RECOMMENDATION

(a) That the General Manager of Public Works be authorized and directed to submit the Hamilton Clean Harbour Project - Green Infrastructure Funding Application, attached as Appendix “A” to Report PW12060/FCS12064, to Infrastructure Canada for approval from the Minister of Transport, Infrastructure, and Communities in support of the associated funding request;

(b) That the General Manager of Finance & Corporate Services be authorized and directed to proceed with incorporating the City’s $132 Million contribution, contingent on the Minister’s approval of the application outlined in subsection (a), into the 2013 Water, Wastewater, and Storm Rate Budget;
(c) That contingent on the Minister’s approval of the application outlined in subsection (a), the General Manager of Public Works be authorized and directed to proceed with delivering the Clean Harbour Project utilizing the most appropriate project delivery model that meets the requirements and timelines of the funding agreement through consultation with the established Public Works Sub-Committee for the Woodward Avenue Wastewater Treatment Plant Upgrade and Expansion Project;

(d) That the General Manager of Public Works be authorized and directed to hire an additional FTE in a temporary full-time position, contingent on the Minister’s approval of the application outlined in subsection (a) for the Water and Wastewater Engineering Section for the term of the Clean Harbour Project;

(e) That contingent on the Minister’s approval of the application outlined in subsection (a), the Mayor and City Clerk be authorized and directed to execute the federal funding agreement and all necessary associated documents, in a form satisfactory to the City Solicitor and with content acceptable to the General Manager of Public Works, and the General Manager of Finance & Corporate Services;

(f) That staff be directed to identify, within the Hamilton Clean Harbour Project - Green Infrastructure Funding Application, attached as Appendix “A” to Report PW12060/FCS12064, that a $100 Million GIF federal grant be applied specifically to the Clean Harbour Project;

(g) That following the Federal Government’s approval of the $100 million GIF grant for the Clean Harbour Project, staff be directed to apply the $100 Million Provincial grant specifically to the Clean Harbour Project.

EXECUTIVE SUMMARY

The Public Works Department has revised the implementation plan for Hamilton’s Woodward Avenue Wastewater Treatment Plant (WWTP) Upgrade and Expansion Program (WWTP Program) in order to best align the investment need with changing economic conditions and affordability that drive the overall water and wastewater program. The revised approach will allow for the delivery of a water quality upgrade by 2017 and a revised expansion for growth, estimated to be between 2019 and 2025 depending on the status of community demand, without negatively impacting the 10-year Water, Wastewater, and Storm Rate Budget. This revised WWTP Program implementation plan is primarily in response to discussions held with both Provincial and Federal representatives in the Fall of 2011 respecting the $100 Million Green Infrastructure Fund (GIF) commitment the City received March 2010, as well as the $100 Million Provincial grant received in 2009 for the WWTP Program. The original 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 efforts. 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 align 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.

In the Fall of 2011, City staff met with both Provincial and Federal representatives to discuss the changing pressures in Hamilton impacting the original implementation plan and the City’s ability to meet the 2014 funding deadline and to explore options that would allow the City to retain the original GIF commitment. It was agreed by all parties at that time that the City provide the funding partners with 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, estimated to be between 2019 and 2025 depending on the status of community demand. 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 cost of the Clean Harbour Project is currently estimated at $332 Million. This Report seeks Council approval to proceed with the Clean Harbour Project by endorsing the Hamilton Clean Harbour Project - Green Infrastructure Fund Application attached as Appendix “A”.

Council’s endorsement of the Hamilton Clean Harbour Project - Green Infrastructure Fund Application is required prior to Federal staff forwarding their recommendation to the Minister of Transport, Infrastructure, and Communities for approval and in order to complete the associated Approval-in-Principle which formalizes the funding commitment. It must be noted that any cost incurred by the City prior to an Approval-in-Principle being in place would be considered non-eligible.

Alternatives for Consideration - See Page 10

**FINANCIAL / STAFFING / LEGAL IMPLICATIONS**

**Financial:** The revised costs and funding of the WWTP Upgrade and Expansion Program are summarized in Table 1. The table clearly shows the two distinct phases or projects that comprise the entire program. Assumptions regarding the amount of DC funding are undetermined at this time due to outstanding 2009/2011 DC Appeals as well as undetermined subsidy parameters. That is why Table 1 shows a range of available DC funding. Staff will provide more certainty and detail around the financial forecast for
the 2013 Rate budget. The following fiscal benefits would accrue to the ratepayers of Hamilton as a result of the revised WWTP Upgrade and Expansion Program;

- A reduction of total required funding by the ratepayers of Hamilton in the range of $79 million to $152 million for the period 2013-2031.
- 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 a date estimated between 2019 and 2025 depending on the status of community demand. This would allow the City to accumulate increased DC’s and smooth out debt requirements for the cost of the plant rehab and expansion.
- Allow for the City of Hamilton ratepayers access to the Federal GIF subsidy of $100 million.

### Table 1

**Woodward Avenue Wastewater Treatment Plant**

<table>
<thead>
<tr>
<th></th>
<th>Phase 1 Clean Harbour Project 2012 - 2016</th>
<th>Phase 2 Plant Expansion 2017 - 2025</th>
<th>Total Program 2012 - 2025</th>
<th>Difference Incr (Decr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 Budget Financing Plan</td>
<td>770,347,000</td>
<td>265,090,000</td>
<td>720,090,000</td>
<td>(50,257,000)</td>
</tr>
<tr>
<td>Total Expenditures (Note 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Funding Sources (Note 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development Charges 295,620,000</td>
<td>35,370,000 to 129,894,000 to 225,353,000 to 129,894,000 to 297,504,000 to (70,267,000) to 1,884,000</td>
<td>1,884,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Subsidy 33,690,000</td>
<td>133,686,078</td>
<td>133,686,078</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provincial Subsidy 126,500,000</td>
<td>126,500,000</td>
<td>126,500,000</td>
<td>126,500,000</td>
<td></td>
</tr>
<tr>
<td>From Operating 13,847,000</td>
<td>13,337,000</td>
<td>13,337,000</td>
<td>13,337,000</td>
<td>(510,000)</td>
</tr>
<tr>
<td>Reserves 15,100,000</td>
<td>15,100,000</td>
<td>15,100,000</td>
<td>15,100,000</td>
<td></td>
</tr>
<tr>
<td>Total Ratepayer Net Cost 285,590,000</td>
<td>70,917,922 to 2,956,000 to 133,962,922 to 133,962,922 to 206,113,922 to (79,476,078 to 151,627,078)</td>
<td>(79,476,078 to 151,627,078)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note 1:** Revised cost of $720 million excludes the Biosolids Management Facility project and other minor project adjustments totalling $50.3 million.

**Note 2:** Revised Development Charge Funding and subsequent subsidy proration among various subprojects is undetermined at this time.

**Staffing:** Should Council approve the proposed recommendations, one full time temporary position, to be funded from the Clean Harbour Project, will be required as Director of Clean Harbour to deliver the project. Additionally a number of other staff will
be re-directed to support the project until its completion however it is expected that these FTEs will come from existing complement.

**Legal:** Approving the recommendations will not expose the City to additional legal liabilities.

### HISTORICAL BACKGROUND

The recommendations contained within this Report have City Wide implications.

In 2006, the City of Hamilton completed the Water and Wastewater Master Plan (WWMP) to determine the long-term strategy for the City's water and wastewater systems to 2031. The Master Plan addressed two key drivers in respect to the City's wastewater system which were established and endorsed by Council as Policy prior to undertaking the WWMP and includes the following two key elements:

- **Accommodate Growth:** Committed to the need to expand the City's Woodward Avenue Wastewater Treatment Plant (WWTP) to accept flows that are consistent with growth projections established in the Province’s “Places to Grow” legislation. Places to Grow established that Hamilton must plan to accommodate an additional 160,000 people equivalency, and 40 million square feet of Institutional, Commercial, and Industrial (ICI) space by 2031.

- **Improve Water Quality:** Committed to improving the effluent quality from the City's wastewater system (Collection and Treatment) to meet Hamilton Harbour Remedial Action Plan (HHRAP) targets for the de-listing of Hamilton Harbour as an International Joint Commission (IJC) Area-of-Concern on the Great Lakes by 2015 and addressing Ministry of the Environment Procedure F-5-5 for managing and treatment of wet weather flow.

The preferred servicing plan recommended in the 2006 Master Plan included a number of projects. All projects related to the wastewater system are classified in two key areas including collection system improvements and upgrades and expansion of the WWTP. Collection system improvements are required to reduce the pollutant loading to Hamilton Harbour and identified environmentally sensitive areas within. Pollutant loadings are associated with the discharge of untreated combined sewer overflows (CSO) resulting from wet weather events that exceed collection or treatment system design limits. Wastewater treatment expansion and upgrades are required to meet the growth requirements and to improve the effluent quality from the Woodward Avenue Wastewater Treatment Plant (WWTP) during both normal dry weather and wet weather conditions in order to meet HHRAP targets. Given the size and complexity of the identified undertaking a Schedule C Class Environmental Assessment was required, which was completed in March 2008, following the Municipal Engineers Association Class Environmental Assessment process.

The defined strategy identified two key programs, the Real Time Control (RTC) Program and the WWTP Program. The strategy of the RTC Program is to hydraulically manage combined sewer overflows by retaining the flows in the system as required for treatment.
at the WWTP. In addition, once the treatment requirements of CSO are met, the RTC Program would discharge the remaining volume of CSO in a controlled manner as to prevent flooding and to control the flows to the WWTP within the limits of its Certificate of Approval (CoA). The WWTP Program strategy was an integrated design that addressed the expansion for growth while improving the quality of the WWTP effluent. The WWTP Program was composed of seven sub-projects totaling $770 Million as identified in the 2009 Rate Budget, and a separate $48 Million was identified for the RTC Program.

Although the financial affordability of the overall program remained in question, the implementation plan developed in 2008 which incorporated flow forecasting from the Places to Grow legislation demonstrated that an expansion of the WWTP was required by 2015. Considering the City’s commitment to meet HHRAP targets by 2015 and to avoid wastewater servicing issues related to growth, an implementation plan was approved based on these timelines on the condition that further review was to be undertaken to address the concerns related to financial affordability, prior to advancing projects to the construction phase. Staff then proceeded with issuing two Request for Proposals (RFP) and awarded contracts for Professional Engineering Consulting Services for the Real Time Control Program (C11-76-08) for $9,476,470.75 in November 2008 and for the Woodward Expansion Program (C11-28-09) in June 2009 for $43,570,793 which included Pre-Design, Detailed Design, Tender Assistance and Construction Management Services.

In March 2010, the City of Hamilton received confirmation in response to an application made in January 2010 that the Provincial and Federal governments had committed grant money to support specific sub-projects identified under the WWTP Program. The partnership contribution was established at a value of $300 Million and included $100 Million from each of the partners: the City Hamilton, the Province of Ontario, and the Federal Government. The Federal funding commitment was made under the Green Infrastructure Fund (GIF) having a substantial completion date of 2014. Staff subsequently accelerated the WWTP Program schedule from 2015 to 2014 as to meet these established GIF timelines. An Approval-in-Principle remained to be completed between all three funding partners which ultimately requires approval from the Minister of Transport, Infrastructure, and Communities to formally commit the proposed funds to the project.

Considering the City’s $100 Million contribution was to be funded through Water, Wastewater, and Storm Rate Budget (Rate Budget) and Development Charges (DCs), it had been made clear that confidence in the revenues from both sources need to be secure prior to proceeding with this funding agreement or investments in the overall WWTP Program. Therefore throughout 2010, staff in Finance and Corporate Services and Public Works continued to analyze the financial affordability of the WWTP Program in relation to the Rate Budget. Observations of declining flows to the WWTP continued despite a slow emergence from an unfavourable economy. A decline in water consumption and the departure of a number of large water users within the City signaled the beginning of a trend that was contrary to planning assumptions that were
undertaken throughout the WWMP process. Additionally, the proliferation of water efficient fixtures coming to market, including low flow toilets and efficient front load washing machines, began to affect water consumption forecasts across the City. As a result of these analysis and reconsideration of key planning assumptions, staff confirmed the financial burden being created as a result of what translates into lost revenue both on the Rate Budget and DCs pertaining to reduced sale of water and a slower development forecast. However the reduced water consumption and growth forecast resulted in an opportunity whereby it was demonstrated that the need for expansion of the WWTP and associated funding to accommodate growth can be delayed by four years to 2019.

