

WATER & WASTEWATER USER RATE AND RESERVE FUND ADEQUACY REVIEW

The Regional Municipality Of York

HEMSON Consulting Ltd.

in conjunction with



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EXECUTIVE SUMMARY

To follow pending Regional staff review.

I PURPOSE OF STUDY IS TO TEST THE ADEQUACY OF CURRENT RESERVE FUND PROVISIONS AND RATE REQUIREMENTS TO ACHIEVE FULL- COST RECOVERY

The need for sound and systematic long range financial planning is very important to Ontario municipalities as they deal with the financial pressures of growth in combination with the need to keep up with the requirement to maintain their infrastructure in a “state-of -good-repair.”

The Regional Municipality of York is a rapidly growing region within the Greater Toronto Area (GTA). The Region has grown from a population of 204,000 in 1976 to almost 910,000 in 2005. Not surprisingly, the infrastructure to support the Region’s growth, particularly that for the water and wastewater systems, has been expanded significantly over the period and has been the focus of a great deal of long range financial planning. Trunk sanitary sewers and watermains have been extended to open new greenfield areas for development; sewage treatment plants, water treatment plants, wells and pumping stations have been added or expanded; and servicing and financial arrangements have been made with neighboring municipalities for the provision of water and the treatment of wastewater. The capital investment for this infrastructure has been financed largely through the Region’s longstanding use of lot levies and development charges (capital imposts paid by developers under the authority of the *Planning Act* and the *Development Charges Act* respectively). This has helped to ensure that the capital cost of growth has not adversely affected the Region’s ratepayers.

In addition to emplacing infrastructure to keep pace with growth, the Region has also recognized that its water and wastewater infrastructure is aging. The Region has been addressing this by making annual contributions for the rehabilitation and eventual replacement of its infrastructure. Presently, a charge of 4¢ per cubic meter is being assessed as part of the wholesale rate charged to area municipalities for the water capital rehabilitation and replacement program and 3¢ per cubic meter for the wastewater program. The 4¢ per cubic meter charge for water capital replacement forms about 8.4% of the Region’s total water rate of 47.87¢ per cubic meter, while the 3¢ per cubic meter charge for wastewater capital replacement represents about 6.8% of the 43.89¢ per cubic meter rate for wastewater (2005 rates).

The Region has been using the water and wastewater rehabilitation and replacement reserve funds not only for specific rehabilitation and replacement programs, but also as a source of funds to smooth annual rate increases, generally in the face of uneven capital expenditure requirements, e.g. for funding the “non-growth” share of the growth-related capital program or the effect of the development charge discount policy for some non-residential development. The “non-growth” share for the water program is about 11%, while the wastewater program’s non-growth share is about 32%, reflecting the significant benefit to existing and future development for the Duffin Creek WPCP expansion. The policy discount on development charges requires rate support in the range of \$25 million annually for water and wastewater combined. The balances in the water and wastewater rehabilitation and replacement reserve funds stood at \$44.3 million and \$36.5 million respectively at the beginning of 2005.

The purpose of this study was to develop a long term financial planning model covering a 25 year period from 2005 - 2031 to assist the Region in evaluating the adequacy of its provisions for financing the eventual rehabilitation and replacement of its extensive water and wastewater infrastructure. In addition, the Region wanted to evaluate the impact of financing the “non-growth” portion of water and wastewater projects that are included in its development charges, the rate requirements associated with the development charge discount policy and to provide for the eventual replacement of growth-related assets as they are added in the future. Finally, a new user rate model was developed that combines these capital requirements with forecasts of normal operating and maintenance costs to determine the rates that will be required to recover the full costs of the Region’s water and wastewater systems into the future.

In undertaking this study Hemson and MacViro

- established a detailed inventory database for the existing water and wastewater systems that links with the Region’s geographic information system (GIS) and the financial models;
- developed a reserve fund financial model which evaluates the annual funding needed to meet the long term capital requirements for major rehabilitation and replacement of the Region’s existing water and wastewater infrastructure and for eventual replacement of future additions to the systems;
- analyzed the Region’s recently updated development charges study to identify the “non growth” and policy discount requirements that will require funding from water and wastewater rates; and
- developed a rate setting model for water and wastewater.

