couplings and closed Valves. In the event that the excavation involves exposing a point of thrust, or exposing an area near a point of thrust, specific instructions provided by the Company must be followed. Failure to follow these instructions can result in significant harm to persons and property.

2.8 REPAIR OF DAMAGED PIPE AND PIPE COATING

In all cases where the pipe or the pipe coating is damaged by the construction operation, contact the Company immediately and leave the excavation open until Company personnel have made the necessary repairs.

2.9 BLASTING, PILE DRIVING OR COMPACTION

Blasting, Pile Driving, or Compaction activities in the vicinity of natural gas pipelines requires the prior approval by the owner of the pipeline. (TSSA Act 2001).

Written notification from the owner of the proposed work (municipality, etc.) shall be submitted to the Manager Distribution Planning. The request shall be submitted a minimum of four (4) weeks prior to blasting, pile driving or compaction to allow sufficient time to ensure the Company requirements are followed. (**Refer to Section 4.0, Blasting Requirements, and Section 5.0, Pile Driving and Compaction Requirements**, for specific responsibilities.)

d) Soil types fitting the description of Type 4 soil as defined in Article 226 of the Occupational Health and Safety Act and Regulations for Construction Projects (**Refer to Section 5.6 Soil Types, page 30**).

For all these situations, monitoring of vibrations, with the appropriate number of seismographs, is mandatory. The seismographs shall be the portable types with the capability of producing on site printouts. This control will confirm the intensity of the vibrations generated by the pile driving or compaction work as projected. Furthermore, reports of recorded intensities shall be provided on a regular basis or at the request of Enbridge Gas Distribution.

Should a situation with low energy compaction operations with a soil cover of less than 1.5 meters above the pipeline at a stand-off distance of 3 meters or less from a pipeline be encountered, Enbridge Gas Distribution may require the opinion of an independent Engineer.

In addition, if a Type 3 soil (**refer to Section 5.6 Soil Types, page 30**) is present on site, Enbridge Gas Distribution may, again, require the opinion of an independent Engineer.

For the start of the construction operations, the equipment and method used for pile driving shall comply with the guidelines presented in **Figure 2, page 28**, and **Table 6, page 29**, which identify the maximum vibration intensities expected from pile driving in dry and wet sand and clay. These guidelines can be replaced by actual vibration testing (portable seismograph) on site.

The Peak Particle Velocity (PPV) measured on the pipeline, or at the closest point of the related structure with respect to the work, shall not exceed 50 mm/s. Furthermore, the maximum displacement for the vertical and/or horizontal component corresponding to the above stated vibration intensity shall not exceed 50 mm at any given length of the pipeline in question.

For all operations, if the Peak Particle Velocity (PPV) and/or the displacement limit are surpassed, all operations must stop notwithstanding any delays or costs incurred by the contractor or owner of the proposed work. Enbridge Gas Distribution will require that the cause of these higher vibrations or displacement be investigated. The operations shall resume only when the cause and remedy are established and with the approval of Enbridge Gas Distribution's Engineering Department.

Should any subsequent recordings indicate vibration intensities or displacements above the prescribed limits all operations shall immediately stop. Enbridge Gas Distribution shall require that the work be carried out according to methods it judges to be acceptable to the integrity of the pipeline or related structure notwithstanding any delays or costs incurred by the Contractor responsible for the proposed work.

Enbridge Gas Distribution shall be responsible for isolating the area of the pipeline in the direct vicinity of the operations as required. The Contractor will be responsible for all Company costs during piling operations.

In the event a third party is affected as a result of the pile driving and/or compaction operations, all expenses associated therewith incurred by Enbridge Gas Distribution shall also be at the Contractor's expense.

5.4 GUIDELINE FOR PILE DRIVING OR COMPACTION

The information provided in this section is to be viewed as a guideline only and is not intended to remove Contractor responsibility for damages caused by the piling and/or compaction operations. The contractor is responsible for ensuring that all pile driving and/ or compaction work is performed in a good and workmanlike manner in accordance with all applicable laws, codes, by-laws and regulations.

Prior to pile driving and/or compaction work, a site meeting shall be arranged with an authorized representative of the Contractor and an Enbridge Gas Distribution representative to confirm details of the location of Company facilities and the proposed work.

The pipeline should not be excavated prior to the piling or compaction operation. If the particular situation warrants the excavation of the pipeline, then it must be properly supported in accordance with **Section 3.0 Standard Procedures.**

If in the assessment of Enbridge Gas Distribution, the soil cover is deemed to be insufficient, Enbridge Gas Distribution shall require that a protective ramp be constructed and maintained above the pipeline in accordance with Company guidelines. Construction vehicles or equipment will not be allowed to pass over a pipeline without the authorization of a Company representative.

The following situations will require the opinion of an independent Engineer. This Engineer must be specialized in vibration control, analysis and soil movement in order to evaluate and validate the proposed method of work and operation.

a) Compaction of soils or backfill rated at 10,000 ft-lbs or higher at a stand-off distance of 6 meters or less from the pipeline

b) Pile driving at a stand-off distance of 10 meters or less from the pipeline or other natural gas facility.

c) High-energy dynamic compaction for the rehabilitation of soils at a distance of 30 meters or less from the pipeline.

3.0 SUPPORT OF GAS PIPELINES

3.1 TRENCHING PARALLEL TO GAS PIPELINES

When a trench parallels an existing gas pipeline, support may be required depending on trench depth, pipeline material and soil conditions. **(Refer to Section 3.4, Support of Pipelines Parallel to Trench,** for details.)

3.2 MINIMUM REQUIREMENTS

Support methods specified by the Company are minimum requirements. Excavators shall not depart from these unless a Professional Engineer working for or on behalf of the excavator has designed an alternative method. Any alternative method must ensure support comparable to these specifications and be, in the opinion of the Professional Engineer, consistent with good engineering practices. Where that is the case, the alternative specification shall be documented and approved by the Professional Engineer and sent to the Company's Engineering Department for acceptability.

The following specifications deal with the support of gas pipelines in the vicinity of excavations. Two typical field situations are covered:

- support of gas pipelines **crossing the trench** and
- support of gas pipelines **parallel to the trench**.

3.3 SUPPORT OF PIPELINES CROSSING TRENCH

3.3.1 Temporary Support

Temporary support refers to the support of gas pipelines prior to or at the time of excavation to protect the pipeline from deflection due to its own weight while it is exposed. Temporary support shall remain in place until the backfill material underneath the pipeline is compacted adequately to restore support of pipeline.

Prior to trenching beneath a pipeline or service, temporary support shall be erected for pipelines if the unsupported span of pipeline in the trench exceeds the length indicated in **Table No. 2, page 11.**

When temporary support is required, **Table No. 3, page 11,** below, indicates the required beam for a given span. The beam shall be a continuous length grade No. 1 Spruce-Pine-Fir (S-P-F) or equivalent. For spans exceeding 4.5 m, contact the Company's Engineering Department for approval.

Table No. 2 Maximum Span Without Support Beam			
Pipe Size (NPS)	Steel (m)	PE (polyethylene) (m)	CI (cast iron) (m)
½	2.0	1.0	-
¾ - 1¼	2.5	1.25	-
2	3.0	1.5	-
3 to 4	4.5	1.75	1.0
6	6.0	2.0	1.0
8	7.0	2.0	1.0
12	10.0	-	1.0
16	11.5	-	1.0
20	13.0	-	1.0
24	15.0	-	1.0

Table No. 3 Support Beam Sizes Given: max. span between Beam Supports						
Pipe Size (NPS)	Steel		PE		Cast Iron	
	≤ 2 m	**≤ 4.5 m**	**≤ 2 m**	**≤ 4.5 m**	**≤ 2 m**	**≤ 4.5 m**
½ - 2	Nil	4 x 6	4 x 4	4 x 6	4 x 4	6 x 8
3 – 6	Nil	Nil	4 x 4	6 x 6	4 x 4	8 x8
8 – 12	Nil	Nil	4 x 4	8 x 8	6 x 6	10 x 10
16 – 24	Nil	Nil	Nil	Nil	8 x 8	12 x 12

The beam shall be placed above the pipeline with the ends of the beam resting on firm undisturbed soil. The beam shall not bear directly on the gas pipeline. The pipeline shall be supported from the beam with rope, chain or equivalent in a manner that will prevent damage to the pipeline and pipeline coating, and eliminate sag. The spacing between the rope, canvas sling or equivalent, shall not exceed 1.0 m (**see Drawing No. 1, page 15, for details**).

Backfill material underneath the exposed pipeline shall be compacted to a minimum of 95% Standard Proctor density. Sand padding shall be placed to a level 150 mm above and below the pipeline. Perform compaction with the loose lift height not exceeding 200 mm or one-quarter of the trench width, whichever is less. Injecting water into the backfill beneath the pipeline is not an acceptable method of compaction.

Mechanical equipment **shall not** be operated within 0.3 m of the pipeline. Hand Excavation shall be performed when locating and digging within 0.3 m of the pipeline. Hand held compaction equipment shall be used within 1.0 m of the sides or top of all gas pipelines.

- If required, a technical report with appropriate analysis and prediction of the vibration levels according to the opinion of an independent Engineer specialized in vibration control and analysis;
- A clause stating that the work will be carried out by qualified personnel with appropriate experienced supervision;
- A clause stating that all vibration testing results, or other preventative control testing, will be submitted to Enbridge Gas Distribution on a regular basis, or upon request.

To help with the preparation of the written request, locates to determine the location of the pipeline can be requested by calling "Ontario One Call" listed in Regional Contact List on Appendix A, and appropriate markups of drawings can be obtained by contacting "Distribution Planning" listed in Regional Contact List on Appendix A.

5.3 EVALUATION BY ENBRIDGE GAS DISTRIBUTION

Enbridge Gas Distribution shall conduct a record search on the natural gas facilities in the vicinity of the proposed work to identify their materials, location and maintenance history.

Enbridge Gas Distribution shall assess the impact of the proposed operation on the pipeline or related facility versus the stand-off distance. If it is determined that the proposed operation and/or method of work may be detrimental, the Contractor must retain the services of an independent Engineer. This Engineer must be specialized in vibration control, analysis and soil movement in order to evaluate and validate the proposed method of work and operation.

Enbridge Gas Distribution shall conduct leak surveys (flame ionization unit) of the pipelines and other related natural gas facilities prior, during and after the start of work. Leak surveys shall be conducted at any time during the project notwithstanding any delays or costs incurred by the Contractor responsible for proposed work.

Enbridge Gas Distribution shall prepare a contingency plan in case the isolation of the line or shut down of the related facility becomes necessary. This may not be possible without affecting a large number of customers and all operations may be suspended until Company investigations are completed notwithstanding any delays or costs incurred by the Contractor responsible for proposed work.

Enbridge Gas Distribution shall locate all control valves within the vicinity of the approved location and check all valves involved in the contingency plan to ensure accessibility and proper operability.

5.0 PILE DRIVING OR COMPACTION REQUIREMENTS

5.1 POLICY

Prior to any pile driving or compaction operations within the vicinity of a gas pipeline, the potential damage to Enbridge Gas Distribution plant will be evaluated to ensure the uninterrupted operation and long-term safety of its underground facilities. Any resultant damage caused either directly or indirectly to the gas plant will be borne entirely by the Contractor undertaking the proposed work.

If, in the opinion of Enbridge Gas Distribution, the particular pile driving or compaction operation cannot be carried out without affecting the pipeline or facility integrity, the following alternatives, or contingencies, may be implemented:

- a review of the particular situation by an independent consultant including a risk analysis and a prevention program;
- change in the construction methods;
- replacement or relocation of the pipeline/facility.

All costs incurred will be covered by the Contractor undertaking the proposed work with final approval being granted by Enbridge Gas Distribution.

5.2 PILE DRIVING OR COMPACTION APPLICATION

The application must include the following information:

- Name of project owner, general contractor and relevant sub-trades;
- A copy of the permits, certificates or other forms required by municipal bylaws;
- Name of design engineer and a copy of plans issued for construction with detailed drawings identifying all affected natural gas facilities;
- The type of piles and equipment used; including the methods of control to prevent the deviation of the piles;
- Geo-technical reports and other pertinent information;
- A copy of the location of other public utilities such as telephone, cable TV, sewer and water mains, electrical services, etc.;

3.3.2 Cast Iron Pipelines

Any cast iron pipeline NPS 8 or less which is completely exposed crossing a trench for a length greater than 1.0 m must either be replaced or temporarily supported and properly backfilled. Any cast iron pipeline NPS 12 or greater that is completely exposed for greater than 1.0 m must be referred to the Company's Engineering Department for analysis. **(See Drawing No. 1, page 15**, for details)

If the pipeline is to be replaced, the replacement section shall extend to beyond the two 45° lines projected upward from the trench bottom (**see Drawing No. 3, page 16**, for details).

If the pipeline is to be temporarily supported, the spacing of the rope, canvas sling or equivalent, shall be a maximum of 1.0 m. Any exposed joint shall be supported by canvas sling or rope at either side of the joint and at 1.0 m spacings along the pipeline's length (**see Drawing No. 1, page 15**, for details).

3.3.3 Steel and Polyethylene Pipelines

All steel and polyethylene pipelines exposed to a length greater than indicated in Table No. 1 shall be temporarily supported and backfilled as shown in **Drawing No. 2, page 15**, and as outlined **in Section 3.3.1**, Temporary Support.

NOTE: All temporary support on polyethylene pipes must be removed prior to permanent backfill. Adequate support shall remain in place until the backfill material has restored support.

3. 4 SUPPORT OF PIPELINES PARALLEL TO TRENCH

3.4.1 General

Two cases exist for pipelines parallel to an excavation;

i) trench < 1.2 m deep,
ii) trench ≥ 1.2 m deep.

In either instance, the pipeline is not to be exposed unless it is necessary to provide direct support.

Trench wall support is not required for excavations provided the pipeline meets the following criteria:

- depth is less than 1.2 metres,
- the pipeline is at least 0.6 metres from the edge of excavation or is outside the shaded area as indicated in Drawing No. 2 and,
- soil is stable (TYPE 1or 2, refer to **Soil Types, page 30)**

Trench wall support is required for excavations if one of the following conditions exists:

- depth is equal to or greater than 1.2 metres,
- the pipeline is closer to the edge of the excavation than the minimum allowed distance as indicated in **Table No. 4, page 13**
- depth is less than 1.2 metres and the soil is unstable (TYPE 3 or 4, refer to **Soil Types, page 30**)

NOTE: Adequate support shall remain in place until the backfill material has restored support.

Table No. 3 gives minimum distances from the edge of the trench to the pipeline in which the excavation influences pipelines for the given soil types.

Table No. 4
Minimum Allowed Distance from Pipeline to Excavation (m)

Trench Depth (m)	Soil Types 1 & 2*	Soil Types 3 & 4*
>1.2	0.9	0.9
≥1.5	0.9	0.9
≥1.8	0.9	0.9
≥2.1	0.9	0.9
≥2.4	0.9	0.9
≥2.7	0.9	1.0
≥3.0	0.9	1.5
≥3.3	0.9	1.8
≥3.6	0.9	2.2
≥3.9	0.9	2.5
≥4.2	0.9	3.0
≥4.5	1.0	3.4
≥4.8	1.5	3.8
≥5.1	2.0	4.1
≥5.4	2.5	4.6
≥5.7	3.0	5.0
≥6	3.4	5.5

*as defined in the Occupational Health and Safety Act

TABLE NO 5
Stand-off Distance for Blasting Near Polyethylene and Steel Facilities

STAND-OFF DISTANCE FROM FACILITY (m)		MAXIMUM ALLOWABLE EXPLOSIVE CHARGE WEIGHT PER DELAY (kg)
3.00		0.18
4.00		0.33
5.00		0.51
6.00		0.73
7.00		1.00
8.00		1.31
9.00		1.65
10.00		2.04
12.00		2.94
14.00		4.00
16.00		5.22
18.00		6.61
20.00		8.16
22.00		9.87
24.00		11.75
26.00		13.79
28.00		16.00
30.00		18.36

The chart above is based on a Peak Particle Velocity (PPV) of 50 mm/sec. No greater velocity shall be allowed. Maximum amplitude shall be limited to 0.1524 mm.