In January 2011, as part of the 2011 Rate Budget presentation, staff confirmed these new trends and advised Council that delaying the major sub-projects of the WWTP Program was most prudent until such a time further observation and analysis can be undertaken to confirm the need for capacity expansion at the WWTP, as well as the overall impact on revenue and associated sustainability of its funding structure. As a result, the funding for the main sub-projects for the WWTP Program was deferred to 2019 as part of the 2011 Rate Budget process. Certain sub-projects were approved to proceed through to construction including the Raw Wastewater Pumping Station, the Primary Clarifiers Upgrades, and Digester/Biogas Upgrades which formed part of the WWTP Program. The RTC Program was also approved to proceed to address wet weather flows and CSO. The Thermal Reduction sub-project which was identified under a separate Biosolids Master Plan and previously reported as a WWTP Program sub-project was programmed independently into 2017 to better align the investment needs with the biosolids management program. Therefore the remaining funding investment need that was deferred to 2019 totaled $525.2 Million of the original $770.5 Million. In addition, and as a result of the program delays, staff suspended progress on all Professional Engineering Consulting Services for the associated sub-projects of the Woodward Expansion Program contract. The decision to delay the sub-projects of the WWTP Program also impacted the ability to complete the Approval-in-Principle that was required to complete the GIF funding commitment as those WWTP Program sub-projects were specifically identified in the original funding application.

In the Fall of 2011 staff met with Federal and Provincial representatives to discuss the City’s evolving funding challenges and alternatives to the original implementation plan as the substantial completion date of 2014 established by GIF was now in jeopardy. The essence of a new proposal as proposed would essentially de-couple the WWTP Program growth component from the water quality component to allow the City to proceed with its water quality improvement plan to support HHRAP’s de-listing initiatives. The capacity expansion would then be deferred to a future date when the need is justified. The strategy is to move forward with the project that supports the improved effluent quality in support of the City’s environmental goals and obligations while securing the commitment of GIF funding. Proceeding with the revised implementation plan in the form of a dedicated Water Quality Upgrade not only supports the City’s stated objectives, it allows the City to benefit from a funding partnership in the
delivery of this large, complex capital improvement, thus easing the mounting pressure on our rate payers. The proposed approach was accepted in essence by all funding partners and a revised completion date of the 2017 fiscal year was established for the purposes of developing the revised implementation plan. The City was then provided until Q2-2012 to submit a revised application to the funding partners that outlined a clear scope, schedule, and budget for the proposed Water Quality approach, along with a Council endorsement confirming that the City remains committed to its share of the funding agreement.

As a result, staff developed a workplan for the development of a revised Green Infrastructure Fund application which focuses on the Water Quality objectives of the WWTP Program. The workplan involved validating four key elements as outlined in Table 1.

**Table 1: Workplan for revised GIF Application**

<table>
<thead>
<tr>
<th>Workplan Element</th>
<th>Approach</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validate Design</td>
<td>• Validate if existing design is suitable for phasing.</td>
<td>• Independent Engineering Peer review was undertaken.</td>
</tr>
<tr>
<td></td>
<td>• Review opportunity to improve design to meet revised approach.</td>
<td>• Most optimum design was identified with sufficient design and costing details to meet the Water Quality objective.</td>
</tr>
<tr>
<td>Validate Affordability</td>
<td>• Ensure the proposed Water Quality option is affordable whereby not to exceed the approved 4.25% annual rate increase over 10 years Rate Budget plan.</td>
<td>• Cash flow estimates from the design validation was provided to Finance and Corporate Services.</td>
</tr>
<tr>
<td></td>
<td>• Ensure no increased burden on rate payer or development charges over that of existing.</td>
<td>• Conclusions support the proposed Water Quality approach as affordable. Final impact on DC not determined at this time.</td>
</tr>
<tr>
<td>Validate Project Delivery Model</td>
<td>• Confirm that suitable project delivery models can be developed to meet specific City objectives of:</td>
<td>• Workshops were undertaken to analyze various project delivery models.</td>
</tr>
<tr>
<td></td>
<td>- Meeting Schedule</td>
<td>• It was concluded that suitable project delivery models can be developed that meet specific City objectives.</td>
</tr>
<tr>
<td></td>
<td>- Budget Control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Minimize Risk with Constructor Issues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Maximize City ability to input into key decision making</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Compliance with Union</td>
<td></td>
</tr>
<tr>
<td>Consult with Key Stakeholders</td>
<td>• Seek input from MOE and HHRAP</td>
<td>• Staff met with key stakeholders from the Ministry of the Environment (MOE) and Hamilton Harbour Remedial Action Plan team throughout the development of the proposed Water Quality Upgrade to ensure all needs are being met and to quantify</td>
</tr>
<tr>
<td></td>
<td>• Develop ‘Environmental and Social Currency’ that demonstrates the overall benefit to the City in pursuing the Water Quality initiatives.</td>
<td></td>
</tr>
</tbody>
</table>
As a result of the work undertaken it was determined that the proposed Water Quality approach is valid and sustainable. Staff proceeded to develop the required revised funding application referred to as the Hamilton Clean Harbour Project - Green Infrastructure Fund Application as presented in this Report as Appendix “A” for Council approval.

Council’s endorsement of the Hamilton Clean Harbour Project - Green Infrastructure Fund Application is required in order for Federal staff to make the recommendation to the Minister of Transport, Infrastructure, and Communities whose approval formalizes the funding commitment through an Approval-in-Principle. It must be noted that any cost incurred to date are not eligible to be recovered until the Approval-in-Principle is approved by the Minister. Should Council approve the proposed recommendation, it has been suggested by the Federal representatives that two months should be allocated for review. Therefore, it is anticipated that the City should receive confirmation by November 2012 if this application is approved.

Contingent on the approval of the application from the Minister of Transport, Infrastructure, and Communities, staff would then proceed with delivering the Clean Harbour Project utilizing the most appropriate project delivery model that meets the requirements and timelines of the funding agreement through consultation with the established Public Works Sub-Committee for the Woodward Avenue Wastewater Treatment Plant Upgrade and Expansion Project.

The Public Works Business Plan, Innovate Now

The recommendations from this Report will assist in meeting the Public Works key goal to be recognized as the centre of environmental and innovative excellence in Canada. In addition, implementing the recommendations will also assist Public Works in building on our Strategic Vision Drivers as follows:

- **Communities (Services our communities connect with and trust)**
  Moving forward with the Clean Harbour Project allows the City to meet its commitment for the wastewater system Remedial Action Plan targets contributing to delisting the Hamilton Harbour as an Area of Concern with the International Joint Commission. Meeting these targets means a cleaner Hamilton Harbour for the entire community to enjoy.

- **People (Skilled teams, ready for any situation)**
  Approving the proposed recommendations allows the City to dedicate the best skilled team to delivery this large infrastructure project. The lessons learned will be transferable to future large infrastructure investments and continue to promote Public Works as a centre of excellence for successful project delivery.

- **Process (Smart processes to match our needs)**
The recommendations demonstrate staffs ability to assess and align the most optimum project delivery approach processes to complex infrastructure programs.

- **Finances (Sound finance management for the long haul)**
  The financial assessments completed in support of the recommendations demonstrate a more financially sustainable solution was attained than is stated in the 2012 Water, Wastewater, and Storm Rate Budget.

**POLICY IMPLICATIONS**

Approving the proposed recommendations satisfies the Policies Council approved as part of the Water and Wastewater Master Planning process where the City committed to meeting water quality targets that the Hamilton Harbour Remedial Action Plan (HHRAP) group established for the City’s wastewater system as well as meeting the growth requirements for wastewater servicing to 2031.

**RELEVANT CONSULTATION**

**Ministry of the Environment (MOE):** Throughout the development of the proposed Clean Harbour Program, staff consulted with representatives of the MOE West Central Branch. Consultation was undertaken to ensure all proposed approaches were in-line with MOE expectations.

**Hamilton Harbour Remedial Action Plan Team (HHRAP):** Throughout the development of the proposed Clean Harbour Program, staff consulted with representatives of the HHRAP. Consultation was undertaken to ensure all proposed approaches were in-line with HHRAP expectations and to quantify overall environmental benefits associated with pursuing the proposed Clean Harbour Project.

**ANALYSIS / RATIONALE FOR RECOMMENDATION**

An analysis was completed in reviewing the proposed capital profile for the Clean Harbour Project in comparison to the existing approved 2102 Water, Wastewater, and Storm Rate Budget. The rationale for the recommendations are based on the fact that by decoupling the water quality and growth components of the Woodward Avenue Wastewater Treatment Plant to 2012-2016 and post 2023 respectively results in a net decrease to the rates in the range of $79 million to $152 million for the period 2013 - 2031. In keeping with the approved 4.25% rate increase results in a pressure between the years 2014 to 2016, however significant decreases resulting in the pre- and post-years allows for adjustments in the capital works program to maintain a 4.25 % rate increase.
Alternatives for consideration include delaying the project until 2023 and losing the current commitment for senior government funding as well as delaying the benefit to the harbour and community from a de-listing perspective.

**Staffing:** There will be no impact on staff should the alternative be considered.

**Legal:** There will be no impact on Legal matters should the alternative be considered.

**Financial:** It must be noted that not proceeding would result in the lost opportunity for receiving a $200 Million grant towards the upgrades to the Woodward Avenue Wastewater Treatment facility. Implications of this alternative include that when the upgrade and expansion do proceed in 2023, a risk of not receiving funding would translate directly into all costs being funded through the Rates Budget and Development Charges which may be deemed unaffordable, placing the City at risk of not meeting its environmental obligations for delisting Hamilton Harbour as an area of concern and increased risk of wastewater servicing capacity to accommodate growth which may result in a development freeze being imposed by the Ministry of the Environment.

**CORPORATE STRATEGIC PLAN**


**Skilled, Innovative & Respectful Organization**

- A culture of excellence
- A skilled, adaptive and diverse workforce, i.e. more flexible staff
- More innovation, greater teamwork, better client focus
- An enabling work environment - respectful culture, well-being and safety, effective communication
- Opportunity for employee input in management decision making
- Council and SMT are recognized for their leadership and integrity

Approving the recommendations and completing the Clean Harbour Project would promote a culture of excellence within the City to the local and international communities. Considering the many years and the effort invested in pursuing this investment opportunity, Council’s and SMT’s leadership would be recognized.

**Financial Sustainability**

- Financially Sustainable City by 2020
- Effective and sustainable Growth Management

Vision: To be the best place in Canada to raise a child, promote innovation, engage citizens and provide diverse economic opportunities.

Values: Honesty, Accountability, Innovation, Leadership, Respect, Excellence, Teamwork
• Delivery of municipal services and management capital assets/liabilities in a sustainable, innovative and cost effective manner
• Full life-cycle costing for capital
• Address infrastructure deficiencies and unfunded liabilities
• Generate assessment growth/non-tax revenues
• Sustainable Tri-parti Government Agreement

The financial assessments completed in preparing this Report demonstrate that an effective and sustainable growth and environmental management plan can be achieved. The proposed project delivery model ensures the Clean Harbour Project is delivered in the most innovative and cost-effective manner and the proposed works are a result of detailed full life-cycle costing for capital including long-term operating and maintenance costs. Approving the recommendations would allow the City to pursue and secure one of the largest tri-partite government funding agreements valued at $332 Million.

**Intergovernmental Relationships**

• Acquire greater share of Provincial and Federal grants (including those that meet specific needs)
• Maintain effective relationships with other public agencies

Proceeding with the proposed Clean Harbour Project would assist the City in acquiring a share of Provincial and Federal grants valued at $100 Million from each level of government. Delivering the Clean Harbour Project would raise the profile locally to both Federal and Provincial stakeholders on a regular basis and provide the ability to further develop positive relationships with other public agencies.

**Social Development**

• Everyone has a home they can afford that is well maintained and safe
• Hamilton residents are optimally employed earning a living wage
• Residents in need have access to adequate support services
• People participate in all aspects of community life without barriers or stigma

Public health is a social issue that is affected by the state of the Harbour. Between 1924 and 1993, swimming was banned in the Harbour due to deteriorated conditions that had materialized as a result of municipal and industrial waste discharge. Today public beaches on the Harbour are monitored for public safety and are closed when contaminants are detected in sufficient quantities.