Preliminary analysis of the Region’s water and wastewater rates has been prepared to test the models and to assess the water and wastewater rates required to provide for “full-cost” recovery of its present and future capital and operating expenditures. The database and financial models are available for future continuing use by the Region.

The following sections of this report provide a summary of the study’s approach and findings.

Section II of the report summarizes the inventory of water and wastewater assets and the major features of the database. The reserve fund financial model is also described together with results of the calculations for rehabilitation and replacement of the Region’s existing infrastructure.

Section III describes the forecast of other rate supported capital requirements, primarily related to new growth.

In Section IV, the results of the preliminary “full-cost” recovery rate analysis are reviewed. Rate recommendations to achieve full-cost recovery are provided.

II REGION'S INFRASTRUCTURE IS SIGNIFICANT: DATA CAPTURED IN A COMPREHENSIVE DATABASE

A. THE 2005 REPLACEMENT VALUE OF THE REGION'S WATER AND WASTEWATER INFRASTRUCTURE IS ESTIMATED AT OVER \$2.1 BILLION

A detailed inventory of the Region's present water and wastewater infrastructure has been prepared to provide an empirical database from which future major rehabilitation and capital replacement requirements can be determined. Only water and wastewater assets owned by the Region are included. Those facilities and infrastructure owned by other jurisdictions from which the Region purchases services are not included as it is assumed that those jurisdictions will have responsibility for eventual rehabilitation and replacement of those capital assets.

The following is a brief summary of the major water and wastewater infrastructure owned by the Region (average ages are shown in brackets).

- 373 km of trunk watermains (16 years)
- 32 well houses (26 years)
- 36 water storage facilities (22 years)
- 16 water pumping stations (18 years)
- 2 water treatment plants (13 years)
- 167 km of gravity trunk sanitary sewers (21 years)
- 42 km of sewage forcemains (18 years)
- 14 sewage pumping stations (22 years)
- 7 sewage treatment plants (17 years) ¹

This is a relatively young system. The water assets have an average age of 18 years, and about half of the water assets (by value) are less than 15 years old. The wastewater system has an average age of 20 years and about two-thirds of the system (by value) is less than 20 years old. In total, the water and wastewater infrastructure is estimated to have a 2005 replacement value of over \$2.1 billion. Of this, \$750 million relates to the water system. The remaining nearly \$1.4 billion is the estimated replacement value of the wastewater system. The wastewater inventory value is significantly higher than that estimated in 1998 since, at that time, the value of the Duffin Creek WPCP was not included. Tables 1 and 2 provide a breakdown of the 2005 replacement value of water and wastewater inventory by asset type and by age respectively.

¹ Includes Duffin Creek WPCP which is jointly owned with the Regional Municipality of Durham.

Table 1

**REGIONS OWNS \$750 MILLION OF WATER RELATED INVENTORY AND
NEARLY \$1.4 BILLION OF WASTEWATER RELATED INVENTORY**

Water Related Assets	2005 Replacement Value
Watermains	\$416,307,000
Water Pumping Stations	\$127,510,000
Water Treatment Plants	\$44,430,000
Well Houses	\$48,420,000
Water Storage Tanks	\$108,395,000
Water Meter Chambers	\$4,490,000
Total Water Related Assets	\$749,552,000

Wastewater Related Assets	2005 Replacement Value
Gravity Trunk Sewers	\$547,713,000
Sanitary Forcemains	\$90,379,000
Sewage Pumping Stations	\$104,820,000
Sewage Treatment Plants ²	\$629,470,000
Sewage Meter Chambers	\$2,010,000
Total Wastewater Related Assets	\$1,374,392,000

² Duffin Creek WPCP value based on 80% ownership by the Regional Municipality of York.

