As we near the end of 2013 and look forward to another challenging year, I am pleased to submit the 2014 Rate Budget and Services Overview for Council’s consideration. Reflecting on the events of 2013 reveals another year that presented a number of challenges and opportunities; however, the staff of Hamilton Water continue to move the portfolio in a positive direction. Themes that continue to be of significance for the Division include revenues, weather and climate change, Hamilton Harbour and the measurable benefits of capital investments in the system.

Hamilton’s economy and that of most of the country is tracking in a positive direction but the pace of this growth remains slow. Additionally, the proliferation of water efficient fixtures and an emerging culture of water conservation appears to be influencing water consumption across all sectors. The corresponding effect on our rate revenues suggests a continuing decline and although stability has returned to our forecasts, growth remains flat. Residential and industrial, commercial and institutional (ICI) sector revenues are expected to be below forecast however lower operating costs have mitigated much of this negative variance.

The weather continues to be top of mind for staff at Hamilton Water. While the occurrence of severe wet weather was less evident this year, staff have undertaken a number of projects in response to the events of January 13th and July of last year in Binbrook. Staff remain vigilant in developing measures to protect public health, property and the environment against future severe weather and in preparation for this, the proposed budget includes a Flooding/Storm Water Study that will endeavour to identify opportunities throughout the entire City for mitigating and/or eliminating the adverse effects these
In addition, unusual conditions in Lake Ontario that appear to be weather-related are being closely monitored to ensure that the treatment facilities in Hamilton remain effective and efficient.

The Clean Harbour Program continues to move forward with the commissioning of the Primary Clarifier Expansion and Phase One Real Time Control projects. These new facilities are already reducing the discharge of raw sewage into the environment and will have a positive influence on water quality in the harbour. Our team is anxious to see the corresponding benefits these projects will deliver in helping to improve water quality in Hamilton Harbour. Other Clean Harbour projects that developed momentum recently include both Randle Reef and the Woodward Plant Upgrade projects. Final approvals that allow for detail design and actual construction to begin have been received for these legacy projects and meaningful construction activities will begin throughout 2014.

In addition, the City has completed its business case submission and is awaiting a response from Public-Private Partnership Canada (PPP Canada) with respect to our Biosolids Management Program. We remain optimistic that our Federal counterparts will see the benefits of this important project and will partner with us in its delivery.

The following pages detail the great work that the Hamilton Water team has accomplished this year and provide an overview of the exciting projects that will be implemented over the next several years. The information in the following pages reflects the passion, commitment and skill the staff at Hamilton Water bring to their work every day and the importance it has for our community. As always, I remain thankful for the ongoing support of City Council and Senior Management that allows the Hamilton Water team to continue their important work.
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Awards, Presentations and Official Openings

Hamilton Water Facts
Water and Wastewater Planning & Capital | Plant Operations | Water Distribution and Wastewater Collection | Customer Service and Community Outreach | Compliance & Regulations | Infrastructure Planning & System Designs

Financial Review
The Drinking Water Quality Management System (DWQMS) is a requirement of the Safe Drinking Water Act and requires all regulated systems in Ontario to develop and maintain a DWQMS. Much of the capital program in Hamilton is developed to ensure a safe, reliable supply of drinking water for the residents and businesses of Hamilton. The projects highlighted in this section represent the major investments occurring in this budget that directly support the DWQMS.
**Woodward Avenue Water Treatment Plant Study**

The objectives of this Woodward Avenue Water Treatment Plant (WTP) Study are to confirm the extent of any required process upgrades and to develop a capital works program for the Woodward Avenue WTP in order to meet the goals of the City and align with the annual capital planning budget. Depending on the overall outcome of the study, individual projects may be included in the existing capital planning budget for the near future or may be included in future upgrade plans for the WTP to meet longer term goals. The study will delineate future engineering assignments and construction contracts at the Woodward Avenue WTP. The WTP is currently in compliance with the Ministry of the Environment regulations; it is recognized that physical upgrades are needed to treatment processes in order to maintain efficient and effective operation into the future. The City is interested in maintaining a robust, reliable and efficient plant that minimizes risk while meeting regulated water quality requirements. The study will identify where investments are required considering age, asset condition, capacity / hydraulic and operational limitations. This assessment is completed in order to determine whether or not to restore or replace assets on a like-for-like basis or to implement alternative innovative best practice investments that provide improved long term sustainable solutions for the City.
Removal and Replacement of Granular Activated Carbon (GAC)

Architectural and structural rehabilitation of Hamilton’s historic Water Filtration Building at the Woodward Avenue Water Treatment Plant was completed in 2011. The City is now in the process of removal and replacement of the Granular Activated Carbon (GAC) in the filter cells within the Filtration Building.

The water treatment process consists of pre-chlorination of raw water, screening, and water clarification by coagulation, sedimentation and filtration. Chlorine for disinfection can be added at three places: raw water intake, the pre-treatment stage, and post filtration. A coagulant is added to assist in settling solids through the sedimentation process. The settled water is filtered using dual media filters of sand and GAC. GAC is used to reduce the presence of taste and odour causing compounds such as Geosmin and Methyl-Isoborneal (MIB) in the raw water. Taste and odour episodes typically occur in late summer as a result of decaying algae within Lake Ontario and are most effectively removed through the use of GAC.

The Filtration Building contains 24 dual-media rapid rate filters, with 12 filters per module. Each filter is comprised of two concrete cells, each 13.72 m long x 4.88 m wide and providing 131.9 m² of filter area. Each filter has an underdrain, covered with approximately 250 mm of gravel and 150 mm to 230 mm of sand, and 740 mm of GAC.

The GAC replacement project is currently scheduled to be completed in 2014 at a cost of approximately $6 million.
The Clean Harbour Program is a series of projects that have been developed by Hamilton Water to enable the delisting of Hamilton Harbour as an area of concern with the International Joint Commission. These projects occur both in the wastewater collection system and directly at the wastewater treatment plants in Dundas and at Woodward Avenue. The ultimate goal of these projects is to improve effluent quality leaving our wastewater treatment facilities as well as reduce and/or eliminate the occurrence of direct wastewater discharges to any headwaters of Hamilton Harbour.

These projects represent a significant investment, past and present by the City to do its part to remediate Hamilton Harbour and the natural environment. The projects include: the Woodward Upgrade, Primary Clarifier Expansion, Randle Reef, Dundas Filter Upgrade, Real Time Control and the Sewer Lateral Cross Connection Pilot Study.
Clean Harbour Program

Woodward Avenue Wastewater Treatment Plant Upgrade

The Woodward Avenue Wastewater Treatment Plant (WWTP) upgrade (‘Woodward Upgrade Project’) is considered one of the main projects under the Clean Harbour Program. This upgrade provides for the largest return on investment towards achieving the target of delisting Hamilton Harbour as an area of concern with the International Joint Commission (IJC). Valued at $330 million, the Woodward Upgrade Project’s primary objective is to increase the treatment efficiency of the City’s Woodward Avenue Wastewater Treatment Plant. This will be accomplished through upgrades to the final treatment stage of the existing treatment process from what is referred to as a secondary level of treatment (gravity settling tanks) to a tertiary filtration treatment system so as to achieve strict discharge limits as imposed through the Hamilton Harbour Remedial Action Plan (HHRAP) process. In addition, sub-projects including a new Raw Sewage Pumping Station and Collection System Control.

Upgrades will support wet weather and flooding control initiatives while the remaining sub-projects are required to support these primary objectives. The Woodward Upgrade Project is composed six (6) sub-projects which include:

- New Raw Sewage Pumping Station
- Secondary Upgrades and New Tertiary Treatment Process
- New Outfall with Upgrades to Red Hill Creek
- New Chlorine Contact Tank
- Electrical System and Standby Power Upgrades
- Collection System Control Upgrades.
These major sub-projects of the Woodward Upgrade Project provide the most significant impact in reducing loadings to Hamilton Harbour. Details are as follows:

New Raw Sewage Pumping Station

Through extensive engineering assessments, a number of challenges were identified with the existing station which include:

- Inability to meet future pumping capacities
- Existing single wet well design does not allow for isolation for maintenance purposes
- Small wet well presents operational challenges whereby levels rise at a rapid rate during wet weather that create a risk when additional pumps are brought on-line
- Shallow wet well creates a condition whereby the collection system leading into the wet well is continually submerged causing solids to settle during periods of low flow.

When a wet weather event occurs, solids are ‘flushed’ to the treatment plant causing operational challenges.

The new station will provide significant water quality benefits by increasing pumping capacity and station reliability as to better manage the wet weather flows for treatment. The new pumping station will also be designed with a deeper and larger wet well allowing the hydraulic gradeline within the trunk sewers to be better maintained during peak wet weather events, thereby improving the capture of wet weather flows and reducing risk of flooding resulting from system surcharging.

Secondary Upgrades and New Tertiary Treatment Process

Upgrades to secondary treatment are required to improve the capability and reliability of biological nitrification (treatment of ammonia) to meet HHRAP goals. In addition, tertiary filtration is required to meet HHRAP goals with respect to total phosphorus and suspended solids. The selected treatment option developed during the associated studies was originally membrane technology due to its small footprint and compact design that functions as both nitrification and filtration in one treatment process.

Moving forward, the City will be expanding the technology approach to include a second strategy based upon expanding the aeration and secondary clarification tankage of the existing South Secondary Treatment Plant. Tertiary filtration will then be added based on the use of ‘cloth media’ technology. Leaving the procurement of equipment open to a wider range of technology solutions will provide the best competitive pricing and technical solutions from the wastewater industry.

New Outfall and Upgrades to Red Hill Creek

Considering the existing outfall was found to have hydraulic limitations during wet weather
events, adding an additional outfall was determined to be the preferred solution. The new outfall into Red Hill Creek will convey disinfected tertiary effluent, while the existing outfall will remain and convey flows associated with wet weather. Upgrades will also be completed to Red Hill Creek as to improve the capability of the creek to convey this flow to Hamilton Harbour, and will include erosion control and habitat improvements for aquatic species.

**New Chlorine Contact Tank**

A new chlorine contact chamber is required for tertiary treated effluent. This new contact chamber will include a dechlorination step to meet regulations associated with effluent toxicity.

**Electrical System and Standby Power Upgrades**

The implementation of a new tertiary treatment system and a need for increased reliability requires an upgrade and expansion to the power supply and distribution system for the plant. In addition, a major upgrade and expansion to the standby power system is required to ensure reliable treatment at the plant. This upgrade will provide service for all critical loads during conditions of interrupted power, the most critical of which is the raw wastewater pumping station.

**Collection System Control Upgrades**

Upgrades within the combined sewer system at strategic locations will provide improved monitoring and/or control during wet weather. This upgrade will provide additional operational tools to help improve the control of system hydraulics and mitigate combined sewer overflow to Hamilton Harbour.

**Project Benefits**

The opportunity exists to revitalize Hamilton Harbour, to improve the health of its ecosystem, and to reap the environmental, social and economic benefits of a remediated Hamilton Harbour as a result of delisting this Area of Concern. This goal is worthy from a National and International perspective. Government collaboration at all three levels: municipal, provincial and federal have been essential. The environmental, social and economic benefits that could be realized with the proposed Woodward Avenue Wastewater Treatment Plant Upgrade project are summarized as follows:

**Environmental**

The Hamilton Harbour Remedial Action Plan defined specific loading targets for combined sewer overflows and the Woodward Avenue WWTP. Through collection system improvements to better hydraulically manage wet weather flow and by increasing the wet weather treatment capacity and implementing a water quality upgrade of the Woodward Avenue WWTP, the proposed strategy will reduce contaminant loadings to the Harbour, and realize improvements to Harbour water quality compatible with HHRAP objectives.

**Figure 1: Total Suspended Solids (TSS)**

![Figure 1: Total Suspended Solids (TSS)](image)
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Figure 1, Figure 2 and Figure 3 present the overall loading reductions for key pollutant parameters of Total Suspended Solids (TSS), Total Phosphorus (TP) and Ammonia (NH3) respectively. Calculated over a 10 year period, the estimated reduction for each parameter is 14,900 Tonnes of Total Suspended Solids, 500 Tonnes of Total Phosphorous and 6,100 Tonnes of Ammonia.

**Social**

Investment in the Woodward Avenue Wastewater Treatment Plant Upgrade will benefit the local community by moving Hamilton Harbour closer to meeting its target of delisting as an International Area of Concern resulting in a healthy and vibrant waterfront. This will be achieved by providing for a cleaner discharge into the harbour from the City’s overall wastewater collection and treatment system. In addition, the significant investment through this Clean Harbour Project, which will take five years to complete, will translate directly into job creation within the local community. Once the Harbour is remediated and access to a clean, safe waterfront becomes widely understood by the community the social payback will be significant from both a recreational and tourism perspective.

**Economic**

In an effort to control costs, City staff was successful in securing a tripartite funding agreement between all three levels of government (Municipal, Provincial and Federal) in support of this Clean Harbour Project. Through the Green Infrastructure Fund (GIF), the contributions equate to one third from each level of government to a maximum of $300 million. This funding is critical to the success of this project as the City would not have been able to afford the full cost resulting in the project likely not proceeding. In addition, the significant investment through this Clean Harbour Project, which will take five years to complete and at its peak, will reach expenditures of an estimated $14 million per month translating directly to job creation within the local community.
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Primary Clarifiers & Disinfection Upgrades at the Woodward Wastewater Treatment Plant

This project focused mainly on the management of wet weather flows through upgrades to the primary treatment process at the Woodward WWTP in order to satisfy the Ministry of the Environment Procedure F-5-5 which establishes limits for the discharge of combined sewage during wet weather events. The current strategy for the City’s wastewater system is to maximize conveyance of flows to the sewage treatment plant and to provide secondary treatment for as much of the flow as possible including wet weather flow. Flow in excess of secondary treatment capacity will continue to receive the equivalent of primary treatment before discharge into the environment.

Highlights of the project include the addition of new primary clarifier influent and effluent channels to improve hydraulics and treatment efficiency, two new Primary Clarifiers and chemical addition to achieve high rate primary treatment up to 1300 million Litres per Day (MLD) from 614 MLD, a new Chlorine Contact Tank for chlorination/de-chlorination of sewage bypasses and secondary effluent and a new Hauled Sewage Pumping Station to receive and transport sludge from the Dundas Wastewater Treatment Plant.