One of the primary objectives of the remediation process is to remove barriers to the harbour and provide the public an opportunity to not only access the Harbour but enjoy its full potential. The success of this objective depends upon Harbour water quality and the ability to remove any real or perceived concerns related to public health and the associated stigma the current situation creates. A healthy Harbour translates to a
healthier local community. Sustainable communities maintain a good public image and social marketing is essential to build social goodwill maintaining community support. Successful cleanup initiatives removing public health concerns lead to social benefits including:

- Opportunity for increased recreational use of the Harbour and the surrounding area for hiking, swimming, angling, and boating.
- Improved pride in the community and psychological benefit related to living in a clean and healthy environment.
- Enhanced opportunity to attract recreational and business-related events that enhance the image of the City at a national level.

**Environmental Stewardship**

- Natural resources are protected and enhanced
- Reduced impact of City activities on the environment
- Remove Hamilton Harbour from Great Lakes area of concern list by 2015
- Reduce the impact of Hamilton's industrial, commercial Private and Public operations on the environment
- Aspiring to the highest environmental standards

The main benefit of the Clean Harbour Project is an improved local environment through enhanced treatment of wastewater flow to our local harbour. Considering the effluent from the Woodward Avenue Wastewater Treatment facility is the single largest contribution of pollutant loading from a single point to the Hamilton Harbour, the Clean Harbour Project will allow the City to meet its commitments to de-listing Hamilton Harbour as an Area of Concern with the International Joint Commission.

Hamilton Harbour is one of the most important fish habitats on western Lake Ontario, harbour clean-up is also essential to the long term aquatic health of lake Ontario as well.

Hamilton continuously strives to improve the environmental health of its community. Through the remediation of Hamilton Harbour, the City will enjoy environmental benefits not only to this community but in neighbouring communities as well.

Modern thinking has evolved to the point where the City knows that success is a balance considering many elements and that sustainable communities must address these issues in order to remain viable. Our communities are connected to the natural environment and we need to pay attention to that. The short-sighted approach of implementing solutions for production without comprehensive planning for sustainable long-term operations are gone. Without a proper functioning ecosystem our communities are degraded and severely limited in their capacity to prosper.

Environmental benefits are obvious outcomes of remediation work to restore the function of a healthy Harbour. The interrelationship between people and the environment is evident. Cleaner water promotes healthier plant and wildlife.
communities. In turn, this is reflected in the opinions of the people that live and visit the region. Environmental factors are the basis for the resulting social and economic advantages that will be realized in the future.

APPENDICES / SCHEDULES

Appendix “A”: Hamilton Clean Harbour Project - Green Infrastructure Funding Application
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EXECUTIVE SUMMARY

Hamilton is an industrious city, rich in history and natural resources. Hamilton is proud of its economic contribution, not only regionally but at a national and international level. Being among Canada’s largest and busiest inland ports, Hamilton is moving approximately 12 million tonnes of goods and materials annually. Hamilton Harbour presently supports economic growth and productivity nationally and internationally to improve Canada’s competitiveness and facilitate trade.

Strategically located, Hamilton is one of 11 cities showcased in the book, “Green City: People, Nature & Urban Places” by Quebec author Mary Soderstrom, which examines the city as an example of an industrial powerhouse co-existing with nature. Hamilton’s natural beauty has been showcased internationally through a number of events and most notably was a result of Hamilton hosting the World Cycling Championships. Hamilton’s tree covered escarpment, expansive harbour and variety of environmental landscapes was broadcast internationally and was received positively.

Unfortunately, local and national perception is that of a polluted city with a toxic harbour. Although the image of a dirty industrial city was forged as Hamilton functioned as an economic engine for the rest of the country, the burden of cleaning up this legacy has remained largely with the City. Hamilton’s Harbour remains a symbol of past environmental naivety and continues to receive unfavourable international attention for its toxic condition culminating to it being identified as an Area of Concern through the International Joint Commission.

Now is the time to change this legacy. Building the infrastructure and creating a cleaner environment is required to return Hamilton Harbour to its former glory. This requires all levels of government to participate. A firm financial commitment from the provincial and federal government is needed to ensure that capital programs can be implemented in a timely manner and in support of Harbour remediation. The physical and psychological healing that this community requires to move effectively into the future can only happen with tangible and significant investments of senior levels of government.

As Hamilton’s economy evolves and less emphasis resides on heavy industry it is necessary to develop flexibility and diversity in our planning. Intellectual infrastructure is woven into the fabric of our community and supports what is becoming Hamilton’s new identity, bio-medical research and health care. McMaster University is one of Canada’s top research universities; Hamilton is becoming recognized as
a health care centre of excellence. The remaining heavy industries in Hamilton have become leaders in environmental management and pollution abatement.

The City is moving in a sustainable and environmentally conscientious manner and leading by example as demonstrated by the construction of its new environmental laboratory which has been recognized provincially and nationally with Leadership in Energy and Environmental Design Silver certification. Hamilton Renewable Power Incorporated, an arm’s length corporation of the City with facilities located at the Woodward Avenue Wastewater Treatment Plant (WWTP) has been successful in converting methane gas generated at the WWTP into electricity. This project was recognized with the 2008 CCME Pollution Prevention Award and the 2008 AMO Peter J. Marshall Innovation Award. Hamilton hosts a regional training centre in water and wastewater technology for operators and was officially attended by Justice Dennis O’Connor himself. The Canada Centre for Inland Waters sits on the shoreline of Hamilton Harbour and is one of the world’s premiere freshwater research centres.

Taking the necessary steps to de-list the Harbour is essential to our joint economic future; a future that will be brighter through collaborative support from all levels of government. The BENSIM report, which was developed by the Institute for Research and Innovation, York University and DSS Management Consultants indicates that the completion of all remediation projects and de-listing of Hamilton Harbour would result in an economic benefit of approximately $1 billion both regionally and nationally.

In addition to the obvious value of cleaning up the Harbour and improving the effectiveness of the City’s wastewater treatment plant, the recent economic downturn has focused attention on the general state of infrastructure. Countries around the world are looking closely at their infrastructure needs and identifying monetary investments in this regard as an appropriate way to mitigate the negative effects of a possible recession. The timing for Hamilton in this regard couldn’t be better as the Environmental Assessments associated with the aforementioned works are complete. Upon receiving funding approval for this work, the City can initiate construction activities very quickly.

In 2005, both the provincial and federal government, under the Canadian Strategic Infrastructure Funding Program, joined forces with Hamilton in a $75 million Tripartite Agreement. This commitment supported the implementation of disinfection upgrades at the Dundas Wastewater Treatment Plant, upgrades to Primary Clarification at the Woodward Avenue Wastewater Treatment Plant and naturalization of Windermere Basin.

Hamilton applauds the federal and provincial government’s commitment to the local economy, a cleaner environment and better communities by demonstrating the importance of upgrading municipal infrastructure. The recent announcement of a Canada - Ontario Infrastructure Framework Agreement and the associated funding commitment supporting it, provides a timely opportunity for the government to build on the momentum in Hamilton regarding the Harbour. Making a commitment to the subsequent phase of the Harbour clean-up, referred to herein as ‘The Clean Harbour Program’ makes a profound statement both nationally and internationally respecting Canada’s commitment to the Great Lakes and the environment.

With the forgoing in mind, we are looking to both the Province of Ontario and the Government of Canada to join us once again in a Tripartite Agreement for this very important initiative that will invest in the economic and environmental future of Hamilton Harbour, and ultimately building Canada. The Clean Harbour Program continues to move towards the necessary steps to realize our collective goal of delisting Hamilton Harbour as an Area of Concern with the International Joint Commission and restoring one of the Provinces natural resources.
We intently await confirmation of your continued dedication and commitment to a Tripartite Agreement in the amount of $300 million. Securing our economic, environmental, and social future is showcased through defined political leadership to de-list Hamilton Harbour by remediating the natural environment of our extended community.
Hamilton has been recognized as a corridor for transportation and a settlement for people over hundreds of years. Positioned at the western end of Lake Ontario next to the Harbour, Hamilton was destined in its early development to become an important centre of activity for Canada. In fact, Hamilton is among Canada’s largest and busiest inland ports on the great lakes, which operates on an international scale receiving and sending material to North America and overseas.

The Hamilton area, noted for its rich diversity of nature and resources, called to First Nation native communities who would frequent the area. The first aboriginals to settle in the Hamilton area called the bay Macassa, meaning “beautiful waters”. The unique character of this region was also recognized by Étienne Brûlé a French explorer, who was one of the first known Europeans to visit the Hamilton area in 1616. At that time the rich natural and geophysical diversity was an attractive aspect of the land providing an abundance of resources. In 1815, European settlement began in a formal way as small industries began and the population increased. George Hamilton planned a village destined to become the City of Hamilton on 257 acres of land in what was then known as Barton Township. In 1830, the Burlington canal was built linking Hamilton Harbour to Lake Ontario. This was a catalyst for rapid modern development, establishing the foundation for transportation by boat, and accompanied with plans to develop rail systems. In 1833, the town became officially incorporated as a police village with a population of 1000. In 1846, it was designated a city. In 1854, the arrival of the Great Western Railway materialized.

It wasn’t long before local people realized that the competition for resources and industrial power was taking its toll on the environment and local living conditions. New business relied on the water for transportation and manufacturing; residents utilized the Harbour for recreation and a water resource. In 1832, and again in 1854, cholera epidemics gripped the new city as a result of pollution. Eventually this led to real concerns over the industrialization and urbanization in this area.

Hamilton expanded and grew in response to the industrial age and strong transportation links, to become a major economic engine contributing to the economy of Canada. This was a time when steel production statistics were the barometer of the Nation’s health and technical advancement. Steel production and associated heavy industry, to which Hamilton strongly contributed, was at one time the backbone of economy in the Canada.
Hamilton’s strategic location has proven to be a double-edged sword. As the industrial revolution advanced, Canada’s foundation for economic growth in the great lakes was developed, resulting in environmental degradation of Hamilton’s natural ecosystem near the Hamilton Harbour. This has resulted in an environmental legacy left behind, which today still warrants attention and which has culminated into Hamilton Harbour being identified as a Great Lakes Area of Concern in 1987 by the International Joint Commission.

Hamilton has been the largest producer of steel and steel products in the country for many years, and is currently home to operations that form part of the world’s 5th largest steel maker. The products made are shipped internationally to support modern society.

Hamilton Harbour is host to the port of Hamilton, Canada’s largest and busiest inland port, which is an integral component of the heavy industry that is found here. Without this vital transportation link, large quantities of heavy materials could not be sent to markets across North America and international markets overseas. Each year the port handles roughly 700 arriving vessels carrying approximately 12 million tonnes of material.

Hamilton is more than a local steel town, located at the strategic confluence of road, rail and water transportation networks which link the United States, Ontario and the rest of Canada. Hamilton and the industry it supports are of national significance. The local area has inherited a national environmental dilemma, the full clean-up of Hamilton Harbour. This issue has been a result of past industrial practice common in the modern world, a result of Hamilton’s role in supporting the development and prosperity of our growing Country during the industrial age, and a result of the unique opportunities that exist in this area to facilitate efficient multimodal transportation opportunities on the shores of a relatively small enclosed Harbour.

Municipal, industrial, commercial and institutional activities all have a place in the current city. There have been many changes made since the early years of the industrial revolution to make Hamilton one of the most environmentally conscious cities in Canada. Many programs involving local industry and the municipality have been coordinated with the help of the Hamilton Harbour Remedial Action Plan, a process established to improve Hamilton Harbour through a watershed focussed, multi-stakeholder approach. The success of this process has been documented to provide the justification for future delisting of the Harbour.