If the applicant insists that blasting is necessary, the required independent blasting consultants report shall evaluate and validate the proposal.

The applicant shall comply with the Ontario Provincial Standard Specification - OPSS 120 - General Specification for the Use of Explosives, in addition to these Enbridge Gas Distribution blasting requirements.

Monitoring of blasting vibrations with a portable seismograph capable of producing on site print outs in the vicinity of Company facilities is mandatory to confirm that predicted vibration levels are respected. At the completion of the blasting operation, a copy of the seismographic report shall be provided to Enbridge Gas Distribution.

Table 5, page 22, shall be used to guide explosive charge weights. Peak Particle Velocity (PPV) shall be limited to 50 mm/sec and maximum amplitude shall be limited to 0.1524 mm.

4.6 POST BLASTING OPERATION

Upon completion of daily blasting operations and within 30 days after the final blasting, Enbridge Gas Distribution shall conduct a leak survey (flame ionization) of the pipeline at the applicants' expense. Leak survey shall also be completed at the end of each day of blasting. Damage that has resulted from the blast will be repaired at the applicants' expense. A summary of all blasting operations including blasting logs, vibration control, seismograph reports and other pertinent information shall be provided to Enbridge Gas Distribution by the applicant at the completion of blasting operations.

3.4.2 Cast Iron Pipelines

If a cast iron pipeline lies within the 45° line projected upward from the bottom of the trench, the trench shall be suitably shored to support the pipeline. A sliding trench box does not provide adequate support.

If a cast iron pipeline lies within the 45° line projected upward from the trench bottom and the bottom of the trench is below the water table, a field assessment of the situation is required to determine if this pipeline must be replaced.

For cast iron pipelines within the minimum distances given in **Table No. 4, page 13**, above, the support shall be abandoned in place.

If any cast iron pipeline becomes exposed for a length greater than 1.0 m it shall be replaced. Replacement limits shall be determined in the field.

3.4.3 Steel and Polyethylene Pipelines

In the case of a steel or polyethylene pipeline within the limits of 3.4.1, and the trench bottom is below the water table, the trench shall be suitably supported as required in 3.4.1.

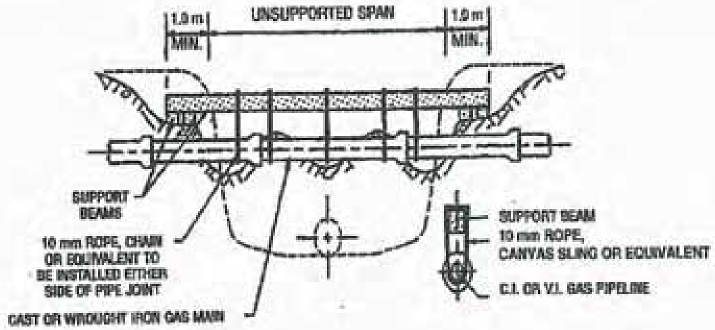
For steel and polyethylene pipelines within the minimum distances given in **Table No. 4, page 13**, support shall remain in place until backfill material restores support.

Any steel or polyethylene pipeline that is unsupported for a length greater than indicated in **Table No. 2, page 11**, shall require field assessment by the Company.

ENBRIDGE

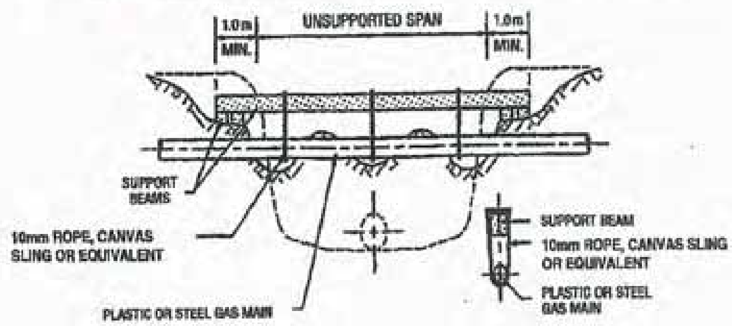
DWG NO. 1: Support of Cast/Wrought Iron Gas pipelines Crossing Excavations

NOTE: BEAM SHALL EXTEND TO 1.0 m BEYOND THE SIDE OF THE TRENCH ON UNDISTRURBED SOIL OR A DISTANCE EQUAL TO THE DEPTH OF THE PROPOSED EXCAVATION, WHICHEVER IS GREATER.



DWG NO. 2: Support of Plastic or Steel Gas Pipelines Crossing Excavations

NOTE: BEAM SHALL EXTEND TO 1.0m BEYOND THE SIDE OF THE TRENCH ON UNDISTURBED SOIL OR A DISTANCE EQUAL TO THE DEPTH OF THE PROPOSED EXCAVATION, WHICHEVER IS GREATER.



ENBRIDGE

4.4 GROUND WATER MONITORING

Where there is a potential for damage to nearby wells, the blaster shall conduct an evaluation designed and implemented to minimize adverse impacts on potentially affected wells. Generally, all water wells within 100 meters of proposed blasting locations should be monitored for quality and quantity prior to construction.

Blasting in a watercourse requires Department of Fisheries and Oceans (DFO) authorization.

4.5 GUIDELINES FOR BLASTING

The information provided in this section is not to be construed as an exhaustive list of performance specifications, but rather a guide for conducting blasting in the vicinity of Enbridge Gas Distribution pipelines. The applicant is responsible for ensuring that all blasting work is performed in a good and workmanlike manner in accordance with all applicable laws, codes, by-laws, and regulations.

The contractor shall be liable for and indemnify Enbridge Gas Distribution in relation to any and all damage directly or indirectly caused or arising as a result of blasting operations carried out by the applicant, its employees, contractors or those for whom the applicant is responsible at law.

Prior to blasting operations, a site meeting shall be arranged with an authorized representative of the applicant and an Enbridge Gas Distribution representative to confirm details of the location of Company facilities and the proposed blast.

Enbridge Gas Distribution pipelines shall not be excavated prior to blasting. If excavation is unavoidable, then the pipeline shall be properly supported according to current Enbridge Gas Distribution requirements as outlined in this booklet. The applicant shall take suitable precautions to protect the exposed pipeline from fly-rock. Blasting mats shall be used to minimize the risk of fly-rock.

Explosives shall be of a type that will not propagate between holes nor desensitize due to compression pressures. No explosives shall be left in the drill hole overnight.

For surface blasts located at distances of 10 meters or less from a pipeline and when the excavation of the first blast hole has attained a depth equal to the top of the buried natural gas pipeline, the vertical depth of subsequent blast holes shall be restricted to one half of the horizontal distance to the closest portion of the natural gas pipeline. The required independent blasting consultants' report shall specifically address the impact of these conditions. This condition is not applicable for tunnel blasting operations.

Horizontal stand-off distances for surface blasting and directs stand-off distances for tunnel blasting of less than 3 meters are not permitted.

- Type of advancement proposed and type of tunnel method proposed; full face, top of heading and bench, pilot tunnel
- Type of tunnel lining proposed.
- The use of preventative blasting techniques such as line drilling, cushion blasting, etc.
- Other pertinent information specific to tunneling techniques.

To assist with the preparation of the written request, locates to determine the location of the pipeline can be requested, or mark-ups of drawings can be obtained by contacting the Manager Distribution Planning, Enbridge Gas Distribution. Lists of Regional addresses and phone numbers are outlined at Appendix A.

4.3 EVALUATION BY ENBRIDGE GAS DISTRIBUTION

Enbridge Gas Distribution will conduct a record search on the facilities in the vicinity of the blast to determine the material, location and maintenance history.

Enbridge Gas Distribution will evaluate the impact of the blast on the facilities, assessing the charge weight to be detonated in relation to the stand off distance. If, in the opinion of Enbridge Gas Distribution, a hazardous condition may result if the charges are fired as outlined in the application, the applicant shall be notified in writing. The applicant shall not commence operations and shall retain the services of an independent blasting consultant to evaluate and validate the application. A copy of the required consultants' report shall be forwarded to Enbridge Gas Distribution Engineering Department for approval.

Enbridge Gas Distribution shall conduct a leak survey (flame ionization unit) of the pipeline prior, during and after the blasting and independently of its normal leak-monitoring program to establish satisfactorily that the pipeline is not leaking.

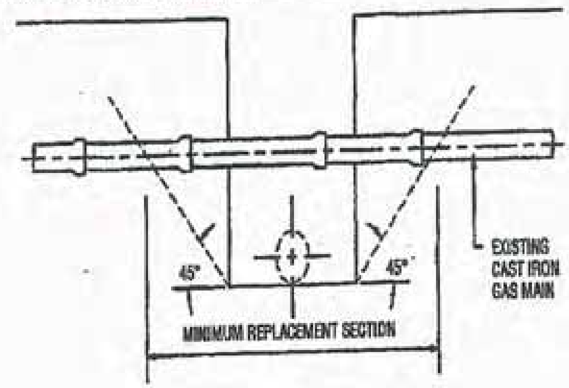
Enbridge Gas Distribution shall prepare a contingency plan to respond in the event that isolation of the pipeline becomes necessary. Blasting operations shall not commence until all Enbridge Gas Distribution procedures have been implemented and the applicant has received written notification of it.

Enbridge Gas Distribution shall locate all control valves within the vicinity of the approved blast area. Check all valves involved in the contingency plan to ensure accessibility and proper operability.

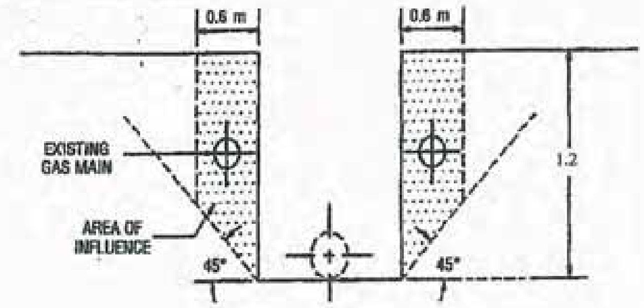
In the event a third party is affected as a result of the blasting operations, all expenses associated therewith incurred by Enbridge Gas Distribution shall also be at the applicant's expense

DWG NO. 3: Influence Lines for Gas Pipelines Adjacent to Excavations

CAST IRON CROSSINGS – MINIMUM REPLACEMENT SECTIONS



PARALLEL MAINS – GENERAL



NOTE: IF PIPE IS LOCATED IN THE SHADED AREA, IF SOIL IS UNSTABLE (TYPE 3 or 4), THE TRENCH IS REQUIRED TO BE SUPPORTED

4.0 BLASTING REQUIREMENTS

4.1 POLICY

Prior to any blasting operation in the vicinity of a gas pipeline, the hazard to Enbridge Gas Distribution Inc. plant will be evaluated to ensure the uninterrupted operation and long-term safety of its underground facilities. Responsibility for the design of the blast and any resultant damage is born entirely by the party using the explosives.

A recognized independent blasting consultant shall be retained at the applicants' expense to evaluate and validate the risks for blasting under any of the following conditions:

a) Explosive charge weight per delay in **Table 5, page 22**, is exceeded.

b) Blasting requirements less than 3 meters from Company facilities.

c) Blasting in the vicinity of cast iron and wrought iron pipelines.

d) Any tunnel blasting operation in the vicinity of Company facilities.

e) Surface blasts less than 10 meters from a Company pipeline where the excavation depth of the first blast hole is equal to the depth of the top of the pipeline and subsequent blast hole depths are greater than one half the horizontal distance to the closest portion of the pipeline.

f) Any time if in the opinion of Enbridge Gas Distribution Inc., it is felt the integrity of Company facilities may be affected by the blast.

The Independent Blasting Consultant shall be a Registered Professional Engineer and a holder of a Certificate of Authorization (C of A), specializing in blasting.

A copy of the consultant's report shall be forwarded to Enbridge Gas Distribution Inc. Engineering Department for review.

If in the opinion of Enbridge Gas Distribution Inc. or an independent blasting consultant, blasting cannot be carried out without affecting the facility's integrity, alternatives shall be considered, including the replacement or relocation of the affected facility at the applicants' expense. In these situations, additional time must be allowed to obtain the necessary permits and to complete the necessary construction work.

4.2 NOTIFICATION REQUIREMENTS

4.2.1 Surface Blasting Applications

The written request for surface blasting shall include the following information:

- Name of the owner of the project, general contractor and design engineer.
- Name of the blasting contractor and person in charge of the blast.
- Date for the blasting operation.
- A copy of a construction drawing or sketch drawn to scale indicating:
  - i Details of the proposed drilling and loading pattern for explosives.
  - ii Diameters of drilled holes, relative to Company facilities.
  - iii Location of other public utilities, i.e. Bell, hydro, water etc.
- Number and timing of delays.
- Total explosive weight to be detonated per delay.
- Specifications for the type of explosives to be used.
- Predicted vibration levels anticipated at the pipeline and controls to be used to confirm vibration levels (i.e. Seismographs).
- Potential stabilization of rock face and type of potential stabilization techniques i.e.: rock anchors, shot crete, ribs, etc.
- Geological parameters (Borehole logs or Geological reports) which indicate the design of the blast are acceptable.
- Written confirmation that the blasting operation will be carried out by qualified personnel with appropriate engineering supervision.

4.2.2 Tunnel Blasting Applications

The written request for tunnel blasting shall include all information required in the surface blasting application as set out above in 4.2.1. In addition, the required independent blasting consultant's report shall include:

- Location plans and profile views with construction drawing or sketch, drawn to scale.
- Evaluation of geo-technical data.
- Exact stand-off distances horizontal and direct (radial)

TORONTO AND REGION Conservation
for The Living City

March 30, 2009

CFN
XREF CFN 40670

VIA MAIL AND E-MAIL

Jamie McEwen
Waterfront Secretariat
Toronto City Hall
100 Queen St W
Toronto, ON M5H 2N2

Dear Mr. McEwen:

Re: Official Plan Amendment No. 257 (Amended)
Central Waterfront Secondary Plan for the Lower Don Lands
City of Toronto (Toronto and East York Community Council)
Waterfront Toronto

Thank you for the opportunity to review the draft Official Plan Amendment submitted by Waterfront Toronto received March 15, 2009 in support of revisions to the Central Waterfront Secondary Plan to implement the draft preferred alternatives for the Lower Don Lands EA Master Plan and the draft preferred alternative for the Mouth of the Don Renaturalization and Port Lands Flood Protection Individual Environmental Assessment (Don Mouth EA).

We offer the following comments on the draft Official Plan Amendment. Comments on the draft Lower Don Lands EA Master Plan and draft North Keating Precinct Plan will be provided under separate cover.

Our Understanding of the OPA

We understand that the purpose of the OPA is to amend the council-approved Central Waterfront Secondary Plan. The proposal reflects the work completed to date to identify the draft preferred alternatives for the reconfigured Mouth of the Don River and associated public road, transit and sewer infrastructure for the Lower Don Lands. The draft OPA includes revisions to Central Waterfront Secondary Plan Maps A through E.

Draft Official Plan Amendment

TRCA staff support the proposed draft revisions to Maps A through E. We also recommend that the following be considered for inclusion in the text of the amended Central Waterfront Secondary Plan:

1. Section A, Page 1 & 2, we recommend that a new "Big Move" should be added:

   A7_COMPLETING THE DON MOUTH NATURALIZATION AND PORT LANDS FLOOD PROTECTION PROJECT

   Completing the Don Mouth Naturalization and Port Lands Flood Protection Project will be a top priority for connecting people, places and the natural heritage system from the West Don Lands, East Bayfront to the Port Lands.

2. Section B, Big Move B11, Page 5, reference a realigned Don Greenway and revise to reflect the preferred alternative.

Member of Conservation Ontario

5 Shoreham Drive, Downsview, Ontario M3N 1S4 (416) 661-6600 FAX 661-6898 www.trca.on.ca

3. Section B, Big Move B18, Page 6, delete reference to Commissioner's Park.

4. Section C, Big Move C21, Page 8, revise to state:

   C21_ RENATURALIZING THE MOUTH OF THE DON RIVER

   The mouth of the Don River will be extended through lands south of the Keating Channel. This will restore the ecological function of the river, provide flood protection for the Port Lands, reduce or eliminate flooding on lands east of the Don River, attract new wildlife to the area, and provide for the appropriate sediment management. The extension of the Don River valley will also become a key open space and recreational link to the Don Valley, West Don Lands, Port Lands and waterfront park system. Pedestrian and cyclist's bridges over the extension of the river and the Keating Channel will be designed as signature entrances of beauty and inspiration. The preferred alternative for the Don Mouth Naturalization and Port Lands Flood Protection Project, along with the associated major sewer, water and transportation infrastructure will be the driver for substantial urban regeneration of the Keating Precinct of the Port Lands.

