











BLACK CREEK (ROCKCLIFFE AREA)
RIVERINE FLOOD MANAGEMENT
CLASS ENVIRONMENTAL ASSESSMENT

Toronto Region Conservation Authority



TABLE OF CONTENTS

			Page
	EXE	CUTIVE SUMMARY	ES-1
1.0	INTR	RODUCTION	
	1.1	Purpose/Overview	1
	1.2	Description of Study Area	
	1.3	Background	
	1.4	Class Environmental Assessment Process	2
2.0	BACI	KGROUND INFORMATION REVIEW	5
	2.1	Information Sources	5
	2.2	Technical Drawings and Maps	
	2.3	Models	
	2.4	Reports	
	2.5	Field Reconnaissance	6
3.0	BASI	ELINE INVENTORY	
	3.1	Hydrology	
	3.2	Hydraulics	
	3.3	Risk and Damage	
	3.4	Natural Areas Inventory	
	3.5	Land Use	
	3.6	Social/ Cultural Features	
	3.7	Infrastructure	
	3.8	Summary of Baseline Inventory	12
4.0		ERNATIVE ASSESSMENT	
	4.1	Long-List of Alternatives	
	4.2	Assessment Factors	
	4.3	Short Listed Alternatives Evaluation	24
5.0		FERRED ALTERNATIVE	
	5.1	Primary Recommendations	
	5.2	Secondary Recommendations	
	5.3	Phasing of Works	30
6.0		ICLUSIONS AND RECOMMENDATIONS	
	6.1	Conclusions	
	6.2	Recommendations	33



TABLE OF CONTENTS (cont)

LIST OF FIGURES

Figure 1	Study Area Plan
Figure 1.1	Planning and Design Process
	Class Environmental Assessments
Figure 2	Humber River Watershed and Flood Vulnerable Areas
Figure 3	Black Creek Subwatershed
Figure 4	Creek Reaches and Measures of Flood Risk Depths
Figure 5	Regional Storm Flooding Depths
Figure 6	Environmental Inventory
Figure 7	Land Use Plan
Figure 8	Infrastructure Plan No. 1
Figure 9	Infrastructure Plan No. 2
Figure 10	Photographic Inventory
Figure 11	Reach No. 1 (Humber River to Jane Street)
	Short-Listed Alternatives
Figure 12	Reach No. 2 (Jane Street to Rockcliffe Blvd.)
	Short-Listed Alternatives
Figure 13	Reach No. 3 (Rockcliffe Blvd. to Alliance Avenue)
	Short-Listed Alternatives
Figure 14	Reach No. 4 (Alliance Avenue to Weston Road)
	Short-Listed Alternatives
Figure 15	Grandravine Drive Stormwater Management Flood Control Facility
Figure 16	Preferred Solutions
Figure 17	Change in Flood Risk
Figure 18	Flood Risk for Preferred Alternatives

LIST OF DRAWINGS

Drawing 1 Existing Floodline Mapping Plan

LIST OF APPENDICES

Appenaix A	Public Consultation
Appendix B	Summary of Public Information Centre No. 1
Appendix C	Summary of Public Information Centre No. 2
Appendix D	Community Liaison Committee
Appendix E	General Correspondence
Appendix F	Background Information Photographic Inventory
Appendix G	Cost Estimates
Appendix H	Hydrology and Hydraulics



EXECUTIVE SUMMARY

The 1980 Flood Control Program Watershed Plan, 1980 identified flood damage centres across Toronto Region Conservation Authority's (TRCA's) jurisdiction. One of the flood damage centres identified at that time was the Black Creek, specifically from Weston Road to Rockcliffe Blvd. (Black Creek – Rockcliffe Area). This flood damage centre in 1980 was ranked fifth (5th) out of thirty-one (31) flood damage centres in terms of overall priority.

In recent years, flooding has become more of a concern due to the greater frequency of severe storms leading to higher flows and increased risks of flooding. This is one of the primary reasons the TRCA has updated the 1980 Flood Control Program Watershed Plan. As part of the update, but as a separate standalone study, TRCA is using the assessment process from the "Class Environmental Assessment for Remedial Flood and Erosion Control Projects", Conservation Ontario, January 2002, (amended September 2009), to assess the specific problem of riverine flooding along Black Creek in the Rockcliffe Area. The intent of this study has been to evaluate the causative factors related to riverine flooding within the Rockcliffe Area of Black Creek and based on this understanding, develop various mitigation alternatives to protect private and public property and to reduce the threat to life and limb.

Riverine flooding specifically refers to the flood mechanism related to open water flowing in creeks and rivers, whereby these man-made and natural conveyance systems overtop their banks and flood adjacent lands (i.e. within a floodplain). Riverine flooding can be caused by severe storms simply overwhelming the capacity of the open waterway or through limited capacity at roadway/rail/culvert/bridge crossings (causing backwater) or by blockages at these crossings due to debris and ice. Riverine flood risk is managed by the TRCA through its regulation granted by the Province of Ontario (ref. Ontario Regulations 42/06, 146/06 to 182/06 and 97/04) whereby it manages uses/changes within designated floodplains established through standard conventions. The Black Creek's riverine flood risk zone is based on the floodplain which would be caused by Hurricane Hazel had it centred itself over this watershed.

Flooding can also be caused when the local conveyance systems (storm sewers, combined sewers, and roadways) have insufficient capacity to move stormwater runoff to the receiving systems of creeks, rivers, and the lake. When these local systems flood, the storm sewers surcharge (flood to surface) and the roadways pond and surface flooding occurs. Also in cases where homes have direct connections to storm or combined sewers (either through foundation drains or sanitary lines), basement flooding can occur. Local conveyance systems come under the management of the City of Toronto. Storm sewers are typically designed to a five (5) year design storm standard while overland flow on roadways is typically designed to a 100 year standard. Riverine flooding can affect the capacity of the local conveyance system since high water levels in the creeks and rivers can prevent local systems from draining as effectively as they can, thereby potentially influencing local capacity and flood risk. As such, it is important to have an integrated technical evaluation of the local system which considers the performance of the riverine system concurrently. For this study, Toronto Water (local system) and TRCA (riverine system) collaborated to develop a solid understanding of how the respective systems perform and from this knowledge developed a set of integrated solutions.



The Rockcliffe Area of the Black Creek, a subwatershed of the Humber River, is located near the downstream limit of the subwatershed (ref. Figure 3) and is considered completely urbanized. The watercourse has been straightened and heavily modified over time through concrete lining and numerous bridge and culvert crossings. Historical development has encroached the watercourse's floodplain and has resulted in a significant flood risk to property and life. It has been estimated that the Rockcliffe area exposes over 1800 people to direct flood risk during the Regional Storm (Hurricane Hazel). The low flow concrete channel through the study area, depending on the specific location, has a 5 to 10 year storm flow capacity. Downstream of Jane Street there are approximately 20 homes, as well as Smythe Park, exposed to flood risk during a Regional Storm. Upstream of Jane Street the Regional Storm flooding potential increases with nearly 600 buildings in the Regulatory floodplain due to historical development encroachment and the hydraulics (backwater) caused by the Jane Street crossing.

This study has examined various ways of reducing the flooding potential. A number of alternatives have been developed and assessed, starting with a long-list of alternatives which has been screened to a short-list using functionality related to reduced flood risk, as the key factor for alternative screening. The short-listed alternatives have been further assessed on a reach by reach basis using a detailed evaluation matrix considering specific reductions to flood risk, threat to life and property damage afforded by each alternative. The short-listed alternatives have included the following:

- Jane Street: Upgrade Bridge, Valley Wall Reshaping
- Rockcliffe Blvd.: Bridge Replacement, Adjust Road Profile
- Alliance Avenue: Bridge Elimination(s)
- Jane Street to Rockcliffe Blvd.: Floodplain Grading
- Rockcliffe Blvd. to Alliance Avenue: Floodplain Grading, Low Flow Channel Expansion
- Alliance Avenue to Weston Road: Low Flow Channel Expansion
- Scarlett Road to Jane Street: Berming on north valley wall for protection of residential area
- Jane Street to Rockcliffe Blvd.: Berming of elementary school
- Rockcliffe Blvd. to Alliance Avenue: Berming along Alliance Avenue and Hilldale Road
- Centralized flood control facilities (Grandravine Drive)

Based on the detailed assessment of the short-list of alternatives, a set of preferred alternatives has been advanced for consideration by TRCA and its study partners. The Preferred alternatives have been organized into primary and secondary recommendations based on their ability to specifically address the problem of flood risk. Under each set of recommendations, the alternatives have been considered for short-term and long-term implementation, based on benefits, costs and other factors, as per the following:

Toronto Region Conservation Authority Black Creek (Rockcliffe Area) Riverine Flood Management Class EA, Final Report March 2014



Primary Recommendations:

Short Term

The Primary short term recommendations include continued maintenance of the Black Creek channel system to preserve flow conveyance capacity as it was originally designed, including maintaining the structural integrity of the concrete lined channel.

In addition to on-going maintenance, a flood protection berm along Black Creek Blvd. and Scarlett Road is recommended to be constructed to protect 13 homes to a Regional Storm standard with a preliminary cost estimate of \$ 465,000.00 (+/-).

Long Term

The Primary long term recommendations would include replacing the existing arch culvert at the Jane Street crossing with a higher capacity bridge structure. The Black Creek Valley local to the crossing would also need to be widened to allow for a 200 m (+/-) span (opening) bridge. The preliminary cost range for implementing this alternative is \$25 Million to \$30 Million.

Secondary Recommendations:

Short Term

Flood protection berms should be constructed at the Rockcliffe Middle School on Rockcliffe Boulevard and along Hilldale Road and Symes Road. These would provide protection to the 100 year flood level. Preliminary costs estimates for the Rockcliffe Middle School and Hilldale Road flood protection berms would be approximately \$400,000 and \$900,000 respectively. The Hilldale Road flood protection berm would provide protection to approximately 77 homes, once the Jane Street bridge has been constructed.

Long Term

The creek reach between Rockcliffe Blvd. and Alliance Avenue should be naturalized increasing the system's capacity from the 2 to 5 year to the 10 year storm. This creek reach is approximately 620 m in length and 'naturalization' would cost approximately \$1,600,000. In addition, opportunities to improve the grading within the City of Toronto works area should also be considered by flattening the overbank area north of Rockcliffe Court, which would improve conveyance and reduce local flood risk.

Tables ES.1 and ES.2 summarize the estimated costs of the recommended works along with the anticipated properties and people removed from flood risk for two (2) scenarios, Jane Street Bridge replaced and other recommended works in-place and secondly, recommended works with Jane Street bridge remaining. Projects have been prioritized based on the number of properties and people removed from the floodplain, with the understanding that the Jane Street bridge project is a prerequisite for the Hilldale Road and Rockcliffe Middle School Flood Protection Berm projects.



	Table ES.1: Summary	y Of Recommende	d Works with Jane Street	Bridge Replaced
		Estimated	В	enefits
Priority	Projects	Cost (\$)	Level of Service	Property/People Removed from Floodplain/Others
1.	Jane Street Bridge Upgrade	\$15,000,000 (+/-)	Regional Storm	115 homes, 1 school, 8 businesses, (345 people +/-) removed from Regional Storm floodplain based on resident land uses. Note the school would have 1500 (+/-) people and the businesses would have 380 (+/-) people
2.	Rockcliffe Middle School Flood Protection Berm	\$400,000 (+/-)	Regional Storm	1 school, 400+ people removed from Regional Storm floodplain (complementary to Jane Street Bridge)
3.	Hilldale Road Flood Protection Berm	\$900,000 (+/-)	Regional Storm	77 homes, 231 people removed from Regional Storm floodplain (complementary to Jane Street Bridge)
4.	Black Creek Drive Flood Protection Berm	\$465,000 (+/-)	Regional Storm	13 homes, 39 people removed from Regional Storm floodplain
5.	Rockcliffe Blvd. to Alliance Avenue Channel Widening/Naturalization	\$1,600,000 (+/-)	10 year	Creek naturalization improved flood storage

	Table ES.2: Summary of Recommendations with Jane Street Bridge In-place As Is										
			Benefits								
Priority	Projects	Cost \$	Level of Service	Property/People Removed from Floodplain/Others							
1	Rockcliffe Middle School Flood Protection Berm	\$400,000 (+/-)	100 year	1 school, 400+ people removed from 100 year floodplain							
2	Hilldale Road Flood Protection Berm	\$900,000 (+/-)	100 year	77 homes, 231 people removed from 100 year floodplain							
3	Black Creek Drive Flood Protection Berm	\$465,000	Regional	13 homes, 39 people removed from Regional floodplain							
4	Rockcliffe Blvd. to Alliance Avenue Channel Widening/Naturalization	\$1,600,000 (+/-)	10 year	Creek naturalization improved flood storage							

Based on the assessment of flood risk and management alternatives for the Rockcliffe Area, it is recommended that TRCA commence discussion with the City of Toronto regarding increasing the hydraulic capacity of the Jane Street crossing in an effort to coordinate the project with other City of Toronto infrastructure projects and long-term capital budget planning. In addition, TRCA should commence discussion with the Toronto District School Board regarding the Rockcliffe Middle School Flood Protection Berm.



1.0 INTRODUCTION

1.1 Purpose/Overview

The Toronto Region Conservation Authority (TRCA) has commissioned this study adopting Conservation Ontario's Class Environmental Assessment procedures (2002, updated 2009) as the basis to assess the problem of riverine flooding along the Black Creek (a predominantly urban tributary of the Humber River) from immediately upstream of Weston Road to Scarlett Road (ref. Figure 1). The study has been conducted to determine appropriate measures to address the historical riverine flooding risk in this area and identify other complementary opportunities within the Rockcliffe Area.

Toronto Region Conservation Authority's jurisdictional area covers nine watersheds generally extending from Etobicoke in the west to Ajax in the east. TRCA has updated its Flood Management Program based upon current flood risk mapping building upon the Flood Control Program Watershed Plan from 1980, (ref. Metropolitan Toronto and Region Conservation Authority). The updated Flood Management Program has identified 2270 Flood Vulnerable Areas (buildings) and 336 Flood Vulnerable Roads in the Humber River Watershed alone. As part of the updated Flood Management Program, the Humber River basin has been examined in greater detail for concentrated areas of significant flood risk (referred to as flood clusters). Seven (7) such clusters of flooding have been determined as part of that study. The Rockcliffe Area is one of those and has been selected as a pilot project by TRCA due to its location in the Humber River Watershed, history of flooding and high flooding potential.

The intent of this study has been to evaluate the causative factors related to riverine flooding within the Rockcliffe Area of Black Creek and to develop various mitigation alternatives to protect private and public property and to reduce the threat to life. It is noteworthy that TRCA has focussed this study on the riverine flood mechanism specifically for the Black Creek and its tributaries within the Rockcliffe study area. Riverine flooding is based on the capacity/performance of the open water system and the various conveyance elements including channels, culverts and bridges. TRCA recognizes the relationship of riverine-based systems to the local urban drainage system (storm and combined sewers and roadways), hence has engaged Toronto Water, who has jurisdiction over the local drainage network, to develop an integrated understanding of the area's flood risk. Toronto Water has conducted a separate assessment of the local urban storm and sanitary system with due consideration of TRCA's study of the Black Creek (ref. "Combined Sewer Overflows Control in Humber River and Black Creek Sewersheds and Investigation of Basement Flooding in Areas 4 and 5, Class EA", XCG); further details of relevance are offered in this report.

1.2 Description of Study Area

The Humber River Watershed (ref. Figure 2) has a drainage area of approximately 857 km² at the outlet to Lake Ontario. The Black Creek confluences with the Humber River upstream of Dundas Street and has a drainage area of 65 km² (+/-) to this point. The Rockcliffe Area of the Black Creek subwatershed is located near the downstream limit of the Black Creek subwatershed (ref. Figure 3) and is considered completely urbanized with a mixture of residential, commercial, institutional and industrial land uses. The watercourse has been



straightened and heavily modified over time through concrete lining and many culvert and bridge crossings. Historical development has encroached upon the watercourse's floodplain resulting in a significant flood risk to property and people.

The Black Creek has flooded on several occasions including the August 2005 storm event where the concrete lined channel upstream of Alliance Avenue was at capacity and the overbank areas downstream of Jane Street were flooded, and July 2013 which similarly caused extensive surface flooding and also local basement flooding.

1.3 Background

The 1980 Flood Control Program Watershed Plan, identified flood damage centres for TRCA's jurisdiction. One of the flood damage centres identified in that plan was the Black Creek from Weston Road to Rockcliffe Blvd. The flood damage centre was ranked fifth out of thirty one flood cluster sites at that time in terms of priority (based on standardized risk factors).

In recent years, flooding has become more of a concern due to the greater frequency of storms leading to higher flows and increased risk of flooding. The Black Creek (Rockcliffe Area), as a highly flood prone site, has been selected by TRCA as a pilot as part of the update to the Flood Control Program. The current Flood Control Program has assessed some 40 (+/-) flood prone areas (i.e. flood clusters) in TRCA's jurisdiction using an automated Query Process Tool (QPT).

As noted, Toronto Water is separately examining basement flooding problems in various areas including the Rockcliffe Area. These basement flooding problems are typically related to local sewer capacity (storm and combined), as well as local grading issues. The TRCA Class Environmental Assessment (Class EA) has not considered the basement flooding problems directly given the inherent focus on the riverine environment. Notwithstanding, through this study process, the riverine flooding conditions (existing and improved) have been provided to Toronto Water as technical background material for its basement flooding assessment.

1.4 Conservation Ontario Class Environmental Assessment Process

The "Class Environmental Assessment for Remedial Flood and Erosion Control Projects", Conservation Ontario, January 2002, Amended September 2009, outlines the process and approach associated with addressing remedial flooding and erosion problems in riverine settings. The Conservation Ontario Class Environmental Assessment (Class EA) document defines the respective undertakings, which are governed by this process as follows:

Remedial Flood and Erosion Control Projects refer to those projects undertaken by Conservation Authorities, which are required to protect human life and property, in previously developed areas, from an impending flood or erosion problem. Such projects do not include works which facilitate or anticipate development.

The Conservation Ontario Class EA for Remedial Flood and Erosion Control Projects establishes a planning and approval process for a variety of projects that may be carried out by Conservation Authorities in Ontario. The Class EA approach is considered a suitable process for the planning of remedial flood and erosion since such projects:



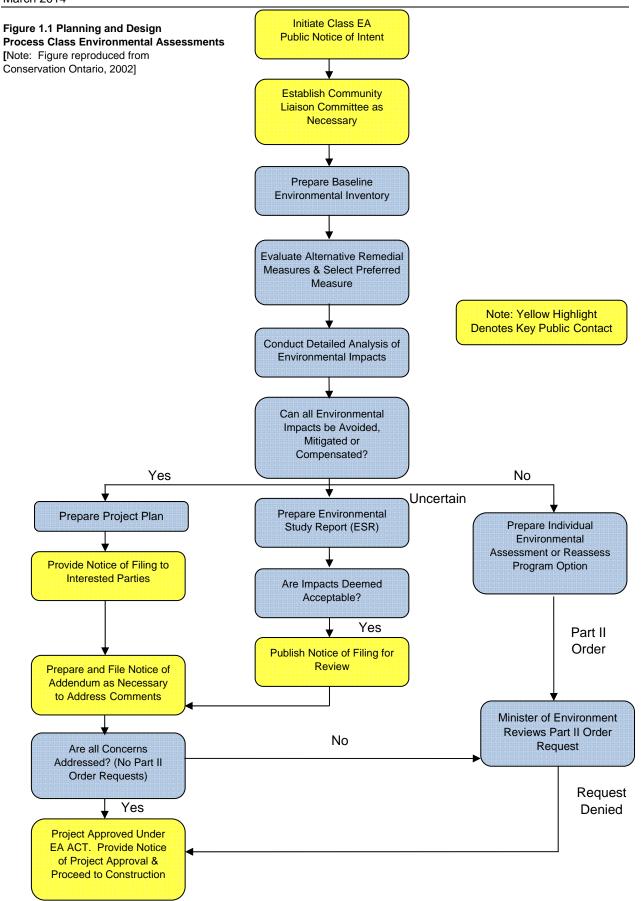
- Have a common process of planning, design, approval, construction, operation and monitoring and
- Have a generally predictable range of effects which, though significant enough to require environmental assessment, are generally responsive to standard mitigation measures.

The Conservation Ontario Class EA process provides a consistent, streamlined, easily understood process for planning and implementing flood and erosion control projects. The process also provides the flexibility to be tailored to the activity, taking into account the environmental setting, public interest and unique situation requirements. The Conservation Ontario Class Environmental planning and design process is depicted in Figure 1.1.

As noted on Figure 1.1, the Class EA process includes public consultation in a variety of forms including general notices, public meetings, and a Community Liaison Committee (CLC). For the Black Creek (Rockcliffe Area) Riverine Flood Management Class EA, a CLC was formed explicitly to discuss issues and opportunities with a select/smaller group of local stakeholders. The CLC met on two (2) occasions throughout the study, providing an excellent opportunity for the stakeholders to engage in direct dialogue on the relevant aspects of this study to the Rockcliffe Area.

In addition, as part of this study, two (2) Public Information Centres (PICs) were held with the general public, firstly to present the general background and study inventory and secondly to provide the public with an opportunity to discuss and provide input on the riverine flood management approach. TRCA staff also separately participated and supported Toronto Water in its public consultation process as related to the basement flooding investigation/study; the objective in this regard was to offer the perspective of the Black Creek Riverine Flood Management Study and its relationship to the basement flooding initiative of Toronto Water.







2.0 BACKGROUND INFORMATION REVIEW

2.1 Information Sources

Through this study process, information has been provided by the TRCA, City of Toronto and also by members of the public through the Community Liaison Committee established for this study and the Public Information Centres.

2.2 Technical Drawings and Maps

TRCA, in conjunction with the City of Toronto has provided various reports, drawings and other documentation considered relevant to the undertaking as per the following:

- 1. Aerial photography for study area 2005
- 2. Property fabric 2005
- 3. Building mapping 2005
- 4. Contour mapping 2005
- 5. Land use mapping 2005
- 6. Infrastructure mapping sanitary sewer, storm sewers, combined sewer and watermain
- 7. Street name layer
- 8. Black Creek Regional Storm and 100 Year Floodlines
- 9. Black Creek Floodline Mapping Sheets, June 2005
- 10. Flood Vulnerable Areas and Flood Vulnerable Roads (FVA and FVR) data
- 11. City of Toronto Yard Consolidation Drawings, January 2009
- 12. Black Creek channel design plans, 1962

2.3 Models

- 1. Humber River Hydrologic Modeling (InterHYMO)
- 2. Humber River HEC-RAS Hydraulic Modeling

2.4 Reports

The following documents and reports have been received and reviewed as part of this Class EA:

• Flood Control Program Watershed Plan, 1980, Metropolitan Toronto and Region Conservation Authority

The purpose of this study was to document the flood centres in the MTRCA jurisdiction and develop recommendations for the highest priority flood centres. Flood damage centres were evaluated using social, economic and environmental factors.

Humber River Hydrology Update, November 2002, Aquafor Beech Limited

This report established the latest hydrology for the Humber River using the hydrologic model SWMHYMO. The report provides both existing and future land use peak flows based upon the Atmospheric Environmental Service (AES) storm distribution and the



Toronto Bloor Street rainfall gauge intensity duration frequency data. Peak flows were developed for Black Creek as part of the hydrology update.

Naturalization of Black Creek and Lambton Golf and Country Club Phase 1 Report Feasibility Study, March 2002, Dillon Consulting

This report investigated the potential of removing the lined watercourse system within Lambton Golf and Country Club. The study examined naturalization of the creek system to improve channel stability, reduce channel erosion potential, improve water quality and maintain existing flood potential. The study recommended the watercourse system to be lined with stone to convey the frequent storm events and the upper section (overbanks) to be a naturalized area.

Combined Sewer Overflows Control in Humber River and Black Creek Sewersheds and Investigation of Basement Flooding in Areas 4 and 5, Class EA", XCG

The ongoing study is firstly developing recommendations to address water quality issues in Black Creek and Humber River due to the discharge of combined sewer overflows (CSO) within the study area boundary, and secondly assess the causes of flooding and develop solutions to reduce the risk of future surface and basement flooding within basement flooding areas 4 and 5, proximate to the Rockcliffe Area.

2.5 Field Reconnaissance

Field reconnaissance (ref. Figure 10) with TRCA staff has been conducted (ref. Appendix 'E') in September 2008. The purpose of the field reconnaissance was to develop an understanding of the study area characteristics such as topography, land use and the watercourse system formation.

From the field reconnaissance, it has been observed that from Jane Street upstream to Hilldale Road, historical development has been set back from the creek to a greater extent than upstream of Hilldale Road. Upstream of Hilldale Road development is located immediately adjacent to the rectangular concrete channel, resulting in increased flood risk.

Each of the creek crossings within the study area appear to constrict flow conveyance as compared to the floodplain and valley sections.



3.0 BASELINE INVENTORY

3.1 Methodology

The Conservation Ontario Class EA process requires that a baseline inventory of the study area be prepared to develop a better understanding of the setting, both natural and man-made. For this study the baseline inventory documents the background information and provides details related to the existing conditions of the Black Creek Study area in various disciplines relevant to the identified flooding risk, including hydrology, hydraulics, natural system inventories, watercourse characteristics, land use conditions and infrastructure. Specifically, the Black Creek Study area has been examined as to what the conditions are which have lead to the riverine flood risk. In addition, the inventory of study area characteristics has provided a basis for the evaluation of various remedial alternatives to address the risk (ref. Section 4: Alternative Assessment).

3.2 Hydrology

Hydrology is the science of determining the amount of water moving through various physical processes within a watershed, based on various meteorologic conditions. Hydrologic modelling allows for the determination of a runoff rate from a particular land form in response to a rainfall or snowmelt event.

For this study of riverine flood risk, the hydrology provides the flow rates for use in determining flood elevations and limits (extent) during extreme storms. The 2002 Humber River Hydrology Update provides the peak flows (ref. Table 3.1) for assessing flood risk and system performance. The hydrology has not been updated as part of this current study's scope, however it has been used in the assessment of flood remediation alternatives.

	Table 3.1: Black Creek Peak Flows (m³/s)											
Location 2 yr 5 yr 10 yr 25 yr 50 yr 100 yr Reg												
Weston Road	74	113.2	140.9	177.7	206.9	240	510.8					
Humber Blvd.	74	113.2	140.9	177.7	206.9	240	510.8					
Alliance Rd	74	113.2	140.9	177.7	206.9	240	510.8					
Rockcliffe	82	123	151.3	189	219.4	254.8	563.8					
Jane Street	82	123	151.3	189	219.4	254.8	563.8					
Scarlett Rd	82	123	151.3	189	219.4	254.8	563.8					

Some of the potential factors influencing the Black Creek's hydrology include land use change (intensification) and climate change (more frequent and larger storms). In terms of land use it is clear that very limited lands (greenfield) remain hence net impacts even with some form of greater coverage through land use intensification would likely have a minor change on peak runoff and associated flood risk. That said, TRCA and the City of Toronto should require that any future development or redevelopment in the Black Creek results in no additional flood risk.

Climate change influences are more difficult to predict and manage, however various jurisdictions including TRCA are examining means of adding resilience in drainage systems to ensure the population remains safe in the future. Further dialogue will be required between



TRCA and Toronto Water as the respective projects are advanced and design standards and criteria established.