This $48M project was supported with funding from the Canadian Strategic Infrastructure Funding (CSIF) whereby two thirds of the cost was provided by the Federal and Provincial Governments and was substantially completed in late 2013. Implementation of this project will improve water quality in the harbour and help to provide a natural environment consistent with the objectives of the HHRAP program and the vision of the local community.
Randle Reef

Randle Reef is now the most significant area of coal tar contamination in Canada and one of the remaining reasons Hamilton Harbour is designated as a Federal “Area of Concern”. The contaminated area of the Harbour is approximately 80 hectares in size and is located along the south shore in front of Pier 15. In order to address the environmental and public health impacts of these contaminated sediments, another year of effort by staff has gone toward moving this project forward with the partnership group that has fully formed around this initiative. The strategy to “cap and contain” sediment was identified in 2002 to meet environmental goals and objectives while acknowledging technical, social and financial constraints. The project’s end result will be a major accomplishment toward delisting Hamilton Harbour, creating new port space, and most importantly eliminating the interaction between contaminants and our local environment.

The City of Hamilton has taken a leadership role in recent years and again in 2013 to ensure the continued progress of the project to the implementation stage. This process involved collaboration with the project’s lead agency, Environment Canada, as well as with a number of partners contributing to this common remediation goal. The City of Hamilton has committed $14M toward a total project cost of $140M shared between 7 partners. This financial contribution is being supported by both the rate budget ($6M) and the levy budget ($8M). In 2013, staff have been important contributors in the advancement of the last set of pre-implementation activities. As a result of these efforts, 2013 represents a milestone year for the Randle Reef Sediment Remediation Project with the finalization of a project cash flow strategy and legal agreements. The project is now on track for implementation to begin in 2014. Future work led by and contracted through the Federal government will include construction of a containment cell, dredging of contaminants, and capping to take place over the next eight to nine years. The end result will be a new area of land capable of supporting port activities. The City of Hamilton will continue to participate in this project under the governance structure that has been established to oversee the work.
Dundas Wastewater Treatment Plant Filter Upgrade Project

The refurbishment of the tertiary sand filter at the Dundas Wastewater Treatment Plant was undertaken and completed in 2013. The project included the replacement of all filter media and diffuser cones, realignment of the travelling backwash bridge and concrete tank repairs in both filter cells. The refurbishment was done after 10 years of continuous operation of the filter units and resulted in the significant improvement in the plant effluent quality.
Real Time Control (RTC)

The goal of RTC is to take advantage of underutilized sewer system/facility capacity during wet weather to reduce Combined Sewer Overflows (CSO), provide peak flow protection to the Woodward Avenue Wastewater Treatment Plant and hydraulically isolate areas prone to flooding. RTC accomplishes this by managing flows dynamically using gates or similar devices which are typically operated automatically based on sensors in the sewer system.

Four sites were chosen for this phase of RTC and each provide unique benefits in managing wet weather flows. The Wellington/Burlington CSO represented the largest uncontrolled overflow in the city and a new regulator gate and above ground control structure was designed, constructed and ultimately commissioned in 2012. This site takes advantage of spare capacity in the Western Sanitary Interceptor North Branch and employs dynamic flow diversion to shunt flows to the interceptor for treatment at the Woodward WWTP. In the first 10 months of operation, this site has captured over 500,000 m\(^3\) of CSO and reduced loadings of total suspended solids, total phosphorous and ammonium nitrogen by an estimated 44,500 kg, 120 kg and 130 kg respectively. The Mary/Ferrie RTC gate serves a dual purpose - protecting the neighbourhood from flooding during large storms when the Western Sanitary Interceptor South Branch surcharges and also works to fill and drain the James Street CSO tank and associated in-line pipe storage. The Ferguson/Ferrie RTC gate operates to help fill the Eastwood Park CSO tank. Electrical and control systems including backup power was centralized at a new building, architecturally suited to fit into the community, located adjacent to the Mary/Ferrie site. The Wentworth/Rosemary RTC gate located in front of 330 Wentworth serves an important function in protecting Woodward Avenue
WWTP from peak flows during extreme wet weather events: when shut it can divert flows away from the interceptor and out to the harbour.

Collectively these new RTC sites help us achieve Ministry of the Environment CSO volume targets and move us forward in the delisting of Hamilton Harbour as an International Joint Commission Area of Concern by reducing pollutant loadings and meeting Hamilton Harbour Remedial Action Plan targets. The RTC system also helps protect critical wastewater treatment plant infrastructure from increasingly more frequent extreme storms. Performance assessment, improvements and operator training on the RTC system will continue into 2014.

**Sewer Lateral Cross-Connection Pilot Study**

The purpose of the Sewer Lateral Cross-Connection Pilot Study is to identify sources of sanitary discharge into the natural environment, specifically, the cross-connection of residential sanitary plumbing systems to the municipal storm sewer system. The study has concentrated mainly on storm sewer subwatersheds of Chedoke Creek, Red Hill Creek and Davis Creeks where elevated levels of E. Coli have been recorded at storm sewer outfalls and within the subwatersheds.

Study results have revealed that 10% of the cross connections found are due to a single plumbing fixture incorrectly connected to the storm drain under the basement floor. Ninety percent of the cross connections have been found to be sanitary drains from homes directly connected to the City’s storm sewers. The City has corrected over 100 cross-connections within the City road allowance with the majority being performed within the roadway without disruption to driveways and landscaping.

Investigations within subwatersheds of Chedoke Creek, consisting of approximately 3270 properties have confirmed a total of 100 complete cross-connections of which 94 have been corrected to date. Another 8 homes were found to be partially cross-connected. The total number of cross connections within the subwatersheds of Davis Creek and Red Hill Creek have yet to be determined as investigations are presently underway.

It is too early to determine what level of water quality improvement will be had from this pilot study. The City will continue to conduct the study to identify and correct cross-connections where practical until sufficient information has been gathered to determine if a long term Cross Connection Program is warranted and if so, determine how that program would be structured and funded.
Since 2005, the Storm Event Response Group (SERG) has achieved many strategic tasks. The City is committed to assessing, analyzing and implementing stormwater management improvements where possible and continues to be proactive in its approach. SERG is a group composed of City of Hamilton staff representatives from different departments and divisions across the City including Hamilton Water, Growth Management, Engineering Services, Operations and Maintenance and Risk Management. This group is committed to enhancing the City’s storm event preparation and response.
To improve the level of service for Stormwater Management, the following successes have been achieved:

**Post Storm Event Response and Investigation:**

**Binbrook and Upper Stoney Creek Flooding**
SERG was called into action following flooding from an unprecedented summer storm on July 22, 2012 that delivered 140 mm+ of rain in a 3 hour period. SERG immediately began an investigation of the root causes of flooding including a review of available monitoring information, smoke testing and collection system investigations of nearly 100 kilometres of sewer including wet weather manhole inspections and CCTV, review of outstation performance and planned upgrades. Collection system investigations have been completed and final recommendations are currently being drafted. Interim remedial measures, including placement of solid manhole covers across Binbrook to protect against inflow from extreme storms, have already been implemented. Work is expected to begin on trenchless collection system rehabilitation for Binbrook and downspout disconnection in Stoney Creek in 2015.

**Ancaster HC005**
A combination of heavy rain, snowmelt and frozen/saturated ground, stressed sewers across the city on January 13, 2013. Residents in northwest Ancaster were hit particularly hard as flows overwhelmed a sanitary pumping station and backed up into residents’ basements. SERG immediately began an investigation of the root causes of flooding from this event following much the same formula as the July 22, 2012 storm. Collection system investigations are now complete and final recommendations for rehabilitation are currently being drafted. Investigations into station performance are nearing completion and are expected to be completed this year.

**Infrastructure Enhancements:**

**Lower East End Neighbourhood Drainage**
Strategic addition of new sewer pipes in areas of greatest need. In 2014 through 2015, improvements in the Rothsay Avenue/Gage Park area will be implemented.

**Fessenden Neighbourhood**
Installation of an underground tank on Greencedar Drive has been completed with Phase II works including new trunk storm sewer and new stormwater management pond scheduled for construction in 2013 through 2014.

**Protective Plumbing Program (3P)**
In total, 5,895 installations of backwater valves have resulted in protected basements throughout the City since the program was implemented. Additionally, backwater valves are now standard plumbing features for all new residential homes in Hamilton.
Outreach and Education:

Residential Drainage Assistance Program (RDAP) Pilot
This 2 year pilot program anticipated to complete two large and two small drainage improvement projects per year. Since its inception in April 2012, staff have received over 100 requests for assistance and are on target for expected project completions. The work has evolved to include assisting By-Law Enforcement with grading and drainage concerns that fall under the Property Standards By-law.

Basement Flooding Guide – Protect Your Home and Health
A one-stop resource including information for residents affected by basement flooding including: Emergency Contact Information; Special Safety Precautions; Emergency Housing; Cleaning & Sanitizing; Financial Considerations; Help Prevent Flooding; Types of Flooding Situations; Hamilton’s Sewer System; and Potential Causes of Flooding.

WebTV
Two videos educating residents on drainage issues and homeowner maintenance related to private properties.

Future Initiatives:

City Wide Flooding & Drainage Study
In response to Climate Change and specifically to develop a Proactive Adaptation Strategy, Hamilton Water will lead the development of a program that recognizes increased frequency and severity of rainfall in our region. The product of this analysis is envisioned to include strategies that will increase resiliency to heavy rain following industry best practice in the Hamilton context. Solutions may range through the full spectrum of stormwater management strategies from Source Control to end-of-pipe solutions. The plan will also recognize the impact of Intensification Targets of the City’s Official Plan ensuring the impact of growth on stormwater management systems is accommodated.

Corporate Strategic Plan – Strategic Actions
Staff continue to work towards the completion of the various actions/objectives of the Corporate Strategic Plan. The activities completed to date and future works are directly tied to the components of Strategic Priority 1.2 – Continue to prioritise capital infrastructure projects to support managed growth.
SUSTAINABLE INITIATIVES

Sustainable Initiatives is a program that identifies projects required to ensure the ongoing viable and efficient operation of the system over the longer term and requires disciplined Asset Management principles to achieve this. These projects may include both water and wastewater projects and are planned to ensure that asset life cycle is not exceeded and the necessary investments are made in a timely and appropriate manner.
Water & Wastewater Facility Asset Management Program

Hamilton Water staff have established a program of Water and Wastewater Facility assessment and Asset Management that continually provides analysis to determine the need for capital works. This process is focussed on strategically replacing or rehabilitating assets that are responsible for the delivery of water and wastewater services to our community. In 2013, this program has again undertaken a number of detailed facility inspections at key locations based on a priority sequence that has been documented as part of the program. The resulting data that quantifies condition, risk, and life cycle parameters feed capital work recommendations that are programmed into capital budgets.

Hamilton Water intends to improve on the processes already in place for managing this infrastructure and in 2013 developed an RFP (Request for Proposal) which was released for bids. The intent of this work is to leverage what has been developed in the program so far and build on it to create a more integrated system of strategic management which is aided by technology to manage data. This is the next step forward in optimizing data, financial resources, and improving integrated support for future decision making processes. The project will be guided by documented best management sources of information and a team of staff and consultants working together to build the most appropriate Water and Wastewater Facility Asset Management System that fits the needs of the City. It is expected that a successful bidder will be selected in 2013 and work will begin in 2014.
Biosolids Management Project

Biosolids are produced from operations undertaken at the City’s wastewater treatment plants that separates solid material from wastewater. Since 1996, the City has used Land Application for beneficial reuse, by contracting with a private service provider, whereby the biosolids are dewatered then trucked off-site for application onto agriculture lands as a soil additive which provides a source of nutrients including phosphorus. During the off-season winter months (December through March) or during wet weather periods when land application is prohibited by the Nutrient Management Act regulations, biosolids are stored in an approved facility. Once weather permits, stored biosolids are loaded and trucked to agriculture lands for application. If storage is not available, as a contingency, biosolids may be sent to a registered landfill. As a result of concern over the potential of changing regulations, the inherent logistical risks and a desire to review current practices with a focus towards long term sustainability, the City completed a Biosolids Master Plan (BMP) in 2007. The BMP and associated Environmental Assessment (EA) were finalized in 2012 identifying Thermal Reduction as the preferred strategy for biosolids management at the City’s Woodward Avenue Wastewater Treatment Plant. As a result of the BMP and subsequent EA process, the alternative of Thermal Reduction (TR) was approved as the preferred strategy for the City’s future biosolids management project and the associated budget was identified in the 10 year Water, Wastewater and Storm Rate forecast as approved by Council.
Funding Opportunity through Public-Private Partnerships Canada (P3 Canada)

Subsequent to the completion of the EA process and in response to opportunities now available through P3 Canada, City Council directed staff to apply to P3 Canada and submit a Biosolids Management Program as a candidate for consideration.

The Project Team as well as senior management at the City developed a set of objectives for the Project which were selected to ensure that the Technology solution will:

• Provide the City with a long-term contractual solution in the range of 20-30 years in duration;
• Be environmentally sustainable over the long term;
• Be reliable over the long term;
• Provide a long-term cost effective Technology that will ensure cost and performance certainty and will fit within affordability constraints identified by the City; and
• Minimize long-term risks to the City and transfer or share these risks with the private sector as commercially appropriate.

P3 Canada received the City’s business case and staff are hopeful a response will be received in 2013 indicating whether or not the project has been approved for funding.

While the preferred solution identified through the BMP was thermal reduction the market place in this industry has changed substantially over the last several years revealing more options and as a result the business case submitted to P3 Canada includes the opportunity to allow a number of technologies to compete through the procurements process. With P3 Canada funding, the City can realize a project substantial completion date as early as the fourth quarter of 2017.
Hansen 8
Maintenance Management System

Hansen is an electronic Work Order and Service Request system used for work management. The Hansen system has been used by Hamilton Water since 1987. Over the years, it has been expanded and continually upgraded to meet the needs of the Water Distribution and Wastewater Collection (WDWC) and Customer Service and Community Outreach (CSCO) sections. The CSCO section is currently in the process of upgrading the Hansen software to their latest Web Technology Platform. This will affect approximately 750 users across Public Works and the Corporation. The project is expected to be completed by the end of 2014.

