TORONTO CITY CLERK

Consolidated Clause in Works Committee Report 5, which was considered by City Council on July 25, 26 and 27, 2006.

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Update on the Implementation of the Water Efficiency Program - 2005 (City-wide)

City Council on July 25, 26 and 27, 2006, adopted this Clause without amendment.

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The Works Committee recommends that City Council adopt the staff recommendations in the Recommendations Section of the report (June 20, 2006) from the General Manager, Toronto Water, subject to deleting Recommendation (2) and replacing it with the following new Recommendation (2):

"(2) the General Manager, Toronto Water, in consultation with the General Manager, Parks, Forestry and Recreation, bring forward a report on how Parks, Forestry and Recreation can implement measures to reduce their use of water, including computer controlled irrigation systems, and on other initiatives that will advance the achievements of the targets within the Water Efficiency Plan."

Purpose:

To report on the progress made during 2005 to advance the initiatives outlined in the Water Efficiency Plan and to make recommendations for additional activities during 2006.

Financial Implications and Impact Statement:

There are no financial implications arising from this report. The funding required to undertake the 2006 work plan is available in the approved 2006 Toronto Water Capital Budget and funding to provide financial incentives to third parties for the implementation of water efficiency measures as contained in the City's Water Efficiency Plan, are available in the approved 2006 Toronto Water Capital Budget in account: WBS CP009-7 - Water Efficiency Program.

Recommendations:

It is recommended that:

(1) the Province of Ontario be requested to develop enabling legislation that restricts the sale and installation of any toilet in the Province to only ultra-low flush models (i.e., six litres or less);

(2) the General Manager of Toronto Water and the General Manager of Parks, Forestry and Recreation be requested to prepare a report during the 2007 Operating and Capital Budget review process outlining the financial implications of implementing a Water Conservation Program for Parks, Forestry and Recreation parks and facilities that incorporates capital and operating initiatives that will advance the achievement of the targets in the Water Efficiency Plan, such as installing water meters in all parks facilities to monitor water consumption and computer controlled irrigation systems; and

(3) the appropriate City officials be authorized and directed to take the necessary action to give effect thereto, and that leave be granted for the introduction of any necessary bills in Council to give effect thereto.

Background:

The City of Toronto Water Efficiency Plan (WEP) was approved by City Council at its meeting held on February 4, 5 and 6, 2003 (Clause 29 in Report 1 of the Policy and Finance Committee). The WEP is a plan to provide sufficient water and wastewater capacity to accommodate population growth projections to the year 2011 by using water more efficiently and thereby deferring the need for expensive capital infrastructure expansions. The total cost to implement the WEP to 2011 is projected to be $71.5 million, of which $49.1 million has been approved as part of the Toronto Water 2006-2010 Capital Budget. This is about one-third of the estimated $220 million required for the equivalent expansion of water and wastewater treatment plant infrastructure (i.e., $130 million for water supply and $90 million for wastewater treatment).

In adopting the above report, City Council requested an annual progress report with respect to the implementation of the approved programs and the water savings achieved. The annual report also provides an opportunity to discuss adjustments to the programs in order to take advantage of lessons learned and new opportunities.

Comments:

The Water Efficiency Unit of Toronto Water was formed in May 2004 and is responsible for designing, implementing and evaluating the programs within the WEP to ensure that water reduction targets are achieved and that these reductions are sustained over the long term.

2005 Achievements:

The Water Efficiency Unit was recognized in several ways for the program's accomplishments in 2005:

- In February 2005, the American Water Works Association (AWWA) awarded Toronto Water with the 2005 Public Communications Achievement Award for its water efficiency and stormwater pollution communication programs.

- In October 2005, Congress Canada recognized the City of Toronto's Water Efficiency Plan for outstanding achievement in program and service delivery at the Public Sector Quality Fair "The Power of Partnership". A silver award was presented to the City of Toronto for the Toilet Replacement Program. The award recognizes the City's commitment to water efficiency and excellence in the broader public service sector.

