

AGENDA

LAWSS Board Meeting



Thursday, October 31, 2019

12:00 pm

Tourism Sarnia-Lambton Assembly Room

1455 Venetian Blvd. Point Edward

1. Declaration of Pecuniary or Conflict of Interest

2. Approval of Regular Agenda Minutes

A copy of the minutes for the September 26, 2019 meeting are attached to this agenda.

Moved By _____

Seconded By _____

"That the minutes from the September 26, 2019 meeting of the LAWSS Board be adopted."

3. Delegations

a. Presentation: Canada's Plan for Used Nuclear Fuel, Nuclear Waste Management Organization (NWMO)

Becky Smith, Regional Communications Manager – Southwestern Ontario and Paul Gierszewski, NWMO's Director of Safety and Technical Research, and Jim Gowland, Chair of the South Bruce Nuclear Waste Community Liaison Committee

Moved By _____

Seconded By _____

"That the National Waste Management Organization's presentation titled "Canada's Plan for Used Nuclear Fuel" **BE RECEIVED** for the information of the Board of Management."

4. LAWSS Monthly Financial Statements

A copy of the August LAWSS budget statement and cash balance sheets are

attached for review and approval.

Moved By _____

Seconded By _____

"That the August 2019 Financial Statement and Cash Balance Sheet **BE RECEIVED** for the information of the Board of Management."

- a. August 2019 Financial Statement and Cash Balance Sheet

5. OCWA Operational Statements

The September Monthly Operations Report and other materials from OCWA are attached.

Moved By _____

Seconded By _____

"That the September Operational Statements **BE RECEIVED** for the information of the Board of Management."

- a. September 2019 Operational Statement

6. Information Reports

The September 2019 Flow Summaries and Information Report.

Moved By _____

Seconded By _____

"That the September 2019 Flow Summaries and the Information Report, dated October 2019, **BE RECEIVED** for the information by the Board."

- a. September 2019 Flow Summaries

- b. October 2019 Information Report

7. Capital Update

8. Reports of Committees

9. Miscellaneous Reports

10. Ongoing Issues

- a. Clean Harbors Lambton Incineration Facility

Moved By _____

Seconded By _____

"That the Thallium Shipment Information Request Report **BE RECEIVED** for information by the Board."

b. Emerging Issues- Plastics

Moved By _____

Seconded By _____

That the Emerging Issues- Plastics Report, and its accompanying documentation, **BE RECEIVED** for the information by the Board."

11. Correspondance

12. New Business

a. Wireless Communication Proposal

Multiple requests have been received for establishment a wireless internet hub at LAWSS Water Tower and Standpipe facilities.

Moved By _____

Seconded By _____

"That the Joint Board of Management for the Lambton Area Water Supply System to **AUTHORIZE the** General Manager to develop agreements, as they are requested, related to all LAWSS owned Facilities with respect to telecommunication.

13. By-Laws

a. By-Law No. 1-2019 Confirming

Draft Confirming By-Law to confirm the proceedings of LAWSS for the 2018 calendar year.

Moved By _____

Seconded By _____

"That the attached 2018 Confirming By-Law **BE INTRODUCED** and approved by the Joint Board."

b. By-Law No. 2-2019 Procedural

Draft Procedural By-law and Report detailing changes is attached

Moved By _____

Seconded By _____

"That the attached By-Law to regulate the proceedings of the Lambton Area Water Supply System Joint Board of Management **BE INTRODUCED** and approved by the Joint Board"

14. IN-CAMERA Items

The Board will adjourn to an in-camera meeting if necessary.

Moved By _____

Seconded By _____

That the Board Adjourn to an in-camera session.

15. Chair to Rise and Report on the Matters of Public Concern from the In-Camera Session.

The Chair will report as required.

16. Adjournment/Next Meeting

Moved By _____

Seconded By _____

That the LAWSS Board adjourn this meeting to its next board meeting held on November 28, 2019 at 12:00pm



Minutes

LAWSS Board Meeting

Thursday, September 26, 2019

12:00 pm

Lambton Area Water Supply System WTP – 1215 Fort Street, Sarnia ON N7V 1M1

Members Mayor Jackie Rombouts, Township of Warwick
Mayor Steve Arnold, St. Clair Township
Mayor Lonny Napper, Town of Plympton-Wyoming
Councillor Margaret Bird, City of Sarnia
Mayor Bev Hand, Village of Point Edward
Councillor Rick Goodhand, Municipality of Lambton Shores

Staff David Jackson, Director of Engineering City of Sarnia
Chris Charter, CAO City of Sarnia
Andrew Maver, Public Works Manager/Drainage Superintendent
Township of Warwick
Nova Vanderslagt, Water/Wastewater Specialist
Adam Sobanski, Director of Public Works Town of Plypton-Wyomng
Jay Versraeten, Manager of Environmental Services Village of Point Edward
Dave Hunt, Senior Operational Manager - OCWA
Suzanne Budden, Business Development Manager – OCWA
Suzanne Durling, Administrative Assistant – OCWA
Michael Helps, Financial- LAWSS
Clinton Harper, General Manager - LAWSS

1. Declaration of Pecuniary or Conflict of Interest

2. Approval of Regular Agenda Minutes

A copy of the minutes for the meeting are attached to this agenda.

