



Enwave Energy Corporation Deep Lake Water Cooling Supply Expansion

DLWC Supply Expansion – Phase
1 & 2 Project File Report

Final

Prepared for:
The City of Toronto and Enwave
Energy Corporation

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RVA 184176

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1. EXECUTIVE SUMMARY

1.1 Introduction and Municipal Class Environmental Assessment Process

The City of Toronto (City) and Enwave Energy Corporation (Enwave), as co-proponents, are carrying out a Schedule “B” Municipal Class Environmental Assessment (MCEA) study for the expansion of the existing Deep Lake Water Cooling (DLWC) Supply.

The publication of this Phase 1 and 2 Project File Report represents the conclusion of Phase 2 of the MCEA process, including public and agency consultation. The objective of this Project File Report is to document the results of the MCEA process pertaining to the project justification, the problem/opportunity statement, and the identification, evaluation, and recommendation of the preferred solution. In addition, communication and consultation with the public, government agencies, First Nation communities and other interested stakeholders are documented in this report.

R.V. Anderson Associates Limited, in association with LURA Consulting, Argyle Public Relations, Hutchinson Environmental Services Ltd., Scarlett Janusas Archaeology Inc., Irvin Heritage, Baird & Associates, ASI Marine, York – Durham Regional Environmental Laboratory, Thurber Engineering Ltd. and Grounded Engineering Inc. and CSR Geosurveys Ltd., was retained to undertake this study.

This Project File Report will be placed on the public record for 30 days, during which time, any comments or requests from stakeholders, agencies, or concerned parties will be addressed according to the procedures outlined in the Municipal Class EA Manual (2000, as amended in 2007, 2011, and 2015). In addition, a request may be made to the Ministry of the Environment, Conservation and Parks (MECP) for an order requiring a higher level of study (i.e. requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered.

1.2 Justification and Need for Project

1.2.1 Existing DLWC System

The City and Enwave operate under an existing Energy Transfer Agreement (ETA) that facilitates the transfer of heat energy from Enwave’s District Energy System to the City’s cold drinking water infrastructure through heat exchangers.

Following a Schedule B MCEA conducted by the City and Enwave in 1998, the DLWC system, including three new raw water intakes, was constructed, and commissioned in 2004. The intakes draw cold water to feed the Island Water Treatment Plant's (WTP's) direct filtration processes. The cold potable water is transferred to the John Street Pumping Station (JSPS), where it is pressurized for distribution into Toronto Water's drinking water distribution system.

Within the JSPS, Enwave-owned heat exchangers transfer heat from the Enwave's chilled water return loop to the City's cold drinking water. The chilled water supply loop then distributes cold water throughout downtown Toronto to cool buildings. Enwave's District Energy System provides cooling to over 80 buildings within the City's downtown core, including critical care facilities, government buildings, data centers, universities, commercial and residential towers.

1.2.2 Why Expand the DLWC System

There is continued growth in demand for cooling in Toronto's downtown core. Enwave anticipates about a 35% increase in its customers' cooling demand over the next few years and is also looking to shift some of their non-renewable cooling loads in the District Energy System to a more renewable source of cooling through the DLWC supply.

The use of renewable energy sources to provide cooling is in alignment with the City's TransformTO Plan implementation strategies. The City's TransformTO climate change action strategy aims to reduce greenhouse gas (GHG) emissions by 30% by 2020, 65% by 2030, and achieve net-zero by 2050 or sooner¹. As buildings generate over half of Toronto's GHG emissions, district energy systems such as Enwave's district heating and cooling systems, are considered critical components of this strategy.

Adding a fourth intake to the DWLC could increase Enwave's District Energy System's cooling capacity by 26,000 tons. This expansion would reduce the demand on the electricity grid by up to 0.5 kW per ton of cooling load delivered, resulting in up to 70% peak demand savings in electricity compared to a mechanical chiller plant. This system can also recover heat from customers that require cooling in the winter, resulting in lower natural gas consumption and up to 93% fewer carbon emissions compared to traditional heating technologies. The City will also benefit from improved reliability, redundancy, and operational flexibility through the construction of new City infrastructure, repurposing

¹ Compared to 1990 levels.

of some currently unused City infrastructure, and increased revenues to the City under the ETA and reduced operation and maintenance costs.

