CITY OF HAMILTON
PUBLIC WORKS DEPARTMENT
Hamilton Water Division

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	March 20, 2017
SUBJECT/REPORT NO:	Ancaster Elevated Water Reservoir Class Environmental Assessment (EA) and Conceptual Design (PW17022) - (Ward 12)
WARD(S) AFFECTED:	Ward 12
PREPARED BY:	Winston Wang 905-546-2424, Extension 4092 Udo Ehrenberg 905-546-2424, Extension 2499
SUBMITTED BY: **SIGNATURE:**	Stuart Leitch Acting Director, Water & Wastewater Planning & Capital Public Works Department

RECOMMENDATION

(a) That the General Manager, Public Works Department be authorized and directed to file the Notice of Completion and issue the Project File Report for the Class Environmental Assessment for Ancaster Elevated Water Reservoir and Conceptual Design for the mandatory 30-day public review period;

(b) That upon completion of the 30-day public review period, the General Manager, Public Works Department be authorized and directed to proceed with detailed design and implementation of the preferred solution of the Class Environmental Assessment for Ancaster Elevated Water Reservoir and Conceptual Design, provided that no Part 2 Orders by the Minister of the Environment and Climate Change are received;

(c) That an additional $4.24M be included in the 2018 Rate Budget to supplement Project ID No. 5141395354 in order to update the total budget requirement from $8.77M to $13M (including $11.85M design/construction budget and $1.15M for internal resource/staffing) for the preferred design concept outlined in the Environmental Assessment Study Report.

EXECUTIVE SUMMARY

The City of Hamilton (City) retained WSP Canada Inc. (previously GENIVAR) to complete a Schedule 'B' Class Environmental Assessment (Class EA) for the construction of the Ancaster Elevated Water Reservoir, pursuant to the requirements of the Municipal Engineers Association Class EA Document (MEA, 2015).

The need for the Ancaster Elevated Water Reservoir was identified and documented in the City of Hamilton Water and Wastewater Master Plan Class EA Report (KMK Consultants, 2006), which indicated an unbalanced water supply, with low pressure concerns in certain areas, limited redundancy, and insufficient capacity to service future system demands in the area.

In order to partially address some of these issues, the current mode of operation at the Garner Road HD018 Pumping Station for the distribution system is to maintain an average pressure of 667 kPa (96 PSI) to ensure that the pressure within the entire district is within the acceptable range required by the Ministry of Environment and Climate Change (MOECC). However, the station was originally designed for an operating pressure of 520 kPa (75 PSI). As a result, the pumps require more energy to pump at the same rates given the higher pressure requirements.

In addition, issues have also been identified that impact the current pumping station operation such that in order to maintain system pressure, pumps are operated to recirculate approximately 5 ML/day, which increases energy costs. As well, during high demands, all four pumps need to be operated at the same time in order to meet the demand at the higher discharge pressure settings; this scenario does not allow for pumping redundancy.

The Problem/Opportunity Statement for this project has been defined as:

> A solution is required to mitigate low pressure issues in Ancaster, to improve the operability and efficiency of the pumping station, to provide redundancy and security of supply, and to meet Ministry of the Environment and Climate Change (MOECC) guidelines and City design standards, while reducing energy consumption and greenhouse gas (GHG) emissions in accordance with the City's Corporate Energy Policy.

The Study Area (Appendix A) is generally bounded by Power Line Road in the north, Scenic Drive in the east, Book Road in the south, and Trinity Road South/Highway 52 North in the west.

Five (5) alternative servicing solutions were identified and evaluated as follows:

- Alternative 0 *(Net Present Value $22.7M)* – Do Nothing approach (maintain current operation)
- Alternative 1 *(Net Present Value $34.5M)* – Increase the capacity of the HD018 pumping station by rebuilding this facility on the same site.

