# Deep Lake Water Cooling Supply Expansion

## Municipal Class Environmental Assessment

## Public Consultation Event

May 21, 2020

toronto.ca/DLWCexpansion

TORONTO

enwave ENERGY CORPORATION

arva

# Welcome

The purpose of this Public Consultation Event is to present and seek feedback on the proposed expansion of the Deep Lake Water Cooling (DLWC) supply. This presentation outlines the purpose of the DLWC supply expansion, including:

- Background information on the project and Municipal Class Environmental Assessment (MCEA) process
- The Study findings to date including:
  - The Problem and Opportunity Statement
  - Alternative Solutions to the Problem
  - Evaluation Criteria
  - Review of Impacts and Evaluation of the Alternative Solutions
  - Recommended Solution
- Next Steps

# We Want Your Feedback

Details on this Public Consultation Event are as follows:

**Date:** Thursday May 21st, 2020

**Time:** 5:00 pm to 8:00 pm

**Location:** Due to the COVID-19 pandemic, this Public Consultation Event will be held online. No in-person event will be held.

To help facilitate this online event, please:

- Review the project materials which include: this presentation, information on how the event will work, etc., ahead of the event. More information can be found at www.dlwc-consultation.com
- Register for a call back from one of our technical specialists to answer your questions during the Public Consultation Event. Registration will be open ahead of and during the event.
- Submit your comments or questions by completing the feedback form online, or by mail or email, by June 4, 2020, to:

**Ms. Natasha Lee, P.Eng.**

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Project Website: toronto.ca/DLWCexpansion

# Introduction to the Project Proponents

## The City of Toronto (City)

- Owns and operates the Island Water Treatment Plant (Island WTP) located on Centre Island which was originally constructed in the late 1800s
- The Island WTP operates year-round to produce over 100 billion litres of water annually, approximately 24% of Toronto's drinking water each year
- The City owns the three (3) active existing intake pipes in Lake Ontario which supply raw water to the Island WTP and two (2) inactive intake pipes. The active intakes form a key part of the existing Deep Lake Water Cooling Supply

## Enwave Energy Corporation (Enwave)

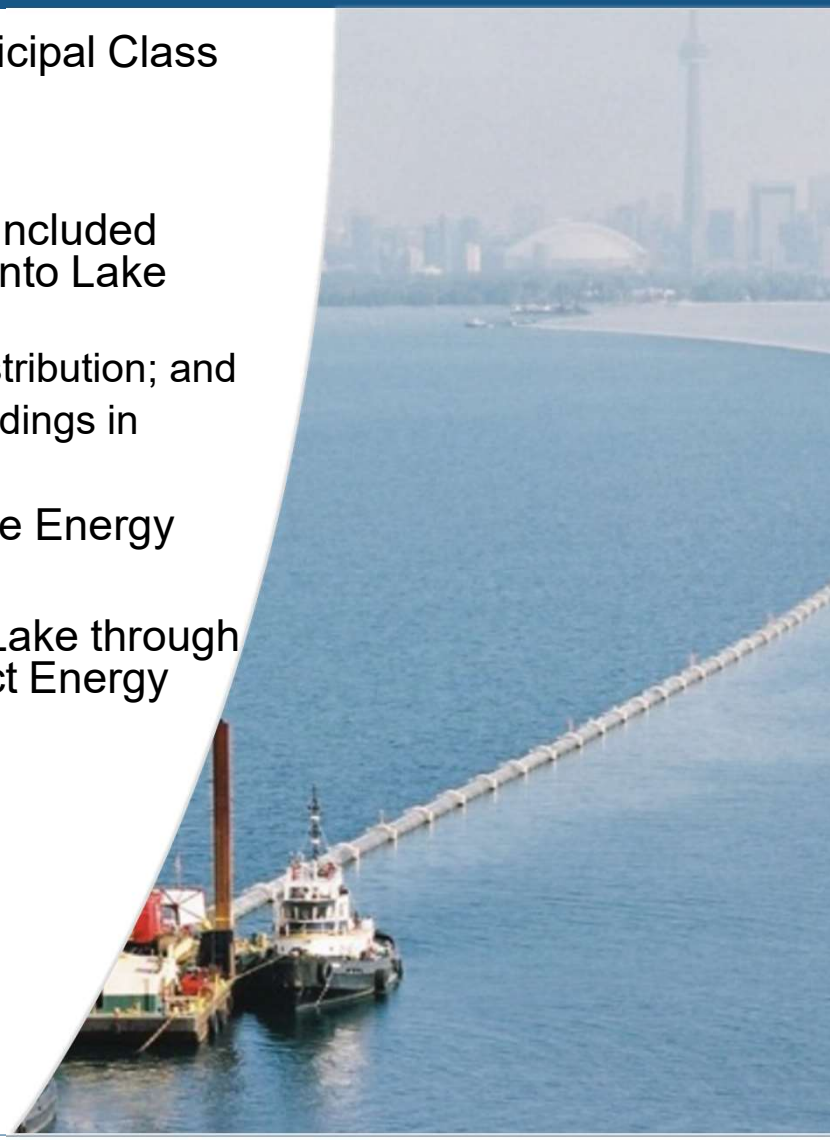
- Enwave provides cooling to over 80 buildings in downtown Toronto through its District Energy System, including critical care facilities, government buildings, data centers, universities, and commercial and residential towers.
- Under an agreement with the City, Enwave contributed to the construction of City infrastructure, including the three (3) existing intake pipes in Lake Ontario
- Lake-cooled water from the intakes, as part of the Deep Lake Water Cooling supply, chills water in the District Energy System, providing cooling to buildings downtown

# The Existing DLWC Supply

- In 1998, the City of Toronto completed a “Schedule B” Municipal Class Environmental Assessment (MCEA) study
- Enwave was a partner, and RVA was the consultant
- The study was for construction of the DLWC Supply which included three (3) new 5-km long intake pipes from the Island WTP into Lake Ontario to supply cold water to:
  - The City’s Island WTP for drinking water treatment and distribution; and
  - Enwave’s District Energy System to provide cooling to buildings in downtown Toronto
- Since 2004, the DLWC supply has been operating under the Energy Transfer Agreement (ETA) between the City and Enwave
- The ETA facilitates the transfer of cooling energy from the Lake through the City’s drinking water infrastructure into Enwave’s District Energy System through heat exchangers

