August 29, 2005

To: Works Committee

From: Brian Denney, Chief Administrative Officer, TRCA

Subject: Toronto Water 2005 Multi-Year Business Plan report as requested in City Council recommendation adopted on February 1, 2 and 3, 2005.
All Wards

Purpose:

To respond to the recommendation approved by Toronto City Council on February 1, 2, and 3, 2005 and adopted without amendment which resolved, in part, that TRCA report on a comprehensive multi-year business plan to protect the source of Toronto's river systems.

Financial Implications and Impact Statement:

There are no financial implications resulting from the receipt of this report. However, any actions that may be required as a result of this report will require appropriate allocations of funding.

Recommendations:

It is recommended that:

(1) the Policy and Finance Committee be forwarded the report submitted by the Toronto and Region Conservation Authority (TRCA) in response to the request by Works Committee regarding multi-year business plans; and

(2) TRCA be requested to report on measures to protect the source of Toronto's river systems following the substantial completion of the integrated watershed management plans for the Rouge, Don and Humber rivers and the initial steps to develop the anticipated Credit Valley - Toronto and Region - Central Lake Ontario Conservation Authority (CTC) Watershed Region Source Water Protection Plan as required and funded by the province; and

(3) the appropriate City Officials be authorized and directed to take the necessary action to give effect thereto.

Background:
City Council at its meeting of February 1, 2 and 3, 2005 in adopting Report 2, Clause 1 from Works Committee requested:

> *the Toronto and Region Conservation Authority be requested to report to the Works Committee on a comprehensive multi-year business plan to protect the source of Toronto's river systems;*

The request from the City of Toronto for a report on TRCA's comprehensive multi-year plan to protect the source of Toronto's river system is timely in light of a number of provincial policy initiatives, TRCA program initiatives, and the adoption and initial implementation of the city's Wet Weather Flow Management Master Plan (WWFMMP).

TRCA is currently undertaking a number of key projects which will shortly lead to updates to TRCA's multi-year business plan. This work is part of the ongoing process of ensuring each of its watershed plans are kept current; that they reflect new information including recent groundwater and water budget projects; that they integrate undertakings by others e.g. WWFMMP, Oak Ridges Moraine Act, Oak Ridges Moraine Conservation Plan, Greenbelt Plan, Provincial Source Water Protection Planning, and that they build on ongoing monitoring activities by TRCA and others **(Attachment 1)**. These watershed plans are built on nearly 50 years of watershed management experience and include a strong public consultation component in addition to ongoing involvement of the provincial ministries and municipal agencies.

TRCA's integrated watershed management program is premised on actions which contribute to the protection of source water through protection of landforms and features, such as the Oak Ridges Moraine, through land securement (almost 40,000 acres are currently in TRCA ownership), planning advice to upstream municipalities, reforestation and habitat enhancement, rural land owner education and stewardship management programs, and has increasingly advocated for and required stormwater management programs that address both the quantity and quality of waters entering the City of Toronto. TRCA carries out research on new initiatives in source water protection ensuring that green roofs and similar activities are constructed in a manner to deliver cost effective solutions.

The City of Toronto completed its Wet Weather Flow Management Master Plan in 2002, a landmark document that sets out a comprehensive program to address the ongoing program requirement for public education, source controls, municipal operations, conveyance controls, shoreline management, stream restoration and end-of pipe facilities, as well as a program to address basement flooding within the City of Toronto. This program clearly recognizes that management of the city's water resources requires a watershed approach as stated in the Wet Weather Flow Management Master Plan Vision and Principles (July 2003):

Vision:
Wet weather flow will be managed on a watershed basis in a manner that recognizes rainwater as a potential resource to be utilized to improve the health of Toronto's watercourses and the near shore zones of Lake Ontario and enhance the natural environment of Toronto's watersheds.

Principles:
Rainwater is a resource. As a priority, rainwater (including snowmelt) should be managed where it falls on the lots and streets of our City, particularly before it enters a sewer. Wet weather flow will be managed on a watershed basis with a natural system approach being applied to stormwater management as a priority. A hierarchy of wet weather flow solutions will be implemented – starting with "at source", then "conveyance", and finally "end of pipe". Toronto's communities need to be made aware of wet weather flow issues and involved in solutions.