3.3 Hydraulics

Hydraulics provides insight into the conveyance capacity associated with sewers, creeks, culverts, bridges, etc. For this study, the focus is on riverine system performance only. It provides an indication of the velocity and depth associated with various extreme flow rates. TRCA maintains hydraulic models for each creek within its jurisdiction. The Humber River HEC-RAS version 3.1.3 hydraulic model includes the Black Creek (a major tributary of the Humber River). The hydraulic modelling results for the existing watercourse system have been included within Appendix 'G'. Tables 3.2 and 3.3 provide a hydraulic structure summary for the road crossings from Scarlett Road to Weston Road within the Study Reach.

Table 3.2: Hydraulic Structure Summary										
Crossing	Size of Opening	Inver	ts (m)	Top of	Approx. Flow	Storm				
Location	(span x rise) (m x m)	Upstream	Downstream	Road/Crossing (m)	Capacity ^{1.} (m³/s)	Frequency				
Scarlett Road	15.2 x 5.0	94.10	93.90	100.4	254.80	100 yr				
Jane Street	12.80 x 6.4 m	97.39	97.39	108	563.80	Reg				
Rockcliffe Blvd.	15.2 x 4.2	98.40	98.40	103.0	219.4	50 yr				
Alliance Avenue	12.0 x 4.3	99.91	99.80	105.3	177.70	25 yr				
Humber Blvd.	12.0 x 4.3	100.10	99.90	105.3	240.00	100 yr				
Weston Road	11.0 x 5.1	101.10	101.10	107.0	177.70	25 yr				

^{1.} To the point of roadway overtopping

The crossings listed in Table 3.2 have varying capacities prior to the onset of overtopping of the roadways. Based on the assessment, the flooding depths and velocities at each crossing would pose a threat to vehicles and people, based on the Ministry of Natural Resources (MNR) guidelines for pedestrian and vehicular safety on roadways. Specifically, the MNR requires that for private vehicles, roadway flooding depths of 0.3 m or less should have a velocity below 3.0 m/s. In addition, the MNR guidelines require that the roadway flooding, depth-velocity product should be a maximum of 0.4 m²/s (ref. Table 3.3).

Table 3.3: Hydraulic Structure Overtopping Performance Summary									
Crossing Location	Maximum Flooding Depth (m)	Maximum Flooding Velocity (m/s)	Maximum Depth- Velocity Product (m²/s)						
Scarlett Road	1.21	1.85	2.24						
Jane Street	n/a	n/a	n/a						
Rockcliffe Blvd.	4.76	0.41	1.95						
Alliance Avenue	2.49	0.54	1.34						
Humber Blvd.	2.51	0.56	1.40						
Weston Road	2.61	1.55	4.04						

3.4 Risk and Damage

To develop an understanding of the measure of flood risk, the study area watercourse system has been divided into four reaches (ref. Figure 4) on the basis of clear and distinct break points:



- Reach 1: Humber River to Jane Street
- Reach 2: Jane Street to Rockcliffe Blvd.
- Reach 3: Rockcliffe Blvd. To Alliance Avenue
- Reach 4: Alliance Avenue to Weston Road

Reach 1: Humber River to Jane Street

Reach 1 has the lowest flood risk to private property and threat to life with 23 FVA's flooded during the Regional Storm event and less than 10 FVA's during the 100 year storm event. The predicted flooding depth of homes within the Regional Storm floodplain is within the 0.0 to 1.0 m range (ref. Figure 5). The riverine flooding within this reach results from both backwater from the Scarlett Road crossing and the historical encroachment of homes within the floodplain. Flood depths range from 1.0 m to greater than 5.0 m within the uninhabited overbank areas and valley floor. The Smythe Park buildings have flood depths of less than 1.0 m (+/-). The channel capacity through this reach is less than the 5 year storm (+/-).

Reach 2: Jane Street to Rockcliffe Blvd.

The hydraulic performance for Reach 2 and for the remaining upstream reaches is largely controlled by the Jane Street crossing and the embankments which encroach into the valley. Riverine flooding within Reach 2 is a direct result of the backwater from the Jane Street crossing and historical encroachment of development within the Black Creek floodplain. There are are 100 (+/-) FVAs in Reach 2 including the Rockcliffe Middle School. Regional Storm flood depths for the majority of homes in this reach are less than 2 m (+/-). The Middle School is exposed to Regional Storm flood depths of 2 to 3.5 m (+/-). The channel capacity through this reach is approximately the 5 year storm.

Reach 3: Rockcliffe Blvd. To Alliance Avenue

Reach 3 includes approximately 60 residential FVAs along Hilldale Road, 80 residential FVAs north of Alliance Avenue, the City of Toronto Works Yard, Frank Oke Secondary School and a number of commercial and industrial properties which would be expected to flood from the Black Creek during a Regional Storm. Most of the FVA's would not be flooded during a 100 year storm apart from the Toronto Works Yard and most of the homes along Hilldale Road. The channel capacity through this reach is approximately the 5 year storm.

Reach 4: Alliance Avenue to Weston Road

Reach 4, located upstream of Alliance Avenue, has a rectangular concrete lined channel with a 10 year (+/-) flow capacity prior to overtopping. The overbanks of the channel are highly developed on either side and are predicted to be flooded for storm events greater than a 10 year storm event, with Regional Storm flooding depths in the 3 to 4 m range. The north side of the channel has 120 (+/-) residential FVAs while the south side of the channel has a number of apartment buildings and the Archbishop Romero Catholic Secondary School.



Approximately 1,857 people would be threatened during a Regional Storm. The approximate number of people threatened for each storm frequency is estimated as follows, based on an occupancy factor of 3 per dwelling:

2 year storm - 3
 5 year storm - 9
 10 year storm - 32
 25 year storm - 267
 50 year storm - 429
 100 year storm - 498

3.5 Natural Areas Inventory

Natural area inventory information has been provided by TRCA (ref. Figure 6). The study area is heavily built-up with historical development. The Black Creek through the study area is a concrete lined channel with minimal fish habitat potential; the number and variability of land and aquatic species is limited. The majority of the flora/fauna observed in the study area are located downstream of Jane Street within Smythe Park.

Land species identified are common to Southern Ontario such as the gray squirrel and green frog. Bird species observed include the North American robin and North American crow and others species considered to be common. Herons have also been observed in Symthe Park.

Aquatic species that have been observed include Pumpkinseed, brown bullhead, fathead minnow, brook stickleback, white sucker, bluntnose minnow and common shiner. These species are considered warmwater species that are tolerant of warmer waters resulting from urban runoff and the limited riparian cover along Black Creek.

Terrestrial communities are also limited along Black Creek and are generally present downstream of Jane Street, although some communities are located along Lavender Creek by Symes Road.

The concrete lined channel has required maintenance due to trees growing through the joints and cracks in the concrete. Trees within the concrete channel Reach 4 between Alliance Avenue and Weston Road were removed in October 2012 by Toronto Parks. Trees growing within the concrete channel result in the channel flow capacity being reduced based on an increase in channel roughness. The trees grow through concrete joints and cracks and result in the concrete further breaking apart and as such are removed on a regular basis. These trees are not considered significant or important in any natural perspective or context.

3.6 Land Use

Land use in the Rockcliffe Study area (ref. Figure 7) consists of primarily residential uses on both sides of Black Creek. Three Schools are located within the Regional Storm floodplain, Rockcliffe Middle School, Frank Oke Secondary School and Archbishop Romero Catholic Secondary School The land immediately downstream of Black Creek, west of Rockcliffe Bvld. is either parks or open space. Upstream of Rockcliffe Blvd. to Alliance Avenue the channel is encroached upon by the Toronto Works Yard and other commercial/ industrial buildings. Upstream of Alliance Avenue, the west side of the channel is residential while the east side is the Catholic School.



3.7 Social/ Cultural Features

The Rockcliffe Area was originally farmed in the 1800s. Urban development of that area did not commence until the opening of the Smythe gravel pit in the 1920s, by Conn Smythe. The gravel pit closed after World War II and the area surrounding the pit was developed into urban uses. Single detached homes were constructed for servicemen and families after World War II. The neighbourhood has retained the Smythe name with the Smythe Park located on the downstream side of Jane Street. The Smythe Park exists today on the site of the old gravel pit. Smythe Park is approximately 13 ha in size and includes walking trails, natural areas, a baseball field, swimming pool and recreation centre.

Other social/ cultural features include the neighbourhood schools and the Jane Park Plaza located immediately north of Black Creek on Jane Street. The community focal point is the Black Creek channel and the open space adjacent to it.

The study area is serviced by a number of Toronto Transportation Commission (TTC) bus routes, including a route on Jane Street and on Weston Rd linking to the Jane and Keele subway stations to the south.

3.8 Infrastructure

The Rockcliffe Area has been developed with urban uses since the 1950's and as such has been serviced by a combination of separate storm and sanitary sewers which, at various locations, feed into a combined sewer system (ref. Figures 8 and 9). A combined sewer overflow is located along the Black Creek at the north west side of the creek and Rockcliffe Blvd. The City of Toronto Wet Weather Flow Management Master Plan (WWFMMP) proposed a combined sewer storage tank at the location of the combined sewer outfall to reduce the number and volume of discharges; to-date this has not been constructed. Numerous storm sewer outfalls line the creek throughout the study area. The area has recorded basement flooding, within a concentrated area of flooding north of Alliance Avenue. Toronto Water has conducted a study into the basement flooding (ref "Combined Sewer Overflows Control in Humber River and Black Creek Sewersheds and Investigation of Basement Flooding in Areas 4 and 5, Class EA", XCG, 2014) that recommends the following:

- New sanitary sewer on Alliance Avenue to provide basement flooding protection for Cliff Street and Cordella Avenue.
- A new sanitary storage tank to be located southwest of Alliance Avenue and Rockcliffe Blvd.
- A new storm sewer on Cliff Street, Cordella Avenue, Humber Blvd., and Alliance Avenue to convey stormwater downstream of Jane Street.

The Black Creek through the study area has a rectangular concrete channel along Humber Blvd. (Reach 4) and a trapezoidal concrete channel with vegetated overbanks in Reaches 1 to 3. As noted earlier, the concrete channel in all reaches requires regular maintenance as vegetation grows through joints and cracks in the concrete, reducing the channel flow capacity. The concrete in the channel as of the time of field reconnaissance appeared to be in reasonable



condition, although the frequency of vegetation removal should continue to be reviewed based on the size of vegetation that has been observed growing in the channel.

3.9 Summary of Baseline Inventory

The following summarizes the key findings of each component of the Baseline Inventory and outlines the issues and/or opportunities to be considered in the Alternative Assessment:

Hydrology

The 2002 Humber River Hydrology Update provides the peak flows for the Black Creek in the study area. No update to the hydrology has been conducted for this study. The Peak flows for the study area range from 74 m³/s for the 2 year storm to 550 m³/s (+/-) for the Regional Storm. Toronto Water, along with TRCA, should ensure that future intensification and redevelopment within the Black Creek watershed does not result in an increase in flood risk in the Rockcliffe Area.

Hydraulics

The hydraulic performance for the study area watercourse has been assessed on the basis of four distinct reaches. The Black Creek low flow concrete channel, depending on the reach, has a 5 to 10 year storm flow capacity. Regional Storm flooding potential downstream of Jane Street is limited to approximately 20 homes and Smythe Park. Upstream of Jane Street, the Regional Storm flooding potential increases with approximately 595 buildings in the Regulatory floodplain due to historical development encroachment and the hydraulics (backwater) caused by the Jane Street crossing.

Natural Areas Inventory

There are limited natural areas within the Black Creek study area from Scarlett Road to Weston Road. Smythe Park located downstream of Jane Street contains most of the natural features, with most of the wildlife resources being observed in this area, such as herons and a number of aquatic species.

Land Use

The land use in the study area is primarily residential with a core commercial/ industrial area along Black Creek from Rockcliffe Blvd. to Hilldale Road, including the City of Toronto Works Yard. Three schools are also located within the Regional Storm floodplain.

Social/ Cultural Features

The focal point of the community is the Black Creek channel. Smythe Park is the primary park downstream of Weston Road and provides walking trails and other community recreational uses. Other community features include the three schools and the Jane Park Plaza.

Infrastructure

The study area is serviced by both a separate and a combined sewer network. Basement flooding is a documented concern in this neighbourhood and has occurred a number of times including most recently on July 8, 2013. The City of Toronto has studied the basement flooding problem developed potential solutions (ref. "Combined Sewer Overflows Control in Humber River and Black Creek Sewersheds and Investigation of Basement Flooding in Areas 4 and 5, Class EA", XCG).



4.0 ALTERNATIVE ASSESSMENT

In order to address the identified riverine-based flooding potential within the Rockcliffe Area (ref. Figure 4 and 5), it has been necessary to initially establish a long-list of potential remediation alternatives to reduce flooding depths, extent, and frequency. Once established, the long-list of alternatives has been assessed based on functionality, while determining the "pros" and "cons" associated with each of the long-listed alternatives (i.e. short-list screening). For this study, long-list screening has included modelling the performance of the various alternatives to determine the potential flood risk reduction. Once screened to a viable short-list, the assessment has considered the technical and functional aspects, specific to addressing the riverine-based flooding problems as identified, to assist in the evaluation of the respective short-listed alternatives. The foregoing process has led to a preferred solution(s), which has been vetted through input from the TRCA, the City of Toronto, Community Liaison Committee (CLC) stakeholders and general public.

4.1 Long-List of Alternatives

The assessment of riverine-based flood management alternatives has been conducted on a reach by reach basis with consideration of the unique flood risk and potential damages for existing conditions for each reach. The scale and cost of the hydraulic improvements which would potentially reduce flooding conditions in each reach has then been conducted, with an explanation of the screening. The semi-quantative flood risk (High, Medium, Low) for the respective reaches has been established as follows:

Reach 1: Scarlett Road to Jane Street: Low
Reach 2: Jane Street to Rockcliffe Blvd.: Medium

Reach 3: Rockcliffe Blvd. to Alliance Avenue: *Medium* to *High*

Reach 4: Alliance Avenue to Weston Road: *High*

The Baseline Inventory of the study area has provided a characterization of the Rockcliffe Area in terms of its physical and natural features, as well as the associated man-made built infrastructure and land uses. In essence, this community is highly urbanized and has urban development which historically (i.e. prior to current regulations) encroached within the floodplain. The upstream drainage area is large (6409 ha) and highly urbanized, hence the response to storms is quick and significant. The topography across the respective study area reaches varies but generally goes from relatively deep and defined in the lower reaches to very flat and shallow in the upper reaches. This is noteworthy in that the effectiveness of various flood management strategies changes depending which reach is being considered. instance, the vertical walled channel between Alliance Blvd. and Weston Road has minimal capacity and also has roads and homes on either side of it. In order to effectively manage the Regulatory Flood (which is 4 to 5 times larger than the capacity of the existing channel) would require significant widening, removal of numerous homes and relocation of transportation routes. Hence going-forward, the consideration of practical and viable flood management alternatives must be based on the man-made and physical conditions prevalent within each study reach.



Long- List:

In order to reduce riverine flood risk in the respective reaches within the Rockcliffe Area, there are a variety of techniques which can be used. In essence, flood risk can be reduced and/or minimized by:

- lowering flood levels
- decreasing the frequency of at-risk flood levels
- removing flood risk properties from flood exposure
- constructing barriers to isolate affected properties/people from flood risk

The following provides an outline and a summary of the various alternatives (general to specific) which have been considered as part of a long-list of riverine-based flood management alternatives.

A. Do Nothing

• The 'Do Nothing" alternative assumes that the predicted flood conditions (and risk) would remain as is. Regular annual inspection of the creek system would continue including the removal of vegetation in the channel, concrete repairs and other routine maintenance works as required. In addition, TRCA would continue to regulate land use through its Regulation and permit process. It is also a requirement of the Conservation Ontario Class EA process to include consideration of the Do Nothing alternative as a basis of comparison for all other alternatives.

B. Increase Conveyance Capacity

Culverts/bridges

Roadway/rail crossings of watercourses often constrain conveyance capacity causing local backwater flooding. Increasing the size of 'under-sized' systems or removing them altogether can reduce the depth of riverine flood waters upstream of these crossing; the following opportunities have been considered as part of the long-list under this category of works:

- The Humber River downstream of study area: CNR bridge, pedestrian bridge improvements
- Black Creek through study area: Scarlett Road: bridge upgrade, drop structure relocation, supplemental culverts
- Jane Street: drop structure relocation, supplemental culverts, bridge, valley wall reshaping
- Rockcliffe Blvd.: supplemental culverts, bridge replacement, road profile
- Alliance Avenue: bridge elimination(s)

Toronto Region Conservation Authority Black Creek (Rockcliffe Area) Riverine Flood Management Class EA, Final Report March 2014



Creek/floodplains

The capacity of creeks and their floodplains can be increased through physical modifications which result in lower flood levels in at-risk areas, including widening, regrading, and lowering. The following offers some long-list opportunities in this regard:

- Scarlett Road to Jane Street: floodplain regrading, low flow channel widening
- Jane Street to Rockcliffe Blvd.: valley wall reshaping, floodplain regrading, low flow channel widening
- Rockcliffe Blvd. to Alliance Avenue: valley wall reshaping, floodplain regrading, low flow channel widening
- Alliance Avenue to Weston Road: low flow channel widening
- Scarlett Road to Weston Road: channel lowering

C. Flood Proofing

Flood proofing basically considers the establishment of a form of barrier(s) which isolates the flood risk area from the riverine-based flood waters for a prescribed or attainable level of flood protection. The means of establishing this barrier(s) can be through a variety of approaches including:

- earthen berms
- structural flood walls
- integral to flood affected buildings
- combinations

The preferred approach relates to the available property, height of protection, and means of managing surface drainage 'behind' the barrier as this can often lead to local flood risk which in some circumstances can outweigh the risks due to riverine-based flooding [Note: Flood protected lands through flood proofing would continue to be subject to TRCA regulation].

Berming/structural

Some potential locations for barrier systems considered as part of the long-list include:

- Scarlett Road to Jane Street: berming on north valley wall for protection of residential area
- Jane Street to Rockcliffe Blvd.: berming of elementary school
- Rockcliffe Blvd. to Alliance Avenue: berming along Alliance Avenue and Hilldale Road
- Alliance Avenue to Weston Road: structural walls

D. Stormwater Management Flood Control

Centralized flood control through designated flood storage systems can both lower the magnitude and frequency of flood flows causing risk. [Note: Areas protected by flood storage techniques would continue to be considered within TRCA's regulated zones and may in fact be



exposed to greater flood risk due to the need to consider the potential failure of flood storage systems.] Some opportunities considered as part of the long-list have included:

- Centralized flood control facilities: On-line facility(s) upstream of study area
- Site specific storage: Toronto Works Yard

E. Land/Property Acquisition

In the event that flood risk is so severe and frequent, and practical/effective alternatives are not available, Public agencies can also consider acquiring those properties at greatest risk to effectively remove them from the risk zone permanently.

F. Combinations

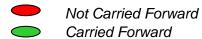
Clearly the respective alternative categories and the site-specific opportunities can and will need to be considered both in isolation and in combination going forward.

Long-List Screening:

Based on engineering principles, and preliminary hydraulic assessments, the long-list of alternatives has been screened on a reach by reach basis with the results presented in Table 4.1; details on the supporting rationale follows the table.



	Table 4.1: Long List of Flood management Alternatives Screening								
Long-list of Alternatives	Screening Results								
A: Do Nothing									
Continue Maintenance	N/A								
Emergency Response	N/A								
B: Increase Conveyance Capacity – Culverts/bridges									
Downstream Bridges on Humber River, CNR Bridge, pedestrian bridge improvements									
Scarlet Road:									
 bridge replacement/upgrade 									
 drop structure relocation 									
 supplemental culverts 									
Jane Street									
drop structure relocation									
 supplemental culverts 									
upgraded bridge and valley wall reshaping									
Rockcliffe Blvd.									
supplemental culverts									
bridge replacement/upgrade									
road profile adjustment									
Alliance Avenue; combine two bridges into one new crossing at downstream bridge									
B: Increase Conveyance Capacity – Creeks									
Scarlett Road to Jane Street: low flow channel widening									
Jane Street to Rockcliffe Blvd. low flow channel widening									
Scarlett Road to Weston Road channel lowering									
Rockcliffe Blvd. to Alliance Avenue low flow channel widening									
Alliance Avenue to Weston Road: low flow channel expansion									
B: Increase Conveyance Capacity – Floodplains									
Scarlett Road to Jane Street: valley wall reshaping, floodplain grading									
Jane Street to Rockcliffe Blvd.: valley wall reshaping, floodplain grading									
Rockcliffe Blvd. to Alliance Avenue: valley wall reshaping, floodplain grading									
Alliance Avenue to Weston Road: valley wall reshaping, floodplain grading									
C: Flood Proofing									
Scarlett Road to Jane Street: berming on north valley wall for protection of residential area									
Jane Street to Rockcliffe Blvd.: berming of elementary school									
Rockcliffe Blvd. to Alliance Avenue: berming along Alliance Avenue and Hilldale Road									
D: Stormwater Management Flood Control									
Centralized flood control facilities: On-line facility(s) upstream of study area									
Site specific storage: Toronto Works Yard									
E: Land/Property Acquisition									
Flood prone lands/buildings									
F: Combinations									
Combinations									





The following provides details on the rationale related to the screening of the various long-list alternatives from further consideration:

A. Do Nothing

The Do Nothing alternative would not reduce the flood potential/ risk within the Rockcliffe
Area. TRCA would though be expected to continue to conduct channel maintenance,
regulate development through the permit process and provide floodplain management
for the Rockcliffe Area.

B. Increase Conveyance Capacity

Culverts/bridges:

- <u>Humber River downstream of the Study Area Reach</u>: The pedestrian bridge over the Humber River has a low profile and the CNR bridge is above the Regional Storm flood elevation, therefore both structures would have nominal backwater impacts and their replacement would not appreciably change flood conditions (risk) within the Rockcliffe Area.
- <u>Black Creek: Scarlett Road</u>: Relocation of the drop structure and/or supplemental culverts would not provide a significant benefit in reducing Regional Storm flood levels (i.e. < 0.25 m). Bridge replacement would provide a benefit immediately upstream of the crossing by lowering the Regional Storm flood levels by less than 1.0 m, but this capital work would be a significant cost for a low flood risk reach.
- <u>Black Creek: Jane Street:</u> The drop structure relocation and/or supplemental culverts would not provide a significant benefit in lowering the Regional Storm flood levels (i.e. < 0.25 m +/-).
- <u>Black Creek: Rockcliffe Blvd.:</u> Supplemental culverts would not provide a significant benefit (i.e. 0.25 m +/-).

Creek/floodplains:

- Scarlett Road to Jane Street: In this creek reach the floodplain is relatively flat and provides effective and relatively confined flow within the overbanks. Increasing the low flow channel would provide additional flow capacity however this would have a marginal overall benefit since the residential area is located above the 100 year storm flood elevations.
- <u>Jane Street to Rockcliffe Blvd.</u>: The low flow channel widening would provide additional flow capacity however would have a marginal benefit since the residential area and elementary school is located above the 100 year storm flood elevations.
- <u>Rockcliffe Blvd. to Alliance Avenue:</u> Reshaping of the valley wall would not be possible due to the proximity of existing residential areas.
- Lowering of the watercourses upstream of Jane Street to Weston Road (over 1760 m +/-) would result in a 2.6 m +/- drop in the watercourse elevation at Weston Road. The watercourse lowering would require all of the concrete channel and bridges to be replaced. Lowering the channel as described (and maintaining the general cross-sectional form) would only result in a reduction of



flood elevations upstream of Rockcliffe Blvd. Specifically, the 100 year flood elevations would be reduced by 0.3 m +/- from Rockcliffe Blvd. to Humber Blvd. and by 1.1 m +/- from Humber Blvd. to Weston Road. The Regional Storm flood elevations would not be appreciably reduced by lowering the channel invert. As limited benefit would result from this alternative and given that it would require significant channel and bridge reconstruction it has been screened from further consideration.

C. Flood Proofing

Flood proofing upstream of Alliance Avenue along Humber Blvd. and the Black Creek channel would need to take the form of flood protection walls due to the absence of any open space for earthen berms. Concrete flood protection walls along each side of the channel would have to be at least 3 to 4 m in height with no openings to prevent flooding from the less frequent storm events such as the 50 to 100 year events. At the downstream and upstream limits of the flood protection wall, flood elevation would remain as is and increase respectively. Due to high cost, low functional effectiveness, and constructability concerns (particularly at road crossing), this alternative has been screened.

D. Stormwater Management Flood Control

• Site specific (i.e. local) storage within the Toronto Works Yard would have a negligible benefit downstream of Jane Street which has the lowest flood risk. Insufficient area is available for effective flood storage to tangibly reduce risk.

E. Land/Property Acquisition

Acquisition of flooded properties would require the purchase of over 200 homes, three (3) schools and numerous commercial/industrial units. As such, acquisition has not been considered a viable alternative for TRCA to pursue.

4.2 Assessment Factors

Based on the initial functional screening of the Long-list of Alternatives, the following opportunities have been short-listed for more detailed assessment:

B. Increase Conveyance Capacity

- Jane Street: Upgrade Bridge/Valley Wall Reshaping
- Rockcliffe Blvd.: Road profile adjustment
- Alliance Avenue: Combine two bridges into one
- Rockcliffe Blvd. to Alliance Avenue: Valley wall/floodplain grading
- Alliance Avenue to Weston Road: Channel expansion/floodplain grading



C. Floodproofing

- Scarlett Road to Jane Street: berming on north valley wall
- Jane Street to Rockcliffe Blvd.: berming of elementary school
- Rockcliffe Blvd. to Alliance Avenue (Lavender Creek): berming along rear residential lot line along Hilldale Road and Symes Road

D. Centralized Flood Control

Online Facility(s)

F. Combinations

These alternatives have been assessed using either the hydraulic modelling (HEC-RAS) and/or hydrologic modelling (SWMHYMO). Additional assessment of the short-listed alternatives has also included consideration of threat to life reduction.

The Ministry of Natural Resources (MNR), as part of the former Flood Damage Reduction Program identified various flood risk factors to evaluate flood-prone sites. The Flood Damage Reduction Program involved the definition of flood risk related to Direct and Indirect property damages, expressed as Average Annual Damages (a statistical summary of flood damages related to each storm frequency expressed as an annual relationship) which were then converted to a Present Value based upon the anticipated engineered life of a remedial work (i.e. as part of Cost Benefit calculation) and an appropriate discount rate. The Ministry of Natural Resources has also established measures related to assess human exposure to flooding, which incorporate flood frequency and severity. The various measures specific to these protocols have been incorporated in to an Evaluation Matrix for use in this study, based upon the following hierarchy of Site Evaluation Categories, Factors and Indicators:

Level I: Evaluation Categories

- Social
- Economic

Level II: Category Factors

Social

- Flood Exposure and Risk
- Human Ingress/Egress/Emergency Response

Economic

Flood Damage Costs

Level III: Factor Indicators

Flood Exposure and Risk

- Depth of flooding under the Regional Storm
- Threat to life



Human Ingress/Egress/Emergency Response

- MTO or municipal design criteria
- Private vehicle access
- Emergency vehicle access

Flood Damage Costs

- Direct Flood Damages
- Indirect Flood Damages

Table 4.2 is the evaluation matrix which has been used for assessment of the short-listed alternatives. The evaluation matrix is consistent with the matrix used in the Query Process Tool developed to rank flooding sites across TRCA's jurisdiction.



