



CITY OF HAMILTON
PUBLIC WORKS DEPARTMENT
Hamilton Water

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	January 15, 2018
SUBJECT/REPORT NO:	Dundas Wastewater Treatment Plant and Cootes Paradise (PW18009) (Wards 1& 13) (Outstanding Business List)
PREPARED BY:	Bert Posedowski (905) 546-2424, Extension 3199
SUBMITTED BY:	Mark Bainbridge Director Water Wastewater Planning & Capital Public Works
SIGNATURE:	

RECOMMENDATION

- (a) That the initiative to upgrade the Dundas Wastewater Treatment Plant (Dundas WWTP), as outlined in report PW18009, to meet the new Hamilton Harbour Remedial Action plan (HHRAP) effluent targets, be endorsed;
- (b) That the General Manager of Public Works be authorized and directed to seek funding opportunities, or other forms of financial assistance in support of the Dundas WWTP Upgrade Project in order to offset the identified budget shortfall of \$20.0 million;
- (c) That staff be directed to report back to Public Works Committee by December 2018 to provide a financing plan to support the Dundas WWTP upgrade project;
- (d) That the item "Dundas Wastewater Treatment Plant and Cootes Paradise" be identified as completed and removed from the Public Works Committee Outstanding Business List.

EXECUTIVE SUMMARY

Cootes Paradise Marsh is the central feature of the Royal Botanical Gardens Cootes Paradise Nature Sanctuary. Cootes Paradise Nature Reserve (est. 1927), including 25km of shoreline, represents 99% of the unaltered Lake Ontario shoreline within the Golden Horseshoe. The marsh has been the subject of an intensive Great Lakes restoration program since 1996 as part of the (HHRAP). The focus of marsh restoration is to remove the underlying stresses ultimately recovering water clarity to the bottom and improving oxygen conditions to meet marsh restoration targets.

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The discharge of effluent from the Dundas WWTP into Cootes Paradise is a contributor to the water quality and health of the marsh. Hamilton Water (HW) has identified a need to rehabilitate a portion of the Dundas WWTP as it reaching the end of its useful life. Due to the significance of Cootes Paradise as a key natural feature of the larger Great Lakes region, it is important to apply wastewater treatment solutions that match the environmental importance of the water feature that receives the treated effluent.

In June 2017 the HHRAP presented a new effluent target of 0.05 mg/l of Total Phosphorous (TP) for the Dundas WWTP which was endorsed by HHRAP stakeholders. A City study report titled “A Preliminary Asset Replacement Study for the Future Use of the Dundas WWTP” (replacement study) was completed in 2015. In that replacement study several new treatment plant configurations were identified that could potentially produce effluent quality that meet the HHRAP targets. The estimated cost of a plant upgrade to meet the new HHRAP effluent targets is \$45M. HW’s current ten-year capital budget for the design and construction of a like-for-like Dundas WWTP Upgrade is set at \$25.7M. Under a like-for-like plant upgrade the effluent quality from the WWTP is expected to meet the previously identified HHRAP effluent target of 0.11mg/l total phosphorous.

To meet a construction start date in 2022 the design and tendering process for the Dundas WWTP must begin in early 2019. The City requires additional time to explore other sources of funding and/or financing opportunities that are necessary to close the budget gap of \$19.3M. It is therefore recommended that staff initiate the design and tendering process in early 2019 and furthermore, that in the interim, staff seek other sources of funding and/or financing. It is recommended that staff provide an update report to Council in late 2018 prior to the start of design and tendering. The intent of the report will be to update Council on the successes in securing financial support, and if successful, begin procurement to pre-select the preferred tertiary treatment technology.

Alternatives for Considerations – See Page 6

FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial: Hamilton Water has allocated \$25.7M in the 10-year capital rate budget (under Project ID 5161266213) for the replacement of the Dundas WWTP (Plant A). This budget is for the design and construction of the treatment plant on a like-for-like basis which can meet previous HHRAP targets but not the updated ones identified in 2017. Additional financing support is one way to cover the cost of a more expensive program to meet new effluent quality targets.

Staffing: No implications

Legal: The City has no legal obligation to upgrade the Dundas WWTP to meet effluent targets set by the HHRAP. If upgrades are pursued an MOECC issued Environmental Compliance Agreement (ECA) will be required. The

ECA is expected to reference HHRAP targets as a treatment objective that the future plant would be designed to address.