- The City's Water Efficiency Program was featured in the September 2005 issue of Business Edge Magazine for its unique and innovative Capacity/Water Buyback Program for the industrial, commercial and institutional (ICI) sectors.

- The City's Water Efficiency Program was recognized in The Globe and Mail for its Outdoor Water Saving Program.

- For the first time, a Water Efficiency category was presented at the Toronto Green Awards.

Water Efficiency Targets:

Peak Day Demand and Supply Capability:

The Peak Day Demand (PDD) is the highest daily water demand in the year and is the basis for which supply (capacity) is built since the infrastructure of the water supply system must be able to handle the highest daily water demand during the year (usually experienced during the summer months).

Average Day Demand and Wastewater Flows:

It is generally accepted that approximately 70 percent of the annual Average Day Demand (ADD) supplied to a community is returned to the wastewater system as sewage. The remaining 30 percent associated with irrigation evaporation (e.g., lawn sprinklers, cooling tower losses) and consumer product manufacturing (e.g., beverage production) is not returned to the wastewater collection system. However, since Toronto has a number of combined sewer and stormwater systems, the wastewater flows tend to be higher than 70 percent, generally closer to 90 percent. As the Downspout Disconnection Program progresses and diverts stormwater away from the sewer systems, wastewater flows are expected to decrease.

Peak Day Demand will always be the highest value in terms of water demand as Wastewater Flows are a percentage of ADD and therefore lower than ADD. Furthermore, it is accepted that a reduction in wastewater flows will be a consequence of a reduction in ADD. Therefore, in order to avoid infrastructure expansion of the water supply system, the City must reduce its peak day demands (PDD). For these reasons, the Water Efficiency Plan uses PDD as a measurement for success of the WEP, as the intent of the program is to delay costly infrastructure expansion. However, PDD is directly impacted by many factors, including hot weather conditions during the summer and whether or not a mandatory water restriction is in place. Also, since water conservation involves to a large degree behaviour and equipment change to achieve sustainable daily water use reductions, the WEP is looking at implementing initiatives that reduce not only peak day demands, but also average day demands and wastewater flows.

When fully implemented, the WEP is expected to achieve:

- a reduction in projected Peak Day Demands (PDD) of 266 million litres per day (ML/d) to provide capital infrastructure reductions in water treatment supply;

- a reduction in Average Day Demands (ADD) of 175 ML/d; and

- a reduction in projected Wastewater Flows of 123 ML/d to provide capital infrastructure reductions in wastewater collection and treatment.

Table 1 provides a summary of the PDD and ADD. The WEP uses the year 2001 as the base year. As seen in Table 1, even with 2005 having one of the hottest summers on record, the 2005 Peak Day Demand was 94 ML/d lower than the 2001 PDD. Furthermore, the 2005 Average Day Demand was 36 ML/d lower than the 2001 ADD.

Table 1: Water Demand Targets:

Year	Annual Average Peak Day Demand (PDD)	Annual Average Day Demand (ADD)	Annual Average Wastewater Flows		
	Projected with Conservation (ML/d)	Actual (ML/d)	Projected with Conservation (ML/d)	Actual (ML/d)	Actual (ML/d)
2001	2034	1850	1262	1258	1259
2002	2021	1751	1264	1257	1246
2003	2008	1682	1247	1237	1199
2004	1996	1492	1227	1190	1149
2005	1983	1756	1214	1222	1239
WEP Reduction Targets (ML/d)	266		175		123
Reductions from 2001 to 2005 (ML/d)		94		36	20

2005 Update – Highlights:

The WEP identifies four main sectors where water efficiency/conservation initiatives are to be implemented. The sectors are as follows:

- Municipal;
- Single-family residential;
- Multi-unit residential; and
- Industrial, commercial and institutional (ICI).