"That the minutes from the June 27, 2019 meeting of the LAWSS Board be adopted."

Moved by: Mayor Steve Arnold

Seconded by: Mayor Jackie Rombouts

Carried

3. Delegations

4. LAWSS Monthly Financial Statements

A copy of the May, June, and July LAWSS budget statement and cash balance sheets are attached for review and approval.

a. May 2019 Financial Statement and Cash Balance Sheet

b. June 2019 Financial Statement and Cash Balance Sheet

c. July 2019 Financial Statement and Cash Balance Sheet

"That the Board accept the financial statements and cash balance sheets for May, June and July 2019."

Moved by: Mayor Steve Arnold

Seconded by: Mayor Jackie Rombouts

Carried

5. OCWA Monthly Operational Statements

The June, July and August 2019 Monthly Operations Report and 2nd Quarter Financial Report from OCWA are attached.

"That the Board accept the June, July and August 2019 Operational Statements and 2nd Quarter Financial Report from OCWA."

a. June 2019 Operational Statements

b. July 2019 Operational Statement

c. August 2019 Operational Statement

d. 2nd Quarter Financial Report

Moved by: Mayor Steve Arnold

Seconded by: Councillor Margaret Bird

Carried

6. Information Reports

The June, July and August 2019 Flow Summaries are attached.

a. June 2019 Flow Summary Sheets

b. July 2019 Flow Summary Sheets

c. August 2019 Flow Summary Sheets

"Motion to receive June, July and August 2019 Flow Summaries as Information."

Moved by: Mayor Jackie Rombouts

Seconded by: Mayor Steve Arnold

Carried

7. Capital Update

a. Radio / PLC Upgrade Project

"Motion to **receive** report Subject: Radio / PLC Upgrade Project Update, dated September 26, 2019, as information and approve implementation of cloud-based, software defined, wide area network to replace existing radio communication system."

Moved by: Mayor Steve Arnold

Seconded by: Mayor Lonny Napper

Carried

8. Reports of Committees

a. Meeting Minutes: LAWSS Technical Group

1. Revised TM#4 Financial Plan (20 Year Plan)

"Motion to **receive** Minutes of the LAWSS Technical Group, dates September 12, 2019, as information."

Moved by: Councillor Rick Goodhand
Seconded by: Mayor Steve Arnold

Carried

9. Miscellaneous Report

"Motion to invite a representative from the Nuclear Waste Management Organization (NWMO) to provide a presentation on the Deep Geological Repository (DGR) to the LAWSS Board."

Moved by: Councillor Margaret Bird
Seconded by: Mayor Steve Arnold

Carried

"Motion for staff to provide update report on large amount of toxic materials traveling over land to the Clean Harbors Canada site located on Telfer Road in St. Clair Township."

Moved by: Councillor Margaret Bird
Seconded by: Mayor Steve Arnold

Carried

"Motion for staff to prepare a report that details existing cost allocation at LAWSS and explores how neighboring water utilities assign costs for capital projects."

Moved by: Councillor Margaret Bird
Seconded by: Mayor Steve Arnold

For (5): Councillor Margaret Bird

Against (6): Mayor Jackie Rombouts, Mayor Steve Arnold, Mayor Lonny Napper, Mayor Bev Hand, and Councillor Rick Goodhand

Defeated (5 to 6)

10. Ongoing Issues

11. Correspondence

12. New Business

a. DRAFT 2020 Budget

"The Board **approve** the 2020 Budget as presented complete with 0.0% increase."

Moved by: Mayor Steve Arnold

Seconded by: Councillor Margaret Bird

Defeated

"The Board **approve** the 2020 Budget as presented complete with 3.0% increase."

Moved by: Mayor Lonny Napper

Seconded by: Mayor Jackie Rombouts

Defeated

"The Board **approve** the 2020 Budget as presented complete with 1.5% increase."

Moved by: Councillor Rick Goodhand

Seconded by: Councillor Margaret Bird

Carried

"Motion for LAWSS Master Water Plan update, as proposed in the 2020 Budget proposal, to be funded in 2019 through reserves."