5. Section C, Policy P28, Page 9, add "flood protection" to the list of items that lake filling can be used for.

6. Section 5(1), Page 14, add "extension of the Don River" to the third paragraph of Regeneration Areas description.

7. Section 5(2), Items 2.4 and 2.5, Page 18 and 19, revise the term "flood proofing" to "flood protection."

8. A large portion of the Lower Don Lands south of the Keating Channel is located within a Special Policy Area. The Special Policy Area (SPA) flood plain management approach has historically been used in limited circumstances where other flood plain management approaches (e.g. One Zone approach) are not considered feasible or practical. Generally, the approach is applied to existing built up areas within communities that have historically existed within the flood plain and through specific policies, allow for the continued viability of existing uses and address the significant social and economic hardships to a community that would result from strict adherence to provincial policies concerning development.

   Given that further development within the portion of the SPA included within the Lower Don Lands is not likely to be desirable or pursued prior to full or phased implementation of the preferred alternative for the Mouth of the Don, the City of Toronto and Waterfront Toronto may wish to hold further discussions as to the appropriate mechanism for staging the development of the Lower Don Lands south of the Keating Channel. The result of these discussions may result in a need to modify the boundary of the SPA or the placement of a Holding Designation on the lands (or other mechanisms).

   Modifications to, or site specific applications within, SPAs must be approved by both the Minister of Natural Resources and Minister of Municipal Affairs and Housing because SPAs reflect a relaxation of the natural hazard policy standards for flood-related events. A modification of the boundary of the SPA or the proposed amendment to the Central Waterfront Secondary Plan will therefore require the approval of the two Ministries. Guidelines for provincial approval of modifications to an existing SPA boundary and site specific applications within an SPA are available in the Province's draft *"Procedures for Approval Of New Special Policy Areas (SPAs) and Modifications to Existing SPAs…"*. This document is available on the EBR (Registry No. 010-5775). TRCA staff would be pleased to discuss further and arrange the appropriate contact with provincial staff.

We trust this is of assistance. Please feel free to contact me if you have any questions.

Sincerely,

Steven H. Heuchert, MCIP, RPP, MRTPI
Manager, Development Planning and Regulation
Planning and Development
Extension 5311

cc: Brenda Webster, Waterfront Toronto
Gwen Mcintosh, City of Toronto
Christian Giles, City of Toronto
Carolyn Woodland, TRCA
Adele Freeman, TRCA
Laurie Nelson, TRCA
Ken Dion, TRCA
Don Haley, TRCA
Renee Afoom, TRCA

April 9, 2009 CFN 40670

BY MAIL AND EMAIL (bwebster@waterfrontoronto.ca)

Ms. Brenda Webster
Waterfront Toronto
20 Bay Street, Suite 1310
Toronto, Ontario, M5J 2N8

Dear Ms Webster:

Re: Response to the Draft Lower Don Lands Infrastructure Master Plan and the Draft Keating Channel Precinct Plan
Lower Don Lands Municipal Class EA and Keating North Precinct Plan
Municipal Cass Environmental Assessment - Schedule C
Waterfront and Don River Watershed, City of Toronto

TRCA staff received the draft Lower Don Lands Infrastructure Master Plan and the draft Keating Channel Precinct Plan on March 13, 2009. The purpose of this letter is to provide Waterfront Toronto with our comments on the both draft plans.

Staff understands that Waterfront Toronto is developing a framework Plan for the study area, a Master Plan for Municipal Infrastructure (including transportation, water, wastewater and stormwater), and a Precinct Plan for the first phase of the development.

TRCA staff has completed the review of the draft plans and have identified several key concerns presented in Comment #1 of Appendix A. Other detailed comments are provided in Appendix A. Staff are available to discuss these comments with you in greater detail. In your next submission, please provide a cover letter which outlines how each of our comments have been addressed using the numbering scheme provided in Appendix A. Should you have any questions, please contact me at extension 5217 or by email at bwilliston@trca.on.ca

Yours truly,

Beth Williston, H. BA, MCIP, RPP
Manager, Environmental Assessments
Planning and Development

BY EMAIL

cc:	Waterfront Toronto	Raffi Bedrosyan (rbedrosyan@waterfrontoronto.ca)
	City of Toronto	Jamie McEwan (jmcewan@toronto.ca)
	MVVA	Liz Silver (esilver@mvvainc.com)
	TRCA	Carolyn Woodland, Director, Planning and Development
		Adele Freeman, Director, Watershed Management
		Deb Martin-Downs, Director, Ecology
		Steve Heuchert, Manager, Development Planning and Regulation
		Ken Dion, Senior Project Manager, Lower Don
		Don Haley, Senior Project Manger, Engineering
		Renée Afoom, Planner II, Environmental Assessments

Appendix A

#	TRCA Comments	Waterfront Toronto Response
Draft LDL Infrastructure Master Plan; Section 1:		
1.	Please note that the primary focus of our comments is to ensure that the LDL Class Environmental Assessment Master Plan: a. provides a similar baseline assessment of the environment as will be stated in the Don Mouth Naturalization and Port Lands Flood Protection Project EA (DMNP EA), and b. that those elements and conditions of the DMNP EA that are of particular concern or provide direction that the Master Plan must abide by as part of its evaluation of alternatives to ensure that the objectives and goals of the DMNP EA are met. c. However, it is also noted that this EA is about the infrastructure required to facilitate the redevelopment of the Portland's and Keating North Precinct areas through a series of Precinct Planning initiatives. The existing land use and planning related issues should be included, specifically as it relates to the existing Provincially-approved Special Policy Area (SPA). The current PPS clearly states that no intensification shall take place within an SPA, Unless the flood risk is permanently dealt with through flood control works and the SPA designation removed through the Don Mouth Naturalization and Port Lands Flood Protection Project EA (DMNP EA), none of these land use changes or required infrastructure would be allowable under current Provincial Policy.. The physical changes to contain the floodplain, including hydraulic sizing of principle crossings is a part of the DMNP EA, and therefore needs to be clearly set forth as providing direction for design within the LDL Class EA Master Plan. Additional planning initiatives by the City to remove the SPA designation will also be required and should also be identified as a requirement. d. Given the importance of the overall flooding and SPA to the final outcome of revitalization of this section of the Waterfront, this and any other EA studies should recognize and identify these issues. The consequences of not establishing the correct EA connections and therefore structure sizing, adjacent grading for roadways such as the Don Roadway or other key factors could lead to difficulties within the ultimate approvals and process to remove the flood risk and SPA designation thereby freeing up the lands for change. e. Please ensure that TRCA, MOE and City of Toronto stormwater criteria with respect to water quality, water quantity and water balance are clearly presented in the LDL report. f. Page 1-1: Don Mouth Naturalization EA here and throughout the document should be changed to Don Mouth Naturalization and Port Lands Flood Protection Project EA or DMNP EA	
Draft LDL Infrastructure Master Plan: Section 2:		
2.	a. Page 2-12 Section 2.7: Paragraph 1 – the DMNP EA does not have the same study area as the LDL Class EA. It shares the similar limits of the LDL (minus areas east of Don Roadway) plus it includes	

	the channel up to the top of bank in the Don Narrows from the CN Railway – Kingston Crossing up to Riverdale Park. b. Page 2-12 Section 2.7: Paragraph 5 – Sentence 3 – The Keating Channel is retained but cut off from the redirected river mouth flows ***during normal conditions***. c. Page 2-12: Second to last paragraph - The preferred alternative is DRAFT d. Page 2-13 Section 2.7: Paragraph 3 – "…protection features***,*** and sediment, ***ice and*** debris management,…." e. Page 2-13. The report should create a new section 2.8 regarding TRCA's Valley and Stream Corridor Management Program, especially with respect to ideal buffers from valley top of bank – ie. Regulatory Flood plus 0.5m and 10m structural development setback	
Draft LDL Infrastructure Master Plan: Section 3:		
3.	a. Page 3-15, Section 3.3(a), should also note that existing infrastructure is not in the right place to accommodate sediment control facility and other infrastructure needed to support realigned mouth of Don River.	
Draft LDL Infrastructure Master Plan: Section 4:		
4.	a. Page 4-19 – Fish Community – Paragraph 1: TRCA has extensive additional fish records for Keating and Don River since 2003. b. Page 4-21 – Tables 4-2 and 4-3 – TRCA – AECOM/SENES can provide this new information. c. Page 4-21 – Vegetation Communities – Paragraph 1: Caution when using the number of vegetation communities for the area. The boundaries of the reference area in the source report likely extends greatly beyond the limits of the LDL Study area (ie. Lake Ontario Park, Don Valley up to Riverdale Park, TTP, Toronto Islands). Ensure when referencing #'s of communities that the #'s are representative of the study area. d. Page 4-22 – Flora & Wildlife Resources – Same comment as Vegetation Communities. e. Page 4-23 – Landscape Connectivity – Paragraph 3 – Should be "Lower Don River West Remedial Flood Protection Project" or LDRW. This section should also indicate that the DMNP EA will improve terrestrial and aquatic habitat conditions at the mouth of the Don, and the instream aquatic habitat conditions within the Don Narrows, which should improve linkages with the Don Valley and ORM. f. Page 4-25 – Flooding – "…. and spill to the extent that the valley allows." There is no valley south of Queen Street. It is essentially a broad, wide, low-lying expanse of lakefill, possessing no valley containment of the Regulatory Flood. The FPL being constructed to the west of the Don, north of the CN Kingston Subdivision will essentially extend the valley wall southward to the CN elevated tracks. This is currently not yet complete. The intent of the DMNP EA is to construct a new containing valley system that will convey up to the Regulatory Flood in the Don out to the Inner Harbour. g. Page 4-25 – Water Quality – Last Paragraph: The worst water quality in the Ship Channel is located near the CSOs in the Turning Basin. Adjacent to the LDL Study area, particularly near Cherry St crossing, water quality is not nearly so poor in the Ship Channel. h. Figure 4-2: Should be corrected for parcel 333 – Bunge which is now in TWRC ownership.	

	i. Page 4-27 – Current Land Uses and Planning Designations: Should include the TPA harbour operations yard in the Keating Channel, and possibly, the Film Port development that has occurred on the east side of Don Roadway, south of Commissioners. j. Page 4-29, Figure 4-3 should probably be updated to reflect latest and greatest in the PIC#3 slides. k. Page 4-29 and 4-30 – East Bayfront Precinct Plan – Paragraph 1: A bit confusing. Doesn't the Keating North Precinct now incorporate the previously identified East East Bayfront Precinct (east of Parliament). As such, should this not be refined/revised to only deal with the East Bayfront west of Parliament? l. Page 4-30 – West Don Lands Precinct Plan: Appears to be disconnect between the size of the park in the first paragraph (19.5acres) vs the size of the park in bullet a) (18 acres). m. Page 4-30 – Last sentence. Dated. The first residents are not moving into the WDL in 2008. Contact Meg Davis at Waterfront Toronto – current schedule calls for FPL completion and therefore occupancy in October 2010. n. Page 4-31 – First sentence: Delete "in" after ….within in… o. Page 4-31 – Table 4.6 – first bullet: The underpass of the CN Railway crossing was completed by TRCA in October 2007, as was an underpass under GO Transit's Bala Subdivision, north of the CN Railway which will connect the Don River Trail with the future West Don Lands. The Bala Underpass remains closed until the Don River Park is complete. p. Page 4-32 – Table 4.6 continued: Waterfront Toronto's Sports Fields that were completed in fall 2008, near Cherry Beach should be included. q. Page 4-32 – The Port of Toronto – last sentence: excludes the value brought to the area from Porter Airlines on the Toronto Islands. Would be an interesting economic item to add. r. Page 4-35 – Air Quality: Is it not possible to obtain air quality data for Downtown Toronto over the last 10-20 years? City of Toronto Public Health or Toronto Environment Office should have this information readily available. Would be more representative of the conditions than just 2002. s. Page 4-41 – Second paragraph – 1st sentence: Change "…sweeping posers…" to "…sweeping powers…." t. Page 4-42 – First Nations/Aboriginals' Interests: Alderville First Nation expressed interest on March 23, 2009. May need to refine this section to address their concerns, possibly other First Nations as well. u. Page 4-42 - First Nations/Aboriginals' Interests – Second to last paragraph: There may be more than "little to no potential" near the Cherry Street alignment where the original Cherry Street spit extended out into the lake. The degree of stone hooking over the Cherry St spit may have been negligible, and that the underlying native materials may be comparatively undisturbed and at a shallower depth than the former Ashbridge's Bay Marsh area (Polygon E5 on Map in Appendix A4). Some commentary on this potential should be considered in the EA. v. Page 4-42 – Commercial/Industrial Land Uses – last paragraph: The $422M is not consistent with the $400M indicated on page 4-32. w. Page 4-49 – Regional Transportation – 6th paragraph: Porter Airlines now flies to Chicago, Mount Tremblant, and Thunder Bay as well as the previous list.	

	x. Page 4-67 – Bicycle Network – 2nd paragraph: Proposed off-road route on Lake Shore east of Don River, is an existing bike route and has been for several years. Not sure about Carlaw. It should be confirmed which routes have been established since the 2001 Study. y. Page 4-67 – Heavy Rail – last sentence: There are two rail yards immediately north of Lake Shore Blvd area. The more northerly is owned by GO Transit (called the Don Yard) is used exclusively by GO Trains during the off-peak hours during the late-morning and early afternoon. The second yard is called the Wilson Yard, which is owned by TEDCO. It is understood that GO Transit is interested in acquiring the Wilson Yard. TRCA is not aware whether that transaction has gone through, however in 2008, it was observed that TEDCO was investing heavily in upgrading the railbed and rails of the Wilson Yard. Previously, it was used as temporary storage of freight cars. z. The Kingston Subdivision (CN's east west line) is a combination of GO Transit, freight and Via. The Bala Subdivision (GO Transit) and Belleville Subdivision (CP) travels east from Union Station then north along the west bank of Don River. Bala is primarily utilized by GO trains with occasional freight trains along the Belleville Subdivision. TRCA can provide a detailed railway study for the area. aa. Page 4-68 – Heavy Rail – Paragraph 2: The railway spur to Red Path does not have 10 trains per week – that spur is currently only used to store Redpath Sugar freight cars. The Spur coming from the CN Kingston Subdivision and down across to the east side of the Don River and into the Keating Yard has the 10 trains per week. Currently, these trains go to Ashbridge's Bay Treatment Plant, and two other operators in the Port Lands. bb. Page 4-68 – Heavy Rail – Last sentence: Some of the spurs in the Port Lands within the study area have been recently decommissioned (ie. along the Don Roadway to the Ship Channel and then west along the Ship Channel) . The map as shown is outdated. cc. Figure 4-25: LLI has been realigned south through the West Don Lands but reconnects to original alignment before crossing the river. dd. Page 4-78 – first paragraph: Should include discussion that the underground oil-filled pipes cross over the Don on a utility bridge between the CN Kingston crossing and the transformer substation on the west side of the Don. The underground pipes then veer south on the east bank of the Don along the Don Roadway ROW. Some of the underground cables also veer to the north of the utility bridge on the west bank, and traverse under the elevated CN tracks. (Marko can provide the specific names of the transformer station, number of cables, and alignment). The DMNP EA identifies that the utility bridge will need to be removed. The DMNP EA currently assumes that the hydro substation will remain in place, though this may change as the DMNP EA progresses. ee. Page 4-79 – Geology: There is more information available soon on the location of bedrock. There are also abandoned and decommissioned oil pipelines up the Don Roadway and DVP, Lake Shore Blvd and Commissioners, as well as extensive functioning utilities throughout the entire area.	
Draft LDL Infrastructure Master Plan: Section 5:		
5.	a. Regarding the crossings for Cherry Street, Lake Shore Boulevard, Commissioners Street, Keating Channel, Trinity Street, and Basin Street, the evaluation of alternatives must include confirmation that all preferred alternatives are capable of providing crossings over the Don River, Keating Channel or	

