TORONTO CITY CLERK

Clause embodied in Report No. 1 of the Policy and Finance Committee, as adopted by the Council of the City of Toronto at its regular meeting held on February 4, 5 and 6, 2003.

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Water Efficiency Plan

(City Council at its regular meeting held on February 4, 5 and 6, 2003, adopted this Clause, without amendment.)

The Policy and Finance Committee recommends the adoption of the recommendation of the Works Committee embodied in the following communication (January 8, 2003) from the City Clerk:

Recommendations:

The Works Committee at that portion of its meeting on January 8, 2003:

(1) recommended the adoption of the report dated December 19, 2002, from the Commissioner of Works and Emergency Services respecting the approval of a Water Efficiency Plan; and

(2) further recommended that the Province of Ontario be requested to develop enabling legislation that restricts the sale and installation of new toilets to ultra low-flow models (i.e., six litres or less).

The Works Committee reports, for the information of the Policy and Finance Committee and Council, having requested the Commissioner of Works and Emergency Services to submit a report directly to Council on the advisability of including alterations to inefficient toilets as part of the Water Efficiency Plan.

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(Report dated December 19, 2002, addressed to the
Works Committee from the
Commissioner of Works and Emergency Services)

Purpose:

To seek approval for the City of Toronto Water Efficiency Plan.

Financial Implications and Impact Statement:

Implementation of the Water Efficiency Plan will require a capital expenditure of $68.6 million over the next nine years. Together with the $6.6 million budgeted on toilet replacement

programs in 2001 and 2002, the Water Efficiency Plan's total implementation cost of $74.8 million is expected to defer an equivalent $220 million in water and wastewater treatment infrastructure expansions, necessary to accommodate the projected increase in water demand due to population and employment growth over that same time period.

The proposed Water and Wastewater Services 2003-2007 Capital Budget submission incorporates a $44.4 million request for the implementation of the Plan from 2003 to 2007. The cash flow request included in the Water and Wastewater Services Capital Budget for 2003 is $6.5 million.

Additional staff required to implement the Water Efficiency Plan represents an increase in the proposed Water and Wastewater Services Operating Budget in 2003 and subsequent years of $0.5 million and $0.6 million, respectively.

Funding to support the implementation of the Water Efficiency Plan will be reviewed annually through subsequent Water and Wastewater Services Capital and Operating Budget submissions to ensure that target water consumption reductions identified in the Plan are achieved in accordance with the schedule proposed.

The Chief Financial Officer and Treasurer has reviewed and concurs with the financial impact statement.

Recommendations:

It is recommended that:

(1) the Water Efficiency Plan be approved and the Commissioner of Works and Emergency Services report back to Works Committee on an annual basis on the progress made in implementing the Plan and achieving the target water consumption reductions;

(2) the funding necessary to implement the Water Efficiency Plan to 2007, contained within the Water and Wastewater Services 2003-2007 Capital Program, be approved subject to final approval of the Water and Wastewater Services 2003-2007 Capital and 2003 Operating Budgets;

(3) the Chief Financial Officer and Treasurer in consultation with the Commissioner of Works and Emergency Services report back on a water rate structure and funding model to support the implementation of the Water Efficiency Plan and the Water and Wastewater Services long range Capital Program needs;

(4) the Water and Wastewater Services 2003 Operating Budget be increased by $0.5 million to support the additional staff resources required to implement and monitor the effectiveness of the Water Efficiency Plan, subject to final approval of the Water and Wastewater Services 2003-2007 Capital and 2003 Operating Budgets; and

(5) the appropriate City officials be granted the authority to give effect thereto.

Background:

In 1996, the former Metropolitan Toronto Council commissioned the development of a new Water Efficiency Plan. The objective of the plan was to reduce water use by at least 15 percent by the year 2011, the date when major capital works would have to be undertaken to meet those demand projections.