The upgrade process from Hansen 7 to Hansen 8 includes converting millions of historical records. This includes the condition of all water distribution and wastewater collection assets, work orders, customer service calls, water meter readings, permits and licences. All existing workflow processes have been rebuilt and tested in Hansen 8 and phase one for the Customer Service upgrade is complete. Phase two for Permits and Licensing is scheduled to be complete by end of 2013 and Phase 3 for Assets and Work Orders is scheduled to be completed by end of 2014.

Hansen 8 Web Technology provides a modern base for Hamilton Water to integrate with other systems and technologies such as GIS and GPS mapping and tracking, Smart Meters, Tablets for field staff, Bar Code readers, Online Payments for permits and licences, Mobile Apps for citizen requests, etc. This will provide a reliable, stable and versatile platform for efficient work management for years come.

From a user perspective, Hansen 8 provides common user interface, common workspace, common reports, common analytics, common workflow, common data management, common mobility; in other words there is only one system to learn, saving time and improving data quality. New staff will find Hansen 8 more user friendly or “Google like” when it comes to searches or navigating the screen.
SCADA Master Plan Upgrade Project

The SCADA master plan was completed in 2011 to develop standards for equipment and process control, provide redundancy for the system and upgrade all water and wastewater facilities to comply with the new standards and establish a common platform. Current implementation work covering phases 1, 2 and 3 includes the completion of a secondary HUB room, conversion of 19 critical sites and current upgrading of 41 legacy facilities to the new controller systems.

Future works include the upgrading of control systems at the Woodward Wastewater Treatment plant under phase IV and the remaining 26 facilities under phase V, which is currently under design.
Carlisle Water Tower Refurbishment and Well House Replacement

The Carlisle Elevated Water Storage Tower was constructed in the mid-1980s; two adjacent groundwater wells and well houses were constructed prior to the water tower and have now reached the end of their useful life. The water tower is undergoing structural, process, mechanical and aesthetic repairs and upgrades. The two existing well houses are being decommissioned and replaced with one new well house. The existing well houses are being demolished and the site regraded. The existing submersible well pumps, piping and appurtenances are being replaced including a new watermain constructed from the wells to the new well house. Within the new well house, a new chlorine contact pipe is being installed, and a chemical feed system and analyzing equipment are being provided. A new treated watermain is being constructed to connect to the existing distribution system. The existing gravel road to the water tower and the new well house is being paved. Tree removal, re-planting and landscaping are also being undertaken. The project is currently in construction with a value of $3.3 million and a scheduled completion date in the first quarter of 2014.
Hillcrest Reservoir Upgrades

The Hillcrest Reservoir was originally constructed in 1932. It is located at the base of the escarpment, east of Chedoke Golf Course. The west cell upgrades were completed in 2012; these included various structural repairs, and civil landscaping for improved drainage. The last phase of this project is currently under design and construction is anticipated to commence in early 2014. This phase includes various structure, civil, security, access and process improvements to the east cell and once completed, the reservoir will meet modern standards, allowing a continued reliable supply of safe drinking water and operation for decades to come. The construction value is estimated at $11 million with a completion date in the fourth quarter of 2015.
Highland Gardens Park Water Pumping Station

The new Highland Gardens Park Water Pumping Station will be constructed on Hillcrest Avenue adjacent to Hillcrest Park. Construction of the new station will provide a secure alternate feed into Water District H3 on the west side of the lower City. The project will improve the security of water delivery to the district and provide increased reliability of pumping infrastructure. Construction work is planned to commence early 2014. In an effort to meet community expectations, a Community Liaison Committee was established during the design phase of work which is now complete. This community engagement provided residents an opportunity to contribute input on the design, location and building exterior. Located in a “park like” setting, special attention was paid to the station’s exterior so it would blend with the natural setting of the escarpment (see image above). In addition to the regular amenities of a pumping station, two public washrooms will be added for events hosted in the park. Once completed, this pumping station will become a vital part of the water supply to Pressure District H3 including supply to St. Joseph’s Hospital. The construction value is estimated at $11 million with a completion date in 2015.
The Public Works Department is committed to timely and cost effective assembly of Capital Works Projects within the Municipal Right of Way (ROW). The various infrastructure elements within the ROW: Watermains, sanitary sewer pipes, storm sewers, pavements/curb & gutter/sidewalks, all have variable life cycles. These various components rarely have coinciding end-of-life dates and do not need to be replaced at the same time.

Over time, staff developed strategies to align replacement timing and manage future funding requirements and service levels. One of these strategies is the rehabilitation of selected elements in the ROW. This strategy extends life and improves service levels on the rehabilitated infrastructure and preserves the initial investment on the remaining elements in the ROW.

Following this strategy, 297.9 kms of sanitary and storm sewers have been structurally lined using trenchless technology methods, over the past 10 years resulting in the deferral of $141.2M that would have otherwise been spent for traditional open-cut replacement. Additionally, $335M in asphalt replacement has been avoided entirely following this approach. Subsurface infrastructure rehabilitation technologies used by the City are trenchless, meaning there is no need to dig, or required digs have very small footprints. Furthermore, costs and risks arising from social disruption are significantly reduced.
Community Programs include a number of service and grant programs directed specifically to our customers and include Lead Water Service Replacement, Protective Plumbing Program, Sewer Lateral Management to name a few. These programs seek to assist customers with direct infrastructure renewal as well as education respecting best practices to manage their systems and save money. These programs are both very active and visible and provide meaningful benefits to the participants who access these programs annually.

Road excavation to access residential water line
Lead Service Replacement Program

The City of Hamilton’s Lead Service Replacement Program provides assistance to homeowners interested in replacing their lead water services. The City will inspect the water service line to confirm if it is constructed of lead or alloy and replace the water service pipe from the municipal watermain to the property line after the private portion has been replaced by the homeowner. Response to the program continues at an increased rate since the issue of lead in drinking water became a concern in Ontario in 2007. The volume of inspections completed and water services replaced in the past has been highly variable – correlating with the amount of media attention given to the issue of lead in water. Over the last three years, the volume of inspections and water service replacements completed has been relatively stable at 800 and 950 respectively. We expect these volumes to persist into 2014.
Backflow Prevention Program

During 2013, staff continued to assist property owners and contractors to understand their roles and responsibilities under this program. Staff continue proactive measures in order to gain compliance with the By-law. These efforts include site visits and meetings with property owners to develop plans for compliance. Recognizing that costs associated with Backflow Installation is a challenge for some property owners, staff work with them to look for the most cost effective solutions. These efforts have resulted in the completion of over 5,200 surveys and the installation of 1,325 Backflow Prevention Devices thus far. While there is still much work to do, we continue to work with property owners to ensure the continued safety of Hamilton’s drinking water.
Protective Plumbing Program

On February 13, 2013, a report was approved by Hamilton City Council amending the Protective Plumbing Program (3P) guidelines to include the requirement that three quotes be submitted to the City by the property owner, and that the amount of the grant be based on the lowest quote. The intent of this amendment was to improve customer service and derive greater value.

On March 19, 2013, council approved a community improvement plan (CIP) which makes it possible for property owners of a rental property who wish to proactively protect their property from sewer surcharging during storm events to be eligible to participate in the program.

In April 2013, City of Hamilton staff held an Outreach meeting for City Licensed contractors who are performing work under the program in order to review the new guidelines. This was done in an effort to educate contractors about their roles and responsibilities in the program, how they could better service customers who elect to participate in the grant program, and to share with them what staff found during follow up investigations of properties who flooded after having a backwater valve installed.

In the first eleven months of 2013, approximately $2.4 million in grants have been paid out resulting in the installation of over 1116 backwater valves throughout the city.

### Program Activity Since Inception (2009)

<table>
<thead>
<tr>
<th>Year (Year to Date)</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<tbody>
<tr>
<td>Number of Backwater Valves Installed</td>
<td>267</td>
<td>1594</td>
<td>761</td>
<td>2368</td>
<td>1116</td>
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<tr>
<td>Total Grant Amount</td>
<td>$507,994.98</td>
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<td>$1,514,334.67</td>
<td>$5,227,626.23</td>
<td>$2,400,000.00</td>
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</table>
Sewer Lateral Management Program

The Sewer Lateral Management Program (SLMP) provides guidance and grants to property owners experiencing sewer related problems. Established in 2006, the program allows the City to investigate private sewer laterals on the homeowner’s behalf as well as repair and replace sewer laterals that have failed and are not functioning. From 2009 to 2012, there had been a steady decline in investigations of approximately 12% annually. Over the last year, 1,084 sewer lateral investigations were completed – a year over year increase of 23%. This increase may be attributed to major storm events experienced over the course of the year. The City continues to repair or replace an average of 500 sewer laterals annually under this program with a total of 538 completed in the last year.
Community Programs

Pollution Prevention Program

The City of Hamilton’s Pollution Prevention (P2) Program was developed with the help of the Canadian Centre for Pollution Prevention (C2P2) in 2009. The P2 Program is aimed at reducing the level of contaminants produced by small to medium sized businesses and residents. The main objective is to provide guidance and codes of practice for businesses to assist them in eliminating pollutants from being used in the first place so that sewer discharges are in compliance with the Sewer Use By-law.

The P2 Program has been very effective in helping small businesses achieve compliance with the Sewer Use By-law. The Fats, Oils and Grease Management Program assists food service businesses on how to properly manage their cooking grease with the objective of reducing sanitary sewer blockages and overflows. Facilities such as Hospitals, Granite Operations, Dry Cleaning Facilities and Schools, have been educated on codes of practice that will assist them in obtaining compliance.

A residential component to educate residents on what can and can’t be disposed of down the drain has also been developed and is delivered via brochures, videos and is a big part of our community outreach messaging.
AWARDS, PRESENTATIONS AND OFFICIAL OPENINGS

Presentations:
WEFTEC
Project: Biogas Enhancements & Digester Upgrades
Title: Biogas Enhancement and Utilization at Hamilton’s Woodward Avenue Wastewater Treatment Plant
Presenter: CH2M HILL (engineering consultant)

Article:
Project: Biogas Enhancements & Digester Upgrades
2012 Biocycle Article - Biomethane Production at Ontario Wastewater Treatment Plant

Project: The Enhancement of Windermere Basin
January/February 2013 The Ontario Technologist Cover Article – How the Waterfront Enhancement project transforms Windermere Basin into a diverse coastal wetland

Awards:
Project: Biogas Enhancements & Digester Upgrades
Award: 2013 AEE (Association of Energy Engineers) - Canada Region Renewable Energy Project of the Year

Openings:
Project: The Enhancement of Windermere Basin
The Windermere project had an official opening held on June 26, 2013, attended by City Officials, various stakeholders and interest groups including the following dignitaries: Mr. Peter Kent, Federal
Awards, Presentations and Official Openings

Minister of the Environment, Mr. Jeff Leal, Provincial Minister of Rural Affairs, Mr. Bob Bratina, Mayor, City of Hamilton.

Project: Ferguson Pump Station
Official Opening and Corktown Park
Commemorative Archway Unveiling
The City of Hamilton thanked the neighbours of the Corktown community for their patience during the two-and-a-half-year construction process to build the new Ferguson Avenue Water Pumping Station. A new archway feature to Corktown Park was installed as part of this project and includes a unique medallion that was inspired by students from neighbouring Queen Victoria School.

Doors Open Hamilton
In 2013, the addition of the Ferguson Avenue Pump Station tour and the Woodward Avenue Water Treatment Plant Learning Centre tour to the existing Environmental Laboratory tour were very well attended by the residents who took part in the Doors Open community event. The Ferguson Avenue Pump Station had over 400 people tour the 1912 and 2012 facility and the Learning Centre tour had a response of over 240 people within the 4 hour timeframe.
HAMilton water facts

Water and Wastewater Planning & Capital (WWPC)

Water and wastewater facilities provide an important public service to produce and deliver clean, safe drinking water and provide effective treatment of wastewater to protect public health, property and the local environment. WWPC manages a large portfolio of capital projects related to upgrades and renewal of all water and wastewater facilities within the City including treatment facilities, communal wells, pumping stations, reservoirs and combined sewer overflow tanks. This
can only be accomplished through the hard work and dedication of our staff through solid project management principles which are the core of the WWPC project delivery structure. Recent accomplishments clearly demonstrate these skills including the design and completion of multiple challenging projects such as the expansion of the Primary Clarification processes at the Woodward Avenue Wastewater Treatment Facility. While many of these projects were undertaken at very old and complex facilities, the projects were completed in a timely manner with minimal disruption to operations and our customers and no negative impact to our environment by employing solid communication and risk management best practices. We are confident that the processes and experience applied by our skilled professionals will be maintained through continual improvement processes to meet our future infrastructure investment needs and challenges.

In order to maintain safe and reliable water treatment/distribution and wastewater collection/treatment services to our community, WWPC applies the principle of sustainable infrastructure management through detailed asset management practices. An asset management program is in place to plan the systematic evaluation of Water and Wastewater facilities on a proactive basis to promote the highest level of dependability is maintained across the entire water and wastewater system. Assets are prioritized, and fully inspected over time to identify needs at each facility based on information collected on condition, risk and estimated life cycle metrics. Site assessment conclusions are used to identify remediation works which are budgeted
and planned as future capital upgrades or, in some cases, a full replacement is recommended as to optimize future serviceability and mitigate risks. A data supported process is utilized to prepare a defendable capital budget necessary to deliver these system improvements. Examples of recent successful projects within the City of Hamilton that demonstrate the advantages of a programmed approach include several large reservoirs and pump stations. These sites include the StoneChurch Pump Station, Ferguson Pump Station, Kenilworth Reservoir, Hillcrest Reservoir, and the Waterdown Standpipe. These city assets are critical in providing daily service to the community and were thoroughly inspected through the asset management process to detail capital needs before construction projects were designed and implemented. In 2014, it is anticipated that the program will be further enhanced through further documentation of practices and procedures as well as the exploration of technology tools that can help coordinate data and improve integrated decision making.