HISTORICAL BACKGROUND

Cootes Paradise Marsh:

Cootes Paradise Marsh is the central feature of the Royal Botanical Gardens Cootes Paradise Nature Sanctuary. The marsh has been the subject of an intensive Great Lakes restoration program underpinned by remediating inflowing waters and onsite carp exclusion. The marsh has improved substantially during the past 20 years. Both very large in size and strategically located at the intersection of a great lake and the Niagara Escarpment the marsh supports international migrations of birds and is a Lake Ontario fish spawning and nursery area. Fish community monitoring work in the 1990s found that fish production was estimated to have the potential of 15 million fish per year.

In its diminished state, Cootes Paradise Nature Reserve continues to sustain one of the highest biodiversity of plant species per hectare in Canada, and is home to 35 endangered species in the region. Most of these species are found within the surrounding old growth forest, a habitat also in decline partially due to the loss of wildlife whose life cycles are connected to a healthy marsh.

The discharge of effluent from the Dundas WWTP into Cootes Paradise is one of several contributors to the quantity and quality of water that passes through the marsh. The impact changes seasonally and is most dramatic in the late summer when natural creek flows are at their lowest providing limited dilution ability. The result is domination of the plant community by algae, poor water clarity, and impaired oxygen.

Dundas Wastewater Treatment Plant:

The Dundas Wastewater Treatment Plant (Dundas WWTP) is located at 135 King Street East in the Town of Dundas and treats all of the sanitary waste generated in Dundas and some sanitary waste from Waterdown, plant capacity permitting. The Dundas WWTP discharges into Desjardins Canal and is a contributor of nutrients to Cootes Paradise and in particular has a dominant influence on the West Pond area as it is upstream of any appreciable dilution from other water sources.

HHRAP's Treatment Targets to Restore Cootes Paradise

The HHRAP technical team was formed at the outset of the HHRAP with a goal of setting water quality loadings targets and in-marsh and harbour objectives to support the overall goal of clean water and a functioning ecosystem.

Both phosphorous and total suspended solids have been the focus of water quality parameters that need to be reduced in Cootes Paradise for restoration of the marsh. As these parameters are tied together in terms of sewage treatment, a single target for the more complex Total Phosphorous (TP) target has been set as the desired objective.

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On June 6, 2017, the HHRAP released a draft report titled “Recommended Total Phosphorous Targets for Cootes Paradise Marsh and the Dundas Waste Water Treatment Plant: Towards Achieving a Healthy Marsh and Delisting as an Area of Concern” in which more stringent WWTP effluent targets were defined. HHRAP stakeholders have principally endorsed these new targets.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

Upgrading of the Dundas WWTP will trigger the need for the City to apply for an Environmental Compliance Approval (ECA) through the Ministry of Environment and Climate Change (MOECC) which will reference both effluent objectives and limits. For clarity, effluent objectives reflect the MOECC’s expected performance of a treatment plant on a consistent basis but do not represent a compliance threshold. Effluent Limits, represent a compliance limit that shall not be exceeded.

The overlying surface water quality management goal of the MOECC is to ensure that the surface waters of the Province are of a quality which is satisfactory for aquatic life and recreation. For impaired sites like Cootes Paradise, goals will consider what will foster improvement.

RELEVANT CONSULTATION

Ministry of the Environment and Climate Change:

At a June 28, 2017 HHRAP Technical Team meeting MOECC staff provided the City with early indications that they will endeavour to set the Effluent Objectives at 0.05 mg/l TP, based on a six-month averaging period. This would reflect the new HHRAP target. MOECC staff did not provide any indication on proposed legal Effluent Limits.

At a meeting held June 5, 2017 to discuss the Dundas WWTP Upgrade ECA application the MOECC cautioned Hamilton Water regarding plans to begin an upgrade of the Dundas WWTP concurrent with the upgrades underway at the Woodward WWTP. The MOECC suggests any attempt to execute upgrades that impact performance at both WWTP’s as highly risky and they encourage any major upgrades at the Dundas WWTP to occur after the Woodward Upgrade is fully commissioned. The Woodward WWTP upgrades are scheduled for completion in 2022.

Hamilton Harbour Remedial Action Plan:

At the June 28, 2017 HHRAP technical team meeting, representatives from the HHRAP office acknowledged that the new effluent targets endorsed by the HHRAP and its stakeholders was a significant change from a previous target of 0.11 mg/l TP set years before. Representatives from HHRAP further acknowledged that the cost to upgrade the Dundas WWTP to this new effluent target could be significantly higher and that the HHRAP is prepared to negotiate with the City to reach effluent targets that are both beneficial to the environment and cost affordable for the City.

ANALYSIS AND RATIONALE FOR RECOMMENDATION

A study report titled “A Preliminary Asset Replacement Study for the Future Use of the Dundas WWTP” (replacement study) was completed by CIMA Canada dated February 2015. The replacement study included a feasibility component that examined the application of Best Available Technology Economically Feasible (BATEA) that could be applied at the Dundas WWTP. The purpose of that feasibility study was to identify and rank different levels of treatment achievable at the Dundas WWTP and to report on the associated costs of each.