				Table 4.2: TRCA Flood Site	e Evaluation Matrix							
Category	Factors	Indicator	Indicator Description and Method of Determination	Measure		Weighting	ı (0-10)		Frequency	Weighting Modifier	Indicator Importance/ Significance (1-10)	Product
Social	Flood Exposure and Risk	Threat to Life	The number of people endangered by various flooding depths and velocities (based on land use, occupancy rates and building area) for the complete flow regime. Person would be endangered in all food depths and velocities to simplify assessment. The importance of a building being flooded depends on whether it is used for day and night or just during the day. Land uses that are typically day time use only would be: Commercial Industrial Municipal Institutional (i.e. schools, churches etc.) All other land uses would be day and night time usage	velocities (based on land use, occupancy rates g area) for the complete flow regime. Person indangered in all food depths and velocities to sessment. Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequency X weighting) Normalized Number of People (Number of people threatened/storm frequ	Day Time Only Usage 9 Day and Night Time Usage 10							
Social	Human Ingress- Egress/ Emergency Response	Roadway class related to point of flooding (frequency) Private vehicle access	This relates to which storm event floods the crossing based on the class of roadway. Ability to maintain access routes (flood depths/ velocities). The level of importance varies based on road classification Private vehicle access ingress/egress based on the following flood depths and velocities • d <0.3 m, v>4.5 m/s, • 0.3 <d>>0.4, v> 3m/s, • d>0.4, v>0.3 m/s.</d>	Classification/flood frequency Depths and frequency of events which prevent private vehicle passage	More than 1,500 Rural local Urban local Collector Arterial Highway (EMS Route) Highway (EMS Route) Arterial Collector Urban Local Rural Local	4 5 7 8 10 10 10 8 7 5 4	0 - 10% 10 - 20% 20 - 30% 40 - 50% 50 - 75% 75 - 100% 0 - 10% 10 - 20% 20 - 30% 40 - 50% 50 - 75% 75 - 100%	1 3 5 6 8 10	2 Year 5 Year 10 Year 25 Year 50 Year 100 Year Regional 2 Year 5 Year 10 Year 25 Year 50 Year 100 Year Regional	1.0 0.4 0.2 0.08 0.04 0.02 0.008 1.0 0.4 0.2 0.08 0.04 0.02 0.08	6	
		Emergency vehicle access (as per private vehicle access)	Ability to maintain access routes. The level of importance varies based on road classification Emergency vehicle access ingress/egress based on the following flooding depth velocity relationship: [d>0.9 m, v>4.5 m/s] i.e. relates to diesel fire trucks.	Depths and frequency of events which prevent emergency access	Highway (EMS Route) Arterial Collector Urban Local Rural Local	10 10 8 7 5 4	0 – 10% 10 – 20% 20 – 30% 40 – 50% 50 – 75% 75 – 100%	1 3 5 6 8 10	2 Year 5 Year 10 Year 25 Year 50 Year 100 Year Regional	1.0 0.4 0.2 0.08 0.04 0.02 0.008	8	

106159 Page 22



				Table 4.2: TRCA Flood Site	Evaluation Matrix				
Category	Factors	Indicator	Indicator Description and Method of Determination	Measure		Weighting (0-10)	Frequency Weighting Modifier	Indicator Importance/ Significance (1-10)	Product
Economic	Flood Damages	Direct Flood Damage Costs	Flood damage to buildings varies based on flooding frequency, lowest opening elevations and potential for structural damage. Damage costs also depend on the building type and value.	\$ Average Annual Damages (based on updated MNR curves)	\$0 \$1 to \$5,000 \$5,000 to \$10,000 \$10,000 to \$25,000 \$25,000 to \$50,000 \$50,000 to \$100,000	0 2 5 7 8 10	NA	7	
Economic	Flood Damages	Indirect Flood Damage Costs	Property damage to out buildings, pools, decks, etc. for the full flow regime, as well as clean up costs and potential loss of business Includes consideration for loss of work, health, business etc. Economic costs related to associated property and building damages	\$ Estimated Damage (Adjusted % of Direct)	\$0 \$1 to \$750 \$750 to \$1,500 \$1,500 to \$1,750 \$1,750 to \$13,500 \$13,500 to \$6,750	0 2 5 7 8 10	NA	4	

Project Number: TP106159

4.3 Short Listed Alternatives Evaluation

The short-listed alternatives summarized in Table 4.1 have been assessed in more detail using the evaluation matrix as well as the other protocols of TRCA and MNR. The following provides a description of this evaluation:

B. Increase Conveyance Capacity

Culverts/Bridges

Jane Street: Bridge and Valley Wall Reshaping:

In order to provide significant flood level reductions upstream of Jane Street, the existing culvert and embankment would have to be removed and replaced with a bridge. Hydraulic modelling has shown that removing the constraint afforded by the existing embankment and culvert only would continue to constrain flow capacity and result in backwater conditions, under the Regional Storm, not significantly less than with the existing bridge in place. To substantially reduce the riverine flood risk to the residential neighbourhood between Jane Street and Rockcliffe Blvd. the south valley wall would also need to be pulled back to provide improved flow conveyance at Jane Street. It has been estimated that a bridge with span of 200 m (+/-) with two or more piers would be necessary to traverse the widened valley. The bridge would remove approximately 65 homes (+/-) from the Regional Storm floodplain and would reduce flooding depths at the Rockcliffe Middle School from 2 to 3.5 m to 0.5 m (+/-). Upstream of Rockcliffe Blvd. to Alliance Avenue, Regional Storm flood depths would also be reduced by 2.9 m (+/-) to just over 1.5 m (ref. Figures 17 and 18). The Frank Oke Secondary School on Alliance Avenue and three (3) commercial properties on the north side of Alliance Avenue would also be removed from the Regional Storm floodplain. The Toronto Works Yard would remain in the Regional Storm floodplain albeit somewhat reduced. From Alliance Avenue to Weston Road, Regional Storm flood depths would be reduced by 0.9 m (+/-).

To construct the Jane Street bridge with a 200 m (+/-) span would require a number of piers which would be dependent upon the form of the bridge. Costs for implementing this alternative would be approximately \$25 to \$30 Million.

It has been estimated that in total 115 homes (+/-) would be removed from the Regional Storm floodplain with this work in-place along with a reduced flooding depth for the remaining 530 (+/-) at risk homes/buildings in the floodplain. As such, there would be a significant reduction in the threat to life (345 people (+/-) based on residential land uses alone). Removing one school and largely removing a second school from the Regional Storm floodplain would also be considered a significant benefit derived from implementing this alternative.

Rockcliffe Blvd.: Bridge Replacement and Adjust Road Profile:

The Rockcliffe Blvd. hydraulic crossing currently provides effective flow conveyance for most storm events and is predicted to be overtopped at the 50 year storm frequency (+/-). To assess

the bridge replacement alternative, the existing bridge was removed from the hydraulic model and the road profile adjacent to the elementary school adjusted, with and without, the replacement bridge at Jane Street. It was determined that existing valley form and grades control flood elevations and that without the bridge in the hydraulic model, flood elevations would not be reduced significantly (<0.10 m), as such this alternative has been screened from further consideration.

Alliance Avenue: Bridge Elimination(s)

Currently there are two crossings of the Black Creek at Alliance Avenue and Humber Blvd. in close proximity (i.e. <50 m). The hydraulic effect of both bridges is such that there is a significant backwater for the 100 year storm event. As a stand-alone alternative, elimination of one bridge would have no impact on Regional Storm flood elevations water level. For more frequent events, assuming elimination of both structures, flood levels would reduce by 0.4 m (+/-) to 2.4 m (+/-) for the 2 year to the 100 year storm events respectively, based on existing backwater conditions. Consideration for removing at least one or both bridges should be given in the context of widening the concrete channel at the bridge and upstream to Weston Road.

Creek/Floodplains

Jane Street to Rockcliffe Blvd.: Floodplain Grading

Grading of the overbank area north of the creek would allow for additional flood storage to compensate for storage lost from potential flood proofing. Based upon the limited floodplain grading that could be accommodated in this area to provide additional flow area in the floodplain, and the possible future Combined Sewer Overflow storage tank at Alliance Avenue and Rockcliffe Blvd., this alternative has been screened from further consideration.

Rockcliffe Blvd. to Alliance Avenue: Floodplain Grading, Low Flow Channel Widening

Floodplain grading could be conducted within the City of Toronto Works Yard for two purposes; firstly, additional flood storage can be generated to compensate or off-set flood proofing impacts on floodplain storage and secondly, improved flood protection can be provided to facilities by relocating the Public Works buildings to south of Rockcliffe Court. Grading in this area of the floodplain would not provide a significant improvement to reducing upstream flood levels (<0.25 m (+/-) for a 50 year storm) and should only be considered in the context of a combined initiative related to the potential improvements to flood protection for the Works Yard area.

This creek reach would also benefit from widening the overall hydraulic cross-section. By doubling the creek width upstream of Rockcliffe Blvd., channel capacity would increase from the 2 to 5 year storm flow capacity to approximately a 10 year capacity. Creek works should only be considered as a supplemental alternative, as limited local flood relief benefit would result in this reach with the works in-place. Channel improvements can also consider potential naturalization opportunities as secondary overall benefits.

Alliance Avenue to Weston Road: Low Flow Channel Widening

The channel from Weston Road to Alliance Avenue if widened from its existing 12 m width to approximately 21 m by reducing Humber Blvd. N. to one lane with parking and reducing Humber Blvd. S. to one lane, would provide 25 year (+/-) flow capacity versus the currently estimated 10 year (+/-) flow capacity of the existing channel. In addition, the two bridges at the downstream limit of this reach would have to be replaced with a single wider structure. This work though would only reduce Regulatory flood levels by 0.1 m (+/-). As noted earlier, in order to effectively reduce the Regulatory event impact on the local community, it would require substantially altering the channel configuration in this reach beyond what would be considered practical. Based on the elimination of two way traffic on either side of the creek and the associated social issues, this alternative has been screened from further consideration.

Flood Proofing

Berming/Structural

Scarlett Road to Jane Street: Berming on north valley wall for protection of residential area

Approximately 13 homes could be flood proofed to the Regional Storm standard by berming along property boundaries within the valley along Black Creek Blvd. The earthen berm height would be approximately 1 m (+/-). The earthen berm along Scarlett Road would have to be 0.60 m to 1.0 m in height to contain the Regional Storm and/or the profile of Scarlett Road north of the Black Creek crossing could be raised by 1.0 m (+/-) while still allowing access to Clairton Crescent. The preliminary costs for this alternative would be approximately \$1,225,000 and would only protect 12 homes, therefore due to the high cost and limited overall benefits, it has not been considered further.

Jane Street to Rockcliffe Blvd.: Berming of elementary school

Flood protection of the elementary school could be provided by constructing a 3 m high earthen berm (+/-) with Jane Street as is, or with a 0.5 m to 1.0 m berm with Jane Street culvert replaced with an open span bridge. Preliminary costs for the 0.5 m to 1.0 m berm would be \$400,000 (+/-).

Rockcliffe Blvd. to Alliance Avenue: Berming along Alliance Avenue and Hilldale Road

Flood protection of the residential area along Hilldale Road could be realized through a 3 m high earthen berm (+/-) with Jane Street crossing as is, or by a 1.5 m berm with Jane Street crossing replaced with a bridge. Preliminary costs would be \$900,000 for the 1.5 m high berm. Flood protection for Frank Oke Secondary School on Alliance Avenue could also be provided by a 1 m (+/-) high earthen berm, based on the existing Jane Street crossing remaining in-place. The school would not require flood proofing should the Jane Street crossing be upgraded to a bridge. The remaining industrial/ commercial area along Alliance Avenue and the residential area to the north could not be flood proofed due to the extent of flooding in this area.

C. Stormwater Management Flood Control

Centralized flood control facilities: On-line facility(s) upstream of study area

The flood storage potential upstream of the study area has been assessed to determine flood storage required to control the existing 25 year storm event peak flow to the 10 year storm event flow and similarly the 100 year to the 25 year storm event peak flow (i.e. reflective of optional protection levels downstream). Flood storage requirements to control the 25 year peak to the 10 year peak would be 455,000 m³ and 640,000 m³ to control the 100 year to the 25 year storm event peak flow.

Based on a review of possible storage sites upstream of the study area, one location that would provide significant storage potential is immediately upstream of the Grand Ravine Drive, located north of Sheppard Avenue West, and south of Finch Avenue West, within the Black Creek valley (ref. Figure 16). This area is open space and is considered to be a natural area with mature trees. For the Regional Storm, 128.6 ha of flood storage has been estimated to be available. Implementing a flood control system with 1,286,000 m³ of effective/available flood storage would reduce Regional Storm flood elevations at Jane Street (as is) by 0.5 m (+/-) with the on-line flood storage in-place as noted. Based on Provincial policy, on-line flood storage would only be considered functional and would not allow for changes in the Regulatory floodline or related management policy, unless the on-line storage was approved by the Ministry of Natural Resources and Ministry of Environment as a designated dam and flood control system.

Table 4.3 provides the potential influence of on-line controls on frequency flows at Grand Ravine Drive, Weston Road and Jane Street. At Grand Ravine Drive, there would be a reduction of the 100 year flood to almost the 25 year flood level. At Weston Road, the 100 year storm peak flow would only be reduced by 5% (+/-) due to the contributing drainage area between Grand Ravine Drive and Weston Road. As such, this alternative has been screened from further consideration, particularly given the high capital and operating cost, significant environmental impacts and limited overall effectiveness.

Table 4.3: Peak Flows with and without Flood Storage at Grand Ravine (M³/s)											
2 year											
Grand Ravine Dr.	37.8 /	59.0 /	74.6 /	94.8 /	111.4 /	127.2 /	244.0 /				
	37.8	59.0	68.4	82.6	90.6	99.5	141.8				
Weston Road	74.0 /	113.2 /	140.9 /	177.7 /	206.9 /	240.0 /	510.8 /				
	74.0	113.2	138.6	172.3	198.2	227.6	427.2				
Jane Street	82.0 /	123.0 /	151.3 /	189.0 /	219.4 /	254.8 /	563.8 /				
	82.0	123.0	150.0	186.10	215.9	249.3	490.9				

Note: Rating curve for flood storage facility at Grand Ravine as follows:

Table 4.4: Grand Ravine Flood Storage Discharge Rating Curve	
Q (m³/s)	S (ha – m)
0	0
59	0.3
74.6	3.0
82.5	4.6
94.8	8.9
99.5	11.2
111.4	20.8
127.2	45.2
141.7	83.8
244.1	128.6

4.4 Summary

Based on the foregoing technical assessment of the short-list of flood management alternatives, the following alternatives have been carried forward for consideration as part of the preferred solution.

- Jane Street Bridge upgrade and Valley Wall Reshaping
- Flood Protection barrier along:
 - Black Creek Blvd. and Scarlett Road
 - Rockcliffe Blvd.
 - Hilldale Road and Symes Road
- Creek naturalization between Rockcliffe Blvd. and Alliance Avenue with grading within the City Works property

5.0 PREFERRED ALTERNATIVE

Section 4 has described the process of establishing a long-list of riverine-based flood management alternatives, screening to a short-list, and then conducting more detailed analyses and assessment of the short-list to establish the components of the preferred solution; in short these include the following:

- Jane Street Bridge and Valley Wall Reshaping
- Flood Protection (barrier) along:
 - Black Creek Blvd, and Scarlett Road
 - Rockcliffe Blvd.
 - Hilldale Road and Symes Road
- Creek naturalization between Rockcliffe Blvd. and Alliance Avenue with grading within the City Work property

The components of the preferred solution have been considered under two implementation frameworks, Primary versus Secondary and Short versus Long term. In the former, the inference is on those works which can be conducted to provide direct and tangible reduction in flood risk (or flood protection to a stated standard); those would constitute the "Primary" recommendations. "Secondary" recommendations would either be conditional on "Primary" recommendations or relate to a complementary activity rather than one which affords direct flood risk reduction. Short versus Long term has been offered as a means for the TRCA and its implementation partners to consider works in a shorter timeline than others premised on factors associated with cost, complexity, and process (i.e. required land acquisition for implementation). The following summarizes the various elements of the preferred riverine flood management system for the Black Creek Rockcliffe Area and their implementation framework.

5.1 Primary Recommendations

Short Term

The Primary short term recommendations include continued maintenance of the Black Creek channel system to maintain flow conveyance capacity, as it was originally designed including the structural integrity of the concrete-lined channel. As funding allows and as the need requires, TRCA should continue to implement on-going maintenance.

In addition to on-going maintenance, TRCA should further investigate the possibility of implementing a flood protection berm along Black Creek Blvd. and Scarlett Road. The berm along the back of homes on Black Creek Blvd. would have to be 0.73 m to 2.75 m in height to contain the Regional Storm, and 0.63 m for the 100 year Storm. The preliminary cost estimate for the Black Creek Blvd. flood protection berm is \$ 465,000.00 (+/-) and would protect up to 13 homes.

Long Term

The Primary long term recommendations include replacing the existing arch culvert at the Jane Street crossing with a full span bridge structure. The Black Creek Valley would also need to be widened to allow for a 200 m (+/-) bridge (ref. Figure 12). The preliminary cost range for implementing this alternative is \$25 Million to \$30 Million.

5.2 Secondary Recommendations

Short Term

Flood protection berms should be constructed at the Rockcliffe Middle School on Rockcliffe Blvd. (0.5 m - 1.0 m) and along Hilldale Road and Symes Road (1.5 m +/-). The flood protection berms (ref. Figures 12 and 13) would complement the Jane Street Bridge replacement and provide flood protection to existing flood prone areas. The flood berm along Hilldale Road would have to include a 1.0 m (+/-) local road profile adjustment near Black Creek to prevent flooding beyond the flood berm and a 180 m (+/-) realignment of Lavender Creek near Symes Road to provide sufficient areas for the flood berm. In addition, storm sewer systems would require back flow prevention valves and accommodation for overland flow. Preliminary costs estimates for the Rockcliffe Middle School and Hilldale Road flood protection berms are approximately \$ 400,000 and \$ 900,000 respectively (ref. Appendix 'F'). The Hilldale Road flood protection berm would provide protection to approximately 77 homes, once the Jane Street bridge has been constructed.

Long Term

The opportunity to naturalize the creek reach between Rockcliffe Blvd. and Alliance Avenue while increasing the flood protection from the 2 to 5 year to the 10 year storm standard should be considered. Although the alternative only improves flow capacity for the lower storm events, it would allow for this creek section to be naturalized. This creek reach is approximately 620 m in length and it has been estimated to cost approximately \$ 1,600,000 to naturalize and increase local conveyance. Opportunities to improve grading within the City of Toronto Works area should also be considered by flattening the overbank area north of Rockcliffe Court.

5.3 Phasing of Works

The purpose of a Phasing Plan is to identify timing dependencies for construction of environmental management infrastructure, which would serve to:

- Minimize overall cost
- Minimize environmental impacts due to repeated construction disturbance
- Minimize temporary work requirements
- Avoid liability associated impacts of out-of-phase works.

The Black Creek Riverine Flood Management Class EA has been developed in accordance with the requirements of the Environmental Assessment Act for Phases 1 and 2. Subsequent environmental investigations will be required for the recommended projects, including consideration for the following environmental principles:

- Consultation with affected parties early and throughout the process
- Consideration of a reasonable range of alternatives
- Identification and consideration of the effects of each alternative on all aspects of the environment
- Systematic evaluation of alternatives in terms of their advantages and disadvantages to determine their net environmental effects
- Provision of clear, complete documentation of the planning process to allow for traceability of the proponent's decision making process

The proposed projects outlined in this Class EA require completion of subsequent steps to facilitate implementation in accordance with the provisions of Conservation Ontario Class EA, outlined in Table 5.1.

As these works will in some cases affect municipal infrastructure (such as the Jane Street bridge) and in other cases not (such as local berming), TRCA may or may not be the ultimate lead proponent. In any case, TRCA would be expected to have a Central role in the review and approval of any flood protection works, regardless of proponency.

The City of Toronto is anticipated to be the primary partner and implementation timing and scope would be conditional on the support and approval of City Council and TRCA's Board for the recommended works through this Class EA. The implementation of the Riverine Flood management preferred solution will need to consider a follow-on process of preliminary and detailed design and associated approvals.

	Table 5.1. Future Study Requirements									
No.	Preferred Alternatives	Undertaking	Consultation Requirements							
Shor	Short Term Projects									
1	Channel Maintenance	N/A	Exempt							
2	Black Creek Blvd. Flood Protection Berm	Remedial Flood Control Project	Conservation Ontario Class EA - Two points of Public Contact - Notice of Intent, Notice of Filing, PIC is not required.							
3	Rockcliffe Middle School Flood Protection Berm	Remedial Flood Control Project	Conservation Ontario Class EA - Two points of Public Contact - Notice of Intent, Notice of Filing, PIC is not required.							
4	Hilldale Road Flood Protection Berm	Remedial Flood Control Project	Conservation Ontario Class EA - Two points of Public Contact - Notice of Intent, Notice of Filing, PIC is not required.							
Long	Term Projects		<u> </u>							
1	Jane Street Bridge	Remedial Flood Control Project	Conservation Ontario Class EA - Two points of Public Contact - Notice of Intent, Notice of Filing, PIC is not required.							
2	Channel widening/naturalization Rockcliffe Blvd. to Alliance Avenue with potential floodplain grading	Remedial Flood Control Project	Conservation Ontario Class EA - Two points of Public Contact - Notice of Intent, Notice of Filing, PIC is not required.							

5.4 Toronto Water Basement Flooding Investigation

As noted, over the course of the Black Creek Riverine Flood Management Study, TRCA has consulted with Toronto Water insofar as its progress and scope related to its basement flooding investigation. As discussed earlier in this report, Toronto Water has jurisdiction over the local urban drainage system (storm, sanitary, and combined systems), hence has assumed responsibility for this component of the investigation. TRCA has, through the Black Creek Class EA Study, provided data to Toronto Water so that it could examine the influence of the existing and proposed Black Creek riverine system, on the local storm and combined sewer networks (Basement Flooding Area 4). Area 4 is serviced by both separate storm sewers and a combined sewer system with outlets and overflows to Black Creek respectively. During extreme storm events, flood elevations in Black Creek can influence the capacity of the local storm sewer and combined sewer system, resulting in potential increases in basement flooding risk. The Toronto Water study has developed the following recommendations to reduce and prevent basement flooding due to extreme storm events:

- New sanitary sewer on Alliance Avenue to provide basement flooding protection for Cliff Street and Cordella Avenue.
- A new sanitary storage tank to be located southwest of Alliance Avenue and Rockcliffe Blvd.
- A new storm sewer on Cliff Street, Cordella Avenue, Humber Blvd., and Alliance Avenue to convey stormwater downstream of Jane Street.

It is an important and noteworthy distinction when considering the riverine flood potential (of the Black Creek) versus that of the local Rockcliffe Area's drainage system, in that the flood timing of the local system will be very quick and dominated by local rainfall whereas for the Black Creek this will be much longer and more dominated by subwatershed scale precipitation. Hence ultimately the performance-based metrics to evaluate each system independently or concurrently will need to consider the influence of the scope of extreme precipitation events and watershed/subcatchment scale runoff timing.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

- i) The Black Creek Regulatory floodplain (based on transposed Regional Storm Hurricane Hazel) currently impacts numerous properties and buildings, mostly upstream of Jane Street to Weston Road within the Rockcliffe Area.
- ii) Historical development prior to the TRCA Regulation has encroached within the Black Creek Regulatory floodplain.
- iii) The creek has been straightened and lined to increase flow capacity throughout the study area, with the most substantial creek alteration upstream of Alliance Avenue to Weston Road, where the creek is in a concrete vertical walled channel.
- iv) The natural areas inventory documented limited terrestrial communities, aquatic and land species, with most of the natural areas occurring downstream of Jane Street and along Lavender Creek by Symes Road.
- v) The study area is serviced by a separated and combined sewer network. The City of Toronto has separately studied the existing sewer network and developed solutions to the related basement flooding problems, integrated with this study.
- vi) The preferred solution of riverine flood management alternatives will not be able to practically eliminate the existing Regulatory flooding potential for all properties within the study area, although overall (post-implementation) be a reduced flood risk.

6.2 Recommendations

- i) Conduct the additional studies required for each of the recommended flood management alternatives leading to detailed design, approvals, and implementation.
- ii) Commence discussion with the City of Toronto regarding increasing the hydraulic capacity of the Jane Street crossing, to coordinate the project with other City of Toronto infrastructure projects and long-term capital budget planning.
- iii) Commence discussion with the Toronto District School Board regarding the Rockcliffe Middle School, noting the integration with the Jane Street bridge project.
- iv) Due to uncertainty related to area hydrology, TRCA and Toronto Water should consider installation of area flow gauges to support future studies and designs.
- v) Future development (Infill/Intensification) in the Black Creek subwatershed should control peak flows such that there is no net impact to the Rockcliffe Area's flood risk.

vi) TRCA and Toronto Water should consider and evaluate various design standards and criteria to safeguard for the drainage system for the unknowns related to climate change, through increased system resiliency.

	Table 6.1: Summary of Recommended Works with Jane Street Bridge Replaced									
				Benefits						
Priority	Projects	Cost \$	Level of Service	Property/People Removed from						
				Floodplain/Others						
1	Jane Street Bridge	\$25,000,000 to	Regional Storm	115 homes, 1 school, 8 businesses,						
		\$30,000,000 (+/-)		(345 people +/-) removed from						
				Regional Storm floodplain based on						
				resident land uses. Note the school						
				would have 1500 (+/-) people and the						
				businesses would have 380 (+/-)						
				people						
2	Rockcliffe Middle School	\$400,000	Regional Storm	1 school, 400+ people removed from						
	Flood Protection Berm	(+/-)		Regional Storm floodplain						
				(complementary to Jane Street Bridge)						
3	Hilldale Road Flood	\$900,000	Regional Storm	77 homes, 231 people removed from						
	Protection Berm	(+/-)		Regional Storm floodplain						
				(complementary to Jane Street Bridge)						
4	Black Creek Drive Flood	\$465,000	Regional Storm	13 homes, 39 people removed from						
	Protection Berm	(+/-)		Regional Storm floodplain						
5	Rockcliffe Blvd. to Alliance	\$1,600,000 (+/-)	10 year	Creek naturalization improved flood						
	Avenue Channel			storage						
	Widening/Naturalization									

	Table 6.2: Summary of Recommendations with Jane Street Bridge In-place As Is										
			Benefits								
Priority	Projects	Cost \$ 1.	Level of	Property/People Removed from							
			Service	Floodplain/Others							
1	Rockcliffe Middle School	\$400,000	100 year	1 school, 400+ people removed from							
	Flood Protection Berm	(+/-)		100 year floodplain							
2	Hilldale Road Flood	\$900,000	100 year	77 homes, 231 people removed from							
	Protection Berm	(+/-)		100 year floodplain							
3	Black Creek Drive Flood	\$465,000	Regional Storm	13 homes, 39 people removed from							
	Protection Berm			Regional Storm floodplain							
4	Rockcliffe Blvd. to	\$1,600,000 (+/-)	10 year	Creek naturalization improved flood							
	Alliance Avenue Channel			storage							
	Widening/Naturalization										

^{1.} Costs for berming have been provided for berms being built to provide Regional Storm level of service

Tables 6.1 and 6.2 summarize the recommended works and the associated costs and benefits to people for two (2) scenarios, Jane Street Bridge replaced and other recommended works in-place and secondly, recommend works with the existing Jane Street Bridge remaining. Based on the annual damages mitigated and alternative cost estimates, financial benefit/cost ratios have been determined. Projects have been prioritized using the number of properties and people removed from the floodplain, and with the understanding that the Jane Street bridge project is a prerequisite for the Hilldale Road and Rockcliffe Middle School Flood Protection Berm projects.