The WWFMMP objectives for Water Quality, Water Quantity, Natural Areas and Wildlife, and Drainage Systems recognize the importance of meeting and exceeding water quality standards, elimination of toxic substances through pollution prevention, and preserving and re-establishing the natural hydrologic cycle by maximizing permeability and minimizing runoff at source.

TRCA was pleased to participate in the development of the WWFMMP and strongly advocates for its implementation and for additional resources to be made available to the city from federal and provincial levels of government to expedite the major capital projects.

The Wet Weather Flow Management Master Plan, in addition, will form a fundamental component of a comprehensive Source Watershed Protection Plan for the CTC Watershed Region, which is being led by the TRCA, on behalf of Ministry of Environment, in conjunction with the Credit Valley Conservation Authority and the Central Lake Ontario Conservation Authority. This plan will involve the City of Toronto and the regional municipalities of Halton, Peel, York, Durham, as well as the local municipalities and many other stakeholders.

While many initiatives are currently underway to improve plans, there are immediate opportunities to protect source water through land securement, stewardship and management activities that have been identified and have proven of value to source water protection. While the WWFMMP combined with the city's contributions to the TRCA's annual program of watershed management address watershed priorities within the city boundary, the majority of the water in the city's creeks and rivers originate north and west of the City of Toronto's boundaries. The remainder of this report outlines the importance to the City of Toronto of upstream source water protection and suggests a program of investment that will provide measurable improvements that together with actions undertaken within the city will preserve and re-establish some of the natural hydrologic processes and improve the quality of surface waters.

TRCA recognizes the timing of this report coincides with a city staff report on the initial assessment of damages resulting from the August 19, 2005 storm including information provided from TRCA staff on erosion issues. TRCA is also reporting jointly with Toronto Water to the Sept 14, 2005 Works Committee meeting on a funding from the Land Acquisition for Source Water Protection Reserve.

Comments:

The Importance of Managing Watersheds at Their Source

In order to protect public safety, municipal infrastructure and Toronto region watersheds and waterfront, there is merit in the City of Toronto supporting conservation programs in the 905 regions. Funding projects outside of municipal boundaries *(or, cost sharing projects across municipal boundaries)* in order to gain benefits in terms of flooding and erosion protection, and water quality improvements has been the cornerstone of conservation efforts in southern Ontario.

Major storms can cause massive erosion washing out streets, culverts, bridges and exposing municipal infrastructure. Repairs can cost millions of dollars and take several months, adding to existing congested traffic woes. Public use infrastructure in the valleys such as bridges, trails, parks and sport facilities can be damaged and remain out of service for lengthy periods of time. When sewers are broken, raw sewage flows into the creeks creating immediate public health concerns. All of these outcomes resulted from the August 19th storm.

The tons of sediment and debris eroded from the streams during major storms is deposited in lower gradient reaches and river mouths or discharged out into Lake Ontario. Plumes of sediment and contaminant laden water enter Lake Ontario, affecting aesthetics, beach quality, fish habitat and drinking water intakes.

Headwater areas outside of the city boundaries are important to water management efforts. This recognition is one of the key reasons for widespread interest in protecting physiographic features like the Oak Ridges Moraine. Reforestation of headwater areas has been demonstrated to be an effective water quantity and quality management practice. Long standing practices of planting trees on marginal or pubic lands in the headwaters has been a foundation of TRCA's water management programs, since Hurricane Hazel. In the 2003 watershed plan for Duffins Creek, integrated modelling studies demonstrated that an increase in natural cover from 37 percent (existing) to 49 percent could reduce the flooding risk by as much as 25% in the Town of Ajax for the 100 year storm event and significantly improve water quality and aquatic habitats. Similar modelling is being undertaken in the integrated watershed management plans underway for the Rouge, Don and Humber rivers and will demonstrate the value of natural cover to water management efforts.

Since the Walkerton Tragedy in 2000, attention has been paid to the protection of drinking water supplies in the province at their source. The City of Toronto shares concerns with other municipalities along the north shore of Lake Ontario about the quality of lake based water supplies. TRCA recently initiated a drinking water source protection study with funding provided by the Province of Ontario. This study is being undertaken on a watershed basis and will ultimately use a risk assessment approach to identify priority management actions. Review of source water protection plans from other jurisdictions, such as the City of New York, reveal that from a practical and economic perspective, the protection of source water supplies originating upstream of a municipality makes good business sense. Less sediments and nutrients entering the lake helps to improve drinking water plant treatment efficiencies and reduces the risk of contaminated municipal water and helps to instil public confidence in municipal supplies.

