CITY OF HAMILTON
PUBLIC WORKS DEPARTMENT
Hamilton Water Division

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	June 15, 2015
SUBJECT/REPORT NO:	New Valve Chamber No. 3 - Budget Increase (PW15052) - (City Wide)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Dan McKinnon Director, Hamilton Water (905) 546-2424, Extension 5941 Stuart Leitch Manager, Capital Delivery (905) 546-2424, Extension 7808
SUBMITTED BY: **SIGNATURE:**	Gerry Davis, CMA General Manager Public Works Department

RECOMMENDATION

That the budget in capital Project ID 5141061303 (Valve Chamber No. 3) be increased by $1,000,000 from $1,800,000 to $2,800,000 and that the increase be funded with $500,000 from Project ID 5140795752 (PD3 PS Highland Gardens) and $500,000 from Project ID 5141195151 (HD007 Highland Road PS).

EXECUTIVE SUMMARY

The capital work under this project is focused on Valve Chamber No. 3 (VC3) originally constructed in 1977 and located on the east mountain near Glover Mountain Road. This infrastructure is associated with the Greenhill Avenue Pumping Station and operates in Pressure District 5 (PD5) playing a critical role in providing water supply to the Upper City (Mountain) through PD5 and on to several other pressure districts.

The Capital Budget for Valve Chamber No. 3 water upgrade was originally approved through the 2010 Rate Budget and further evaluated through subsequent studies. Detailed design activities that are now nearing completion have identified the need to increase the scope of the works as a result of a more thorough understanding of existing conditions. The new scope now includes the need to build a new valve chamber adjacent to the existing valve chamber (in order to minimize risk during construction and the out-of-service period), install more and larger protective equipment and piping, use a higher class of pressure piping, and provide enhanced 24/7 all-weather access to the rugged and remote location of the facility for Plant Operations and Water Distribution Staff. The approved budget for the project is currently not

sufficient to cover estimated costs that have been recently revised based on new information.

The requested budget increase for this project is in part due to scope changes that have been developed to address the issues noted above but is also the result of applying standardized cost estimation methodologies that include higher contingency ranges.

The recommendations contained in this report support the Mission Statement of the Public Works Business Plan "Innovate Now" - "Provide safe, strategic and environmentally conscious services that bring our communities to life".

Alternatives for Consideration - See Page 5

FINANCIAL - STAFFING - LEGAL IMPLICATIONS

Financial: The recommended budget increase for the Valve Chamber No. 3 project account (5141061303) is available through a transfer from two other Hamilton Water rate supported projects that have available surplus funds. The following accounts are proposed for this recommended transfer:

1) PD3 PS Highland Gardens Project ID 5140795752: $500,000 surplus transfer;
2) HD007 Highland PS Project ID 5141195151: $500,000 surplus transfer.

Staffing: N/A

Legal: N/A

HISTORICAL BACKGROUND

The capital work under this project is focused on Valve Chamber No. 3 (VC3) originally constructed in 1977 and located on the east mountain near Glover Mountain Road. This infrastructure is associated with the Greenhill Avenue Pumping Station and operates in Pressure District 5 (PD5) playing a critical role in providing water supply to the Upper City (Mountain) through PD5 and on to several other pressure districts.

This facility was identified as needing rehabilitation or reconstruction in 2010 and evaluated through a condition assessment study in 2012 supporting the programming of this capital work. The original capital budget for the project was approved as part of the 2010 rate budget. As the project moved from conceptual design into detailed design, it became apparent that assumptions made originally with respect to the opportunity to maintain existing structures were no longer viable and as a result the scope for the project has increased. This report is seeking approval to increase the project budget as described in the recommendation above.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

The recommendation in this report is consistent with the "Capital Projects Budget Appropriation and Works-in-Progress Transfer" Policy.

RELEVANT CONSULTATION

Not applicable

ANALYSIS AND RATIONALE FOR RECOMMENDATION

Reasons for Increased Construction Cost Estimate

The recommendation in this report seeks approval to increase the budget for this project in the amount of $1,000,000 and results from issues that have emerged through a more detailed understanding of the project and include;

1) **New VC3A to Replace Existing VC3:** When the project was originally conceptualized and budgeted for, it was assumed that the existing VC3 could be re-utilized and retrofitted in order to house the required new protective equipment and components. Extensive engineering reviews and analyses during Detailed Design demonstrated to the satisfaction of the Project Team and Key Stakeholders that retrofitting VC3 was not feasible and that, even if retrofitting were feasible, the lengthy amount of time that the facility would have been out-of-service would have exposed a large service area to unacceptable risk. Accordingly, it was considered much safer and more prudent to construct the new VC3A adjacent to VC3; and re-instating VC3 for valve isolation purposes only. This approach would facilitate the construction of the new VC3A in a more expedient manner, but at a greater estimated construction cost. A shorter construction window will also reduce the risk of complications.