The Water Efficiency Plan supports the goals of "environmental sustainability" and "city building" outlined in the City's Strategic Plan. The need for the development and implementation of a Water Efficiency Plan is recognized in Recommendation No. (15) of the City's Environmental Plan, adopted by Toronto Council in 2000.

In approving the Mediation Agreement to the Ashbridges Bay Treatment Plant (formerly Main Treatment Plant) Environmental Assessment, the City was obligated to investigate more aggressive water reduction targets in the development of the Water Efficiency Plan, provide broad public consultation through public and industry review of the Plan, and establish a Water Efficiency Plan Review Committee to review the Plan, review public comments, and report to the Commissioner of Works and Emergency Services regarding revisions that should be made to the draft Plan.

Comments:

The annual average day water demand for the City of Toronto's 2.6 million residents, area businesses and industries is about 1,250 million litres per day (ML/d). Under agreement, the City has an obligation to supply York Region with an additional annual average day demand of 259 ML/d equivalent to 525,000 residents.

In accordance with the City's recently approved Official Plan, the City's population and employment levels are expected to increase by 10 percent and 12 percent, respectively by the year 2011. Correspondingly, the City's water treatment/supply and wastewater collection/treatment infrastructure will have to be expanded to support the future water demand projections, at a cost estimated to be $220 million ($130 million for water supply and $90 million for wastewater treatment). Wastewater treatment infrastructure expansion is required to service wastewater flows generated (e.g., wastewater from toilets) and water treatment plant infrastructure expansion is required to supply peak day water demand during the summer months (e.g., lawn watering). However, more efficient use of water provides a way of creating capacity within the existing system for future needs, while providing environmental benefits such as: decreased energy use for pumping and a corresponding decrease in CO_2 emissions, decreased usage of water and wastewater treatment chemicals and a decrease in wastewater treatment plant effluent discharges. Accordingly, a Water Efficiency Plan (WEP) was developed as a way of deferring capital works expansions in the City's water and wastewater treatment (related to liquid stream collection/treatment) infrastructure, while providing sufficient capacity to accommodate future growth projections to the year 2011.

The new Official Plan encourages new development and redevelopment with density increases along arterial roads. Increases in local water and sewer pipe capacity will be required to

accommodate the future growth in some areas of the City. These local upgrades are difficult to predefine, without knowing the degree of intensification and exactly where the development will occur. Implementing across the City water reductions allows for new growth, in some areas of the City, with minimal local network upgrades.

In developing the Water Efficiency Plan, a number of water conservation/efficiency measures which could reduce wastewater flows and maximum day demands (associated with summer outdoor water use) were identified. These measures were screened for consideration in the Plan on the basis of cost-effectiveness, implementation considerations and public acceptance based on local and international experiences.

These measures were further screened for applicability by "water use" sector: municipal, single-family residential, multi-unit residential and industrial/commercial/institutional.

The following summarizes the measures proposed for implementation in the Water Efficiency Plan by water use sector:

Municipal	Single-Family Residential
System Leak Detection	Toilet Replacement
Computer Controlled Irrigation	Clothes Washer Replacement
Watering Restrictions	Outdoor Water Audits
Multi-Unit Residential	**Industrial, Commercial and Institutional**
Toilet Replacement (public housing)	Toilet Replacement
Toilet Replacement (private housing)	Clothes Washer Replacement
Clothes Washer Replacement	Outdoor Water Audits
Outdoor Water Audits	Indoor Water Audits

The measures were further assessed on the basis of maximum potential and practically achievable uptake by sector. While "natural" replacement of old fixtures with water efficient fixtures is occurring across sectors, the target reductions in water usage are not possible with these rates of replacement. In addition, while the Ontario Building Code mandates the usage of ultra-low flush toilets for new house construction, high water consumption toilets are still being sold and are legal for installation for retrofit and home renovation purposes. As a result, financial incentives are proposed to help offset the cost of implementing water conservation measures and thereby encouraging higher implementation rates. Measure specific financial incentives were derived based on a "capacity buy-back principle", wherein the estimated reduction in water use is used to derive a financial incentive of a value less than the cost of building an equivalent level of expansion in water supply and wastewater treatment. The financial incentives offered represent about 34 percent of the equivalent cost of infrastructure expansion.