Table 2

**AVERAGE AGE OF WATER INFRASTRUCTURE IS 18 YEARS AND
OF WASTEWATER INFRASTRUCTURE IS 20 YEARS**

Water Related Asset Ages	2005 Replacement Value
0 to 5 years	\$246,801,000
6 to 10 years	\$58,929,000
11 to 15 years	\$75,317,000
16 to 20 years	\$36,291,000
21 to 24 years	\$112,353,000
25 years and older	\$219,861,000
Total Water Related Assets	\$749,552,000

Wastewater Related Assets	2005 Replacement Value
0 to 5 years	\$273,637,000
6 to 10 years	\$295,938,000
11 to 15 years	\$10,557,000
16 to 20 years	\$362,579,000
21 to 24 years	\$251,490,000
25 years and older	\$180,191,000
Total Wastewater Related Assets	\$1,374,392,000

B. THE INFRASTRUCTURE DATABASE IS COMPREHENSIVE

The information contained in the database was gathered from existing as-built drawings, reports and from operations staff at the Region. The database is comprehensive, containing both general and physical information about York Region's entire existing water and wastewater infrastructure. The information is used not only to describe, but also to define the quantity and age of the existing facilities.

The inventory was grouped into eleven main asset categories, six of which relate to water and the remaining five to wastewater (see Table 1). Additional information was collected on individual assets within each category. The reason for structuring the database in this manner is twofold. It permits the calculation of detailed and accurate rehabilitation and replacement schedules and it allows for the data to be updated easily in the future.

C. THE DATABASE CONTAINS A REHABILITATION SCHEDULE FOR BOTH WATER AND WASTEWATER

Rehabilitation is intended to extend the life of the facility or equipment to its predicted service life or replacement date. Rehabilitation includes work such as cleaning and relining watermain, repainting steel tanks, replacing parts or larger components and generally reconditioning the facility or equipment.

Rehabilitation schedules have been prepared for the Region's major facilities and infrastructure in conjunction with Regional staff.

D. A REPLACEMENT SCHEDULE FOR WATER AND WASTEWATER IS ALSO CONTAINED WITHIN THE DATABASE

The replacement of infrastructure takes place at the end of its projected service life. Service lives for the York Region water and wastewater assets have been assigned at this time on the basis of industry standards, manufacturers specifications and from practical experience. Any changes in the assumed useful lives based on additional experience or future information can be easily made.

As is the case with the rehabilitation schedule, individual replacement costs and lives are calculated for each asset and, in aggregate, form the replacement schedule for all of the water and wastewater assets in the Region.

E. FINANCIAL RESERVE FUND MODEL USES DATABASE SCHEDULES TO CALCULATE FUNDING REQUIREMENTS

A financial reserve fund model has been developed and is used to calculate annual contributions to provide for the rehabilitation and replacement as specified in the rehabilitation and replacement schedules.

A “full-costing” approach is employed to calculate the annual reserve fund provisions required to provide for the rehabilitation and replacement of existing assets.

This “full-costing” approach is recognized as a fair way to charge residents for the use of these assets. As current assets are used by residents, provisions are made for the rehabilitation and eventual replacement of these assets. In essence, the annual provisions are charges to current residents for their use of Regional water and wastewater assets - residents are paying for what they are using.

The model is both flexible and user-friendly. Input parameters such as the starting year of analysis, the inflation rate and investment rates can be set and easily tested by the user. The model also contains two "policy switches" - one for determining the start date for setting aside the annual rehabilitation or replacement provision and one for extending the life of “overdue” facilities.

The first policy switch allows the user to delay the commencement of rehabilitation or replacement provisions. As some assets have useful lives of 75 to 100 years, it may make sense to defer the provisional payments into the future to avoid heavy financing costs in the early years of the forecast period. This policy switch allows for payment to commence from day one or from the point at which $\frac{1}{2}$, $\frac{1}{4}$ or other designated proportion of the useful life has expired.

The second policy switch deals with the concept of “overdue” facilities. The model makes a calculation as to whether the scheduled replacement or rehabilitation work to be done is “overdue” or not. For example, an asset installed in 1970 with a life expectancy of 30 years is overdue by 5 years if the base year of analysis is 2005. For situations like this, the model allows the user to extend the life of the asset for any number of years beyond the base year of analysis. In essence, this second policy switch allows for smoothing of the provision in the early years of the forecast by delaying the replacement or rehabilitation by any number of years, thereby allowing a longer time frame to set aside funds for the actual rehabilitation or replacement.