- Alternative 2 *(Net Present Value $30.1M)* – Construct a New Elevated Water Storage Reservoir in Ancaster and upgrade the existing HD018 Pumping Station.
- Alternative 3 *(Net Present Value $35M)* – Construct a new booster pumping station to service higher elevations (new Pressure District 26) and increase the capacity of HD018 pumping station by rebuilding this facility on the same site.
- Alternative 4 *(Net Present Value $36.5)* – Construct a new booster pumping station and in-ground reservoir to service higher elevations (new Pressure District 26) and increase the capacity of HD018 pumping station by rebuilding this facility on the same site.

Following the evaluation of each alternative against natural, social, economic, and technical evaluation criteria, the preferred solution was identified to be Alternative 2 – construction of a new elevated water storage reservoir in Ancaster. This alternative will provide the following benefits:

- Water supply is uninterrupted by power outages and other emergencies;
- Minimal reliance on mechanical equipment;
- Provides superior equalization of daily flow cycles and system pressures;
- Significantly lower operational costs than pumped storage;
- Permits power-saving time-of-day filling strategies;
- Lower life-cycle cost.

A total of 12 alternative locations were evaluated for siting the proposed elevated water reservoir. The preferred location was identified to be in the area of a group of properties located south of the intersection of Fiddlers Green and Garner Roads; defined as Sites 3, 4, and 7-12. Selection of the specific site is subject to property purchase negotiations and agency approvals and would be subject to a future Council request.

The following must be completed as part of the implementation of the preferred solution at the preferred location:

- Geotechnical investigation;
- Stage 2 Archeological Assessment;
- Stage 2 Archeological Assessment (findings from Stage 2 may trigger additional study which would also need to be completed as part of the implementation);
- Zoning variance to allow for construction of an elevated storage facility;
- Additional cultural heritage study;
- Additional natural environment studies;
- Property acquisition, contingent upon outcomes of the above items.

Public, Agency, and Aboriginal consultation was completed in accordance with the requirements of the MEA Class EA document.

Alternatives for Consideration – See Page 12

FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial:

The recommendations in this report request that an additional $4.24M be included in the 2018 Rate Budget to supplement Project ID No. 5141395354 in order to update the total budget requirement from $8.77M to $13M (including $11.85M design/construction budget and $1.15M for internal resource/staffing). This Project ID #5141395354 currently has an available budget of $8.77M for the implementation of the elevated reservoir.

The preferred design concept outlined in the Environmental Assessment Study Report is for the design and construction of the elevated water reservoir, which includes water reservoir, re-chlorination and recirculation system, other process and electrical equipment and appurtenances, site works, watermain extension, land acquisition, allowances, engineering, internal resources and contingency. Throughout the life of this Class EA the estimated budget for the tower was refined. Initially a planning level estimate of approximately $5.3M (in the 2006 Citywide Master Plan) was established for the tower alone. Through the Class EA process estimates for the all components required to deliver the project that were not known in the original estimate were confirmed including the following items: Land, Trunk Watermain Extension, Rechlorination and Recirculation System, Process and Electrical Works, Site Works, Engineering Design Fees, Utility and Testing Allowances, internal resource/staffing costs and Contingency. The volume of the final elevated reservoir is now planned to be larger than the original 2006 estimated volume which also affected the final budget of $13M.

Staffing:

Once the Elevated Reservoir is commissioned 0.3 FTE will be required to operate and maintain this new infrastructure. This FTE will be recommended in the Operating Budget in the year it is required.

Legal:

Depending on which parcel is acquired, a zoning variance application will be required to facilitate the implementation of the Elevated Reservoir.

HISTORICAL BACKGROUND

Ancaster is divided into Pressure Districts (PD's) 13, 14, and 18 where the majority of customers are in PD 18. Currently all of the water for Ancaster is supplied by the HD018 Pumping Station and HDR18 Reservoir, located on Garner Road, west of Glancaster Road. The Ancaster distribution system also feeds sub-zone PD-15 through a pressure reducing valve, and provides a secondary feed into PD-22 in northwest Dundas through a watermain along Sulphur Springs Road. PD-18 operates as a direct pumped system and does not have a floating storage facility (i.e. elevated reservoir). It is pressurized solely by the HD018 Pumping Station with no redundancy of supply. The need for an elevated water storage facility was documented in the City of Hamilton's Water and Wastewater Master Plan Class Environmental Assessment Report dated November 2006.