An implementation schedule for the Plan which identifies target water consumption reductions and implementation costs by Program and by Sector to the year 2011 is presented in

Attachment A. A copy of the Water Efficiency Plan has been provided separately to Committee members and the Clerk's office.

The following provides a brief description of each program contained within the Water Efficiency Plan:

Toilet Replacement Program:

The Toilet Replacement Program is directed at replacing inefficient 16 litre (City-wide average of toilets between 13 and 25 litres) high volume toilets with ultra-low flush (6 litre or less) toilets. It is estimated that water used, on average for toilet use, represents about 256 litres per day or 28 percent of the total volume of water used in a single family residence and on average about 272 litres per day or 60 percent of the total volume of water used in a typical multi-unit residence. A pilot multi-unit residential toilet replacement program initiated by the City in 1999 resulted in actual water use reductions of about 260 litres per suite per day. The Water Efficiency Plan estimates that on average the water savings associated with toilet replacement in the multi-unit sector should amount to 178 litres per suite day. The program will target the replacement of 732,000 high volume toilets in the single-family, multi-unit and industrial, commercial and institutional sectors, representing an estimated reduction of approximately 100 million litres per day of water.

Clothes Washer Replacement Program:

The Clothes Washer Replacement Program is directed at replacing old top-loading ("vertical-axis") clothes washers with new water efficient front-loading ("horizontal-axis") washers. A pilot program initiated by City within City operated social housing multi-unit residential buildings in 1999, reduced water use by 45 percent and energy usage by 65 percent. It is estimated that 14 ML/d of water will be reduced with the installation of 92,000 front-load washing machines.

Outdoor Water Audits and Computer Irrigation Program:

Outdoor water audits are aimed at reducing summer outdoor water use by changing practices and habits associated with the watering of residential lawns, sporting fields, and parks. For example, computerized and properly designed irrigation systems can be used to optimize water needs of landscape features and to halt watering during or after rainfall and if rain is forecast. In addition, a focussed public education campaign is required to alter the lawn watering habits for the single family residential sector. Combined, these programs are targeting a reduction in peak day demands of 115 ML/d.

Indoor Water Audit Program:

This program will look at reducing water consumption in the industrial, commercial, and institutional sectors through the implementation of water conservation measures and water use process changes. An estimated reduction of about 8 ML/d is expected to be achieved through the implementation of an Indoor Water Audit Program.

System Leak Detection Program:

Consistent with the Water and Wastewater Services, District Service Improvements program objective of improving the overall performance and efficiency in the operation and maintenance of the City's buried pipe infrastructure, a proactive City-wide watermain leak detection program is proposed. The program is directed at identifying high water loss areas for infrastructure renewal and detecting longer term and ongoing water losses within the system. In some cases, leaks may be detected before they surface and cause damage to public and private infrastructure, and thereby directing watermain repair works and decreasing disruption of service. It is estimated that 28 ML/d can be saved by implementing a City-wide Leak Detection Program.

Public Education:

In addition to the above programs, a significant investment of about $3.7 million has been allocated for public education and community outreach initiatives, aimed at informing the public about the various programs and the need to reduce water use.

Monitoring:

Careful consideration has been given to the development of and resourcing for monitoring and tracking the effectiveness of each program so that the overall effectiveness of the Plan can be assessed as it is being implemented.

Benefits:

In comparison to infrastructure expansion, a key advantage of this Plan is its flexibility during implementation. For example, programs that prove to be more effective than anticipated can be expanded, while programs that are found to be less effective can be modified, if appropriate, or discontinued. Furthermore, if uptake rates are lower than expected, an increase in financial incentives can be explored (as long as they remain less costly than the equivalent infrastructure expansion). The Plan also allows for the implementation of new technologies as they become available and their effectiveness is proven.