E.1 Annual Rehabilitation and Replacement Provisions Are Calculated Over the 2006 - 2031 Period

The reserve fund model calculates the annual financial contributions that are required to pay for the scheduled rehabilitation and replacement requirements taking account of inflation (to estimate future values) and investment rates (to estimate interest earnings until the actual work is required). For the 25 year term covered by the financial models developed for this study, an

inflation rate of 2 percent per annum has been assumed. An investment rate of 4 percent has been assumed. These parameters are variable, but the selected rates for the purpose of the present analysis were based on the rates used recently by the Region in its development charges update. It is noted that even though the majority of rehabilitation and replacement will not actually take place until the post-2031 period, the calculations ensure that adequate reserve balances are available at that date to undertake the works in the future as they are scheduled. This will mean that very significant balances will be accruing in the reserve funds, but these funds will be necessary to ensure that future funding is available to undertake the works.

E.2 The Present Rate of 4¢ Per Cubic Meter Inflation Adjusted Annually is Sufficient for Water Infrastructure Rehabilitation and Replacement

The analysis shows that the present contribution rate for water of 4¢ per cubic meter, if inflation adjusted annually, will be sufficient to address the future rehabilitation and replacement requirements for the water infrastructure. In 2006, the required contribution, based on estimated flows of 125.37 million cubic meters and a rate of 3.7¢ per cubic meter, will be about \$4.7 million. This amount will have to be increased annually by inflation and by growth in the volume of water sold to the area municipalities.

III AS INFRASTRUCTURE IS ADDED TO ACCOMMODATE GROWTH, ADDITIONAL CAPITAL FUNDING WILL BE REQUIRED FROM WATER AND WASTEWATER RATES

A. DEVELOPMENT CHARGES PAY FOR THE MAJORITY OF REQUIRED SYSTEM EXPANSIONS

The Region has updated its development charges for water and wastewater services recently, representing a continuation of long-standing financial policies aimed at protecting existing ratepayers. The expansion plans included in the recent update have been used in this study as the data source for the projects, costs and timing that will be required in the future as the Region continues to develop. While the majority of the system capital expansion costs will be funded from development charges, the so-called non-growth shares of the program together with the policy discount shares for non-retail non-residential development will require funding from the water and wastewater rates.

The growth-related capital costs to be funded from development charges have been subjected to a cash-flow analysis. In the analysis, debt charges in respect of already issued development charge related debt are assumed to have priority claim on available reserve fund balances. For years in which the remaining available balances in the respective development charges reserve funds are inadequate to fully fund the capital program, it has been assumed that new debt would be issued based on a 10 year term and a borrowing rate of 5%. Annual debt charges for the new debt are assumed to commence one year after the debt is issued.

For the water program, new debt is forecast to be required annually during the 2008- 2016 period. After that point, as existing debt repayment is significantly reduced, no further debt financing is forecast to be required.

The wastewater program is forecast to require significant new debt financing annually for the years 2005-2011 due to the continuing expansion of the Duffin Creek WPCP and York's share of the South Peel system. The forecast indicates that significantly reduced debt financing would be required for the years 2012-2020.

B. NON-GROWTH SHARES REQUIRE FUNDING FROM WATER AND WASTEWATER RATES

B.1 Non-Growth Capital Requirements for Water Totals \$79.1 Million Over the 2005-2031 Period

The water program calls for the addition of \$767.7 million over the 2005 - 2031 period. Of this amount, \$688.6 million is funded from development charges. The remaining \$79.1 million represents the non-growth share and is to be funded from the water rate. It is assumed that the non-growth shares will be funded directly (capital from current) through the water rate.

B.2 Non-Growth Capital for Wastewater Total \$365.6 Million Over the 2005-2031 Period

The wastewater capital program calls for the addition of \$971.7 million over the 2005 - 2031 period. Of this amount, \$606.1 million is funded from development charges. The remaining \$365.6 million represents the non-growth share and is to be funded from the wastewater rate. It is assumed that the non-growth shares will be funded directly (capital from current) through the rate.