Water and Wastewater Planning & Capital

- Annual capital upgrades of approximately $50-$60 million
- Total value of ongoing projects $300 million
- Manage approximately 40 projects and studies annually
Plant Operations

Water Purification

The City’s Drinking water production over the last 12 months from the Woodward WTP totalled 75,183 ML, which is a 2.5% reduction from the 2012 total of 77,079 ML. Water production is predicted to remain stable at an annual amount of 75,000 to 78,000 ML for the upcoming 2014 operating year. Continued water conservation and reduced industrial, commercial and institutional (ICI) usage are the contributing factors for this trend.

During 2013, several major capital upgrades were completed at the Woodward WTP and were made operational; these included the new Fluoride Chemical Process Facility, Low Lift Pumping Station Raw Water Intakes disinfection system, High Lift Pumping Station retrofit/auto control system upgrade, 48 inch Large Valve Replacement at the Stelco Water Supply Station and Carlisle Communal Well System upgrades including the replacement of the FDC01/02 well facility and elevated storage tower refurbishment. Replacement of the GAC is planned for 2014 in the Woodward WTP filtration process for improved taste and odour control.

Wastewater Treatment

Total influent volume to the Woodward WWTP for the last 12 months increased to 112,204 ML as compared to the 2012 volume of 101,820 ML, which is primarily the result of more normal weather conditions and rainfall events during 2013. The increase and average day flow is expected to yield a total capacity utilization of 73% at the treatment facility. Effluent quality and performance continues to be excellent with operating performance at the Woodward WWTP reaching 92 months of continuous compliance for effluent parameters. Influent temperature decreased by over 9% from an average of 19.52°C to 17.65°C indicative of cooler weather conditions and more rainfall events but continued utilization of the optimization program resulted in ammonia effluent concentrations. An optimization study is being undertaken at the Dundas WWTP to achieve better treatment performance from the existing unit processes and higher quality effluent.

Plant upgrades that were completed in 2013 included the installation of additional primary treatment and disinfection upgrades, which resulted in the new chlorine contact tank being utilized during the disinfection season and continuous operation of the new primary sludge thickener facility to improve the digestion process of sludge. The refurbishment and upgrading of the effluent water tertiary filter at the Dundas WWTP was completed to improve overall effluent quality discharged from the facility.

Biosolids and Gas Production

The production, stabilization and land application of biosolids for the past 12
Facility Maintenance

A total of 9,847 preventative and corrective maintenance work tasks have been generated over the last 12 months compared to 9,079 work tasks in 2012. The breakdown of these work orders has been a total of 6,603 preventative and 3,244 corrective, which represents a maintenance ratio of 67% to 33% compared to the target level of 75% to 25%. A maintenance process review was undertaken in 2013 to look toward achieving better performance of the Enterprise Asset Management (EAM) system, identify key performance indicators and provide resources to continually improve and sustain the Computerized Maintenance Management system. A total of 16 elements will be developed into projects for implementation to improve the performance of the maintenance department and the INFOR EAM System. Maintenance was completed on several major equipment components that included the refurbishment of #3 Archimedes Return Screw pump, Secondary Clarifier maintenance on final clarifiers #5/#10, Centrifuge rebuilds on units 1 and 2, along with sludge conveyor #5 at the Woodward WWTP, aeration membrane replacements on tanks A2 and B2 at the Dundas WWTP and the replacement/overhaul of pumps at the Main/King CSO tank.

Cogeneration Production

A total of 11,122 MWH of electricity was produced through the methane-powered cogeneration facility in the last 12 months, which compares with 9,934 MWH of production in 2012. The reduction in power generation for 2012 resulted from the operation of the biogas purification unit to validate gas production capacities and establish an operational strategy for the cogen and BPU, whereby the cogen output is maximized as a result of the more favourable economic basis and is reflected in the increased generation amount for the last 12 months.
Water Distribution and Wastewater Collection

Water Distribution

Over the preceding year, 268 watermain breaks were repaired, and of those, 142 (or 53%) occurred during the colder period of December 1 to April 30. The number of breaks this year is consistent with the four year average of 287. The number of breaks that occur in the colder season continues to trend downward from a high of 65% five years ago to 53% this year. This downward trend may be a reflection of the generally warmer winters we’ve experienced recently, an outcome of the ongoing investment in watermain replacement, or a combination of the two.

Several years ago, the City re-invested in a water valve exercising program with the goal of operating all the valves in our water distribution system on a 3 year cycle. Through this program, 6,939 valves were “exercised” this year and as an outcome of this program, 100 valves were identified as inoperative and were either repaired or replaced.

Wastewater Collection

The primary technique used by the section for monitoring and maintaining the sanitary and storm sewer collection systems is zoom camera inspection of manholes. The Zoom Camera Inspection Program aims to inspect all the manholes in the collection system on a 4 to 5 year cycle. This year, approximately 22% of the entire network was inspected for a total of 9,547 manhole inspections.

The data collected by the zoom camera inspections is the primary driver of the City’s proactive sewer maintenance activities including CCTV sewer inspections, sewer cleaning and manhole maintenance. From the zoom camera inspections, the City cleaned 110 kms of sewers, CCTV inspected 80 kms of sewers, and 250 manhole frames and covers were reset or replaced.
Customer Service and Community Outreach

Hamilton Water’s Customer Service and Community Outreach group is responsible for managing a number of water and wastewater related programs and services such as issuing permits and licences, managing the Protective Plumbing Program (3P), administering and enforcing the Backflow Prevention By-law, maintaining over 140,000 water meters, educating youth and the public, providing support to the other sections within Hamilton Water, and managing the Hansen and GIS systems for Public Works. We are pleased to provide the following highlights from the past 12 months.

In 2013, two new multi-year contracts were awarded related to the installation and maintenance of new and existing water meters. The past 12 months has seen a significant increase in new home construction and as a result, we installed approximately 2,100 new water meters representing a 40% increase over last year. The meter operations group completed over 8,000 work orders related to the installation and maintenance of the City’s meters.

Through our storefront operations, sales in permits and licences increased from $1.4 million to $1.6 million and our Call Centre handled approximately 30,600 calls all of which are related to water and wastewater operations.

During this past summer, our engineering systems group completed phase 1 of the Hansen 8 upgrade which includes the successful implementation of the Customer Service portion of Hansen that is used by over 700 users across Public Works.

One of the highlights for our group is the annual Children’s Water Festival; this year our Outreach staff were able to expand the festival from 90 Grade 4 classes to 99 classes over the 3 days of the event. In addition to the Children’s Water Festival, we also organized the 9th annual World Water Day Walk-a-thon, the annual Rain Barrel Sale, Doors Open event for 3 water locations, the official ceremony for the Windermere project and the Ferguson Avenue Pump Station and Corktown Park Commemorative Archway unveiling.
Compliance & Regulations

Environmental Laboratory

The City of Hamilton Environmental Laboratory (CHEL) maintained Laboratory Accreditation through the Canadian Association for Laboratory Accreditation (CALA) for specific water and wastewater analysis listed in their scope of accreditation. CHEL also maintained MOE Laboratory Licensing for Drinking Water Analysis. Similar to 2012, approximately 200,000 analytical tests of drinking water, wastewater, industrial waste and landfill site samples were completed.

Seven days a week, CHEL staff are in the Hamilton Distribution System collecting drinking water samples. 2,186 water samples were collected for field and laboratory analysis. These numbers include the distribution samples the lab collects monthly, the Quarterly Drinking Water samples and MOE split sampling. The number of distribution samples required to be collected is mandated by the Safe Drinking Water Act (SDWA) O.Reg.170/03 and is based on the population served.

Through the implementation and maintenance of the Beyond Compliance Operating System (BCOS) and Drinking Water Quality Management System (DWQMS), the Compliance Support Group (CSG) oversees regulatory compliance for the Hamilton Water Division and supports the Division’s objectives to achieve sustainable operations. While the focus of the DWQMS is on drinking water, the BCOS program meets or exceeds regulatory requirements in the areas of wastewater, environment, emergency response planning and occupational health and safety (OH&S).
The Hamilton Water Operating Authority first received full DWQMS accreditation for its five Drinking Water Systems in 2011. Following the successful completion of an external Surveillance Audit, new Certificates of Accreditation were issued in July 2013 and are valid until May 2015.

**Compliance Support Group**

As a key component of the BCOS and DWQMS programs, CSG uses information technology tools to facilitate communication, make information available to staff and maintain critical records. To date, approximately 15,500 documents and records are managed through Hamilton Water’s BCOS Database. To build on this strong document control foundation, new software was recently acquired for the delivery of training and tracking of training records.

**Environmental Monitoring & Enforcement**

The Environmental Monitoring & Enforcement (EME) Group monitors 500 industrial, commercial and institutional (ICI) facilities in Hamilton to ensure the protection of the City’s sewer infrastructure, wastewater treatment plants as well as the natural environment. Our Enforcement Officers attended 74 ICI facility inspections, and our Monitoring Technicians captured 1,105 samples in order to ensure compliance with the Sewer Use By-law. These samples led to 95 Notices of Violation being issued due to non-compliance. EME staff also responded to 209 spills to sewers, catch basins, ditches and the natural environment. EME also offers assistance to a large number of small and medium sized businesses in achieving compliance with the Sewer Use By-law via the Pollution Prevention (P2) Program. 186 small to medium sized facilities were visited to educate their operators on various best management practices. The EME Program has had significant growth and changes in the past few years. Success of EME Programs is evident in the number of dischargers that have been brought into or are nearing compliance since 2006.

**Source Control – Wastewater Treatment Plant Influent Quality Improvement**

The Source Control Program is comprised of several initiatives aimed at improving the quality of influent received at the City’s Wastewater Treatment Plants.

EME Staff continue to work with industries to assist them in bringing their discharges into compliance with the By-law through the use of Sewer Discharge Agreements.

The influent loading data below highlights the significant improvements to the quality of wastewater influent at the Woodward Ave WWTP over the past year. There has been a major decrease in many of the parameters of concern since 2007, while we’ve seen a range of reductions in 2012-2013 from 14% - 95%
New Sewer Use By-law

A new and improved Sewer Use By-law has been drafted and is expected to be received at Public Works Committee in early 2014. The By-law will include language to support our Pollution Prevention and Waste Hauler Programs and will allow for the replacement of Discharge Agreements with a more user friendly Permit system. It will also mandate the installation and maintenance of oil, grease, sediment and dental amalgam interceptors to help further reduce the impact of these materials to our infrastructure.

Summary of Major Changes

- Language requiring installation and maintenance of grease control devices has been included and aims to reduce the amount of Fats, Oil and Grease (F.O.G.) that is discharged to the sewers from food premises such as restaurants and bakeries.
- Language requiring installation and maintenance of pollution control devices such as oil and grease interceptors and dental amalgam separators has been included and aims to reduce the amount of pollutants such as mercury, benzene, toluene, PAHs and fuels that are discharged to the sewers from vehicle service facilities, car washes and dental offices.
- Language surrounding hauled sewage and Pollution Prevention Planning is clearer and now includes provisions to support the current programs.
- The Sewer Discharge Agreement program will be replaced by a more streamlined Permitting system and will include a new fee structure.
- A new sewer use By-law is necessary to expand into previously unregulated areas, conform to new norms in sewer regulation, promote clarity, and fair and consistent administration and enforcement.

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<thead>
<tr>
<th>Parameter</th>
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<th>Average Concentration</th>
<th>Average Reduction</th>
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<tr>
<td></td>
<td></td>
<td>2012</td>
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<tr>
<td>Total PAHs (ug/L)</td>
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<td>Phenols (mg/L)</td>
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<tr>
<td>Oil and Grease Vegetable (mg/L)</td>
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<td>12</td>
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Infrastructure Planning & System Designs (IPSD)

IPSD initiates servicing strategies for secondary planning and coordinated Class Environmental Assessments which allow dependent planning works to proceed. Class Environmental Assessments (EA) for Infrastructure servicing were initiated in 2013 for the expansion of capacity at the Water Booster Station on Old Ancaster Road in Dundas, the Centennial Underpass Drainage Study, and the Old Dundas Road Sewage Pumping Station in Ancaster. Completion of the Class EAs are conditions of Ministerial and Approval Authorities permitting for construction process. Stormwater service analysis and solutions were completed including: Stoney Creek & Battlefield Creek Flooding and Drainage; assessments for Winona Neighbourhood; Mount Albion Pond Rehab; Binbrook & Stoney Creek Mountain Flooding; Lower Stoney Creek; and Corinthian Neighbourhood. In 2013, the construction of the Greencedar Underground Stormwater facility was completed with the construction of the downstream Stormwater Management Pond programmed to take place throughout 2014.

The IPSD section undertakes interdepartmental support for proposed land-use changes, zone change applications and planning of subdivisions. In the past year, approximately 340 circulations were reviewed and commented on to move forward growth-related proposals. Growth and capital renewal of the city’s water distribution network requires extensive documentation and standards review as dictated by the Ministry of the Environment. IPSD reviewed and approved Ministry documentation requirements for approximately 32 Form 1 – Record of Watermains Authorized as a Future Alteration packages ensuring continued compliant system design and function.
The Water, Wastewater and Storm Program is a distinctly separate budgeting process. Its revenues come from billed charges which are based on water consumed\(^1\). Water consumption is based on metered consumption; meters are read with ratepayers billed by the City’s billing agent, Horizon Utilities Corporation. Both Operating and Capital costs for the water, wastewater and storm programs are fully funded from rates and therefore, do not affect municipal property taxes.

The 2014 Rate Budget is submitted for Council’s consideration. The 2014 Rate Budget balances the need to invest in environmental infrastructure upgrades and changing trends in demand for water and growth in users relative to “Places to Grow.” Over the period 2014 to 2023, water, wastewater and stormwater capital investment is forecast at nearly $1.5 billion which represents an increase of $0.1 billion from last year’s 10-year forecast.

\(^1\) The City of Hamilton is almost entirely metered. The remaining unmetered accounts are charged based on a flat annual charge.
This report identifies the steps staff have incorporated into the current 10-year forecast related to significant risks that have been identified related to a variety of conditions which may impact ratepayers. In combination the following risk factors may place significant financial pressures on ratepayers and are detailed further in later sections of this report.