2) **Sizing Requirements for New Valve Chamber:** As the Detailed Design progressed, it was determined that larger equipment and piping is required in order to provide the level of protection than had been assumed in the original conceptual study. Along with the provision of a future connection within the new VC3A and the sizing requirements of the equipment, the existing VC3 does not have sufficient space to accommodate the design requirements. These items have an impact of increasing the estimated construction cost.

3) **Higher Pressure Class for New Piping:** Transient Pressure (sometimes referred to as “water hammer”) analysis during Detailed Design led to recognition of a requirement for a more robust and higher pressure class of piping in order to provide the necessary level of protection, as well as replacing existing piping and equipment within the Greenhill Avenue Pumping Station (HD05A), to meet the required higher pressure rating - again increasing the estimated construction cost.

4) **Safe Access Requirements:** The need for Hamilton Water Plant Operations and Water Distribution Staff to access and service the quite remote, rugged, and extremely constrained site of the critically important VC3 and VC3A on a 24/7 all-weather basis led to identification of the need for providing additional, upgraded Civil and Grading works under Detailed Design, also entailing increased estimated construction costs.

5) **Certified Construction Cost Estimate:** The application of Certified Cost Estimating procedures during Detailed Design led to the need for higher levels of estimated contingency allowances, as well as the identification of current construction market pricing practices, which had the impact of increasing the estimated construction costs.

Hamilton Water capital projects are now applying a more standardized cost estimation methodology. In order to manage variability more effectively, the Capital Delivery section developed a cost estimating variance matrix in 2013. This tool provides a range of estimated variance that is expected based on the level of construction document completion, in combination with an evaluation of the level of complexity of the project as detailed in table 1. below. As part of this 2013 initiative, all consultant projects going forward require this cost estimating framework to be adopted and information to be qualified by certified estimators. Note that the latest project construction cost estimate developed for the Valve Chamber No. 3 water upgrade was based on a Class C estimate utilizing this approach. The Class C estimate contains an allowance that accounts for risks and unknowns, which is expected to be refined as the project progresses through detailed design (Class B) to tender ready construction (Class A).

Table 1. Cost estimate varibility based on stage of project development

COST ESTIMATE VARIANCE MATRIX - %			
Class of Estimates	Based On	Percent Complexity	
		LOW	HIGH
D	Conceptual Design	20	30
C	Preliminary Design	15	20
B	Detailed Design	10	15
A	100% Tender Ready Documents	5	10
Unique Projects, Circumstances, or Risks		Varies	Add to above %

Further developing the scope of work to include necessary improvements, combined with the application of a structured cost estimating process introducing higher contingency allowances, accounts for the additional $1.0 M being requested.

To date, the Consulting Engineer for this project is nearing completion of the design and will be ready to issue construction tender documents for General Contractor bidding purposes in the summer of 2015. In order to commence tendering and award of this construction project, it is recommended that Council approve this budget increase. Funding is proposed to come from existing approved project budgets that contain surplus funds.

ALTERNATIVES FOR CONSIDERATION

An alternative to the recommendation in this report is to proceed with the scope of work as originally conceived for this project, however this is not recommended as a result of the risks revealed through the detailed design phase and as summarized above.

ALIGNMENT TO THE 2012 - 2015 STRATEGIC PLAN

Strategic Priority #1

A Prosperous & Healthy Community

WE enhance our image, economy and well-being by demonstrating that Hamilton is a great place to live, work, play and learn.

Strategic Objective

1.2 Continue to prioritize capital infrastructure projects to support managed growth and optimize community benefit.
1.6 Enhance Overall Sustainability (financial, economic, social and environmental).

Strategic Priority #2

Valued & Sustainable Services

WE deliver high quality services that meet citizen needs and expectations, in a cost effective and responsible manner.

Strategic Objective

2.1 Implement processes to improve services, leverage technology and validate cost effectiveness and efficiencies across the Corporation.
2.3 Enhance customer service satisfaction.

APPENDICES AND SCHEDULES ATTACHED

None