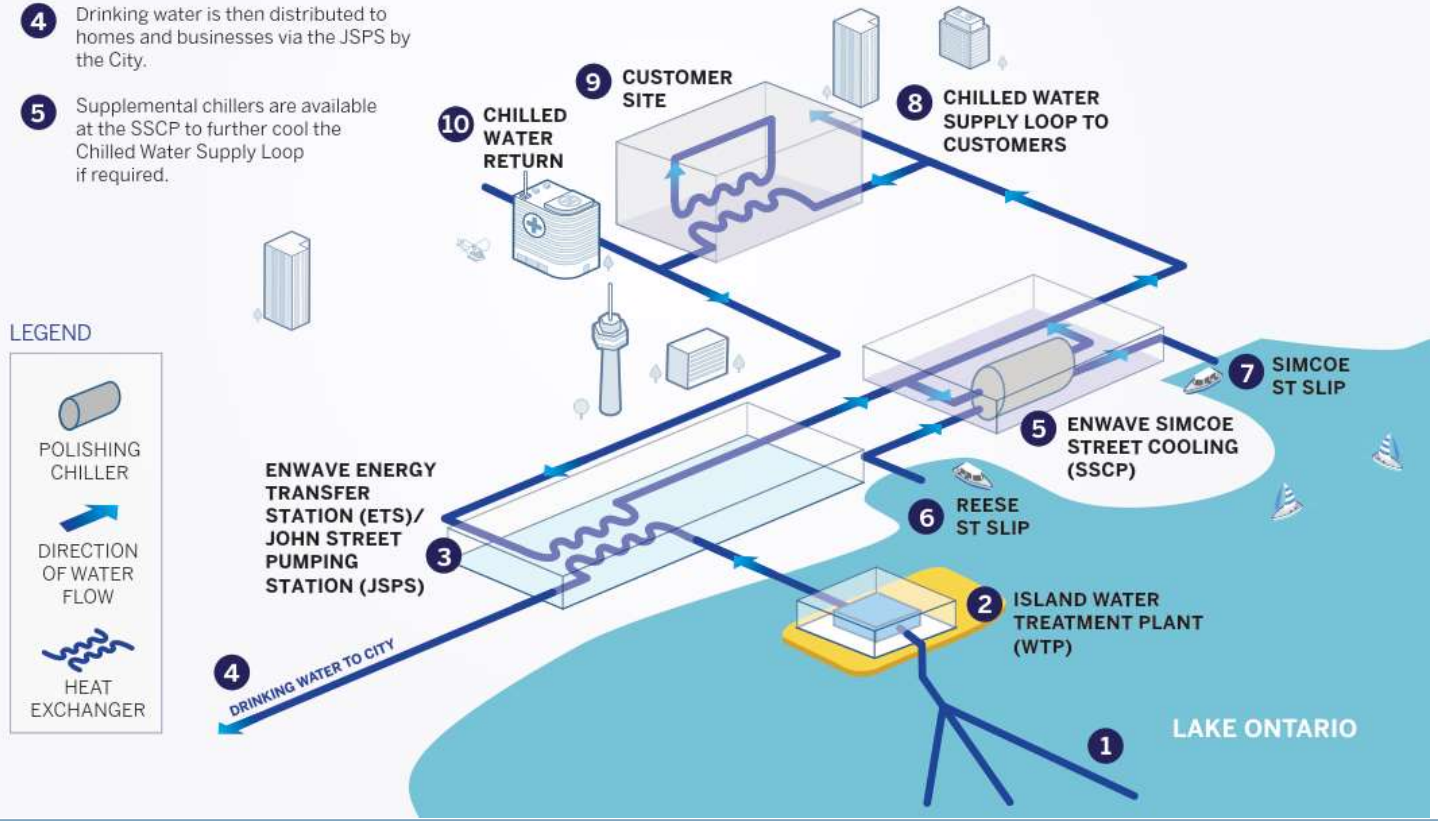
"I believe Deep Lake Water Cooling is an innovative local renewable energy project. By using lake water to cool city buildings and provide drinking water to Torontonians, it demonstrates the kind of environmentally appropriate thinking our city needs. The City of Toronto is taking a leadership role on the Great Lakes by investing in this green energy project," *says Mark Mattson, Lake Ontario Waterkeeper and President of Swim Drink Fish*.

SWIM DRINK FISH



# The Existing DLWC Supply

1. Three intake pipes draw 4°C water from Lake Ontario at a depth of 83 m.
2. The Island WTP treats water for the City's drinking water supply.
3. At the ETS heat exchangers transfer heat from Enwave's Chilled Water Return Loop to the City's cold drinking water, providing cooled water for Enwave's Chilled Water Supply Loop.
4. Drinking water is then distributed to homes and businesses via the JSPS by the City.
5. Supplemental chillers are available at the SSCP to further cool the Chilled Water Supply Loop if required.
6. A separate intake draws water from Toronto Harbour via Rees St Slip for cooling at the SSCP.
7. Cooling water from the SSCP is discharged to Toronto Harbour through the Simcoe St Slip.
8. Chilled water is supplied to 80+ hospitals, universities, data centers, and commercial and residential buildings.
9. Heat exchangers at the customer building cool the internal building loop, providing chilled water for the building cooling system.
10. Warmer water from the heat exchange process at customer buildings is returned to the ETS via the Chilled Water Return Loop to repeat the cycle.



# The Existing DLWC Supply

## Why expand the DLWC supply?

- There is continued growth in demand for cooling in Toronto's downtown core
- Enwave anticipates a 35% increase in its customers' cooling demands in the near future
- There is an opportunity for the City and Enwave to amend the ETA and expand the DLWC supply to meet the cooling demand in a mutually beneficial way
- District energy is a key component of the City's TransformTO climate action strategy
  - Transform TO greenhouse gas (GHG) emission reduction targets (from 1990 levels) are:
    - 30 per cent by 2020
    - 65 per cent by 2030
    - Net zero by 2050, or sooner
  - Buildings generate over half of Toronto's GHG emissions
  - DLWC and other district energy systems distribute thermal energy to multiple buildings in an area or neighbourhood, and can reduce greenhouse gas emissions and improve energy resilience compared to individual buildings
  - In 2019, the City of Toronto declared a climate emergency to accelerate efforts to mitigate and adapt to climate change. More information on TransformTO is available at toronto.ca/transformTO.

# The Municipal Class Environmental Assessment Process

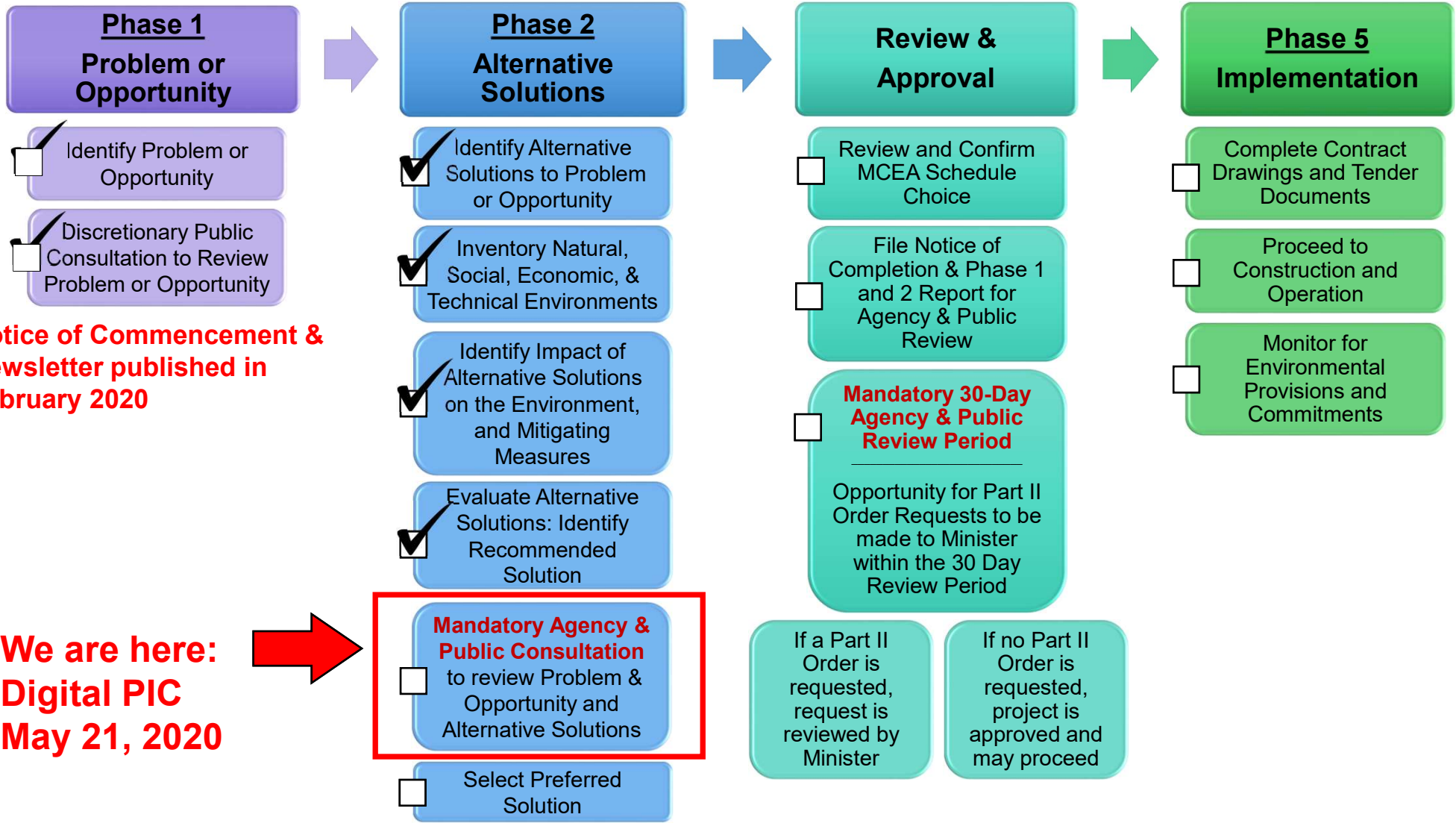
## What is a Municipal Class Environmental Assessment (MCEA)?