Initiatives/programs to be implemented include ultra-low flush toilet replacement, clothes washer replacement, outdoor water audits, system leak detection, computer controlled irrigation, public education and promotion, indoor water audits and watering restrictions.

Table 2 shows a summary status of the WEP programs. A total of $14.6 million has been expended since water efficiency programs began, resulting in total annual water savings of approximately 36.3 ML/d, which is based on monitored and measured savings of participants that have applied and received an incentive/rebate issued for the water efficiency incentive programs. Table 2 outlines the projected water savings as per the WEP, actual water savings based on incentives issued and number of incentives issued for the incentive based programs.

Table 2: Status of Water Efficiency Programs:

Sector	Measure	Total Projected Water Savings by 2011 in WEP ML/d	Actual Water Savings to Dec. 2005 (based on incentives issued) ML/d	No. of Incentives Issued to Dec. 2005 (For Incentive Based Programs Only)
Municipal	System Leak Detection	28	Program Implementation delayed - Pilot program due to be completed in 2007	
	Computer Controlled Irrigation	8.0	Dependent on Parks, Forestry and Recreation capital and operating budget allocations	
Single-Family	Toilet Replacement	26	2.1	24,912
	Clothes Washer Replacement	3.6	0.78	10,700
	Outdoor Water Audit	88	Pilot program currently underway	
Multi-Unit	Toilet Replacement – Public and Private	55.1	31.26	128,078
	Multi-Unit Residential/ICI Clothes Washer Replacement	8.5	0.28	1,142
	Outdoor Water Audit	12	Program implementation is expected for 2009	

Sector	Measure	Total Projected Water Savings by 2011 in WEP ML/d	Actual Water Savings to Dec. 2005 (based on incentives issued) ML/d	No. of Incentives Issued to Dec. 2005 (For Incentive Based Programs Only)
Industrial, Commercial, Institutional	ICI Toilet Replacement Flush Valve	20	0.48	2,311
	Clothes Washer Replacement	1.9	Program implementation is expected for 2009	
	Outdoor Water Audit	7.0	Program implementation is expected for 2009	
	Indoor Water Audit (ICI Capacity Buy Back)	8.3	1.36	9
	Total	266.4	36.26	167,152

Below are highlights of the program status for 2005. For more detailed information, the 2005 Water Efficiency Activity Report (Appendix – with City Clerk's office) contains a description of all of the WEP programs currently underway to implement each of the above measures, with the corresponding incentive levels, total number of incentives issued and water savings achieved. A description of related studies that were undertaken has also been included in the report and a copy is publicly available from the City Clerk's office.

Incentive Based Programs:

A large component of the current Water Efficiency Plan is based on using cash rebates to encourage customers to replace inefficient water using fixtures, processes or equipment with new technology. The rebate is not only a payback reduction tool, but can be an effective catalyst for the implementation of water efficient measures. Water efficiency initiatives are already underway including providing incentives for the replacement of high water use toilets and washing machines with more water efficient models. The incentive programs are available to single family homes, multi-unit residences and ICI sectors. In 2005, approximately 30,900 incentives were issued for the water efficient toilets and washing machines.

Single Family Toilet Replacement Program:

As water used for toilet flushing represents about 30 percent of the "indoor" water used by a typical single family household, the toilet replacement program is the measure with the greatest potential for water savings within the residential sector. Various options are being explored to make this program more visible and to increase participation by the single family sector in the residential toilet replacement rebate program.

The difficulty in using incentives for measuring water use changes is that not all purchasers of water efficient toilets and washing machines submit an application for rebates, thereby making it difficult to track all water savings achieved for single family residential programs. Based on discussions with manufacturers, retailers and rebate companies, it is estimated that approximately 50 percent of the City-selected toilets purchased, are not submitted for an incentive rebate from the City. It is not possible to use water-billing account information to verify actual water savings as an alternative in these cases since retailers are unable to release property information related to sales for privacy reasons. As a result, it is difficult to track actual participation rates. Staff estimate that participation by single-family homes in implementing water efficiency measures are significantly higher than reported. Therefore, in all likelihood the water savings achieved from the single family residential toilet and washer replacement programs is much higher than shown in the Table 2.