According to the MOECC Design Guidelines for Drinking-Water Systems (2008), the capacity of pumping stations is defined in terms of their firm capacity. For systems that do not have adequate floating storage and for which the pumping station is the only source of supply, a Pumping Station's firm capacity is defined as the capacity of the station with the two largest pumps out of service. In addition, the MOECC's guidelines recommend that pumping stations servicing areas without floating storage be sized for a firm capacity to handle peak hourly flows, or maximum day plus fire flows (whichever is higher). Based on the current situation, the firm capacity of the pumping station in PD18 is insufficient to meet current maximum day plus fire flow requirements.

Furthermore, historically low pressure issues have been reported in the high elevation areas of Ancaster. To address these issues as an interim, non-standard measure, the City has modified the operations of PD18 Pumping Station to maintain a pressure higher than the original design, which has resulted in increased water recirculation within the station, low pump efficiency, increased equipment wear and tear, and increased maintenance and energy costs. Therefore, a solution is required to mitigate low pressure issues in the water distribution system, to improve the operability and efficiency of the pumping station, to provide redundancy and security of supply, and to meet MOECC guidelines and the City's design standards, while reducing energy consumption and GHG emissions in accordance with the City's Corporate Energy Policy. A water servicing study has been conducted to confirm that an elevated water reservoir is needed to resolve those issues for water servicing in the Ancaster Community.

A project team, including Public Works Department staff and consulting engineers, was developed to undertake this Class EA Study. Other key staff and sub-consultants, including Environmental Scientists, Heritage Planners and Archaeologists, were engaged as required to provide support for various components of the Study.

The Class EA was completed as a Schedule "B" of the Municipal Class Environmental Assessment process. The Class EA for this project included Public and Review Agency consultation, evaluation of alternatives, assessment of impacts of the proposed works, and identification of measures to mitigate any adverse impacts. Upon completion of the study, a Project File Report documenting the planning and decision-making process and preferred relocation alternative was prepared. This file is ready for public review. Pending approval of the recommendations of this staff report, a separate advertisement will be issued to advise the public and stakeholders of the Notice of Completion of the Class EA.

The preferred solution is the elevated storage reservoir option (Alternative 2) from a system performance, cost, and aesthetic standpoint. Since the Ancaster area does not currently have a floating storage facility, it currently relies completely on the HD018 Pumping Station to maintain system pressure. A power failure (due to failure of the standby generator) or an instrumentation fault could result in loss of system pressure and potential water quality issues for PD-18, PD-13, PD-14 and PD-15. The construction of an elevated storage reservoir would make the system more robust and

less vulnerable in case of pumping station failure. It would also result in significant operating and energy cost reductions relative to the current conditions.

In addition, a total of 12 alternative sites have been evaluated according to their natural environment, social and cultural environment, economic, and technical impacts/merits. A comparative assessment of the alternative sites was conducted to determine which solution had the least overall impacts. Sites 3, 4, and 7-12 are preferred as they result in the least overall impact to natural and technical environments and low to moderate impact on the social and cultural environment.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

These recommendations are consistent with the Urban Official Plan. Other policies affecting or impacting this Report include:

- *Ontario Environmental Assessment Act*
- *Ontario Environmental Protection Act*
- *Safe Drinking Water Act, 2002*

RELEVANT CONSULTATION

The Ward Councillor has been advised about the completion of the study and the recommendations of the report. Public and Review Agency (see Appendix B – Agency Mailing List) consultation is an integral and legislated component of any Municipal Class Environmental Assessment study. Stakeholders are initially notified of the study with a formal Notice of Commencement advertised in the local newspaper. Review Agencies are notified directly by mail or email.

Project Stakeholder and Review Agencies lists are developed at the onset of the study and maintained throughout, thus ensuring all interested parties are kept informed. All Stakeholders are invited and encouraged to comment on the project at any time during the study.