- A MCEA is an approved planning process under the *Environmental Assessment Act*
- The process provides members of the public and interested stakeholders with opportunities for input at key stages of the study before a project is implemented
- The process defines the existing problem and opportunity, reviews potential impacts, evaluates alternative solutions, and identifies the recommended solution.
- Additional information and details on the MCEA process can be found on the Government of Ontario's website at https://www.ontario.ca/page/preparing-environmental-assessments

## How will this study be carried out?

- This study is being completed similar to the 1998 EA
- The City of Toronto and Enwave are co-proponents for this expansion study
- Study is being undertaken as a Schedule "B" MCEA

# "Schedule B" MCEA Process



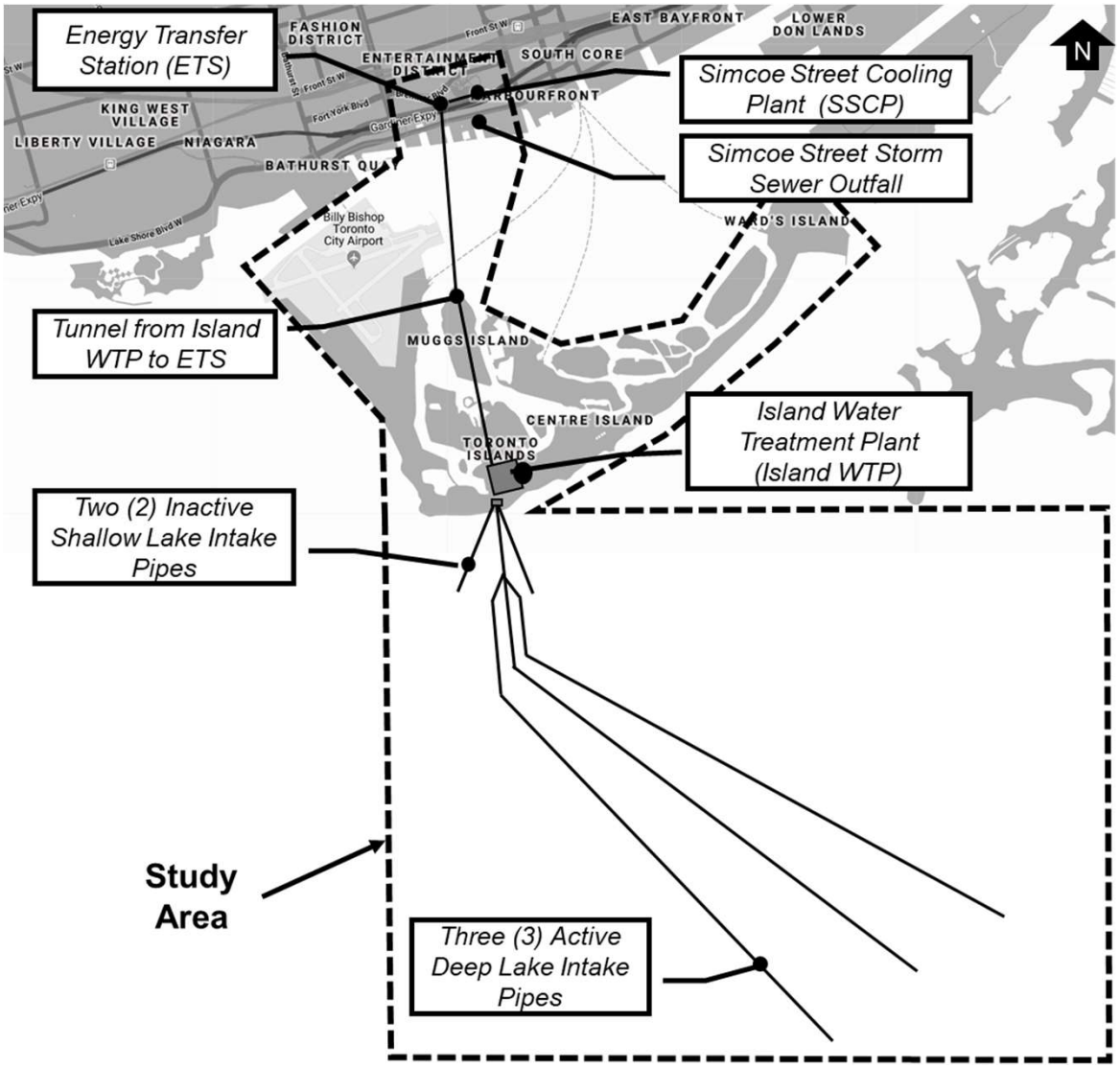
# Problem & Opportunity Statement

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 cooling season.

# Study Area

- The Toronto Islands & Island Water Treatment Plant (Island WTP)
- Lake Ontario – area around the existing water intake pipes locations
- Inner Harbour – area around the existing tunnel location
- Downtown Toronto – around the John Street Pumping Station/ Energy Transfer Station (ETS), the Simcoe Street Cooling Plant (SSCP), and the Simcoe Street Slip/Outfall



# List of Alternative Solutions

As part of this study, two alternative solutions were evaluated (similar to the 1998 study):

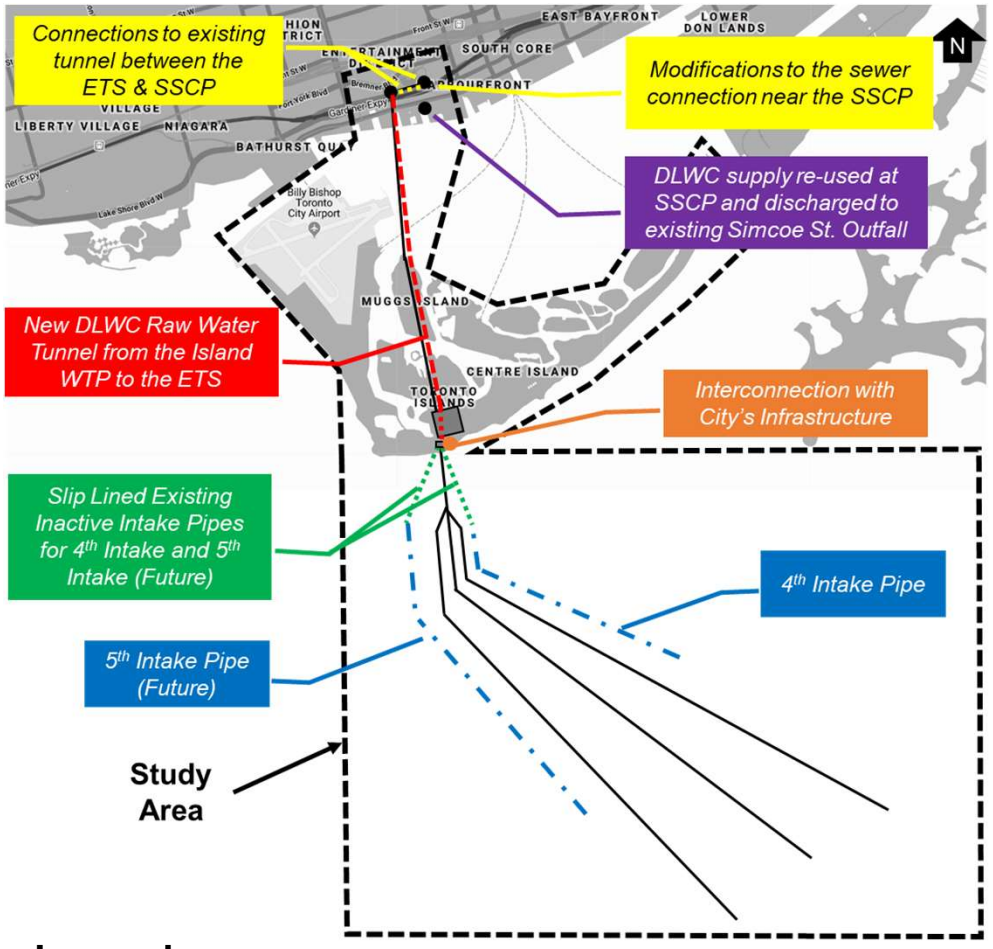
- Alternative Solution 1 – Expand the Existing DLWC Supply
- Alternative Solution 2 – Do Nothing

# Alternative Solution 1 – Expand the Existing DLWC Supply

- Under this alternative, the existing DLWC supply would be expanded
- The DLWC supply expansion requires a MCEA study due to interconnection with City (municipal) infrastructure
- Up to two existing inactive shallow intake pipes at the Island Water Treatment Plant (WTP) could be slip lined and extended deep into Lake Ontario to a depth with constant cold water supply
- The new intake pipe(s) would be inter-connected with the three existing deep lake intake pipes at the Island WTP

# Alternative Solution 1 – Expand the Existing DLWC Supply

- Raw water would be conveyed from the raw water intake pipes to the existing District Energy System through a new tunnel from the Island WTP to Enwave's Energy Transfer Station (ETS), separate from the City's drinking water supply.
- The cold water would pass through new raw water heat exchangers at the ETS. The warmer water would then be transferred to the Simcoe Street Cooling Plant (SSCP) via an existing tunnel.
- At the SSCP, the water would provide supplemental cooling before being discharged back into Lake Ontario via an upgraded connection to the City's stormwater system.




