AN INDUSTRIOUS CITY

Hamilton is an industrious city willing to make bold financial decisions for the betterment of the community.

We use proactive, forward thinking when planning strategic investments to ensure continuous improvements to the water and wastewater systems.

Protecting and conserving our water source will ensure continuous safe drinking water for residents to enjoy for years to come.

Water is the essence of life; Hamilton’s ability to provide clean, safe drinking water for its residents as well as protect the natural environment through wastewater collection and treatment is a fundamental task of the City.
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PROJECTS FORTHCOMING

As we celebrate the 150th anniversary of municipal drinking water, we reflect on the many circumstances, improvements and upgrades involving Hamilton’s water and wastewater systems that have taken place over the years.

Similarities abound. In the mid-1800s Council faced significant challenges to protect public health, property and the environment. Constructing

from: Canadian Illustrated News October 3, 1863 The Hamilton Gore

Photo above: Gore Park, 2008
a waterworks system was a huge undertaking and financial burden. Hamilton not only faced this challenge, but led the way using advanced technology for the time.

In 2009, Council faces significant challenges including the decision to proceed with the expansion required at the wastewater treatment plant. The extent of the wastewater infrastructure upgrade that must be completed is a tremendous undertaking at a vast cost. Once again, Hamilton has embraced that challenge, finding solutions and overcoming challenges to build a stronger community using advanced technology and rising above in a culture of leadership making us able to protect public health, property and the environment in Hamilton.
ENSURING A HIGH QUALITY OF DRINKING WATER

Filtration and Purification Plant
The 1933 Water Filtration building has the capacity to treat 909 million litres of water a day and currently supplies treated drinking water to approximately 480,000 customers within Hamilton as well as neighbouring municipalities.

Over the years, expansions and continuous upgrades have taken place to ensure a clean, safe cost-efficient continuous supply of drinking water. But, due to the age of the facility the architectural and structural components of the Water Filtration building have reached the end of their useful lives.

Recent joint funding from the provincial and federal levels of the government through the Infrastructure Stimulus Fund will be used towards completing a structural rehabilitation and exterior architectural facelift. The work will maintain the historical and architectural elements of the building and extend the life of the facility for another 60 to 80 years. This upgrade provides the ability to return the facility to its previous glory while ensuring the health and safety of our employees as they continue to provide the residents of Hamilton with clean, safe, high-level drinking water.

Photos from:
October 20, 2000, Rehabilitation of Water Filtration Facility
Water Filtration Facility

General Contractor

The original 1933 facility was completed by W.H. Yates

The reconstruction of the facility is being completed by Alberici Construction

Through a series of changes in ownership, what was once W.H. Yates is now a subsidiary of Alberici Construction

Photo from: October 20, 2000
Rehabilitation of Water Filtration Facility
Ferguson Avenue Pumping Station

Through the Infrastructure Stimulus Fund, in 2010 we will be completing the construction of a new Ferguson Pumping Station to the east of the current building on Ferguson Avenue. The current 1912 Ferguson Pumping Station is one of the oldest and most critical pumping stations in the Hamilton system. It could be considered the heart of one of our most populated areas in the distribution system as water is pumped to this location from the Woodward Water Treatment facility and then proceeds to reservoirs supplying our downtown water distribution system. Over the years it has been upgraded and has continued to service the residents with clean, safe drinking water but it has surpassed its life expectancy.

Photos from:
July 24, 2009
Ferguson Pumping Station
Reservoirs

Upgrades will be ongoing until approximately 2012 at various reservoirs across Hamilton as they are key elements of the system and rehabilitating them is essential to ensure a reliable continuous operation of the water distribution system going forward.
Water Efficiency Master Plan
Quick access to Lake Ontario has blessed the City with an abundant, excellent raw water source for our drinking water system. Hamiltonians are accustomed to having a continuous supply of high quality water available for any reason. Industrial, commercial and residential property owners formed the backbone of the community throughout the middle of the twentieth century that was dependent on this water and the idea of having to conserve or worry about supplies never entered the consciousness of the average person.
Now with international focus on dwindling water resources around the world the need to conserve has become relevant. Hamiltonians understand that water conservation is our social and environmental responsibility.

Early this year the City initiated a Water Efficiency Master Plan. This plan will take into account the projected growth rate (both residential and non-residential demands), the condition of the existing infrastructure (both water and wastewater), planned capital works, available budget and determine through a cost benefit ratio conservation programs that make financial sense for the City of Hamilton and protect and conserve our valuable resource.
Dealing with climate change and its extreme weather events has become a major concern for municipalities throughout Canada and the world. Climate change continues to present circumstances that previously have not been experienced or planned for. Since 2005, the City has experienced summer rains that are unprecedented and much of the rainwater flows through combined sewer systems. Combined sewer systems, which carry sanitary and rainwater flows, are in abundance within the old City of Hamilton.
The plan for Wastewater Treatment facility upgrades and expansion include various sub-projects beginning in the fall of 2009. The expansion assists in meeting key City initiatives which include:

- Improve water quality discharged from our wastewater system and delisting Hamilton Harbour as an “Area of Concern” with the International Joint Commission by 2015
- Ensure future servicing requirements are met that will allow the City to grow
- Capture and treat more wet weather flow to meet Ministry of the Environment Procedure F-5-5 and Hamilton Harbour Remedial Action Plan Targets

A holistic approach was taken when the City was determining key initiatives that must be obtained through an expansion. Climate change and extreme weather conditions will be better addressed by the increased capacity and the treatment process.