- Declining consumption
- Sustainability of grant/subsidy programs funded by water/wastewater rates
- Sustainability of stormwater management program

Staff pursued a variety of measures in an effort to control the impact of the above risks in order to maintain a safe and reliable service at a reasonable cost.

The 2014 requested operating budget for water, wastewater and storm is approximately $178 million, which represents an increase over the 2013 Budget of approximately $6.4 million, or 3.7%. The 2014 recommended combined water and wastewater/storm rate increase is 4.0% or approximately $23 for the average household.

Other water and wastewater service user fees have been reviewed in accordance with the Water/Wastewater User Service Fee and Charges Policy approved by Council in February 2013. The Policy requires identification of both the cost of the service and the fees/charges to recover such cost with the intent that full cost recovery is achieved. By charging the full cost of these specific services, there should be reduced pressure on general water and wastewater rates. Accordingly, staff have undertaken a comprehensive water/wastewater service user fee review. A number of services were identified as no longer provided by the City or are provided by City divisions other than Hamilton Water.
and therefore no longer a Rate
related service. Many service
fees have remained unchanged
with full cost recovery
currently being achieved with
others undergoing varying fee
increases to achieve full cost
recovery. A number of new
fees were identified related
to the installation of new/
replacement water meters
for specific meter sizes that
previously were not identified
in the fees and charges
schedules. Similarly, there are
additional new fees identified
by Laboratory Services for
testing of specific substances
not previously identified in
prior years.

The ten-year Rate Supported
Capital Budget (excluding
growth which is funded
from Development Charges)
amounts to nearly $1.5 billion,
of which $85.8 million or
5.7% is being financed
through rate supported debt.
This capital program
supports the rehabilitation
of aging infrastructure and
supports the wastewater and
storm water environmental
improvements to meet the
Hamilton Harbour Remedial
Action Plan targets. As a
result, the 3-year gross capital
program, 2014 to 2016,
incorporates over $667 million
in rate supported funding and
development charges. The
following steps have been
taken to try to lower the debt
requirements in the initial
years:

a) utilizing in excess of
$28.6 million of funding
from previously approved
projects (WIPs) to support
capital;
b) $100 million in Federal
funding commitment;
c) $100 million in Provincial
subsidy;
d) funding growth-related
costs from development
charge recoveries;
e) the revision of major capital
project costs and timing;
f) $52.1 million in funding
from Reserves (2014 –
2017).

In addition to subsidies, the
Financial Review

The City of Hamilton reviewed its pricing structure for potable water, wastewater (sewer) collection and treatment, and stormwater management over the past few years. The process included a review of existing practices, costs and revenue sources; research on industry standards and best practices; a review of municipal rate structures used across Ontario; the development of goals and objectives to evaluate various options; and analysis to understand how any changes to the rate structure may affect typical customers.

The Review and recommendations were intended to create a fair and consistent rate structure for all three essential services. The new rate structures will have no financial impact to the average residential customer. Other customer sectors (multi-residential, industrial, commercial and institutional) are impacted differently depending on the customer’s consumption and size of the meter servicing the property. Larger consumers are responsible for more of the overall infrastructure costs. Council has approved a Water and Wastewater/Storm Rate Structure that continues Hamilton’s position as a leader with respect to pricing and delivery of these services. The Rate Structure is transparent, cost effective, easy to maintain and ensures a sustainable future for all customers with proper financing and maintenance of these essential services.

2014 – 2023 WATER, WASTEWATER AND STORM RATE SUPPORTED OPERATING AND CAPITAL FORECAST

Sustainable Rate Strategy

The recommended 2014 Rate Supported strategy endeavors to achieve a balance between capital investment, rate of growth and rate stability. The 2014 Rate Supported Strategy links the change in demand for water with a staged approach to necessary capital investments at the Woodward Wastewater Treatment Plant.
The current financing strategy includes $200 million ($100 million for each of the Federal and Provincial governments) subsidy to support the wastewater treatment plant rehab and upgrades. As reported earlier, staff have attempted to identify mitigating measures including the deferral of capital investments in an effort to alleviate the reliance on both debt and reserves. It should be noted that the above subsidy and commitment assumption is aligned to report PW12060/FCS12064 Green Infrastructure Fund Application – Water Quality Upgrade to Woodward Wastewater Treatment Plant. The current Development Charges By-law does not reflect the commitment from the Federal Government to support the wastewater treatment plant rehabilitation and upgrades. With the confirmation of the $100 million Federal commitment, it will be incorporated into the 2014 Development Charges Background Study and By-law, which are expected to be presented to Council in early-mid 2014.

While the Rate Supported Strategy has changed from time to time, the overall goal, of achieving a sustainable level of funding to support the necessary infrastructure investments, has not. The Strategy has been in place since 1997, which at that time, called for water rates to increase by three to seven percent after adjusting for inflation over a 15-year period. The 2014 – 2023 strategy is a continuation of the Strategy which assumes combined annual rate increases ranging from 4.0 – 4.5% over the 10-year period.
Since 2001, staff have recommended further amendments, for reasons including changing economic conditions, which in effect resulted in lower rate increases in the short-term and extending the period for rate increases in excess of inflation. When comparing the 2002 Strategy versus the 2014 Strategy, annual water and wastewater/storm billings based on the 2014 Strategy continue to be lower than had staff and Council continued based on the 2002 Strategy.

In general, the goal of the Strategy has been to support the water, wastewater and storm programs through a sustainable level of funding. While revenue forecasts have been adjusted from time to time, for a variety of reasons, so too have expenditure forecasts, and the need for additional financial resources. It should be noted that the intention of the 2002 Strategy was to provide approximately $92.5 million (2000$) in support to the capital program in the form of capital financing (contribution and debt). The current Strategy calls for capital funding in 2014 of approximately $104 million (2013$) and climbing to $153 million (2013$) by 2023.

PROPOSED 2014 WATER AND WASTEWATER / STORM RATES

Municipal financial management is fundamentally different from the financial management of either the federal or provincial government. Revenue sources for the municipal order of government are limited to: (1) taxation on property assessment, (2) development charges, (3) user fees, (4) license fees, (5) fines and (6) transfers from the Provincial and Federal governments.

Unlike the tax (levy) budget which is funded through taxation on property assessment, the water, wastewater and storm budget is principally funded through user fees. Water/Wastewater/Storm rates are a form of user fee charged by the City to its residential, commercial, institutional and industrial water consumers, as well as, water sales to Haldimand County and Halton Region. In the City of Hamilton, its metered consumers are charged based on volume of water consumed (i.e. the more you consume the greater the cost).

Since 1999, Council has been committed to making progress in an effort of achieving a sustainable water, wastewater and storm system by adopting the principle of sustainable pricing. While the financing strategy has deviated in
previous years from an accelerated sustainable pricing strategy (previously required a 15% rate increase), opportunities and initiatives have been taken to achieve the requested level of investment through lower than anticipated rate increases. For instance, the funding partnership of over $110 million announced in 2009 in by all three levels of government, allowed for an increase in capital spending, within the previously forecast rate strategy.

The 2014 Water, Wastewater and Storm Budget continues to support the objective of sustainable water and wastewater systems. The recommended 10-year pricing accommodates an increase in the level of capital investment, principally associated with enhanced effluent treatment at the wastewater treatment plant to meet Hamilton Harbour Remedial Action Plan effluent targets.

The 2014 Rate Budget with total combined operating and capital financing expenditures of $178 million will require a 4.0% increase in water and wastewater/storm rates, as well as, an inflationary increase for most other water and wastewater user fees. As illustrated below, of the $178 million requested budget, approximately $103.4 million pays for the capital program and approximately $74.9 million is for operating expenditures. This ratio of capital to operating has improved as over the years the focus of rate increases in general has been towards capital. For instance, in 2002, the ratio of capital to operating was 54% to 46% relative to the ratio identified below of 58% to 42%, respectively. While the focus of rate increases since the initial 2002 Strategy has been to support capital investments, from time to time increases have been required to mitigate changes in consumption, in part the result of changes in economic activity and the local demand for water.

![2014 Rate Budget Breakdown](image)
Proposed Rate Structure

The impact of the recommended rate increases on the water and wastewater/storm fixed charges as well as the water consumption and wastewater/storm treatment charges are identified in the table below.

| Impact of Recommended Rate Increases on Water and Wastewater/Storm Rates |
|--------------------------------------------------------|-----------------|-----------------|-----------------|
|                                                        | 2013\(^1\)     | 2014            | Increase        |
| Water Fixed Charge (daily)\(^2\)                       | $0.29           | $0.29           | $ -             |
| Consumption Charge Block 1 (cubic metre)               | N/A\(^3\)      | $0.65           | $ -             |
| Consumption Charge Block 2 (cubic metre)               | $1.22           | $1.29           | $0.07           |
| Wastewater/Storm Fixed Charge (daily)\(^2\)            | $0.29           | $0.29           | $ -             |
| Treatment Charge Block 1 (cubic metre)                 | N/A\(^3\)      | $0.66           | $ -             |
| Treatment Charge Block 2 (cubic metre)                 | $1.22           | $1.32           | $0.10           |

\(^1\) 2013 rates restated to reflect the rate structure changes effective January 1, 2014.
\(^2\) Rate is for a 15-20 mm meter which most residential homes have installed.
\(^3\) Two tier system introduced as of January 1, 2014 and did not exist in 2013.

As previously noted Council approved a new Water and Wastewater/Storm Rate Structure and concurrently endorsed a revised Rate budget methodology typical of the industry. The Rate budget will continue to identify the expenses for all three rate-supported services separately and begin to budget the revenues for wastewater/storm separate from water. The intention would be to have the Water service separately budgeted and for Wastewater and Stormwater to be treated as one service.

Going forward rates and related increases to the two services of Water and Wastewater/Storm will likely differ. Typically wastewater fees are higher than water fees due to the more costly wastewater infrastructure, treatment expenditures and a smaller customer base than water to apportion total service costs (Hamilton has approximately 3,300 fewer water accounts than...
those with both water and wastewater services). A review of other Ontario municipalities consistently reflects higher wastewater fees than water fees even in those cases where the wastewater fee does not support stormwater services. The following table identifies the impact of the proposed rate increase on a residential customer:

<table>
<thead>
<tr>
<th>(based on annual water consumption of 210 m³)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 Residential Bill</td>
<td>$580.58</td>
</tr>
<tr>
<td>2014 Residential Bill</td>
<td>$603.80</td>
</tr>
<tr>
<td>Recommended Change ($)</td>
<td>$23.22</td>
</tr>
<tr>
<td><strong>Recommended Change (%)</strong></td>
<td><strong>4.00%</strong></td>
</tr>
</tbody>
</table>

In recent years, there has been a decline in water consumption on a per household basis. Annual water consumption per household, over the period 2009 to 2013, has averaged approximately 213 m³. In general, residential consumption has exhibited a downward trend principally due to changes in regulations (i.e. local building codes) and the availability/use of water efficient appliances/fixtures. Prior to 2007, forecasted average water consumption
per household was assumed at 291 m$^3$. In 2007, this assumption was revised to 275 m$^3$, and reduced further to 260 m$^3$ in 2008. For 2014, the forecasted average water consumption is assumed to be at 210 m$^3$. It should be noted that while the volumetric rate has increased by 34% from 2007 to 2013, the typical household actual annual billings have increased by about 9%. Therefore, over this period the average residential property owner has been able to mitigate most of the rate increases through conservation and demand management.

Affordability

In 2002, Council made a commitment to address potential hardship issues as a result of the need to increase water and wastewater/storm rates to achieve a sustainable system, and the impact of these increases to the more vulnerable water users in the City of Hamilton. For the purpose of the development of the 2014 Rate Budget, funding of $500,000 has been incorporated towards the City’s Utility Arrears Program (UAP) which represents an increase of $150,000 over 2013. This program targets three main groups, Ontario Works (OW) participants, Ontario Disability Support Program (ODSP) participants and ‘low-income’ residents that are not on social assistance (i.e. seniors on fixed incomes or low-income single individuals and families).

In 2013, under the City’s UAP, $350,000 had been deemed eligible under the Community Services Program to obtain a cost sharing with the Ministry of Community and Social Services; consequently $350,000 can leverage up to $1,252,520 in funding through the Ministry of Community and Social Services. The UAP is administered through the City’s Community Services Department, Benefit Eligibility Division.

The following table summarizes the sources of funding and the target groups the assistance is meant to aid for 2013.

The Province announced
effective July 1, 2012, a change to the funding formula to cap all discretionary benefits (including utility arrears assistance) for health and non-health related benefits to $10 per OW/ODSP case. This has a direct significant impact to the UAP due to the loss of the provincial cost-sharing to discretionary benefits. Consequently, in 2013 the UAP has been provided at status quo with the shortfall in utility arrears funding being accommodated within the available $350,000 Rate budget funding.

It is important to note that staff implemented a process change effective July 1, 2012 where discretionary utility arrears would be accessed only when there was no Housing Stability Benefit funding available. Therefore, WWW contributions have decreased.

Community Services Staff are preparing a report to Council with further recommendations regarding the UAP.

### OPERATING BUDGET HIGHLIGHTS

Exclusive of the 2014 recommended 4.0% rate increase, support for total operating expenditures are forecast to increase by approximately $6.4 million, bringing the total operating budget request to approximately $178 million, compared with $172 million for 2013.