C. THE DEVELOPMENT CHARGE POLICY DISCOUNT FOR NON-RETAIL NON-RESIDENTIAL DEVELOPMENT REQUIRES FUNDING FROM WATER AND WASTEWATER RATES

The Region's policy of discounting development charges for the non-retail sector of commercial-industrial development will also affect the water and wastewater rates. On average, the discount is estimated at about 21% for the water program and 14% for the wastewater program over the forecast period assuming a continuation of the policy discount throughout. The weighted average discount for the combined programs averages about 17% over the forecast period. In dollar terms, the annual discount is estimated at between \$20 and \$26 million for the combined programs.

As noted above, it has been assumed that debt will be issued in the years in which the development charges reserve balances are insufficient to fund the program. Debt repayment in respect of the portion of the new debt related to the policy discount is accounted for in the rate model. If direct, rather than debt, financing had been assumed for modeling purposes, the \$20 to \$26 million in annual impact would be required to be funded through the water and wastewater rates.

D. PROVISION FOR THE EVENTUAL REPLACEMENT OF NEW INFRASTRUCTURE IS ALSO REQUIRED

As just discussed, additions will continue to be made to the Region's inventory of capital infrastructure as growth continues throughout the forecast period. As capital projects are constructed, funding for their eventual replacement should be considered. Although the eventual rehabilitation and replacement of these assets won't be required until well into the future (and for the most part beyond the forecast period included in this review), it is desirable and consistent with the philosophy of full-cost recovery to begin to make provision for this future funding requirement.

For the purposes of the evaluation contained in this study, it has been assumed that reserve fund contributions in respect of future infrastructure will begin when 10% of the useful lives of the assets have passed. Instead of assuming that contributions would begin from day-one, the minor deferral reflects the fact that debt financing will be required to support a portion of the "first-round" capital financing. The deferral avoids the implicit doubling up of paying for the full cost of this infrastructure.

The contribution to reserve funds for the eventual rehabilitation and replacement of the new infrastructure under these assumptions is calculated at slightly less than 1¢ per cubic meter (.09¢ per cubic meter) for the water system and about 1.7¢ per cubic meter for the wastewater program. As with the contributions in respect of the existing infrastructure, these amounts will require annual adjustment for inflation in order to ensure that sufficient funding is available when required in the future.

E. PROVISION IS MADE FOR SYSTEM IMPROVEMENTS/ENHANCEMENTS

Provision is also included in the financial model for improvements or enhancements to the Region's water and wastewater systems required due to regulatory changes or other factors. The provision is based on the portion of the 2005-2014 capital program in respect of these factors. For the period beyond 2014, an annual provision is made based on the average of the 2005-2014 expenditures. An average capital requirement of about \$1.5 million and \$1.6 million is included for the water and wastewater programs respectively. It is assumed that these amounts will be funded directly from the water and wastewater rates.

IV PRELIMINARY ANALYSIS INDICATES THAT PRESENT WATER RATES (INFLATION-ADJUSTED) WILL PROVIDE FOR FULL COST RECOVERY, WHILE SIGNIFICANT RATE INCREASES ARE REQUIRED FOR THE WASTEWATER SYSTEM

A. OPERATING AND MAINTENANCE COSTS/NON-RATE REVENUES ARE BASED ON REGION'S PRESENT PROGRAM STRUCTURE

In addition to the capital requirements reviewed above in Sections II and III, the financial model also includes forecasts of normal operating and maintenance costs/non-rate revenues. The model is based on the present program structure embodied in the budget and business planning process so that updates can be easily tied into annual budget reviews.

The forecast is based on assumptions regarding future inflation and the impact that increased flows will have on normal operations. The model is flexible, allowing different inflation rates to be applied to the various expense/revenue categories included in the water and wastewater budgets. Objects of expense most affected by changes in forecast flows, e.g. power related to pumping or processing, chemicals, sludge treatment, can also be specified. Additional flexibility is provided for unusual known expenditures which can be specified by the user for any or all of the water or wastewater programs. The model also takes account of debt repayment schedules for already issued debt.

For the purposes of the present study, the operating forecast was based on 2006 preliminary budget submissions from T&W. Inflation of 2% per annum has been assumed for all expenditures/non-rate revenues. Expense items affected by flows include gas and oil, treatment chemicals and power. These assumptions can be changed easily in future modeling as deemed necessary by Regional staff.