	Ship Channel wetland with adequate clearance to meet the hydraulic conveyance requirements specified in the Don Mouth Naturalization and Port Lands Flood Protection Project (this means the Regulatory Flood level + 0.5m as a minimum clearance. No upstream hydraulic impacts will be acceptable). b. All crossings of the Keating Channel must also provide adequate clearance to allow for a floating hydraulic dredge barge to operate unfettered periodically within the Channel (minimum of 3m clearance at normal lake water levels). c. Regarding the Lake Shore Boulevard crossing, the conditions of the crossing, must be in conformance with the need to allow for bed scour to a pre-determined elevation (to allow for the conveyance of the regulatory flood but not to the point that the flow splitting efficiency of the Lake Shore weirs are undermined), while also not impeding the need to manage for debris and sediment north of the crossing, and ice south of the crossing. Weirs are also likely to be adjustable and will require a footprint to operate/maintain. d. Regarding the Basin Street crossing, the evaluation of alternatives must provide for opportunities to moor the proposed hydro cyclone (or similar dewatering technology) and sediment barges, allow for the occupation of slurry conveyance infrastructure (pipes) to connect the proposed hydraulic dredge north of Keating to the proposed dewatering technology to be located in the Ship Channel, and to allow for direct hydrologic and controlled fish access connections between the Ship Channel and the Ship Channel Wetland. e. It must be demonstrated that the preferred alternative for the Don Roadway has sufficient space allocated within the road allowance to allow for: (F and G) and that the Don Roadway needs to be raised south of Lake Shore to ensure adequate containment of the Regulatory Flood + 0.5m. f. 2 - 14" underground pipes (1 primary pipe and 1 redundancy - backup pipe) g. Riser pipes would be located every 100 m h. A clearly identified footprint for a booster pump station and portable-to-permanent piping connection areas adjacent to the proposed sediment trap. i. **NOTE:** The number and size of pipes and the spacing of risers may be reduced during detailed design.. j. **NOTE:** An additional item that the LDL Master Plan should acknowledge is that the construction phasing and long-term maintenance dredging may requirealternative end-of-pipe locations other than the proposed Ship Channel/Basin Street locations (eg. elsewhere in the Ship Channel, Keating and/or Inner Harbour). The EA should recognize that the proposed mobility of the hydraulic dredge system and dewatering system would facilitate the need to periodically dredge the Keating Channel and future mouth of the Don. k. The southern Cherry St crossing should be designed to minimize shading impacts on the natural vegetation below the structure. l. The Don Roadway north of Lake Shore Boulevard must either remain at present grade or preferably,	

be lowered to allow for flood conveyance between the CN bridge and Lake Shore - raising the Don Roadway north of Lake Shore is not a viable option.

m. The DMNP EA has identified a need for a flood protection landform to be constructed east of the Don Roadway between Lake Shore Boulevard and the elevated CN railway embankment. This may have implications on grading, infrastructure, etc...

n. On page 5-99, Table 5.2 Evaluation Criteria: the Natural Environment Criteria includes consistency with the DMNP EA. However, there is no discussion as to what that means. The specific issues related to the DMNP EA related to transportation have been identified in the points above. Those specific conditions (criteria) must be met in order for an alternative to be considered further in the LDL Class EA.

o. Page 5-85: Consideration of Other Processes: The EA is based on the assumption that the Gardiner remains in place. What accommodation has been made to allow for the Gardiner to come down?

p. Page 5-92: Features of Alternative Solutions: Add "e) 2-14" underground slurry conveyance pipes with vertical risers every 100m along the west side of the Don Roadway". There should be some mention that TEDCO is also undertaking a study of the Don Roadway as it relates to the needs for the Film Port build out.

q. Section 5.2.3 Evaluation of Alternatives:
- For all street crossings over water bodies, it is not clear as to how the various alternatives stack up to the specific criteria for the DMNP EA. More location specific discussion is required for each crossing.
- There is no discussion on the Trinity Street Bridge over the Keating Channel.
- There is no discussion on the needs to accommodate pipes along the Don Roadway.

Draft LDL Infrastructure Master Plan: Section 6:

6.

a. Page 6-111 – Table Main criteria: Natural Environment should include more specific conditions to be in conformance with DMNP EA. For example: infrastructure crossings of the naturalized areas should be installed such that regular maintenance, replacement and/or upgrades of the infrastructure will not:
- require future disturbance to naturalized areas, flood and ice jam protection infrastructure, and sediment and debris management infrastructure,
- place underground infrastructure in possible sediment management areas (where dredging will occur); nor
- increase the risk of exposing any underlying contaminated soils and groundwater to the naturalized environment above.

b. Page 6-117 – Qualifying Conditions: No discussion of possible utilidors or comparable technology/approach to address the DMNP EA criteria for infrastructure crossings above.

c. Page 6-118 – Constraints for Waste Water (as above in Page 6-111)

	d. Page 6-120 Evaluation Criteria Table – Natural Environment: As above from Page 6-111. (NOTE: need not be this repetitive, however, clearly identifying the conditions adequately is important). e. Page 6-122 Table 6.3 – It is not clear how the evaluation of alternatives meets the DMNP EA conditions. f. Page 6-125 – Section 6.2.5 - Selection consideration: Again, do not see how this meets DMNP EA requirements. g. Page 6-126 – Qualifying Conditions: No mention at all of DMNP EA requirements.	
Draft LDL Infrastructure Master Plan: Section 7:		
7.	a. Page 7-127 – Rationale for the System – last sentence: Preference of TRCA and the DMNP EA, if at all possible, would be to divert major system stormwater flows to outlets discharging directly to the Inner Harbour, rather than the new naturalized river channel due to channel stability issues and/or due to a reduction in naturalized area. b. Page 7-128 – 7.2.1 End of 1st Paragraph: Quantity is not an issue as it would relate to the typical concerns further upstream. Quantity does have some implications as it relates to discharges of the major system into the naturalized river channel, due to possible long-term channel stability issues and its effects on the desired wetland ecology behind the constructed levees. As such, the general preference would be to divert the major systems directly to the Inner Harbour if possible. c. Section 7.2.1 - Alternative solutions to the problem are too general. The current alternatives consider 1) Do Nothing, 2a/2b) OGS/Pond and 3) treatment train approach. Based on current criteria, a treatment train approach is necessary, therefore the preferred alternative is consistent with current criteria. However, further alternatives should be developed using the treatment train concept. These alternatives should focus on different configurations of stormwater management practices including size, number, locations and the opportunity for "regional facilities". The report does indicate that "the methods and types of Source, Conveyance and End-Of-Pipe controls will be determined at the later phases where a clearer appreciation of the issues can be further investigated and analyzed", if this statement is acceptable, further information backing it is necessary. d. Page 7-129 – 7.2.2. Evaluation Criteria Table: Under naturalization, the DMNP EA and TRCA regulatory criteria conditions for stormwater (identified in our memo in February 2009) should be clearly identified as it relates to the roof top stormwater flows, minor system flows and major system flows.	
Draft LDL Infrastructure Master Plan: Section 9:		
8.	a. Figure 9-4: second pedestrian bridge over Reach 3 missing. b. Figure 9-4, 9-5 and 9-6: legends do not seem to be complete. c. Figure 9-7: where single loaded streets traveling parallel to the naturalized areas, it would be beneficial to depict roadway cross-sections showing that the roads are above and outside of the naturalized areas (Above the Regulatory +0.5m vertical limit) and outside the 10m horizontal	

	infrastructure setback. d. Section 9: Master Plan – discussion of the road and infrastructure components should include the compliance with DMNP EA conditions, including the proposed slurry conveyance system that is required. e. Figure 9-9, 9-10 and 9-11 should be labeled.	
Draft Keating Channel Precinct Plan		
9.	a. Page 11 - Should also reference TRCA Valley and Stream Corridor Management Program as a defining policy to address in the Precinct Plan. b. Page 15 - Proposal to narrow Keating Channel in the east and fill with large revetment has not been modeled through DMNP EA at this time. Hydraulic modeling confirmation is required first to ensure whether such actions are appropriate. Preliminary assessment suggests given the anticipated flow velocities through the Keating Channel up to the Regulatory Flood, it would require revetment to have a mean diameter of 1.5m to remain stable (which is required to ensure dockwalls do not fail under flood events). c. Page 15 - Recommendation that the revetment placements in Keating Channel provide more irregular side slopes (cross-sectionally) and form a more meandering form other than a submerged V-shaped configuration in planform within Keating Channel. This recommendation is subject to the DMNP EA hydraulic modeling results as to whether this is viable or not. d. Page 23 - Again discuss in more detail specific requirements of TRCA Valley and Stream Corridor Management Program. e. Page 28 - Figure 21 - As per our discussion, these flow splits have not yet been confirmed by both modeling teams. Recommend more graphic depiction of relative flow split values - would not want to be held to such hard #'s at this time. f. Page 32 - Figure 24 - Neighbourhood Plan shows passive lawn space in sediment and debris management area - that should be changed - this is an active industrial yard. g. Page 33 - Figure 25 - KC24 - located in area where Keating Channel is proposed to be filled towards the east. The viability of fill has not been confirmed through the hydraulic models for the DMNP EA. h. Page 35 and 40 - Figures 29 and 38 - Green wetland area shown north of the weir upstream of Lake Shore are not appropriate - this is part of the sediment management area. Similarly, eastern portion of Block 5 (or KC24) has not been determined to be viable hydraulically (as per comments on Page 33) i. Page 38 - Figure 32 - Ice shearing in Keating Channel would likely destroy proposed light standards in the water. Proposed wading area in Keating Channel is problematic. Concrete would be prone to algae and zebra mussel growth (forming slippery and or sharp conditions). Lack of a railing in the water, sharp 5m drop-off would represent a public safety hazard. j. Page 39 - Second paragraph - comments Lake Shore below Gardiner as a grand public space - Contingent on Gardiner remaining. Should this offer only one idea given uncertainty of the Gardiner	

	issue? k. Page 39 - 4th paragraph - sediment and debris management north of Lake Shore is only part of the operations currently along the south shore of Keating. Harbour operations component of the yard still needs to be accommodated in Port Lands - Ship Channel in Turning Basin?? In fact, the sediment management operations are only partially addressed north of Lake Shore. Slurry dewatering operations are located in Ship Channel. Likely need to store dewatering and sediment barges in the Ship Channel. Text currently understates implications of where current south Keating Channel operations will be addressed and does not identify that long-term periodic dredging will likely continue to be needed in the Keating Channel following construction of the new river mouth. l. Pages 39, 40 and 41 - Figures 36, 38 and 39 - Should not show trees north of Sediment/Debris Management area along either side of the river. Not likely recommended hydraulically. Similarly, Waterfront Toronto has now asked TRCA to re-examine hydraulic models with the removal of the hydro sub-station on the west bank of the Don River to assess whether footprint of proposed berm on Unilever can be significantly reduced. The viability of planting of non-wetland vegetation within the future floodplain will be determined through the DMNP EA. m. Pages 46 to 51 - Figures 45, 47 and 49 - Rocky beach west of Cherry Street may not be an appropriate land use given possible water quality issues, and sharp drop-off as one moves into the water. Gardiner issue - it relates to proposed courts and promonade. In-fill of Keating Channel at KC24 has not been confirmed as being viable by DMNP EA hydraulic modeling. n. Page 57 - Last paragraph first sentence - Add - "The results of the DMNP EA will inform the Gardiner Expressway EA to ensure that only those alternatives that will allow for the required flood protection and sediment management to proceed north of the Lake Shore Boulevard crossing of the Don will be carried forward through the Gardiner Expressway EA." o. Page 58 - Figure 54 - Should show sediment/debris management facility and sediment conveyance route down Don Roadway and Basin Street and EoP slurry/sediment management location in Ship Channel as a required infrastructure component of the Precinct Plan. Subject to the detailed analysis of the DMNP EA. In so doing, the Precinct Plan puts a placeholder for this infrastructure, whose details will play out through the DMNP EA. p. Page 59 - Again, remain concerned with the apparent direct bury approach to infrastructure across the proposed natural areas. The DMNP EA strongly urges an approach that will minimize or eliminate the need to excavate infrastructure at natural area crossings as part of the long-term maintenance, replacement and upgrades of infrastructure due to the impacts on naturalized habitats, the potential for releasing underlying contaminated soils and groundwater, and the potential disruption of flood protection structures and flood conveyance function of the constructed valley system. The DMNP EA will also state that the utility corridors will need to be defined and coordinated with the construction of the naturalized areas, and will recommend construction processes / procedures designed to recognize and protect the revitalized ecosystem as part of the long-term maintenance/operation of the utilities crossing the naturalized areas.	

	q. Page 61 - Recommend adding details of the sediment and debris management infrastructure components (as referenced from the DMNP EA). r. Page 65 - First Paragraph - Text states that land use west of Cherry and north of Keating Channel is not influenced by DMNP EA, assuming that the Preferred Alternative is approved as anticipated. This is not quite true. Development of this area, still must conform with the hydraulic conveyance clearance issues for all crossings, must meet the structural/in-water/dockwall conveyance impediment issues required by the DMNP EA, and must have adequate grading to ensure remains outside of the SPA. In the second paragraph, these conditions must also be met by areas east of Cherry Street in the Keating Channel. Also, stormwater may be directed (if applicable) to the Keating Channel to assist in ensuring that water quality and circulation objectives are met. s. Page 66 - Municipal Planning Approvals - TRCA permits required.	

TORONTO AND REGION Conservation for The Living City

June 19, 2009

CFN 42571
XREF CFN 40670

VIA MAIL AND E-MAIL

Jamie McEwen
Waterfront Secretariat
Toronto City Hall
100 Queen St W
Toronto, ON M5H 2N2

Dear Mr. McEwen:

Re: Official Plan Amendment No. 257 (Amended)
Central Waterfront Secondary Plan for the Lower Don Lands
City of Toronto (Toronto and East York Community Council)
Waterfront Toronto

Thank you for the opportunity to review the second submission draft Official Plan Amendment No. 257 (Amended). The amendment is to allow revisions to the Central Waterfront Secondary Plan in order to implement the draft preferred alternatives for the Lower Don Lands EA Master Plan and the draft preferred alternative for the Mouth of the Don Renaturalization and Port Lands Flood Protection Individual Environmental Assessment (DMNP Mouth EA). We have reviewed the following documents:

- Draft Official Plan Amendment – Lower Don Lands, received by City Planning on May 22, 2009, received May 26, 2009;
- Draft Planning Rationale Report, prepared by Waterfront Toronto, dated May 2009, received May 26, 2009;
- Urban Design Guidelines, Keating Channel Precinct, prepared by Waterfront Toronto, dated May 2009, received May 26, 2009.

We offer the following comments.

Draft Official Plan Amendment – Preface and Explanatory Notes

1. *Page 1, Basis, first sentence,* please add *"...principally north of the Ship Channel and west of the Don Roadway."* to the end of the sentence.

2. *Page 1, Basis, first paragraph,* please add "(TRCA)" after "Toronto and Region Conservation Authority" and add "(DMNP EA)" after "...Flood Protection Project." For the remainder of this and the other documents, please consistently use "TRCA" and "DMNP EA" as the abbreviations.

3. *Page 2, Basis, third paragraph with bullets,* there was only one goal for the Design Competition with a follow-up Statement of Intent. We recommend for clarity that the paragraph should be replaced to reflect that the goal of the *"Innovative Design Competition [was] to produce a unifying and inspiring concept for this long-neglected area that can provide common ground for three concurrent environmental assessments, including the Don Mouth Naturalization and Port Lands Flood Protection EA; the Queens Quay Boulevard Extension EA; and the Lower Don Transportation Infrastructure EA"* and the intent of the competition was *"to produce a bold and compelling concept for the*

Member of Conservation Ontario
5 Shoreham Drive, Downsview, Ontario M3N 1S4 (416) 661-6600 FAX 661-6898 www.trca.on.ca

Lower Don Lands that makes the river a central feature of the urban landscape, while providing for new waterfront development and new linkages to the rest of the city: This effort to bring design into the planning process to inform detailed environmental and hydrological studies presents a unique opportunity to reshape both the physical landscape and the relationship between land-use planning and design." The original alternatives under the DMNP EA had greater challenges for harmonious integration of the hydraulic and naturalization components. This was due to the defined study area which resulted in a direct conflict with existing and future infrastructure, boundary conditions defined by the proposed Commissioners Park and higher levels of underlying soil contamination. The original alternatives should not be downplayed as simply "spillways" as they provided the inspiration for the potential of the site, the resulting international design competition, and a solid framework to consider an alternative that was well outside of the original study area assigned to TRCA.