---

#### Target Group

<table>
<thead>
<tr>
<th>Target Group</th>
<th>Rate Budget (Cost Share)</th>
<th>Ministry of Community &amp; Social Services</th>
<th>Total Available in 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario Works</td>
<td>$172,000</td>
<td>$828,000</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Ontario Disability Support Program</td>
<td>$15,480</td>
<td>$74,520</td>
<td>$90,000</td>
</tr>
<tr>
<td>Low Income (working poor and seniors)</td>
<td>$162,520</td>
<td>$0</td>
<td>$162,520</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>$350,000</strong></td>
<td><strong>$902,520</strong></td>
<td><strong>$1,252,520</strong></td>
</tr>
</tbody>
</table>

#### Table

<table>
<thead>
<tr>
<th></th>
<th>HYDRO (includes Water)*</th>
<th>HEAT</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Internal Program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OW/ODSP</td>
<td>$206,572</td>
<td>$44,428</td>
<td>$251,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>688</td>
</tr>
<tr>
<td>External Program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Supports</td>
<td>$27,431</td>
<td>$5,900</td>
<td>$33,331</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>68</td>
</tr>
<tr>
<td>2013 YTD SEPT TOTAL</td>
<td>$234,003</td>
<td>$50,328</td>
<td>$284,331</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>756</td>
</tr>
<tr>
<td>2012 YTD SEPT TOTAL</td>
<td>$391,370</td>
<td>$147,262</td>
<td>$538,632</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1,408</td>
</tr>
<tr>
<td>2012/13 Increase/(Decrease)</td>
<td>$(157,367)</td>
<td>$(96,934)</td>
<td>$(254,301)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(652)</td>
</tr>
</tbody>
</table>
It should be noted, while the recommended rate increase is 4.0%, metered revenues are forecast to increase by 3.9%, in part due to forecast decline in consumption. The following table summarizes the budget changes for the 2014 Requested budget:

### Summary of the 2014 Operating Budget

<table>
<thead>
<tr>
<th></th>
<th>2013 Restated Budget</th>
<th>2014 Requested Budget</th>
<th>2014 Requested vs 2013 Restated Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expenditures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Expenditures</td>
<td>$ 74.67</td>
<td>$ 74.88</td>
<td>$ 0.21 0.3%</td>
</tr>
<tr>
<td>Capital/Debt Financing</td>
<td>$ 97.33</td>
<td>$ 103.52</td>
<td>$ 6.19 6.4%</td>
</tr>
<tr>
<td><strong>Total Expenditures</strong></td>
<td>$ 172.00</td>
<td>$ 178.40</td>
<td>$ 6.40 3.7%</td>
</tr>
<tr>
<td><strong>Revenues</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate Revenue</td>
<td>$ 169.35</td>
<td>$ 175.88</td>
<td>$ 6.53 3.9%</td>
</tr>
<tr>
<td>Non-Rate Revenue</td>
<td>$ 2.65</td>
<td>$ 2.52</td>
<td>-$ 0.13 -4.8%</td>
</tr>
<tr>
<td><strong>Total Revenue</strong></td>
<td>$ 172.00</td>
<td>$ 178.40</td>
<td>$ 6.40 3.7%</td>
</tr>
</tbody>
</table>

### 10-Year Operating Budget

The 10-year operating budget highlights the commitment of a rate strategy as a means of achieving sustainable water, wastewater and storm systems. Beyond 2014, program expenditures, exclusive of costs associated with the addition of tertiary treatment of the wastewater treatment plant, are forecast to increase on average by approximately 3% annually, reflecting a continued commitment to try to identify additional savings and efficiencies. Also, over the next 10 years, the financing for the capital program will increase on average by approximately 5% per annum.

Over the period 2014 to 2023, total expenditures are forecast to increase from $178 million to $258 million, an increase of nearly 45%, or 5% annually.
The need for sustainable pricing as a method of providing sustainable infrastructure means that, over the period 2014 to 2023, the typical residential annual metered bill will increase by an average $29 per year.

Provincial/Federal Subsidy Programs

It should be noted that the forecast includes $100 million received in 2010 of Provincial infrastructure funding related to the Wastewater Treatment Plant water quality improvement project. Recently the City received confirmation of $100 million of Federal funding for the WTP project from the Green Infrastructure Fund on a claim reimbursement basis.
### 2014-2023 Rate Capital Budget

The top graph below illustrates the capital investments to be undertaken in 2014 for water, wastewater and storm infrastructure.

The bottom graph below and following table summarizes the $1.505 billion capital program and the financing requirements for the 2014 – 2023 water, wastewater and storm capital budget. Of this amount, $993.2 million or 66% is for wastewater, $382.9 million or 25% is for water and $128.8 million or 9% is for the storm program. A total of $667 million or 44% of the 10 year capital program is required in the first three years (2014 – 2016). The capital program also includes $233 million for growth infrastructure related to GRIDS which will be funded from Development Charges, except for $72 million in Development Charge exemptions which the city is legislatively required to fund from rates revenues if Council chooses to discount its DC’s or recover less than 100% of growth-related capital costs.
### SOURCE OF CAPITAL FINANCING

#### 2014 to 2023 RATE PROGRAM CAPITAL BUDGET

($ 000's)

<table>
<thead>
<tr>
<th>Source of Funding</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017 to 2023</th>
<th>Total 2014 to 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WATERWORKS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital Program</td>
<td>64,365</td>
<td>48,900</td>
<td>69,910</td>
<td>199,710</td>
<td>382,885</td>
</tr>
<tr>
<td><strong>Source of Funding</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsidy/Other Revenue</td>
<td>-</td>
<td>700</td>
<td>-</td>
<td>1,704</td>
<td>2,404</td>
</tr>
<tr>
<td>Development Charges</td>
<td>6,670</td>
<td>19,390</td>
<td>39,241</td>
<td>58,009</td>
<td>123,310</td>
</tr>
<tr>
<td>Reserves &amp; Other Internal Sources</td>
<td>19,019</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>19,019</td>
</tr>
<tr>
<td>Contribution from Operating</td>
<td>38,676</td>
<td>28,810</td>
<td>30,669</td>
<td>136,697</td>
<td>234,852</td>
</tr>
<tr>
<td>External Debt</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3,300</td>
<td>3,300</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>64,365</td>
<td>48,900</td>
<td>69,910</td>
<td>199,710</td>
<td>382,885</td>
</tr>
<tr>
<td><strong>WASTEWATER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital Program</td>
<td>63,196</td>
<td>115,111</td>
<td>247,863</td>
<td>566,998</td>
<td>993,168</td>
</tr>
<tr>
<td><strong>Source of Funding</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsidy/Other Revenue</td>
<td>17,435</td>
<td>39,334</td>
<td>127,988</td>
<td>11,410</td>
<td>196,167</td>
</tr>
<tr>
<td>Development Charges</td>
<td>(17,916)</td>
<td>21,651</td>
<td>24,162</td>
<td>25,451</td>
<td>53,348</td>
</tr>
<tr>
<td>Reserves &amp; Other Internal Sources</td>
<td>5,118</td>
<td>11,590</td>
<td>30,000</td>
<td>9,150</td>
<td>55,858</td>
</tr>
<tr>
<td>Contribution from Operating</td>
<td>36,462</td>
<td>41,000</td>
<td>42,861</td>
<td>484,971</td>
<td>605,294</td>
</tr>
<tr>
<td>External Debt</td>
<td>22,097</td>
<td>1,536</td>
<td>22,852</td>
<td>36,016</td>
<td>82,501</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>63,196</td>
<td>115,111</td>
<td>247,863</td>
<td>566,998</td>
<td>993,168</td>
</tr>
<tr>
<td><strong>STORM SEWERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital Program</td>
<td>26,840</td>
<td>18,870</td>
<td>12,350</td>
<td>70,770</td>
<td>128,830</td>
</tr>
<tr>
<td><strong>Source of Funding</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsidy/Other Revenue</td>
<td>188</td>
<td>75</td>
<td>75</td>
<td>525</td>
<td>863</td>
</tr>
<tr>
<td>Development Charges</td>
<td>9,940</td>
<td>4,950</td>
<td>5,050</td>
<td>35,990</td>
<td>55,930</td>
</tr>
<tr>
<td>Reserves &amp; Other Internal Sources</td>
<td>5,845</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5,845</td>
</tr>
<tr>
<td>Contribution from Operating</td>
<td>10,867</td>
<td>13,845</td>
<td>7,225</td>
<td>34,255</td>
<td>66,192</td>
</tr>
<tr>
<td>External Debt</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>26,840</td>
<td>18,870</td>
<td>12,350</td>
<td>70,770</td>
<td>128,830</td>
</tr>
<tr>
<td><strong>TOTAL RATE PROGRAM</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital Program</td>
<td>154,401</td>
<td>182,881</td>
<td>330,123</td>
<td>837,478</td>
<td>1,504,883</td>
</tr>
<tr>
<td><strong>Source of Funding</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsidy/Other Revenue</td>
<td>17,623</td>
<td>40,109</td>
<td>128,063</td>
<td>13,639</td>
<td>199,434</td>
</tr>
<tr>
<td>Development Charges</td>
<td>(1,306)</td>
<td>45,991</td>
<td>68,453</td>
<td>119,450</td>
<td>232,588</td>
</tr>
<tr>
<td>Reserves &amp; Other Internal Sources</td>
<td>29,982</td>
<td>11,590</td>
<td>30,000</td>
<td>9,150</td>
<td>80,722</td>
</tr>
<tr>
<td>Contribution from Operating</td>
<td>86,005</td>
<td>83,655</td>
<td>80,755</td>
<td>655,923</td>
<td>906,338</td>
</tr>
<tr>
<td>External Debt</td>
<td>22,097</td>
<td>1,536</td>
<td>22,852</td>
<td>39,316</td>
<td>85,801</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>154,401</td>
<td>182,881</td>
<td>330,123</td>
<td>837,478</td>
<td>1,504,883</td>
</tr>
</tbody>
</table>
The chart above provides the sources of capital financing for the 2014 – 2023 forecast period. The growth related infrastructure investment included in the 2014 – 2023 forecast to accommodate for growth is $232.6 million, which will be funded from debt with the associated debt charges recovered from development charges over the next 20 years.

The 2014 – 2023 Capital Forecast includes $28.6 million in funding from WIP’s in 2014. Capital funding from reserves in years 2014 through 2017 totals $52.1 million, which helps to mitigate debt financing.

**Wastewater Treatment Upgrade & Expansion Project**

The implementation plan for the Upgrade and Expansion of the Woodward Avenue Wastewater Treatment Plant is consistent with the 2013 Rate Budget, in that the plant improvements are forecast using a phased approach. Phase 1 is for effluent treatment improvements and Phase 2 is for expansion of the treatment plant to accommodate growth. The majority of the growth component costs ($248.5 million) are forecast beyond the 10 year period (2014 – 2023) in the 2014 Budget.

The total budget for the Wastewater Treatment Plant upgrade and expansion has increased by $42.4 million in the 2014 budget compared to the 2013 budget. The budget increase is mainly attributable to budgeting for contingencies and cost escalation in the 2014 budget. However some of the costs forecast in the 2013 budget for years 2014 and 2015 have been deferred to 2016 and 2017 in the 2014 budget.
The table above provides a comparison of the budgeted costs in the 2013 and 2014 Rate Budgets for the Wastewater Treatment Plant upgrade and expansion.

### Projected Water / Wastewater / Storm Debt

The 2013 Water, Wastewater and Storm Budget incorporates a significant reliance on both rate supported debt and growth related debt supported from development charges over the 10-year period. The rate supported debt financing for the 10 year period 2014 – 2023 has decreased approximately $110 million, whereas the DC supported debt financing has remained about the same over the same period, resulting in an overall net decrease in debt financing from what was forecast in the 2013 Rate Budget. The decreased reliance on debt is attributable to the $100 million Federal Subsidy to help fund the Clean Harbour Project, which was not included in the 2013 Budget as the subsidy commitment had not been confirmed until the fall of 2013. The 2014 Budget also incorporates using $52 million in funding from the Wastewater Reserve which also reduces the reliance on debt financing.

The rate supported debt is projected to peak at $308 million in 2017, compared with the 2013 budget forecasted debt peak at $394 million in 2016. The debt funded from DC’s is projected to peak at $297 million in 2019, whereas the 2013 forecast was $325 million in 2017. These levels of debt supported by development charges represent a significant risk if future growth does not materialize as planned; however, relative to forecasts in previous years, the risk has been deferred as a significant portion of the growth component of the Wastewater Plant Expansion is now planned in the years beyond the next 10 years until after 2023. This will allow an opportunity to monitor growth and DC Revenues over the next 10 years (2014 – 2023) and make adjustments to the plant expansion project and associated financing plan to align with growth requirements.
next 10 years (2014 – 2023) and make adjustments to the plant expansion project and associated financing plan to align with growth requirements.

The table above provides the ten year debt forecast compared to the 2013 Budget forecast.

Consistent with the 2013 Rate Budget, and in an effort to more accurately forecast debt levels and the associated debt charges, the major multi-year Wastewater Treatment Plant projects are budgeted based on the projected cash flow of expenditures for the 2014 Rate Capital Budget, versus full commitment based budgeting.

The graph below compares the total outstanding debt (Rate & DC Funded) from the 2013 Budget forecast to the 2014 Budget forecast. The graph illustrates the overall decrease of the forecasted debt issuance from the 2013 forecast for the 10 year period 2014 - 2023.
The top graph below illustrates the projected outstanding debt for the 10 year period (2014 – 2023) and the funding source of the associated debt charges. The bottom graph below shows the forecasted debt charges funded by water / sewer rates and by Development Charges.

### Water / Wastewater / Storm Outstanding Debt

![Graph showing Water / Wastewater / Storm Outstanding Debt](image)

### Projected Debt Charges

**Water / Wastewater / Storm**

![Graph showing Projected Debt Charges](image)
Impact of Capital Budget on Operating Budget

As summarized below, the 2014 Rate Budget incorporates $103.4 million in capital financing costs which is an increase of $6.8 million from the 2013 budgeted financing costs. The 2014 budgeted debt charges decrease of $0.7 million from 2013 are offset by an increase in Contribution to Capital of $8.5 million from 2013. The DC Exemption Funding has decreased by $1.0 million from $9.0 million in 2013 to $8.0 million in 2014.

The graph on page 73 highlights the annual requirement required to pay for the Rate Supported Capital program. Capital financing costs are projected to increase from $96.6 million in 2013 to $153.2 million in 2023. Rate supported debt charges are expected to increase from 5.9% of total water/wastewater revenues in 2013 to 16.3% in 2018, and decline to 13.0% in 2023.