Multi-Unit Residential Toilet Replacement Program:

The most success has been realized in the Multi-Unit Residential Toilet Replacement Program. Projected savings based on actual monitoring of 70,207 toilet installations is 230 litres per toilet per day. This water savings result is 45 percent higher than the estimated savings projected in the WEP. To date, a total of about 37 percent of the toilets targeted for Multi-Unit Residential Toilet Replacement Program have been installed and almost 57 percent of the total 2011 water saving target for this sector has already been achieved as at the end of 2005.

Indoor Water Audit (Capacity Buy Back Program) – ICI Sector:

The Indoor Water Audit (Capacity Buy Back Program) for ICI customers has resulted in a 1.36 ML/d water savings as of December 31, 2005, with nine participants. The interest in this program is increasing and this program shows the greatest potential for water savings in the ICI sector. The 1.36 ML/d savings achieved, is equivalent to the savings associated with the replacement of approximately 15,000 toilets.

In comparison to infrastructure expansion, a key advantage of the Water Efficiency Plan is its flexibility during implementation. As long as the ratio of total WEP implementation cost to the cost of equivalent infrastructure expansion remains within the approved budget, the rationale for the implementation remains sound. For example, programs that have proven to be more effective than anticipated can be expanded, while programs that are found to be less effective can be modified or discontinued. If uptake rates are lower than expected, an increase in financial incentives can be explored. As new technologies and programs emerge, they can be accommodated into the existing WEP, provided that the annual budget for incentives will not be exceeded and the targeted water savings will not be reduced. In any case, it is critical to the success of the Plan to continuously monitor not only program expenditures and water savings, but also new technologies, customer satisfaction and market conditions. This input is used to adjust the Plan as required to achieve the greatest savings for the least cost.

Recommendations for WEP Activities in 2006:

Ultra-Low Flush Toilet Sales:

The Water Efficiency Plan includes an amount of $43 million (approximately 58 percent of the total cost of implementing the Plan) as financial incentive for the replacement of high water use toilets (typically 13 to 20 litres per flush) with ultra-low flush toilets (6 litres or less per flush). The average life expectancy of a residential toilet is about 25 years. The WEP provides for financial incentives equating to the "natural" replacement rate, estimated at 40 percent of the existing toilets in use within the single family residential sector by 2011.

Since 1996, the Ontario Building Code has required the installation of ultra-low flush toilets in all new construction. However, there are no restrictions on the sale of larger volume toilets for replacement purposes. Most retail hardware and home/building supply centres continue to sell 13 litre per flush toilets. Municipalities including the Cities of Toronto, Waterloo and Guelph, and the Regions of Peel and Durham have to offer financial incentives to steer consumer selection towards the more efficient ultra-low flush toilets, representing a large and unnecessary cost to the municipality. It is therefore recommended that the Province of Ontario be requested to take action to restrict the sale and installation of new toilets to ultra-low flush models (i.e., 6 litres or less per flush).

Computer Controlled Irrigation Programs:

Over-watering is a common practice associated with many in-ground automatic irrigation systems. Computer controlled irrigation is a technology available to optimize watering practices. The City currently owns and operates computer controlled irrigation systems in various locations. Where this technology has been applied in City parks, there have been water savings in excess of 40 percent. The Water Efficiency Plan proposed to link all facilities and parks owned and operated by the City that have irrigation systems to the existing computer controlled system that uses actual weather data to operate irrigation systems (rather than relying on manually set controllers and potentially improperly set schedules).

All existing and newly constructed automatic irrigation systems may qualify to receive funding towards the purchase of the computer linking equipment. Funding will cover the cost to convert to the computer-controlled system, not the irrigation system itself. All metered automatic and manual irrigation systems will be considered for funding.