Moved by: Mayor Jackie Rombouts

Seconded by: Mayor Steve Arnold

Carried

"The Board **receive** the LAWSS 20 Year Growth Plan, WTP- Electrical Reliability Study, WTP- Main Plant HVAC Assessment, Facility Storage- Condition Assessment for the Indian Road Tower, Facility Storage- Condition Assessment for the West Lambton Pumping Station Reservoir, and the 2020-2025 Capital Forecast as information."

Moved by: Mayor Steve Arnold

Seconded by: Mayor Jackie Rombouts

Carried

b. Dog Park @ Forest Standpipe

"The Board agrees in principal to re-purposing an area of LAWSS property as a dog park, and will allow staff to work with the Municipality of Lambton Shores to develop an agreement for its use. Agreement will be presented to the LAWSS Board at a later meeting for approval."

Moved by: Councillor Rick Goodhand
Seconded by: Mayor Jackie Rombouts

Carried

c. Accessibility - LAWSS WTP

"Motion to **receive** report Subject: LAWSS WTP Accessibility, dated September 26, 2019 as information"

Moved by: Mayor Steve Arnold
Seconded by: Councillor Margaret Bird

Carried

13. By-Laws

14. IN-CAMERA Items

The Board will adjourn to an in-camera meeting if necessary.

15. Chair to Rise and Report on the Matters of Public Concern from the In-Camera Session.

The Chair will report as required.

16. Adjournment/Next Meeting

"That the LAWSS Board adjourn this meeting to its next board meeting held on October 31, 2019 at noon at the Tourism Sarnia-Lambton Assembly Room."

Moved by: Councillor Rick Goodhand
Seconded by: Councillor Margaret Bird

Carried



NUCLEAR WASTE
MANAGEMENT
ORGANIZATION

SOCIÉTÉ DE GESTION
DES DÉCHETS
NUCLÉAIRES



Canada's Plan for Used Nuclear Fuel

Lambton Area Water Supply System Board Meeting, October 2019

Paul Gierszewski, Director, Safety and Technical Research and Becky Smith, Regional Communications Manager

NWMO: Who We Are

- Formed in 2002 as required by *Nuclear Fuel Waste Act*
- Charged with developing and implementing national solution for used nuclear fuel
- Funded by Canada's nuclear energy corporations
- Project lifecycle cost of almost \$24B for a capacity of 5.2 million used fuel bundles
- Trust Funds established, fully funded for current used fuel inventory
- Board of Directors, Independent Advisory Council

Our mission is to develop and implement collaboratively with Canadians, a management approach for the long-term care of Canada's used nuclear fuel that is socially acceptable, technically sound, environmentally responsible, and economically feasible.



Dry Storage

Adaptive Phased Management (APM)

APM emerged from dialogue with citizens and experts – best met key priorities

A Technical Method

- » Centralized containment and isolation of used nuclear fuel in a deep geological repository
- » Continuous monitoring
- » Potential for retrievability
- » Optional step of shallow underground storage*

* Temporary shallow storage at the deep geological repository is optional and not currently included in the NWMO's implementation plan.

A Management System

- » Flexibility in pace and manner of implementation
- » Phased and adaptive decision-making
- » Responsive to advances in technology, research, Indigenous Knowledge and societal values
- » Open, inclusive, fair siting process – seek informed, willing host community
- » Sustained engagement of people and communities throughout implementation