B. RATE MODEL IS BASED ON FULL-COST RECOVERY

The rate model integrates forecast water and wastewater flows, operating and maintenance costs, non-growth capital expenditures, debt servicing costs, and rehabilitation and replacement reserve fund contributions over a 25 year time frame. Previously, inflation had not been contained in the Region's rate model. Including inflation provides the Region with a more accurate financial picture as the costs of providing service will inflate over time - rates will need to be set to reflect this reality. This enhances the model for use as a long-term financial planning tool.

B.1 Water Rates at Present Rates With Annual Inflation Adjustment Will Fund the Water Program

The analysis indicates that funding requirements for the water system are expected to increase significantly in 2006 over 2005 budgeted levels and show considerable fluctuation over the

forecast period due largely to annual variations in capital requirements. The increase in 2006 is largely attributed to the impact of year over year changes in debt charges on already issued debt.

Annual fluctuations in rate requirements can be ameliorated through the use of a rate stabilization strategy, similar to that which the Region has been using over the past several years. The analysis indicates that if water rates are increased by 2.5% annually over the 2006-2010 period, deficit financing of the water system (funded through borrowing from the rehabilitation and replacement reserve fund) can be eliminated by 2011. From that point on, it is estimated that annual rate increases can be held at less than 1% per annum through the balance of the forecast period and still provide for full-cost recovery.

B.2 Significant Increases are Required for Wastewater Rates

Changes to the funding requirements for the wastewater system over present levels are estimated to be much more significant than for the water system. This is due largely to the substantial increases required for contributions to the rehabilitation and replacement reserve funds for both existing and new infrastructure and the funding requirements for the non-growth share of the growth-related capital program. The increases in the non-growth funding requirements are estimated to be particularly large from 2007-2011 (increasing from \$23 million in 2005 to a range of about \$50 - \$59 million annually in 2007-2011). This reflects the assumed timing for the expansion program at the Duffin Creek WPCP as contained in the Region's recent development charges update. The required increase in contributions to the rehabilitation and reserve fund is also significant, increasing from about \$3.6 million in 2005 to \$15.6 million annually in 2006 and beyond.

As with the water program, there is also significant annual variation in the capital requirements over the forecast period for both direct capital-from-current funding and for debt charges on existing and newly required debt. The use of a rate stabilization strategy is also applicable to the wastewater system. In this case, however, because of the assumed early timing of expensive major capital expansions, rate increases of at least 10% per annum are warranted over the first five years (2006-2010). These rate increases together with rate increases of 2.5% annually over the balance of the forecast period will provide full-cost recovery for the wastewater system. Even at this level of rate increase, however, significant deficit financing would be required.

C. REPAYMENT OF DEFICIT FINANCING FROM REHABILITATION AND REPLACEMENT RESERVE FUNDS IS IMPORTANT

The Region has been providing for deficit financing of its water and wastewater systems by drawing on the rehabilitation and replacement reserve funds. Given the long time frame over which these funds accumulate and will eventually be used, this is judged to be a reasonable funding approach. Nevertheless, to the extent that these funds continue to be used as the source of interim financing to support the programs and to smooth annual rate changes, it is important to the success of this strategy that any interim borrowing be returned to the respective reserve

funds with applicable interest. This will protect the reserve funds from being drawn down to stabilize rates at the expense of providing for longer-term rehabilitation and replacement requirements.

D. THE FINANCIAL MODEL IS A TOOL THAT CAN BE USED IN THE FUTURE

The Region is at the forefront of long range financial planning for its water and wastewater systems. The full-cost recovery approach is recognized as a fair way to charge residents for the use of the systems. As current assets are used by residents, provisions are made for the rehabilitation and eventual replacement of these assets. In essence, the annual provisions are charges to current residents for their use of Regional water and wastewater assets - residents are paying for what they are using.

The rate model, the financial reserve fund model and the associated database developed for this study are comprehensive financial planning tools that can be used to evaluate any number of economic, financial and engineering assumptions. It is recommended that the model be updated regularly to reflect the Region's ever evolving financial picture.