APPENDIX A Public Consultation

Agency	Contact Person	Position	Fax	Email	Notified re: Study Commencement & PIC1	Issued letter regarding Archaeological Assessment	Notified re: PIC 2
Ministry of the Environment	Regional Office (Yonge Street)		416.325.6345		Yes		No
Conservation Ontario	Bonnie Fox			bfox@conservationontario.ca	Yes		N
Conservation Ontario	Don Pearson	General Mgr		dpearson@conservationontario.ca	Yes		No
City of Toronto	*Bill Snodgrass	Toronto Water		wsnodgr@toronto.ca	Yes		Yes
Black Creek Project	*Gaspar Horvath	Coordinator		ghorvath@trca.on.ca	Yes		Yes
Black Creek Project	Barbara Scott	Founding member		Barbara@gatewayvc.ca	Yes		Yes
Black Creek Project	Mike Peppard	President		ecoaction@earthday.ca	Yes		Yes
Mt. Dennis Community Association	Barb Stone	President		mountdennisRA@hotmail.com	Yes		Yes
Mt. Dennis Community Association	Simon Chamberlain	Secretary		hayeschamber@gmail.com	Yes		Yes
Action for Neighbourhood Change in Mount Dennis	Jean-Marie Boutot	Community Initiatives Coordinator		jmboutot@cspc.toronto.on.ca	Yes		Yes
Mt. Dennis Weston Network	Marabelle McTavish	Chair		mmct@sympatico.ca	Yes		Yes
Councillor Nunziata	*Frances Nunziata	Local Councillor		dcamilo@toronto.ca (Debbie Camilo – Exec Asst)	Yes		Yes
Consulting Economist	Mike Fortin	Contract staff with CO		mfortin@sentex.net	Yes		No

Agency	Contact Person	Position	Fax	Email	Notified re: Study Commencement &	Issued letter regarding Archaeological Assessment	Notified re: PIC 2
Chiefs of Ontario	Sue Chiblow	Environmental Coordinator	416.597.8365	sue@coo.org	Yes	Yes	No
Six Nations of the Grand River Territory	Bill Montour	Chief	519.445.4208		Yes	Yes	No
Mississaugas of the New Credit First Nation	Bryan Laforme	Chief	905.768.1225	bryanlaforme@newcreditfirstnation.co m	Yes	Yes	No
Conseil de la Nation Huronne- Wendat	Luc Laine		418.842.1108		Yes	Yes	No
Ministry of Aboriginal Affairs	Lorena - Head Office		416.326.7603		Yes	Yes	No
Credit River Metis Council	Clayton Cadeau	Interim President		creditrivermetiscouncil@hotmail.com	Yes	Yes	No
Metis Nation of Ontario Region 8 Office			416.977.9911		Yes	Yes	No
Six Nations of the Grand River Confederacy Council	Leroy Hill	Council Secretary	905.765.9193		Yes	Yes	No
Assembly of First Nations			613.241.5808		Yes	Yes	No
Lambton Golf and Country Club	Peter Kinch		416.767.9205	Cell 416.451.7200 email: pkinch@ lambtongolf.com	Yes	Yes	Yes
MP	Alan Tonks			Tonks.A@parl.gc.ca	No		Yes
MPP	Laura			Lalbanese.mpp.co@liberal.ola.org	No		Yes

Agency	Contact Person	Position	Fax	Email	Notified re: Study Commencement & PIC1	Issued letter regarding Archaeological Assessment	Notified re: PIC 2
	Albanese						
TRCA	Deb Martin- Downs	Director, Ecology Division			Yes		Yes
TRCA	Glenn MacMillan	Senior Manager			Yes		Yes
TRCA	Don Haley				Yes		Yes
TRCA	Hendrik Amo	Geomatics Specialist			Yes		Yes
TRCA	Gary Wilkins	Watershed Specialist			Yes		Yes
TRCA	*Susan Robertson	Project Manager			Yes		Yes
TRCA	Beth Williston				Yes		Yes
TRCA	Laurie Nelson	Senior Manager, Development Planning and Policy			No		Yes
TRCA	Steve Heuchert	Manager, Development, Planning and Regulation			No		Yes
York Guardian	via Sinem Kilic	TRCA Communications			Yes (ad ran Fri Jan 16 th)		Yes
Bloor West Villager	via Sinem Kilic	TRCA Communications			Yes (ad ran Fri Jan 16 th)		Yes
Toronto District	*Mario Silva			416.394.3944	No		Yes

Agency	Contact Person	Position	Fax	Email	Notified re: Study Commencement & PIC1	Issued letter regarding Archaeological Assessment	Notified re: PIC 2
School Board							
Toronto District Catholic School Board	*Francesco Termine			francesco.termine@tcdsb.org	No		Yes
City of Toronto	*Anne Milchberg	Manager, Facilities and Real Estate			No		Yes
AECOM for City of Toronto	*Paul Nelson	Senior Project Manager			No		Yes
City of Toronto	Grace Lin	Toronto Water			No		Yes
Local Resident	*John Berry			jp.berry@sympatico.ca	NA		Yes
Local Resident	*David White			dvdwht@sympatico.ca	NA		Yes
Loca l Resident	*Mike Mattos				NA		Yes
Additional Contac					1		T
	Michael Kraljevic	TEDCO			No		No
	Anna Marra	Director, Parks Forestry and Recreation – Etobicoke			No		No
	Lou Moretto	Manager, City Planning			No		No
	Victor Gottwald	Sr. Planner			No		No
	Christian Giles	City Planning			No		No
	John Bryson	Manager, Structures			No		No
	John Kelly	Manager, Technical Services			No		No

Agency	Contact Person	Position	Fax	Email	Notified re: Study Commencement & PIC1	Issued letter regarding Archaeological Assessment	Notified re: PIC 2
	Al Smithies	Manager, Transportation			No		No
	Eric Leon	Technical services			No		No
	Netami Stuart	Landscape Architect			No		No
	Philip Carvalino	City Planning			No		No
	Kevin Bowser				No		No

Note: * CLC member

PUBLIC CONSULTATION

The Conservation Ontario Class EA process has mandatory and optional points for public consultation as depicted in Figure 1.1. Due to the nature of the study, which has had the potential for high public interest, the Consultation Plan developed by the Project Team included the formation of a Community Liaison Committee (CLC) and two public information centres (PICs). The following sections describe the public consultation used throughout the study.

Notice of Intent and Public Information Centre No. 1

A joint Notice of Study of Commencement and Public Information Centre No. 1 was published in York Guardian and Bloor West Villager on January 16th, 2009. Copies of the newspaper advertisement and copies of all comments received and written responses are contained in Appendix 'B'.

Public Information Centre No. 1 (PIC No. 1) was held on Tuesday January 27, 2009 at the Royal Canadian Legion – Branch No. 31. PIC No. 1 was the first opportunity for the general public to meet with the Project Team, and to review the study scope and discuss issues related to the project, including background information, local deficiencies, environmental considerations and alternative solutions. Display boards were prepared that presented the following information (ref. Appendix 'B' – Public Information Centre No.1):

- Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002) Process
- Community Liaison Committee (CLC)
- Study Work Plan
- Problem Statement
- Creek Flooding Management vs. Basement Flooding
- Study Area Drawing
- Black Creek Subwatershed Drawing
- Why and how the Rockcliffe Area was selected for Study?
- Humber River Watershed Flood Vulnerable Areas and Roads Drawing
- Land Use Map
- Infrastructure Drawing
- Environmental Inventory Drawing
- Photographic Inventory Map
- Environmental Inventory
- Flood Management Standards
- Key Issues and Concerns
- Existing Floodline Mapping
- Climate Change Perspectives
- "Long-List" of Management Alternatives
- Flood Management Alternatives
- Evaluation Factors and Criteria
- Don't upstream road and rail embankments and culverts provide me with flood protection?

- Next Steps
- How to Provide Your Comments

The first PIC was well attended, with approximately 18 people signing the attendance record and an estimated total of approximately 50 viewing the material. One comment sheet was submitted at the PIC and one comment was emailed to the Project Team.

Public Information Centre No. 2

The Public Information Centre No. 2 Notice was sent to stakeholders and agencies by mail in May 2009. The Notice was also published in the York Guardian and Bloor West Villager, June 5th, 2009. Copies of the newspaper advertisement, letters to stakeholders and agencies and copies of all comments received and written responses are contained in Appendix 'C'.

Public Information Centre No. 2 (PIC No. 2) was held on Monday June 15, 2009 at the Royal Canadian Legion – Branch No. 31. The purpose of PIC No. 2 was to summarize the background information and study scope, and present the alternative solutions. Display boards were prepared that presented the following information (ref. Appendix 'C' – Public Information Centre No. 2):

- Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002)
- Problem Statement
- Creek Flooding Management vs. Basement Flooding
- Study Area Map
- Black Creek Subwatershed Drawing
- Photographic Inventory Drawing
- Existing Floodline Mapping
- Evaluation Factors and Criteria
- Assessment of Long-list of Alternatives
- Creek Reaches & Measure of Flood Risk Drawing
- Reach No. 1 Drawing
- Reach No. 2 Drawing
- Reach No. 3 Drawing
- Reach No. 4 Drawing
- Preferred Alternatives Drawing
- Preliminary Preferred Alternative
- Next Steps
- How to Provide Your Comments

A presentation was also given by AMEC Earth & Environmental that summarized all of the information presented. The second PIC was not quite as well attended, with only approximately 10 people signing the attendance record and perhaps an additional 10 viewing the material. One comment sheet was submitted at the PIC and one comment was emailed to the Project Team.

Community Liaison Committee Meetings

Meeting No. 1 – April 8, 2009

The first Community Liaison Committee (CLC) Meeting was held on April 8, 2009 (ref. Appendix 'D' – Community Liaison Committee). At PIC No.1 (January 27, 2009) community members were asked by TRCA if they were interested in sitting on the committee, TRCA followed-up with community members and various stakeholder agencies such as the City of Toronto to form the CLC. The TRCA established the CLC to assist in the decision making process for this project. The function of the CLC includes:

- Identify items of public concern with regard to the impact and design of proposed remedial flood management alternatives;
- Provide direct input on these concerns to the Conservation Authority;
- Review any requests made by members of the public and attempt to resolve any issues of concern for a decision, and
- Where appropriate, comment on the effectiveness of the Class Environmental Assessment process for meeting public concerns for the specific project, and where relevant, identify possible improvements.

The first CLC meeting was attended by residents, staff from the Toronto Water Department, Toronto District School Board (TDSB), local consulting firm, and members of the Project Team. AMEC staff gave a brief presentation that focused on the Class EA Process for Remedial Flood and Erosion Control, overview of the role of the CLC, Study Area Baseline Inventory (including land use, flooding, infrastructure and the natural environment), and Management Alternatives. There was also an opportunity for discussion. The following is a summary of the discussion:

- Erosion of the concrete channel appears to be happening along Black Creek. The
 concrete channel is reaching its life expectancy, as it was originally constructed in the
 1960's. Maintenance of the concrete channel has not been preformed along Black
 Creek in the past and tree removal is part of normal maintenance. There is a public
 perception that the trees are beneficial from a visual perspective.
- A member questioned the possibility of using off-line storage, in areas such as the
 existing City of Toronto yards. The City of Toronto is considering keeping the yards and
 rebuilding the existing buildings, therefore the yards could not be used as a man made
 flood storage area. Substantial grading would be required to provide sufficient flood
 storage to reduce flows if at all.
- A member asked if the widening of the existing Jane Street bridge would have negative impacts to properties downstream of Jane Street? Widening Jane Street bridge would not increase the regulatory flood risk downstream as the Regulatory flood lines are determined based upon peak flows without accounting for storage upstream of crossings. Natural storage within creeks and valleys is taken into consideration in developing Regulatory flows.
- Other proposed options discussed include:
 - Closing Humber Blvd. S. and using that area for additional flow capacity within an enclosure or widened creek.

- Relocation of the drop structure on the downstream side of Jane Street relocated upstream of the crossing which would improve hydraulics. This option has been assessed in the past and it would not significantly reduce Regulatory flooding upstream of Jane Street.
- Relocation of the drop structure at Scarlett Road downstream to upstream of the culvert. The condition of the concrete at the Scarlet Road crossing is in need of repair.
- Relief culverts at all existing crossings would provide additional flow capacity for the infrequent storm events.
- Localized diversion of existing storm sewers to reduce flows within critical sections of Black Creek.
- Naturalized flood storage area at the existing City of Toronto property.
- Maintenance of the concrete channel and removal of vegetation would improve flow capacity within the channel.
- Natural channel design within the Lambton Golf Course and City-owned lands.

Meeting No. 2 – June 1, 2009

The second Community Liaison Committee (CLC) Meeting was held on June 1, 2009 (ref. Appendix 'D' – Community Liaison Committee). The second CLC meeting was attended by residents, TDSB, local consulting firm, City Councillor and members of the Project Team. AMEC staff gave a brief review of the Black Creek Flood Management Class Environmental Assessment including the purpose which is focused on addressing riverine flooding. A long-listed alternative and short-listed alternative tables were distributed for review. The following is a summary of the discussion that took place:

Long-listed Alternatives:

- How extreme weather has been factored into the long-list assessment? Extreme
 weather would be considered part of Climate Change and as the Regional Storm is not
 really considered to be impacted by Climate Change, it would not impact the overall
 assessment.
- Why has more frequent flooding had occurred on Black Creek Drive in the last two years? Climate Change impacts are speculated to have been occurring. In addition, due to an increase in riverine flooding, and the inherent interaction of the creek and storm sewer systems, more frequent flooding within the storm sewer may occur. Local grading and servicing issues would also result in the observed flooding.
- How would berms handle local drainage? Typically back flow prevention devices are required to prevent flood waters from entering locally flood protected areas.
- Has the confluence of Black Creek and the Humber River had been assessed with respect to the angle of the Black Creek entering Humber River? This had not been explicitly examined due to the less frequent storm events of 100 year and the Regional Storm not being impacted by the angle of the confluence. The hydraulic models take the angle of the confluence into consideration. There would not be a benefit upstream within the study area if changes were made at the confluence of the Humber River and Black Creek.

- Grading works within the City of Toronto Works Yard should consider removal of material close to the creek block and raising of the Works Yard area at the fringes of the floodplain. A cut/fill balance would have to be assessed
- Who would pay for flood protection berming works? Public dollars would be used for any improvements

Short-Listed Alternatives

- Why an enclosure would not work along Humber Blvd? This alternative would be considered costly and would have significant environmental impacts and challenges which would not be considered approvable by various agencies. Public safety would also be a concern.
- A centralized flood control facility had been assessed, and based upon the required storage to reduce frequency flows from either the 25 year to 10 year or 100 year to 25 year storm events, a suitable location had not yet been found, although the creek reach from Weston Road to Eglinton Road had been reviewed. A flood storage facility would have to consider the costs for acquisition of lands.
- What is the timing of channel maintenance? Maintenance had been planned within this reach of Black Creek later this year.
- A resident has never observed flooding above the walls of the creek along Humber Blvd., but has observed flooding of roadway systems either side of the channel within the floodplain. A possible solution to the storm sewer system flooding would be to relocate the storm sewer outlet downstream to where flood water elevations are lower.

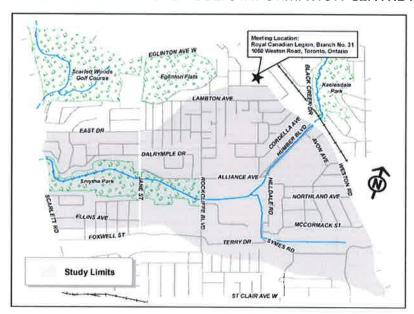
Filing of the Project File and Notice of Completion

All parties previously having expressed an interest in the project have been notified by letter, regarding the completion of the project and filing of the Project File. In addition, a Notice of Completion will be placed in the local newspaper, in accordance with the requirements of the Conservation Ontario Class EA process. TRCA will also post the Class EA on its website for public viewing.

Copies of the Project File will be made available by TRCA at its office

APPENDIX B Public Information Centre No. 1

TORONTO AND REGION CONSERVATION MANAGING FLOOD RISK IN THE BLACK CREEK NOTICE OF STUDY INTENT and PUBLIC INFORMATION CENTRE NO.1



Toronto and Region Conservation (TRCA) has commenced a study to examine various means and opportunities to manage flood risk along the Black Creek, a tributary of the Humber River. The study area extends along Black Creek from Scarlett Road to just beyond Weston Road as indicated on the Key Plan above. This project is being considered in order to investigate opportunities to enhance flood protection for existing flood prone development located within the Black Creek Regulatory floodplain.

A key component of the study will be consultation with interested stakeholders (residents, landowners and regulatory agencies). Two Public Information Centres (PICs) will be held to provide interested parties with an opportunity to review and discuss issues related to the study. The first Public Information Centre will be held as follows:

Tuesday January 27, 2009 6:30 p.m. to 8:30 p.m. Royal Canadian Legion, Branch No. 31, 1050 Weston Rd., Toronto, ON

Those attending the PIC will have the opportunity to meet with the Project Team, review the study scope and discuss issues related to the project, including background information, local deficiencies, environmental considerations and alternative solutions.

We are also interested in hearing any comments or input that you may have about this study. Comments and information regarding the study are being collected to assist the TRCA in meeting the requirements of the Conservation Ontario, Class Environmental Assessment for Remedial Flood and Erosion Control Projects. This material will be maintained on file for use during the study and may be included in study documentation.

If you have questions or specific comments related to this study, please contact either of the following:

Ms. Laurian M. Farrell, M.L.A., P. Eng. Manager, Water Resources Toronto and Region Conservation Authority 5 Shoreham Drive Downsview, ON M3N 1S4 Tel: (416) 661-6600 Ext. 5601

Mr. Ron Scheckenberger, M.Eng., P.Eng. Project Manager Philips Engineering Ltd. 3215 North Service Road, P. O. Box 220 Burlington, ON L7R 3Y2 Tel: (905) 335-2353 E-mail: rscheckenberger@philipseng.com



E-mail: lfarrell@trca.on.ca



BLACK CREEK FLOOD MANAGEMENT CLASS ENVIRONMENTAL ASSESSMENT



PUBLIC COMMENT SHEET

Public Information Centre No.1, January 27, 2009

The Toronto and Region Conservation Authority (TRCA) has commenced a study to examine various means and opportunities to manage flood risk along the Black Creek, a tributary of the Humber River. The study area extends along Black Creek from Scarlett Road to just beyond Weston Road. This project is being considered in order to investigate opportunities to enhance flood protection for existing flood prone development located within the Black Creek Regulatory floodplain. This questionnaire is an opportunity for you to comment on this study and indicate your concerns and preferences. Your views are important to us. Please take a moment to complete this comment sheet.

Please complete this Comment Sheet and deposit it in the "Comment Sheet" box. Please print. Thank you.

1 2 2	SMENT	FLOOR	DRAINS	611	SINCE	1975
				- CV		
				=		
hat probl	ems/issues do ya	ou perceive with l	Black Creek at prese	ent in the Stu	idy Area?	
- 1 - 1 - 1	0	0	1 1 /	P		AVENDER
REE	BEING	STOPP	ING WATE	EK	LOW, B	
SNOW		DUMPI			TON & US	
DEST	RICTOR	1		Romi		BASIA
HON	- 1	CNSTANT		AVE		IT BAC
//Y	PRAIN (LEAMEN	RS PAKE	1116	M 007	E

The information on this comment sheet is collected in accordance with the Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002) and will become public information. All comments will be included in the final report and will be made public at the conclusion of the study.

Personal information including addresses and telephone numbers will not be disclosed.



BLACK CREEK FLOOD MANAGEMENT CLASS ENVIRONMENTAL ASSESSMENT



3.	Solutions to the identified problems will be evaluated using various criteria as noted below. Please tell us which
	of these you feel are more important and which are less important by rating them on a scale of 1 to 3 as follows
	and also if there are any others we should be considering in our assessment:

	Not Important	2.	Moderately Important	3. Very Imp	ortant				
		Evaluat	ion Criteria	Ratin	g				
E	conomic								
	Capital Cost: Cost	to construct	associated works	2					
	Operational Cost:	Operational Cost: Cost to operate and maintain work							
	Flood Damage: Ro	eduction in f	flood damages	7,					
Fu	ınctional								
	Effectiveness: Ab	ility of work	to address the flooding problem.	3					
Eı	nvironmental								
		ivironment i	I/or impacts a proposed work woul including the potential for addition Park.						
			r impacts a proposed work would l including fish, fish habitat, and wa						
So	ocial								
			on in the risk to life including lead access (private vehicle and emerge						
	Recreational Activ		tial impacts a work would have on	active /					
0	thers								
_									

Your answers to the following will help us plan future meetings.

4. Please indicate your satisfaction with the following:

	Satisfied (Y/N)	If Not Satisfied, Please Specify Your <u>Preference Here</u>
Location of Meeting	YES	(
Time of Meeting	YES	
Day of the Week	YES	S

The information on this comment sheet is collected in accordance with the Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002) and will become public information. All comments will be included in the final report and will be made public at the conclusion of the study.

Personal information including addresses and telephone numbers will not be disclosed.

January 2009



BLACK CREEK FLOOD MANAGEMENT CLASS ENVIRONMENTAL ASSESSMENT



On a scale from 1 to 5, where "1" is "very" and "5" is "not at all", please rate the following by circling the appropriate number:

appropria	te number.				
a) How	informative were th	e display materials	and study ou	tline?	
Very 1	2	Somewhat 3	4	Not at all 5	
b) How	helpful were the sta	ff and consultants in	n attendance	?	
Very	,	Somewhat		Not at all	
1	2	3	4	5	
Comments	or Suggestions				
5. Were a	all of your questions	answered satisfact	torily?		
[X] Yes	S	[] No			
6. Would	you like to be notifi	ed directly of the r	next Public I	nformation Centre?	
[X] Yes		[] No		control control	
7 DI .					
	include your name a	ind address. A wr	itten respon	se will be sent to attende	es.
Name:		els Alba	_	Postal Code:	211
Address:		3 3 9		E-Mail:	
	, 				
				**	
Please mail	or fax your comple	ted questionnaire (to:	1411	
Ms. Laurian	M. Farrell, M.L.A.,	P. Eng.			
Toronto and	gement Co-ordinator Region Conservation	n Authority			
5 Shoreham	Drive	,			
Tel: (416) 6	ON M3N 1S4 61-6600 Ext. 5601				
Fax: (416) 6	661-6898				
nail: Ifari	rell@trca.on.ca				
Web: (www.	.trca.on.ca/BlackCree	kClassEA)			

The information on this comment sheet is collected in accordance with the Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002) and will become public information. All comments will be included in the final Posterial information of the study.

Personal information including addresses and telephone numbers will not be disclosed.

January 2009



BLACK CREEK FLOOD MANAGEMENT CLASS ENVIRONMENTAL ASSESSMENT



Thank you for your time.
Other Comments:

a—————————————————————————————————————

The information on this comment sheet is collected in accordance with the Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002) and will become public information. All comments will be included in the final report and will be made public at the conclusion of the study.

Personal information including addresses and telephone numbers will not be disclosed.

January 2009



Flood Protection & Remedial Capital Works Strategy

Why TRCA?

The protection of life and property, and the rehabilitation of valley and stream corridors are the core mandates of the Toronto & Region Conservation Authority (TRCA). It was the devastation and destruction caused by Hurricane Hazel in 1954 that emphasized the necessity of a coordinated flood control and water conservation plan for Metropolitan Toronto and the surrounding Region, and this storm is still used today as the Regulatory Storm (i.e., the storm event that is used to determine the extent of the Regulated floodplain). This realization lead to the amalgamation of a number of conservation authorities in 1957, forming the TRCA (formerly the MTRCA). The Authority's objectives can be achieved through active remedial works and resource management projects which reduce or eliminate existing flood, erosion and slope stability hazards. Projects may be undertaken by the Authority on private and public lands, as well as on Authority owned lands. The Flood Protection and Remedial Capital Works Strategy specifically focuses on riverine flooding.

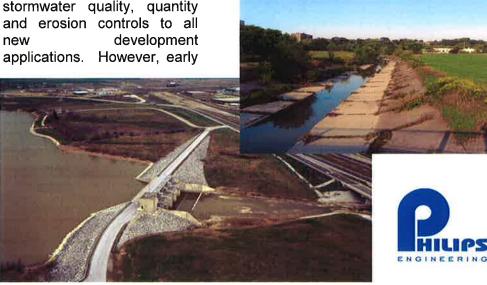
The Strategy

The Flood Protection Remedial Capital Works Strategy will look at existing flood vulnerable areas within TRCA's iurisdiction identify areas where flood risk may be reduced through remedial works projects. The Strategy will also establish a priority ranking for the areas associated remedial and This projects. Strategy updates and builds upon the TRCA's 1980 Flood Control Program. A number of developments have occurred since the 1980 Flood Control Program was prepared which the necessitate update. including: new Policies and Legislation (Provincial, Municipal and Authority); the construction of many of the flood control facilities recommended in the 1980 plan; numerous development applications which affect the hydrology (flows) within the advances watersheds; technology allowing for more modeling accurate and

greater coverage of floodline mapping; and the need to prepare for climate change.

Contemporary land use planning recognizes the importance of natural stream systems for both hydrologic and ecologic functions. As the understanding of these systems has evolved over time. have TRCA's SO requirements for protecting them and subsequently providing protection to the TRCA employs setpublic. backs. riparian buffers, stormwater quality, quantity

development requirements had little regard for the watercourses serviced lands. Water was seen as a nuisance to be conveyed away from developable areas as quickly Therefore, possible. watercourses often were narrowed and channelized, development and often encroached onto flood prone lands, resulting in thousands of flood vulnerable structures (FVA's) in the older developed areas.



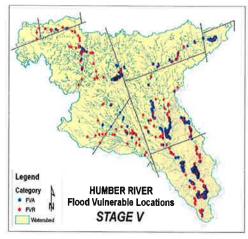
The Process

A Flood Vulnerable Areas (FVA's) Database has been created which identifies all flood-prone structures for a range of storm frequencies (ranging from a 1 in 2 year storm to the Regulatory Storm, or the Hurricane Hazel storm). The database uses most gu to date hydrologic and hydraulic data available and is represented graphically using geographical information system (GIS).

An automated tool to prioritize remedial works has also been developed. The tool

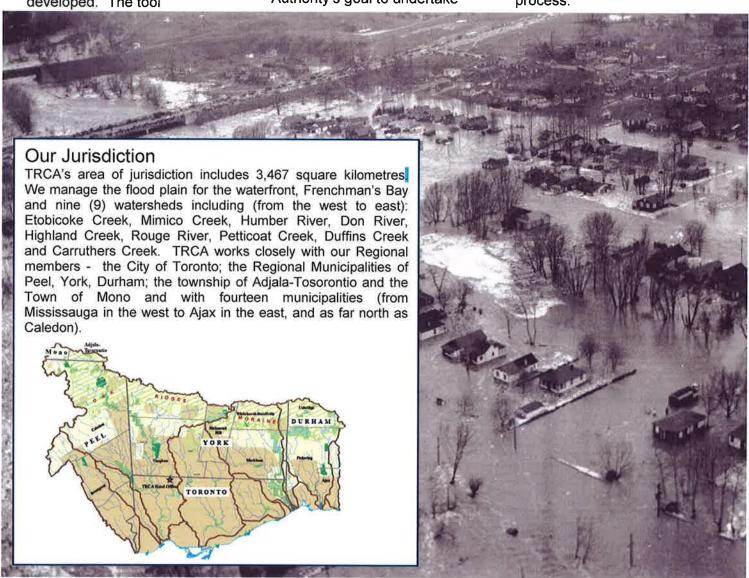
establishes the relative risks associated with flooding for groups of FVA's and thereby provides a method for TRCA staff to manage implementation of flood protection works on a priority basis. Most important is the potential to reduce the risk to human life and to property. The tool is currently being used to assess priorities within the Humber River watershed (test case). Once the tool is extended across all watersheds and the Flood Protection & Remedial Works Strategy is complete, it is the Authority's goal to undertake

remedial works projects on an



on-going basis. Projects will be conducted following the Conservation Ontario Class Environmental Assessment process.