Draft Official Plan Amendment Text

4. *Page 7, Section 10,* we recommend that the text should provide acknowledgement that although the Keating Channel is retained and the principal naturalization activity occurs south of the Keating Channel, a key element of the sustainability of the new naturalized area is to retain the Keating Channel as a flood spillway and that there are significant aquatic habitat enhancement opportunities associated within the Keating Channel itself.

5. *Page 7, Section 11,* consideration should be given to the impact of lakefilling on commercial uses as well as fish habitat.

Draft Planning Rationale Report

6. *Page 9, Development Fronting on Open Space/Park, Current Port Lands Implementation Strategy,* should include linear metres along west side of Cherry, north of Keating Channel in the calculation as development was originally contemplated there as well.

7. *Page 10, Bullet 3,* please revise to state: "Integration of planning work conducted by Toronto and Region Conservation Authority (TRCA) for the Don Mouth Naturalization and Port Lands Flood Protection Project EA (DMNP EA).

8. *Page 10,* a bullet should be added about coordinating with the Gardiner EA and the Don and Waterfront Trunk Sewers EA.

9. *Page 15, second paragraph below bullets,* the LDRW Class EA was finalized and approved in 2005 (not 2006).

10. *Page 18, first paragraph, last sentence,* please revise to state: "... potentially resulting in the overtopping of the elevated railway, and increasing the level of ...".

11. *Page 18, second paragraph,* please revise to state: "*... adopted Secondary Plan was likely to provide limited naturalization opportunities...*".

12. *Page 19, second paragraph,* please revise to state "*...The Provincial Policy Statement (PPS), 2005....*".

13. *Page 19, Special Policy Area,* the interpretation of the approval process is incorrect.

Modifications to, or site specific applications within SPAs must be approved by both the Minister of Natural Resources and Minister of Municipal Affairs and Housing per the *"Procedures for Approval Of New Special Policy Areas (SPAs) and Modifications to Existing SPAs…"*. Please refer to our feedback on the draft of the Planning Rationale document and our letter of March 30, 2009, both of which outline the provincial approval process. Further to our meeting of June 19, 2009 with Waterfront Toronto, we understand that the focus of consultation with ministry staff will be on the OPA and ZBA for the Home Depot / Castcan site in the East Bayfront and that TRCA staff will assist with the technical review required for the City / Waterfront Toronto to apply for ministers' approval.

14. *Page 28, fourth paragraph,* this paragraph is missing a key element in that the DMNP EA is also setting the hydraulic conveyance and sediment management clearance standards for all bridges in the Master Plan. The DMNP EA is also recommending to pre-install underground infrastructure during the construction of the river valley feature to minimize disturbance of naturalized areas, as well as recommending the placement of infrastructure in combined facilities under the river (if possible) to minimize the risk for re-exposure of contaminated soils/groundwater in the future during routine maintenance of the infrastructure.

Proposed Urban Design Guidelines

15. *Pages 54 – 64, Cross Sections of Keating Channel.* Please be advised that the modeling has not yet confirmed the extent of fill that could be permitted in the Keating Channel. Once the extent of fill that is acceptable is determined, the urban design guidelines should illustrate the fill dimensions along with conceptual habitat improvements in the Keating Channel.

We trust this is of assistance. Please feel free to contact me if you have any questions.

Sincerely,

Steven H. Heuchert, MCIP, RPP, MRTPI
Manager, Development Planning and Regulation
Planning and Development
Extension 5311

cc: Brenda Webster, Waterfront Toronto
Gwen Mcintosh, City of Toronto
Kathy Thom, City of Toronto
Christian Giles, City of Toronto
Carolyn Woodland, TRCA
Adele Freeman, TRCA
Laurie Nelson, TRCA
Ken Dion, TRCA
Don Haley, TRCA
Renee Afoom, TRCA

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September 18, 2009

CFN 42571
XREF CFN 40670

VIA MAIL AND E-MAIL

Jamie McEwen
Waterfront Secretariat
Toronto City Hall
100 Queen St W
Toronto, ON M5H 2N2

Dear Mr. McEwen:

**Re: Official Plan Amendment No. 257 (Amended)
Central Waterfront Secondary Plan for the Lower Don Lands
City of Toronto (Toronto and East York Community Council)
Waterfront Toronto**

Thank you for the opportunity to review the third submission draft Official Plan Amendment No. 257 (Amended). The amendment is to allow revisions to the Central Waterfront Secondary Plan in order to implement the draft preferred alternatives for the Lower Don Lands EA Master Plan and the draft preferred alternative for the Mouth of the Don Renaturalization and Port Lands Flood Protection Individual Environmental Assessment (DMNP Mouth EA). We have reviewed the following documents:

- Draft Official Plan Amendment – Lower Don Lands, received by City Planning on August 7, 2009, received August 12, 2009;
- Draft Lower Don Lands Framework Plan, prepared by Waterfront Toronto, dated July 2009, received August 12, 2009;
- Draft Annotated Zoning By-law – Keating Channel Precinct, received by City Planning on August 7, 2009, received August 12, 2009.

The submission is significantly improved and we appreciate the City of Toronto and Waterfront Toronto's efforts to put in place a planning framework for implementing the Don Mouth Naturalization and Port Lands Flood Protection Project Individual Environmental Assessment (DMNP EA). We offer the following comments.

Draft Lower Don Lands Framework Plan

1. Page 17, Figure 14, Habitat Plan. Please be advised that the habitat types and location have yet to be validated and may change. We recommend that this figure be labeled as "conceptual."

2. *Page 30, The Adopted Secondary Plan vs. the Preferred Alternative,* last paragraph above the heading *"Conclusion."* The interpretation of the Special Policy Area policies in the Provincial Policy Statement continues to be incorrect, as noted in our letters of March 20, 2009 and June 19, 2009. We refer back to Comment No. 13 in our letter of June 19, 2009. We would be pleased to discuss further with Waterfront Toronto and the Ministries and assist as needed.

3. Throughout the document, please correctly reference the *"Don Mouth Naturalization and Port Lands Flood Protection Project Individual Environmental Assessment (DMNP EA)."*

Draft OPA

4. *Page 2, First paragraph,* should mention that the preferred alternative had two spillways, one

F:\HOME\PUBLIC\DEVELOPMENT SERVICES\CITY OF TORONTO\TORONTO AND EAST YORK\LOWER DON LANDS OPA_3.DOC through a modified Keating Channel and the other through a new wetland connection to the Ship Channel, as well as the primary outlet to the Inner Harbour.

5. A large portion of the Lower Don Lands subject to the OPA is within the Special Policy Area. The OPA must be approved by the Minister of Municipal Affairs and Housing and the Minister of Natural Resources. Early consultation is essential and we would be pleased to facilitate the appropriate consultation upon City of Toronto request.

Draft Zoning Bylaw - North Keating Precinct

6. *Page 11, Holding Symbol,* the proposal is to place an H on the lands north of the Keating Channel. This approach is supported but the removal of the H must also be contingent on Minister's approval of the Don Mouth Naturalization and Port Lands Flood Protection Project EA in order to ensure that no other alternative river alignments remain in question. In addition, the removal of the H must be contingent upon the completion of the West Don Lands flood protection landform from a flood management perspective so that the lands currently subject to flooding are removed from the floodplain. However, we request consultation with MMAH and MNR regarding this approach on those lands within the SPA that will be removed from the floodplain through the West Don Lands flood protection landform.

7. We assume that the strip of land located south of the Keating Channel identified as I3 D2 and D1 N1 are not subject to a change in zoning. This strip is entirely within the floodplain and the Special Policy Area and, under some future implementation of the preferred alternative for the DMNP EA (ie. not the West Don Lands flood protection landform), will be removed from the floodplain. Please confirm there is no change of land use or intensity of land use proposed in this area.

8. A portion of the Lower Don Lands subject to the ZBA is within the Special Policy Area. The ZBA must be approved by the Minister of Municipal Affairs and Housing and the Minister of Natural Resources. Early consultation is essential.

We trust this is of assistance. Please feel free to contact me if you have any questions.

Sincerely,

Steven H. Heuchert, MCIP, RPP, MRTPI
Manager, Development Planning and Regulation
Planning and Development
Extension 5311

Enclosure:

Procedures for Approval of New Special Policy Areas (SPAs) and Modifications to Existing SPAs.

cc: Brenda Webster, Waterfront Toronto (with enclosure)
Gwen Mcintosh, City of Toronto
Kathy Thom, City of Toronto
Christian Giles, City of Toronto
Carolyn Woodland, TRCA
Adele Freeman, TRCA
Laurie Nelson, TRCA
Ken Dion, TRCA
Don Haley, TRCA
Renee Afoom, TRCA

February 26, 2010

CFN 42571
XREF CFN 40670

VIA MAIL AND E-MAIL

Jamie McEwen
Waterfront Secretariat
Toronto City Hall
100 Queen St W
Toronto, ON M5H 2N2

Dear Mr. McEwen:

Re: Lower Don Lands – Various Planning Documents
City of Toronto (Toronto and East York Community Council)
Waterfront Toronto

Thank you for the opportunity to review the fourth submission package for the Lower Don Lands. We have reviewed the following documents:

- Draft Lower Don Lands Framework Plan, prepared by Waterfront Toronto, dated December 2009, received February 3, 2010;
- Draft Keating Channel Precinct Plan, prepared by Waterfront Toronto, dated December 2009, received February 3, 2010;
- Draft Keating Channel Urban Design Guidelines, prepared by Waterfront Toronto, dated December 2009, received February 3, 2010;
- Draft Official Plan Amendment - Lower Don Lands, received February 3, 2010;
- Draft Annotated Zoning By-law - Keating Channel Precinct, received February 3, 2010.

We offer the following comments:

General

There are numerous planning documents associated with the regeneration of the Lower Don Lands. Some of these documents were provided as part of this submission and we understand that the remaining, including the revised Lower Don Lands Infrastructure Master Plan EA and further revisions to the Official Plan Amendment and a scoped version of the Zoning Bylaw Amendment, will be arriving soon.

We understand that Waterfront Toronto has provided a response, in the form of a matrix, to the various City departmental comments. However, no such response has been provided to TRCA. Given the volume of documents to review, and the fact that they have changed considerably since the early 2009 versions, it would be helpful if TRCA could also receive a similar response to our comments.

Lower Don Lands Infrastructure Master Plan EA

TRCA staff provided written comments on the Lower Don Lands Infrastructure Master Plan EA, received on March 13, 2009, in a letter dated April 2009. Our comments were provided in Appendix A of that letter. Please ensure that three copies of the revised EA document are provided to Margaret Pak, Planner II, TRCA, and that a response to those comments accompany the package.

Draft Lower Don Lands Framework Plan

TRCA staff provided written comments on the Lower Don Lands Framework Plan, dated July 2009, received on August 12, 2009, in a letter dated September 18, 2009. A response to these comments was not provided with the latest version of the Framework Plan, dated December 2009, received February 3, 2010. Please provide a response to these comments on the earlier version as it does not appear that the revised version has addressed some or all of them. Additional comments on the December 2009 version are attached in Appendix A to this letter.

Keating Channel Precinct Plan

TRCA staff provided written comments on the Keating Channel Precinct Plan, received on March 13, 2009, in our letter dated April 2009. A response to these comments was not provided with the latest version of the Precinct Plan, dated December 2009, received February 3, 2010. Please provide a response to these comments on the earlier version as it does not appear that the revised version has addressed some or all of them. Additional comments on the December 2009 version are attached in Appendix A to this letter.

Keating Channel Urban Design Guidelines

Comments are provided in Appendix A.

Draft Official Plan Amendment

Comments are provided in Appendix A.

Draft Zoning Bylaw

Comments are provided in Appendix A.

We trust this is of assistance. Please contact me if you have any questions.

Sincerely,

Steven Heuchert, MCIP, RPP, MRTPI
Manager, Development Planning and Regulation
Planning and Development
Extension 5311

cc: Raffi Bedrosyan, Waterfront Toronto
Brenda Webster, Waterfront Toronto
Liz Silver, MVVA
Gwen Mcintosh, City of Toronto
Kathy Thorn, City of Toronto
Christian Giles, City of Toronto
Carolyn Woodland, TRCA
Adele Freeman, TRCA
Laurie Nelson, TRCA
Ken Dion, TRCA
Don Haley, TRCA
Margaret Pak, TRCA

Appendix A

#	TRCA Comments	Waterfront Toronto Response
Lower Don Lands Framework Plan - Please respond to the comments in our letter of September 18, 2009. The following additional comments refer to the latest version of the Framework Plan and continue the numbering scheme.		
4.	Page 12 - Please add the Lower Don River West Remedial Flood Protection Project to the list of related planning documents. The OPA and ZBA for the Keating Channel Precinct cannot proceed without the completion of the flood protection landform and the railway bridge extension which are part of this EA.	
5.	Page 17 - Water Area. The plan of the new river does not show the extensive lake-connected wetland area in reaches 4, 3, 3a and 2. Please add these additional "water areas" to the plan so that it is clear these areas are not available for active recreational facilities.	
6.	Page 19 - First paragraph. The Keating Channel is described as a "functioning waterway." However, in reality, the channel will have weirs in the east and relatively low fixed link bridges. Please clarify what sort of functions are proposed for the channel in keeping with its design limitations.	
7.	Page 26 - Last paragraph on left column. It may be appropriate to add recent information prepared by TRCA's consultants which identifies that potential flood damages in the Port Lands and South Riverdale area under existing conditions could be in the hundreds of millions of dollars under a Regulatory Flood event.	
8.	Page 29 - first paragraph regarding "It has since been determined.... ". This sentence is not accurate. Under the exact conditions of the Secondary Plan where all the water went through 480 Lake Shore, it was accurate. However, prior to the design competition, the DMNP EA had already revised the range of alternatives to incorporate an enhanced greenway that functioned as flood conveyance and provided significant opportunities for wetland development. In fact, the 4W alternative has more wetland habitat than 4WS. This was done with only minor modifications to the Secondary Plan as shown. However, the main benefits of the alternative 4WS through the design competition was the fact that it resolved the infrastructure knot we were faced with in 480 Lake Shore, the quality of habitat due to moving the valley away from 480 Lake Shore, the private land owner issues faced west of Cherry Street, the significant soil contaminants in 480 Lake Shore, and the huge socioeconomic benefits of putting the river in the middle of the Lower Don Lands rather than constraining it against the side of the railways. These were the reasons why the design competition was held, not because of the fact we could not convey floods and provide green space. The Commissioners Park statements are also minor compared to the issues identified above. The park could have been designed with relatively minor changes in grade which would have meant that the playing fields could not be used during severe rainfall events when flows would have overtopped the naturalized channel and gone south through Commissioners Park.	
9.	Page 30 – SPA. We understand that City Planning is considering options to address the SPA and the required approvals by the MMAH and MNR. We have provided suggested OPA language to address the SPA to City Planning under separate cover, and discussions continue. This section of the Framework Plan will need to be	

	updated to reflect the City's preferred approach to the SPA.	
10.	Page 35 - First paragraph. It may be limiting to refer specifically to "combined facilities." If a number of dedicated, pre-installed, smaller conduits/facilities are installed which result in less shoring or less health and safety issues, then that would suffice. The key message is to install these facilities during the construction of the valley so that one does not need to go back afterwards and disturb the ecological components, the river and valley system, and potentially expose underlying contaminated soils or groundwater to the natural environment. In addition, the issue of sediment management will have little if any input to the conveyance and clearance standards for any crossings.	
Keating Channel Precinct Plan - Please respond to Comment No. 9 a – s, in our letter of April, 2009. The following additional comments refer to the latest version of the Precinct Plan and continue the numbering scheme.		
9.	t. Page 10 – 2nd Paragraph. Please mention that the implementation of the Lower Don River West Remedial Flood Protection Project allows for the Keating Channel Precinct Plan to proceed as it eliminates of the risk of flooding. u. Page 31 – Figure 23 makes it seem that the Don Mouth EA only addresses changes south of the Keating Channel - should include Keating and promontory, north of Lakeshore and Don Narrows. v. Page 16 – Please mention why First Nations archaeological artifacts were not considered likely to be encountered in the Keating Precinct, despite being located at the mouth of a river where a major wetland used to exist. Please also mention how additional studies and construction monitoring will be incorporated to minimize the potential for impacts to any unknown First Nations artifacts that may underlie the area. w. Page 31 – Figure 23. This figure makes it seem that the DMNP EA only addresses changes south of the Keating Channel. Rather, it should include Keating Precinct and promontory, lands north of Lake Shore and the Don Narrows. x. Page 31 – first paragraph. Should state "As part of the DMNP EA process, a *number* of alternative river alignments…". y. Page 45 - Emergency Services. This would be a good place to mention that emergency watercraft will be accommodated in the Keating Channel as well. z. Page 49 - Has the team looked at whether simply placing rocks along the base of the Keating Channel walls will be sufficient to retain the walls in place, especially once additional loadings are placed on the adjacent areas, or will a significant reworking of the tie-backs and walls also be required. The image on Page 50 illustrates additional tie-backs. Should it be mentioned in the main text that there may be a need for additional reinforcement, depending on the condition of the dockwalls, so that it is not a surprise in the future if needed. Perhaps Waterfront Toronto's dockwall conditions survey results can be incorporated here? aa. Page 50 - Last paragraph. In the absence of any supporting modeling, it may be premature to state that the extra depth will provide enhanced circulation in the Keating Channel. We recommend that the sentence should instead state that there will be an examination of a range of passive and active techniques for ensuring circulation within the Channel (ie. change in depth, use of stormwater, modifications to the weirs, and active pumps may be some of the considerations).	