Poor water quality (nutrients) and high Lake Ontario water temperatures were a factor earlier this summer in shortages of municipal water supplies in Durham Region, when algae growth within the drinking water plants forced the treatment system to be shut down in the midst of peak consumption demands. Frequently in late summer, diatom algal blooms in the lake can cause taste and odour problems for municipal supplies, resulting in the requirement for expensive carbon filtration technologies to mitigate. High turbidity in raw water supplies can interfere with treatment processes, which could potentially result in adverse drinking water quality.

Toronto region creeks and rivers have been extensively studied over the past 30 years. Through these studies we know that runoff carries high levels of phosphorous, suspended solids, nitrates and bacteria, in addition to metals and pesticides. Pollution levels following rain storms and snowmelt exceed dry weather conditions by an order of magnitude.

A Lake Ontario pollution loading study undertaken by the Ministry of Environment in 1999 showed two of the most rural watersheds (Humber River and Rouge River) contributed the greatest concentrations of suspended solids while the most urban watersheds (Mimico Creek and Don River) contributed the least. The highly urbanized Highland Creek generated large phosphorus loads due to increased runoff volumes caused by the watershed's high imperviousness **(Figure 1)**. Wet weather flow studies initiated by the city are designed to deal with urban sources of pollution. Key directions for reducing loads to Lake Ontario from the Etobicoke, Mimico, Humber, Don, Rouge and Highland rivers and creeks are outlined in the city's Wet Weather Flow Management Master Plan.

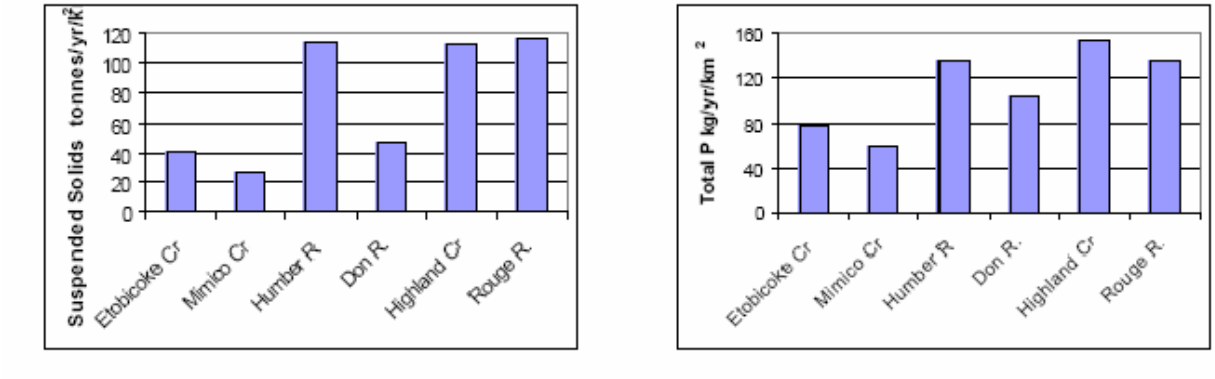

Figure 1 Pollutant Loadings suspended solids and phosphorus by watershed

A University of Guelph study of trends in nitrate and phosphorus levels in tributaries to Lake Ontario during the period 1964-1994 (most recent provincial data) shows that overall levels of nitrates in surface waters has been rising with significant jumps in agricultural areas in the 1960's and 1970's and more recently in urban areas. Total phosphorus levels in tributary streams are declining over the 30-year period due to phosphorus abatement legislation and the resulting pollution control efforts in rural areas (reduced soil erosion) and phosphorus abatement activities in urban areas (decommissioning of in-land sewage treatment plants, rainwater quality management ponds and source controls). Recent watershed report cards for Toronto region

watersheds have identified that at best we are currently "holding our own" in terms of water quality trends in the more urbanized rivers. In light of the economic growth and population increase, this is good news and is a good indication that on-going abatement efforts by the various partners are working.

Agricultural non-point source water quality modelling studies by TRCA have shown that a majority of the sediments leaving rural portions of the watersheds can originate from a small percentage of the drainage area due to physiographic and land use factors. The majority of sediment transported in rural watersheds has been linked to agricultural areas. In comparison, relatively small amounts in rural areas come from bank erosion. Across the province, the agricultural industry has been making significant inroads in reducing rural pollution by adopting modern farming practices such as nutrient management, conservation tillage, grass swales and buffer strips. Knowledge of key pollution source areas helps TRCA staff to effectively target Rural Clean Water Programs.