For clarity, the different levels of treatment examined in the replacement study can be consolidated into three options namely:

1. Like for Like – treatment plant infrastructure would be replaced utilizing the same technologies that currently exist. Effluent quality can be expected to meet the current performance of 0.1 mg/l TP. The capital cost of this option is estimated at \$26M and Net Present Value (NPV) costs at \$43M.
2. Partial Enhancement – the treatment plant would be upgraded with enhancements to the existing technology. Resulting effluent, while better than that of the current plant, would not achieve the HHRAP target of 0.05mg/l TP. The capital cost of this option is estimated at between \$35M to \$40M and NPV costs at \$49M to \$55M.
3. Full Enhancement – the treatment plant would be upgraded with new technology sufficient for the plant to produce an effluent quality that meets the HHRAP target of 0.05 mg/l TP. The capital cost of this option is estimated at \$45M and NPV costs at \$59M.

In all of the options referenced above the capital costs represent immediate capital costs spent over the next five years and the net present value (NPV) costs reflect the cost of replacement of both Plants A and B over their lifecycle periods. Capital costs were derived from conceptual engineering designs and include a cost escalation of 30% which is consistent with established cost estimating standards. Cost estimates are very high level and can be expected to change as the project advances over time through more detailed design stages of work.

Under the current ten-year capital rate budget, \$25.7M has been identified for design and construction of the Dundas WWTP (under a like for like design approach). Therefore the cost to upgrade the facility following selection of a partial or full enhancement option is currently unaffordable.

The replacement study identified that Plant A is near the end of its useful life and should be replaced in the next three to five years. From recommendations received by the MOECC, the upgrade to the Dundas WWTP should be planned for a start date on or after 2022. Based on that milestone date, staff believes that the design and

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procurement processes for the Dundas WWTP upgrade should begin no later than early in 2019.

Between now and early 2019 when design should begin, staff will work with the HHRAP office, its stakeholders and other potential partners to secure funding and/or financing options for the unbudgeted \$19.3M. On or before October 2018 and prior to the start of project design and procurement, staff will provide a project status report to Council to advise them of project funding, project scope, schedule and budget. If a source of funding is secured that allows for the upgrade of the Dundas WWTP to meet the new HHRAP effluent targets, a competitive procurement process should be undertaken to pre-select the treatment technology to be employed on the project.

ALTERNATIVES FOR CONSIDERATION

One alternative is to proceed with a like-for-like replacement of the original Plant A and leave unchanged the existing tertiary treatment equipment. Under this approach the preliminary estimated cost of the upgrade remains at \$25.7M for ageing plant components. This can achieve the old HHRAP target but will not achieve the recently identified TP target.

The environmental significance of Cootes Paradise is well documented and the extensive work carried out by the HHRAP technical team suggests that the marsh is at the cusp of a sustained recovery, provided that water quality improvements continue to be made. The HHRAP technical team acknowledge that the marsh ecosystem is extremely complex and their predictions on how the marsh will respond to differing WWTP effluent concentrations are subject to interpretation. However, the scientific community feel confident that the new target of 0.05mg/l TP will restore the marsh more rapidly and will provide the marsh an added resilience against the stresses of global climate change.

There are no assurances that upgrading the Dundas WWTP to achieve the new HHRAP effluent targets will fully restore Cootes Paradise. However, if the City chooses to proceed with a like-for-like upgrade and conditions in the marsh stagnate or worsen, the City's next opportunity to upgrade the Dundas WWTP to a higher effluent standard is many years away. For this reason, staff do not recommend this alternative but rather support moving ahead with the recommendations presented in this report.

A second alternative identified was to upgrade the Dundas WWTP to produce an effluent quality somewhere between the HHRAP's previous target of 0.11 mg/l TP and their new target of 0.05 mg/l TP. From the replacement study that has been completed a Partial Enhancement option reflects this alternative with a capital cost of \$35M to \$40M. Staff considers this alternative to have merit and recommends that this alternative be re-assessed if funding and/or financial support for the entire \$19.3M budget shortfall cannot be secured.

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ALIGNMENT TO THE 2016 – 2025 STRATEGIC PLAN

Clean and Green

Hamilton is environmentally sustainable with a healthy balance of natural and urban spaces.

Built Environment and Infrastructure

Hamilton is supported by state of the art infrastructure, transportation options, buildings and public spaces that create a dynamic City.

APPENDICES AND SCHEDULES ATTACHED

N/A