Halifax Water
Halifax Regional Water Commission

**ITEM # 5.7**
**HRWC Board**
**April 26, 2012**

**TO:** Colleen Purcell, CA, Chair and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Jamie Hannam, P.Eng.
Director - Engineering & Information Services

**APPROVED:** Carl Yates M.A.Sc., P.Eng., General Manager

**DATE:** April 18, 2012

**SUBJECT:** **Energy Recovery from Orchard Control Chamber - Pilot Project**

## ORIGIN

HRWC Board Meeting - Item 5.2, November 4, 2010
HRWC Board Meeting – Item 5.1, November 24, 2011

## RECOMMENDATION

It is recommended that the Halifax Water Board approve the sole source design and construction of an energy recovery pilot project for the Orchard Control Chamber site, at an estimated cost of $632,964, including $175,000 USD of funding from the Water Research Foundation (WRF) and $25,000 in funding from Nova Scotia Department of Environment (NSE), for a net project cost to Halifax Water of $432,964 including net HST, and contingent on receiving formal approval from the NS Department of Energy that the project is eligible for "run of river hydro" rates under the COMFIT Program.

## BACKGROUND

In April 2010, in conjunction with Nova Scotia Environment (Environmental Trade & Innovation), Halifax Water retained Dr. Mysore Satish to carry out a preliminary investigation and study relating to the potential for energy recovery from Halifax Water's control chambers.

Dr. Satish's report identified a number of high potential sites that could be harnessed to extract renewable/waste energy from the water distribution system. Initially, the two sites being considered for the pilot program were the Robie and Chain Control Chambers (Ref. HRWC Board Report, Item # 5.2 November 4, 2010). After careful consideration by Halifax Water staff, it was determined that installing "proof of concept" or "prototype" in-line energy recovery turbines in these critical water supply systems would involve too much risk on the part of Halifax Water and its customers connected to these systems, due to the potential loss of downstream pressure control in certain circumstances.

Further analysis and evaluation of other lower risk sites revealed that the Orchard Control Chamber would be the preferred candidate for a proof of concept/prototype installation. This chamber feeds two large reservoirs in the Sackville region, and the potential failure of any prototype turbine generator in these systems would have minimal impact on the water supply as the reservoirs provide a hydraulic cushion. As such, it was felt that this would be a better candidate for a pilot energy recovery project with a turbine being used on a closed and pressure controlled water supply system.

## DISCUSSION

The Orchard Control site has been identified as having a reasonable potential for energy recovery. This system has the potential to produce up to 235,000 kWh per year of energy, and $33,000 per year of energy revenue under the "*Community Feed-In Tariff*" (COMFIT) Program. The provincial Department of Energy has indicated tentative approval of this project under the COMFIT Program and is being considered "*as equivalent*" to "*run-of-river hydro*". A formal directive is expected in the near future, officially designating in-line turbine technology as equivalent to "*run-of-river hydro*" based on the energy available from naturally occurring headin the water distribution system.

On November 24, 2011, a recommendation was sent to the Halifax Water Board (Board Report #5.1) based on the possibility of funding participation by the WRF and NSE for a pilot project at the Orchard Control Chamber site. In January 2012, submissions to the WRF and the NSE were made for funding support for this project. Positive responses were received from both the WRF and NSE for funding support of $175,000 USD and $25,000 CDN respectively. As a result of these submissions, the proposed budget for this project has been refined and revised as outlined in the following table:

The revised estimated Capital Cost for this project is detailed as follows:

| **Capital Cost Estimate** | |
|---|---|
| Rentricity | |
| - Detailed Design & Engineering | $115,900 |
| - Equipment Procurement | $89,500 |
| - Construction Support & Commissioning | $31,600 |
| External Contractors | |
| - Installation - Electrical/Mechanical Contractors | $70,000 |
| - Interconnection - NSPI | $50,000 |
| Halifax Water Costs | |
| - Hardware (piping, valves, SCADA, etc.) | $70,000 |
| - Owner Engineering Services | $30,000 |
| - Testing & Commissioning | $15,000 |
| - Miscellaneous | $5,000 |
| - Contingency (10%) & Reserves | $51,700 |
| Sub-Total | $528,700 |
| Net HST (4.286%) | $22,660 |
| Interest & Overheads (4.0%) | $22,054 |
| Duties (15%) | $13,425 |
| Internal Labour + Benefits | $46,125 |
| **Total Estimated Project Costs** | **$632,964** |

The revised Funding Model for this project is detailed as follows:

| **Identified Funding Partners** | |
|---|---|
| Halifax Water | $432,964 |
| Water Research Foundation | $175,000 |
| NS Department of Energy | $25,000 |
| **Total Funding Requirement** | **$632,964** |

The proposed project time line provides for the detailed engineering design and procurement to proceed in 2012/13 (~ $200,000 + some portion of WRF/NSE funding)

and the full construction and commissioning to follow in 2013/14 ($232,964 + remaining portion of WRF/NSE funding). The timely undertaking of the design work and procurement of the technology is important to both maintain momentum on this important research and development project and to show a positive funding commitment from Halifax Water as we continue to work with our suppliers and external funding partners.

Section 7 of HRWC's Procurement Policy states that sole source is an acceptable procurement method when there is only one available proponent of a product or service that meets the needs of HRWC. Negotiation is the accepted method to arrive at sole source prices. This project is acceptable as a sole source, as HRWC is purchasing a product for testing/trial use, and there is currently one supplier available. It has been determined by the General Manager that the purchase is clearly in the best interests of HRWC.

## BUDGET IMPLICATIONS

The net Halifax Water funding requirement is $200,000 for 2012/13, and $232,964 in 2013/14. For the 2012/13 portion, the $100,000 funding is available from within the *2012/13 Capital Budget – PRV Energy Recovery Pilot Project – Orchard Chamber Control*, with the remaining balance of $100,000 coming from reprioritization within the *2012/13 Capital Budget - SCADA Master Plan Implementation.* The balance of the Halifax Water funding will be included within the 2013/14 Capital Budget and consistent with the Five Year Capital Budget Plan. The remainder of funds will come from the WRF's Tailored Collaboration Program and NSE for the balance of the project cost of $200,000.

The overall feasibility for this project (reasonable period of return on investment) is contingent on the external funding contributions, and based on the current COMFIT rates available for "*run-of-river hydro*" subject to DOE approval. Subject to the technical success of this pilot project, future projects would have to be considered in the context of continued external funding, lower project costs or higher energy rates through the COMFIT Program, to ensure a reasonable business case for Halifax Water.

## ALTERNATIVES

Alternatively to the above recommendation, the Board could direct staff to not proceed with the project.

Report Prepared by:
Tom Gorman, P.Eng., Manager, Water Engineering
Jeffrey R. Knapp, P.Eng., CEM, Manager, Energy Efficiency

Financial Review by:
Cathie O'Toole, CGA, MBA, Director, Finance & Customer Service