		bb. Page 60 - Image of rowing crews. Rowing crews in the Keating Channel are not likely as the channel is far too short for this. Typically one needs at least 2km or a loop course. Perhaps images of canoes/kayaks rather than rowing shells is appropriate here. cc. Page 61 - 1st paragraph. The wetlands mentioned here, if they occur, will be considered landscape features rather than functioning wetlands. This also is the location for the vertical storage tanks for CSO discharge identified in the Don River and Central Waterfront Project. This should be mentioned as well as it would supersede the wetland landscaping idea if space is insufficient to accommodate both. dd. Page 68 - First paragraph. Through our discussions with the Toronto Port Authority on the DMNP EA, the TPA have on numerous occasions identified significant concern about the potential for encouraging small recreation craft in the Ship Channel. This section with the text and the map clearly encouraging canoists and kayakers to the Ship Channel would be highly problematic for the TPA based on those past discussions. Small vessels cannot be seen from the bridge deck of freighters in the confines of the Ship Channel according to the TPA. Boaters are going to access the channel on their own anyways, but placing this in the Precinct Plan may raise expectations for the public that this is an official recreational waterway, not an industrial navigation channel that anticipates increased shipping volumes over time. ee. Page 68 – Figure 56. The figure suggests that boaters will be able to move directly from the Keating Channel into Reach 2. However, the weirs will be a barrier. Is this a portage? ff. Page 86 - Paragraph 2. Major stormwater systems need to meet the City's standards, which is the 1:100 year event and not the Regulatory Event. gg. Page 89 – Figure 74. This figure seems out of date based on discussions with City on the Don River and Central Waterfront Project. Furthermore, the entire design of stormwater flow patterns is premature, given that the filling of the site will create significant overall challenges and a need to also coordinate with the next Precinct Plan to the south. We are of the opinion that the stormwater system cannot be designed in the absence of a comprehensive fill strategy for all lands between the new Don Mouth and the Keating channel. The flow direction should and could be then defined to drain north into the Keating Channel should additional waters be required to manage circulation issues. hh. Page 100 – Figure 83. Munition Street Bridge. Please state that the bridge needs to ensure adequate hydraulic conveyance. ii. Page 110 - The Precinct Plan includes a number of items, including preliminary stormwater and infrastructure designs which do not reflect the potential need to fill to contain flood flows or for any RA/RM requirements, such as capping, pre-loading, etc. As such, many of these infrastructure elements may require a redesign affecting some of the planning components. Specifically, the overall drainage design south of the Keating channel may change as a consequence of fill required for flood protection.. jj. Page 111 – EA Approvals. Please reference the need to complete the flood protection landform through the implementation of the LDRW EA prior to development proceeding north of the Keating Channel. kk. Page 111 – Municipal Planning Approvals. Please reference the need for the municipality and the Province of Ontario to lift the Special Policy Area from the lands north and south of the Keating Channel and west of the Don Roadway prior to implementing the proposed land uses. Also, please revise this section to reflect	

	the City's decision regarding the scope of the Zoning Bylaw to be pursued at this time.	
Keating Channel Urban Design Guidelines		
1.	a. Page 13, Relationship to Other Documents. The entire study area, especially south of the Keating Channel and perhaps even on the north side will be required to be raised to contain the floodplain as designed through the DMNP EA. This has significant impacts on the urban design. However, no mention of the DMNP EA is made on Page 13. b. Page 75 - Section 3.23. The sentence "In the context of redirecting the river waters away from the Keating Channel, the channel waters become essentially lake-fed, which means that the water quality relative to the pedestrian experience will be significantly improved" may be misleading. Assuming that circulation issues are resolvable, simply cutting the river off will not improve water quality. In fact, without other measures, it may make it worse. c. Page 93, Stormwater management. The last sentence relates to the introduction of a coordinated stormwater management system north of the Keating Channel, which we understand is already underway. The stormwater management system south of the Keating Channel will be independent in design and fill requirements will have impacts on overall stormwater management (see Comment 9.gg., above). This should be recognized. In addition, filling south of the Keating Channel will create design issues related to all bridge crossings. The elevations north of the channel will need to come close to elevations south of the channel to accommodate the appropriate bridge deck angle, especially for transit vehicles. d. Page 123 - Historic Tracings and Heritage. There should be some mention for First Nations engagement in celebrating their heritage within the area.	
Draft Official Plan Amendment		
1.	The lands south of the Keating Channel, and in the vicinity of the 480 Lake Shore site, are entirely or almost entirely impacted by the Regional Storm Floodplain. In addition, part of these lands is within the in-force and effect Lower Don Special Policy Area in the former City of Toronto Official Plan. As such, the regeneration of these lands is entirely dependent upon the preliminary remedial flood protection works identified in the DMNP EA being implemented, and any Official Plan Amendment to reconfigure land uses must meet the Provincial Policy Statement with respect to Natural Hazards. As such, a prohibition on the consideration of Zoning Bylaw Amendments within the Lower Don Lands until the remedial flood protection works are complete, as well as the lifting of the SPA, must be included within the language of the OPA. We have provided some suggestions to City Planning in this regard under separate cover. The Province of Ontario must approve those portions of the OPA within the SPA.	
2.	Page 2 – Preface, Points 8 and 9. The text refers to a new Natural Heritage corridor fulfilling a variety of functions, including "neighbourhood recreation" and "compatible community uses." The Preface needs to be clear as to what those uses are and where they can be appropriately located. Structures (with the exception of erosion/flood control structures) and active recreation uses must not be located within the new valley system. The new valley system which includes new top of bank plus 10 metres should be illustrated on the various proposed Secondary Plan Maps.	
3.	Map C. There is an "Inner Harbour Special Area" identified on the greenway wetland. Similar to the other "Special	

	Areas" illustrated on the map, we assume the intent is for this area to be used as a major public congregation place. However, this area is the most significant new natural area in the Lower Don Lands, and should not be confused with a congregation area with major public access.	
Zoning Bylaw Amendment		
1.	We understand that the scope of the ZBA is being reduced, and will be limited to the East Bay Front portion of the Lower Don Lands. The preliminary preferred alternative for the DMNP EA no longer includes these lands as being required for flood conveyance. These lands will also be removed from the Regional Storm Floodplain upon completion of the flood protection landform. As such, a Holding Provision should be placed on the lands. Recommended language for the lifting of the H should be consistent with that used for other projects in the Lower Don SPA, as follows: • *The Holding Designation shall not be lifted until the Owner receives a letter from the TRCA stating that the TRCA is satisfied that the flood protection landform is structurally and functionally complete as one continuous landform (including the completed north tie-in and south tie-in) to a rough-grade condition on the dry side and to a final-grade condition with initial hydro-seeding on the wet side. For certainty, "rough-grade condition" does not mean or include final grading, hydro-seeding or the construction of any parklands or walkways.* • *The Holding Designation shall not be lifted until the Don Mouth Naturalization and Port Lands Flood Protection EA is approved by the Ministry of the Environment and it is confirmed that the preferred alternative does not limit the ability to develop the subject property for its intended use under this Zoning Bylaw Amendment.*	

April 26, 2010

CFN 42571
XREF CFN 40670

VIA MAIL AND E-MAIL

Jamie McEwen
Waterfront Secretariat
Toronto City Hall
100 Queen St W
Toronto, ON M5H 2N2

Dear Mr. McEwen:

Re: Lower Don Lands – Lower Don Lands Infrastructure Master Plan and Keating Channel Precinct Environmental Study Report
City of Toronto (Toronto and East York Community Council)
Waterfront Toronto
Toronto Transit Commission

Thank you for the opportunity to review the February 2010 submission for the Lower Don Lands Master Plan and Keating Channel Precinct ESR. I have reviewed the main report and I offer the following comments in Appendix A. Please be advised that these comments reflect how the proposed document relates to the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA) and does not represent a consolidated review of the full TRCA plan review team. TRCA will be providing more comprehensive comments in the near future.

General

With regards to Appendix A, particular attention should be made regarding the:

- dimensions of the proposed Lake Shore Boulevard crossing of the Don;
- discussion about the impacts on and consistency with the DMNP EA; and
- discussion regarding utilidors.

Instructions regarding the formalized response to the enclosed and comments to come will be provided as part of TRCA's formal response from Margaret Pak, Planner II, TRCA.

We trust this is of assistance. Please contact me if you have any questions.

Sincerely,

Kenneth Dion, MSc
Senior Project Manager
Watershed Management Division
Extension 5230

cc: Raffi Bedrosyan, Waterfront Toronto
Brenda Webster, Waterfront Toronto
Liz Silver, MVVA
Gwen Mcintosh, City of Toronto
Kathy Thorn, City of Toronto
Christian Giles, City of Toronto

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Carolyn Woodland, TRCA
Adele Freeman, TRCA
Laurie Nelson, TRCA
Ken Dion, TRCA
Don Haley, TRCA
Margaret Pak, TRCA

Appendix A
Comments on Lower Don Lands Infrastructure Master Plan and Keating Channel Precinct Environmental Study Report (February 2010)

	Page and/or Fig #	Comment	Comment Addressed By:	Response to Comment
	Page 2-8 top of page	Identify impacts to other forms of navigation as well as shipping (i.e.: emergency vessel access, and recreational crafts (motorized and non))		
	Page 2-12 Section 2.7	In Section title, use proper Project Name – Don Mouth Naturalization and Port Lands Flood Protection Project EA (DMNP EA) and in 1st paragraph last sentence, change to DMNP EA		
	Page 2-12 Section 2.7: Last paragraph, last sentence	Does not describe the river appropriately – the following provides a more accurate description, which may be modified for clarity: *During large flood events, flows will be diverted through three separate flow paths. The first is the new primary naturalized river valley that continues south along the Don Roadway until Commissioners where it is turns west to the Inner Harbour along the old Commissioners road alignment. The second flow path continues west through the Keating Channel as before, after flood waters reach a certain level where they are able to overtop new weirs that will be installed at the east end of the Keating Channel. The third flow path provides additional flood relief during very large events through what is known as the Ship Channel Wetland or Greenway. This Greenway provides the largest, continguous wetland habitat in the naturalized area of the mouth of the Don and will be connected hydraulically with lake levels through the Ship Channel.*		
	Page 2-13 First line	Should be referenced as DMNP EA		
	Page 2-13 last paragraph first line	Change to DMNP EA. Other functions provided by the DMNP EA are the hydraulic conveyance requirements for each bridge crossing, and to provide recommendations into the design and location of infrastructure crossings and stormwater management approaches.		
	Figure 3-1	Dated image of tracks to Red Path and in Lower Don Lands; Outdated image for Don Trail at CN bridge underpass at Don River (does not show new channel and path alignment – which was changed before this EA started) – including underpass that was completed to future Don River Park under Bala.		
	Page 3-32: Bicycle Network	During consultation with the public, it was raised that high performance road bikers currently train in the Port Lands on the weekend– down Commissioners, Cherry, Unwin, Leslie then back to Commissioners……		
	Page 3-33: Bottom of page	Redpath Sugar lines are gone.		
	Figure 3-16	The Tedco lines were no longer in service down the Don Roadway and west along the Ship Channel - need to show those in blue.		
	Figure 3-19	The blue layer depicting the river and lake is covering up most of the other layers of information – order needs to be changed.		
	Page 3.2.3.2 Hydro – Last Paragraph	The Hydro One underground conduits also leave the transformer station with some heading north along the west bank of the river, and several crossing east over the Don River on a utility bridge before crossing under the Don Roadway		

		to the east side of the road, where they trend south and then east to the Keating Yards.		
	Page 4-44: first sentence	Should be "shown" not "show"		
	Page 4-45, Section 4.3, second paragraph	o Add "…a low flow channel, floodplain, **river valley,** and promontory…" o Next sentence, use the text from section 2.7 provided above to revise the description of the valley system - as provided it is unclear.		
	Page 4-50, section 4.4, bullet a)	Add "and they do not provide the required conveyance capacity to pass the Regulatory Flood event".		
	Chapter 5: GENERAL COMMENT	Please contact AECOM Markham to make recent changes in text in existing conditions for DMNP EA are reflected in Chapter 5		
	Figure 5-1	ESA layer was removed		
	Page 5-60: Flora and fauna species	Please ensure that species identified in the source report reflect those conditions of the Study Area, rather than a summary of the entire area - otherwise species compositions look much better for area than they really are for the Keating Precinct. These are discussed properly Chapter 17, but should be clearly here as well.		
	Figure 5-2	Should mention the change in ownership in properties from private to public ownership since 2007		
	Page 5-74: 4th paragraph	Sentence starts "A recent study in Toronto…" The reference date is 2000. … I would change to "A study conducted in 2000 in Toronto…."		
	Page 6-92: item f) for Cherry Street	Change to "f) capability of providing crossings over the future Don River valley and Keating Channel to meet the flood conveyance and navigation requirements specified in the DMNP EA;		
	Page 6-94: item c) for Lakeshore Boulevard	Similarly, needs to meet navigation requirements under DMNP EA as well. Should recommend need to provide tie-off points on new piers for the weirs proposed in the DMNP EA.		
	Page 6-97 for Commissioners	Need to add a feature: g) capability of providing crossings over the future Don River valley to meet the flood conveyance and navigation requirements specified in the DMNP EA (for future Commissioners St Bridge)		
	Page 6-99 for all other Keating Channel crossings	Feature required add: e) capability of providing crossings over the Keating Channel to meet the flood conveyance and navigation requirements specified in the DMNP EA		
	Page 6-101 for Don Roadway	Issues and Opportunities: please add here as "d) allow for up to 2 slurry conveyance pipes with vertical maintenance risers every 100m between Lake Shore Boulevard to intersection with future Basin St extension." - (double pipe system allows for dredging to continue in the event of a clog, or during maintenance/replacement of a pipe)		
	Page 6-104 for Basin Street	Same as stated for Don Roadway. Another element, the causeway of the future Basin Street should allow for moorage areas for dewatering equipment and sediment barges. This would be another feature to be accommodated in the next steps of the ESR		
	Page 8-142, last paragraph, second	There were two pollutants of concern in urban areas, chloride, which was mentioned. The other was spills which can occur anywhere and at any time of		

