Item 9.1

Section I – Items for Board of Directors Action

TO: Chair and Members of the Board of Directors
Meeting #1/20, Friday, February 21, 2020

FROM: Michael Tolensky, Chief Financial and Operating Officer

RE: **TORONTO AND REGION CONSERVATION AUTHORITY ADMINISTRATIVE OFFICE BUILDING PROJECT**
Evaluating Options for the Geothermal System

KEY ISSUE

Approval to implement an alternative geothermal heating and cooling system, if it is deemed feasible, for the Toronto and Region Conservation Authority (TRCA) Administrative Office Building.

RECOMMENDATION

WHEREAS TRCA has received a quote for the implementation of a closed loop geothermal system for its Administrative Office Building project;

AND WHEREAS results of a borehole test conducted as a part of the implementation of the closed loop geothermal system indicated an opportunity for the implementation of an alternative geothermal system known as Open Loop and Aquifer Thermal Energy Storage (ATES), which could result in cost savings both during construction and operation of the building in comparison to the closed loop geothermal system;

LET IT BE RESOLVED THAT TRCA staff be authorized to undertake necessary studies to determine if an alternative geothermal system is technically and financially feasible;

AND FURTHER THAT TRCA staff be authorized to proceed with the detailed designs and implementation of the selected alternative geothermal system, if it is deemed feasible.

BACKGROUND

On November 17, 2017, Res.#A216/17 awarded Eastern Construction Company Limited a contract for Pre-Construction and Construction Management Services, which included the tender and installation of the closed loop geothermal system. Closed systems do not require access to ground source water and instead use a local source to provide heating and cooling.

In January 2019 TRCA contracted Geosource Energy Inc. to drill a test borehole and complete a thermal conductivity assessment under the 5 Shoreham Drive site. The results of the study were used to size the closed loop geothermal borehole field included as part of the heating and cooling system for TRCA's Administration Office Building project. The project was tendered by the construction manager, Eastern Construction in three bid packages over the course of May to June 2019. The tender for the geo-exchange system was a part of the Eastern Construction 's bid packages, and Aecon was selected as the preferred bidder at a cost of $800,000.

In early December 2019 TRCA staff reviewed the results of the borehole test and identified that the 5 Shoreham Dr. site is located on two major aquifers, the Thorncliffe formation and Scarborough formation. The Thorncliffe formation is a well-known aquifer that was historically used for municipal water supplies. The Scarborough formation is a deeper aquifer that in this

location is associated with an ancient bedrock valley (The Laurentian Channel) that connects with the waters of Georgian Bay and Lake Simcoe. Identifying these two aquifers on site was an important revelation as previous mapping suggested no aquifers were present. This finding is significant because access to aquifer source water can enable implementation of open loop geothermal systems. The open loop system is preferable, where available, as it is associated with the cost savings both during construction and operation of the building.

RATIONALE
Following the identification of an opportunity for the implementation of the open loop or ATES, TRCA began the evaluation of the alternative and associated risk of the project implementation delay. TRCA staff consulted Ministry of Environment Conservation and Parks (MECP) staff and confirmed that Environmental Compliance Approval (ECA) could be completed in a timely manner. Furthermore, using capital costs prepared by J.L. Richards, TRCA staff compared the capital cost estimates with the tender results for the closed loop system. The analysis indicated that the alternative geothermal systems could reduce capital costs by between $231,000 and $362,000. For the ATES system the capital cost savings could be even greater as that type of system may be eligible for 50% grant funding.

In order to fully complete the assessment of the alternative geothermal system, TRCA staff requires the completion of the following steps:

- Phase I: Feasibility Study would focus on estimating several key aquifer characteristics critical to determining if either aquifer could support open loop or ATES systems. The results of the study would determine if it is feasible to move forward and if so, which type of system and which aquifer should be targeted.
- Phase II: Detailed Study and Environmental Compliance Application study would focus on the target aquifer and selected system to confirm key aquifer characteristics, establish locations for wells, set parameters for detailed design and prepare the ECA for MECP;
- Detailed Design for implementation would be prepared while the ECA is being reviewed by MECP. All evaluations, ECA approval, and designs are expected to be completed by late summer in time for implementation in September 2020.

If one of the alternative geothermal systems proves feasible, in addition to the capital cost savings and some operating cost savings, the solar thermal panels on the roof can be switched to solar photovoltaic (PV) (as per earlier designs) because the heated water would no longer be needed to balance the temperature of the ground loop. The change would also more easily allow the project to achieve some of the LEED onsite renewable energy generation credits toward the projects goal of LEED Platinum. Furthermore, the solar PV panels would provide 5% of the building's electricity consumption over a 30 year lifespan, providing an annual operating cost savings on the order of $5,000.

Relationship to Building the Living City, the TRCA 2013-2022 Strategic Plan
This report supports the following strategies set forth in the TRCA 2013-2022 Strategic Plan:
Strategy 1 – Green the Toronto region's economy
Strategy 8 – Gather and share the best sustainability knowledge
Strategy 10 – Accelerate innovation
Strategy 12 – Facilitate a region-wide approach to sustainability

FINANCIAL DETAILS
The cost to complete the Phase I and Phase II studies is estimated to be between $80,000 and $140,000 depending on the technology and aquifer selected. The cost of detailed design ranges from $62,000 to $250,000 depending on the technology and aquifer selected.

Funding for Phase I, Phase II and detailed design would be provided within the Administrative Office Building envelope and staff will work to find grants to support this effort. There have already been preliminary conversations with potential funders on the matter and there is interest in providing funding support for both the studies and the implementation of this system.

DETAILS OF WORK TO BE DONE
If approved by the Board of Directors staff will:

- Formally approach potential funders to obtain confirmation of their interest in providing financial support for the studies and implementation and submit funding applications;
- Provide MECP with a letter outlining the project, process and timeline, to formally begin development of the ECA submission;
- Prepare a request for proposals (RFP) for Phase I and Phase II studies in a manner that minimizes the procurement and study completion timeline.
- Complete the Phase I study and decide whether to move forward and if moving forward, which type of system and which aquifer to target;
- Complete Phase II study and submit the ECA to MECP;
- Initiate detailed designs and finalize once the MECP ECA is approved;
- Begin implementation by September 2020.

Report prepared by: Bernie McIntyre, extension 5326
Emails: bernie.mcintyre@trca.ca
For Information contact: Bernie McIntyre, extension 5326
Emails: bernie.mcintyre@trca.ca
Date: February 12, 2020