This $700 million wastewater expansion will result in a substantial drop in pollutant loadings (phosphorous, ammonia and solids) and increase the treatment capacity of the plant from an average day flow of 409 million litres per day to 500 million litres per day.
Hamilton has taken a number of steps over past years working towards the remediation of Hamilton Harbour. Currently we are meeting initial Remedial Action Plan targets and with a substantial drop in pollutant loadings we will be moving aggressively towards getting Hamilton Harbour delisted as an “Area of Concern” by the International Joint Commission.

The Primary Clarifier Upgrades are the first of a series of major projects being undertaken as part of the expansion. The Primary Clarification process will increase peak primary treatment from 614 million litres per day to 1300 million litres per day and through de-chlorination provide a non-toxic effluent. This will be accomplished by constructing a new Chemically Enhanced Primary Treatment Process, two new primary clarifiers and a new chlorine contact tank valued at approximately $50 million. It is anticipated this project will be completed by mid-2011.

The Engineering Design and Contract Administration Services for the five remaining major expansion projects has been awarded to a consortium of internationally acclaimed consulting engineers. It is expected the tendering process for these projects will begin in the spring of 2010. The projects include:

- Construct a new Raw Wastewater Pumping Station
- Upgrade and expand the site wide electrical system including standby power
- Construct a new Membrane Facility
- Upgrades to the Outfall and Red Hill Creek
- Upgrades to the Dewatering Complex
Wastewater Pumping Station
The existing wastewater pumping station is approximately 50 years old. The Water and Wastewater Master Plan process identified deficiencies that could result in a catastrophic failure affecting public health, property and the environment. The single wet well doesn’t permit maintenance and the operational volume is limited, which results in difficulty controlling the pumps and causing regular trunk sewer surcharging events during storm events. The pumping station is a critical component of the treatment process and arguably the most important asset the City owns as all wastewater from the City enters the pumping station first. The new pumping station will provide a greater operating wet well volume, state of the art pumping equipment and will operate automatically to control the pump rate based on the influent flows. It will contain two wet wells that will provide the ability to remove one well from operation for preventative maintenance work. The station will have a normal peak flow rate of 1,300 million litres daily and a firm capacity of 1,700 million litres daily.
Membrane Facility

The construction of the new Membrane Facility will be the largest in North America. This new wastewater treatment process takes primary treated wastewater and moves it to the membrane treatment process where it produces a high quality treated effluent for discharge to the natural environment. Tertiary nitrifying membrane bioreactor is an emerging technology in the wastewater treatment industry. A pilot project was previously undertaken to determine the most effective and efficient manner to operate the plant. Both tertiary nitrifying membrane bioreactor and tertiary membrane filtration provided excellent treatment operational performance throughout the entire study and were recommended for the wastewater treatment plant expansion.
Digesters – Dewatering Process

Planned upgrades to the digesters would see present secondary digesters receive modifications that would transform them into primary digesters. Having additional primary digesters would not only accommodate future growth, but provides the opportunity to enhance our financial resource strategy with the generation of sustainable energy. This will also be augmented by the addition of a biosolids pretreatment process which will increase gas production, reduce volumes and increase dewaterability.
FILTERING BASINS.

During the summer months we were able to procure nearly all the water filtered, but in the winter, when the Lake falls and the water freezes out several hundred feet from shore, we have to draw direct from the Lake except in case of storms. A lot of old rotten wood was removed from the end of the 2 foot 9 inch conduit pipe and a new crib built over it. A new valve has been put in at the end of the 3 foot pipe. I would recommend that a bridge be placed on the road between the filter basins, and a passage made connecting the two basins; also that the bar be dredged out in front of the 20 inch main, and I believe money would be saved if a scow with rotary pump and gasoline engine were used for taking out any vegetable matter at bottom of basin.

ERNEST G. BARROW.
City Engineer.
Dredging Hamilton’s Water Basins

Photo to right of:
Sand Sucker in Filtering Basin, 1907

Dredge enlarging the south filtering basin at the beach.
Climate change is causing cities around the world to rethink their infrastructure needs to deal with changing extreme weather conditions. Since 2005, Hamilton has been hit several times with storms that are inconsistent with traditional design standards or expectations. These extreme storm events have brought significant rainfall to Hamilton and caused extensive damage throughout the City. As a result, staff have undertaken a number of activities including inspection of the City’s wastewater collection system in the areas most affected by flooding as well as the development and implementation of a protective plumbing program to support property owners seeking to protect their homes against future flooding.