KEY NATURAL AND MANMADE FEATURES
Hamilton’s natural beauty is showcased by several key natural and manmade features recognized nationally. Hamilton is among the largest cities in Ontario and Canada, covering an estimated area of 1,117 square kilometers.
The local landscape is home to over 500,000 local residents and is punctuated by several key natural and manmade features, as follows:

- The Niagara Escarpment, an ancient glacial ridge rising over 60 meters above the lower cityscape divides the urban core
- Cootes Paradise Marsh, a 250 hectare wetland functioning as an important natural fish hatchery which provides a significant number of young fish every year to Lake Ontario
- Cootes Paradise Natural Area, an 850 hectare wildlife sanctuary containing one of the most diverse plant communities in Canada
- Hamilton Harbour, a 2,160 hectare body of water sheltered from Lake Ontario
- Burlington Beach Strip and shipping canal, a 6 km natural sandbar stretching from Hamilton to Burlington which segregates Hamilton Harbour from Lake Ontario and
- The urban community and industrial areas which lie between the Harbour and the Niagara escarpment
OVERVIEW
As a result of pollution problems in the Great Lakes, the Canada-U.S. International Joint Commission (IJC) identified 43 Areas of Concern (AOC) requiring improvements to restore, protect and conserve the Great Lakes Basin ecosystem. In order to uphold the responsibilities reflected within these international partnerships, the Canada Ontario Agreement respecting the Great Lakes Basin Ecosystem was developed and finalized in 1987. That Agreement states that identified Areas of Concern will receive focused attention, and that wastewater treatment is a priority issue for which the government is committed to successfully resolve through the formation of partnerships that will commit municipal, provincial and federal resources.

In a recent release by the Great Lakes and St. Lawrence Cities Initiative in February 2008 prepared by the Great Lakes Commission, it was estimated that local municipalities in Areas of Concern spend over $15 billion annually on the Great Lakes and St. Lawrence ecosystems, and $4.3 billion was allocated as the Canadian portion of this total. This demonstrates the municipal commitment to improvement remediation initiatives; however, there is still a deficit to be addressed.

Recent studies have indicated that there is a shortage of investment in wastewater systems in both Canada and the U.S. The Great Lakes and St. Lawrence Cities Initiative has put out a call for increased commitment from all levels of government, including significant increases in investment from federal governments, for wastewater treatment infrastructure. In addition, it was recommended that a methodology for fair and appropriate allocation of funds at each government level be determined to help close the existing shortfall.

Although these figures are derived from across the Great Lakes and St. Lawrence region, it stands to reason that a primary focus should now be placed...
on the areas designated Areas of Concern by the International Joint Commission.

THE HAMILTON HARBOUR REMEDIAL ACTION PLAN

Pollution problems in Hamilton Harbour were first formally identified in the early 1970s, although pollution issues date back much earlier than this time.

The Hamilton Harbour Remedial Action Plan program, under the Great Lakes Water Quality Agreement, is an initiative that requires the Federal government to develop plans to address the remaining problems in the Harbour. This remedial approach is a three stage process complete with reporting and monitoring initiatives. A Stage 1 report was issued in 1989 and revised in 1992, and a Stage 2 report was released in 1992 and updated in 2002. A Stage 3 report will not be written until Hamilton Harbour remediation progress provides the data necessary to support delisting the Area of Concern. The Stage 3 report is currently still a future program goal.

Between 2001 and 2005, local stakeholders around Hamilton Harbour, including the City of Hamilton, have invested a combined $210 million for Harbour remediation. Of this total, provincial and federal governments combined have contributed approximately $29 million or 14 percent. Although more recent partnerships have been made, and expenditures are expected to continue, municipalities and other local stakeholders have been contributing the greater share of the clean-up efforts.

The most significant components to the clean-up and delisting of Hamilton Harbour identified in the Remedial Action Plan are the reduction of pollutant loadings from combined sewer overflows from the Hamilton collection system, and from the effluent discharge from the Woodward Avenue Wastewater Treatment Plant. To that end, the Remedial Action Plan Stage 2 document specifically identified pollutant loading targets for wastewater discharges from combined sewer overflows and the Woodward Avenue Wastewater Treatment Plant. These loading targets represent a significant reduction in current loadings from Hamilton wastewater infrastructure.

Hamilton Harbour is an integral part of the local community, as it connects to the City’s history, present and future. The health of the Harbour has a direct impact on the health of Hamilton’s community, affecting all three key indicators (social, economic and environmental) of a healthy and happy community.

TRIPLE BOTTOM LINE BENEFITS OF DELISTING HAMILTON HARBOUR AS AN AREA OF CONCERN

The benefits of a clean, healthy and vibrant community that entices people to choose to live and work within it are obvious. This realization is one of the reasons that identified the need to focus efforts and resources on Areas of Concern to implement change.

Social Benefit

Public health is a social issue that is affected by the state of the Harbour. Between 1924 and 1993, swimming was banned in the Harbour due to deteriorated conditions that had materialized as a result of municipal and industrial waste discharge. Today public beaches on the Harbour are monitored for public safety and are closed when contaminants are detected in sufficient quantities.

One of the primary objectives of the remediation process is to provide the public an opportunity to not only access the Harbour but enjoy its full potential. The success of this objective depends upon Harbour water quality and the ability to remove any real or perceived concerns related to public health. A healthy Harbour translates to a healthier local community. Sustainable communities maintain a good public image
and social marketing is essential to build social goodwill maintaining community support. Successful clean-up initiatives removing public health concerns lead to social benefits including:

- Opportunity for increased recreational use of the Harbour and surrounding area for hiking, swimming, angling and boating
- Improved pride in the community and psychological benefit related to living in a clean and healthy environment
- Enhanced opportunity to attract recreational and business related events that enhance the image of the City at a national level.

**Economic Benefit**

Hamilton Harbour is a fundamental part of the region and has a significant impact on the economy. The historical economy of the federal, provincial and municipal region was built upon the functionality of the Harbour as a vital transportation link for moving large quantities of heavy materials across the country. The future economy and prosperity of this region depends on the adequacy of clean-up efforts which will have an impact on a local and national scale.

In March of 2006, a joint report developed by the Institute for Research and Innovation, York University, and DSS Management Consultants Inc. concluded that the accumulated gross benefits realized by multiple beneficiaries including all levels of government are substantial. This work was supported by a dynamic benefits simulation model termed BENSIM built on the STELLA software platform. STELLA was developed by ISEE systems (http://www.iseesystems.com) as an intuitive icon-based graphical modeling tool.

The report indicates that a cumulative total benefit for the local area would be almost $1 billion if all remediation projects were successfully completed. The report determined that the federal level of government and local business would benefit the most. Through this analysis and acknowledgement of other work in Areas of Concern establishing historical resource allocations, it is evident that to date among government levels, municipalities have been applying greater amounts of resources to a problem which will have the greatest benefit to the federal level. The Harbour is an integral part of the local economy; remediation of the Harbour will provide financial benefits that include:

- Increased shipping activity and expanded port opportunities
- Increased commercial business opportunities as a result of improved corporate image related to modern and responsible industry practice
- Attraction of new business to Hamilton as a result of innovative work opportunities needed to directly address the remediation process in addition to those which respond to Hamilton as a favourable location for staff and future opportunity once remediation is complete
- Economy generated as a result of the publicity and enhanced reputation resulting from applying leading-edge environmental solutions to achieve successful remediation.

**Environmental Benefit**

Hamilton continuously strives to improve the environmental health of its community. Through the remediation of Hamilton Harbour, the City will enjoy environmental benefits to not only this community but in neighbouring communities as well.

Modern thinking has evolved to the point where the City knows that success is a balance considering many elements and that sustainable communities must address these issues in order to remain viable. Our communities are connected to the natural environment and we need to pay attention to that. The short sighted approach of implementing solutions for production without comprehensive planning for sustainable long term operations are gone. Without a proper functioning ecosystem our communities are degraded and severely limited in their capacity to survive.
Environmental benefits are obvious outcomes of remediation work to restore the function of a healthy Harbour. The interrelationship between people and the environment is evident. Cleaner water promotes healthier plant and wildlife communities. In turn, this is reflected in the opinions of the people that live and visit the region. Environmental factors are the basis for the resulting social and economic advantages that will be realized in the future.

HAMILTON’S COMMITMENT TO DELISTING HAMILTON HARBOUR AS AN AREA OF CONCERN

Work began to define the “State of the Harbour” in 1985 with the inception of the Hamilton Harbour Remedial Action Plan (RAP). The Region of Hamilton Wentworth, now the City of Hamilton, was identified as an important partner in the remediation process. A stakeholder group of over 40 agencies from local industry, environmental groups and levels of government have been working toward solutions for over 20 years. Those 20 years have also brought success along the way. The Hamilton Harbour RAP office has announced that “The RAP is just past the halfway point toward meeting its objectives and implementing the various remedial actions.”

It is important to realize that most activities being carried out by various agencies are interrelated and that the goal of delisting requires a successful combination of all identified actions to provide anticipated benefits. Most notable is the very large City of Hamilton objective that will address water quality resulting from municipal wastewater treatment. It has been estimated that $800 million has been spent by local industry and government on the entire Harbour program to the year 2000 and that another $473 million is required to meet targets by 2020; most of this investment is related to wastewater issues. The money reflects the cost of capital upgrades that have been identified and does not include the additional City obligation to ongoing operations and maintenance costs that will result from the installation of new infrastructure.

The City of Hamilton has been a committed partner throughout this collaborative RAP process. The RAP has been successful at identifying agencies that can effectively implement solutions, while at the same time provide support for public and political acceptance and resource allocation. Contributions by the City have been substantial in the past.

Currently, municipal wastewater treatment and collection improvements are the most important and most costly objectives still to be achieved. The City of Hamilton has been an innovative leader in the process of solving local wastewater issues to address remediation and ultimately delisting of the Harbour.

Future prosperity in this City will in part be shaped by Hamilton Harbour improvements and as a result there is a great interest and continued commitment to this cause. The City of Hamilton has a formalized plan of action that has been endorsed by management and Council. The City now looks forward to successfully sourcing the additional financial resources necessary for the development of a sustainable implementation plan which will result in the needed improvements that will benefit Hamilton Harbour as well as our local and global community.
HAMILTON’S WASTEWATER INFRASTRUCTURE

THE SYSTEM
Dating back to the late 1800’s, Hamilton was one of the first municipalities in Canada to construct a wastewater treatment plant for its residents. Presently Hamilton operates a significant and complex system for collection and treatment of wastewater, which is integrated within its urban and natural areas.

This system consists of:
- 2 wastewater treatment plants
- 70 wastewater pumping stations
- 8 combined sewer overflow tanks and 1 combined sewer overflow tunnel
- Approximately 2,400 km of collection system sewers and forcemains, including 600 km of combined sewer.

FIGURE 1: Wastewater System Overview
The unique features of the City’s engineered wastewater systems and environmental features are shown in the diagram on the previous page.

Currently the City owns and operates one of the oldest and largest combined sewer systems in the Great Lakes watershed. Sewer systems built previous to 1956, known as combined sewer systems, were designed to convey both the storm water and sanitary sewage in one pipe. These combined sewers are responsible for conveying residential, commercial and industrial wastewater as well as storm flow within the service area to the wastewater treatment plant.

The disadvantage of this system is that it has the potential to overflow when heavy storm or snow melt flows exceed system capacity. In order to prevent basement flooding and to protect the integrity of the main wastewater treatment plant, the combined sewer system has engineered overflow points that relieve the excess flow at strategic locations within the system. These points are termed combined sewer overflows. Hamilton has 21 combined sewer overflow points, 10 of which have control structures to capture and temporarily store excess wet weather flow which can be returned to the system for treatment once flows subside. Other sites are still today uncontrolled and during wet weather or snow melt periods, allow excess flow to enter directly into Hamilton Harbour.

It was estimated in 2003 that on average, Hamilton’s combined sewer overflows contributed 4,623,000 cubic metres of untreated wastewater annually to local receiving waters. Since this estimate was developed, there have been more control tanks installed to increase the retention capacity of combined sewer overflow during heavy rainfall events to help protect our natural environment. Since 1988, the City has been investing in these structures to control combined sewer overflows. A total of $86 million has been spent to install almost 300,000 cubic metres of combined sewer overflow storage capacity, which is used every year to mitigate overflows to the environment.

Still, more work is required to reduce pollutant loadings to Hamilton Harbour, to achieve the Remedial Action Plan documented pollutant loading targets from Hamilton’s combined sewer overflows, and the ultimate delisting of the Harbour as an Area of Concern. The original RAP delisting timeline to 2015 has recently been adjusted to the year 2020 and the City of Hamilton remains committed to meeting these timelines.

THE WOODWARD AVENUE WASTEWATER TREATMENT PLANT

The Woodward Avenue Wastewater Treatment Plant (WWTP) is the largest municipal facility that contributes flow to Hamilton Harbour. This facility was originally constructed in 1964, upgraded in 1972 to secondary treatment, and expanded in 1980 to arrive at its current design capacity of 409 Million Litres Per Day (MLD), with a peak capacity of 614 MLD.