Categorically, the Agency and Stakeholder Contact Lists include the following groups:

- Federal Agencies
- Provincial Ministries and Agencies
- Aboriginals
- Property owners/businesses adjacent to the preferred sites area
- Others (e.g. utilities, school boards, etc.)

Two Public Information Centres (PIC's) were held in the Ancaster community. The first PIC was held at Ancaster Municipal Building & Library on September 25, 2012 at 300 Wilson Street East and the second PIC was held on October 5, 2016 at Ancaster Old Town Hall at 310 Wilson Street East. Feedback from attendees was positive, focusing on issues such as project goals and timelines; and location of the elevated reservoir. Key feedback from review agencies to date is summarized as follows:

- Ministry of Environment and Climate Change (MOECC) – For the construction of a new elevated water reservoir, MOECC acknowledges that a Schedule 'B' Municipal Class Environmental Assessment (EA) process is undertaken under the MEA Class EA Document in order to identify, evaluate and determine the preferred alternative for addressing water servicing issues in Ancaster. MOECC noted that this project is subject to the *Safe Drinking Water Act, s. 31* (need for approval, permit and licence), which does fit part of the definition of a Drinking Water System-DWS, which includes anything used in the collection, production, treatment, storage, supply or distribution of water (excluding plumbing). Therefore, MOECC requires that a Schedule C Application to the DWS's Drinking Water Works Permit be required. In addition, MOECC also requires that the Project File to be prepared in such a way as to clearly demonstrate that appropriate steps in Phases 1 and 2 have been followed and suitable for easy review by the public at any time. Also, the MOECC requires adequate consultation with affected Aboriginal communities in the project area.

  The Schedule C Application will be submitted in the Detailed Design Phase of the implementation. The Notice of Completion and the complete Project File are to be forwarded to the MOECC Office for review, filing and potential comments. Consultation with Aboriginal communities has also taken place and has been documented in the Project File for this Class EA.

- Grand River Conservation Authority (GRCA) – For this project, GRCA is mainly concerned with wetlands and flood plains, water courses and valley lands within the study area. They would like to be involved in the future implementation of the recommendations.

  This requirement will be carried forward into the implementation phase.

- Hamilton International Airport Ltd (HIAL) – Due to the proximity of the proposed sites to the HIAL, a review of the sites is required to determine potential impact on airport zoning regulations. HIAL has recommended that the proposal be submitted to Transport Canada and NAV Canada for review to ensure the structure(s) meet lighting requirements and flight procedures are not impacted. They also expressed interest in continued involvement in the project process, including to the project implementation phase.

  This requirement will be carried forward into the implementation phase.

- Ministry of Tourism, Culture and Sport (MTCS) – Their concerns focused on three (3) areas: archaeological resources including land-based and marine, built heritage resources, and cultural heritage landscapes. In terms of the environmental assessment reporting, they require that all technical heritage studies and their recommendations are to be addressed and incorporated into EA projects. If the screening has identified no known or potential cultural heritage resources, or no impacts to these resources, the EA report or file is required to include the completed checklists and supporting documentation.

Technical heritage studies and their recommendations have been incorporated into the Project File for this Class EA. As a condition of purchase for the preferred parcel, archaeological and historic building significance will be assessed and must be mitigatable before acquisition.

- Niagara Escarpment Commission (NEC) – The Part of the subject lands are in the Escarpment Natural Area where only essential transportation and utility facilities are permitted. NEC is interested in the specific information about the relocation of utilities so as to determine any effect in the Niagara Escarpment Plan area.

  The preferred site/area is not within the NEC Development Control area.

- Hamilton Conservation Authority (HCA) – For this project, HCA is also concerned with wetlands, flood plains, water courses and valley lands. However, most of the sites including the preferred sites are within the watershed of GRCA.

The recommendations of this staff report are in itself the final stage of consultation which is an inherent part of the Class EA process. The project team will receive and attempt to mitigate any stakeholder concerns or request for a Part II Order that is initiated within the mandatory 30-day review period.

ANALYSIS AND RATIONALE FOR RECOMMENDATION

By applying the Municipal Class EA process, the project followed the legislated multi-phased analysis rationale.
Specifically, the narrative of this study is summarized as follows in the text below with detailed documentation in the Project File Report under separate cover.