In urban areas, a combination of erosion and sediment control, stormwater retrofits and rainwater source controls have been identified as effective management actions to improve local and downstream water quality and quantity problems. The City of Toronto's Wet Weather Flow Management Master Plan has identified water quality and quantity control measures for creeks and rivers draining south of Steeles Avenue.

Source Water Protection Program for Toronto Region Headwater Creeks and Rivers

The City of Toronto Council has expressed interest in having source water protection activities happen outside its jurisdiction to compliment the directions already underway to implement the Wet Weather Flow Management Master Plan. These activities should seek to reduce peak flows and manage water quality.

A source water protection program (SWPP) for Toronto region creeks and rivers is outlined in **Table 1**. This SWPP is designed to reduce loadings of sediment, bacteria and nutrients to Lake Ontario resulting in improved water quality of watercourses as they enter the city. Multiple watershed-wide benefits are expected from the SWPP initiatives, including flood reductions, improved aquatic habitats, better water quality and streams aesthetics, biodiversity enhancements and safer drinking supplies. The SWPP was designed to target suspended solids, nutrients and bacteria which serve as "key indicator" parameters for assessing safe drinking water supplies and are useful surrogates for tracking other persistent pollutants. The outlined SWPP reflects current knowledge of the key pollution sources and effective management actions, identified through on-going watershed planning studies.

The SWPP provides options for a "level of effort approach" detailing actions that can be accomplished on an annual basis for three alternative levels of funding support (e.g. $2, $5 and $10 million). Funding for the SWPP from local and regional municipalities would be used by the TRCA to lever new funding from our watersheds partners (province and federal governments, and others e.g. foundations). SWPP efforts are initially focused on the larger more rural watersheds. However at higher funding levels, it would be possible to extend efforts more broadly to ensure that activities are being undertaken in all city watercourses such as the Etobicoke and Mimico Creeks.

By 2006, TRCA will be in a position to use our integrated watershed management studies that are being funded by the municipalities, to identify practical, short term and long term actions such as stormwater management enhancements, reforestation, stream bank riparian planting and rural land management activities.

Opportunities for implementing the proposed programs within the Toronto region watersheds will be developed in consultation with city staff, watershed task forces, Rouge Park Alliance and the Remedial Action Plan (RAP) steering committee. The province's source water protection legislation is expected to be unveiled later this year, at which time we will have a better understanding of funding priorities. Initiation of a municipally funded SWPP will be of assistance in securing drinking water source protection funding from the province. It is anticipated that the federal government will support watershed management efforts designed to protect Lake Ontario drinking water supplies in response to international water quality treaty obligations.

Table 1 SWPP Levels of effort and priority actions on a watershed basis

Funding Level **Project Type**	**Rouge River**	**Higland Creek**	**Don River**	**Humber River**	**Mimico Creek**	**Etobicoke Creek**
$2,000,000 /yr						
Stormwater Retrofit	**$600,000**		**$300,000**	$600,000		
Reforestation	$100,000			$100,000		
Riparian/Wetland Plantings	$100,000			$100,000		
Rural Land Management	$50,000			$50,000		
Stream Channel Improvements						
Total	**$850,000**	$0	**$300,000**	**$850,000**	$0	$0
$5,000,000 /yr						
Stormwater Retrofit	$1,000,000		$500,000	$1,000,000		
Reforestation	$500,000			$500,000		
Riparian/Wetland Plantings	$200,000			$200,000		
Rural Land Management	$100,000			$100,000		
Stream Channel Improvements		$250,000	$250,000		$200,000	$200,000
Total	**$1,800,000**	**$250,000**	**$750,000**	**$1,800,000**	**$200,000**	**$200,000**
$10,000,000 /yr						
Stormwater Retrofit	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
Reforestation	$1,000,000			$1,000,000		
Riparian/Wetland Plantings	$1,000,000	$200,000	$100,000	$100,000	$100,000	$100,000
Rural Land Management	$200,000			$200,000		
Stream Channel Improvements	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
Total	**$3,200,000**	**$1,200,000**	**$1,100,000**	**$2,300,000**	**$1,100,000**	**$1,100,000**

The multi-year program presented in Table 1 is broken down into program areas, and some of the proposed works to be conducted by TRCA under these program areas are as follows:

Stormwater Retrofit:

- Approximately 80 locations in upstream areas urbanized prior to 1990, have been identified as areas where water quantity facilities can be constructed or upgraded to provide water quality treatment **(Attachment 2)**.