Raw wastewater is delivered to the plant site via three deep, large diameter trunk collection sewers where an on-site raw wastewater pumping station pumps all flow to the treatment processes. Flow up to the peak capacity of 614 ML/d receives full treatment, whereas flow above 614 ML/d receives preliminary treatment through screening and grit removal before being discharged as a system bypass in order to protect the integrity of downstream treatment processes. Flow receiving full treatment up to a peak of 614 ML/d, goes through process steps that include:

- Preliminary Screening and Degritting
- Primary Clarification
- Secondary treatment, including biological aeration and secondary clarification
- Coagulant addition to precipitate phosphorus, where it is removed in the primary or secondary settling tanks
- Disinfection by chlorination followed by dechlorination (May 15 to October 15)
Raw wastewater bypasses and primary effluent bypasses (i.e., flow pumped to the plant but not receiving full treatment) are combined with the secondary effluent and discharged through an outfall into Red Hill Creek, just upstream of the mouth of Windermere Basin.

In the past, the plant has operated close to this design limit as a result of increasing flow to the plant. However over recent years, as a result of the economic downturn and on-going water conservation measures, annual average flow to the WWTP has been in decline since 2008 but still remains the largest municipal contributor of pollutant loads to the Harbour.

Through previously executed operational and capital improvements, some progress has already been made in reducing loadings to the environment from the Woodward Avenue WWTP, resulting in measurable benefit. However, additional effort is required to reach Remedial Action Plan pollutant loading targets due to limitations in the WWTP’s current design to treat for parameters of concern such as Ammonia and Phosphorus. The existing plant is still a viable and valuable part of Hamilton’s water and wastewater infrastructure, but it must be upgraded to address issues related to age and original design limitations.
DEVELOPMENT OF THE CITY’S WASTEWATER PROGRAM

The City of Hamilton has been proactively working toward implementing reliable wastewater systems for future generations. Through Master Planning, the City has developed an integrated approach to have the necessary infrastructure in place to accommodate future growth while protecting the environment and community.

The City of Hamilton is situated in one of the fastest growing regions of North America. As legislated by the province in the Places to Grow Act, by 2031, the population in this area is expected to grow substantially. The realization of this growth will require new areas of residential and employment lands, which will require supporting water and wastewater services. Ready and accessible public infrastructure is essential to the viability of existing and growing communities. Infrastructure planning, land use planning and infrastructure investment require close integration to ensure efficient, safe, and economically achievable solutions to providing the required water and wastewater infrastructure. The City of Hamilton has defined goals to blend the economic and social activities of a growing City with the preservation and protection of natural areas and resources through a sustainable approach to land management.

In 2006, the Water and Wastewater Division completed an innovative Water and Wastewater Master Plan for its Lake-based systems (KMK, 2006). This study is important to the City, as it is the first time a completely integrated process considering interaction between its water distribution and wastewater collection systems and associated treatment systems was undertaken. This Master Plan lays out a program for future upgrades, expansions and new facility requirements to meet growth, environmental and community protection, economic sustainability and legislative requirements for the existing wastewater collection, water distribution, and water and wastewater treatment systems to the year 2031. The program is based on optimization of existing infrastructure and development of a long-range sustainable program for improvements and enhancements to the system. This approach supports Hamilton’s corporate Vision 2020 principles.

The preferred servicing plan recommended in the 2006 Master Plan included a number of component projects across the water and wastewater system. For the purpose of this application, reference will be made to the wastewater program of which the two largest components include collection system improvements to reduce the discharge of untreated combined sewer overflows resulting from wet weather events and to
protect specific sensitive areas, and the upgrade and expansion of the Woodward Avenue Wastewater Treatment Plant. Given the size and complexity of these projects a Schedule C Class Environmental Assessment was required, which was completed in March 2008 (AECOM, 2008), following the Municipal Engineers Association Class Environmental Assessment process (MEA, 2007).

The result is an ambitious plan that will address growth pressures as well as improved performance of the City's wastewater system. The work that has been done through the Master Planning and Class Environmental Assessment processes included extensive stakeholder consultation with federal and provincial levels of government, and the Hamilton Harbour Remedial Action Plan office. The work identified to meet the needs of the community, and the environment has received strong support from all key stakeholders. The City of Hamilton is actively pursuing the implementation of the recommended infrastructure to meet our environmental and growth servicing standards to the year 2031.

**THE RECOMMENDED HAMILTON CSO CONTROL AND WOODWARD AVENUE WASTEWATER TREATMENT PLANT EXPANSION PROGRAM**

**Program Context**

Through the Schedule C Class Environmental Assessment project, specific project criteria were defined for developing the recommended program of collection system improvements and the expansion and upgrade of the Woodward Avenue WWTP, as follows:

- Provide capacity for growth to the year 2031, based on the projections defined by Ontario Places to Grow Legislation
- Plan for the future within the context of the City's Vision 2020
- Reduce loadings to Hamilton Harbour from combined sewer overflows and from the Woodward Avenue Wastewater Treatment Plant to meet the Remedial Action Plan goals for delisting
- Meet relevant applicable provincial and federal legislation and guidelines for wastewater management and treatment
- Address limitations and deficiencies in aging infrastructure to ensure a sustainable and reliable infrastructure solution throughout the planning period

The development of the preferred program components was completed following Hamilton’s Triple Bottom Line approach. Specifically, alternative solutions were evaluated considering social, environmental and economic impacts, to identify the optimal balanced solution to meet the program criteria.
**Capacity for Growth**

Based on population growth projections developed in the Master Plan, the projected average day flow for the Woodward Avenue WWTP service area for the 2031 planning period is 500 Million Litres per Day (MLD). This projection includes an allowance for normal dry weather sanitary flows, infiltration and inflow from separate systems and average wet weather flow from the Woodward Avenue WWTP collection system resulting in a net increase capacity expansion need of 91 MLD.

**Vision 2020**

Hamilton’s Vision 2020 is shared by city staff, citizens, City Council, businesses and organizations and was a guiding principal during the water and wastewater master planning process. Relevant Vision 2020 goals include ensuring that the water quality of streams, Cootes Paradise, Hamilton Harbour, Lake Ontario and other surface water bodies is generally good, and that the water is clean and clear so that swimming is a safe activity. The program includes these detailed statements:

- To identify and virtually eliminate sources of potential chemical contamination
- To reduce the municipal water use by households and businesses
- To restore adequate habitat for fish and birds so that populations are healthy and productive
- To ensure the quality of groundwater throughout the City is suitable for drinking and is a source of pure recharge for surface waters
- To ensure that water quality is not affected by run-off and sedimentation due to changes in the landscape
- To make Lake Ontario and Hamilton Harbour waterfronts accessible, safe and attractive for recreation.

**Hamilton Harbour Remedial Action Plan**

The Remedial Action Plan (RAP) program established for Hamilton Harbour in 1985 is an initiative that responds directly to the International Joint Commission’s designation of Hamilton Harbour as an Area of Concern.

Stakeholders in the region have been working toward a common set of targets that were developed for contributors of pollutants of concern with the goal of improving overall Harbour water quality and environmental health. Pollutant loading targets for total phosphorus, ammonia and suspended solids that were defined in the Remedial Action Plan exist for the Woodward Avenue Wastewater Treatment Plant and for combined sewer overflows in Hamilton, as well as for other agencies that contribute loadings to Hamilton Harbour.

The Remedial Action Plan process has identified reduced pollutant loadings from combined sewer overflows and from the Woodward Avenue wastewater treatment plant as the next most important step in improving water quality and meeting the Harbour delisting goal. In particular, it has been acknowledged that efforts to reduce combined sewer overflows and improve the Woodward Avenue Wastewater Treatment Plant treatment performance will provide one of the greatest positive impacts on Harbour remediation.

**Provincial and Federal Guidelines**

The Province of Ontario has for some time been aware of issues related to combined sewer systems and the potential for these older designs to overflow untreated wastewater as a result of wet weather and snow melt.

In 1994, the Ministry of the Environment in Ontario introduced a provincial guideline for the protection of water quality impacted by treatment works titled; F-5 - Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters. Following the release of F-5, which called for protection of waterways from impact associated with sewage release, Procedure F-5-5 - Determination of Treatment Requirements for Municipal and Private
Combined and Partially Separated Sewer Systems, was developed to support this objective. The Procedure applies to sewage treatment works with combined sewer systems such as the one that operates in Hamilton. F-5-5 identifies key goals including:

- Elimination of all combined sewer overflows during dry weather,
- Capture and treatment to primary equivalency (removal of 50 percent solids and 30 percent BOD) 90 percent of wet weather flow from an average year,
- Optimize the use of existing conveyance and treatment capacity,
- Protection of beaches to permit unrestricted recreation for 95 percent of the summer season.

It can be noted, that the Hamilton Harbour Remedial Action Plan requirements are in-line with the Ministry of the Environment procedures, and as such, in meeting the Remedial Action Plan goals, will result in compliance with the Ministry requirement.

WOODWARD WASTEWATER TREATMENT PLANT UPGRADE AND EXPANSION PROGRAM

Investment Needs and Implementation Plan

The Environmental Study Report (AECOM, 2008) documenting the Schedule C Class Environmental Assessment Process for combined sewer overflow management and wastewater treatment at the Woodward Avenue WWTP identified specific sub-projects to meet the program criteria described above as outlined in Table 1.

<table>
<thead>
<tr>
<th>Program Component (Sub-Projects)</th>
<th>Rationale/Primary Benefit</th>
<th>Capital Cost (in 2012$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Raw Wastewater Pumping Station Replacement</td>
<td>Existing pumping station does not provide firm capacity and is difficult to maintain. More importantly, the new station provides significant water quality benefits by increasing the pumping capacity and station reliability as to better manage wet weather flows for treatment as well as reducing the risk of flooding due to system surcharging in the collection system.</td>
<td>$70,100,000</td>
</tr>
<tr>
<td>2. Primary Treatment Process Upgrade and Expansion</td>
<td>An increase to primary treatment capacity from 614 ML/d to 1,300 ML/d is a first step to maximizing treatment of wet weather flow diverted from combined sewer overflows.</td>
<td>$68,700,000</td>
</tr>
<tr>
<td>3. Secondary/Tertiary Upgrades and Expansion</td>
<td>Secondary upgrades and tertiary treatment implementation to meet the level of treatment (for removal of suspended solids, ammonia and phosphorus) required to reduce loadings to Hamilton Harbour, to achieve RAP goals for Woodward Avenue WWTP.</td>
<td>$350,000,000</td>
</tr>
<tr>
<td>4. New Chlorine Contact Tank</td>
<td>The existing chlorine contact tank does not provide capacity for the expanded peak flow. A new chlorine contact tank dedicated to tertiary effluent is planned, to include chlorination with dechlorination to meet Federal CEPA regulations.</td>
<td>$24,500,000</td>
</tr>
</tbody>
</table>
The final phase of the master planning process is developing an implementation plan. Since completion of the Environmental Study Report, a number of key planning design variables were in flux which influenced the process of developing a sustainable implementation plan and which required a detailed analysis to be undertaken. Key variables included but were not limited to, available capacity at the Woodward Avenue WWTP as well as the forecasting of growth projections and water consumption. The subsequent analysis undertaken identified that recent historical development uptake lagged behind the provincial forecast of the Places to Grow Legislation. This realization, coupled with a substantial reduction in consumption associated with the economic downturn and general overall consumption patterns across all sectors, made the development of a sustainable implementation plan challenging considering the revenues that fund the expansion are directly associated with water consumption and development charges resulting from growth. As a result of the capacity assessment analysis, it was demonstrated that the expansion component of the Program addressing growth will not be required to commence until 2019 at

<table>
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</thead>
<tbody>
<tr>
<td>5. New Tertiary Effluent Outfall and Upgrades to Red Hill Creek</td>
<td>The existing outfall is undersized for new peak flow, and therefore, a new dedicated outfall for the tertiary treated effluent is planned. The lowest cost option and shortest outfall discharges upstream in Red Hill Creek (from existing discharge point), requiring improvements to the Creek.</td>
<td>$5,600,000</td>
</tr>
<tr>
<td>6. Power Supply, Electrical Distribution System and Standby Power Upgrade</td>
<td>The existing power supply and standby power facility does not provide capacity for the new tertiary treatment plant, and the existing facilities are nearing the end of their useful life; replacement and capacity expansion is required to meet the essential loads of the WWTP including the Raw Wastewater Pumping Station.</td>
<td>$73,000,000</td>
</tr>
<tr>
<td>7. Upgrades to Sludge Digestion</td>
<td>Upgrades are required to the sludge digestion system to provide adequate capacity for current or future sludge generation. Therefore, this project includes upgrades to primary and waste activated sludge thickening, again to improve digestion performance.</td>
<td>$52,500,000</td>
</tr>
<tr>
<td>8. Collection System Real Time Control (RTC) Upgrades</td>
<td>Upgrades to the collection system control structures and operation are required to ensure that the optimum volume of flow can be delivered to the plant for treatment, to minimize the occurrence of combined sewer overflows when there is treatment capacity available and associated risk of system surcharging and flooding.</td>
<td>$30,000,000</td>
</tr>
<tr>
<td><strong>Total Capital Cost for Program</strong></td>
<td></td>
<td><strong>$674,400,000</strong></td>
</tr>
</tbody>
</table>

**NOTE:** Capital costs have been revised and updated in Table 1 to reflect 2012 dollars. Total Capital Cost for Program outlined in Table 1 does not include Engineering or capital identified through a separate Biosolids Master Plan.
the earliest. Considering the City’s desire to proceed with the commitment to improve the quality of effluent from the City’s existing wastewater system as to meet the targets for de-listing Hamilton Harbour, the City developed a sustainable implementation plan whereby capital infrastructure to improve plant performance and produce improved effluent quality at current capacities, referred to herein as a “water quality upgrade” are proposed to be invested between 2012 and 2017. Capital works associated with the expanded capacity component of the program will be deferred until the year 2019 at the earliest.