Version: January 2009



Please visit: www.trca.on.ca/BlackCreekClassEA for more information or contact Laurian Farrell @ (416) 661-6600 ext 5601 lfarrell@trca.on.ca

PUBLIC INFORMATION CENTRE

Class Environmental Assessment For Black Creek Flood Management





Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002)

- The Class EA for Remedial Flood and Erosion Control Projects establishes a planning and approval process for a variety of projects that may be carried out by Conservation Authorities in Ontario
- The Class EA process categorizes proposed municipal projects according to their anticipated environmental impact, and calls for increasingly stringent review requirements as the magnitude of the anticipated environmental impact increases.
- Remedial Flood and Erosion Control Projects refer to those projects undertaken by Conservation Authorities, which are required to protect human life and property, in previously developed areas, from an impending flood or erosion problem. Such projects do not include works which facilitate or anticipate development.





Community Liaison Committee (CLC)

The Conservation Ontario Class Environmental Assessment protocols encourage the formation of a CLC to assist in the decision making process regarding remedial flood management. The function of CLC includes:

- Identify items of public concern with regard to the impact and design of proposed remedial flood management alternatives;
- Provide direct input on these concerns to the Conservation Authority;
- Review any requests made by members of the public and attempt to resolve any issues of concern for a decision, and
- Where appropriate, comment on the effectiveness of the Class Environmental Assessment process for meeting public concerns for the specific project and, where relevant, identify possible improvements.





Community Liaison Committee (CLC)

The composition of the CLC membership is proposed as follows:

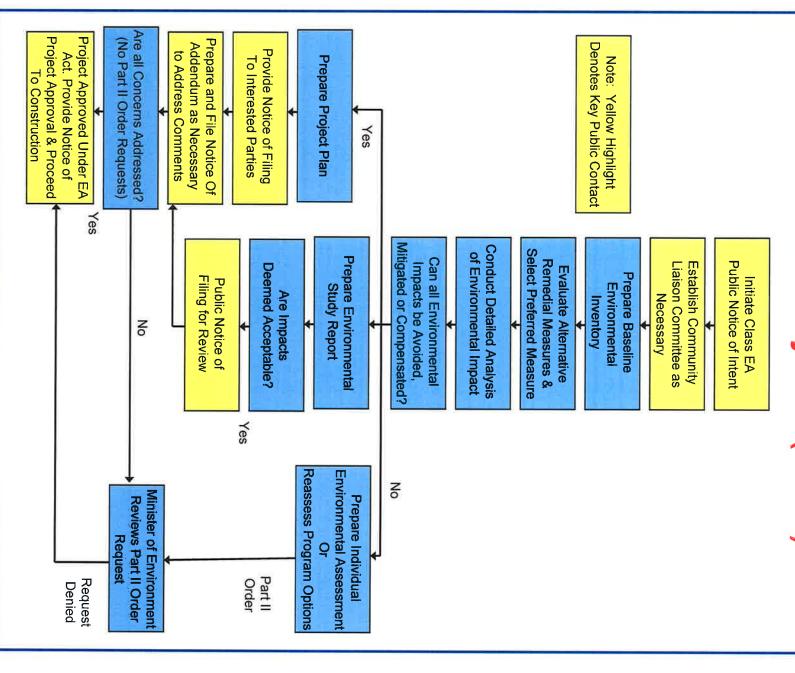
- 2 Community Groups Representatives
- 2 School Board Representatives
- 2 City of Toronto Representatives
- 2 Councillors, MP and/or MPP
- 2 Residents
- 1 Lambton Golf Course Representative
- 1 Business Owner
- 4 Toronto and Region Conservation Authority Representatives
- 2 Philips Engineering Staff (Consultant)

Representation on the CLC for the Community Groups, Residents, and Business will be established by the TRCA, once individuals have indicated interest by completing the application form provided tonight by TRCA.





Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002) Conservation Ontario



Study Work Plan

- Background Information Collection
- Land Use and Infrastructure Inventory
- Flooding Conditions Inventory
- Environmental Inventory
- Screening of Alternatives to Address Flooding
- Selection of Preferred Solution(s)
- Formulation of Recommendation(s)







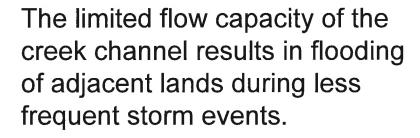


Problem Statement

The intent of this study is to assess various means and opportunities to manage flood risk along the Black Creek from Scarlett Road to just beyond Weston Road for the existing flood prone development within the Regulatory Floodplain.



August 19, 2005 High Flows









Basement Flooding Creek Flooding **Management**

and the overall floodplain. the capacity of the watercourse, culverts, bridges risk associated with creek flooding which relates to The current TRCA led study is examining flood

well as potential local grading issues. For further information on this matter please contact: process is examining basement flooding problems. These problems are typically related to local sewer capacity (storm and combined), as Toronto WATER as part of a separate study

Josie Giordano,

The Investigation of Chronic Basement Flooding Class Environmental Assessment Study Public Consultation Coordinator for

City of Toronto

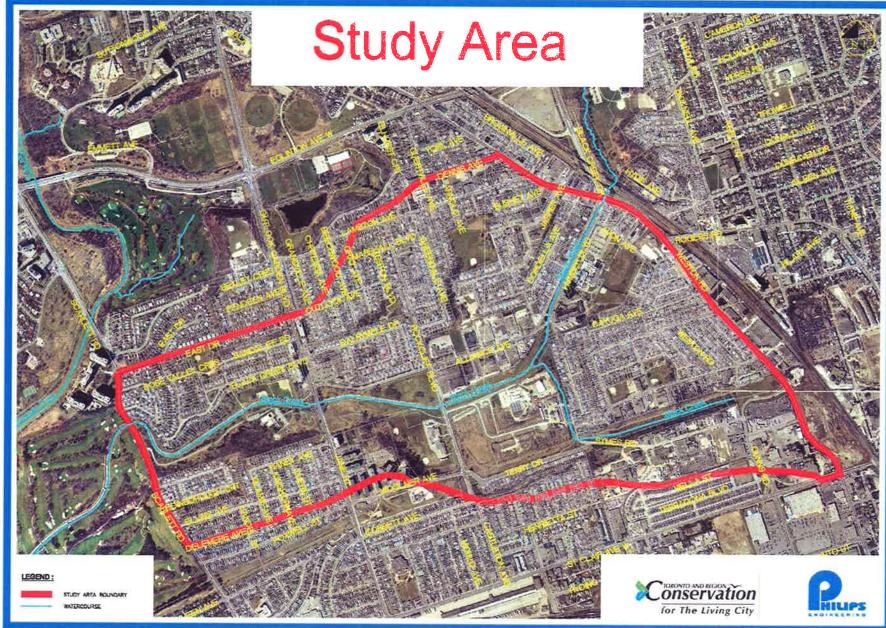
Tel: 416.338.2859 Fax: 416.392.2974

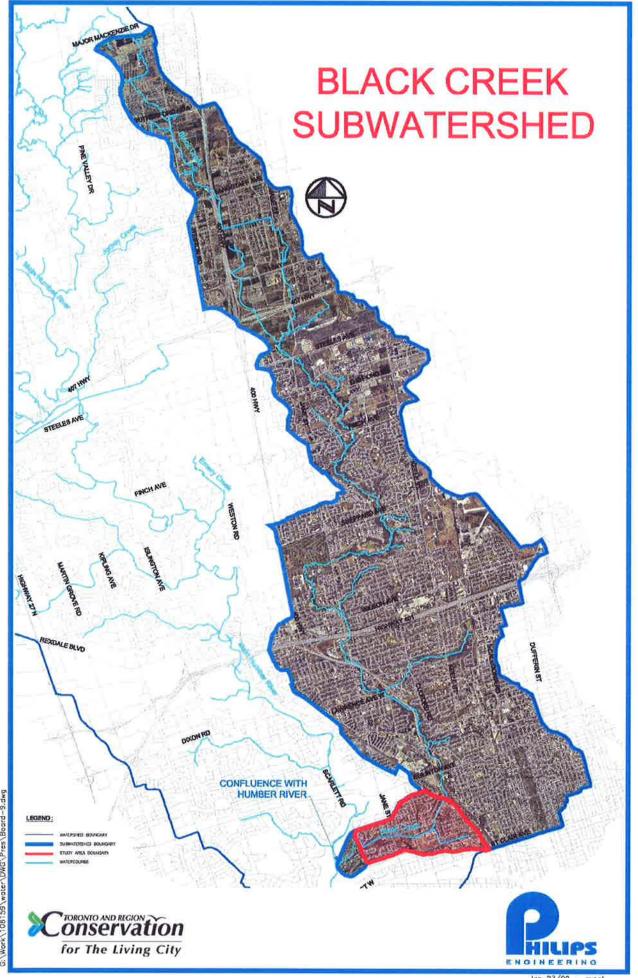
email: jgiorda@toronto.ca

www.toronto.ca/involved/projects/Basement_flooding/index.htm









Why and how the Rockcliffe Area was selected for Study?

TRCA's jurisdictional area covers nine watersheds generally extending from Etobicoke in the west to Ajax in the east. TRCA is updating its Flood Management Program based upon current flood risk mapping. This effort has identified some 2270 Flood Vulnerable Areas and 336 Flood Vulnerable Roads in the Humber River Watershed alone. As part of this larger project, the Humber River basin has been examined initially in greater detail for concentrated areas of significant flood risk. The Rockcliffe Area has been selected as a pilot project by TRCA due to its location in the watershed, history of flooding and widespread area of flooding.





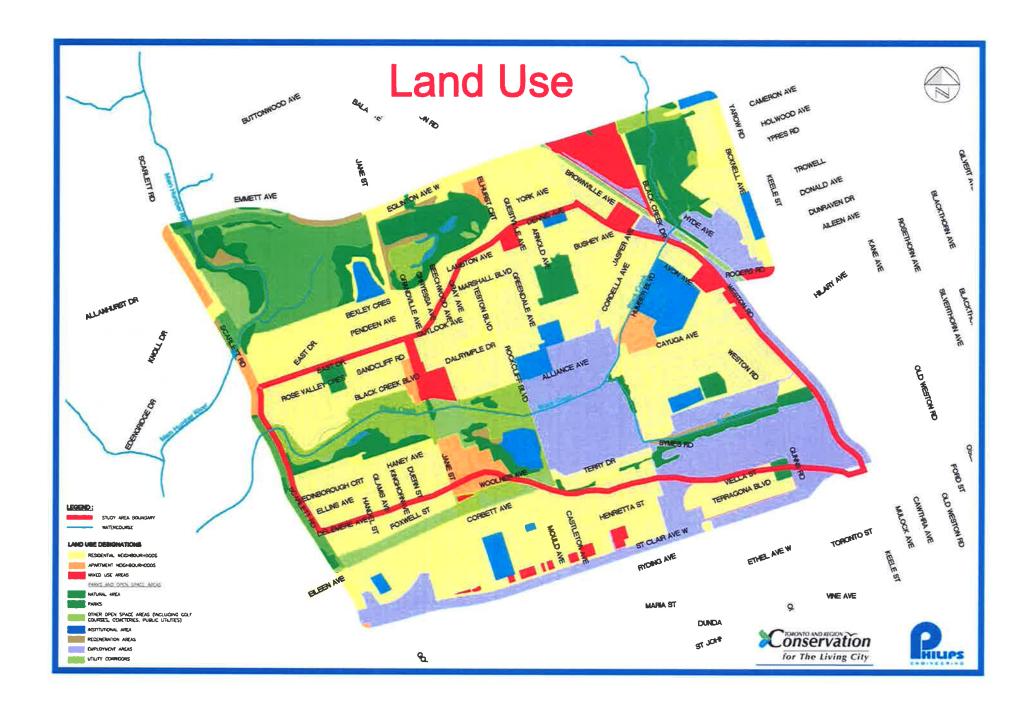


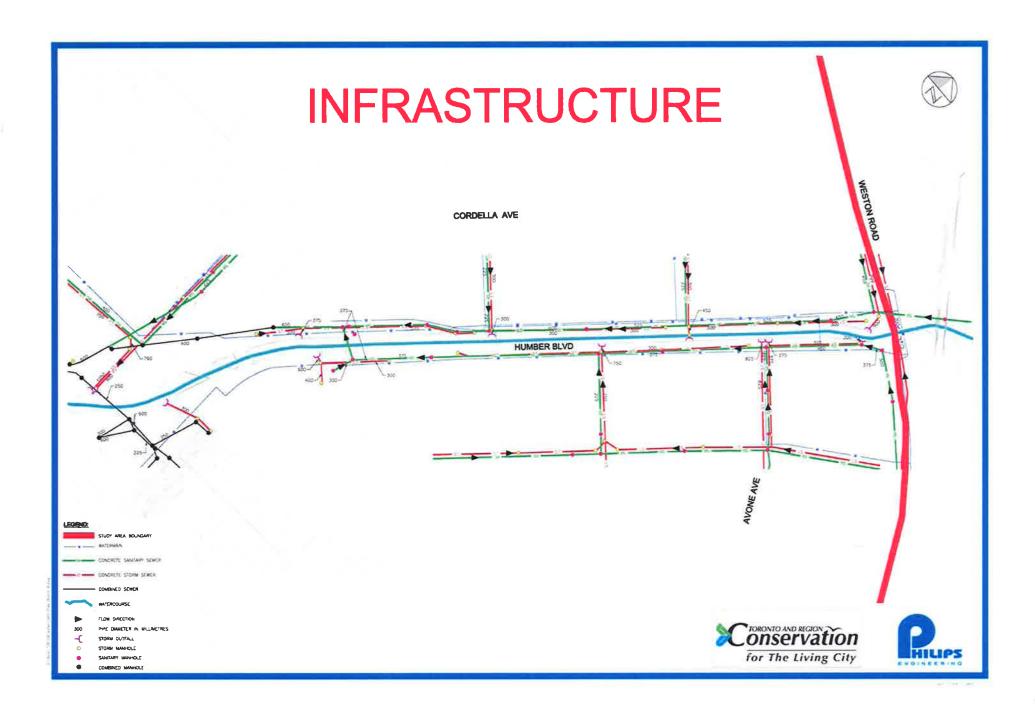


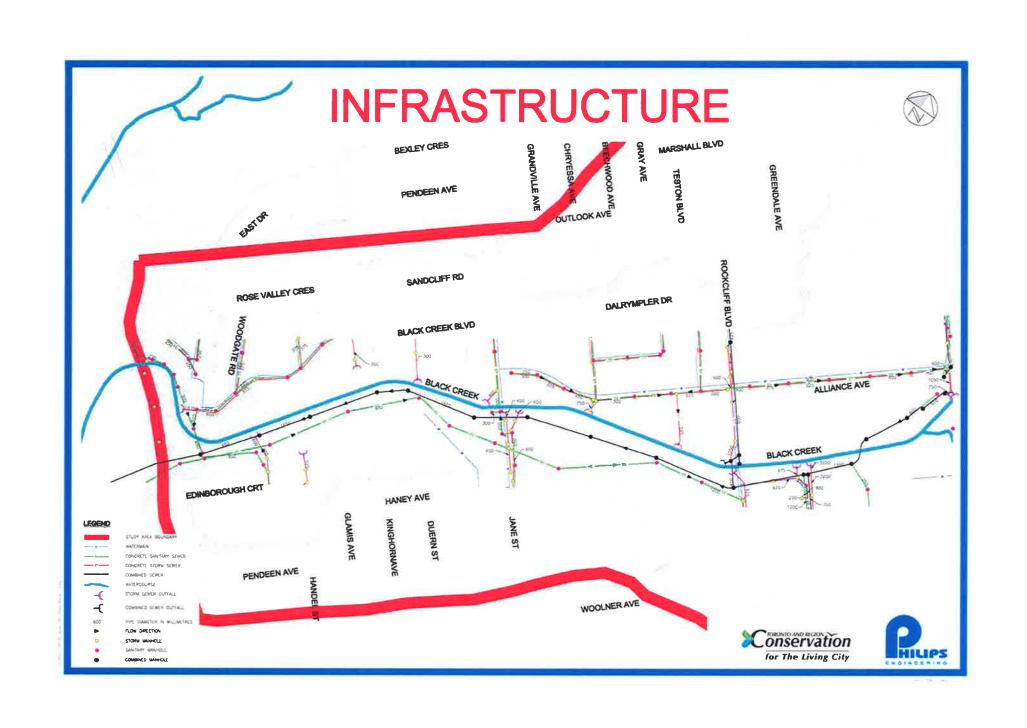
Humber River Watershed Flood Vulnerable Areas and Roads

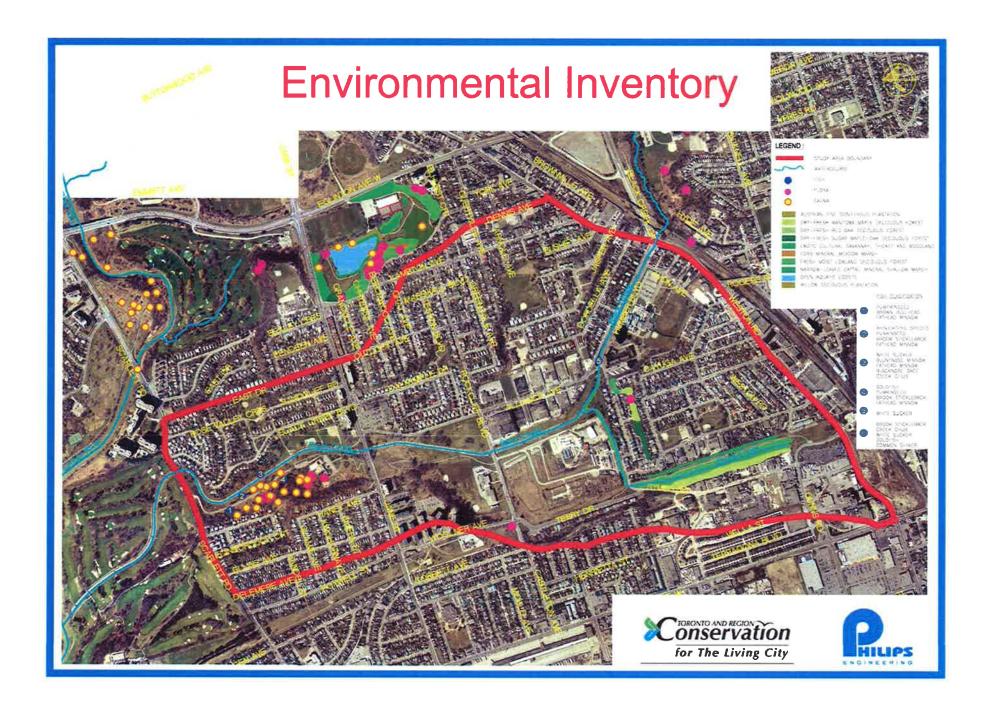
Onservation for The Living City

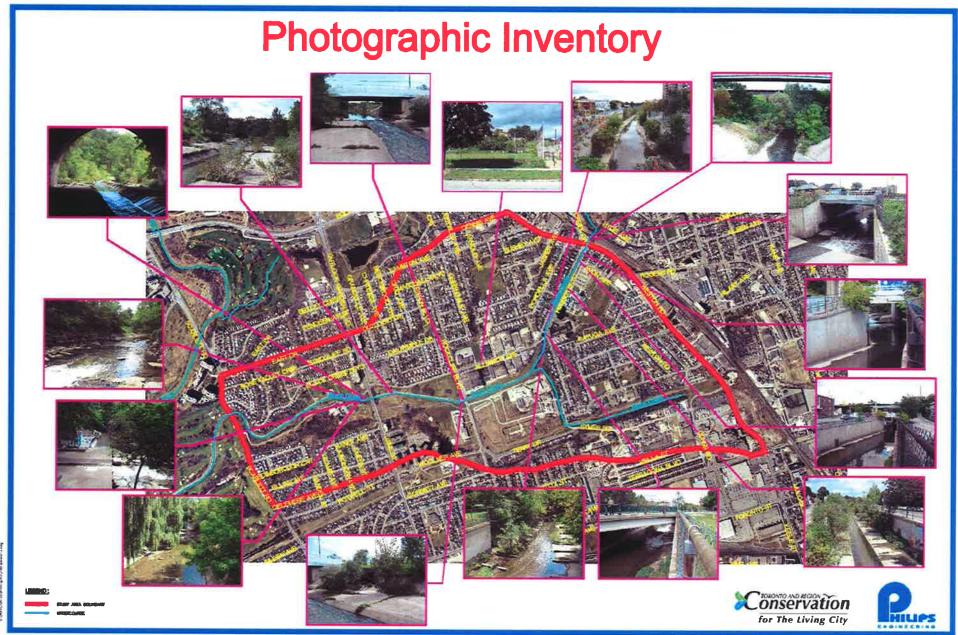












Environmental Inventory

The following information has been gathered from existing sources which

reflects the environmental condition of the area:

- Highly altered creek with long sections of concrete channel.
- Creek corridor is typically narrow with private property bordering each side.
- No significant woodlots adjacent to creek.
- Creek classified as warmwater system, supporting respective fish community.
- No species at risk within Black Creek Study Area (ref. Ministry of Natural Resources – Natural Heritage Information Centre).









Flood Management Standards

Culverts and Bridges

Creek openings for culverts and bridge crossings shall be designed in accordance with the Ministry of Transportation Ontario (MTO) policies and guidelines as outlined below:

Ministry of Transportation Design Flood Control				
Road Classification	Design Capacity – Return Frequency (yr.)			
	Bridge and Culverts			
	Total Span Up to 6.0 m	Total Span Greater than 6.0 m		
Freeway/Urban Arterial (Jane Street and Scarlett Road)	50	100		
Rural/Arterial Collector (Rockcliffe Road)	25	50		
Local (Hilldale Road)	10	25		
Temporary Detours	1 to 5 years	1 to 10 years		





Flood Management Standards

- Ministry of Natural Resources Natural Hazards
 - Private and emergency vehicle ingress/egress criteria. Flood depth and velocity relationships
 - Flooding Hazard conditions
- TRCA Regulations, Valley and Stream Corridor Management Program (VSCMP), October 1994 and the Planning and Development Procedural Manual, January 2008
 - Alteration to watercourse floodplain for existing and proposed development
 - Regulatory floodplain should be 0.3 m within top of watercourse block
- City of Toronto
 - Emergency access flood depths less than 0.3 m.





Key Issues and Concerns

Flooding of:

- Property adjacent to the creek
- Humber Boulevard Area
- Alliance Avenue Area
- Rockcliffe Middle School and Frank Oke Secondary School
- Scarlett Road, Jane Street, Rockcliffe Boulevard, Alliance Avenue, Humber Boulevard, Weston Avenue

Capacity of:

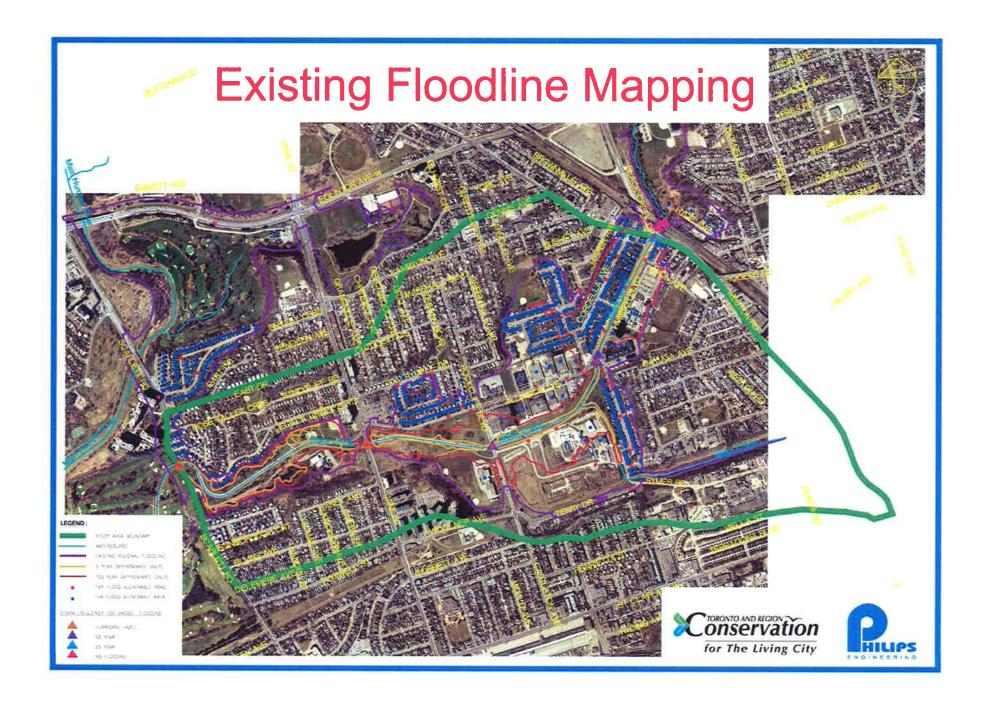
- Creek block
- All Road Crossings

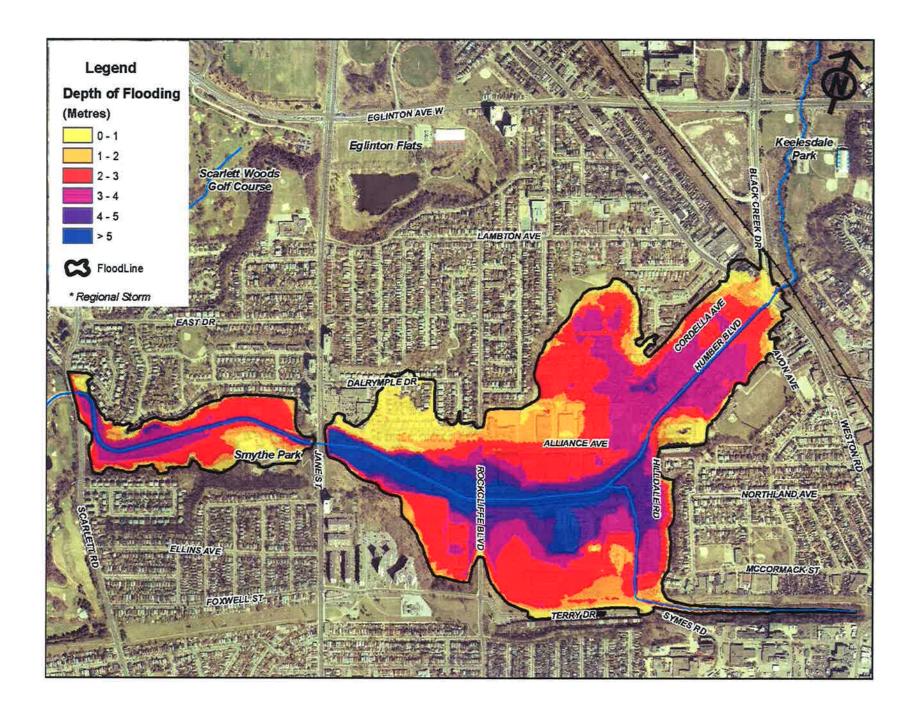












Climate Change Perspectives

- Climate change as it relates to precipitation events may follow one or a combination of the following trends:
 - An increase in total rainfall amounts (mm),
 - An increase in frequency (extreme event frequency up 14% since 1970),
 - An increase in intensity (mm/h) (some climate models predict 20 to 60 %),
 - A change in seasonal distribution (more severe rainfall in spring and fall, less snow in the winter).
- This can lead to more frequent and severe flooding and conveyance infrastructure (culverts, bridges, creek systems, roads) becoming stressed.
- A Risk Management approach is required to assess the need to increase sizing
 of drainage infrastructure. TRCA is currently developing the Humber River
 Watershed Plan which will address climate change and the required adaptive
 management.