- Based on a 10 year program at the 2 million dollar investment level/per annum with a 2:1 leverage factor (2006 costs), it is estimated that 50 stormwater management retrofits could be implemented. These estimates are based upon a capital cost of $500,000 per retrofit and an accompanying $100,000 urban best management source control program.

Reforestation:

- TRCA has identified potential reforestation lands located on both public and private lands located outside the City of Toronto as illustrated on **(Attachment 3)**. These lands include areas contained within the Oak Ridges Moraine Conservation Plan Area and the Greenbelt Plan area.

- Based on a 10 year program, at the 2 million dollar investment level/per annum **(Table 1)** and a conservative 2:1 leverage factor, it is estimated that 400 ha of land can be reforested in critical headwater areas for source water protection.

Riparian/Wetland Plantings:

- TRCA has identified critical areas for riparian plantings adjacent to agricultural areas, roadways and other lands where direct flow to streams carries excess levels of sediment and nutrients to watercourses. Riparian zones provide ephemeral wetland habitat, water storage during seasonal flooding and contribute woody material improving fish habitats.

- Based on a 10 year program at the 2 million dollar investment level/per annum **(Table 1)** and a conservative 2:1 leverage factor, it is estimated that 80 ha of riparian forest lining stream banks.

Rural Land Management:

- Rural Clean Water Program works with rural landowners and other funding partners to improve rural water quality through technical, financial and educational services.

- Based on a 10 year program at the 2 million dollar investment level/per annum **(Table 1)** and a conservative 1:1 leverage factor, it is estimated that 60 farm plans will be completed resulting in opportunities for reforestation, riparian plantings, fencing of animals from watercourses, and improved manure storage on small to medium sized farm operations not covered by the provincial Nutrient Management Act.

Stream Channel Improvements:
At the highest proposed funding level, program delivery could include works on stream erosion sites and other channel improvements on urbanized subwatersheds in the Humber, Don and Rouge Rivers and on the smaller more urbanized watersheds (Etobicoke, Mimico and Highland Creeks)

- A monitoring program to inventory, monitor, assess and evaluate watercourse realignments designed based on 'natural' channel design principles.
- Completion of field work and flood risk assessment as well as a preliminary cost-benefit analysis in order to prioritize land areas or structures within TRCA's jurisdiction requiring remedial flood protection works and/or acquisition in order to minimize the risk to public safety or damage to property from flooding.
- Barrier mitigation projects.
- Preparation of risk assessments and emergency planning studies for each large dam as recommended in the Dam Safety Assessment reports. Updating of equipment/technology, operating procedures and structural improvements.
- Capital works on small dams and flood control facilities in order to maintain levels of public safety and risk to property damage, provided by existing flood protection works.
- Waterfront and valley erosion control projects throughout TRCA's jurisdiction.

Conclusions:

This report responds to a request for a multi-year plan from TRCA on the protection of the city's rivers and recommends that TRCA report on a regular basis to Works Committee.

While the City of Toronto generously supports TRCA programs in partnership with upstream municipalities which directly deal with water management, this funding does not generally extend to programs including stormwater management facilities retrofit in areas urbanized prior to stormwater management requirements, reforestation, riparian plantings and rural land management. The increase of investment into these and related program offerings can be financially levered to provide a cost effective investment in source water protection. Upstream municipalities currently invest in these programs which provide downstream benefits to the City of Toronto. TRCA strives to match or better the financial investment for these programs through annual submissions to the Great Lakes Sustainability Fund, federal EcoAction Community Funding Program, the Oak Ridges Moraine Foundation and through the fundraising efforts of The Conservation Foundation of Greater Toronto.

The TRCA objectives, programs and policies are consistent with the WWFMMP, the city's Strategic Plan and Environmental Plan, and provide the necessary ecosystem watershed approach working with and in upstream municipalities to undertake a comprehensive plan of integrated watershed planning and management.

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Brian Denney
Chief Administrative Officer

List of Attachments:
Attachment 1 - TRCA Jurisdiction
Attachment 2 - 905 Stormwater Management Retrofit Opportunities
Attachment 3 - Reforestation Opportunities
Attachment 4 - Reforestation Opportunities (Detailed Example)