The Class EA Problem/Opportunity Statement was identified as follows:

> A solution is required to mitigate low pressure issues in Ancaster, to improve the operability and efficiency of the pumping station, to provide redundancy and security of supply, and to meet MOECC guidelines and City design standards, while reducing energy consumption and GHG emissions in accordance with the City's Corporate Energy Policy.

The objectives of the Schedule B, Class EA project will be to review and compare alternative solutions to address the Problem/Opportunity Statement (and relevant construction impact), in order to address the above-noted concerns and to identify the preferred solution.

All reasonable alternatives that meet the requirements of the Problem/Opportunity Statement were identified. The following is a list of the five (5) alternatives considered in the study:

Alternatives for Water Servicing	Description
Alternative 0 - Do Nothing Approach	• Maintain the current mode of operation at Garner Rd HD018 Pumping Station

Alternatives for Water Servicing	Description
	• Future upgrades include only a replacement of the existing pumps with similar capacity pumps • Results in extremely high operations and energy costs • Firm capacity deficiency
Alternative 1 – Increase the Capacity of HD018 Pumping Station	• Replace the existing pumps with larger capacity pumps (in a new station on the same site as HD018) to achieve a firm capacity • Modify the existing ground reservoir HDR018 • High operations and energy costs • Not resolve potential water supply risks
Alternative 2 – Construct a new Elevated Storage Reservoir	• Construct an elevated storage reservoir to provide floating storage • Provide security of water supply and alleviate low pressure issues in higher elevation areas • Provide reliable water supply and reduce pumping cost and GHG emissions • Lowest overall cost due to reduced energy cost in the long run
Alternative 3 – Construct a New Booster Pumping Station and Increase the Capacity of HD018 Pumping Station	• Construct a new booster pumping station to service the higher elevation areas to create a new pressure district PD-26 • Replace the existing pumps with larger capacity pumps (in a new station on the same site as HD018) to achieve a firm capacity • Increased energy costs and requires standby power to maintain supply during power outages • High lifecycle costs
Alternative 4 – Construct A New Booster Pumping Station and In-ground Reservoir, and Increase the Capacity of HD018 Pumping Station	• Construct a new booster pumping station to service higher elevation areas to create a new pressure district PD-26 • Construct an in-ground reservoir to provide pumped storage for the new pressure PD-26 • Replace the existing pumps with larger capacity pumps (in a new station on the same site as HD018) to achieve a firm capacity • Dependent on HD018 Pumping Station to maintain supply • Increased energy costs and requires standby power to maintain supply during power outages • Highest lifecycle costs

The following is the list of the potential sites for the elevated water reservoir and the preferred sites:

Alternative Sites for Elevated Water Reservoir	Description
Site #1 – North-East corner of Martin Road and Jerseyville Road West in the Robert E Wade Ancaster Community Park	• Located within the Niagara Escarpment and near a built heritage area • Contains archaeological potential • High aesthetic impact on the Niagara Escarpment and high impact during construction • Reduced tank height but less preferred hydraulically • City owned • Overall, the least preferred location
Site #2 – West of Fiddler's Green Road and Garner Road West in James Smith Park	• Located beside a designated built heritage area and in a Potentially Significant Wetland • No archaeological potential • High impact during construction due to being within a major residential area • Reduced tank height and most preferred hydraulically • City owned • Overall, less preferred location
Site #3, #4, #7 - 12 - South-West corner of Fiddler's Green Road and Garner Road West	• Not near any environmentally sensitive areas or built heritage areas • Contains archaeological potential • Private owned • Low construction impact due to not near major residential areas • Reduced tank height and most preferred hydraulically • Overall, most preferred locations
Site #5 – North-West of Southcote Road and Garner Road East	• Located within the American Chestnut and Woodlands area • Not near any built heritage areas • City owned • High impact during construction due to being within a major residential area • Greater tank height due to lower ground elevation • Most preferred hydraulically • Overall, less preferred location