"Long-List" of Management Alternatives

A. Do Nothing

B. Increase Conveyance Capacity

- Culverts/bridges
- Creek/floodplains (including creek naturalization)

C. Flood Proofing

Berming/structural

D. Stormwater Management Flood Control

- Centralized flood control facilities
- Site specific storage

TORONTO AND RECION TO ONSERVATION for The Living City

E. Enclosures

Along Humber Boulevard

F. Land/Property Acquisition

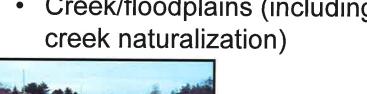
Flood prone lands/buildings

G. Combinations



Flood Management Alternatives

- Increase conveyance capacity C. Flood Proofing В.
 - Culverts/bridges
 - Enclosure(s)
 - Creek/floodplains (including creek naturalization)



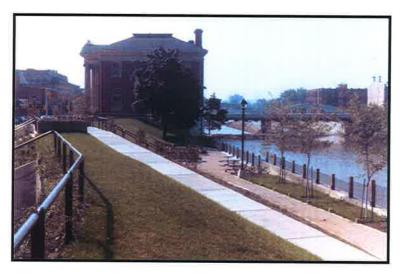


Red Hill Creek, City of Hamilton



Groff Mill Creek, City of Cambridge

Berming/structural



Living Levee, City of Cambridge





Flood Management Alternatives

D. Stormwater Management Flood Control

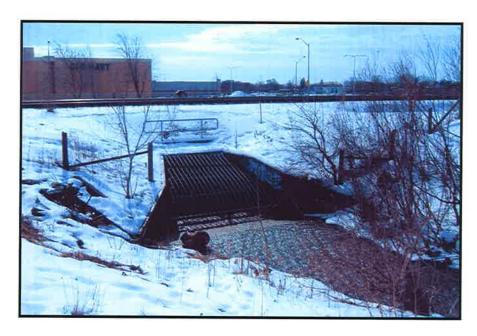
- Centralized flood control facilities
- Site specific storage



Carolyn Creek Stormwater Management Facility, Mississauga

E. Enclosures

Along Humber Boulevard



Roseland Creek 2.8m by 1.8m Enclosure,
City of Burlington





Flood Management Alternatives

F. Land/Property Acquisition G. Combinations

Flood prone lands/buildings











Evaluation Factors and Criteria

1. Economic

- Capital Cost: Cost to construct works
- Operational Cost: Cost to operate and maintain work
- Flood Damage: Reduction in flood damages

2. Functional

Effectiveness: Ability for the work to address the flooding problem/concern

3. Environmental

- Terrestrial: Improvements and or impacts a proposed work would have on the terrestrial environment including the potential for additional plantings within Black Creek Park
- Aquatic: Improvements and/or impacts a proposed work would have on the existing aquatic system including fish, fish habitat, and water quality

4. Social

- Risk to Life: Relative reduction in the risk to life including lead time for flood warning and vehicle access (private vehicles and emergency vehicles)
- Recreational Opportunities: Potential impacts a work would have on active or passive recreation





Don't upstream road and rail embankments and culverts provide me with flood protection?

The Provincial approach to establishing and managing flood risk areas assumes that culverts can be periodically upgraded (to reduce flood impacts upstream) and roadway embankments can wash-out if not designed to hold back water. This in fact happened in August 2005 at Finch Avenue. In that instance, had TRCA established flood plains, downstream of Finch Avenue, assuming flood flows would be reduced by the Finch Avenue embankment, numerous properties would have been placed at risk.



It is this management approach which results in the delineation of flood risk areas, which often don't reflect actual historical flood occurrences, as upstream road and rail crossings have provided 'false' levels of protection.





Next Steps

- Receive public comments by Wednesday February 11, 2009.
- Screen Alternatives based upon evaluation factors and criteria (Feb 2009)
- Assess short listed alternatives using hydraulics, level of flood protection, functionality, environmental and social considerations and cost (March 2009).
- Develop preferred solution(s) based on alternative assessment (April 2009).
- Hold PIC No.2 to present alternative assessment (late April 2009).
- Finalized preferred solution(s) based on public input (May 2009).
- Prepare and document environmental impacts and proposed mitigation measures in Project File (late May 2009).
- File for 30 day public review period (June 2009).
- Approvals from the City of Toronto, TRCA, the Ministry of Natural Resources, the Department of Fisheries and Oceans, the Ministry of the Environment etc.





How to Provide Your Comments



Complete a comment sheet

- By Mail
- By Phone
- By Fax
- By e-mail to rscheckenberger@philipseng.com or lfarrell@trca.on.ca



Please submit comments no later than February 11, 2009 (two weeks).

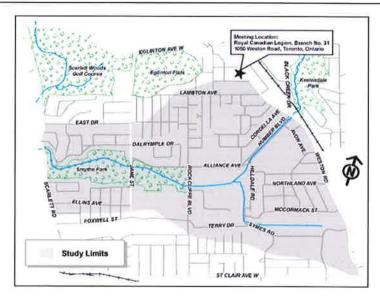
Thank you for your Participation!





Appendix C
Public Information Centre No. 2

TORONTO AND REGION CONSERVATION MANAGING FLOOD RISK IN THE BLACK CREEK NOTICE OF STUDY INTENT and PUBLIC INFORMATION CENTRE NO.2



Toronto and Region Conservation (TRCA) has commenced a study to examine various means and opportunities to manage flood risk along the Black Creek, a tributary of the Humber River. The study area extends along Black Creek from Scarlett Road to just beyond Weston Road as indicated on the Key Plan above. This project is being considered in order to investigate opportunities to enhance flood protection for existing flood prone development located within the Black Creek Regulatory floodplain.

A key component of the study will be consultation with interested stakeholders (residents, landowners and regulatory agencies). A minimum of two Public Information Centres (PICs) will be held to provide interested parties with an opportunity to review and discuss issues related to the study. The first Public Information Centre was held in January 2009 and provided background information and study goals. The second Public Information Centre will be held as follows:

Monday, June 15, 2009 6 p.m. to 8 p.m. Royal Canadian Legion, Branch No. 31, 1050 Weston Rd., Toronto, ON

The Project Team will summarize the background information and study scope, but will focus on presenting the alternative solutions at the PIC. The alternative solutions will consider local deficiencies and environmental concerns.

We are interested in hearing any comments or input that you may have about this study. Comments and information regarding the study are being collected to assist the TRCA in meeting the requirements of the Conservation Ontario, Class Environmental Assessment for Remedial Flood and Erosion Control Projects. This material will be retained on file for use during the study and may be included in study documentation.

For additional information regarding the study, please visit the Black Creek Flood Management Class Environmental Assessment Information Page at www.trca.on.ca/BlackCreekClassEA.

If you have questions or specific comments regarding this study, please contact either of the following:

Ms. Laurian M. Farrell, M.L.A., P. Eng. Water Management Coordinator Toronto and Region Conservation Authority 5 Shoreham Drive Downsview, ON M3N 1S4 Tel: (416) 661-6600 Ext. 5601

Mr. Ron Scheckenberger, M.Eng., P.Eng. Project Manager Philips Engineering Ltd., Consultant 3215 North Service Road, P. O. Box 220 Burlington, ON L7R 3Y2 Tel: (905) 335-2353

E-mail: rscheckenberger@philipseng.com



E-mail: lfarrell@trca.on.ca



PUBLIC INFORMATION CENTRE No.2

Monday June 15, 2009

COMMENT SHEET

PROJECT:	BLACK CREEK FLOOD MANAGEMENT ASSESSMENT
PLEASE PRINT	ADDEDDIVE (1
NAME:	
E-mail:	
(Number & Street)	
(Municipality)	
(Postal Code)	
Comments:	
_ I would	like to see a high level of
	ion of Black Creek, with restoration
ot or nath.	er creation of much more meander
	mmend of chanellization west of
Humber Bou	levand. Lapender should be naturalize
to The pede	strian bridge at Sandcliff is on the
site of di	he historic Aboriginal trail used
	nch athen the BritishiThe Toronto Carryin
Place	
There have	been drawnings at the Jane 54
	ring Dood occurences
-	0
¥	

PUBLIC INFORMATION CENTRE No.2

Class Environmental Assessment For Black Creek Flood Management





Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002)

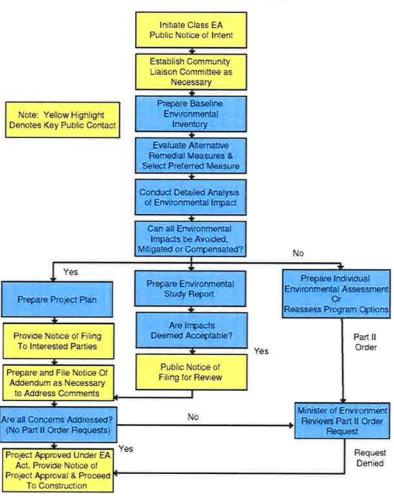
- The Class EA for Remedial Flood and Erosion Control Projects establishes a planning and approval process for a variety of projects that may be carried out by Conservation Authorities in Ontario
- The Class EA process categorizes proposed municipal projects according to their anticipated environmental impact, and calls for increasingly stringent review requirements as the magnitude of the anticipated environmental impact increases.
- Remedial Flood and Erosion Control Projects refer to those projects undertaken by Conservation Authorities, which are required to protect human life and property, in previously developed areas, from an impending flood or erosion problem. Such projects do not include works which facilitate or anticipate development.







Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002)



Problem Statement

The intent of this study is to assess various means and opportunities to manage flood risk along the Black Creek from Scarlett Road to just beyond Weston Road for the existing flood prone development within the Regulatory Floodplain.

The limited flow capacity of the creek channel results in flooding of adjacent lands during less frequent storm events.



Provided by Don Walker









Creek Flooding Management vs. Basement Flooding

The current TRCA led study is examining flood risk associated with creek flooding which relates to the capacity of the watercourse, culverts, bridges and the overall floodplain.

Toronto WATER as part of a separate study process is examining basement flooding problems. These problems are typically related to local sewer capacity (storm and combined), as well as potential local grading issues. For further information on this matter please contact:

Bill Snodgrass,
Senior Engineer
The Investigation of Chronic Basement Flooding
Class Environmental Assessment Study
City of Toronto

Tel: 416.392-9745 Fax: 416.392.9134

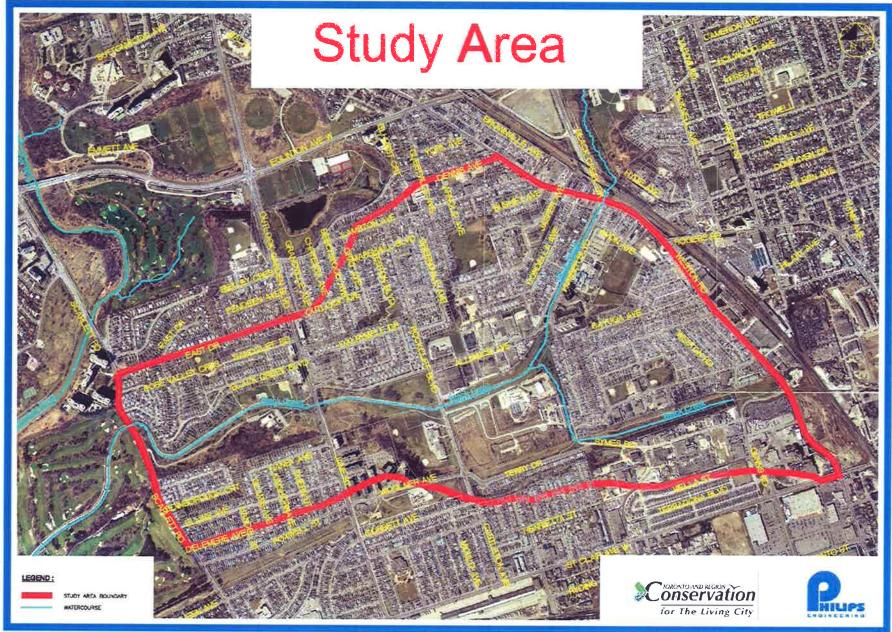
email: bsnodgr@toronto.ca

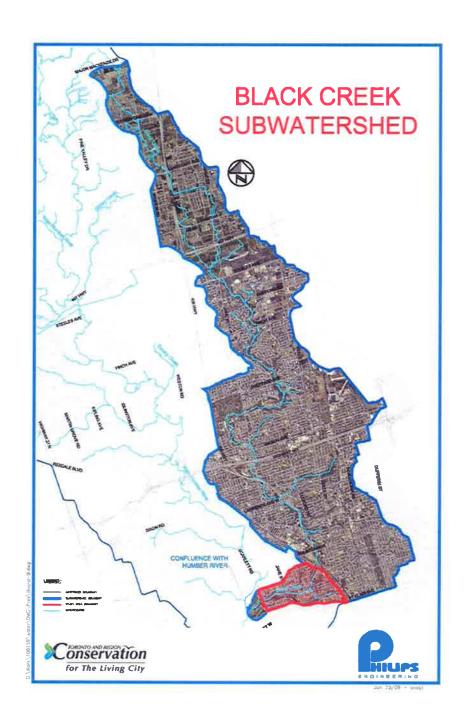
www.toronto.ca/involved/projects/basement_flooding/index.htm



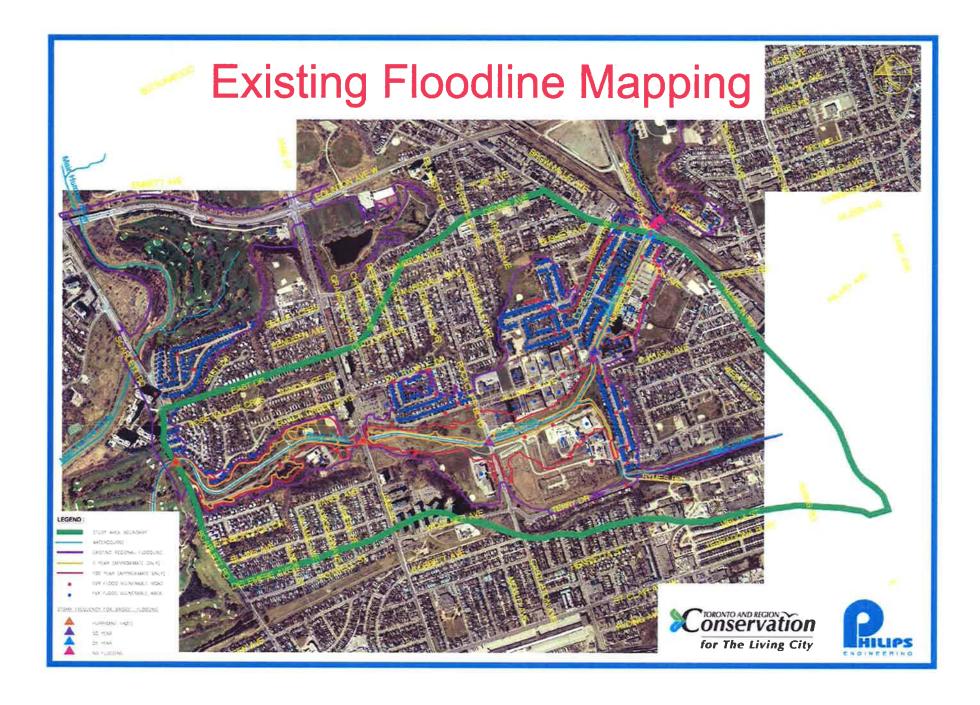


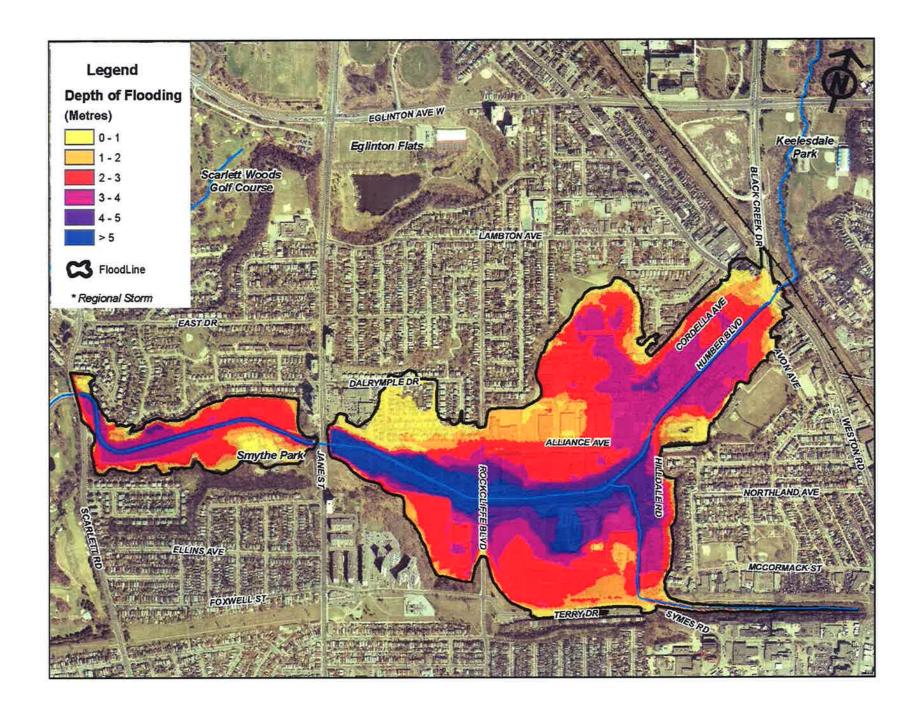












Evaluation Factors and Criteria

1. Economic

- Capital Cost: Cost to construct works
- Operational Cost: Cost to operate and maintain work
- Flood Damage: Reduction in flood damages

2. Functional

Effectiveness: Ability for the work to address the flooding problem/concern

3. Environmental

- Terrestrial: Improvements and or impacts a proposed work would have on the terrestrial environment including the potential for additional plantings within Black Creek Park
- Aquatic: Improvements and/or impacts a proposed work would have on the existing aquatic system including fish, fish habitat, and water quality

4. Social

- Risk to Life: Relative reduction in the risk to life including lead time for flood warning and vehicle access (private vehicles and emergency vehicles)
- Recreational Opportunities: Potential impacts a work would have on active or passive recreation







Long-List of Alternatives

Long-list of Alternatives	Screening Results
A: Do Nothing	
Continue Maintenance	N/A
Emergency Response	N/A
B: Improve Capacity - Culverts/bridges/floodplain	
Downstream Bridges on Humber River, CNR Bridge, pedestrian bridge improvements	
Scarlet Road:	
bridge replacement/upgrade	
 drop structure relocation 	
supplemental culverts	
Jane Street	
 drop structure relocation 	
supplemental culverts	
 bridge and valley wall reshaping 	
Rockcliff Boulevard	
supplemental culverts	
 bridge replacement/upgrade 	
road profile adjustment	
Alliance Avenue; combine two bridges into one new crossing	









Long-List of Alternatives

Long-list of Alternatives	Screening Results
B: Increase Conveyance Capacity – Creeks	
Scarlett Road: to Jane Street: low flow channel upgrading	
Jane Street to Rockcliffe Boulevard low flow channel upgrading	
Rockcliffe Boulevard to Alliance Avenue valley wall reshaping, floodplain grading	
Alliance Avenue to Weston Road: low flow channel expansion	
B: Increase Conveyance Capacity – Floodplains	
Scarlett Road: to Jane Street valley wall reshaping, floodplain grading	
Jane Street to Rockcliffe Boulevard valley wall reshaping, floodplain grading	
Rockcliffe Boulevard to Alliance Avenue valley wall reshaping, floodplain grading	
Alliance Avenue to Weston Road valley wall reshaping, floodplain grading	
C: Flood Proofing	
Scarlett Road to Jane Street: berming on north valley wall for protection of residential area	
Jane Street to Rockcliffe Boulevard: berming of elementary school	
Rockcliffe Boulevard to Alliance Avenue: berming along Alliance Avenue and Hilldale Road	









Long-List of Alternatives

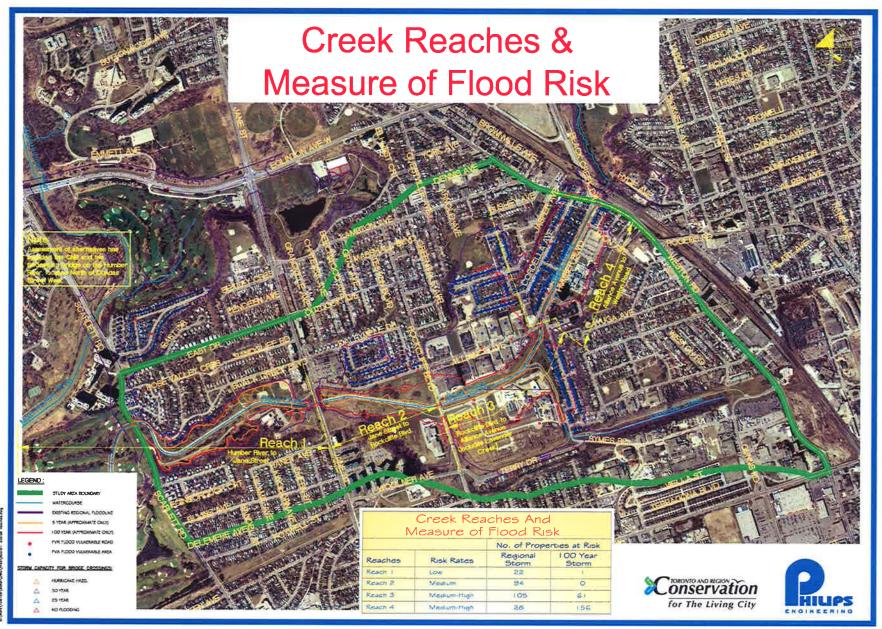
Long-list of Alternatives	Screening Results
D: Stormwater Management Flood Control	
Centralized flood control facilities: On-line facility(s) upstream of study area	
Site specific storage: Toronto Yard	
E: Enclosures	
Along Humber Boulevard	
F: Land/Property Acquisition	
Flood prone lands/buildings	
G: Combinations	
Combinations	