**Legend**
Coloured Items = System Expansion (New)
Greyscale Items = Existing System

# Alternative Solution 1 – Expand the Existing DLWC Supply

- The expansion of the DLWC supply will add approximately 26,000 tons of cooling capacity to Enwave's District Energy System with the addition of the 4th intake.
- Many of Enwave's customers, such as data centers and hospitals, require cooling year-round, even in the middle of the winter.
- Customer sites reject their heat to Enwave's chilled water loop, and during the winter Enwave's District Heat Recovery System can recover this heat and deliver to their customers through their District Heating System.
- The recovery of heat from the cooling system results in lower natural gas consumption and lower carbon emissions compared to traditional heating technologies.

# Alternative Solution 1 – Expand the Existing DLWC Supply

- The City of Toronto will benefit from the DLWC expansion through:
  - Use of a renewable energy source to provide cooling, in alignment with the City's TransformTO Plan implementation strategies.
  - The expansion of the DLWC supply could reduce demand on the electricity grid during peak times 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
  - The expansion will increase the capacity of the District Heat Recovery System, which produces up to 93% less carbon emissions compared to traditional heating technology.
  - Improved reliability, redundancy, and operational flexibility through the construction of new and repurposed unused City infrastructure.
  - Increased revenues to the City under the ETA and a minor reduction in maintenance costs.

# Alternative Solution 2 – Do Nothing

- Under this alternative the existing DLWC supply would not be expanded. Other means of meeting the cooling demand would still be available.
- For example, individual buildings could generate their own cooling supply, or Enwave could expand its District Energy System by adding additional mechanical chillers.
- For the purposes of this Class EA, the potential cooling scenarios below were considered under “Alternative 2 – Do Nothing”:
    - **The District Energy System is expanded with mechanical chillers.** This would require new facilities (e.g. buildings) to be constructed in some combination with other individual buildings that would generate their own cooling supply as Enwave’s existing facilities do not have enough space to support the additional mechanical chillers and associated equipment required to match the cooling capacity provided by the DLWC supply expansion; or
    - **The District Energy System is <u>not</u> expanded by mechanical chillers, and individual buildings would need to fully generate their own cooling supply.**
- This alternative would not require a MCEA study to implement as there is no connection to municipal infrastructure.
- Under this alternative, the City would not receive additional infrastructure or increased revenue from the expanded DLWC supply.

# Evaluation Criteria

The two alternative solutions were evaluated on the following criteria:

## Natural Environment

- Minimizes or mitigates climate change impacts
- Protects natural environmental features
- Protects wildlife and species at risk
- Protects groundwater, lakes, streams, and rivers
- Protects air quality

## Economic Environment

- Minimizes economic impacts to other land uses
- Optimizes capital, operating, and maintenance costs
- Be financially viable
- Comply with funding requirements

## Social & Cultural Environment

- Minimizes impacts to Indigenous Communities
- Minimizes impacts to neighbourhoods related to noise, odour, traffic, and aesthetics
- Minimizes impacts to businesses
- Manages and minimizes construction impacts
- Manages and minimizes property acquisition requirements
- Aligns with existing and future land use
- Protects built heritage and cultural heritage features
- Protects archaeological features
- Protects health and safety

## Technical Environment

- Maintains drinking water quality and protection to public health
- Provides reliable service
- Meets existing and future capacity needs
- Meets timeline of the project
- Ability to adapt to Climate Change
- Aligns with existing and planned infrastructure
- Aligns with approval and permitting process
- Manages and minimizes construction risks

# Evaluation Criteria

The evaluation was conducted by an independent consultant, R.V. Anderson Associates Limited.

Each environment was given a single score, with the scores from each environment having equal weighting (25%). The scores for the environments were then combined into an overall score for each alternative solution.

For “Alternative 2 – Do Nothing”, a sub-rating was given to the two potential cooling expansion scenarios for each criteria. The final rating for “Alternative 2 – Do Nothing” under each criteria considers the best case sub-rating of the two potential cooling scenarios.

The scoring graphics are:

|  |  |  |  |  |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| Poor Alignment with Criteria | Not Well Aligned with Criteria | Somewhat Aligned with Criteria | Well Aligned with Criteria | Very Well Aligned with Criteria |

Preference for an alternative solution is indicated by the direction and colour of the arrow, as well as the magnitude of the numerical score. A double blue arrow represents an optimal option and a double orange arrow represents a poor alignment with the criteria objective.

# Evaluation Results

| Evaluation Environment | Weighting | Key Points for: Alternative 1 – Expand the Existing DLWC Supply Points | Alt. 1 Overall Rating | Key Points for: Alternative 2 – Do Nothing | Sub-Rating | Alt. 2 Overall Rating* |
|---|---|---|---|---|---|---|
| **Natural** | 25% | • Renewable, sustainable energy source is used to provide cooling<br>• Lower operating emissions of greenhouse gases and pollutants to the air for DLWC compared to mechanical chillers. Additional carbon emission reductions through the District Heat Recovery system with increased capacity of the DLWC supply.<br>• Reduced energy usage and potable water usage compared to mechanical chillers<br>• Higher construction emissions of greenhouse gases and pollutants to the air compared to Alternative 2.<br>• Well aligned with City's climate change initiatives<br>• Potential for impact on Natural Environmental Features<br>• Potential for impact on wildlife and Species at Risk<br>• No significant adverse impacts to Lake Ontario |  | If mechanical chillers are added to expand the District Energy System to provide cooling:<br>• Non-renewable energy source is used to provide cooling<br>• Higher operating emissions of greenhouse gases and pollutants to the air.<br>• Higher operating energy usage and potable water usage<br>• Lower construction emissions of GHG<br>• Aligned with City's climate change initiatives<br>• Potential for impact on Natural Environmental Features<br>• Potential for impact on wildlife and Species at Risk<br>• No significant adverse impacts to Lake Ontario |  |  |
| | | | | If individual buildings generate their own cooling supply:<br>• Non-renewable energy source is used to provide cooling<br>• Higher operating emissions of greenhouse gases and pollutants to the air and higher carbon emissions from traditional heating methods<br>• Higher energy and potable water use<br>• Lower construction emissions of GHG<br>• Aligned with City's climate change initiatives<br>• Minimal potential for impact on Natural Environmental Features<br>• Minimal potential for impact on wildlife and Species at Risk<br>• No significant adverse impacts to Lake Ontario |  | |

**Best case sub-rating for scenarios under "Alternative 2 – Do Nothing" was used as Overall Rating.*

# Evaluation Results

| Evaluation Environment | Weighting | Key Points for: Alternative 1 – Expand the Existing DLWC Supply Points | Alt. 1 Overall Rating | Key Points for: Alternative 2 – Do Nothing | Sub-Rating | Alt. 2 Overall Rating |
|---|---|---|---|---|---|---|
| **Social & Cultural** | 25% | • Potential for impact to Indigenous Communities<br>• Low long-term noise, odour, traffic aesthetic impacts<br>• High short-term construction impacts to noise and traffic<br>• Short-term construction impacts to activities on Lake Ontario near new intake location<br>• Temporary and permanent easements required<br>• No impact on heritage features<br>• Potential for impact on archaeological features<br>• Public health and safety would not be impacted |  | If mechanical chillers are added to expand the District Energy System to provide cooling:<br>• Potential for impact to Indigenous Communities<br>• Potential for long-term noise, odour, traffic, and aesthetic impacts<br>• Short-term construction impacts to noise and traffic<br>• Temporary and permanent easements may be required for new/ expanded building(s)<br>• Potential for impact on heritage features<br>Potential for impact on archaeological features<br>• Public health and safety would not be impacted |  |  |
| | | | | If individual buildings generate their own cooling supply:<br>• Lower potential for impact to Indigenous Communities<br>• Potential for long-term noise and aesthetic impacts<br>• Short-term construction impacts to noise and traffic<br>• Minimal potential for impact on heritage features<br>• Potential for impact on archaeological features<br>• Public health and safety would not be impacted |  | |