APM selected by Federal government June 2007

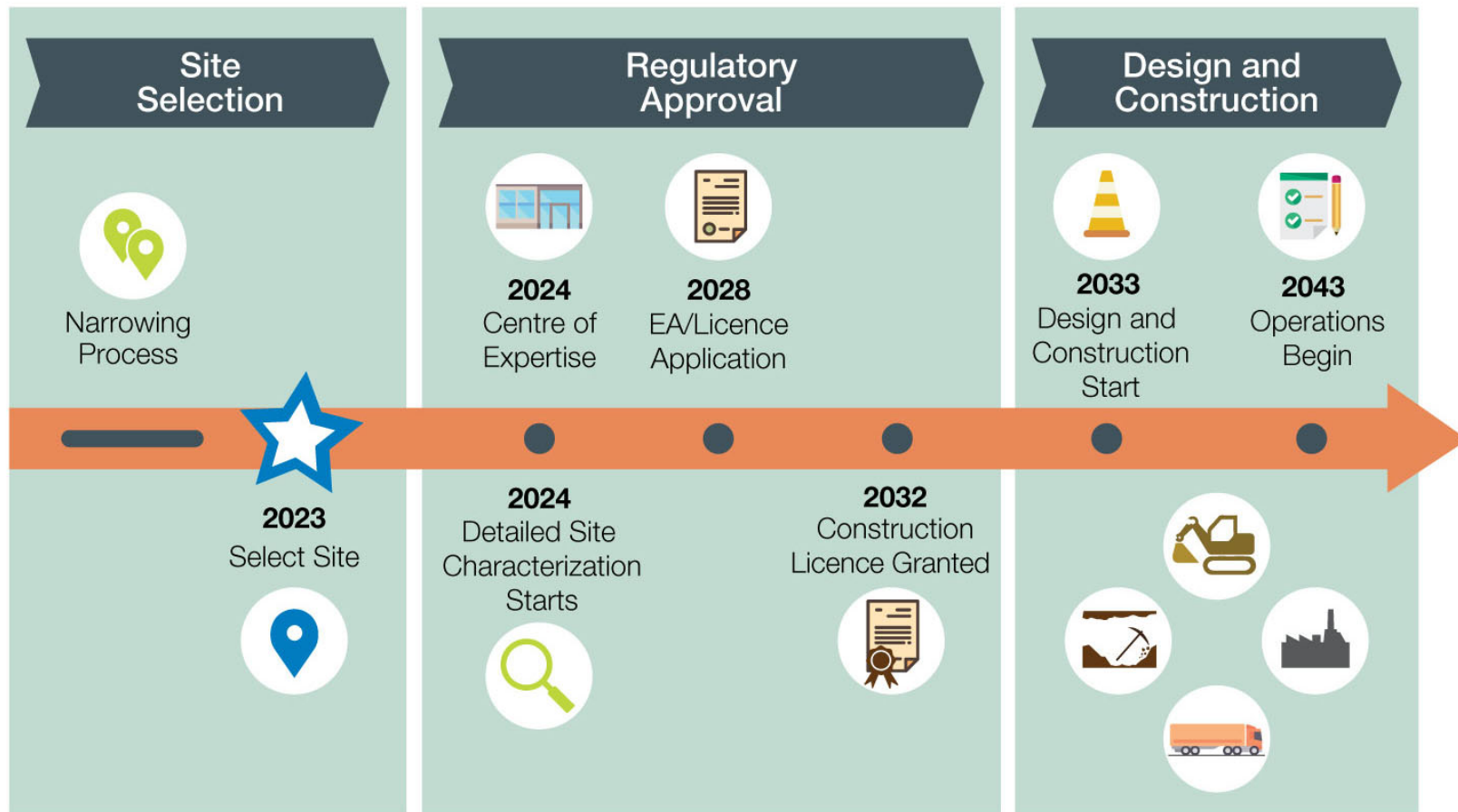
Site Selection Process: Initiated May 2010

Seeking informed and willing host with suitable geology

- Developed through two-year public dialogue
- Multi-stage technical and socio-economic assessment approach
- Phased process over many years
- Communities expressed interest to participate
- Communities can choose to leave the process

The project will only proceed with the involvement of the interested community, First Nation and Métis communities in the area, and surrounding communities, working in partnership to implement it.

Project Timelines



Criteria for Selecting a Preferred Site

Safety

Confidence a deep geological repository can be developed with strong safety case at that location