1.2.3 Problem and Opportunity Statement

The City and Enwave operate under an existing Energy Transfer Agreement (ETA) that enables Enwave to use the City's drinking water supply infrastructure to facilitate energy transfer with Enwave's District Energy System. With the growing cooling demands in downtown Toronto, there is an opportunity for the City and Enwave to amend the ETA and expand the DLWC supply to meet that demand in a mutually beneficial way.

Specifically, the expansion must:

1. Continue to use renewable cold-water resource for cooling via the expansion of the existing Deep Lake Water Cooling (DLWC) supply.
2. Be in alignment with the City's TransformTO Implementation Plan and Climate Change initiatives.
3. Sustainably meet future service demands in a financially and technically feasible manner.
4. Improve reliability, redundancy, and operational flexibility in the City and Enwave's existing infrastructure.
5. Preserve the security, quality and purity of Toronto's drinking water while improving the City's financial position and reducing its operating costs; and
6. Meet Enwave's required in-service date of the 2023-2024 cooling season.

1.3 Existing Conditions

1.3.1 Study Area

The City of Toronto, including the Toronto Islands, is located on the north shore of Lake Ontario, near the western end. The downtown area of the city represents the potential market area for the DLWC system. **Figure 3.1** shows the study area as it pertains to this MCEA study.

The characterization of the natural environment and socio-economic environment have focused on the areas that could be impacted by the expansion of the DLWC Supply, including the Toronto Islands area around the Island WTP and Lake Ontario at the intake and outfall locations.

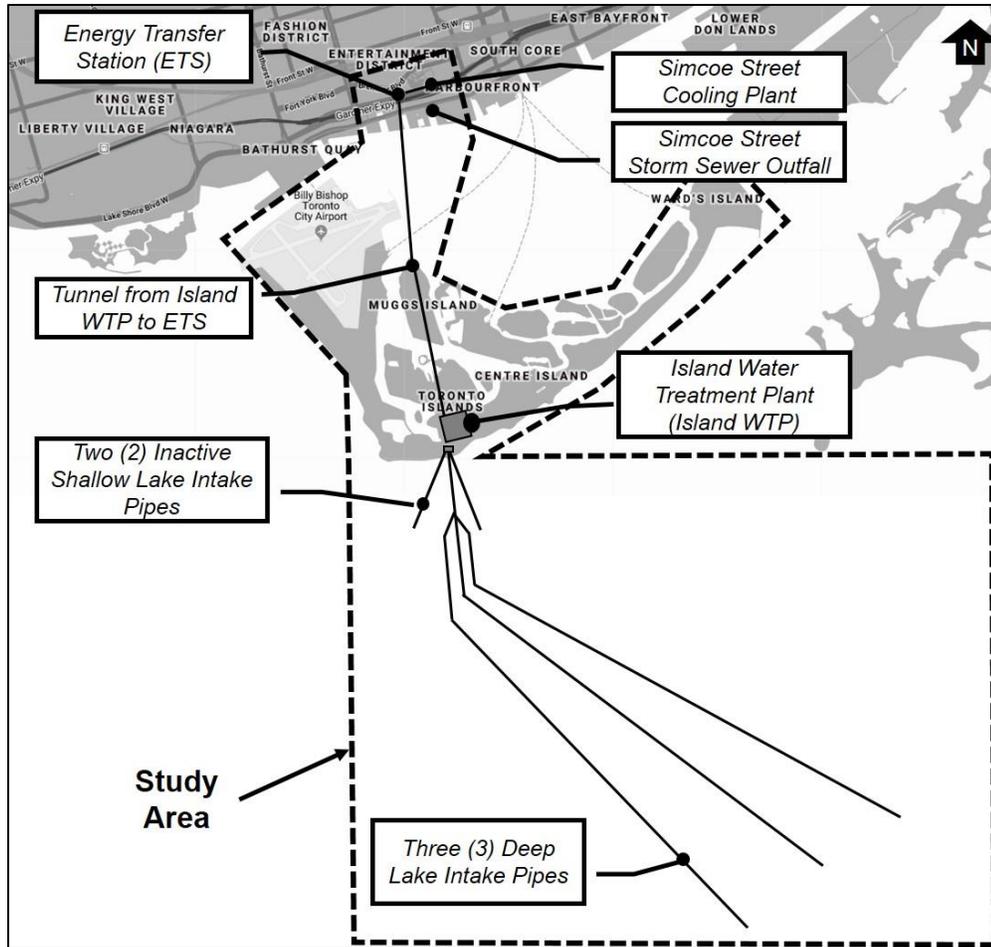


Figure ES.1 DLWC Supply Expansion MCEA Study Area

1.4 Development and Evaluation of Alternative Solutions

As part of the study, two alternatives were evaluated for their ability to address the problem and opportunity statement:

- Alternative 1 – Expand the existing DLWC Supply to use renewable cold water as a source of cooling for the Enwave District Cooling System.
- Alternative 2 – Do Nothing. Building cooling needs to be met with traditional mechanical chiller cooling technology, through Enwave District Cooling System, or individual building equipment.