In order to reflect the two distinct program initiatives, the program components as outlined in Table 1 were separated into two distinct phases of Growth and Water Quality as follows:

- **Water Quality** – Projects listed in Table 2a address the program objective of achieving effluent water quality targets based on remedial action plan (RAP) requirements to assist in de-listing the Harbour as an Area of Concern. The existing capacity of the facility (i.e. 409 ML/d average day and 614 ML/d) will be retained.

- **Growth** – Projects listed in Table 2b address the program objective for growth which is expected to be required in the 2019 – 2025 timeframe (depending upon growth rate and water usage by homeowners and industry), and includes an expansion from the current rated capacity of 409 ML/d to 500 ML/d.

### TABLE 2A: Water Quality Program

<table>
<thead>
<tr>
<th>Program Component (Sub-Projects)</th>
<th>Rationale/Primary Benefit</th>
<th>Capital Cost (in 2012$)</th>
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</thead>
<tbody>
<tr>
<td>1. Raw Wastewater Pumping Station Replacement</td>
<td>Existing pumping station does not provide firm capacity and is difficult to maintain. More importantly, the new station provides significant water quality benefits by increasing the pumping capacity and station reliability as to better manage wet weather flows for treatment as well as reducing the risk of flooding due to system surcharging in the collection system.</td>
<td>$70,100,000</td>
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<tr>
<td>2. Primary Treatment Process Upgrade and Expansion</td>
<td>An increase to primary treatment capacity from 614 ML/d to 1,300 ML/d is a first step to maximizing treatment of wet weather flow diverted from combined sewer overflows.</td>
<td>$68,700,000</td>
</tr>
<tr>
<td>3. Secondary/Tertiary Upgrades and Expansion</td>
<td>Secondary upgrades and tertiary treatment implementation to meet the level of treatment (for removal of suspended solids, ammonia and phosphorus) required to reduce loadings to Hamilton Harbour, to achieve RAP goals for Woodward Avenue WWTP.</td>
<td>$150,000,000</td>
</tr>
<tr>
<td>4. New Chlorine Contact Tank</td>
<td>The existing chlorine contact tank does not provide capacity for the expanded peak flow. A new chlorine contact tank dedicated to tertiary effluent is planned, to include chlorination with dechlorination to meet Federal CEPA regulations.</td>
<td>$24,500,000</td>
</tr>
</tbody>
</table>
Of the above noted sub-projects in Table 2a, the City is in the process of completing construction of the capacity expansion for the Primary Treatment Process at the Woodward Avenue Wastewater Treatment Plant. The total project is currently scheduled to be completed by late 2012 and, once commissioned, will enable more wet weather flow to be treated at the plant, and reduce combined sewer overflow loadings to the Harbour, in line with the goals of the Hamilton Harbour Remedial Action Plan targets for reducing loadings from combined sewer overflows (as well as F-5-5).

In addition, the Upgrades to the Sludge Digestion sub-project is under construction and scheduled to be completed 2012. The Collection System RTC Control sub-project is composed of three phases of which phase 1 is under construction and scheduled to be completed late 2012. Phases 2 and 3 are being developed in conjunction with subsequent program investments. The remaining sub-projects in Table 2a are what form the basis of the Clean Harbour Program as detailed in later sections of this application.

The following Table 2b outlines the growth components of the Program which will be deferred to 2019 as a result of the downturn in economy and reduced water consumption.

<table>
<thead>
<tr>
<th>Program Component (Sub-Projects)</th>
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<th>Capital Cost (in 2012$)</th>
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<tr>
<td>5. New Tertiary Effluent Outfall and Upgrades to Red Hill Creek</td>
<td>The existing outfall is undersized for new peak flow, and therefore, a new dedicated outfall for the tertiary treated effluent is planned. The lowest cost option and shortest outfall discharges upstream in Red Hill Creek (from existing discharge point), requiring improvements to the Creek.</td>
<td>$5,600,000</td>
</tr>
<tr>
<td>6. Power Supply, Electrical Distribution System and Standby Power Upgrade</td>
<td>The existing power supply and standby power facility does not provide capacity for the new tertiary treatment plant, and the existing facilities are nearing the end of their useful life; replacement and capacity expansion is required to meet the essential loads of the WWTP including the Raw Wastewater Pumping Station.</td>
<td>$42,000,000</td>
</tr>
<tr>
<td>7. Upgrades to Sludge Digestion</td>
<td>Upgrades are required to the sludge digestion system as to provide adequate capacity for current or future sludge generation. Therefore, this project includes upgrades to primary and waste activated sludge thickening, again to improve digestion performance</td>
<td>$45,000,000</td>
</tr>
<tr>
<td>8. Collection System Real Time Control (RTC) Upgrades</td>
<td>Upgrades to the collection system control structures and operation are required to ensure that the optimum volume of flow can be delivered to the plant for treatment, to minimize the occurrence of combined sewer overflows when there is treatment capacity available and associated risk of system surcharging and flooding.</td>
<td>$30,000,000</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
<td></td>
<td><strong>$37,200,000</strong></td>
</tr>
<tr>
<td><strong>Total Capital Cost for Capacity Expansion</strong></td>
<td></td>
<td><strong>$473,100,000</strong></td>
</tr>
</tbody>
</table>
TABLE 2B: **Growth Component**

<table>
<thead>
<tr>
<th>Program Component (Sub-Projects)</th>
<th>Rationale/Primary Benefit</th>
<th>Capital Cost (in 2012$)</th>
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<tbody>
<tr>
<td>1. Secondary/Tertiary Upgrades and Expansion</td>
<td>Secondary upgrades and tertiary treatment implementation to meet the level of treatment (for removal of suspended solids, ammonia and phosphorus) required to reduce loadings to Hamilton Harbour, to achieve RAP goals for Woodward Avenue WWTP.</td>
<td>$200,000,000</td>
</tr>
<tr>
<td>2. Power Supply, Electrical Distribution System and Standby Power Upgrade</td>
<td>The existing power supply and standby power facility does not provide capacity for the new tertiary treatment plant, and the existing facilities are nearing the end of their useful life; replacement and capacity expansion is required to meet the essential loads of the WWTP including the Raw Wastewater Pumping Station.</td>
<td>$31,000,000</td>
</tr>
<tr>
<td>3. Expansion to Sludge Digestion and Handling</td>
<td>Expansion of digestion and dewatering to meet requirements at 500 ML/d.</td>
<td>$7,500,000</td>
</tr>
<tr>
<td>4. Engineering</td>
<td></td>
<td>$20,300,000</td>
</tr>
<tr>
<td><strong>Total Capital Cost for Capacity Expansion</strong></td>
<td></td>
<td><strong>$258,800,000</strong></td>
</tr>
</tbody>
</table>

**HAMILTON’S FUNDING REQUIREMENTS OF THE GREEN INFRASTRUCTURE FUND**

Hamilton has a higher poverty rate than many comparable cities of its size. A study investigating the link between income and health found that a small sampling of downtown industrial neighbourhoods had 37 percent, over one-third, of participants living below a low income cut-off point, defined as $30,000 per year in 2006.

Poverty in Hamilton is one of the City’s biggest challenges. City-wide, it is estimated that 20 percent, or one-fifth, of the citizens live at or below the poverty line defined by a Statistics Canada Low Income Cut-off measure.

The City is addressing this issue through development of initiatives aimed at underlying issues and root causes of the problem. While being sensitive to the status of residents, Hamilton still realizes the importance of proactively and consistently raising the cost of drinking water and wastewater services to address issues related to sustainable infrastructure planning and full cost recovery of services.

Hamilton City Council has been a leader in realizing this trend and embraced the benefits of this view despite the political stress it may cause. Currently rates are utilized to support a $1.6 billion 10 year capital budget for upgrades and improvements to water and wastewater systems as per the 2012 Water, Wastewater and Storm Rate Budget. Rates have been increasing consistently for over ten years and 4.25% is committed annually over the next ten years. This commitment is a reflection of the need to meet projected growth and Hamilton Harbour Remedial Action Plan objectives in the most sustainable manner. It is recognized that water and wastewater rate increases in Hamilton are needed to address further investment in infrastructure, and this challenge is common among other Ontario municipalities. The difference in Hamilton is the need to pay particular attention to the ability of residents to afford the cost of services which are outpacing inflation with the added burden of the cost associated with harbour remediation.
The City of Hamilton has been committed to support the principle of sustainability by approving reasonable levels of financial recovery allocated to all users of the system. The scale of the current wastewater infrastructure needs, not only to address aging infrastructure (which costs are in addition to what is outlined herein) and to service growth, but also to achieve the Federal and international goal to clean up the Harbour by 2020. This objective is very large and compressed in a relatively short window of time. This makes it difficult to finance the entire solution, considering the demographic of the citizens in this City.

Rate payers have and will continue to contribute a fair and continually increasing share toward operation and management of the system. However, realistically, the local community cannot support the entire cost of solving the issues at hand. A partnership is required to close the budget gap necessary to address all of the City’s objectives and commitments to the environment, related to wastewater servicing.

The opportunity exists to revitalize Hamilton Harbour, to improve the health of its ecosystem, and to reap the environmental, social and economic benefits of the 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 is essential.

In order to proceed on the remaining Clean Harbour Program, additional funding is required. Specific projects have been identified and detailed in subsequent sections of this funding application which will have the most significant impact on delisting Hamilton Harbour. A cooperative effort is needed in the amount of $300 million as a jointly funded initiative equally shared by municipal, provincial, and federal governments. This arrangement will provide $100 million in support from each of the federal and provincial governments, reflecting a large portion of the project.

**PROPOSED PROJECTS FOR GREEN INFRASTRUCTURE FUNDING**

Although there are a number of sub-projects developed as part of an overall program to address various issues related to growth, wet weather and Harbour clean up, the focus of this application is on the sub-projects that compose the proposed Clean Harbour Program (CHP).

The Clean Harbour Program is composed of those sub-projects as identified during the master planning process which will have the most beneficial effect on water quality in the Harbour and include:

- A new Raw Sewage Pumping Station
- Upgrades to Secondary Treatment Process
- Addition of a new Tertiary Treatment Process
- New Chlorine Contact Chamber
- New Outfall with Upgrades to Red Hill Creek
- Upgrades to the WWTP power supply’s Electrical System and Standby Power

The description for each sub-project and capital costs are summarized in Table 3 – Clean Harbour Program Components and Capital Cost. These major sub-projects of the Clean Harbour Program provide the most significant impact in reducing loadings to Hamilton Harbour. Details of these sub-projects are as follows:

**New Raw Sewage Pumping Station** – The existing pumping station does not provide firm capacity and is difficult to maintain. More importantly, the new station provides 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 Process

Upgrades to secondary treatment are required to improve the capability and reliability of biological nitrification to meet RAP goals. In addition, tertiary filtration is required to meet RAP goals with respect to total phosphorus and suspended solids. The selected treatment option developed during the Water Quality Technical Study was based upon expanding the aeration and secondary clarification tankage of the existing South Secondary Treatment Plant. Tertiary filtration has been based on the use of cloth media filters.