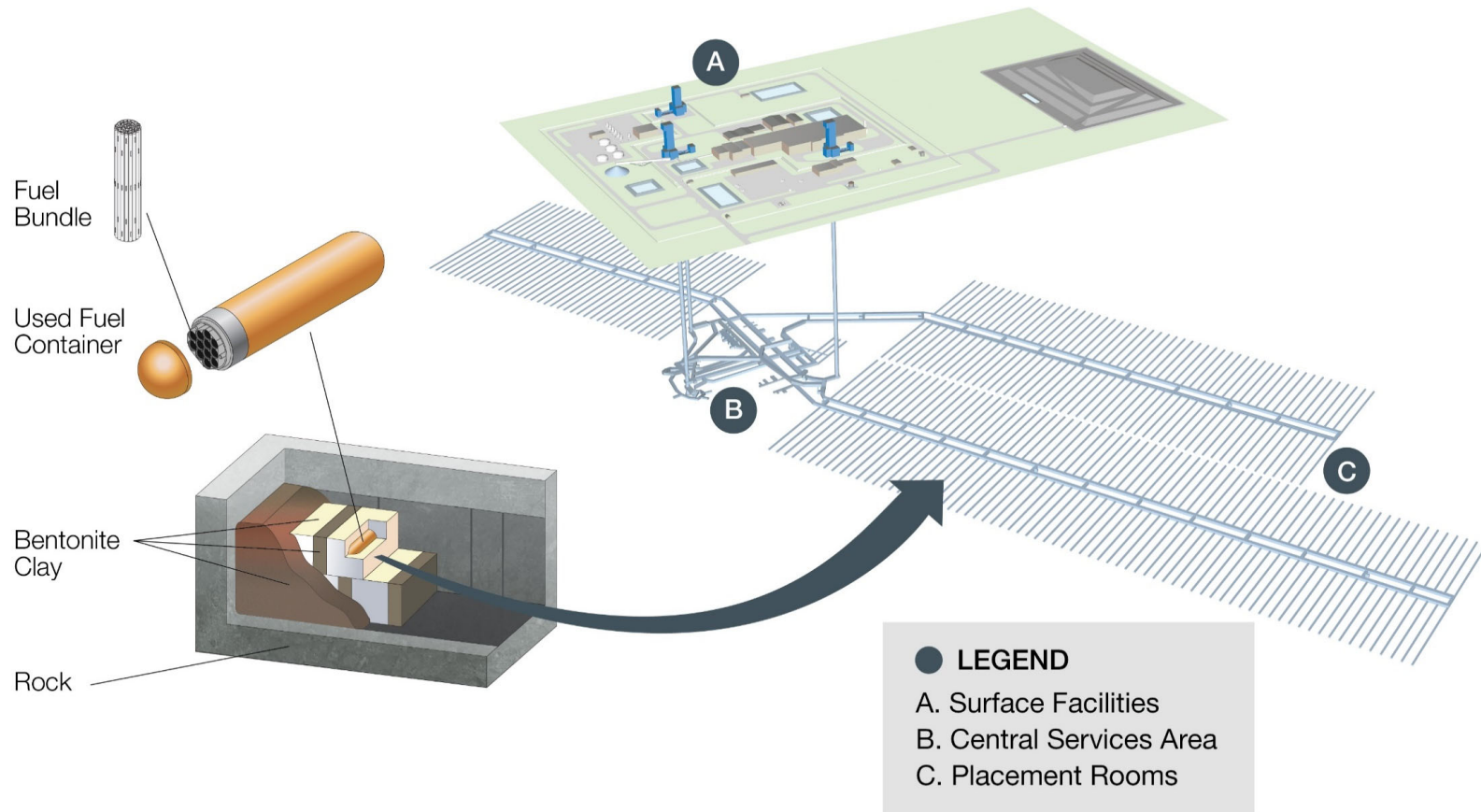
Transportation

Confidence a safe, secure and socially acceptable transportation plan can be developed

Partnership

Confidence a strong partnership can be developed with interested community, First Nation and Métis communities in the area, and surrounding communities

Deep Geological Repository: Ensuring Safety



Used CANDU Fuel

Used fuel bundle

- Uranium oxide fuel pellets
- Zircaloy alloy metal sheath

Durable solid materials

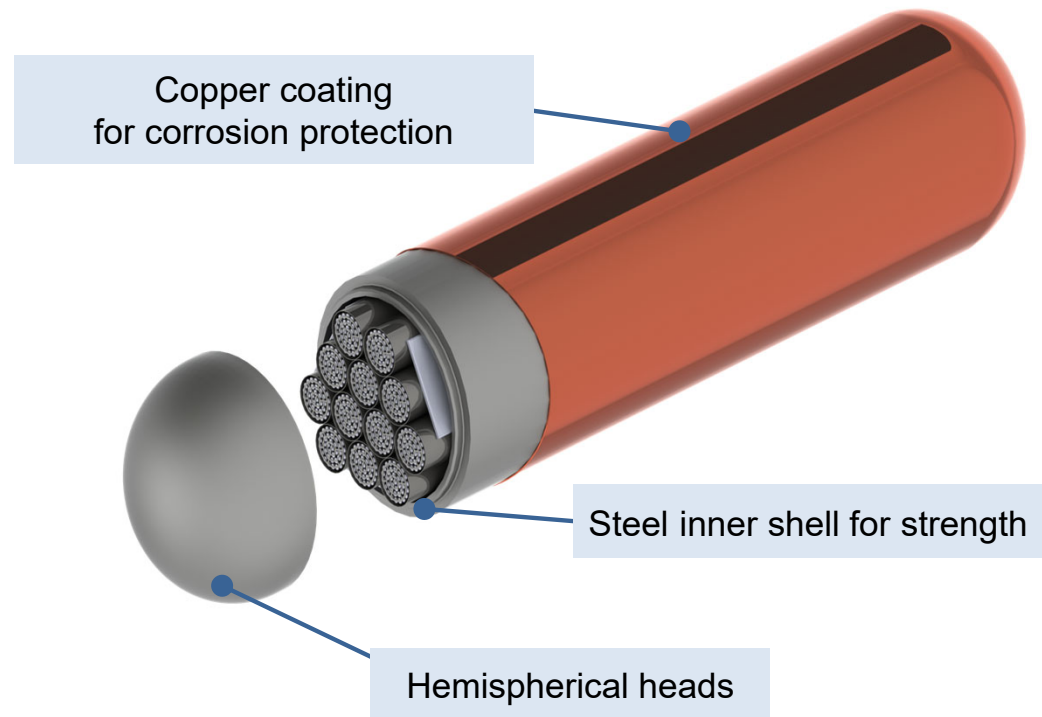
Producing some heat, but does not need water cooling at repository