**Best case sub-rating for scenarios under "Alternative 2 – Do Nothing" was used as Overall Rating.*

# Evaluation Results

| Evaluation Environment | Weighting | Key Points for: Alternative 1 – Expand the Existing DLWC Supply Points | Alt. 1 Overall Rating | Key Points for: Alternative 2 – Do Nothing | Sub-Rating | Alt. 2 Overall Rating |
|---|---|---|---|---|---|---|
| Economic | 25% | • Financially viable<br>• Lower life cycle costs (higher capital costs, lower operating & maintenance costs)<br>• Increases revenue for the City, operational cost neutrality, and minor maintenance cost savings. |  | If mechanical chillers are added to expand the District Energy System to provide cooling:<br>• Financially viable<br>• Higher life cycle costs (high capital costs for new or expanded building(s), higher operating & maintenance costs for Enwave and their customers)<br>• The City would not receive increased revenue and added infrastructure. |  |  |
| | | | | If individual buildings generate their own cooling supply:<br>• Financially viable<br>• Higher life cycle costs (lower capital costs, higher operating & maintenance costs due to the lack of economy of scale, more labour, etc. for individual building owners.<br>• The City would not receive increased revenue and added infrastructure. |  | |

**Best case sub-rating for scenarios under "Alternative 2 – Do Nothing" was used as Overall Rating.*

# Evaluation Results

| Evaluation Environment | Weighting | Key Points for: Alternative 1 – Expand the Existing DLWC Supply Points | Alt. 1 Overall Rating | Key Points for: Alternative 2 – Do Nothing | Sub-Rating | Alt. 2 Overall Rating |
|---|---|---|---|---|---|---|
| **Technical** | 25% | • Does not compromise Toronto's drinking water supply<br>• Provides a more reliable, flexible service to both the City and Enwave, while using existing infrastructure<br>• Meets existing and future capacity needs, with consideration for phased implementation and futureproofing<br>• Approval from regulatory agencies required<br>• Aligned with Toronto's Resilience Strategy<br>• Meets Enwave's required in service date |  | If mechanical chillers are added to expand the District Energy System to provide cooling:<br>• Does not compromise Toronto's drinking water supply<br>• Does not provide a more reliable, flexible service to the City, however would provide a more reliable, flexible service to Enwave<br>• Would not fully provide enough cooling capacity to Enwave's District Energy System to meet near and future-term needs unless combined with the addition of cooling at individual buildings.<br>• Would not meet the required in-service date of the 2023 cooling season. Option would need to be combined with individual buildings generating their own cooling supply. |  |  |
| | | | | If individual buildings generate their own cooling supply:<br>• Does not compromise Toronto's drinking water supply<br>• Does not provide a more reliable, flexible service to the City or Enwave (individual buildings are not connected to the District Energy System)<br>• Individual building cooling would not contribute to the cooling capacity of Enwave's District Energy System but would satisfy individual building needs<br>• Cooling would come online at individual buildings as needed; meeting required in-service dates |  | |

**Best case sub-rating for scenarios under "Alternative 2 – Do Nothing" was used as Overall Rating.*

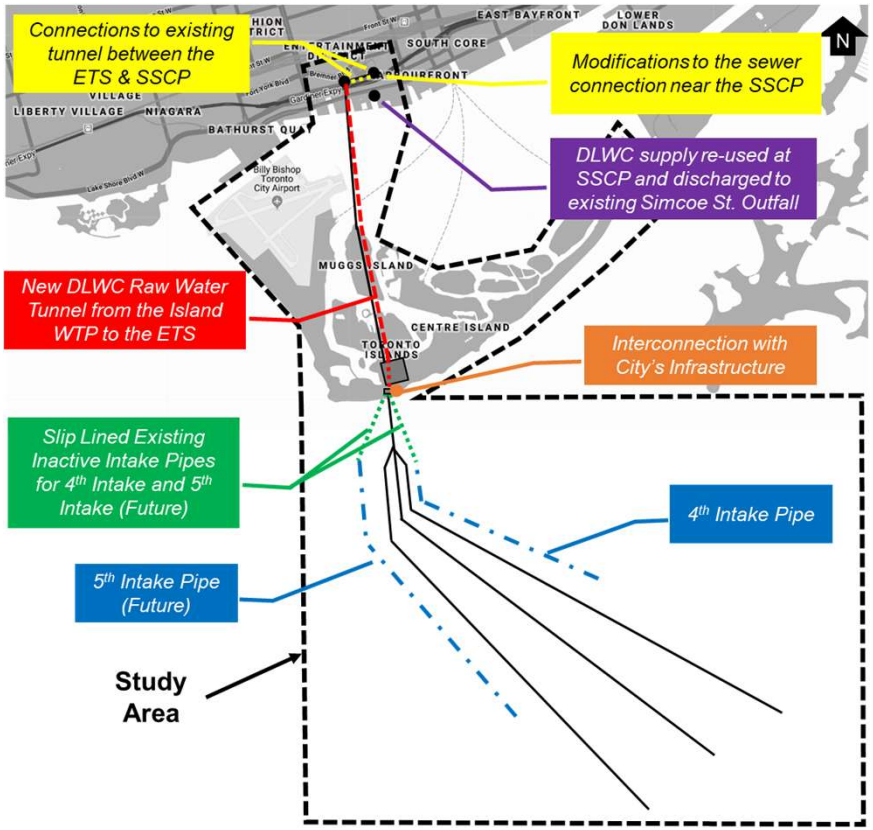
# Evaluation Results

| Evaluation Environment | Weighting | Overall Rating: Alternative 1 – Expand the Existing DLWC Supply Points | Overall Rating: Alternative 2 – Do Nothing |
|---|---|---|---|
| Natural | 25% |  |  |
| Social & Cultural | 25% |  |  |
| Economic | 25% |  |  |
| Technical | 25% |  |  |
| **Overall Score** | |  |  |

# Recommended Solution

## Alternative 1 – Expand the Existing DLWC Supply

- Overall, expanding the existing DLWC supply had the highest overall score from the evaluation.
- Recommend expansion via the 4th intake pipe and upgrades as presented in the DLWC Expansion Conceptual Design (next page).
- Recommendation pending public input and completion of ongoing supporting studies