It is estimated that there are approximately 250 municipal sites with automatic irrigation systems in the City of Toronto. A majority of the sites are managed by the Parks, Forestry and Recreation Division. The targets in the Water Efficiency Plan were formulated based on the assumption that 100 percent of all of the City's in-ground automatic irrigation systems will be linked to the computer controlled irrigation system. Based on the results of a study completed in 1994, it is estimated that a computer controlled irrigation system can reduce irrigation demands by an average of 40 percent.

Most City parks are not metered and do not pay for the water they use, therefore, there are no offsetting cost reductions available to the Parks, Forestry and Recreation Division to recover the installation costs of this technology. It has been identified that the capacity buy-back incentive

of the WEP would not be sufficient to cover the cost of converting to the computer-controlled system. The fact that many of the parks are not metered, acts as a disincentive to participate in the program. It would be desired by Toronto Water as a conservation measure to have Parks, Forestry and Recreation pay for the water they use. However, this would cause a significant operating budget pressure for the City since it is currently funded by the water rate. During the 2006 operating budget review a direction was considered during the review of the water budget that the Deputy City Manager and Chief Financial Officer and the Deputy City Manager for Toronto Water report to the Policy and Finance Committee prior to its deliberation of the 2007 Budget on a plan for phasing in the implementation of collection of water billing from the Parks, Forestry and Recreation Program. In light of a zero percent budget target for 2007, this would cause service reductions if Parks, Forestry and Recreation had to pay for water.

In order to implement a conservation program in the most cost-effective manner, staff from both Divisions would need to work together to achieve the most equitable distribution of costs to implement this technology and report on the financial implications to Council for direction. The target water savings to 2011 for the Computer Controlled Irrigation Program in City parks are 8 ML/d at a program cost of $1,867,000.00. It is noted that this cost estimate is for the capacity buy back portion only and does not represent the full cost of installation.

Since the City currently owns and operates a computer controlled irrigation system, the program can be implemented more readily. Monitoring and evaluation of this program would require the City to complete ‘pre’ and ‘post’ water demand monitoring using water-billing accounts to verify actual water savings. Only sites having active water meter accounts could be accepted into the program at the start.

Computer controlled irrigation systems will help reduce the Peak Day Demand (PDD) on the water supply and distribution system which occur during extended periods of hot dry weather in summer. Where irrigation systems are already installed, changes can be made to optimize watering according to weather and off-peak periods. It is recommended Toronto Water investigate with the Parks, Forestry and Recreation Division the cost of developing an overall strategy to achieve water efficiencies and report back to Council on implications.

Conclusions:

The Water Efficiency Plan is well underway with full-scale water efficient toilet and washing machine replacement programs in single family homes, multi-unit residences and the ICI sectors. The residential toilet replacement programs, clothes washer programs and capacity/water buyback program have shown that there is a consistent market for these types of incentives and that significant water savings can be achieved. The Multi-Unit Residential Toilet Replacement Program has shown the most success. Options are being explored to increase program participation in the Single Family Residential Toilet Replacement Program. Ongoing monitoring of the programs has shown that the water savings are real and sustainable. Significant effort is required to market the programs effectively and efforts will be expended to explore partnership opportunities to facilitate participation and promotion of the program in addition to targeting high volume water users and multi-unit residential sector. Toronto Water will continue to work co-operatively with the water efficiency industry, property owners and managers, as well as manufacturers, distributors, retailers and installers of water using fixtures and appliances, to

ensure that our programs are as effective as possible. A detailed summary of the 2005 Water Efficiency Activity Report is available and a copy is on file with the City Clerk.

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(A copy of the 2005 Water Efficiency Activity Report, referred to in the report, was forwarded to Members of the Works Committee and a copy is on file in the office of the City Clerk, City Hall.)