Once implemented, the WEP is expected to achieve a reduction in peak day demands of 266 ML/d and a reduction in wastewater flows of 123 ML/d by 2011. It is estimated that an additional water demand reduction of 62 ML/d will be achieved during the WEP implementation period through the natural replacement (independent of the WEP programs) of water efficient fixtures across the City.

The total cost to implement the WEP over the planning period is estimated to be $74.3 million. This represents good value to the City, at about one-third of the $220 million ($130 million for water supply and $90 million for wastewater treatment) required for the equivalent expansion of water supply and wastewater treatment infrastructure.

Additional benefits offered by the WEP include:

(i) offsetting energy and chemical cost increases by an estimated $29 million up to 2011 and an additional $4.5 million per year in chemical and operating costs after 2011;
(ii) reductions in CO_2 emissions by 90,000 tonnes, as a result of decreased energy requirements, during the planning period and about 14,000 tonnes per year thereafter;
(iii) reductions in contaminant loadings to Lake Ontario from the City's wastewater treatment plant effluent discharges; and
(iv) improved customer service by providing opportunities to lower water billing costs.

Public Review Process:

In late September 2002, the draft Water Efficiency Plan was released to the public for review. Subsequently, City staff held five Open House events across the City to present the Plan to the general public and solicit their feedback. A copy of the draft Plan was also made available on the City's website.

In general, feedback received from those attending the Open House events was supportive of the water efficiency programs contained within the Plan and they advocated for more initiatives in public education and promotion.

In addition, a peer review panel consisting of staff from local, national and US municipalities, government agencies and universities was asked to review the Plan and provide comments. This feedback was also positive and their comments were incorporated where appropriate in the final Plan.

In accordance with the Ashbridges Bay Treatment Plant Mediator's Report, a Water Efficiency Plan Review Committee was established. The Committee was chaired by Councillor Irene Jones and included representatives from: the Ashbridges Bay Treatment Plant Implementation and Compliance Monitoring Committee; Toronto Environmental Alliance (TEA); Toronto Board of Trade; Toronto District School Board and District Catholic School Board; Toronto Housing Company; Local 416; Local 79; and local residents. The Committee's recommendations are summarized in Attachment B and, with the exception of one, have either been included within the Plan or are addressed as recommendations within this report. The remaining recommendation, Recommendation No. (1), will have to be considered when the City's Development Charges By-Law is updated, expected in 2004.

Financial Analysis and Water Rate Implications:

Staff from the City's Finance Department have undertaken an analysis of the funding implications and water rate impacts of implementing the WEP. The Water and Wastewater Services Division operates on a user-pay principle basis. That is, the program's annual capital and operating funding requirements are met entirely through the revenues derived through the water rates, capital-from-current contributions and reserve financing, without reliance on the property tax base or from external debenture financing. Rate increases, if any, are determined annually and set with the objective of ensuring that the programs remain self-funding with a high degree of financial stability for both operating and capital needs over the long term.

The Water and Wastewater Services Division has, in recent years, documented the need for major increases in capital spending in order to properly address infrastructure renewal needs. These costs and the costs of implementing the Water Efficiency Plan have been included in the Water and Wastewater Services 2003-2007 Capital Program submission, which together with the Division's 2003 Operating Budget submission, justified the need to increase revenues through increases in water and sewer rates. As a result, Council at its meeting of November 26, 27 and 28, 2002, approved a nine percent increase in the water and sewer rates effective January 1, 2003, with similar increases projected over the next five years.
The Water and Wastewater Services Division has projected a need for sustained base capital expenditures of approximately $550 million annually to maintain a state of good repair on existing infrastructure. As a consequence, water rates are expected to double over the next five years, to meet these infrastructure renewal needs, regardless of water efficiency. The impact of funding the implementation of the Water Efficiency Plan is small relative to the overall base program capital expenditure requirements, representing about 3.1 percent and 1.4 percent of the annual Water and Wastewater Services Capital budget request in 2003 and 2007, respectively. The WEP implementation costs have been incorporated in the Water and Wastewater 2003-2007 Capital Program submission.