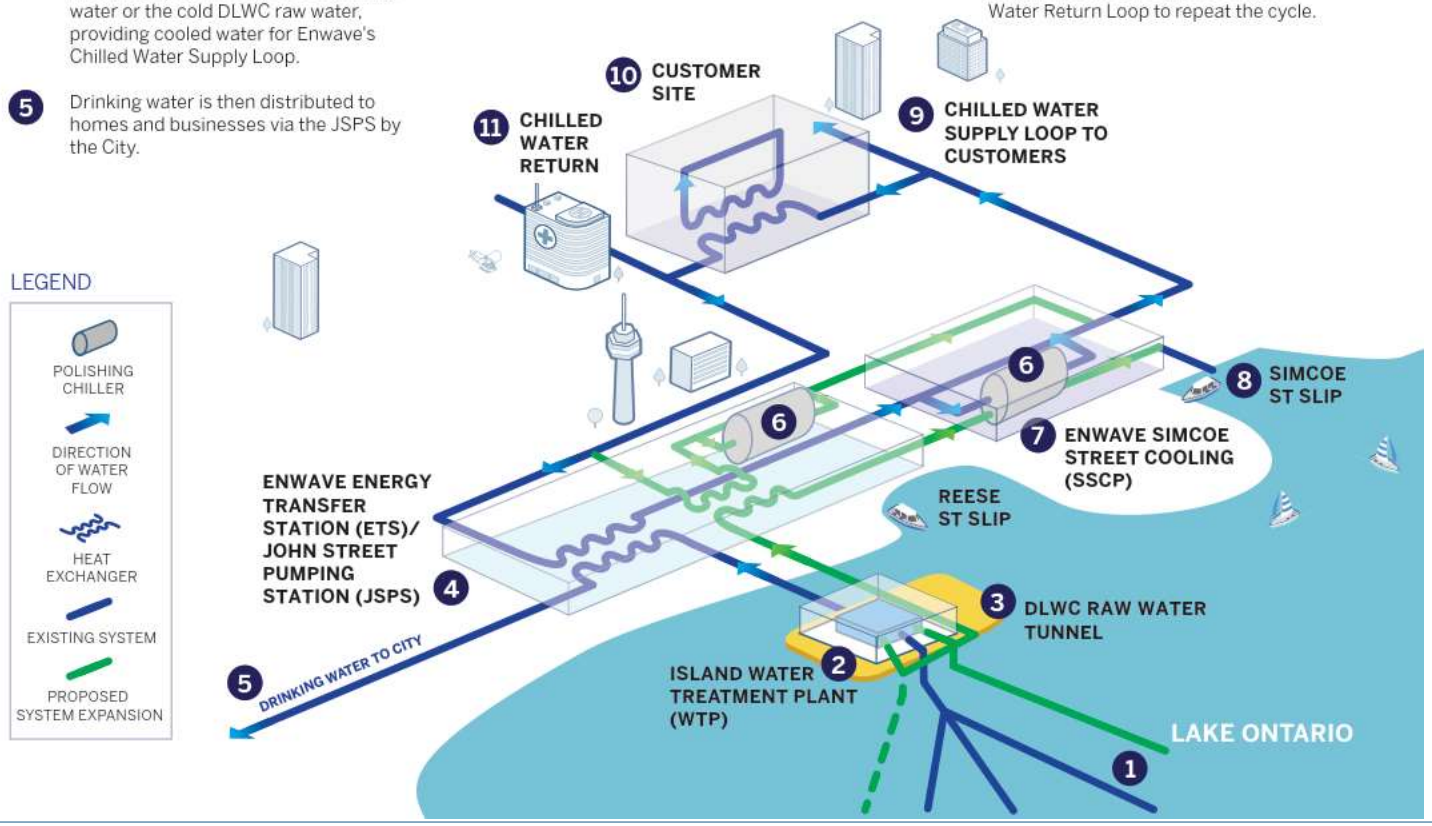



## 5th Intake

- Some supporting studies have only focused on the 4th intake pipe and not the potential impacts of a 5th intake pipe.
- If a 5th intake is required, additional studies and an MCEA addendum would be completed in the next 10 years

# Recommended Solution

1. Up to five intake pipes draw 4°C water from Lake Ontario at depths of 70 to 83 m
2. The Island WTP treats water for the City's drinking water supply.
3. A portion of raw water bypasses the Island WTP.
4. At the ETS two sets of heat exchangers transfer heat from Enwave's Chilled Water Return Loop to the City's cold drinking water or the cold DLWC raw water, providing cooled water for Enwave's Chilled Water Supply Loop.
5. Drinking water is then distributed to homes and businesses via the JSPS by the City.
6. Supplemental chillers are available at the ETS and SSCP to further cool the chilled water loop if required.
7. The DLWC raw water continues to the SSCP where it is used again for cooling.
8. DLWC raw water from the SSCP is discharged to Toronto Harbour through the Simcoe St Slip.
9. Chilled water is supplied to 80+ hospitals, universities, data centers, and commercial and residential buildings.
10. Heat exchangers at the customer building cool the internal building loop, providing chilled water for the building cooling system.
11. Warmer water from the heat exchange process at customer buildings is returned to the ETS via the Chilled Water Return Loop to repeat the cycle.



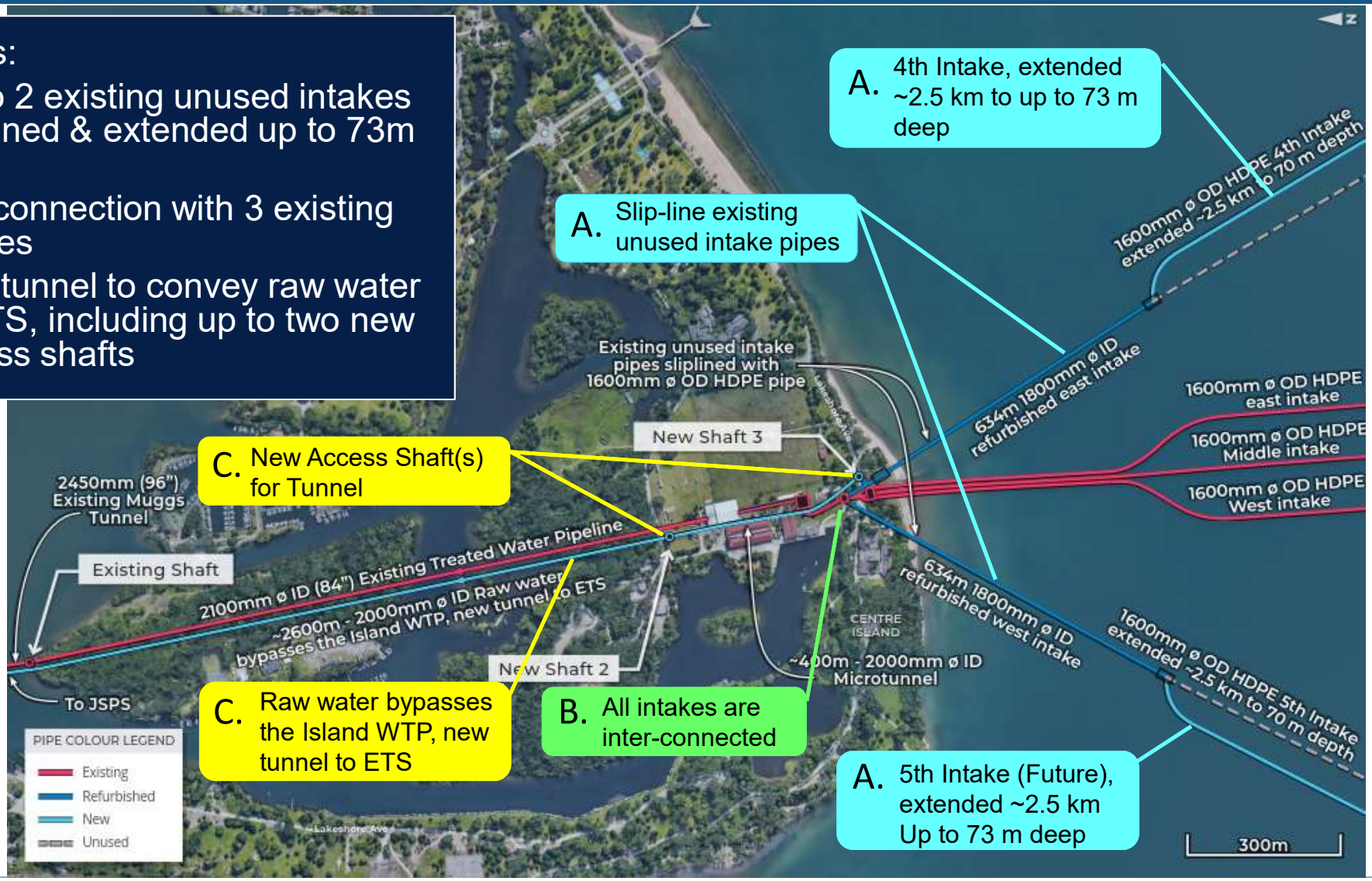
# DLWC Expansion Conceptual Design

Includes:

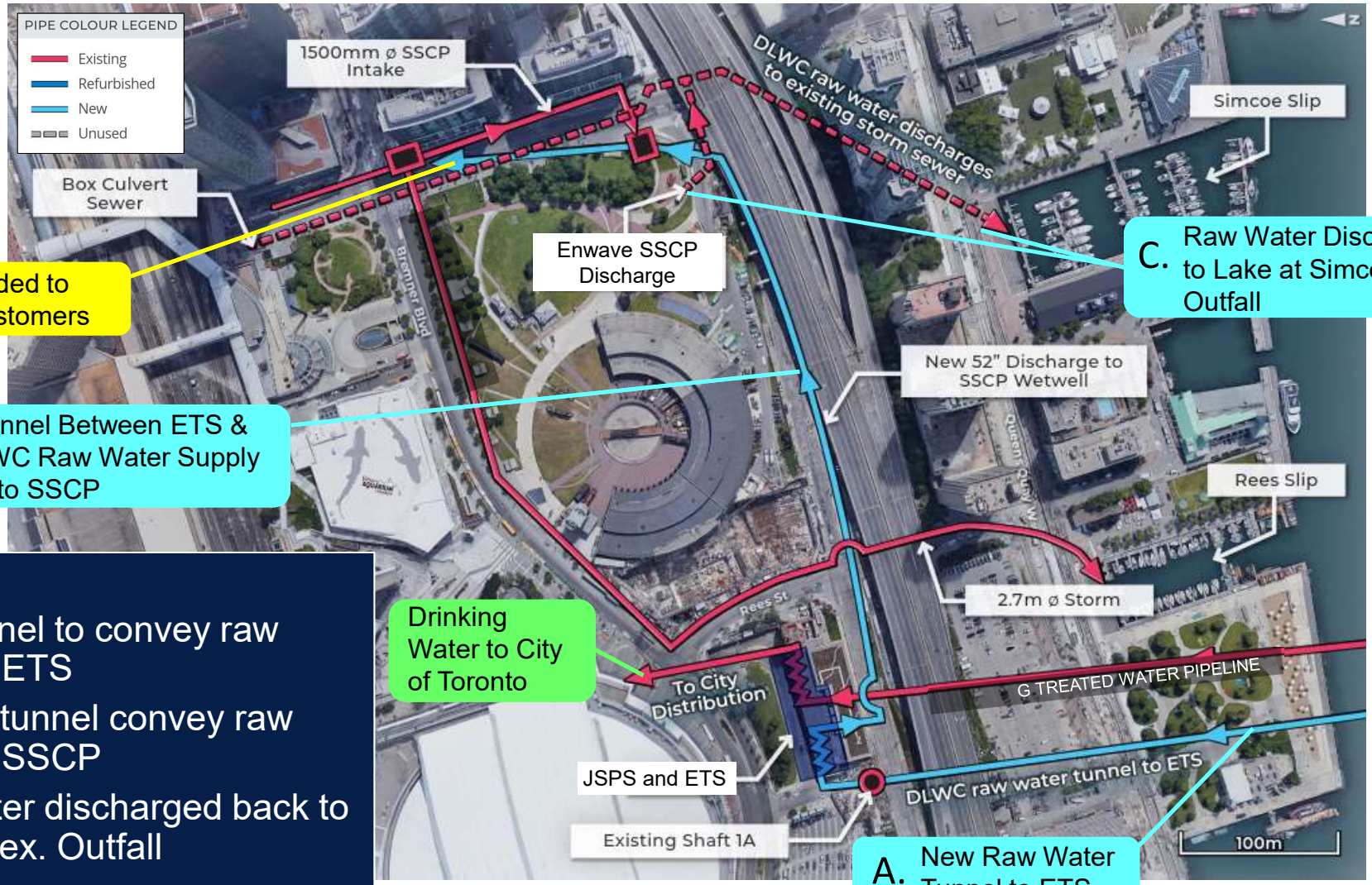
A. Up to 2 existing unused intakes slip-lined & extended up to 73m deep

B. Interconnection with 3 existing intakes

C. New tunnel to convey raw water to ETS, including up to two new access shafts



# DLWC Expansion Conceptual Design




Cooling provided to Enwave's Customers

B. Existing Tunnel Between ETS & SSCP, DLWC Raw Water Supply Continues to SSCP

C. Raw Water Discharged to Lake at Simcoe Street Outfall

A. New Raw Water Tunnel to ETS

Includes:

A. New tunnel to convey raw water to ETS
B. Existing tunnel convey raw water to SSCP
C. Raw water discharged back to Lake @ ex. Outfall

# Supporting Studies

Additional studies are being undertaken as part of this study to determine the potential impacts of the DLWC supply expansion and identify mitigation measures, including:

- Deep Lake Temperature & Water Quality Sampling
- Intake Protection Zone (IPZ) Study
- Geotechnical, Bathymetric, & Geophysical Studies
- Archaeological Assessment
- Natural Environmental Impact Assessment

# Supporting Studies

**Deep Lake Temperature and Water Quality Sampling**

- Temperature logger installed in Sept. 2019 at proposed intake mouth to confirm lake temperature and compare to temperature at existing intakes
- Water samples taken periodically beginning Oct. 2019 at proposed intake mouth and analyzed at third-party lab; data used to confirm water quality and compare to raw water at existing intakes
- Study is ongoing, preliminary results are positive as they show water temperature and quality at the 4th intake location is similar to the existing intakes, i.e. the temperatures are low enough to be used for cooling in the DLWC supply, and treatment of the raw water (if raw water is used for drinking water) would be similar to the processes already in place at the Island WTP.

**Intake Protection Zone (IPZ) Study**

- Study to determine the area around the new intake which could be impacted by contaminants from spills, runoff, etc. in order to identify potential threats and establish the new protection zone
- Study is ongoing

# Supporting Studies

## Archaeological Assessment

- Study to determine potential construction impacts to archaeological resources on the Toronto Islands and Lake Ontario
- Stage 1 and/or 2 land assessments are ongoing to confirm whether there is any archaeological potential where new infrastructure will be located (e.g. new shafts, tunnel). Field investigations anticipated in May/June 2020.
- Desktop marine assessment is ongoing to confirm whether there is any archaeological potential where the new intake will be located on the lake bed. No potential for archaeological resources for tunnel under harbour as location is deep in bedrock. If areas of interest found, further work (Stage 1/2 AA) will be recommended.

## Geotechnical, Bathymetric, and Geophysical Studies

- Geotechnical investigations (e.g. boreholes) along the proposed intake ro shaft locations, and tunnel locations are ongoing to determine optimal locations of infrastructure based on ground conditions.
- Bathymetric and geophysical studies ongoing to determine profile of lake and type of sediment along lake bed. Data will be re-used to support the desktop marine archaeological assessment.

# Supporting Studies

**Natural Environmental Impact Assessment**

Studies cover three main areas:

- **4th Intake** – impacts to water quality, water temperature, and aquatic habitat impacts at the intake mouth, along lakebed near shore, and deep in Lake Ontario
- **Toronto Islands** – construction and operation impacts to the natural environment
- **Outfall** – impacts to water quality, water temperature, and aquatic habitat impacts where the outfall discharges back in Lake Ontario in the inner Harbour

These studies will help to recommend mitigating measures to be implemented during design and construction such as:

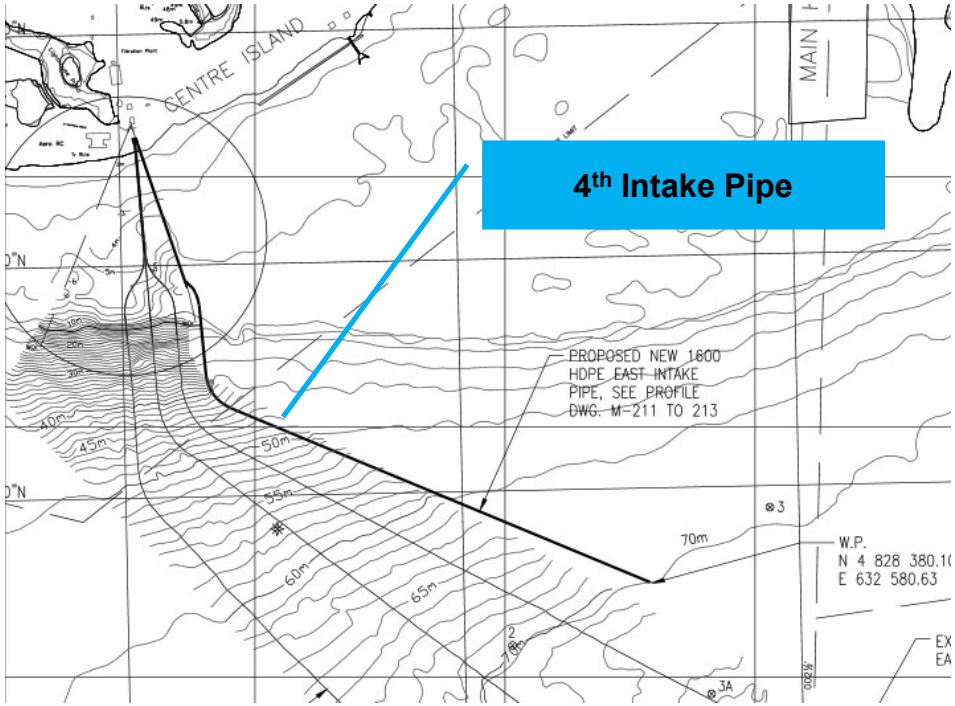
- Fencing to separate construction zones from surrounding properties and ecological areas
- Timing of Activities
  - Avoid or minimize wildlife disturbance
  - Clearing of vegetation outside breeding bird season
  - In-water construction timing windows per Fisheries and Oceans Canada
- Sediment and erosion control measures
- Invasive species management