**System Inspection**

Zoom camera inspections of Hamilton’s wastewater collection system is completed on an annual basis. Inspections are on a four-year cycle meaning 25 percent of the entire system is completed each year. Due to the extreme weather conditions experienced in 2009, inspection areas were prioritized based on the volume of flooding complaints to determine the condition of the system and to identify any potential operational issues that may exist in the system. To-date inspections completed in the flooding areas have confirmed that the system is operating as designed. The inspections will be completed in March of 2010 and may include 8,000 to 9,000 segments of pipe.
Protective Plumbing Program (3P)

September 30, 2009, the Protective Plumbing Program was approved to provide financial assistance to residents who have experienced flooding in their homes and would like to undertake plumbing improvements to help guard their basement against sewer back-ups from storm water overloading the wastewater collection system.

The program helps to subsidize the cost of investigations, installation of a backwater valve on their plumbing system, disconnection of downspouts and sump pump installation and/or sewer lateral repairs. Grants available include $2,000 plumbing improvements and downspout disconnects as well as $1,500 for sewer laterals where there is a City tree affecting the sewer. In addition property owners may also be eligible to take advantage of loans provided by the City.
Looking for renewable green-energy technologies has become exceedingly important around the world as the harmful effects of electricity generation and greenhouse gas impact climate change and our natural environment. Hamilton’s Cogeneration Facility has been both an environmental and economic success. It currently creates energy from wastewater and reduces greenhouse gas by approximately 6,500 tonnes annually. Expanding on the success of the Cogeneration Facility, Hamilton is set to use European technology to become the first Canadian municipality to produce bio-methane to run its fleet of vehicles by March of 2011.

Funding for this project was assisted by the federal and provincial levels of government through the Infrastructure Stimulus Fund. The tripartite agreement provides a grant of $10 million from each level of government with the City contributing an additional $10 million for a total amount of $30 million to create this environmentally sustainable green energy project.
The technology allows the City to harvest methane gas from sludge instead of wasting this valuable resource. The City is increasing the capacity in its digesters and will invest in technology that will exploit the residual energy in bacteria that have been used to break down solid waste. More complete digestion of the bacteria allows more energy to be harvested. The process will increase energy recovery from 5 percent to nearly 70 percent. After the additional gas is collected, a new refining system will separate the methane. The bio-methane will then be used to fuel approximately 110 water and wastewater vehicles. Retrofitting the vehicles will cost approximately $6,000 each, but with $1 million in annual fuel savings it will pay back the expense quickly.

Hamilton’s Cogeneration Facility sets an environmental standard with economic benefits that will likely be utilized in the future in every wastewater facility across North America as we look for sustainable green energy to reduce greenhouse gas emissions. The City also hopes to reduce energy costs $1.5 million to $2 million from the operation at the Woodward plant. By expanding the existing biogas cogeneration facility. The electricity and heat produced are used to power the facility.

The long-term goal is to accept more materials, such as food waste and oils, to produce more energy for the power grid and fuel additional vehicles, such as City buses and garbage trucks.
Hamilton is initiating the construction of a new complex that will bring all staff of the water and wastewater sections together in one location. It will include offices and support spaces, a system control centre, a training centre for plant operators, public information centre, along with a consolidated works yard for the Operations.

The facility will be integrated with passive and active recreation facilities and links to the Red Hill Valley and the Lake Ontario waterfront.
A thorough study was completed with staff to determine the space requirements to run operations in the most effective and efficient manner. This resulted in an approximately 30% reduction in net space requirements.

The building design is in its preliminary stages but it will be located adjacent to the Woodward Avenue Water and Wastewater Facilities.

A number of goals and objectives were determined in advance to guide the design process and decision-making. The goals were divided into three categories: Institutional, Work Life and Overall Design. This was done to ensure the building properly integrated with the expansion of the wastewater treatment plant and the community, as well as meeting service and program related staff requirements.
Our youth are brought into this world associating water with fun activities like blowing bubbles, splashing around in a pool, running through water sprinklers or enjoying a cold glass of water. They don’t realize the importance of protecting our most valuable resource, water is a necessity for all life to be sustainable. So it is with this playful enthusiasm with water that we have created programs for the youth in our community to help educate them on the importance of wise water use so that it may also be enjoyed for generations to come.

We strive to educate on present and future water environmental issues, instilling ownership and responsibility towards wise water habits. Our youth focused programs educate on water conservation, source water protection, water awareness and science and technology. We are very pleased with the direction our youth education program has taken and the success we have experienced to-date. Success is achieved as Hamilton youth and teachers continuously comment on the fun they had learning to adopt new water conscious behaviours while participating in our educational activities.
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