The implementation of the WEP is projected to reduce the Water and Wastewater Services Capital Budget requirements by $146 million over ten years ($220 million for plant expansion less $74 million for WEP implementation) and offset operating budget expenses by about $29 million over ten years ($4.5 million annually by 2011) associated with a decrease in the usage of treatment plant chemicals and lower heating and energy requirements.

Although there is a net reduction in operating and capital expenditure requirements through the implementation of WEP, projected water demand is also reduced, necessitating a slight increase in water rates to compensate for the loss in revenue. This is projected to translate to an increase in water rates of about two percent in comparison to the infrastructure expansion option. This increase in water rates is more than offset by the water consumption reductions targeted in the WEP. To illustrate this, Table 1 presents a comparison of projected water consumption and annual costs for an average single family residence. In this example, the slight increase in water rates of two percent, in comparison to the infrastructure expansion option, is more than compensated by the estimated 15 percent reduction in water consumption, translating to an estimated saving of $76 (or 13 percent) per year.

Table 1

Single Family Residence: Projected Water Consumption and Water Billing

Scenario	Annual Water Consumption (Cubic Metres/Year)	Water Rate ($/Cubic Metre)	2003 Annual Cost	2007 Annual Cost
2003 - Status Quo	300	1.09	$327	
2007 - without WEP	300	1.97		$591

Scenario	Annual Water Consumption (Cubic Metres/Year)	Water Rate ($/Cubic Metre)	2003 Annual Cost	2007 Annual Cost
		(projected based on Capital Budget needs)		
2007 - with WEP	255 (15 percent reduction targeted in WEP)	2.02 (projected based on Capital Budget needs and reduced water consumption)		$515
Net Savings				$76.00 (13%)

While the increase in water rates projected through the implementation of the WEP is not significant on its own, coupled with the projected increases in water rates to support the Water and Wastewater Services infrastructure renewal needs, the overall increase may have a significant financial impact on the City's high volume commercial and industrial users, even with the implementation of water conservation measures appropriate to their operation. In light of the above, a review of the water rate pricing structure and funding model to support the implementation of the Water Efficiency Plan and the Water and Wastewater Services long range Capital Program needs is recommended. In 2003 the water rates from the former area municipalities will have been harmonized to a single rate as a result of the four-year phase-in period. Staff will review the water rate pricing structure during 2003 in time for any approved changes to be implemented in 2004.

Conclusions:

This new City of Toronto Water Efficiency Plan presented in this report was developed as a way of deferring expensive capital works expansions in water and wastewater treatment infrastructure, while providing sufficient capacity to accommodate future growth projections to the year 2011. Once implemented, the Water Efficiency Plan is expected to achieve a reduction in peak day demands of about 266 ML/d (12 percent) and a reduction in wastewater flows of about 123 ML/d (13 percent) by 2011. It is estimated that an additional water demand reduction of 62 ML/d will be achieved during the WEP implementation period through the natural replacement (independent of the WEP programs) of more water efficient fixtures across the City. The Plan identifies sector specific measures, that make more efficient use of water, thereby creating capacity within the existing Water and Wastewater Services infrastructure to service future growth needs.

Measure specific financial incentives are proposed as a means of encouraging the implementation of water efficiency measures. The estimated reduction in water use is used to derive a financial incentive of a value less than the cost of providing the equivalent expansion in water supply and wastewater treatment infrastructure. An implementation schedule has been

developed for the Plan and included in this report. The implementation schedule identifies target water consumption reductions and implementation costs by Program and by Sector to the year 2011.

In comparison to infrastructure expansion, a key advantage of this Plan is its flexibility during implementation. For example, programs that prove to be more effective than anticipated can be expanded, while programs that are found to be less effective can be modified, if appropriate, or discontinued. Furthermore, if uptake rates are lower than expected, an increase in financial incentives can be explored (as long as they remain less costly than the equivalent infrastructure expansion). The Plan also allows for the implementation of new technologies, as they become available and their effectiveness is proven.