	sentence	the year		
	Page 8-143, first paragraph	The use of riverine wetlands is inconsistent with the DMNP EA. It should be changed to lake-connected wetlands. In addition, the roof-top stormwater would go to artificial aquifers built into the future river valley side slopes to form unique "seepage wetlands"… The roof top water does not go directly to the riverine wetlands ("lake-connected wetlands").		
	Page 8-150: second and third paragraphs under Water Quantity	The DMNP EA provides direction that storm run-off from non-green-roof sources will go either to the Keating Channel, Ship Channel or Inner Harbour. We are only anticipating flows to the naturalized river channel from the green-roof areas for the seepage wetlands… Way the text is written, looks like road run-off can go either way.		
	Figure 8-1	Please revise terminology of "High Quality Wetland" = "Seepage Wetland" and "Riverine Wetland" = "Lake-Connected Wetlands" to be consistent with DMNP EA.		
	Figure 8-2	Legend needs to be updated as discussion in Figure 8-1. Wetland area in Ship Channel Wetland (Greenway) seems smaller than it should.		
	Page 8-153: Water Quality	Again terminology for seepage wetlands and lake-connected wetlands needs to be revised.		
	Figure 8-13	The outfall and conveyance pipe at the west end of the expanded Lakeshore Boulevard appears to be a bit too far east as it intersects with the proposed bridge and bisects the adaptable weir on the north side…. Please revise to avoid conflict with critical infrastructure.		
	Chapter 10.1.3 Individual Street Links	Please reinforce conveyance requirements in this summary section for the Basin, Cherry, Commissioners, Lake Shore and Keating Channel crossings. In addition, details on the weirs for Lakeshore, raising roadbed for Don Roadway, slurry pipes for Don Roadway and Basin St, and mooring and operating space for the dewatering facility and barges at Basin St should be summarized.		
	Page 10-176	The DMNP EA recommends that water and wastewater crossings under the naturalized portions of the future river valley, should be preinstalled with the construction of the valley, and that future infrastructure crossings (after the establishment of the naturalized areas), maintenance and replacement works would use non-dig techniques. The DMNP EA also recommends that the location where crossings under the naturalized component be minimized to 2 or 3 specific locations. Though the Master Plan gets into details about the use of utilidors, which TRCA supports, it is the function of the utilidors which is of particular importance in the DMNP EA (i.e.: limits where infrastructure is permitted to cross the valley, and eliminates the need for open cut excavations once naturalized areas are established). If alternative approaches can be devised that meets the function of these utilidors (i.e.: pre-installing a series individually placed conduits to meet the existing and future utility needs for the area), the requirements of the DMNP EA would be satisfied.		
	Figure 10-7	Very blurry basemap.		
	Table 10-1	Under EOP (Sedimentation) for Public Park and Open Space: Dry and Wet Pools were classified Green. These storm water management ponds are not acceptable if they enter into the valley system as they would eliminate habitat features that form the basis of the DMNP EA approvals.		

	Page 12-217: Lakeshore crossing:	Existing services and utilities: It is recommended in the report to relocate infrastructure under the river upstream of the crossing. This is in the area of the sediment trap and adaptable weir.... What is the proposed depth for this infrastructure to avoid scour of the river and to avoid impacts with the dredge? What are the mitigation factors proposed to avoid damages.		
	Page 12-222: Navigational Clearances	Should include emergency vessels, and other sediment management barges (in addition to the dredge barge, as required)		
	Page 12-223: Hydraulic Requirements	A landform is referenced... Unclear what this is in reference to.		
	Page 12-225	End of page seems to cut off mid-sentence... Is Page 12-226 missing?		
	Page 13-237: Top of page	See comment for Page 10-176.		
	Page 13-237: Approval requirements: 13.1.10.1	TRCA will also ensure that LDL works proceed in conformance with the DMNP EA beyond EA approvals.		
	Page 14-246: Table 14-1	This review of alternatives, states equal impacts to DMNP EA – to state this, studies would need to have been conducted to determine whether each alternative will: • have equal impacts on water quality in the Keating Channel as it relates to contaminants and circulation; • not affect the configuration of the wetted area of the Keating Channel, nor the placement of rock along the dockwalls of the Keating Channel (differences in either can impact the Channel's ability to convey flood flows, and the quantity of fish habitat in the Keating Channel); • not impact the ability to periodically utilize dredge barges in the Keating or to move barges through the Keating; and • not impact the functioning of the adaptable weirs in the east end of the Keating. Have these been done?		
	Page 14-248: 14.3	Please add a drawing of the preferred.		
	Page 14-248: second to last bullet Page 14-248	Please confirm that the outlet of this tank north of Lakeshore will discharge into the Keating without impacting the operations of the proposed sediment management facility, nor impact the operations of the proposed adaptable weir north of Lakeshore.		
	Figure 15-8	We compared the dimensions of the proposed Lakeshore Crossing in this figure with the crossing code used in the Delft Model for the DMNP EA. We identified that there was an approximate 10% reduction in total hydraulic capacity under the Lakeshore crossing in the Class EA drawing (94.6m), versus the capacity depicted in the Delft Model (105.70m). The LimnoTech EFDC model depicted a hydraulic capacity under Lakeshore of 97.41m. This variability reflects the slight variation in grid layout used to establish both models.		

		Given the lack of freeboard associated with this crossing, this reduction in capacity was deemed potentially problematic. LimnoTech did identify that the results between the EFDC and Delft model remained similar, despite the 8m difference in capacity under Lakeshore Boulevard between both models. Further analysis determined that the main difference between the Delft model and the Class EA drawings were due to the planform thickness of the piers, with the drawings showing wider piers than depicted in the Delft model. To provide an additional level of confidence, we revised the pier widths in the Delft model to better reflect the dimensions of the Class EA drawing. The results indicated little change in water levels between the four outside spans. However, the central span depicted what appears to be a hydraulic jump of about 0.5m. Further refinement of the model is underway and will be ready to discuss later this week (week of April 26) The modeling suggests that we are able to convey the Regulatory Flood with the available footprint for the Lakeshore Crossing. However, it will need to be confirmed during the detailed design phase whether minor changes in the design of the piers is required (narrowed) to ensure conveyance of the Regulatory Flood. The results suggest that a physical model will likely be required during the Detailed Design Phase, to confirm the results of the hydrodynamic models.		
	Page 15-262	Existing infrastructure attached to Lakeshore Bridge crossing. Recommendation is to bury. Please confirm depths, and location and additional protections to prevent exposure or damage due to scour and/or dredging.		
	Page 15-262: Last paragraph	Can confirm in 2008 that Red Path spur was gone		
	Figures 15-14 and 15-15	Formatting/legends not entirely consistent between the two. Do not depict major system flows south of Keating Channel.		
	Section 16	Please refer to DMNP EA by appropriate title, rather than Don Mouth Naturalization Project throughout section.		
	Page 17-289 – 17.1.5 – 2nd paragraph	Flooding "from the river will be eliminated" (not reduced) with the implementation of the flood protection works, combined with the necessary filling of lands within the Keating Precinct to the necessary grades (on both sides of the channel) - Please provide proposed grading plans for both sides of the Channel.		
	Page 17-289 – 17.1.5 – 23rd paragraph	Confirm major system flows in document are discharged to the Keating Channel or directly into the Inner Harbour.		
	Page 17-291 – Section 17.2.5 Marine Uses	The plan depicts portages at the east end of the Keating Channel to allow canoe access with naturalized river. Portages are federally regulated under NWPA… Though anticipated to be covered under the DMNP EA, this should be acknowledged here. Should also accommodate emergency water craft, the sediment barges and the hydrocyclone if deemed necessary to operate in the east end of the Keating.		
	Page 17-294 onwards regarding utilidors	Please see comments from Page 10-176. Please use consistent terminology for the DMNP.. Not New Don Mouth River Valley….		

	Figure 17-5	There used to be a utility crossing connecting SW precinct with Filmport District Precinct… Appears to be gone – Is that correct?		
	Page 17-302: 17.3.3 Aboriginal interests	The Keating Precinct is in the Mississaugas of New Credit Claim area. The Claim seeks financial compensation from the Federal government. A tentative offer was made in January 2010, which the Mississaugas were to vote on through a referendum. It is anticipated that continued consultation with the Mississaugas of the New Credit will be required throughout the detailed design and construction processes. Some additional text regarding the need to monitor the construction works to ensure that in the event aboriginal artifacts are encountered, proper response protocols are implemented…. See the DMNP EA for similar text.		
	Page 17-303: Section 17.4.1	o Should mention that redevelopment of the western portion of the Keating Precinct (Cherry Street westward) is not permitted until the completion of the Lower Don River West Remedial Flood Protection Project works in the WDL. o For the south side of the Keating Channel, no redevelopment can proceed until the DMNP EA has been implemented in its entirety. o Similarly, new bridge crossings over the Keating Channel are not permitted where filling of the Keating Channel is required until the new naturalized river channel has been completed.		
	Page 17-304	Explain what an mBGS is for the public		

Appendix 16-A4

First Nation Notification

WATERFRONToronto

TORONTO

Toronto Transit Commission

March 5, 2009

Chief James Marsden
Alderville First Nation
PO BOX 46
Roseneath, ON, K0K 2X0

RE: Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment

Dear Chief Marsden:

I am Ken Dion, a Project Manager at the Toronto and Region Conservation Authority (TRCA). Since 2002, TRCA has been working with Waterfront Toronto on a number of projects which focused on eliminating flood risk, remediating extensive areas of contaminated soils and groundwater, and increasing the amount of green public space as part of the efforts to revitalize the Toronto Waterfront. Most recently we have been undertaking the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA).

The goal of this project is to transform derelict former industrial lands into a more natural river mouth for the Don, protect 230 hectares of land currently at risk to flooding to the east and south of the river, and integrate this new natural area within the developing urban fabric of the City of Toronto. Enclosed is a map of the study area and proposed new alignment of the Don River, as well as a number of newsletters that have been produced through the DMNP EA.

In March 2008, a preferred river alignment was selected following a detailed evaluation of alternative river alignments at the mouth of the Don. We have since been working with Waterfront Toronto and their consultants to further develop a conceptual design for the naturalized river mouth, based on the preferred alignment.

A component of the DMNP EA is to look at opportunities for improving the quality of habitat within the Don Narrows, which will not increase the frequency of flooding on the Don Valley Parkway to the east and Bayview Avenue to the west. The Don Narrows refers to the narrow and straightened lower reaches of the Don River that extend from the Keating Channel in the south to Riverdale Park in the north (just south of the Bloor Street Viaduct).

The planning is now approaching a key stage within the EA process; the presentation of the preliminary conceptual design, which we hope to present to the general public on Saturday May 9, 2009.

As this project is located within the area of the Toronto Purchase Specific Claim, TRCA has to date, focused our consultation efforts with the Mississaugas of the New Credit First Nation, having attended a number of their Council meetings, and providing on-going correspondence throughout the planning process.

However, we have recently received advice that our efforts to consult should have included the four other Mississauga First Nations that were signatories to the 1923 Williams Treaty's, given that the ecological improvements that are anticipated at the mouth of the Don River should provide spin-off ecological benefits that will likely propagate further upstream in the Don River.

In light of these recommendations, TRCA would like to extend an invitation to the Alderville First Nation to participate in the consultation for the Don Mouth Naturalization and Port Lands Flood Protection Project EA. We would be pleased to meet with your Council to discuss the project more fully.

If you wish to receive more information than has been provided herein, or if you have any other comments, questions or concerns about the project, please contact me at your convenience at (416) 661-6600 (ext. 5230) or by email at kdion@trca.on.ca.

Sincerely,

Ken Dion, MSc
Senior Project Manager
Watershed Management Division

Cc.: Adele Freeman, TRCA
Jamie McEwan, City of Toronto
Brenda Webster, Waterfront Toronto

March 5, 2009

Chief Irvin Knott
Curve Lake First Nation
General Delivery
Curve Lake, ON
K0L 1R0

RE: Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment

Dear Chief Knott:

I am Ken Dion, a Project Manager at the Toronto and Region Conservation Authority (TRCA). Since 2002, TRCA has been working with Waterfront Toronto on a number of projects which focused on eliminating flood risk, remediating extensive areas of contaminated soils and groundwater, and increasing the amount of green public space as part of the efforts to revitalize the Toronto Waterfront. Most recently we have been undertaking the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA).

The goal of this project is to transform derelict former industrial lands into a more natural river mouth for the Don, protect 230 hectares of land currently at risk to flooding to the east and south of the river, and integrate this new natural area within the developing urban fabric of the City of Toronto. Enclosed is a map of the study area and proposed new alignment of the Don River, as well as a number of newsletters that have been produced through the DMNP EA.

In March 2008, a preferred river alignment was selected following a detailed evaluation of alternative river alignments at the mouth of the Don. We have since been working with Waterfront Toronto and their consultants to further develop a conceptual design for the naturalized river mouth, based on the preferred alignment.

A component of the DMNP EA is to look at opportunities for improving the quality of habitat within the Don Narrows, which will not increase the frequency of flooding on the Don Valley Parkway to the east and Bayview Avenue to the west. The Don Narrows refers to the narrow and straightened lower reaches of the Don River that extend from the Keating Channel in the south to Riverdale Park in the north (just south of the Bloor Street Viaduct).

The planning is now approaching a key stage within the EA process; the presentation of the preliminary conceptual design, which we hope to present to the general public on Saturday May 9, 2009.

As this project is located within the area of the Toronto Purchase Specific Claim, TRCA has to date, focused our consultation efforts with the Mississaugas of the New Credit First Nation, having attended a number of their Council meetings, and providing on-going correspondence throughout the planning process.

However, we have recently received advice that our efforts to consult should have included the four other Mississauga First Nations that were signatories to the 1923 Williams Treaty's, given that the ecological improvements that are anticipated at the mouth of the Don River should provide spin-off ecological benefits that will likely propagate further upstream in the Don River.

In light of these recommendations, TRCA would like to extend an invitation to the Curve Lake First Nation to participate in the consultation for the Don Mouth Naturalization and Port Lands Flood Protection Project EA. We would be pleased to meet with your Council to discuss the project more fully.

If you wish to receive more information than has been provided herein, or if you have any other comments, questions or concerns about the project, please contact me at your convenience at (416) 661-6600 (ext. 5230) or by email at kdion@trca.on.ca.

Sincerely,

Ken Dion, MSc
Senior Project Manager
Watershed Management Division

Cc.: Adele Freeman, TRCA
Jamie McEwan, City of Toronto
Brenda Webster, Waterfront Toronto

March 5, 2009

Chief Laurie Carr
Hiawatha First Nation
RR 2, Keene, ON
K0L 2G0

RE: Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment

Dear Chief Carr:

I am Ken Dion, a Project Manager at the Toronto and Region Conservation Authority (TRCA). Since 2002, TRCA has been working with Waterfront Toronto on a number of projects which focused on eliminating flood risk, remediating extensive areas of contaminated soils and groundwater, and increasing the amount of green public space as part of the efforts to revitalize the Toronto Waterfront. Most recently we have been undertaking the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA).

The goal of this project is to transform derelict former industrial lands into a more natural river mouth for the Don, protect 230 hectares of land currently at risk to flooding to the east and south of the river, and integrate this new natural area within the developing urban fabric of the City of Toronto. Enclosed is a map of the study area and proposed new alignment of the Don River, as well as a number of newsletters that have been produced through the DMNP EA.

In March 2008, a preferred river alignment was selected following a detailed evaluation of alternative river alignments at the mouth of the Don. We have since been working with Waterfront Toronto and their consultants to further develop a conceptual design for the naturalized river mouth, based on the preferred alignment.

A component of the DMNP EA is to look at opportunities for improving the quality of habitat within the Don Narrows, which will not increase the frequency of flooding on the Don Valley Parkway to the east and Bayview Avenue to the west. The Don Narrows refers to the narrow and straightened lower reaches of the Don River that extend from the Keating Channel in the south to Riverdale Park in the north (just south of the Bloor Street Viaduct).

The planning is now approaching a key stage within the EA process; the presentation of the preliminary conceptual design, which we hope to present to the general public on Saturday May 9, 2009.

As this project is located within the area of the Toronto Purchase Specific Claim, TRCA has to date, focused our consultation efforts with the Mississaugas of the New Credit First Nation, having attended a number of their Council meetings, and providing on-going correspondence throughout the planning process.

However, we have recently received advice that our efforts to consult should have included the four other Mississauga First Nations that were signatories to the 1923 Williams Treaty's, given that the ecological improvements that are anticipated at the mouth of the Don River should provide spin-off ecological benefits that will likely propagate further upstream in the Don River.