### WATER, WASTEWATER & STORM IMPACT OF CAPITAL ON OPERATING BUDGET (000's)

<table>
<thead>
<tr>
<th></th>
<th>2013 APPROVED</th>
<th>2014 PROPOSED</th>
<th>CHANGE $</th>
<th>CHANGE %</th>
<th>2014 - 2023 FORECAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt to be Issued</td>
<td>30,910</td>
<td>22,097</td>
<td>(8,813)</td>
<td>-28.5%</td>
<td>85,801</td>
</tr>
<tr>
<td>Debt Charges (Net)</td>
<td>10,118</td>
<td>9,419</td>
<td>(699)</td>
<td>-6.9%</td>
<td>288,643</td>
</tr>
<tr>
<td>Contribution to Capital</td>
<td>77,500</td>
<td>86,005</td>
<td>8,505</td>
<td>11.0%</td>
<td>906,338</td>
</tr>
<tr>
<td>DC Exemption Funding</td>
<td>9,000</td>
<td>8,000</td>
<td>(1,000)</td>
<td>-11.1%</td>
<td>72,460</td>
</tr>
<tr>
<td>Impact on Operating Budget</td>
<td>96,618</td>
<td>103,424</td>
<td>6,806</td>
<td>7.0%</td>
<td>1,267,441</td>
</tr>
</tbody>
</table>
Woodward Wastewater Treatment Plant Upgrade and Expansion

The implementation and subsequent financing plan for Hamilton’s Woodward Avenue Wastewater Treatment Plant (WWTP) Upgrade and Expansion Program (WWTP Program) has been revised from the 2013 Rate Budget Program presented to Council. The current financing strategy includes a $100 million commitment from the Federal Government and $100 million in Provincial subsidy to support the wastewater treatment plant rehab and upgrades. Correspondence from the Federal Government dated September 30, 2013 indicated that the federal review of the project had been completed and that the project had been deemed eligible for a maximum contribution of up to $100 million. The submitted project for Federal Subsidy eligibility (phase 1) dealt only with the rehabilitation phase of the Woodward Wastewater Plant.

Staff have identified mitigating measures including the deferral of capital investments in an effort to alleviate the reliance on both debt and reserves. It should be noted that the above subsidy and commitment assumption is aligned to report PW12060/FCS12064 Green Infrastructure Fund Application – Water Quality Upgrade to Woodward Wastewater Treatment Plant. The current Development Charges By-law does not reflect the commitment from the Federal Government to support the wastewater treatment plant rehabilitation.
Financial Review

and upgrades. Now that the Federal commitment has been confirmed, it will be incorporated into the 2014 Development Charges Background Study and By-law, which are expected to be presented in early-mid 2014.

The revisions were implemented in order to best align the investment need with changing economic conditions and affordability that drive the overall water and wastewater program. This revised approach will allow for the delivery of a water quality upgrade by 2017 and a revised expansion for growth by 2024 (construction) without negatively impacting the 10-year Water, Wastewater, and Storm Rate Budget.

The original Green Infrastructure Fund (GIF) funding commitment stipulated a substantial completion date for all constructed works of 2014. However, a revised implementation plan was necessitated as a result of changes in the overall program planning conditions including significant reduction in water consumption and subsequent flows to the WWTP resulting from a combination of the effects of the past recession, as well as conservation regulations and a decline in overall water consumption across all sectors and a loss of Institutional, Commercial, and Industrial (ICI) customer base.

A revised implementation plan was also pursued due to continuing concerns for the overall program affordability and the timing and pace of debt financing (both rate and development charge supported).

The basis for the revised implementation plan is to postpone the expansion elements of the WWTP Program to accommodate future requirements, while in the relative short-term, deliver a water quality improvement project that improves effluent quality from the WWTP to support the City’s commitment to meeting the targets set by the Hamilton Harbour Remedial Action Plan (HHRAP).
for the de-listing of Hamilton Harbour as an International Joint Commission designated Area-of-Concern.

The City has a revised implementation plan based on proceeding with a Water Quality Upgrade for the WWTP having a completion date of 2017 and deferring the expansion for growth to 2022 (design, construction in 2024). In order to develop the details for the Water Quality Upgrade (referred to as the ‘Clean Harbour Project’), staff undertook a work plan which validated Design Concepts, Financial Affordability, Project Delivery Options and Stakeholder Consultation. The resulting effort demonstrated that a Clean Harbour Project can be implemented in a financially sustainable manner within the established revised timelines. The proposed balance of costs of the Clean Harbour Project is currently estimated at $362 Million.

The revised costs and funding of the Clean Harbour Project are summarized in the following table. The table focuses on the future Wastewater Plant rehabilitation costs of $362 million and illustrates the impact on the ratepayer of $200 million in subsidies. With the $200 million in funding, ratepayers are expected to contribute $137 million. Not receiving subsidy funding would mean that other water/wastewater programs would have to be significantly reduced in order to complete the repairs and upgrades to the Wastewater Plant.

The following fiscal benefits would accrue to the ratepayers of Hamilton as a result of the revised WWTP Upgrade and Expansion Program;

- Net project cost increases to the ratepayer would remain within Council’s forecast 10-year guideline of 4.25%.
- The expansion of the WWTP would be deferred to 2024 (construction). This would allow the City to accumulate increased DC’s and smooth out debt requirements for the cost of the plant rehabilitation and expansion.

### Wastewater Plant Rehabilitation (Phase 1) 2014-2023 ($000’s)

<table>
<thead>
<tr>
<th>Gross Cost (excluding WIP's)</th>
<th>$ 362,000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding</strong></td>
<td></td>
</tr>
<tr>
<td>Subsidy</td>
<td>200,000</td>
</tr>
<tr>
<td>DC's residential (66%)</td>
<td>16,038</td>
</tr>
<tr>
<td>DC's nonresidential (34%)</td>
<td>8,262</td>
</tr>
<tr>
<td><strong>Rate budget</strong></td>
<td>137,700</td>
</tr>
<tr>
<td><strong>Total Revenues</strong></td>
<td>362,000</td>
</tr>
</tbody>
</table>
Development Charges (DC) – Water, Wastewater, and Storm

Risk Assessment of DC Revenues Meeting Debt Obligations

A critical financial issue with the growth-related repair and expansion of the Wastewater Plant and other growth-related rate services infrastructure is that once the capital spending occurs (most of it in advance of DC collections), the DC revenue has to keep coming in on a consistent basis year after year in order to pay the debt charges associated with this work. The City’s credit rating agencies had been concerned with the amount of Rate Budget DC debt since the wastewater plant’s expansion had been first introduced in 2009. What is different in this year’s forecast from previous years is that the Wastewater plant project has now been split into 2 distinct phases consisting of the repair and upgrade of the existing plant (Phase 1) and the expansion of the plant (Phase 2). By splitting the project into 2 phases and deferring the second phase by approximately 5 years, staff have been able to smooth out the funding requirements and decrease the forecast DC supported debt peak.

Also, the funding impact of DC’s on the first phase of the repair and rehabilitation of the plant ($362 million – 15% growth related after subsidy application) isn’t as significant as the plant expansion ($258 million - 100% growth related). Therefore the front-ending of the growth-related capital cost has now been greatly reduced as a risk factor.

The City’s 2014-2023 Development Charge Debt Principal projections for all rate services growth infrastructure are shown in the table below. The debt projections are based on new infrastructure required according to the Provinces

<table>
<thead>
<tr>
<th>Projected DC Supported Debt ($ Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 Rate Budget Funded from DC's (20 Yr)</td>
</tr>
<tr>
<td>62</td>
</tr>
</tbody>
</table>
“Places to Grow” population and employment forecasts. One of the rate DC debt assumptions is that all growth infrastructure is 100% debt financed. At a 5% financing rate and 15-year amortization, the annual debt payments (P & I) would be approximately 10% of the principal amount.

The following table presents a 6-year history of residential and non-residential development starts in the City of Hamilton. The significance of this Table is that historical development activity may be a good indicator of future development trends and the resulting development revenue that may be projected in order to determine the risk of meeting future DC debt obligations. The starts and DC activity in 2010 represents an anomaly due to a significant development charge (DC) rate increase phase-in and the fact that developers rushed to complete building permits to take advantage of lower rates of the previous DC by-law.

There are concerns regarding recent slow economic conditions and their long-term impact on development activity. Historical trends indicate that the Province’s projections regarding future population growth may not be aligning with actual development activity.

### City of Hamilton Development Activity

<table>
<thead>
<tr>
<th>Year</th>
<th>Single-Detached Unit Equivalent</th>
<th>Non-Residential (Sq.Ft.)(rateable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>1803</td>
<td>1,512,918</td>
</tr>
<tr>
<td>2009</td>
<td>1053</td>
<td>946,092</td>
</tr>
<tr>
<td>2010</td>
<td>2102</td>
<td>2,857,736</td>
</tr>
<tr>
<td>2011</td>
<td>1167</td>
<td>1,025,991</td>
</tr>
<tr>
<td>2012</td>
<td>2027</td>
<td>1,416,744</td>
</tr>
<tr>
<td>2013</td>
<td>1513</td>
<td>1,025,000</td>
</tr>
<tr>
<td>6-year Average</td>
<td>1,611</td>
<td>1,464,080</td>
</tr>
<tr>
<td>2014 Projection</td>
<td>1750</td>
<td>750,000</td>
</tr>
<tr>
<td>2015 Projection</td>
<td>1750</td>
<td>750,000</td>
</tr>
<tr>
<td>2016 Projection</td>
<td>1750</td>
<td>750,000</td>
</tr>
</tbody>
</table>
The table above compares the Provincial forecast development activity with the City’s historical activity. Also included in the City numbers is a conservative DC activity projection for the term of the “Places to Grow” forecast. This table shows that development activity in the City has not kept pace with the Provincial forecast. This means that the City is falling further behind in development activity and related revenues needed to support the debt required for the Places to Grow infrastructure.

As the City goes forward with its growth infrastructure plans, current policies must sustain the “Places to Grow” growth patterns. The City is basing its growth planning on Provincial forecasts which peg Hamilton’s population at 660,000 by 2031. To date, the City is falling short of projections.

The Province’s Growth Plan for the Greater Golden Horseshoe (Places to Grow) released in June 2006, directs that by 2031, the City of Hamilton plan for a population of 660,000 and employment of 300,000. As required under the “Places to Grow Act” 2005, the City of Hamilton must bring its Official Plan into conformity and use the population targets to plan for the infrastructure required to service same.

However, census data has shown that Hamilton (as well as other municipalities) is not keeping pace with the projected growth. For example, Hamilton over the last 6 years has averaged 1,611 single-detached unit equivalents for its residential construction activity. Places to Grow, in its forecast to 2031, requires Hamilton to average approximately 2,566 units annually. That forecast is what staff must plan for in expanding, for example, the wastewater capacity. If the growth does not occur, the City would still have to meet its debt obligations which funded the growth infrastructure. The City does not have the financial capacity to meet these obligations from non-rate sources. Accordingly, if growth projections do not materialize, the debt becomes unaffordable and will further impact water and wastewater rates.
There are several steps the City has taken to minimizing its risk exposure in meeting annual projected DC debt payments. These include:

a) The phasing in of the wastewater plant expansion. The further out in time the plant expansion occurs, the more time the City would have to meet development activity/revenue targets.

b) Increased subsidy from the Federal/Provincial Governments for growth related rate projects. This would reduce the amount of financing required.

c) Create DC reserve policies which minimize risk. One such example would be to limit reserve balances to a minimum balance which must equal 2 or 3 years of DC debt payments.

d) Staging of Development. The City has such a program in place which ensures that only available DC revenues are targeted first to those developments which maximize assessment growth. There would be no funding of DC projects with phantom DC revenues (revenues which have not been collected to date).

The Woodward Avenue wastewater treatment plant, water, wastewater linear and storm growth infrastructure represent a significant part of the City’s Development Charges. The increase in water and wastewater DC’s is happening across municipalities in southern Ontario as a consequence of growth and more stringent Provincial and Federal water and wastewater regulations regarding water quality and the quality of wastewater effluent.

In order to address the excess wastewater flow and the forecasted growth potential for the City, a substantial plant expansion is required. Since the 2009 Rate Budget deliberations, staff indicated to Council that there is significant risk attached to the current Wastewater plant expansion as it relates to meeting the Province’s “Places to Grow” development forecasts and generating enough growth revenue to pay for the capital costs attributed to growth. This is especially significant, as it relates to current recessionary economic conditions and the corresponding decrease in residential construction activity.

The 2014 Rate Capital Budget and 10 year forecast reflect the phasing of the Wastewater plant expansion. The DC Reserve forecast projects a positive reserve balance based on meeting staff’s growth forecast and the phasing of the plant expansion.

Table below examines the risk of forecast DC revenues covering forecast DC debt. The information illustrates that forecast DC rate revenues for the 10-year period 2014 – 2023 is greater than the budgeted DC debt requirements by $131 million. The forecast DC rate revenue is a conservative figure which takes into account the 6-year historical development activity average. The funding strategy was accomplished by splitting the wastewater plant development into 2 phases (rehab/upgrade – phase 1, expansion – phase 2) and deferring the 2nd phase beyond 2023. The surplus DC fund balance as presented below in 2023 would then be applied to the Plant expansion costs which would be scheduled for implementation in 2024.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Debt payments</td>
<td>3</td>
<td>9</td>
<td>17</td>
<td>23</td>
<td>25</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>DC Exemptions</td>
<td>(8)</td>
<td>(8)</td>
<td>(8)</td>
<td>(7)</td>
<td>(7)</td>
<td>(7)</td>
<td>(7)</td>
<td>(7)</td>
<td>(7)</td>
<td>(7)</td>
<td>(7)</td>
</tr>
<tr>
<td>(surplus) / loss</td>
<td>(33)</td>
<td>(27)</td>
<td>(19)</td>
<td>(12)</td>
<td>(10)</td>
<td>(8)</td>
<td>(7)</td>
<td>(6)</td>
<td>(5)</td>
<td>(4)</td>
<td>(131)</td>
</tr>
</tbody>
</table>
The Woodward Avenue wastewater treatment plant, water, wastewater linear and storm growth infrastructure represent a significant part of the City’s Development Charges. The increase in water and wastewater DC’s is happening across municipalities in southern Ontario as a consequence of growth and more stringent Provincial and Federal water and wastewater regulations regarding water quality and the quality of wastewater effluent.