Additional benefits offered by the Water Efficiency Plan include:

(i) offsetting energy and chemical cost increases by an estimated $29 million up to 2011 and an additional $4.5 million per year in chemical and operating costs after 2011;
(ii) reductions in CO_2 emissions by 90,000 tonnes, as a result of decreased energy requirements, during the planning period and about 14,000 tonnes per year thereafter;
(iii) reductions in contaminant loadings to Lake Ontario from the City's wastewater treatment plant effluent discharges; and
(iv) improved customer service by providing opportunities to lower water billing costs.

The Plan has incorporated comments received from: the public attending a series of 5 Open House events across the City; a peer review panel consisting of staff from local and international municipalities, staff from government agencies and academics; and a Water Efficiency Plan Review Committee, chaired by Councillor Irene Jones.

The total cost to implement the Water Efficiency Plan through to 2011 is estimated to be $74.8 million. This represents good value to the City, at about one-third of the estimated $220 million ($130 million of water supply and $90 million for wastewater treatment) required for the equivalent expansion of water supply and wastewater treatment infrastructure.

The Plan implementation costs have been included in the Water and Wastewater Services 2003-2007 Capital Budget. An increase to the Water and Wastewater Services 2003 Operating Budget of $0.5 million will be required to support the implementation of the Plan.

While the Plan is projected to reduce the Water and Wastewater Services Capital and Operating Budget requirements by about $146 million and $29 million, respectively, over ten years, the Plan also reduces water consumption, necessitating a slight increase in water rates to compensate for the loss in revenue. However, for an average single family household, the projected increase in water rates of two percent, in comparison to the infrastructure expansion option, is more than compensated by the estimated 15 percent reduction in water consumption, translating to a net saving to the household of about 13 percent of their annual water billing.

While the increase in water rates projected through the implementation of the WEP is not significant on its own, coupled with the projected increases in water rates to support the Water and Wastewater Services infrastructure renewal needs, the overall increase may have a

significant financial impact on the City's high volume commercial and industrial users, even with the implementation of water conservation measures appropriate to their operation. In light of the above, a review of the water rate pricing structure and funding models to support the implementation of the Water Efficiency Plan and the Water and Wastewater Services long range Capital Program needs is recommended.

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Insert Table/Map No. 1
attachment A - city of toronto water efficiency plan

Attachment B

Water Efficiency Plan Review Committee Recommendations

The Water Efficiency Plan Review Committee was established as an advisory body to the Works and Emergency Services Department. Consistent with the recommendation contained within the Ashbridges Bay Treatment Plant Mediation Agreement, the committee has submitted the following recommendations to the Commissioner of Works and Emergency Services for consideration in finalizing the Water Efficiency Plan:

Recommendation 1:

All new developments be required to retrofit older buildings with water efficient measures to create the water and sewer capacity equal to the demand of the new development. No new net demand will therefore be created.

Recommendation 2:

The Water Efficiency Plan be presented to the general public in a succinct, reader-friendly (less technical) manner. This plan should emphasize the possible dollar savings for users as well as the benefits to the environment.

Recommendation 3:

The Commissioner of Works and Emergency Services issue an annual report card to the public on the status of the Water Efficiency Plan. The report card should include a record of the water savings achieved and program costs.

Recommendation 4:

A ten-year implementation budget for the Water Efficiency Plan be approved prior to its implementation.

(City Council, at its regular meeting on February 4, 5 and 6, 2003, had before it, during consideration of the foregoing Clause, the following report (January 28, 2003) from the Commissioner of Works and Emergency Services:

Purpose:

To report on the advisability of including alterations to inefficient toilets as part of the Water Efficiency Plan.

Financial Implications and Impact Statement:

There are no financial implications associated with this report.

Recommendations:

It is recommended that this report be received for information.