New Chlorine Contact Tank – A new chlorine contact chamber is required for tertiary treatment effluent. This new contact chamber will include a dechlorination step to meet regulations associated with effluent toxicity.

New Outfall and Red Hill Creek Upgrades

A new outfall is required into Red Hill Creek to convey disinfected tertiary effluent. Upgrades will be completed to Red Hill Creek to improve the capability of the creek to convey this flow to Hamilton Harbour, and will also include habitat improvements for aquatic species.

Power Supply, Electrical Distribution System and Standby Power Upgrade – The implementation of a new tertiary treatment system 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.

Wastewater 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.

Engineering – The engineering included predesign, design, tender services and contract administration associated with the above capital projects.

To that end, the City is requesting that the sub-projects composing the Clean Harbour Program, as defined in Table 3 below, be considered a wastewater project for funding under the Green Infrastructure Fund.

### TABLE 3: Clean Harbour Program Components and Capital Costs

<table>
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<th>Program Component</th>
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<th>Capital Cost (in 2012$)</th>
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<td>1. New Raw Sewage Pumping Station</td>
<td>Existing pumping station does not provide firm capacity and is difficult to maintain. More importantly, the new station provides significant water quality benefits by increasing the pumping capacity and station reliability as to better manage wet weather flows for treatment as well as reducing the risk of flooding due to system surcharging in the collection system.</td>
<td>$70,100,000</td>
</tr>
<tr>
<td>2. Secondary/Tertiary Upgrades and Expansion</td>
<td>Secondary upgrades and tertiary treatment implementation to meet the level of treatment (for removal of suspended solids, ammonia and phosphorus) required to reduce loadings to Hamilton Harbour, to achieve RAP goals for Woodward Avenue WWTP.</td>
<td>$150,000,000</td>
</tr>
</tbody>
</table>
Table 3 summarizes the Clean Harbour Program related to the Woodward Plant Upgrade being submitted in this Green Infrastructure Funding application. We are confident that the reduction in pollutant loadings to the Harbour achieved by the implementation of the Clean Harbour Program will significantly contribute in the de-listing of Hamilton Harbour as an Area of Concern.

<table>
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<tbody>
<tr>
<td>3. New Chlorine Contact Tank</td>
<td>The existing chlorine contact tank does not provide capacity for the expanded peak flow. A new chlorine contact tank dedicated to tertiary effluent is planned, to include chlorination with dechlorination to meet Federal CEPA regulations.</td>
<td>$24,500,000</td>
</tr>
<tr>
<td>4. New Tertiary Effluent Outfall and Upgrades to Red Hill Creek</td>
<td>The existing outfall is undersized for new peak flow, and therefore, a new dedicated outfall for the tertiary treated effluent is planned. The lowest cost option and shortest outfall discharges upstream in Red Hill Creek (from existing discharge point), requiring improvements to the Creek.</td>
<td>$5,600,000</td>
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<tr>
<td>5. Power Supply, Electrical Distribution System and Standby Power Upgrade</td>
<td>The existing power supply and standby power facility does not provide capacity for the new tertiary treatment plant, and the existing facilities are nearing the end of their useful life; replacement and capacity expansion is required to meet the essential loads of the WWTP including the Raw Wastewater Pumping Station.</td>
<td>$42,000,000</td>
</tr>
<tr>
<td>6. Wastewater Collection System Control Upgrades</td>
<td>During heavy wet weather the combined sewer system is subject to overflow events. Installation of new control infrastructure and/or monitoring equipment at key sites within the wastewater collection system will improve management of flow to protect property and the environment.</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>7. Engineering</td>
<td></td>
<td>$30,000,000</td>
</tr>
</tbody>
</table>

Total Capital Cost for Project $332,200,000
The following section responds to the specific structure as outlined in the Guideline for Green Infrastructure Funding Application.

PROJECT OVERVIEW
The Woodward Avenue WWTP treats sanitary and combined sewage from the City of Hamilton, including the former town of Ancaster, the Township of Glanbrook and the City of Stoney Creek. The plant currently has a rated average day flow capacity of 409 ML/d and a peak flow capacity of 614 ML/d. Figure 2 presents an aerial photograph of the existing plant while Figure 3 presents the plant location on a map.

System Description
Raw wastewater is delivered to the plant site via three deep, large diameter trunk collection sewers. An on-site raw wastewater pumping station pumps all flow to the treatment processes. The pumping station provides a total capacity of 1,500 ML/d. Flow up to 1,300 ML/d.

FIGURE 2: Woodward Wastewater Treatment Facility – Aerial Photograph

The Woodward Avenue Wastewater Treatment Plant is located at:
700 Woodward Avenue
City of Hamilton
Ontario, Canada
L8H 6P4

Map datum: NAD 83
Zone: 17
UTM Easting: 599871.00 m
UTM Northing: 4789964.00 m

Survey Address:
Parts of Lot 29 and 30
Broken Foot Concession
receives preliminary treatment only through screening and grit removal processes. Flow, up to a peak of 614 ML/d, receives treatment that includes:

- Primary settling tanks
- Secondary treatment, including aeration and secondary settling tanks
- Coagulant addition to precipitate phosphorus, where it is removed in the primary or secondary settling tanks
- Disinfection by chlorination followed by dechlorination (May 15 to October 15)

During heavy rain events raw wastewater bypasses and primary effluent bypasses (i.e. flow pumped to the plant but not receiving full treatment) are combined with the secondary effluent and discharged through an outfall into Red Hill Creek, just upstream of the mouth of Windermere Basin.

As noted earlier in this application, a primary clarifier expansion and dechlorination project is on-going, planned for completion in late 2012. That project will provide dechlorination of effluent to meet CEPA non-toxic requirements, and will expand primary treatment capacity to 1,300 ML/d. This expansion will mean that virtually all of the flow delivered to the Woodward Avenue WWTP will achieve a minimum of primary treatment by 2012.

The Hamilton Harbour Remedial Action plan has identified two sets of loading targets for the Hamilton Harbour for three pollutants (ammonia, suspended solids and phosphorus). Through the Master Plan (KMK, 2006) and Class Environmental Assessment (AECOM, 2008), a preferred strategy was developed to address the overall objective of improving the effluent quality from the City’s existing wastewater system. Table 3 of this application summarizes the proposed works for the Clean Harbour Project for which funding is being requested. The following provides specific detail for each project component:

**Upgrades to Existing South Secondary Treatment**

A number of upgrades are proposed to the South secondary treatment train to improve overall reliability of biological nitrification at the Woodward Ave. WWTP. The main focus of these upgrades will be to increase the tank volume in the aeration tanks to allow for increased mixed liquor mass inventory, a key requirement for year round nitrification. This upgrade will require modification and potentially complete
replacement of the existing aeration systems in the South Plant, but no additional mechanical blowers will be required. In addition to the aeration upgrades, it is proposed that an additional two secondary clarifiers be implemented for a total of six clarifiers in the South plant. The secondary clarifier expansion of the South plant will also include capacity improvement to return activated sludge pumping.

**New Tertiary Treatment Process** - A new tertiary treatment facility will be implemented with an average and peak treatment capacity of 409 and 614 ML/d, respectively. At this stage of development, the design is based on the implementation of cloth media style filtration technology. However, this specific technology may change as a result of opportunities identified during the procurement process. Secondary effluent from the existing North and South treatment trains will be conveyed to the new filtration facility. The filtration facility will be equipped with chemical dosing facilities for supplemental phosphorus removal, as well as the new building housing electrical and administration facilities associated with this process.

**A New Raw Wastewater Pumping Station** - A new pumping station will be constructed to replace the existing station, which will provide a larger operating wet well volume, newer pumping equipment and will operate automatically to control pump rate based on influent flows. The pumping station will have a normal operating capacity of 1,300 ML/d and a firm capacity of 1,700 ML/d, which is of greater capacity than the existing pumping station and is equal to the trunk sewers that feed the Woodward Avenue WWTP. The pumping station is a critical process, and will therefore, be connected to the standby power system. The station is proposed to be equipped with 12 submersible pumps (10 duty, 2 standby) in a dry pit configuration, and there
will be two interconnected wet well cells, to enable removal of one cell for maintenance. All details to be confirmed through the design phase of the project.

**A new chlorine contact tank with dechlorination**
The existing disinfection capacity will be upgraded to meet the requirements of the expanded facility and will provide dechlorination in order to meet regulatory requirements.
The disinfection upgrades include the following:

- A new 10,400 m³ final effluent chlorine contact tank (CCT) with a peak flow capacity of 1,000 MLD proposed to be located to the east of the existing North plant secondary clarifiers
- Increasing the capacity and operational flexibility of the existing chlorination equipment through modification and replacement of the existing chlorinators
- Upgrading the sodium bisulphite pumping system in the Chemically Enhanced Primary Treatment (CEPT) Chemical Building
- Construction of a new outfall discharging into Red Hill Creek approximately 900 m upstream of the existing outfall

**A new outfall to Red Hill Creek, approximately 900 m upstream of the existing outfall, and Red Hill Creek improvements to protect and enhance aquatic habitats and natural features.**
The new outfall for secondary/tertiary effluent will discharge at a similar location to the existing maintenance outfall, approximately 900 m upstream of the existing outfall location on Red Hill Creek. The feasibility of constructing the new outfall was evaluated in the Phase 3 and 4 Class Environmental Assessment for the plant. Some of the proposed upgrades recommended in this study included: widening of the Creek to accommodate the increased flows; works to mitigate any anticipated erosion including the construction of vegetated crib walls allowing habitat diversity; and a realignment of the outfall to provide a region of energy dissipation to mitigate any concerns due to the higher rates of flow proposed from the new outfall.

**A major upgrade and expansion of the power supply system, power distribution system and standby power facilities**
The architecture of the Electrical System Upgrades is based on the primary distribution and power generation via 13.8 kV distribution. Upgrades to the Electrical System will consist of the following:

- One new power and emergency generation building
- Pad mounted load centers interconnected by a series of tie feeders
- Primary and secondary selective 13.8 kV feeders
- 13.8 kV double primary loop distribution
- Primary feeders terminated to separate 13.8 kV buses in the main distribution and power generation switchgear
- A primary loop distribution feeder and 13.8 kV emergency generators on each main bus
- 13.8 kV primary distribution loops originating from the main distribution and power generation switchgear from the respective 13.8 kV buses
- Multiple load distribution centers consisting of 13.8 kV, SF6 compact switchgear sections that are designated A and B and are fed from a separate primary distribution loop feeder
- 13.8 kV diesel generators to meet the standby capacity requirements

**Implementation Schedule**
The schedule outlined in Figure 4 in Appendix A demonstrates the activities that are required to be undertaken along with the associated timelines demonstrating substantial completion by March 2017.
FIGURE 4: Woodward Avenue WWTP Water Quality Program Implementation Schedule

<table>
<thead>
<tr>
<th>Contract</th>
<th>Year / Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine Contact Tank and Site Prep</td>
<td>Engineering, Construction</td>
</tr>
<tr>
<td>Pump Station / Electrical</td>
<td>Engineering, Construction</td>
</tr>
<tr>
<td>Secondary South Upgrades</td>
<td>Engineering, Construction</td>
</tr>
<tr>
<td>Tertiary</td>
<td>Engineering, Construction</td>
</tr>
<tr>
<td>Red Hill Creek Upgrades</td>
<td>Engineering, Construction</td>
</tr>
</tbody>
</table>

FINANCIAL AND LEGAL REQUIREMENTS

TABLE 4: Proposed Expenditure Profile – Clean Harbour Program

<table>
<thead>
<tr>
<th>Program Component / Year</th>
<th>Total</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply, electrical distribution system and standby power upgrade</td>
<td>$42,000,000</td>
<td>$5,000,000</td>
<td>$27,000,000</td>
<td>$10,000,000</td>
<td></td>
</tr>
<tr>
<td>New chlorine contact tank</td>
<td>$24,500,000</td>
<td>$1,100,000</td>
<td>$18,000,000</td>
<td>$5,400,000</td>
<td></td>
</tr>
<tr>
<td>New tertiary effluent outfall and upgrades to Red Hill Creek</td>
<td>$5,600,000</td>
<td>$200,000</td>
<td>$4,000,000</td>
<td>$1,400,000</td>
<td></td>
</tr>
<tr>
<td>Secondary Upgrades and Tertiary Treatment</td>
<td>$150,000,000</td>
<td>$30,000,000</td>
<td>$90,000,000</td>
<td>$30,000,000</td>
<td></td>
</tr>
<tr>
<td>New Raw Sewage Pumping Station</td>
<td>$70,100,000</td>
<td>$10,200,000</td>
<td>$9,400,000</td>
<td>$44,500,000</td>
<td>$6,000,000</td>
</tr>
<tr>
<td>Wastewater Collection System Control Upgrades</td>
<td>$10,000,000</td>
<td>$2,000,000</td>
<td>$4,000,000</td>
<td>$4,000,000</td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>$30,000,000</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>$5,000,000</td>
<td>$5,000,000</td>
</tr>
<tr>
<td>Total Capital Cost for Project</td>
<td>$332,200,000</td>
<td>$23,500,000</td>
<td>$80,400,000</td>
<td>$177,300,000</td>
<td>$51,000,000</td>
</tr>
</tbody>
</table>

Project Capital Cost
Table 4 presents a proposed expenditure profile for the Clean Harbour Program.