Alternative Sites for Elevated Water Reservoir	Description
Site #6 – North-East of Raymond Road and Rymal Road West	• Not near any environmentally sensitive areas or built heritage areas • No archaeological potential • Large aesthetic and construction noise impact on residential area • City owned • Greater tank height due to lower ground elevation • Least preferred hydraulically • Overall, less preferred location

Evaluation Criteria reflect the Triple Bottom Line evaluation methodology. The evaluation criteria established by the project team are summarized below. A detailed breakdown of each category is included in the Project File:

- Natural environment
- Economic considerations
- Social and cultural environment
- Technical and operational considerations

The evaluation process focused on identifying three levels of comparison between the evaluation criteria for each of the alternatives. The three levels are:

- Most preferred
- Moderately preferred
- Least preferred

For the alternatives where the evaluation criterion is the best, “most preferred” will be assigned. If the alternative has a disadvantage for that evaluation criterion, then it will be assigned “least preferred”. The “moderately preferred” level is assigned when there is no real preference between the alternatives. The intent of this method of evaluation is to identify, for each evaluation criterion, which alternative or alternatives have an advantage or are preferred. Once this evaluation process is completed for all criteria, it can then be determined which alternative(s) has the overall preference.

Each alternative was screened against the evaluation criteria. The “most preferred” alternative was deemed to be the preferred alternative. The preferred location for the Elevated Water Reservoir is the area with Sites #3, #4, and #7- 12 in the south-west corner of Fiddlers Green and Garner Road West.

Mitigation measures for any negative environmental impact of the preferred alternative have been identified and become conditions of the Implementation Phase of the Class EA. Detailed mitigation measures are included in the Project File Report under separate cover.

Public and Stakeholder consultation is an integral part of the Class EA process; the Agency Mailing List is included in Appendix B of this report. See the Relevant Consultation section of this Report and the Project File for more details.

The final step in the analysis rationale before proceeding to implementation of the preferred alternative is to undertake the Mandatory 30-day Review. A Notice of Completion of the Class EA as recommended herein will be issued in the immediate month(s) following the approval of the recommendations of this staff report. Notices will be issued via newspaper advertising and direct mail out to all members of the Stakeholder and Agency Contact lists. The Project File will be placed on public record along with contact information to receive concerns. All attempts will be made to mitigate all expressed concerns. Should resolution of a concern be unattainable the conflict may be escalated by the opponent to the Minister of the Environment for a decision.

The above analysis rationale is a prescribed process under that Municipal Class Environmental Assessment (MCEA). The project was completed and considered to be in full compliance with the MCEA process.

ALTERNATIVES FOR CONSIDERATION

The recommended alternative solutions have been identified using an evaluation and screening process that fulfils the requirements under the Municipal Engineers Association (MEA) Municipal Class EA document for Schedule B projects.

Should Council not wish to approve the filing of the Ancaster Elevated Water Reservoir Class Environmental Assessment and Conceptual Design, the Municipal Class EA process would be considered incomplete by the provincial government. As such, the City will not have approval under provincial environmental legislation to have the option to pursue the preferred solution to Ancaster Elevated Water Reservoir as a Schedule “B” project. The outcome would be equivalent to the “Do Nothing” alternative, which will result in the risk of insufficient firefighting flows, greater impact of watermain breaks, and higher cost of operation and maintenance, higher greenhouse gas emissions and energy cost in the long run.

ALIGNMENT TO THE 2016 – 2025 STRATEGIC PLAN

Community Engagement & Participation

Hamilton has an open, transparent and accessible approach to City government that engages with and empowers all citizens to be involved in their community.

Hamilton has a prosperous and diverse local economy where people have opportunities to grow and develop.

Healthy and Safe Communities

Hamilton is a safe and supportive city where people are active, healthy, and have a high quality of life.

Clean and Green

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

Built Environment and Infrastructure

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

Our People and Performance

Hamiltonians have a high level of trust and confidence in their City government.

APPENDICES AND SCHEDULES ATTACHED

Appendix A: Study Area

Appendix B: Agency Mailing List