# Supporting Studies

## Natural Environmental Impact Assessment

### 4th Intake – Lake Temperature

- Study reviewed the impact of the DLWC supply expansion on the temperature of Lake Ontario and found:
  - Overall, the DLWC expansion would have negligible changes in the heat budget (balance of heat in/out) of Lake Ontario
  - Any temperature changes from the DLWC is dwarfed by natural exchanges - downwelling, seiches and other internal water movements
  - The cooling water supply is thermally renewable at a withdrawal rate of 10,000 $m^3$/sec
    - In comparison, the total DLWC flow is only 7 $m^3$/sec
    - Thus, the DLWC withdrawal of water from lake is 9,993 $m^3$/s <u>below</u> the thermally renewable withdrawal rate
  - Thus, the DLWC expansion does not represent any magnitude of threat to the thermal characteristics of Lake Ontario



# Supporting Studies

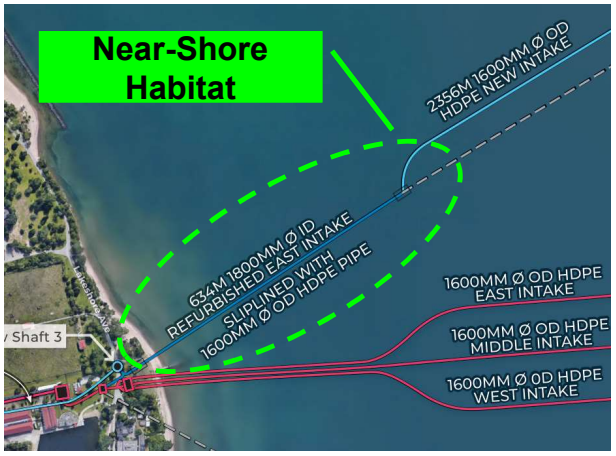
## Natural Environmental Impact Assessment

### 4th Intake – Deep Lake Habitat

- Study found:
  - Deep-water habitat generally supports minimal ecological processes
  - Tolerant of minimal impacts such as installation of an intake pipe
  - Little impact of intake installation on fish habitat or resident fish species
  - Low intake velocity minimizes the potential for fish and other aquatic life to enter pipe


### 4th Intake – Near Shore Habitat

- Study findings identified coast habitat is unlikely to provide spawning habitat for resident species as it is:
  - Sandy
  - Subject to considerable wave action
- Slip lining will minimize impacts to shore and near shore environments



# Supporting Studies

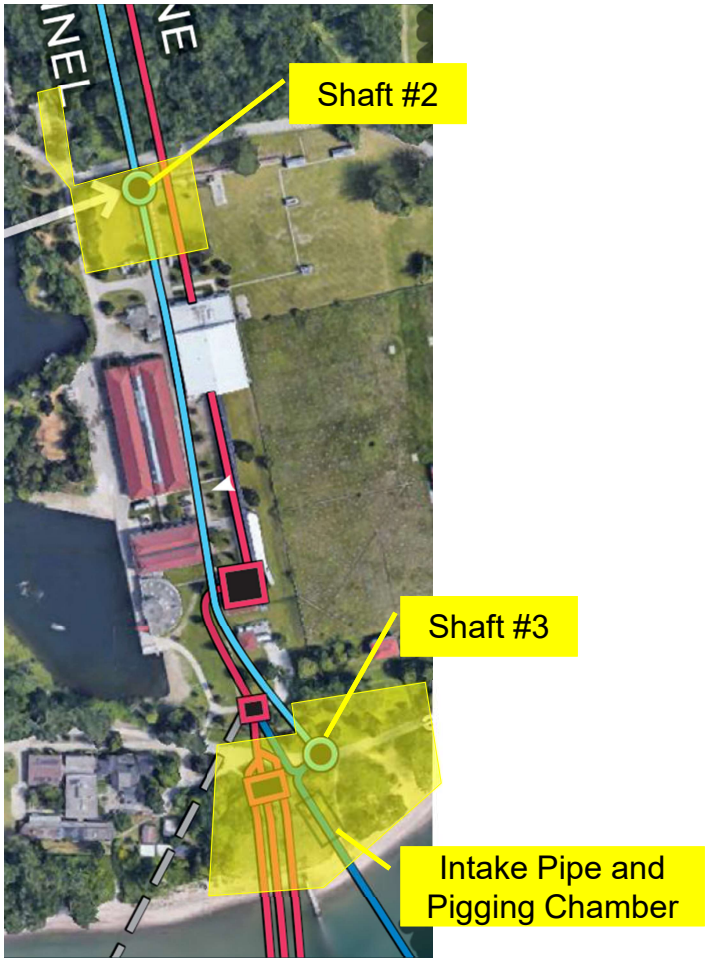
## Natural Environmental Impact Assessment

### Toronto Islands – Natural Habitat & Wildlife

- Studies to determine potential impacts to natural habitat and wildlife at the:
  - New intake pipe and pigging chamber (chamber used for the periodic cleaning of the intake pipe)
  - Shaft #2 and Shaft #3 and construction staging areas

- Preliminary Environment Impact Study completed; further field investigations will be carried out in Spring 2020 including:

| Field Studies | Timing (2020) |
|---|---|
| Vegetation Survey | Early June |
| Breeding Bird Survey | Late May & Mid June |
| Breeding Amphibian Survey | Late April, & Early May |



# Supporting Studies

## Natural Environmental Impact Assessment

### Outfall – Temperature & Quality

- Studied reviewed the existing conditions at the Outfall compared to proposed DLWC expansion and identified:
  - No significant adverse effects to environment
    - Minimal water temperature changes in Simcoe Slip
  - Minor improvements to Simcoe Slip:
    - Cleaner source of cooling water
    - Reduced concentrations of some pollutants (phosphorus, nitrate, and chloride)
    - Temperatures closer to harbour temperatures


### Outfall – Aquatic Habitat

- Study found:
  - Limited spawning opportunities
  - Degraded habitat due to:
    - Pre-existing stormwater inputs from the City's stormwater sewer system
    - Few naturalized features
  - Dominated by tolerant species (Common Carp, White Sucker, Quagga Mussels)

# Next Steps

- Following this Public Consultation Event, the City of Toronto and Enwave will be completing ongoing studies and confirming the recommended solution.
- To learn more about these ongoing studies, please submit your questions by mail or email, or request to speak directly with a member of our Project Team during our Public Consultation Event.

| Project Phases | Anticipated Date |
|---|---|
| Public Consultation Event | May 21, 2020 |
| Submission Date for Comments Following Public Consultation Event | June 4, 2020 |
| Supporting MCEA Studies Completion | Spring 2020 |
| Publication of Notice of Study Completion and Study Report Public Review | July 2020 |
| Study Completion | August 2020 |
| Design & Tendering | Ongoing |
| Construction Award | Fall 2020 (After MCEA Complete) |
| Construction Completion | 2023 Cooling Season |

**Current Opportunity for Public Input**

**Next Opportunity for Public Input**

# Questions or Comments?

- Please complete a comment sheet and submit it to the project team or complete the feedback form found on the project website listed below.
- More information including copies of the project notices and Public Consultation Event materials can also be found on the project website.

**PROJECT WEBSITE:** toronto.ca/DLWCexpansion

- If you have questions or comments at any time through the MCEA process, please contact:

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