All costs meet the criteria for being eligible, based on Annex B of the guideline for completing an application for the Green Infrastructure Fund for Wastewater Infrastructure Projects.

Proposed funding sources and expenditure profile
Funding for the Project is proposed to be generated through a combination of sources including water rates, development charges and government subsidies.

Level of confidence, degree of accuracy, level of contingency
The costs estimates are based detailed estimates at pre-design level information, in 2012 dollars, and include a contingency of 25%.
Assurance of capacity to operate and maintain the service or investment on a sustainable, long term basis

Through the Class Environmental Assessment process, the operating and maintenance (O&M) cost associated with the project have been identified and since been budgeted for in the City's Water, Wastewater and Storm Rate budget. Beginning 2016 an increase in operating dollars to support the revised operating and maintenance conditions of the facility resulting from the clean harbour investment is proposed to be added to the O&M budget.

Adherence to Federal Legislation

The City is well positioned to meet all required federal legislation, permits and approvals. As indicated, the City has completed an extensive Class Environmental for the entire Program and anticipates that the only outstanding requirement would be a Federal Screening Report would be required. The City is experienced on other funding programs in working with our federal partners in completing such reports. As outlined in our project schedule, we have allocated time in our schedule to accommodate this task.

Status and Plan to complete Environmental Assessment and First Nations Consultation

A Master Plan and Schedule C Class Environmental Assessment following the MEA Class Environmental Assessment (MEA, 2007) process were completed in 2006 and 2008, respectively (KMK, 2006; AECOM, 2008). Those projects included consultation with the public, stakeholders and government agencies at municipal, provincial and federal levels. First Nations were included on the contact list.

Fair and Competitive Contract Award

The City confirms and assures that the contract award process for the purchase of engineering services, equipment and construction services will be competitive, fair, transparent and consistent with the Agreement on Internal Trade.

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 is essential. There are a number of social, environmental and economic benefits that can be realized with the support of the proposed Clean Harbour Program which are detailed on pages 12 and 13. These program benefits are summarized as follows:

Social

Investment in the Clean Harbour Program 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, which at its peak, will reach $14 million per month will translate directly to job creation within the local community.

Environmental

The Remedial Action Plan defined specific loading targets for combined sewer overflows and the Woodward Avenue WWTP.

Through the 2008 Class Environmental Assessment, these targets were modified slightly, as requested by the City, in light of the limitations in controlling combined sewers, and also, in consideration of the performance achievable with the best available wastewater treatment technology. A Hamilton Harbour Remedial Action Plan Report published in 2007 reviewed the City’s proposed loading targets and confirmed that these would be consistent with meeting the goals of the originally published loading targets for delisting the Harbour as an Area of Concern. Table 5
TABLE 5: Existing Loadings and Loading Objectives 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

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Current Loading (kg/d)</th>
<th>Clean Harbour Targets (HHRAP)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wastewater System (Woodward &amp; CSO)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Suspended Solids</td>
<td>7,434</td>
<td>1,817</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>339</td>
<td>82</td>
</tr>
<tr>
<td>Ammonia-N</td>
<td>3,559</td>
<td>1,048</td>
</tr>
</tbody>
</table>
Woodward Avenue WWTP, the proposed strategy will reduce contaminant loadings to the Harbour, and realize improvements to Harbour water quality compatible with RAP objectives.

Figure 5, Figure 6 and Figure 7 present the overall loading reductions for target parameters; total reduction of 5,617 kg/d suspended solids, total reduction of 257 kg/d total phosphorus, and total reduction of 2,511 kg/d ammonia, respectively. It should be noted that CSO loading calculations are software modelled outputs based on average rainfall years characterized by 1988 and 1989. Future treatment plant performance is based on proposed design criteria that reflects existing Hamilton Harbour Remedial Action Plan targets.

*Note:* Current loading reflects the design objectives of the existing Woodward WWTP CofA. Ammonia was not an original design parameter, therefore an assumption of 50% ammonia removal is applied to reflect current ammonia removal efficiencies.
Economic
While being sensitive to the status of residents, Hamilton still realizes the importance of proactively and consistently raising the cost of drinking water and wastewater services to address issues related to sustainable infrastructure planning and full cost recovery of services.

Hamilton City Council has been a leader in realizing this trend and embraced the benefits of this view despite the political stress it may cause. Currently rates are utilized to support a $1.6 billion 10 year capital budget for upgrades and improvements to water and wastewater systems as per the 2012 Water, Wastewater and Storm Rate Budget. Rates have been increasing consistently for over ten years and 4.25% is committed over the next ten years. This commitment is a reflection of the need to meet projected growth and Hamilton Harbour Remedial Action Plan objectives in the most sustainable manner. It is recognized that water and wastewater rate increases in Hamilton are needed to address further investment in infrastructure, and this challenge is common among other Ontario municipalities. The difference in Hamilton is the need to pay particular attention to the ability of residents to afford the cost of services which are outpacing inflation with the added burden of the cost associated with harbour remediation.

Investment in the Clean Harbour Program will provide the much needed financial support to a community in need of controlling and developing a sustainable long term water, wastewater and storm rate budget.
Table 6 presents potential project risks and measures that have been taken or are planned to mitigate these risks.

<table>
<thead>
<tr>
<th>Potential Risk</th>
<th>Description</th>
<th>Mitigation Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change to project scope</td>
<td>Due to inadequate planning</td>
<td>Class Environmental Assessment has been completed, which assessed all viable options thorough a triple-bottom evaluation to select the preferred design concept. The preferred design concept was peer reviewed. An Enhanced Conceptual Design Report was prepared in 2009 (AECOM), providing greater detail on the project scope. A second peer review was undertaken in 2012 to validate the approach being undertaken in the Clean Harbour Program.</td>
</tr>
<tr>
<td>Due to inadequate consultation with public and stakeholders</td>
<td></td>
<td>The Master Plan and Class Environmental Assessment included consultation with the public, stakeholders and government agencies. A separate Technical Advisory Committee with key stakeholders, including the Hamilton Harbour Remedial Action Plan Bay Area Restoration Committee (BARC), Hamilton Conservation Authority and the Ministry of the Environment met several times during these planning studies and throughout the development of the proposed implementation plan.</td>
</tr>
<tr>
<td>Due to inadequate consultation with City elected officials</td>
<td></td>
<td>A Public Works Subcommittee was formed to monitor the Class Environmental Study progress and recommendations, who met four times over the course of the project. Committee members reported on project progress to City Council. The Class Environmental Study recommended program was approved by City Council.</td>
</tr>
<tr>
<td>Potential Risk</td>
<td>Description</td>
<td>Mitigation Measure</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Change to project schedule</strong></td>
<td>Delay in design due to delays in retaining engineering consulting services.</td>
<td>The City has already retained a consulting team of CH2M HILL and AECOM, who have proceeded with preliminary design. A detailed work breakdown schedule has been prepared, defining critical path timelines. Both firms have committed to assigning the necessary resources to meet the defined schedule. A revised project delivery model is being considered in the form of a Progressive Design Build which will enhance the City’s ability to control project schedules by having one overall responsible Engineer and Contract Management Services for the entire Clean Harbour Program.</td>
</tr>
<tr>
<td></td>
<td>Delay in design because inadequate information is available for large equipment (i.e., design must be customized for equipment)</td>
<td>The City intends to pre-select major equipment, so that adequate information is available to complete the design.</td>
</tr>
<tr>
<td></td>
<td>Delay in construction that could result if the project were tendered all at once</td>
<td>The City is developing a project delivery model based on a Progressive Design Build approach. This project delivery model offers the benefit of having one overall responsible “Constructor” who can manage the construction activities across the site which greatly mitigates risk of construction delays associated with coordination between sub-projects. In addition, the same Progressive Design Build team will be responsible for Engineering and Tender preparation and can adapt tender packages to the pace of engineering and the construction site activities.</td>
</tr>
<tr>
<td></td>
<td>Delay in construction because bidding contractors are not appropriately qualified for work.</td>
<td>The City will conduct a contractor pre-selection process early in the design, to develop a short-list of interested and qualified contractors for each construction package.</td>
</tr>
<tr>
<td><strong>Change to project budget</strong></td>
<td>Substantial changes to capital costs</td>
<td>As noted, the City has completed an Enhanced Conceptual Design Report, prepared in 2009 (AECOM), which allowed for refinement of the project costs. There are adequate contingencies within the budget appropriate to the level of design. It is anticipated, that since the project scope has been defined, as identified above, costs will become more refined resulting in lower contingency allowance. In addition, the consulting team assigned to this project include two consulting firms with recent experience in the design and construction of large wastewater treatment projects in Ontario, giving further confidence in the budget estimate.</td>
</tr>
<tr>
<td>Potential Risk</td>
<td>Description</td>
<td>Mitigation Measure</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Change to project budget</strong></td>
<td><strong>(continued)</strong></td>
<td>The selected project delivery model of Progressive Design Build also offers the greatest ability to control cost. By placing the engineering, procurement and construction management functions under one Progressive Design Build Contractor allows the City and our funding partners the ability to secure a Guaranteed Maximum Price (GMP) through the associated contract terms and conditions. In addition, cost control measures will be established whereby the City will be involved in the development of each tender package and resulting award. This structure provides the best flexibility for adjustments to be made to design or equipment selection as required to maintain scope, schedule and budget targets.</td>
</tr>
</tbody>
</table>
MINIMUM FEDERAL REQUIREMENTS

ACCESSIBILITY
The City acknowledges that any newly constructed or materially rehabilitated infrastructure intended for use by the public will meet the Canadian Standards Association Technical Standard Accessibility Design for the Built Environment (CAN/CSA B651-04) for new construction.

MEETING NATIONAL STANDARDS
The planned tertiary treatment process will result in treated wastewater effluent that will achieve or exceed the requirements of the Canadian Council of Ministers for the Environment (CCME) standards, based on CCME standards and Ontario Ministry of the Environment (MOE) guidelines, as follows:

- Carbonaceous biochemical oxygen demand less than 25 mg/L
- Suspended solids less than 25 mg/L
- Total residual chlorine less than 0.02 mg/L
- E. Coli less than 200 per mL
- Unionized ammonia concentration at end-of-pipe less than 0.1 mg/L (consider toxic level by Ministry of the Environment).
REFERENCES

KMK, 2006    City of Hamilton Water and Wastewater Master Plan prepared for the City of Hamilton by KMK Consultants Limited (November 2006)


Hamilton Harbour RAP, 2007 Response to City of Hamilton’s Proposed Wastewater System Upgrades, Hamilton Harbour Technical Team (July 2007)

MEA, 2007 Municipal Class Environmental Assessment prepared by the Municipal Engineers Association, Amended 2007

MOE, Procedure F-5-5 A supporting document for the Provincial Guideline F-5 “Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters” prepared by Ontario Ministry of the Environment

AECOM, 2009 Enhanced Conceptual Design Report for the Woodward Avenue WWTP Expansion and Combined Sewer Pumping Stations prepared for the City of Hamilton by AECOM (November 2008)