Initially highly radioactive, decreasing naturally with time

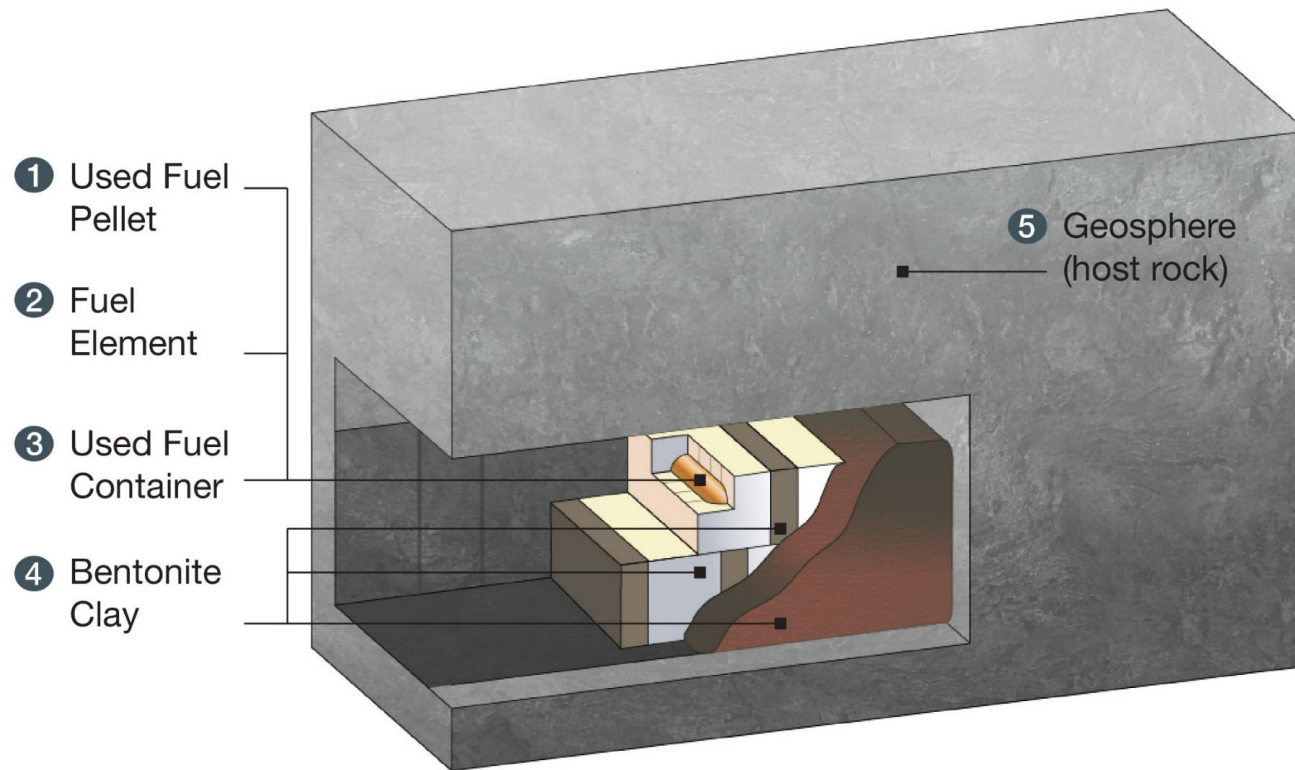


Used Fuel Container

- Designed for present underground loads and future glacial loads

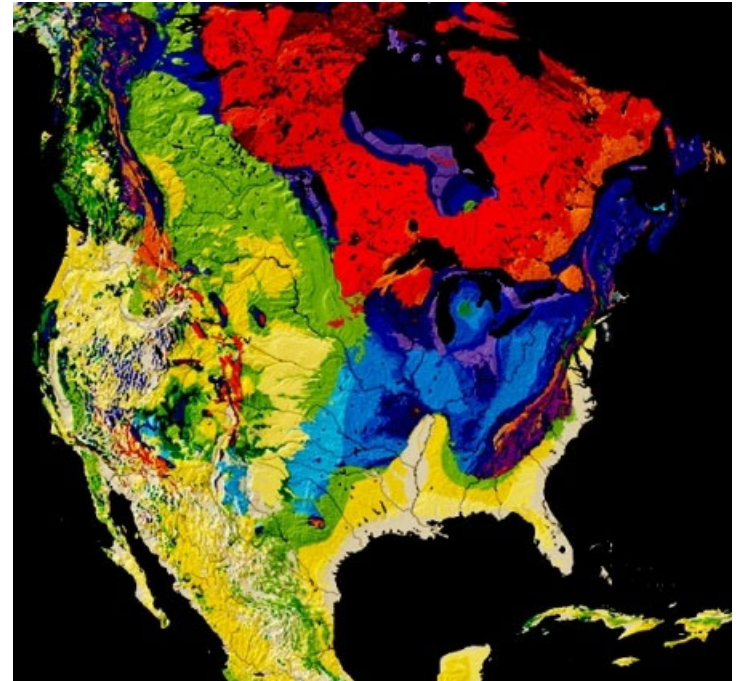


Engineered Barrier System



Key host rock characteristics

- Sufficient volume of competent rock at depth
- Low groundwater movement at repository depth
- Resilience to earthquakes