As part of the evaluation process, the following detailed studies were completed:

- Environmental Impact Study to evaluate the impact of increased water taking on the water temperatures in Lake Ontario, the impact on aquatic habitat at the intake location, the impact on natural environment on the Toronto Islands in the

area surrounding the Island WTP, and the impact of the discharge on the water quality, temperature and aquatic habitat in the Toronto Inner Harbour.

- Stage 1 and 2 Archaeological Assessments to determine the archaeological potential of the Toronto Islands areas around the Island WTP and the marine areas around the intake pipe location.
- Geotechnical, hydrogeological, and marine geophysical survey investigation to review ground conditions in the study area.
- Intake Protection Zone (IPZ) Study to delineate the IPZ-1 and IPZ-2 zones around the proposed fourth intake, and to determine impacts on the Credit Valley, Toronto Region & Central Lake Ontario Source Protection Plan assessment of threats to drinking water.
- Raw water quality sampling and temperature monitoring of the proposed fourth intake location.

A detailed evaluation was undertaken, as documented in this Project File Report. Based on the evaluation, input from the Project Team, and feedback from the public and agencies, Alternative 1: Expand the Deep Lake Water Cooling Supply was identified as the preferred solution.

1.4.1 Description of the Preferred Solution – Expand the Existing DLWC Supply

The proposed expansion is conceptually illustrated in **Figure ES.2** below.

Up to two existing inactive shallow intake pipes at the Island WTP could be slip lined and extended deep into Lake Ontario to a depth that would deliver a constant cold-water supply. The fourth intake would be constructed now, and the fifth intake would be built in the future (subject to the results of additional future studies as outlined in Section 4.3.1 of this Project File Report) to further increase the capacity of the DLWC Supply. The new intake pipes would be inter-connected with the three existing deep lake intake pipes at the Island WTP.

Raw water from the new intakes would supply the existing Island WTP but would also bypass the Island WTP and be delivered directly to the ETS through a new raw water tunnel, separate from the City's drinking water. The cold raw water would pass through new heat exchangers at the ETS. The warmer raw water would then be transferred to the Simcoe Street Cooling Plant (SSCP) via an existing tunnel.

At the SSCP, the warmed raw water would also provide supplemental cooling before being discharged back into Lake Ontario via a modified connection to the City's existing stormwater system. When the expanded DLWC system is operating, Enwave could

replace all or a portion of the cooling water supplied from the Toronto Inner Harbor. The discharged DLWC cooling water would have a lower temperature than the current operation, and as a result, would have a minor positive impact on the harbour.