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The 2014 Rate Capital Budget and 10 year forecast reflect the phasing of the Wastewater plant expansion. The DC Reserve forecast projects a positive reserve balance based on meeting staff’s growth forecast and the phasing of the plant expansion.

**Projected Water / Wastewater / Storm Reserves**

The graph below provides the projected reserve balances for the Water, Wastewater and Storm programs. The reserve forecast reflects utilizing $40.0 million in reserve funds to fund the Woodward Wastewater Treatment Plant – Clean Harbour project in years 2015 ($5 million), 2016 ($30 million) and 2017 ($5 million) in order to reduce the reliance on debt to fund the project. As well, $5.0 million is being used to fund the Wastewater System Lining Program in 2015, which also reduces the reliance on debt.

Development of the West Harbour is partially being funded from the Rate budget for water/wastewater infrastructure projects such as water/sewer servicing, pumping station and force main. The cost of these projects totaling $7.2 million is funded from the reserve over years 2014 – 2017.

The reserve forecast also reflects potentially utilizing $5.6 million in total from the reserve in years 2013 to 2015 to provide future compassionate flood relief to residential property owners in addition to contributions to support previous flooding commitments.

Reserves are essential to assist the City in mitigating unanticipated events such as consumption fluctuations, unforeseen increase in capital costs and potentially to decrease future debt issuance. The current reserve forecast indicates the reserve balance will decrease from $92 million at the end of 2012, to $46 million in 2017 and then increase over the years to $54 million in 2023.
Clean Harbour project in years 2015 ($5 million), 2016 ($30 million) and 2017 ($5 million) in order to reduce the reliance on debt to fund the project. As well, $5.0 million is being used to fund the Wastewater System Lining Program in 2015, which also reduces the reliance on debt.

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USER FEES

Trends in Water Rate Charges 2005-2014

Hamilton’s overall average annual water rate increase is 5.7% before adjusting for inflation during the 10 year period from 2005 to 2014. Accounting for inflation results in the overall average annual rate increase over the same period amounting to 3.62%.

The chart below shows the trend in Hamilton’s water rates for the period 2005 to 2014.

Comparative Rates
In recent years, staff reported that Hamilton’s water and wastewater/storm rates have remained competitive, inclusive of the fact that annual rate increases over the past decade averaged 5.7%, before adjusting for inflation.

An updated review of 2013 annual water and wastewater/storm charges places Hamilton, in the case of residential users, within the low range of a 15 municipality comparator group.

Over the past decade, Hamilton’s ability to maintain competitive water and wastewater/storm rates, given the magnitude of the rate increases approved over this same period, is a reflection of the fact that similar to Hamilton, other municipalities are addressing many of the same investment requirements identified above. Also, it should be noted, that other municipalities, like Hamilton, have adjusted consumption forecasts as a result of conservation efforts.

Over the period 2002 to 2013, Hamilton’s residential annual water and wastewater/storm bill has ranged from 8th to the current ranking of 13th. Other municipalities within the comparator group are facing similar infrastructure
investment requirements as Hamilton. Even though Hamilton is one of the few listed in the comparator group that largely funds its stormwater management program through its wastewater/storm fee, it still has been able to maintain competitive rates. In the case of commercial and industrial ratepayers, the comparison of average annual charges indicates that Hamilton ranks in the mid-range which is consistent with last year.

### 2013 COMBINED METERED WATER/WASTEWATER CHARGE COMPARISON WITH OTHER MUNICIPALITIES

<table>
<thead>
<tr>
<th>MUNICIPALITY</th>
<th>AVERAGE RESIDENTIAL 210 M³</th>
<th>SMALL COMM/IND 325 M³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Charge</td>
<td>Ranking</td>
</tr>
<tr>
<td>Norfolk</td>
<td>$1,268</td>
<td>1</td>
</tr>
<tr>
<td>Haldimand</td>
<td>$981</td>
<td>2</td>
</tr>
<tr>
<td>Cambridge</td>
<td>$881</td>
<td>3</td>
</tr>
<tr>
<td>St. Catharines</td>
<td>$837</td>
<td>4</td>
</tr>
<tr>
<td>Guelph</td>
<td>$810</td>
<td>5</td>
</tr>
<tr>
<td>Brantford</td>
<td>$793</td>
<td>6</td>
</tr>
<tr>
<td>Waterloo**</td>
<td>$760</td>
<td>7</td>
</tr>
<tr>
<td>Kitchener**</td>
<td>$753</td>
<td>8</td>
</tr>
<tr>
<td>London**</td>
<td>$730</td>
<td>9</td>
</tr>
<tr>
<td>Ottawa*</td>
<td>$718</td>
<td>10</td>
</tr>
<tr>
<td>Durham</td>
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</tr>
<tr>
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</tr>
<tr>
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<td>13</td>
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<tr>
<td>Toronto*</td>
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<td>14</td>
</tr>
<tr>
<td>Peel</td>
<td>$344</td>
<td>15</td>
</tr>
</tbody>
</table>

* Include stormwater management in their rates.
** Have dedicated stormwater management user fee that is excluded in above table.

Note: All other municipalities fund stormwater from property taxes.
## 2013 Combined Metered Water/Wastewater Charge Comparison with Other Municipalities

<table>
<thead>
<tr>
<th>MUNICIPALITY</th>
<th>MID-SIZE COMM/IND 2,272 M³</th>
<th>LARGE COMM/IND 22,727 M³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Charge</td>
<td>Ranking</td>
<td>Annual Charge</td>
</tr>
<tr>
<td>Cambridge</td>
<td>$8,201</td>
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</tr>
<tr>
<td>Kitchener**</td>
<td>$8,151</td>
<td>2</td>
</tr>
<tr>
<td>Waterloo**</td>
<td>$7,928</td>
<td>3</td>
</tr>
<tr>
<td>Norfolk</td>
<td>$7,643</td>
<td>4</td>
</tr>
<tr>
<td>Brantford</td>
<td>$7,541</td>
<td>5</td>
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<tr>
<td>Ottawa*</td>
<td>$7,483</td>
<td>6</td>
</tr>
<tr>
<td>Guelph</td>
<td>$6,892</td>
<td>7</td>
</tr>
<tr>
<td>St. Catharines</td>
<td>$6,883</td>
<td>8</td>
</tr>
<tr>
<td><strong>Hamilton</strong></td>
<td><strong>$6,247</strong></td>
<td><strong>9</strong></td>
</tr>
<tr>
<td>Toronto*</td>
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<td>10</td>
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<tr>
<td>Halton</td>
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<td>11</td>
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<tr>
<td>London**</td>
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<td>12</td>
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<td>Haldimand</td>
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<tr>
<td>Peel</td>
<td>$3,724</td>
<td>15</td>
</tr>
</tbody>
</table>

* Include stormwater management in their rates.

** Have dedicated stormwater management user fee that is excluded in above table.

Note: All other municipalities fund stormwater from property taxes.
CONSUMPTION AND RATE-GENERATED REVENUES

Metered Water Consumption

Currently, the City of Hamilton has approximately 144,000 metered water accounts. Residential users account for 92.3% of total metered accounts and approximately 50.7% of total water consumption. While industrial, commercial, institutional and multi-residential accounts only make up 7.3% of total metered accounts, ICI and multi-residential water consumption accounts for 47.2% of total consumption.

2013 Consumption Forecast

Environment Canada tracks municipal water usage and has

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**Metered Accounts by Sector**

- Residential, 92.3%
- ICI & Multi-Res, 7.3%

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**2013 Forecast Metered Consumption by Sector**

- Residential, 50.7%
- ICI & Multi-Res, 47.2%
- Halton, 0.2%
- Haldimand, 1.9%
observed a downward trend on water consumption across the country over the last decade.

For 2013, total water and wastewater/storm revenues are projected to amount to $154 million, based on metered sales of approximately 57 million cubic metres. The 2013 metered and non-metered water and wastewater/storm revenues are forecast to be approximately $9.6 million below budget.

The top figure on page 87 highlights consumption trends in the residential sector.

The average water consumption, per household, during the last three years was approximately 216 m³, and for the purpose of the 2013 forecast 202 m³ was assumed.

The residential sector is forecasting a budget variance for 2013, reflecting ongoing conservation efforts.

The bottom figure on page 87 highlights consumption trends in the ICI & Multi-Residential sector.

For the period January to October 2013, total ICI & Multi-Residential consumption accounts for approximately 24.8 million cubic metres or 51% of total water consumed, versus 25.6 million cubic metres over the same period in 2012.

A 2013 budget variance has been identified in the ICI & Multi-Residential sector as the ICI & Multi-Residential sector remains at low consumption levels relative to the period 2003-2007.
Residential Water Consumption

For the period January to October 2013, total ICI & Multi-Res consumption accounts for approximately 24.8 million cubic metres or 51% of total water consumed, versus 25.6 million cubic metres over the same period in 2012.

Industrial / Commercial / Institutional & Mid-Res Water Consumption

For the period January to October 2013, total ICI & Multi-Res consumption accounts for approximately 24.8 million cubic metres or 51% of total water consumed, versus 25.6 million cubic metres over the same period in 2012.
In the 2011 Environmental Performance report of the Hamilton Industrial Environmental Association (HIEA), the City’s largest manufacturers and other companies reported large reductions in water consumption. The report found that HIEA member companies have reduced potable water use by 52% since 2007 and that City water use over the past five years shows a declining trend. Further more, economic conditions have negatively impacted water consumption with sluggish recovery in the ICI & Multi-Residential sector.

Staff will continue to monitor consumption across all sectors and take efforts to ensure that the City is maximizing its full revenue potential with respect to metered water and wastewater/storm. Similarly, staff will be monitoring changes in consumption on an ongoing basis identifying trends and related financial impacts through the Budget Variance Reports and Information Reports provided to Council.

**2014 Consumption Budget**

Over the past number of years, staff recommended varying degrees of adjustment to the consumption assumptions in recognition of changing demand for water across all sectors.

For 2014, total metered water consumption is forecast at approximately 58.5 million cubic metres, a reduction of approximately 4.6% relative to 2013 budget. The following chart compares forecast budgeted consumption in the years 2013 and 2014.

Based on the review of residential consumption patterns, residential consumption, on average, has been declining over the past decade. The declining

![Hamilton Consumption M³](image_url)
consumption reflects ongoing conservation efforts associated with fixture/appliance obsolescence such as the installation of water efficient toilets and washer machines. For 2014, staff is recommending that the forecast for average residential consumption be reduced to 210 m³ to reflect consumption trends observed in 2010 – 2013.

It is not clear how much further average residential consumption can decline, but there exists the potential for further declines, principally due to conservation efforts and the associated regulations. For example, the Ontario Building Code has changed requirements related to the installation of high-efficiency toilets (4.5L) and expanding the end uses of rainwater and other non-potable water.

The ICI & Multi-Residential sector has experienced significant revenue shortfalls in the last several years that resulted in staff recommending for the 2011 Rate budget with subsequent Council approval, that ICI & Multi-Residential budgeted consumption be reduced over a 3 year period (2011-2013) to consumption realized for the ICI & Multi-Residential sector in 2009-10 as consumption has not rebounded to pre-recession levels. For the 2014 ICI & Multi-Residential sector consumption forecast, staff is recommending basing consumption on prior year actuals to better reflect the consumption trends that have been seen in the past few years.

Under long-term arrangements, Hamilton supplies Haldimand County and Halton Region potable water but does not provide wastewater/storm services to either community. The following chart compares consumption in the years 2013 and 2014.
10-Year Consumption Budget

Total water consumption over the 10-year budget is projected to slightly decrease. This relatively conservative forecast reflects the following:

• Lack of recovery from the 2009-10 recession and continued uncertainty surrounding growth/decline of consumption in the ICI & Multi-Residential sector
• Price elasticity in the ICI & Multi-Residential sector
• Conservation impacts
  • e.g. residential toilet consumption = 30% of indoor consumption
  • newer high-efficiency toilets (4.5L) represents 25% reduction over 6L toilet flush
  • 5% reduction in residential use = reduction of 1.6M m³
  • energy conservation initiatives in the ICI & Multi-Residential sector usually include water impacts
• Haldimand water agreement that expires in 2014
• Renewed Halton water agreement executed in 2011

PRICING STRATEGY AND WATER DEMAND

The cost of supplying clean water for residential use is influenced by demand and
the cost of production. In addition to the cost of production, many municipalities, like Hamilton, have had to introduce financing strategies that incorporate the cost of replacement and remediation of aging infrastructure. All water service providers are mindful of the increasing costs of production, especially with respect to energy. This has undoubtedly spurred the increasing attention that the study of water demand seems to receive from water supply and environmental authorities.

In basic economic theory the key principle to explain why conservation-oriented pricing works is referred to as the price elasticity of demand. In simple terms, people respond differently to changes in price for different goods and services. Some goods and services are very inelastic, meaning that people’s consumption does not change much when the price goes up. Inelastic goods are typically ones that have few substitutes or where having them is a necessity. Given the much higher cost of bottled water, municipal water is not cost effectively substituted.

Research has shown that water demand can, to some extent, be manipulated by price for discretionary uses (lawn watering, car washing, and swimming pools), however, water demand is relatively price inelastic (changes in price do not materially impact demand), particularly when other conservation programs have been implemented, as is the case in Hamilton.

Many home technologies and simple behaviour changes can reduce consumption without significant difficulty or costs. Even for the non-residential sector, research has shown that the response to water price changes is similar to households that begin to change practices and replace old technology.

There have been studies that show that outdoor water use is much more sensitive (elastic) to price changes than indoor water use. Despite this, research suggests that the most likely range for elasticity of residential water demand is – 0.20 to 0.40, which means a 10% increase in price lowers demand by 2 - 4%. However, with the presence of other conservation and efficient water use programs, as is the case in Hamilton, it is reasonable to anticipate that the potential reductions would tend to be at the low end of the range.

Overall the research and Hamilton’s experience, provides evidence that water is relatively “inelastic”, meaning that when the price increases, consumption decreases, but at a lower rate than the increase in price. While water demand elasticity varies both between user groups and seasonal periods, research indicates that water demand in all user classes and all time periods is predominately inelastic.