In light of these recommendations, TRCA would like to extend an invitation to the Hiawatha First Nation to participate in the consultation for the Don Mouth Naturalization and Port Lands Flood Protection Project EA. We would be pleased to meet with your Council to discuss the project more fully.

If you wish to receive more information than has been provided herein, or if you have any other comments, questions or concerns about the project, please contact me at your convenience at (416) 661-6600 (ext. 5230) or by email at kdion@trca.on.ca.

Sincerely,

Ken Dion, MSc
Senior Project Manager
Watershed Management Division

Cc.: Adele Freeman, TRCA
Jamie McEwan, City of Toronto
Brenda Webster, Waterfront Toronto

March 5, 2009

Chief Tracy Gauthier
Mississaugas of Scugog Island First Nation
22521 Island Road
Port Perry, ON, L9L 1B6

RE: Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment

Dear Chief Gauthier:

I am Ken Dion, a Project Manager at the Toronto and Region Conservation Authority (TRCA). Since 2002, TRCA has been working with Waterfront Toronto on a number of projects which focused on eliminating flood risk, remediating extensive areas of contaminated soils and groundwater, and increasing the amount of green public space as part of the efforts to revitalize the Toronto Waterfront. Most recently we have been undertaking the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA).

The goal of this project is to transform derelict former industrial lands into a more natural river mouth for the Don, protect 230 hectares of land currently at risk to flooding to the east and south of the river, and integrate this new natural area within the developing urban fabric of the City of Toronto. Enclosed is a map of the study area and proposed new alignment of the Don River, as well as a number of newsletters that have been produced through the DMNP EA.

In March 2008, a preferred river alignment was selected following a detailed evaluation of alternative river alignments at the mouth of the Don. We have since been working with Waterfront Toronto and their consultants to further develop a conceptual design for the naturalized river mouth, based on the preferred alignment.

A component of the DMNP EA is to look at opportunities for improving the quality of habitat within the Don Narrows, which will not increase the frequency of flooding on the Don Valley Parkway to the east and Bayview Avenue to the west. The Don Narrows refers to the narrow and straightened lower reaches of the Don River that extend from the Keating Channel in the south to Riverdale Park in the north (just south of the Bloor Street Viaduct).

The planning is now approaching a key stage within the EA process; the presentation of the preliminary conceptual design, which we hope to present to the general public on Saturday May 9, 2009.

As this project is located within the area of the Toronto Purchase Specific Claim, TRCA has to date, focused our consultation efforts with the Mississaugas of the New Credit First Nation, having attended a number of their Council meetings, and providing on-going correspondence throughout the planning process.

However, we have recently received advice that our efforts to consult should have included the four other Mississauga First Nations that were signatories to the 1923 Williams Treaty's, given that the ecological improvements that are anticipated at the mouth of the Don River should provide spin-off ecological benefits that will likely propagate further upstream in the Don River.

In light of these recommendations, TRCA would like to extend an invitation to the Mississaugas of Scugog First Nation to participate in the consultation for the Don Mouth Naturalization and Port Lands Flood Protection Project EA. We would be pleased to meet with your Council to discuss the project more fully.

If you wish to receive more information than has been provided herein, or if you have any other comments, questions or concerns about the project, please contact me at your convenience at (416) 661-6600 (ext. 5230) or by email at kdion@trca.on.ca.

Sincerely,

Ken Dion, MSc
Senior Project Manager
Watershed Management Division

Cc.: Adele Freeman, TRCA
Jamie McEwan, City of Toronto
Brenda Webster, Waterfront Toronto

TORONTO AND REGION Conservation
for The Living City

April 30, 2009

Chief Kris Nahrgang
Kawartha Nishnawbe First Nation
P.O. Box 1432
Lakefield, ON K0L 2H0

RE: Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment

Dear Chief Nahrgang:

I am Ken Dion, a Project Manager at the Toronto and Region Conservation Authority (TRCA). Since 2002, TRCA has been working with Waterfront Toronto on a number of projects which focused on eliminating flood risk, remediating extensive areas of contaminated soils and groundwater, and increasing the amount of green public space as part of the efforts to revitalize the Toronto Waterfront. Most recently we have been undertaking the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA).

The goal of this project is to transform derelict former industrial lands into a more natural river mouth for the Don, protect 230 hectares of land currently at risk to flooding to the east and south of the river, and integrate this new natural area within the developing urban fabric of the City of Toronto. Enclosed is a map of the study area and proposed new alignment of the Don River, as well as a number of newsletters that have been produced through the DMNP EA.

In March 2008, a preferred river alignment was selected following a detailed evaluation of alternative river alignments at the mouth of the Don. We have since been working with Waterfront Toronto and their consultants to further develop a conceptual design for the naturalized river mouth, based on the preferred alignment.

A component of the DMNP EA is to look at opportunities for improving the quality of habitat within the Don Narrows, which will not increase the frequency of flooding on the Don Valley Parkway to the east and Bayview Avenue to the west. The Don Narrows refers to the narrow and straightened lower reaches of the Don River that extend from the Keating Channel in the south to Riverdale Park in the north (just south of the Bloor Street Viaduct).

The planning is now approaching a key stage within the EA process; the presentation of the preliminary conceptual design, which we hope to present to the general public on Saturday May 9, 2009.

As this project is located within the area of the Toronto Purchase Specific Claim, TRCA has to date, focused our consultation efforts with the Mississaugas of the New Credit First Nation, having attended a number of their Council meetings, and providing on-going correspondence throughout the planning process.

We are in receipt of a letter from your solicitor Mr. Christopher M. Reid (dated April 3, 2009), providing a legal opinion describing the Treaty and Aboriginal rights of the Kawartha Nishnawbe First Nation with respect to traditional harvesting practices and the care and protection of archaeological, cultural and sacred sites. The map accompanying the legal opinion indicates that these rights extend to the project area for our Environmental Assessment study at the mouth of the Don River.

Given this recent information, TRCA would like to extend an invitation to the Kawartha Nishnawbe First Nation to participate in the consultation for the Don Mouth Naturalization and Port Lands Flood Protection Project EA. We would be pleased to meet with your Council to discuss the project more fully.

If you wish to receive more information than has been provided herein, or if you have any other comments, questions or concerns about the project, please contact me at your convenience at (416) 661-6600 (ext. 5230) or by email at kdion@trca.on.ca.

Sincerely,

Ken Dion, MSc
Senior Project Manager
Watershed Management Division

Cc.: Adele Freeman, TRCA
Jamie McEwan, City of Toronto
Brenda Webster, Waterfront Toronto

Appendix 17-A1

Existing Utilities

WATERFRONToronto

TORONTO

Toronto Transit
Commission

Keating Channel Precinct - Utility Conflict Matrix

TSH Project #42-97007
Updated: February 24, 2010

PRELIMINARY

Subsurface Utility Engineers
TSH TBE
Joint Venture

Con #	Utility Size	~ Existing Location (Station)	Affected Length (m)	Assessment of Effects	P. TH #	Resolved ☑	Ref. Rel #
Toronto Water							
1	300 mm	Lakeshore (Don River to Cherry Street)	690	If above 72.5 m this line will have to be either lowered, relocated or raised and supported on a utility bridge. It is assumed to be lower than elevation 76.0 which is the expected elevation of the floodplain channel.			
		Cherry Street	200				
2	2100 mm Tunnel	Lakeshore (Don River to Cherry Street)	690	Can be maintained, plans indicate this tunnel is 30 metres deep			
3	150mm	Lakeshore (Don River to Cherry Street)	80	If above 72.5 m this line will have to be either lowered/relocated or raised and supported on a utility bridge. It is assumed to be lower than elevation 76.0 which is the expected elevation of the floodplain channel.			
4	400mm	Don River (Lakeshore/Don Yd)	270	If above elevation 72.5 m this line will have to be lowered or relocated.			
Sanitary Sewers							
5	300mm / 375mm	Lakeshore (Don River to Cherry Street)	690	Will need to be lowered or supported on a utility bridge if the line is a pressure conduit. If the line is gravity it will need to be lowered using a siphon. It is expected to be lower than the floodplain channel elevation of 76.0 metres to be constructed			
6	300mm	Cherry St	200	Will need to be lowered or supported on a utility bridge if the line is a pressure conduit. If the line is gravity it will need to be lowered using a siphon. It is expected to be lower than the floodplain channel elevation of 76.0 metres to be constructed			
Storm Sewers							
7	450mm / 525mm	Lakeshore (Don River to Cherry Street)	70	These lines can drain to the proposed Don River Channel as well as Keating Channel			
8	450mm / 525mm	Lakeshore (Don River to Cherry Street)	100	These lines can drain to the proposed Don River Channel as well as Keating Channel			
9	525mm/450mm/375mm/300mm	Lakeshore (Don River to Cherry Street)	180	These lines can drain to the proposed Don River Channel as well as Keating Channel			
10	375mm/525mm/600mm	Lakeshore (Don River to Cherry Street)	130	These lines can drain to the proposed Don River Channel as well as Keating Channel			
11	300mm	Cherry Street	200	These lines can drain to the proposed Don River Channel as well as Keating Channel			
Enbridge Gas							
12	500mm VITAL ST HP	Lakeshore (Don River to Cherry Street)	690	Lakeshore Blvd. being re-routed to north - can remain if Utility Easement is obtained for current alignment			
13	500mm VITAL ST HP	Cherry Street	200	Cherry Street being re-routed to west - can remain if Utility Easement is obtained for current alignment			
14	500mm VITAL ST HP	Lakeshore (Cherry to Lower Sherbourne Street)	800	Review grading and layout of Lakeshore Blvd. for conflicts			

Toronto Hydro							
15	Duct Structure	Lakeshore (Don River to Cherry Street)	690	Lakeshore Blvd. being re-routed to north - can remain if Utility Easement is obtained for current alignment			
16	Duct Structure	Lakeshore (Don River to Cherry Street)	690	Lakeshore Blvd. being re-routed to north - can remain if Utility Easement is obtained for current alignment			
17	Duct Structure	Lakeshore (Don River to Cherry Street)	760	Lakeshore Blvd. being re-routed to north - can remain if Utility Easement is obtained for current alignment			
18	Duct Structure	Cherry Street (North Keating Channel to Lakeshore Blvd.)	200	Cherry Street being re-routed to west - can remain if Utility Easement is obtained for current alignment			
19	Duct Structure	Cherry Street (Lakeshore to Mill Street)	200	Existing structure under sidewalk - underpass will be widened, review detailed design for conflicts			
20	Duct Structure	Lakeshore (Cherry to Parliament Street)	430	Review grading and layout of widened Lakeshore Blvd. for conflicts			
Hydro One							
21	115kV Oill Filled pipes	South side of CN Right-ofway from Don River to Cherry Street	680	Will be located under future Lakeshore Blvd. alignment - confirm depths via means of test holes.			
22	115kV Oill Filled pipes	Lakeshore from Lower Sherbourne to Cherry Street	850	Review grading and layout of widened Lakeshore Blvd. for conflicts			
Bell Canada							
23	Duct Structure	Lakeshore (Don River to Cherry Street)	630	Review grading and layout of widened Lakeshore Blvd. for conflicts			
24	Duct Structure	South side of CN Right-ofway from Don River to Cherry Street	350	Will be located under future Lakeshore Blvd. alignment - confirm depths via means of test holes.			
25	Duct Structure	Cherry St (from Lakeshore to Mill Street)	450	Existing structure under sidewalk - underpass will be widened, review detailed design for conflicts			
26	Duct Structure	Lakeshore (Cherry to Parliament Street)	430	Review grading and layout of widened Lakeshore Blvd. for conflicts			
27	Duct Structure	Lakeshore (Parliament to Small Street)	100	Review grading and layout of Lakeshore Blvd. for conflicts			
Pipelines							
28	3-200mm	Keating Channel to Harbour Lead (crossing Lakeshore)	50	Assumed to be abandoned			
29	2-150mm	Keating Channel to Harbour Lead (crossing Lakeshore)	50	Assumed to be abandoned			

Cherry St / CN Rail Underpass - Utility Conflict Matrix

TSH Project #42-97007
Updated: February 24, 2010

PRELIMINARY

Subsurface Utility Engineers
TSH TBE
Joint Venture

Con #	Utility Size	~ Existing Location (Station)	Affected Length (m)	Assessment of Effects	P. TH #	Resolved ☑	Ref. Rel #
Toronto Water							
1	300mm	Cherry Street Underpass	300	Grades under CN Rail being reduced by approx. 2m. Confirm elevation of main and lower as required.			
Sanitary Sewers							
2	400mm C.I. Pipe	Cherry Street Underpass	300	Grades under CN Rail being reduced by approx. 2m. Confirm elevation of main and lower as required. 300mm pipes connecting to 400mm pipe also in conflict, to be lowered as required.			
Storm Sewers							
3	525mm R.C.P.	Cherry Street / Lakeshore Blvd. intersection	300	Grades being reduced due to proposed underpass. Relocate / lower existing Storm chamber and mains as required.			
Enbridge Gas							
4	500mm VITAL ST HP	Cherry Street / Lakeshore Blvd. intersection	300	Grades being reduced due to proposed underpass. Relocate / lower existing main as required.			
Toronto Hydro							
5	Duct Structure & Chambers (2)	Lakeshore (Don River to Cherry St.)	300	Grades being reduced due to proposed underpass. Relocate / lower existing chambers and duct structures as required.			
Hydro One							
6	115kV Oill Filled pipes	South side of CN Right-ofway crossing Cherry / Lakeshore Intersection	100	Grades being reduced due to proposed underpass. Verify depths of existing Hydro One pipes and relocate / lower as required.			
Bell Canada							
7	Duct Structure & Chambers (2)	Cherry Street Underpass	300	Grades being reduced due to proposed underpass. Relocate / lower existing chambers and duct structures as required.			
Pipelines							
8	100mm Fuel Oil Pipeline (Abnd)	Cherry Street Underpass	300	Remove as required			

9	75mm Gasoline Pipeline (Abnd)	Cherry Street Underpass	300	Remove as required			

Lakeshore Blvd. / Don River Bridge - Utility Conflict Matrix

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PRELIMINARY

Subsurface Utility Engineers
TSH TBE
Joint Venture

Con #	Utility Size	~ Existing Location (Station)	Affected Length (m)	Assessment of Effects	P. TH #	Resolved ☑	Ref. Rel #
Toronto Water							
1	300mm	Don River Bridge	50	Existing main withing bridge deck. City to determine if Watermain should be relocated off of Bridge structure			
2	300mm (Abnd)	Don River Bridge	50	Remove existing main as required			
3	2100mm	Under Don River Bridge	0	Existing main located approx. 30m deep beneath Bridge structure. If other utilties are to be placed under Don River ensure to verify horizontal and vertical location.			
Storm Sewers							
4	375mm V.P. (Abnd)	Lakeshore Blvd. at west side of Don River Bridge	50	Remove existing main as required			
Enbridge Gas							
5	500mm VITAL ST HP	Don River Bridge	50	Currently located on Bridge Structure. City advises that no utilities are to be located on Bridge Structure - relocate main under Don River.			
Toronto Hydro							
6	Duct Structure	Don River Bridge	50	Currently located on Bridge Structure. City advises that no utilities are to be located on Bridge Structure - relocate structure under Don River. Relocation may include new chambers on either side of the bridge to tie into the proposed directional bore (due to depth under Don River)			

Trinity St / CN Rail Underpass - Utility Conflict Matrix

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PRELIMINARY

Subsurface Utility Engineers
TSH TBE
Joint Venture

Con #	Utility Size	~ Existing Location (Station)	Affected Length (m)	Assessment of Effects	P. TH #	Resolved ☑	Ref. Rel #
CN Rail Right-of-way							
1	CN Rail Signals	CN Right-of-way	50	Existing CN Signal cables within CN Right-of-way. Cable located in centre of tracks. Support and protect if exposed.			
2	GT/Allstream/TELUS Fibre	CN Right-of-way (South Side)	50	Existing Telecom fibre on south side of CN Right-of-way. Support and protect cables as required during construction.			
3	GT Fibre	TTR Right-of-way (North Side)	50	Existing Telecom fibre on north side of TTR Right-of-way. Support and protect cables as required during construction.			