Background:

The Works Committee, at its meeting of January 8, 2003, had before it a December 19, 2002 report from the Commissioner of Works and Emergency Services titled "Water Efficiency Plan" and requested the Commissioner of Works and Emergency Services to submit a report directly to Council on the advisability of including alterations to inefficient toilets as part of the Water Efficiency Plan.

Comments and Discussion:

The replacement of high water consumption toilets (13 to 25 litres per flush) with ultra-low flush toilets (6 litres or less per flush) has been identified as one of the most effective water conservation measures within the Water Efficiency Plan.

Alterations or retrofits to high water consumption toilets to reduce flush volumes are also possible and have evolved from basic measures such as bending the float arm down to decrease the tank water level and/or placing bricks or water filled bottles in the toilet tank to displace water, to more recent advances such as "toilet dams", "toilet tummies" and "early closing flappers".

When objects are inserted to displace water within the toilet tank, the size of the object is limited by the available space within the tank, while still allowing for the unimpeded operation of the flush mechanism. Consequently, these alterations provide only relatively small reductions in flush volume (typically between 1 to 2 litres per flush). Furthermore, these types of alterations may also reduce the performance of some toilets (eg. 13 litre per flush toilets), increasing the frequency of "double flushing" and thereby eliminating the anticipated reductions in water consumption. For example, a recent study by the City of Waterloo concluded that water savings were not realized through their toilet tank retrofit program and have therefore redirected their efforts to a toilet replacement program instead. In addition, a reduction in flush volume may also reduce the toilet bowl water depth to unsafe levels, creating a potential for the escape of sewer gases into the home.

More aggressive retrofits can be performed by completely replacing the toilet flush mechanism (involves replacing the fill valve and flapper and properly balancing the fill time of the tank and bowl). However, these retrofits were explored by the Toronto Community Housing Corporation a few years ago, and achieved water consumption reductions of only 3 to 4 litres per flush, at a cost of about $50 per toilet. This relatively expensive retrofit, with marginal reduction in water consumption, was replaced in support of a more aggressive toilet replacement program.

Toilet retrofits were included in the initial list of 70 measures reviewed for inclusion in the Water Efficiency Plan, but were excluded for the reasons stated above. Instead, the replacement of high water consumption toilets with ultra-low flush toilets, to achieve the maximum water consumption reductions possible is a priority within the Plan.

The Plan aims at replacing about 40% (represents an estimated 294,000 toilets) of the high water consumption toilets within the single family sector. Recognizing that not all inefficient toilets will be replaced through the duration of the Plan implementation period, and realizing that some toilets with leaky flappers can consume up to a 100 litres per day, a proactive toilet leak detection program is proposed. This will form a component of the Plan's Public Education Program, wherein toilet leak detection dye strips and information material highlighting the water consumption reduction benefits of toilet replacement (or flapper replacement as a minimum), will be distributed across the City.

Conclusions:

The Water Efficiency Plan's Toilet Replacement Program is directed at replacing inefficient high water consumption toilets with ultra-low flush (6 litre or less) toilets. The financial incentive offered through this program is intended to direct the purchase selection to higher performance 6 litre or less per flush toilets, rather than the widely available 13 litre or poorer performing 6 litre per flush toilets on the market. Toilet retrofits involving the insertion of objects within the toilet tank to displace water, create a false sense of accomplishment because they only provide nominal reductions in flush volumes which may not be realized and can lead to poor toilet performance. More aggressive retrofits are not recommended because they are costly and provide relatively low reductions in flush volumes.

Toilet retrofits are therefore not proposed in the Water Efficiency Plan. Rather, the replacement of high water consumption toilets with ultra-low flush toilets, to achieve the maximum water consumption reductions possible is a priority.

Recognizing that not all inefficient toilets will be replaced through the duration of the Plan implementation period, and realizing that some toilets with leaky flappers can consume up to a 100 litres per day, a proactive toilet leak detection program is proposed. This will form a component of the Plan's Public Education Program, wherein toilet leak detection dye strips and information material highlighting the water consumption reductions of toilet replacement (or flapper replacement as a minimum), will be distributed across the City.

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