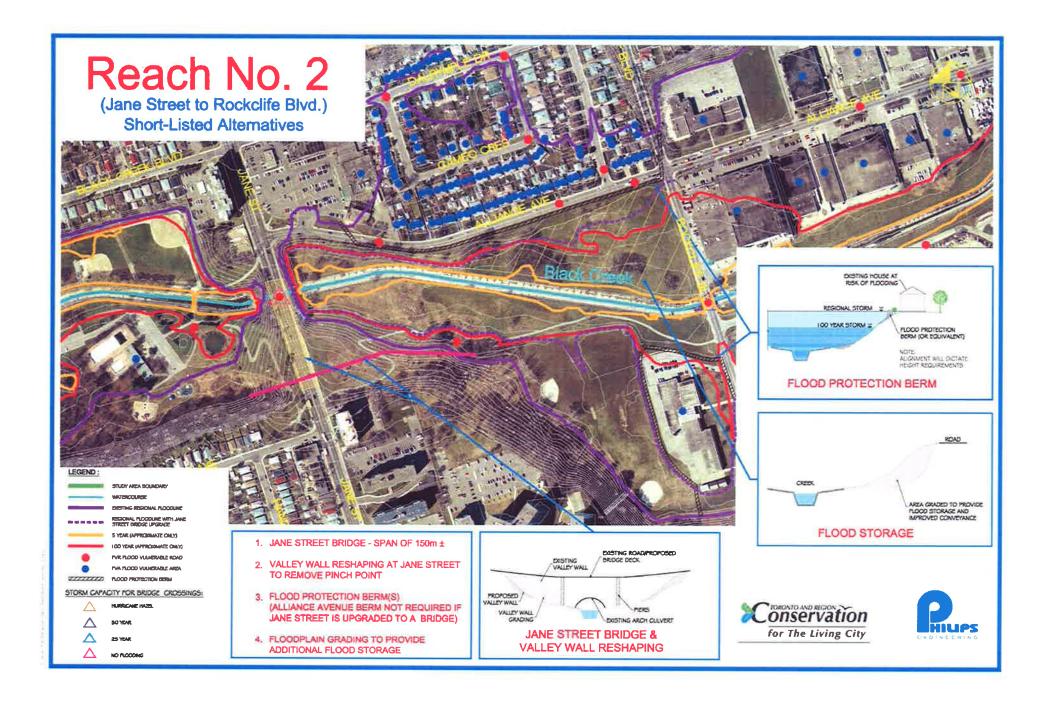


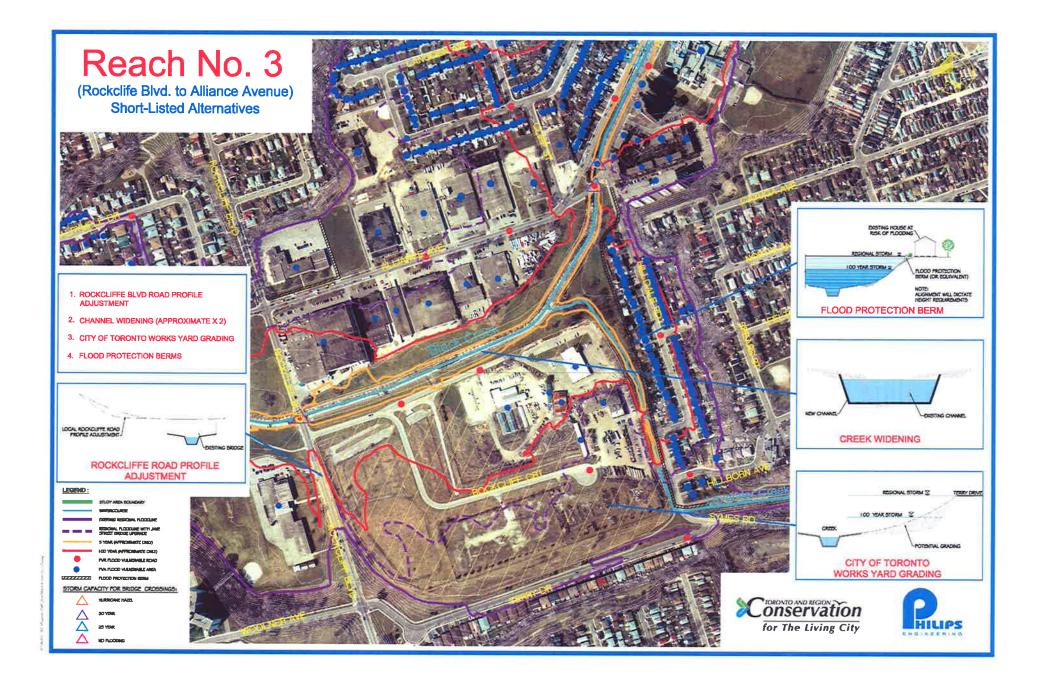


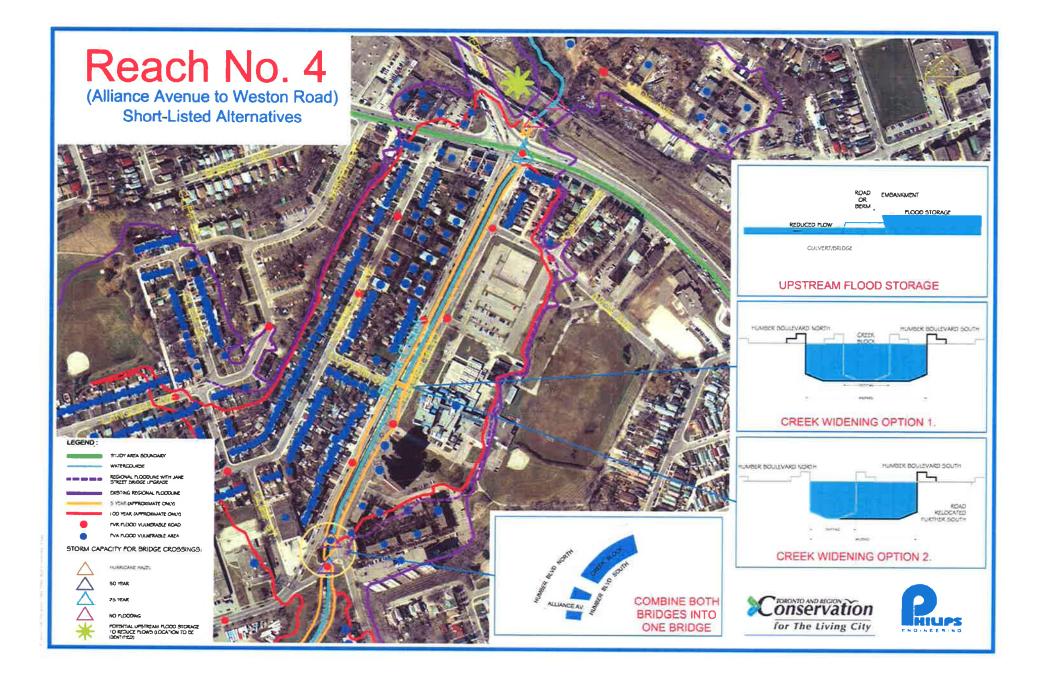


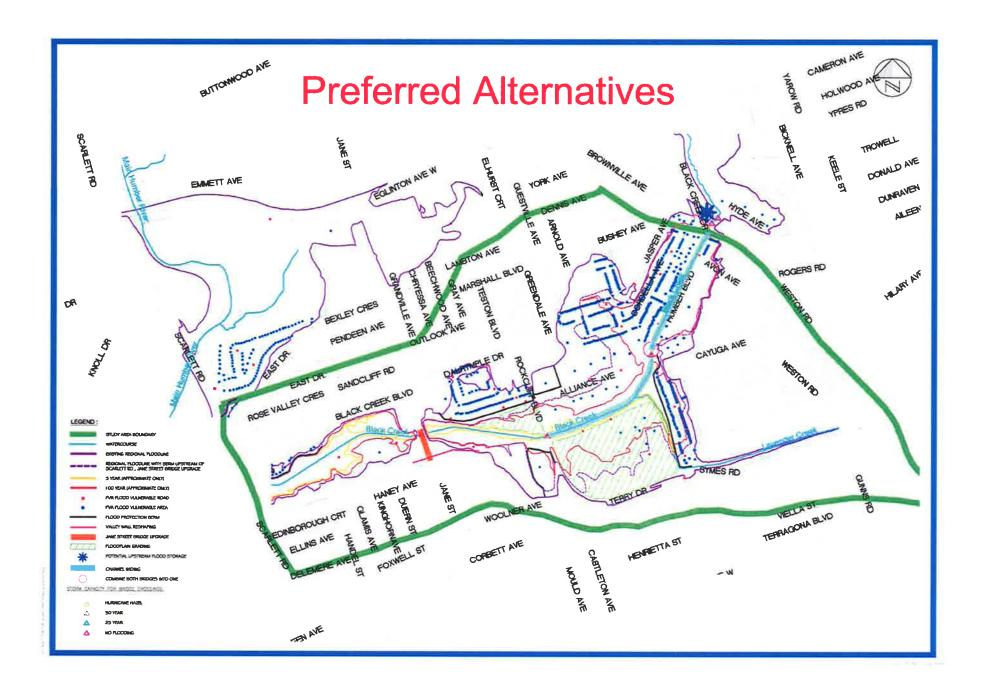


(Arry Speed common of day)









Preliminary Preferred Alternative

B: Improve Capacity of Bridges and Floodplains

- Jane Street Bridge and valley wall reshaping requires further assessment.
- Alliance Avenue combine both bridges take into consideration a wider channel as well as traffic circulation concerns.
- Jane Street to Rockcliffe Boulevard floodplain grading.
- Rockcliffe Boulevard to Alliance Avenue floodplain grading and channel widening.
- Alliance Avenue to Weston Road channel widening.

C: Flood Proofing

 Berming as shown on short-listed alternative boards - Jane Street to Rockcliffe Boulevard may not be required if Jane Street bridge replacement option is pursued.

D: Stormwater Management Control – potential location requires further assessment.





Next Steps

- Receive public comments by Tuesday June 30, 2009.
- Finalized preferred solution(s) based on public input.
- Prepare and document environmental impacts and proposed mitigation measures in Class Environmental Assessment Report.
- File for 30 day public review period.
- Approvals from the City of Toronto, TRCA, the Ministry of Natural Resources, the Department of Fisheries and Oceans, the Ministry of the Environment etc.







How to Provide Your Comments



- Complete a comment sheet
- By Mail
- By Phone



- By Fax
- By e-mail to ron.scheckenberger@amec.com or lfarrell@trca.on.ca



Please submit comments no later than Tuesday June 30, 2009 (two weeks).

Thank you for your Participation!







Appendix D
Community Liaison Committee



To Dana Khademi/TRCA@MTRCA

СС

bcc

Subject Fw: Black Creek EA - Welcome letter to Community Liaison Committee - invite to meeting on Wednesday April 8, 2009

Jenifer Moravek. |Co-ordinator, Office and Administrative Services | Ecology Division Toronto and Region Conservation Authority | office 416.661.6600 ext. 5624| fax 416.661.6898 | 5 Shoreham Drive | Toronto, Ontario, Canada M3N 1S4

---- Forwarded by Jenifer Moravek/TRCA on 04/02/2009 08:30 AM ----



04/01/2009 05:26 PM

To "Jenifer Moravek" < JMoravek@trca.on.ca>

cc

Subject Re: Black Creek EA - Welcome letter to Community Liaison Committee - invite to meeting on Wednesday April 8, 2009

Hello Jennifer:

I will be attending.

Best regards,

---- Original Message -----

From:

To:

 $\overline{\mathbf{u}}$

Sent: Wednesday, April 01, 2009 4:35 PM

Subject: Black Creek EA - Welcome letter to Community Liaison Committee - invite to meeting on Wednesday April 8, 2009

The Toronto and Region Conservation Authority along with Philips Engineering invite you to participate in the Community Liaison Committee (CLC) for the Black Creek Flood Protection and Remedial Works Project. Details of the project and CLC are in the attached Welcome Letter.

Jenifer Moravek. |Co-ordinator, Office and Administrative Services | Ecology Division Toronto and Region Conservation Authority | office 416.661.6600 ext. 5624| fax 416.661.6898 | 5 Shoreham Drive | Toronto, Ontario, Canada M3N 1S4





April 1, 2009

Philips Engineering File: 106159-10A

Dear Madam/Sir:

The Toronto and Region Conservation Authority (TRCA) has commenced a study to examine various means and opportunities to manage flood risk along the Black Creek, a tributary of the Humber River. The study area extends along Black Creek from Scarlett Road to just beyond Weston Road. This project is being considered in order to investigate opportunities to enhance flood protection for existing flood prone development located within the Black Creek Regulatory floodplain.

The TRCA has established a Community Liaison Committee (CLC) to assist in the decision making process for this project. The TRCA is requesting your presence or a representative from your organization to be a member of the Community Liaison Committee. The function of the Community Liaison Committee includes:

- Identify items of public concern with regard to the impact and design of proposed remedial flood management alternatives;
- Provide direct input on these concerns to the Conservation Authority;
- Review any requests made by members of the public and attempt to resolve any issues of concern for a decision, and
- Where appropriate, comment on the effectiveness of the Class Environmental Assessment process for meeting public concerns for the specific project and, where relevant, identify possible improvements.

If you are able to participate in the CLC please contact Dana Khademi at 416-661-6600 ext.5799 or dkhademi@trca.on.ca. Although we do appreciate all those interested in joining the CLC, there is a limited number of participants from each organization we can accommodate.

To ensure the project progresses according to schedule, we have scheduled the first of two Community Liaison Committee meetings as follows:

Wednesday April 8, 2009
6:00 p.m. to 8:00 p.m.
Humber Room, TRCA Head Office
5 Shoreham Drive, Downsview, Ontario

Should you have any questions or concerns, please feel free to contact Dana Khademi at the contact information listed above.

Yours very truly

PHILIPS ENGINEERING LTD.

Per: Ronald B. Scheckenberger, M. Eng., P. Eng.

HD/



Revised Meeting Minutes

Date: June 2, 2009 Our File: 106159-75

Subject: Rockcliffe Area, Black Creek Flood Management

Class Environmental Assessment

Community Liaison Committee Meeting #1

Date: April 8, 2009

Time: 6:00 - 8:00 p.m.

Location: TRCA Office

In Attendance: Laurian Farrell > TRCA

Dana Khademi

Don Haley

TRCA

TRCA

Mike Mattos

David White

John Berry

TRCA

Resident

Resident

Resident

Bill Snodgrass

City of Toronto Water Department

Mario Silva ➤ TDSB

Brent Arlitt > Giffels Engineering (on behalf of

Paul Nelson – AECOM)

Heather Dearlove > Philips Engineering Ltd.
Steve Chipps > Philips Engineering Ltd.

Regrets: Ron Scheckenberger > Philips Engineering Ltd.

MATTERS DISCUSSED

ACTION BY:

1. Introduction

Steve Chipps provided an overview of the Class Environmental Assessment (EA) process for the Black Creek Flood Management. Don Haley provided further input stating that the Conservation Ontario EA process followed by TRCA is slightly different than the Municipal Class EA process in that there is an opportunity for a Community Liaison Committee (CLC). Don Haley added that the CLC allows the public to be involved in an integrated process within the study.

2. Background

MATTERS DISCUSSED

ACTION BY:

Steve Chipps provided an overview of the environmental inventory including land use, flooding potential, infrastructure, and natural environment. Discussion arising out of the baseline inventory included:

- i) John Berry requested definition of the Regional Storm (Hurricane Hazel). Don Haley responded that there is no storm frequency allotted to the Regional Storm used as the Regulatory Storm to establish flood limits on Black Creek.
- ii) How was the study area impacted by Hurricane Hazel? Don Haley responded that the Lambton Golf Course was flooded and the creek realigned itself through the golf course. David White added that the Kodak plant was flooded and that there are some historical photos of the Black Creek during Hurricane Hazel. Don Haley mentioned that the Jane Street crossing of Black Creek acted as a dam, resulting in flooding upstream, including the Kodak Plant.
- iii) David White asked for the definition of the creek block? Steve Chipps responded that it is the Official Plan definition for the lands allotted in which the creek will reside in.
- iv) John Berry inquired if floods could take out the Jane Street embankment? Don Haley responded that during Hurricane Hazel numerous road embankments failed and since then most road embankments have been made more stable to account for flood conditions.
- v) Mike Mattos noted that erosion of the concrete channel appears to be happening along Black Creek. Don Haley advised that the concrete channel is reaching its life expectancy, as it was originally constructed in the 1960's. Mike Mattos noted that maintenance of the concrete channel has not been preformed along Black Creek in the past. Don Haley stated that tree removal is part of normal maintenance. Laurian Farrell indicated that maintenance of part of Black Creek has occurred within the last several years and some vegetation has been removed. Mike Mattos added that there is a public perception that the trees are beneficial from a visual perspective.

vi) David White inquired about the possibility of using off-line storage, in areas such as the existing City of Toronto yards. Brent Arlitt responded that the City of Toronto is considering keeping the yards and rebuilding the existing buildings, therefore the yards could not be used as a man made flood storage area. General discussion continued with the possibility of the yards being relocated elsewhere within the study area on the fringes of the Regulatory floodplain limits, and the remainder of the city lands being used for flood storage.

Don Haley added that substantial grading would be required to provide sufficient flood storage to reduce flows if at all. Don Haley noted that the City is looking at the designation of a Special Policy Area (SPA) along Black Creek. If this were the case, being located within a Special Policy Area, the City of Toronto would not be allowed to intensify the land use in addition, the City would not be able to sell the yards for potential residential or commercial development. The Special Policy Area designation allows for redevelopment to occur and therefore prevents stagnation of the community.

David White noted that the regrading of the City of Toronto yards could be less expensive than building relief culverts under Humber Blvd.

- vii) Mike Mattos inquired as to whether ice jams are an issue along Black Creek? Don Haley noted that this has not been an issue identified along Black Creek.
- viii) Mike Mattos inquired as to whether a widening of the existing Jane Street bridge would have negative impacts to properties downstream of Jane Street? Laurian Farrell responded that widening Jane Street bridge would not increase the regulatory flood risk downstream as the Regulatory flood lines are determined based upon peak flows without accounting for storage upstream of crossings. Don Haley noted that natural storage within creeks and valleys is taken into consideration in developing Regulatory flows.
- ix) Mike Mattos inquired as to the possibility of closing Humber Blvd. S. and using that area for additional flow capacity within an enclosure or widened creek? Don Haley said that is a possible option.

3. Flood Management Standards

Steve Chipps provided and overview of flood management standards for culverts and bridges and creek blocks. Flood management standards included the Ministry of Transportation's design flood control requirements, Ministry of Natural Resources Natural Hazards Guidelines, TRCA's regulations and City of Toronto emergency access requirements.

4. Key Issues and Concerns, and Process

- Steve Chipps outlined the key issues and concerns within the study area including the various flooding locations and depths of flooding along Black Creek.
- ii) Steve Chipps discussed the long-list of management alternatives which were presented at the PIC No. 1 and possible use of some of the flood management alternatives along Black Creek.
- iii) Steve Chipps discussed the evaluation factors and criteria which will be used in assessing the long-list of alternatives including Economical, Functional, Environmental and Social factors.

5. **Discussions:**

Open discussion as summarized herein occurred on possible issues, areas of concern, key information and opportunities.

i) The drop structure on the downstream side of Jane Street could be relocated upstream of the crossing which would improve hydraulics. Don Haley noted that this has been assessed in the past and it would not significantly reduce Regulatory flooding upstream of Jane Street. Philips and TRCA to review.

TRCA/Philips

ii) The drop structure at Scarlett Road could be relocated from downstream to upstream of the culvert. John Berry noted that the condition of the concrete at the Scarlet Road crossing is in need of repair. Philips and TRCA to review.

TRCA/Philips

iii) Relief culverts could be constructed at all existing crossing providing additional flow capacity for the infrequent storm events. Philips and TRCA to review.

TRCA/Philips

MATTERS DISCUSSED

ACTION BY:

iv) Localized diversion of existing storm sewers could be conducted to reduce flows within critical sections of Black Creek. Philips and TRCA to review.

TRCA/Philips

v) The existing City of Toronto property could be used as a naturalized flood storage area. Philips and TRCA to review.

TRCA/Philips

- vi) Mario Silva mentioned that TRCA and the City of Toronto have recently allowed schools to be built close to, or in the Regulatory flood plain. Mario noted that one option to consider would be to close Toronto District School Board Buildings within the Regulatory floodplain and relocate outside of the floodplain. Bill Snodgrass asked if schools have a higher intrinsic value or have a higher priority in the flood prevention assessment. Don Haley responded that risk is determined using land use population densities.
- vii) John Berry noted that maintenance of the concrete channel and removal of vegetation would improve flow capacity within the channel. Philips and TRCA to review.

TRCA/Philips

viii) David White stated that it would be positive to see a natural channel as an outcome of this project within the Lambton Golf Course and City-owned lands. Don Haley responded by indicating that the Black Creek Project has evaluated possible creek naturalization and has determined that there are issues with existing servicing locations, availability of land and velocities within the creek itself. Philips and TRCA to review.

TRCA/Philips

- ix) Mario Silva noted that a comprehensive approach to assessing flood mitigation opportunities be used and that an understanding of the existing problem be determined in the way of threat to people and property damages. The costs for flood mitigation alternatives should be considered less significant to the potential improvement to threat to life.
- TRCA/Philips
- x) David White noted that the long-term process of property expropriation, such as what almost occurred along the Burlington Skyway within the City of Hamilton, would stagnate the community. Don Haley responded that the Special Policy Area designation prevents community stagnation allowing for appropriate land uses.
- xi) Bill Snodgrass noted that the Conservation Ontario Class EA is a pilot study for TRCA and if costs are considered to be extreme for the recommended flood mitigation alternatives, then the Class EA recommendations would be deemed infeasible.

6. Next Steps

Steve Chipps discussed the next steps noting that the next PIC has been tentatively set for April 27, 2009. Discussion ensued that the PIC should provide more than a preliminary assessment or screening of the long-list of alternatives and should provide more specific direction on the preferred approach. Laurian Farrell noted that TRCA will determine, in consultation with Philips Engineering Ltd. staff, whether or not the PIC will proceed and will provide communications to the CLC once a decision has been reached.

TRCA/Philips

The second CLC and PIC meeting dates will be scheduled once TRCA and Philips Engineering Ltd. staff discuss the next steps.

TRCA/Philips

Meeting Minutes prepared by,

PHILIPS ENGINEERING LTD.

Per: Steven Chipps, P. Eng.

SC/II

G:\Work\106159\Corr\Min\09-04-08 Mtg Min doc

c.c. All Present

+ Ron Scheckenberger, Philips Engineering Ltd.

+ Paul Nelson, AECOM

Ron Scheckenberger

From: Dana Khademi [DKhademi@TRCA.on.ca]

Sent: Wednesday, April 15, 2009 9:05 AM

To: Dana Khademi

Subject: Black Creek Flood Protection and Remedial Works EA - past CLC meeting on April 8, 2009.

Hello.

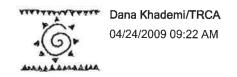
TRCA and Philips Engineering staff would like to thank you for attending the first CLC meeting for the Black Creek Flood Protection and Remedial Works EA. Your concerns and input regarding the flooding of Black Creek within (and adjacent to) the study area will assist us in putting together potential alternatives in alleviating the flooding problems.

Although we have specified dates for the next PIC and CLC, we will likely reschedule these meetings to ensure the CLC is well informed of the various and preferred alternatives prior to informing the general public of these alternatives. We will inform you of these updated meeting times shortly. Should you have any questions or concerns, please feel free to contact me.

For those who have not yet replied, we are still interested in your (or a representative from your organization) participation with the Community Liaison Committee. Please feel free to contact me.

Regards,

Dana Khademi, P.Eng. | Water Resource Analyst | Humber River Watershed | Ecology Division **Toronto and Region Conservation Authority for The Living City** | office 416.661.6600 ext. 5799 | fax 416.661.6898 | 5 Shoreham Drive | Toronto, Ontario, Canada M3N 1S4



To Dana Khademi/TRCA@MTRCA

cc
bcc

RCA,

ng.com,

Subject PIC#2 originally scheduled for Monday April 27, 2009 is CANCELLED. CLC#2 and PIC#2 have been rescheduled.

Good Morning,

I would like to apologize for the short notice, but the PIC meeting originally scheduled for *Monday April* 27th is CANCELLED. It was agreed that another CLC meeting would be scheduled prior to the next PIC to discuss a long list of alternatives and the screening process to reduce the alternatives to a short list.

The next CLC and PIC are scheduled as follows and will be held at the Royal Canadian Legion, Branch # 31 - 1050 Weston Road.

Monday June 1, 2009 from 6-8pm - CLC#2 and

Monday June 15, 2009 from 6-8pm - PIC#2.

An additional CLC and/or PIC may be required. This will be determined based on the outcome of PIC#2 and the CLC will be informed shortly after.

I will be sending out reminders for CLC#2 and PIC#2 again. Please feel free to give me a call should you have any questions or concerns.

Regards,

Dana Khademi, P.Eng. | Water Resource Analyst | Humber River Watershed | Ecology Division **Toronto and Region Conservation Authority for The Living City** | office 416.661.6600 ext. 5799 | fax 416.661.6898 | 5 Shoreham Drive | Toronto, Ontario, Canada M3N 1S4



Dana Khademi/TRCA 05/25/2009 10:22 AM

Tc								
					100	•	100	
CC	202	***	*8	5			~	(6)
bcc								

Subject Black Creek EA - Flood Protection and Remedial Works - CLC meeting reminder

Hello,

This is a reminder that we will be having our second Community Liaison Committee (CLC) meeting on Monday June 1, 2009 from 6-8pm (one week from today) at the Royal Canadian Legion, Branch 31 at 1050 Weston Road (south of Eglinton Ave. W.).

We will be discussing the long and short list of alternatives for this project.

Please RSVP to me by Friday May 29, 2009 to let me know whether you will be attending or not. Also, should you have any questions or concerns, please feel free to give me a call.

Regards,

Dana Khademi, P.Eng. | Water Resource Analyst | Humber River Watershed | Ecology Division **Toronto and Region Conservation Authority for The Living City** | office 416.661.6600 ext. 5799 | fax 416.661.6898 | 5 Shoreham Drive | Toronto, Ontario, Canada M3N 1S4





Meeting Minutes

Date: June 15, 2009 Our File: 106159-75

Subject:

Rockcliffe Area, Black Creek Flood Management

Class Environmental Assessment, Community Liaison Committee

Meeting #2

Date:

June 1, 2009

Time:

6:00 p.m. - 8:00 p.m.

Location:

Legion Hall

In Attendance:

Laurian Farrell **TRCA** Dana Khademi **TRCA** Don Haley **TRCA** Mike Mattos Resident David White Resident John Berry Resident Mario Silva **TDSB** Paul Nelson **AECOM** Frances Nunziata Councillor Ron Scheckenberger **AMEC Philips** Steve Chipps **AMEC Philips**

Regrets:

Bill Snodgrass

City of Toronto Water Dept.

MATTERS DISCUSSED

ACTION BY:

1. Introduction

Ron Scheckenberger provided a review of the Black Creek Flood Management Class Environmental Assessment (Class EA) including the purpose which is focussed on addressing riverine flooding. He advised that basement flooding is not being directly addressed, although it is recognized that there are some linkages between the two types of flooding.

2. Review of April 8, 2009 Revised Meeting Minutes

i) David White noted that on Item #2, sub-item vi) that a correction should be made and the text should be revised from "David White noted that the regrading of the City of Toronto Yards should be less expensive" to read ".....could be less expensive".

AMEC Philips

ii) As a separate item, Mike Mattos requested that Lavender Creek be noted on the mapping rather than Black Creek, for **AMEC Philips** the tributary located at Hilldale Road.

3. Review of Long-listed Alternatives (Tables 1 and 2)

Ron Scheckenberger distributed a long-list of alternatives for review and discussion, with the following points arising:

- David White inquired as to how extreme weather has been factored into the long-list assessment. Don Haley responded that extreme weather would be considered part of Climate Change and as the Regional Storm is not really considered to be impacted by Climate Change, it would not impact the overall assessment.
- ii) Frances Nunziata inquired as to why more frequent flooding had occurred on Black Creek Drive in the last two years. Don Haley responded that Climate Change impacts are speculated to have been occurring. In addition, due to an increase in riverine flooding, and the inherent interaction of the creek and storm sewer systems, more frequent flooding within the storm sewer may occur. Ron Scheckenberger added that local grading and servicing issues would also result in the observed flooding.
- iii) Mike Mattos asked how berms would handle local drainage? Ron Scheckenberger responded that typically back flow prevention devices are required to prevent flood waters from entering locally flood protected areas.
- iv) Don Haley provided an explanation of TRCA's jurisdictional powers with regard to acquisition of property. Don Haley noted that acquisition of property is considered a long-term planning solution. Ron Scheckenberger added that due to the number of flooded properties, this alternative is not considered viable for this neighbourhood.
- v) Paul Nelson requested that reach definitions be added to **AMEC Philips** drawings for the PIC.
- vi) Don Haley requested that the context for the Humber bridges **AMEC Philips** be provided on the PIC material.
- vii) Mike Mattos inquired as to whether the confluence of Black Creek and the Humber River had been assessed with respect to the angle of the Black Creek entering Humber River. Ron

MATTERS DISCUSSED

ACTION BY:

Scheckenberger responded that this had not been explicitly examined due to the less frequent storm events of 100 year and the Regional Storm not being impacted by the angle of the confluence. Don Haley added that the hydraulic models take the angle of the confluence into consideration. Don also mentioned that there would not be a benefit upstream within the study area if changes were made at the confluence of the Humber River and Black Creek.

- viii) Ron Scheckenberger discussed the Jane Street bridge improvement alternative, noting that hydraulic improvements in Regional Storm flood elevations would reduce flood levels for all of the upstream reaches up to Weston Road. John Berry inquired as to what would happen downstream with respect to the increased flow capacity at Jane Street. Don Haley responded that the floodplain assessment does not account for how much artificial flood storage is upstream of Jane Street. Another alternative for the 22 (+/-) homes downstream of Jane Street would have to be examined, such as berming.
- repaired in 2008 (+/-) and that any alternative considering adjustments to the road should have been incorporated with the previous road works. Ron Scheckenberger responded that a staging plan would be required for all of the preferred alternatives and that an effort would be made to incorporate works being proposed by the City, Province, and other stakeholders. Don Haley added that the Class EA report would go to the TRCA Board, which would determine project prioritization based upon funding coming from the City and Province and other sources.
- x) Mike Mattos mentioned that the grade on the Jane Street/Alliance intersection would have to consider street car and LRT requirements.
- xi) David White mentioned that grading works within the City of Toronto Works Yard should consider removal of material close to the creek block and raising of the Works Yard area at the fringes of the floodplain. Ron Scheckenberger responded that a cut/fill balance would have to be assessed.
- xii) Frances Nunziata inquired as to who would pay for flood protection berming works. Don Haley responded that public dollars would be used. Frances mentioned that the City has required residents to pay for property repairs within riverine settings. Don Haley confirmed that public dollars would have

to be used in this setting to provide flood protection using berming or equivalent works.