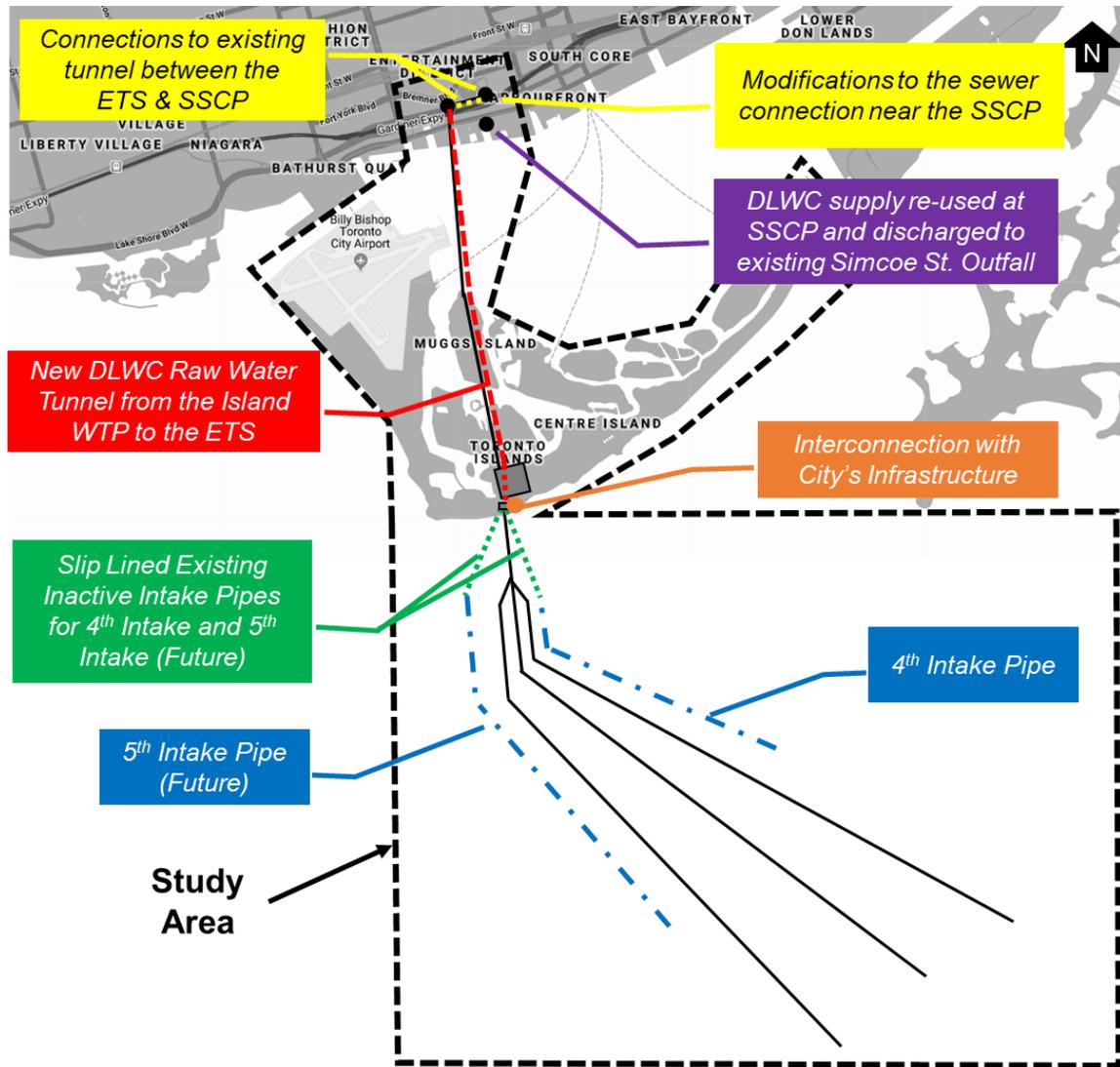


Figure ES.2 - Preferred Solution – Expand the Existing DLWC Supply

1.5 Proposed Mitigation Measures

Measures are proposed to mitigate environmental and community impacts, as detailed in this Project File Report. Mitigation measures include:

- Considerations for the aquatic and nearshore environment for the construction of the intake pipe
- Considerations for the natural environment on the Toronto Islands for the construction of the intake chambers, tunnel shafts and associated works.

- Considerations for the protection of source water through erosion and sedimentation controls during construction
- Considerations for climate change through the reduction in electricity usage from the use of renewable cold water for cooling, and protection of the infrastructure from flooding due to high lake levels.
- Considerations for archaeological and cultural resources during construction through monitoring of excavation works, selection of the location of the intake pipe to avoid potential marine cultural targets of interest, and protection of the public from construction activities both on land and recreational use of Lake Ontario.
- Consideration for the community by minimizing noise, dust, vibration and traffic during construction.

1.6 Public, Agency, Stakeholder and First Nations and Aboriginal Consultation

A comprehensive consultation program was developed for this study to provide a number of opportunities for the public and government agencies/authorities and Aboriginal Communities to review information from the project team, provide comments and feedback, and receive clarifications in accordance with the MCEA process. A description of the stakeholders and Indigenous Communities contacted, opportunities for comment, and feedback provided is detailed in this Project File Report.

The consultation program consisted of the following:

- Project notifications (Notice of Commencement, Newsletter, and Notice of Public Consultation Event) were sent to the project mailing list and were published in local newspapers and on the City's website.
- An on-line Public Consultation Event was held on May 21, 2020, to provide an opportunity for members of the public to obtain information on the MCEA process and the evaluation of alternatives.
- Meetings were held with various agency, public, and First Nations stakeholders when requested to provide further project information.
- Notice of Completion was published in local newspapers and on the City's website. An opportunity was provided for members of the public to review and provide comments on this Project File Report by posting the report on the dlwc-consultation.com website.