4. Review of Short-listed Alternatives (Table 3)

Discussion items arising out of the review of Table 3 included the following:

- i) Paul Nelson inquired as to why an enclosure would not work along Humber Blvd. Ron Scheckenberger noted this alternative would be considered costly and would have significant environmental impacts and challenges which would not be considered approvable by various agencies. Don Haley also added that public safety would be a concern with such a lengthy enclosure.
- ii) Ron Scheckenberger mentioned that a centralized flood control facility had been assessed, and based upon the required storage to reduce frequency flows from either the 25 year to 10 year or 100 year to 25 year storm events, a suitable location had not yet been found, although the creek reach from Weston Road to Eglinton Road had been reviewed. Frances Nunziata noted that a new Community Centre had been proposed on the southwest corner of Eglinton and Black Creek and that this would be within the flood storage area just mentioned. Don Haley noted that a flood storage facility would have to consider the costs for acquisition of lands.
- iii) Don Haley mentioned that flood protection berms do not have to provide Regional Storm protection. Improved return (reduced risk) on flood protection investment could be achieved by providing protection for more frequent storm events such as the 100 year or 50 year storm.
- iv) John Berry questioned the timing of channel maintenance. Laurian Farrell indicated that maintenance had been planned within this reach of Black Creek later this year; Laurian is to confirm with TRCA staff.

TRCA

- v) Mike Mattos inquired as to whether or not the City of Toronto would attend the upcoming PIC to discuss backwater issues within the storm sewer system. Laurian Farrell mentioned that the City of Toronto will be notified of the PIC. Laurian indicated that the City of Toronto has proposed 2011 for the commencement of a Basement Flooding Study.
- vi) Mike Mattos mentioned that he has never observed flooding above the walls of the creek along Humber Blvd., but has

MATTERS DISCUSSED

ACTION BY:

observed flooding of roadway systems either side of the channel within the floodplain. Mike Mattos noted that a possible solution to the storm sewer system flooding would be to relocate the storm sewer outlet downstream to where flood water elevations are lower. Ron Scheckenberger agreed that this could be a possible solution.

5. Next Steps

Dana Khademi mentioned that the PIC has been scheduled for June 15, 2009 and that all CLC members have been invited to attend. Frances Nunziata inquired as to when and where the PIC Notice would be provided to the community. Dana responded that the Notice would be provided within two local newspapers and e-mails would be sent out to CLC members and to the Council office.

TRCA

Meeting Minutes prepared by,

AMEC EARTH AND EVIRONMENTAL A Division OF AMEC Americas Limited

Per: Steve Chipps, P. Eng.

Associate

SC/11

G:\Work\106159\Corr\Min\09-06-01 Mtg Min.doc

c.c. All present

+ Regrets

APPENDIX E General Correspondence

From: Laurian Farrell [mailto:LFarrell@trca.on.ca]

Sent: Friday, July 10, 2009 2:34 PM

To: Yousaf, Saad

Cc: rness@trca.on.ca; Walker, Sharon; Iacobelli, Tony; sdhalla@trca.on.ca; Nick Lorrain; Don

Haley; Dana Khademi

Subject: RE: TRCA Flood remediation project

Hi Saad,

We have developed the FVA database using depth of flooding, however to develop our strategy for remedial works we are looking at a number of criteria including social, economic and environmental factors. For example, under the social heading we are quantifying flood risk through lead time, threat to life, depth of flooding, roadway classification, access etc. Under Economics we are looking at direct and indirect flood damage costs. Environmental impacts will be looked at after the initial model results are determined (more of a qualitative analysis). We have already started a pilot EA in Toronto under our study to implement remedial works and we anticipate having the strategy for the entire jurisdiction completed by the end of the year.

Thanks Laurian

Laurian M. Farrell, P.Eng., M.L.A. | Manager, Water Resources Engineering | Flood Forecasting & Warning Program Coordinator | Ecology Division

Toronto and Region Conservation Authority | Tel 416,661,6600 ext. 5601 | Fax 416,661,6898 | 5 Shoreham Drive | Toronto, Ontario, Canada M3N 1S4

"Yousaf, Saad" <Saad.Yousaf@vaughan.ca>

07/10/2009 01:23 PM

To "Laurian Farrell" <LFarrell@trca.on.ca>

cc "Walker, Sharon" <Sharon.Walker@vaughan.ca>, <rness@trca.on.ca>, "lacobelli, Tony" <Tony.lacobelli@vaughan.ca>

Subject RE: TRCA Flood remediation project

Hi Laurian:

Thanks for your email. City retained Clarifica Inc. to complete City Wide Drainage and SWM Criteria Update Study and I have provided the CD of draft report to Nick Lorrain / Sameer Dhalla. There are few changes required to draft report and the report will be finalized in near future.

Calrifica Inc has used TRCA hydraulic modeling information (10year, 25year, 50year, 100year and the regional storm event) for identifying the Flood Vulnerable roads and structures within the floodplain. The interim Flood Emergency Response Index (FERI) was developed for potential flood sites. The FERI analysis provides a flood response classification system based on a ranking of the highest priority sites using depth of flooding and land use information. I assume that TRCA FVA database is based on the depth of flooding only. We will be working with Clarifica Inc to further refine the FVA database by incorporating the information from TRCA FVA database such that there is one same final product ranked and prioritized using depth of flooding and land use information.

Both the works (the strategy for remedial works and hydraulics through the SPA) appear to be

useful for our study. Based on the schedule of your study, what is the anticipated project completion time?

Ryan: Could you please provide us a bit more description on the completed works associated with the hydraulics through the SPA?

Best Regards,

Saad

From: Laurian Farrell [mailto:LFarrell@trca.on.ca]

Sent: Friday, July 03, 2009 10:19 AM

To: Iacobelli, Tony

Cc: Yousaf, Saad; Walker, Sharon; rness@trca.on.ca **Subject:** RE: TRCA Flood remediation project

Hi Tony,

Yes, I know Saad well. Saad - are you using the TRCA FVA database? We are currently working on a lead time assessment to the area's with large clusters of FVA's and we are also in the process of obtaining data from MPAC to help assess potential damages at these areas. All of this will be rolled into our assessment and used to help develop the strategy for remedial works. If you need any more information regarding the study please feel free to contact me. Ryan Ness (Manager, Water Resources) is the engineer working on the Humber watershed so if you require any technical information regarding the SPA area he will be able to provide that information. I will cc Ryan on this email - I understand that his team has done quite a bit of work lately on the hydraulics through the SPA area.

Regards, Laurian

Laurian M. Farrell, P.Eng., M.L.A. [Manager, Water Resources Engineering] Flood Forecasting & Warning Program Coordinator | Ecology Division

Toronto and Region Conservation Authority | Tel 416.661.6600 ext. 5601 | Fax 416.661.6898 | 5 Shoreham Drive | Toronto, Ontario, Canada M3N 1S4

"lacobelli, Tony" <Tony.lacobelli@vaughan.ca>

To "Laurian Farrell" <LFarrell@trca.on.ca>

07/03/2009 08:36 AM

cc "Walker, Sharon" <Sharon.Walker@vaughan.ca>, "Yousaf, Saad" <Saad.Yousaf@vaughan.ca>

Subject RE: TRCA Flood remediation project

Laurian.

Thanks very much for the quick response. I will share the document with Saad Yousaf (Drainage Engineer) and Sharon Walker (Manager, Emergency Management). In case you are not aware, our Development Engineering team has a draft drainage study that also includes an inventory of Flood Vulnerable Areas. Saad is the contact person for this draft study and I believe he also worked on TRCA's inventory of FVA's at one point in his career.

Tony

From: Laurian Farrell [mailto:LFarrell@trca.on.ca]

Sent: Thursday, July 02, 2009 5:48 PM

To: Iacobelli, Tony

Subject: TRCA Flood remediation project

Hello Tony,

As per my voicemail message, here is a copy of the project sheet that describes the Flood Protection & Remedial Capital Works project that i am currently working on. If you need any further information please feel free to contact me.

Regards, Laurian

Laurian M. Farrell, P.Eng., M.L.A. | Manager, Water Resources Engineering | Flood Forecasting & Warning Program Coordinator | Ecology Division

Toronto and Region Conservation Authority | Tel 416.661.6600 ext. 5601 | Fax 416.661.6698 | 5 Shoreham Drive | Toronto, Ontario, Canada M3N 1S4

This e-mail, including any attachment(s), may be confidential and is intended solely for the attention and information of the named addressee(s). If you are not the intended recipient or have received this message in error, please notify me immediately by return e-mail and permanently delete the original transmission from your computer, including any attachment(s). Any unauthorized distribution, disclosure or copyling of this message and attachment(s) by anyone other than the recipient is strictly prohibited.

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, 8**** étage North York, Ontario M2M 4J1

Tél.: (416) 326-6700 Téléc.: (416) 325-6347



File: EA 02-04-05

RECEIVED PHILIPS ENGINEERING LTD.

January 23, 2009

Laurian Farrell Manager, Water Resources Toronto and Region Conservation Authority 5 Shoreham Drive Toronto, ON M3N 1S4

Managing Flood Risk in the Black Creek RE: **Toronto and Region Conservation Authority Class Environmental Assessment**

Response to Notice of Intent - Technical Support Section Comments

Dear Ms. Farrell:

The Ministry of the Environment (MOE), Central Region Technical Support Section has received your Notice of Intent for the above noted Environmental Assessment (EA).

It is our understanding that this study involves examining the opportunities of enhanced flood protection in the study area. This response acknowledges that the study is following the approved environmental planning process under Conservation Ontario's Class Environmental Assessment for Remedial Flood and Erosion Control Projects (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**

- **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:

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.

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

- 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

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, 8^{lème} étage North York, Ontario M2M 4J1

Tél.: (416) 326-6700 Téléc.: (416) 325-6347

RECEIVED

JAN 2 7 2009

ECOLOGY DIVISION

File: EA 02-04-05

January 23, 2009

Laurian Farrell Manager, Water Resources Toronto and Region Conservation Authority 5 Shoreham Drive Toronto, ON M3N 1S4

RE: Managing Flood Risk in the Black Creek

Toronto and Region Conservation Authority

Class Environmental Assessment

Response to Notice of Intent - Technical Support Section Comments

Dear Ms. Farrell:

The Ministry of the Environment (MOE), Central Region Technical Support Section has received your Notice of Intent for the above noted Environmental Assessment (EA).

It is our understanding that this study involves examining the opportunities of enhanced flood protection in the study area. This response acknowledges that the study is following the approved environmental planning process under Conservation Ontario's Class Environmental Assessment for Remedial Flood and Erosion Control Projects (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

- 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

MONSON TO THE

Watercourses

Woodlots

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.

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.
- 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.

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.

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

- 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. Ron Scheckenberger, Project Manager, Philips Engineering

Rod Adams, Toronto District Office, MOE

Central Region EA File

A & P File

From: Nelson, Paul

Sent: Monday, January 26, 2009 3:34 PM

To: 'lfarrel@trca.on.ca'

Cc: 'rscheckenberger@phillipseng.com'; 'Anne Milchberg'; Brent Arlitt; Dobbin, Bob

Subject: TRCA Public Meeting-Weston-Tuesday Jan 27/09

Ms. Farrell/Mr. Scheckenberger;

Further to the voice mail message I left you both earlier today, we look forward to attending the TRCA public consultation meeting tomorrow evening, Jan 27/09, at the Weston Legion Hall. I am a Senior Project Manager at AECOM (formerly Earth Tech Canada and prior to that Proctor& Redfern Limited). We are presently carrying out a works yard consolidation study for the City of Toronto in their Etobicoke York District, including portions of the Rockcliffe Boulevard, Symes Road and Scarlett Road area, where you study seems to be concentrated. Eventually we will be looking at all City works yards across Toronto.

Of particular interest is how present City lands in the Rockcliffe/Symes area can be enhanced/improved for works yard operational needs while at the same time meeting and if possible improving TRCA's development and flood risk criteria. In addition to a long term Parks Forestry& Recreation yard already being in place at 301 Rockcliffe, the City has 15 acres of vacant land immediately adjacent to the PF&R yard that are of significant interest to us in terms of additional City uses.

AECOM is now engaged for works yard review across the entire City of Toronto so a meeting with TRCA and their advisors is most appropriate as soon as possible to review our yards study mandate in general, as well as TRCA priorities and regulatory controls in general, followed by specific yard by yard reviews where applicable.

You also mentioned on the phone this afternoon that you expect a large turnout for tomorrow's meeting as Rockcliffe is apparently an area prone to flooded basements lately in addition to interest from outdoor activities and ecological groups.

Looking forward to meeting both of you Tuesday evening.

Regards

Paul H. Nelson Senior Project Manager, AECOM Toronto Yard Consolidation Study

Philips Engineering Ltd Confidentiality Notice

The information contained in or attached to this email is intended solely for the individual or entity to which it is addressed. If you are not

the original intended recipient of this email, or a person responsible for delivering it to



January 14, 2009

Dear Sir/Madam:

Re: Black Creek Flood Remediation EA

Please find enclosed information pertaining to the above-noted study being undertaken by Toronto and Region Conservation. The study is being carried out in accordance with the requirements of the Conservation Ontario, Class Environmental Assessment for Remedial Flood and Erosion Control Projects. This project is being undertaken in order to investigate opportunities to enhance flood protection for existing flood prone development located within the Black Creek Regulatory floodplain (see attached Notice of Intent for map of study area).

To assist with your evaluation of interest in this project, a summary of the known archaeological sites in the area is provided here. Note that a Stage 1 Archaeological Assessment (which evaluates archaeological potential ahead of fieldwork) has not yet been completed, but will provide information about the cultural history of this area, the potential for unknown archaeological sites to exist here, and the recommendations for archaeological fieldwork (Stage 2) to occur should any ground disturbance be deemed necessary through the Environmental Assessment process. Once completed, the Stage 1 findings and recommendations will be forwarded to you for further information and discussion should you have any concerns or questions.

At present, there are no archaeological sites registered with the Ontario Ministry of Culture within the study area, although there are ten sites identified within two kilometres of the study area margins. Of these ten, two date to 19th century EuroCanadian activities, including the Lambton Tavern. The study area is quite close to many important First Nations sites, being near to the ancient Carrying Place Trail, just south of two known PreContact villages and a campsite, and just north of the 16th century Seneca village of Taiaiagon and known or possibly related burials. The tableland high ground surrounding this study area was greatly transformed as this section of west Toronto was urbanized in the 19th and 20th centuries; however it is possible that there are archaeological resources remaining intact in the valley lands and other lightly modified locations. For further information regarding the Ministry of Culture's database of sites, staff in the Culture Programs Unit would be able to offer assistance.

If you have any questions, or should you require additional information, please contact the undersigned.

Sincerely,

Patricia Lewis

Water Resources Analyst

Ext. 5218



Portnai - FYI.

Il was archiving my emails and
cume miss this letter!

Jaurian

City Maintenance + Parks.

September 10, 2008

BY MAIL AND EMAIL (councillor nunziata@toronto.ca)

Councillor Frances Nunziata Ward 11, York South -Weston 100 Queen Street West, Suite C49 Toronto, Ontario M5H 2N2

Dear Councillor Nunziata:

Re.

Re: Flooding on Black Creek Boulevard Humber River and Black Creek Watershed City of Toronto - Etobicoke-York

Toronto and Region Conservation Authority (TRCA) attended a meeting organized by Councillor Nunziata on Tuesday, August 26, 2008 at 13 Black Creek Boulevard located in Etobicoke.

The meeting involved residents of Black Creek Boulevard and Smythe Park area who were concerned about flooding of their basements. The residents also wanted an explanation from TRCA about the work currently being undertaking along the Black Creek in this area. The purpose of this letter is provide a formal response to the issues discussed at the meeting and to answer questions raised by residents regarding the extent of TRCA's work within area. The issues and corresponding TRCA responses are presented below:

1. Possibility of Black Creek overflowing its channel during the summer period contributed to flooding of residents basements.

TRCA's flood monitoring gauge network spans the GTA. This network of gauges provide continuous monitoring of in-stream water levels at TRCA dams and river stations. Thus, to determine if Black Creek overflowed its banks anytime during the summer period, TRCA analyzed information from the Black Creek gauge located Scarlett Road which is the closest station to Black Creek Boulevard. This gauge records the highest water elevations in the creek every 15 minutes. There are no records indicating that Black Creek overflowed its channel during the summer period; thus, it is unlikely that water in the Black Creek contributed to the flooding of residents basements.

Additional information on flood warning and forecasting including real time flood monitoring information can be found on TRCA's website home page at www.trca.on.ca.

2. TRCA's work along the Black Creek Channel and Scarlett Road.

TRCA is undertaking channel repair work along the Black Creek channel. The purpose of the work is to repair/replace several damaged concrete panels with similar panels within the flood control channel. The work was initially scheduled for last fall; however, due to some complications, the work was delayed till this summer. Part of the area south of Black Creek Boulevard is currently being used as temporary construction access for importing construction materials and equipment.

Member of Conservation Ontario



138 11

As part of the repair work, TRCA will restore the site upon completion of the project and temporary fencing and debris will be removed. Previously vegetated areas will be seeded upon completion of the work. The aim is to complete the repairs this fall. When completed, the proposed work will improve flood conveyance along the channel. Please note that this work is in no way a project to naturalize the Black Creek channel.

3. Irrigation project proposed by the Lambton Golf Club

A few years back, TRCA was involved in preliminary discussions with representatives from the Lambton Golf Club regarding a proposal to install an irrigation pond on their property as part of their renovations and greening plan. The irrigation project will involve re-naturalization of a section of the Humber River further upstream of Black Creek by removing the existing concrete structure/dam and diverting water from the Humber River into this Irrigation pond during high water levels. Since those preliminary discussions, TRCA has not received a formal permit application or plans for the renovations proposed at Lambton Golf Club. As such, TRCA has not issued a permit for this work.

Should you have any questions, please contact me at extension 5714 or by email at rafoom@trca.on.ca.

Yours truly,

Renée Afoom

Planner II, Environmental Assessments

Planning and Development

BY EMAIL

City of Toronto

TRCA:

Ronald Bassett, Operation and Maintenance (rbasset@toronto.ca)
Ray Stukas, Parks, Forestry and Recreation (rstukas@toronto.ca)
Carolyn Woodland, Director of Planning and Development
Beth Williston, Manager of Environmental Assessments
Steve Heuchert, Manager of Planning Development and Regulations
Mark Rapus, Senior Planner, Planning, Development and Regulations
Laurian Farrell, Water Resource Manager

Gary Wilkins, Humber River Watershed Specialist

* Mark Preston, Restoration Services, Senior Construction Supervisor did the work

Appendix F
Background Information Photographic Inventory



Drop structure downstream of Jane Street



Jane Street arch culvert and concrete channel



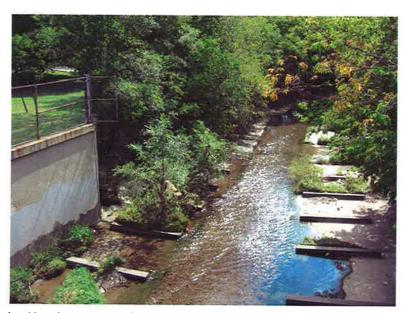
Channel downstream of Jane Street



Concrete lined channel upstream of Jane Street



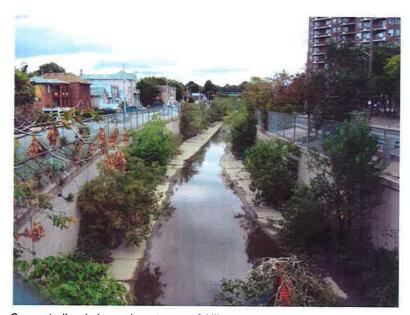
Looking at the channel overbank area upstream of Jane Street



Looking downstream of Alliance Avenue at the energy dissipation blocks



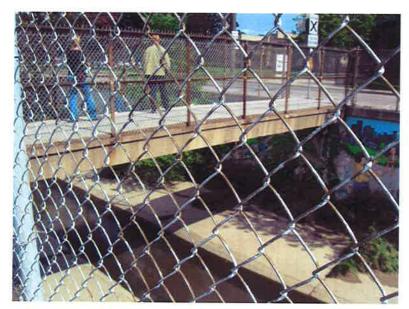
Looking upstream at Rockcliffe Boulevard crossing



Concrete lined channel upstream of Alliance Avenue



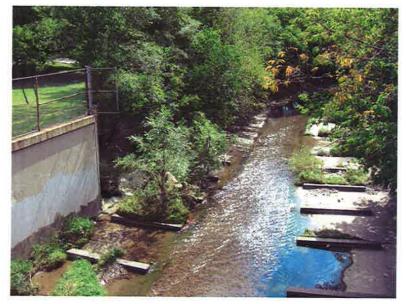
Residential development adjacent to the creek



Pedestrian bridge crossing



Recently constructed home with first floor built up high, to be above the Regulatory floodplain



Vegetation growing within the channel



Channel system immediately downstream of Weston Road



Rail crossings upstream of Weston Road



Drop structure upstream of Weston Road

Appendix G
Cost Estimates

TABLE CREEK REALIGNMENT AND NATURALIZATION PRELIMINARY COST ESTIMATE

Item	Unit Quantity		\$/Unit	Total \$	
Creek Realignment	m	650	600 \$	390,000.00	
Construction Access	m	1950	50 \$	98,000.00	
Dewatering	L,S,	1	200,000 \$	200,000.00	
Remove concrete channel	m,	650	600 \$	390,000.00	
Landscaping	L.S.	I	325,000 \$	325,000.00	
Rounded Subtotal			\$	1,403,000.00	
Contingency (15%)			\$	210,450.00	
Γotal Cost (excl. Taxes)				\$1,613,45	

TABLE BLACK CREEK BLVD FLOOD PROTECTION BERM PRELIMINARY COST ESTIMATE Item Unit Quantity \$/Unit Total \$ Berm Construction m 310 186,000.00 600 \$ Construction Access and Restoration of Access m2 1110 100 111,000.00 Landscaping for 11 homes +/-Ea 11 10,000 110,000.00 Rounded Subtotal 407,000.00 Contingency (15%) 61,050.00 Total Cost (excl. G.S.T.) \$468,050

Cost per unit m of berm

\$1,509.84

TABLE SCARLETT ROAD FLOOD PROTECTION BERM PRELIMINARY COST ESTIMATE							
Item	Unit	Quantity	\$/Unit	Total \$			
Berm Construction	m	350	600	\$ 210,000.00			
Construction Access and Restoration of Access	m2	1230	100	\$ 123,000.00			
Landscaping for 4 homes +/-	Ea	4	10,000	\$ 40,000.00			
Road profile change	m2	5600	150	\$ 840,000.00			
Rounded Subtotal				\$ 373,000.00			
Contingency (15%)				55,950.00			
Total Cost (excl. Taxes)				\$428,950			

F			LE L FLOOD PROTECTION BERM OST ESTIMATE		
Item Unit Quantity \$/Unit					
Berrn Construction	m	540		al e	224 000 00
Landscaping	LS	1	25,00	0 \$ 0 \$	324,000.00 25,000.00
Entrance road profile change	m2	280		0 \$	28,000.00
Rounded Subtotal				\$	349,000.00
Contingency (15%)				\$	52,350.00
Total Cost (excl. Taxes)				T	\$401,350

HILLDALE ROAD FLOOD PROTECTION BERM PRELIMINARY COST ESTIMATE							
Item	Unit	Quantity	\$/Unit	Ι	Total \$		
Berm Construction	ım	570	6(0 8	342,000.00		
Construction Access and Restoration of Access	m2	1050		0 \$	105,000.00		
Lavender Creek Realignment	ın	180	1.80	0 \$	324,000.00		
Road profile change	ın2	600	15	0 \$	90,000.00		
Rounded Subtotal				\$	771,000.00		
Contingency (15%)				s	115,650.00		
Total Cost (excl. Taxes)				+	\$886,650		

New Structure on Jane Street over Black Creek Replacing the Embankment and Concrete Culvert

Item No.	SP/Spec	Description	Quantity	Unit	Unit Price	То	tal Price
1		Traffic Control	±2	LS	\$ 10,000.00	\$	10,000.0
2		Traffic Barriers	200	m	\$ 160.00	\$	32,000.0
3		Protection System	830	m ²	\$ 1,300.00	\$	1,079,000.0
4		Temporary Relocation of Hydro Lines	200	m.	\$ 200,00	\$	40,000.0
5		Temporary Relocation of Utility Lines	200	m ²	\$ 100.00	\$	20,000.00
6		Temporary Relocation of (400mm)Storm Sewer	300	ea	\$ 500.00	\$	150,000.00
7		Temporary Relocation of (450mm)Storm Sewer	40	m	\$ 500,00	\$	20,000.00
8		Temporary Relocation of (250mm) Sanitary Se	180	ea	\$ 400.00	\$	72,000.00
9		Temporary Relocation of (300mm) Watermain	27	m ²	\$ 200,00	\$	5,400.00
10		Clearing and Grubing	25	ha	\$ 2,000_00	\$	50,000.00
11.		Removal of earth fill for bridge pier cap, Autments Construction and Span Erection	15000	m ³	\$ 20,00	\$	300,000.00
12		Substructure Construction (Stage 1)		LS		\$	2,160,000.00
13		Superstructure Construction (Stage 1)	2160	m²	\$ 2,500.00	\$	5,400,000.00
14		Modifications to Shoring protection (Stage2)		LS		\$	30,000,00
15		Insulated Sanitary Sewer on Bridge	200	m	\$ 1,000.00	\$	200,000.00
16		Insulated Watermain on Bridge	200	m	\$ 1,000.00	\$	200,000.00
17		Storm Sewer	400	m	\$ 500.00	\$	200,000.00
18		Utilities on Bridge	180	m	\$ 1,150,00	\$	207,000.00
19		Relocation of temporary barriers	200	m	160	\$	30,000.00
20		Excavations and disposal	354000	m³	\$ 20.00	\$	7,080,000.00
21		Substructure Construction (Stage 2)		LS		\$	2,484,000.00
22		Superstructure Construction (Stage 2)	2160	m²	\$ 2,500,00	\$	6,210,000,00
23		Relocation of Hydro Lines to Stage 1bridge installation	200	m	\$ 100.00	\$	20,000.00
24		Relocation of Utility Hydro Lines to Stage 1 bridge installation	200	m²	\$ 50.00	\$	10,000.00
25		Temporary Flow Provisions		LS		\$	10,000.00
26		Sediment and Erosion Control		LS		\$	10,000.00
27		Removal of Culvert		LS		\$	50,000.00
28		Landscaping		LS		\$	125,000.00
29		Top Soil	2850	m³	\$ 30.00	\$	85,500.00
30		Seed and Mulch	2850	m²	\$ 1.00	\$	2,850.00
	-	Total - Road Structure				\$ 20	6,292,750.00
31		LRT line - 2 tracks	1548	m²		-	9,288,000.00
32	0	Contingencies			15%	\$ 5	5,337,112.50
		Roadway consists of 4 lanes, 2 bikeways and 2 s width is 22.9m and length of 178m LRT consists of a 2 track structure 180m i	1				
	1	otal				\$ 40	,917,862.50

Jane Street Bridge Improvement Cost Recovery

Existing Jane Street Bridge Replacement \$30,000,000

LRT \$10,000,000

Interest Rate 0.05
Term in years 44
Payment \$200,000
(1+i)^n 8.56
(1+i)^n-1 7.56
i(1+i)^n 0.427857514

((1+i)^n-1)/i 151.1430056

Compound Amount Factor

\$30,228,601

Jane Street Bridge Improvement Cost Recovery

Existing Jane Street Bridge Replacement \$30,000,000

LRT \$10,000,000

Interest Rate 0.01
Term in years 100
Payment \$495,000
(1+i)^n 2.70
(1+i)^n-1 1.70
i(1+i)^n 0.027048138

Present Worth Factor

63.02887877 **\$31,199,295** Appendix H
Hydrology and Hydraulics