- Resilience to ice ages
- Resilience to land movement (erosion etc.)
- Favourable chemical composition of rock and water at repository depth

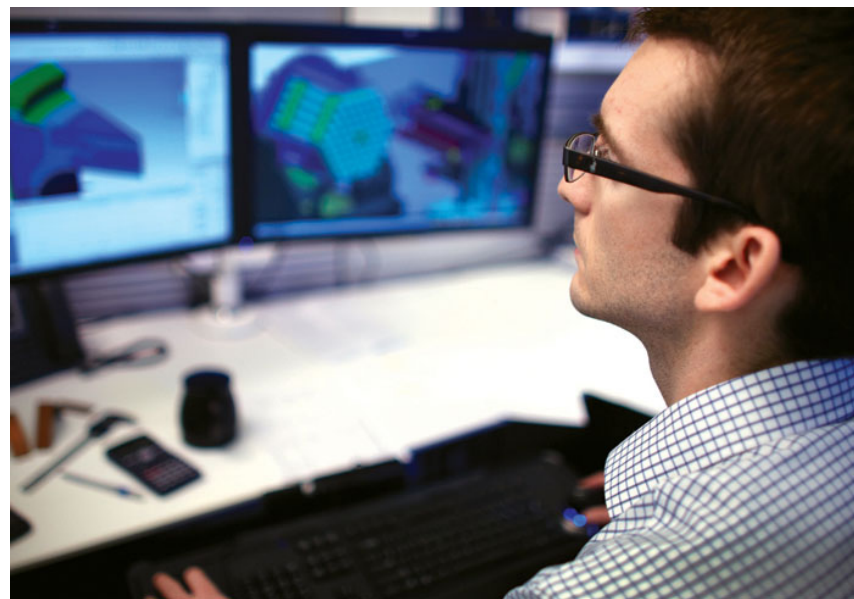


Age of bedrock, from youngest to oldest, is indicated by color: yellow, green, blue, red. Image: U.S. Geological Survey

Monitoring

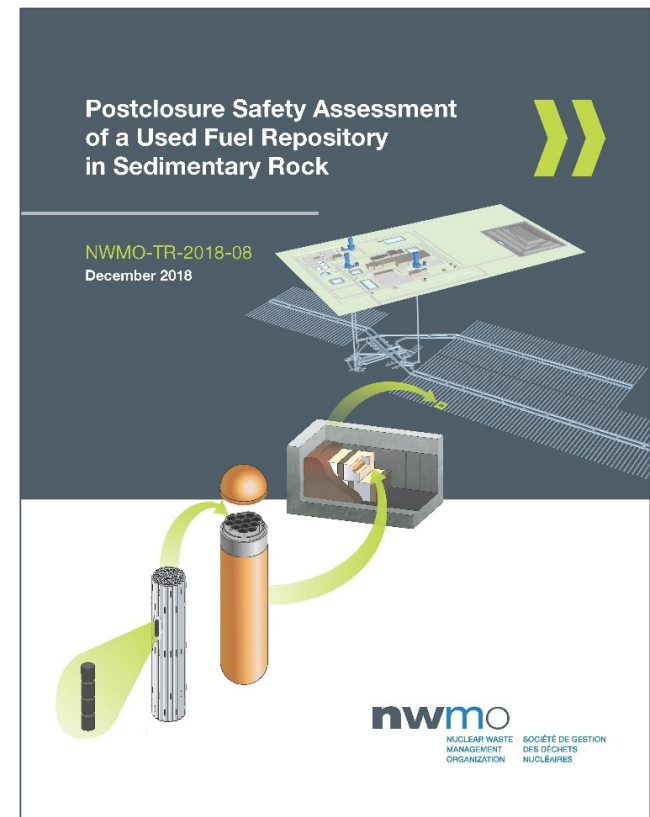
After the repository has been filled with used fuel:

- Extended monitoring period with underground accessible
- Repository sealed; site placed under institutional control
- Monitoring as long as desired, but safety is passive



Long-term Safety Summary

- Durable wasteform
- Robust design and engineered barriers
- Repository depth
- Favourable host rock and site
- Monitoring



Highlights

- ✓ National infrastructure project
- ✓ A deep geological repository provides long-term safety and protection of people and the environment, including bodies of water
- ✓ Funding for the project in place
- ✓ Continuous engagement of people to identify a safe and socially acceptable repository site
- ✓ Advancing discussions on partnership





Questions?

   @nwmocanada

 /company/nwmocanada

		August Actual	Month Budget	YTD - ACTUAL	YTD - Budget	Annual Budget	Variance	Percent of Budget Used
Municipality Revenue								
4050	Municipality Revenue	-798,369.84	-798,369.83	-6,441,192.91	-6,441,192.91	-9,805,197.00	0.00	66%
	Sarnia	-491,623.80	-491,623.80	-3,932,990.40	-3,932,990.40	-5,899,486.00	0.00	67%
	St. Clair Township	-208,848.33	-208,848.33	-1,670,786.56	-1,670,786.56	-2,506,180.00	0.00	67%
	Plympton-Wyoming	-39,458.50	-39,458.50	-315,567.92	-315,567.92	-473,261.00	0.00	67%
	Lambton Shores	-15,567.82	-15,567.82	-124,542.56	-124,542.56	-186,814.00	0.00	67%
	Warwick	-23,072.31	-23,072.31	-184,578.48	-184,578.48	-276,867.00	0.00	67%
	Point Edward	-19,799.08	-19,799.07	-158,392.59	-158,392.59	-237,589.00	0.00	67%
	Bluewater Power Distribution Corp.			0.00	0.00		0.00	
4120	Brooke-Alvinston Revenue		0.00	-82,210.02	0.00	-225,000.00	-82,210.02	37%
	Total Municipalities Revenue	-798,369.84	-798,369.83	-6,469,068.53	-6,386,858.51	-9,805,197.00	-82,210.02	66%
Other Revenue								
4130	Emergency Water Taking		0.00	0.00	0.00	0.00	0.00	0%
4150	LAWSS Other Revenue		0.00	0.00	0.00	0.00	0.00	0%
	Canada Coast Guard		0.00	-7,000.00	0.00	-7,000.00	-7,000.00	100%
	County of Lambton		0.00	-8,400.00	0.00	-7,000.00	-8,400.00	120%
	Bluewater Power- Reimbursement Progra,		1.00	-6,200.76	0.00	-6,200.76	-6,200.76	
4430	Misc. Revenue (HST Rebate)		0.00	0.00	0.00	-100,000.00	0.00	0%
4430	Misc. Revenue from OCWA		0.00	0.00	0.00	0.00	0.00	0%
4430	Misc. Revenue from St. Clair		0.00	0.00	0.00	0.00	0.00	0%
4430	Misc. Revenue from OPA		0.00	0.00	0.00	0.00	0.00	
	Total Other Revenue	0.00	1.00	-21,600.76	0.00	-120,200.76	-21,600.76	18%
Investment Interest								
4420	Interest Earned	-20,775.69	-15,000.00	-140,946.50	0.00	-72,000.00	-140,946.50	196%
Project Expenses								
5100	Total Revenue	-819,145.53	-813,368.83	-6,631,615.79	-6,386,858.51	-9,997,397.76	-244,757.28	66%
	Project Expenses	91,180.55	0.00	856,964.25	1,200,131.21	9,477,383.00	-53,545.02	9%
	19-01 Eng Studies - WTP HVAC Dehumidification		0.00	26,859.55	0.00	20,000.00	6,859.55	134%
	19-02 Eng Studies- WTP SCADA Mitigation (Filtration Controls)		0.00	0.00	0.00	5,000.00	-5,000.00	0%
	19-03 Eng Studies- WLPS Tank Re-Coating		0.00	0.00	0.00	30,000.00	-30,000.00	0%
	19-04 HVAC Admin Replacement Project	57,235.95	0.00	237,009.13	0.00	250,000.00	-12,990.87	95%
	19-05 WTP PLC Conversion /upgrade construction		0.00	0.00	0.00	150,000.00	-150,000.00	0%
	19-06 WTP Exterior Transformers		0.00	0.00	0.00	500,000.00	-500,000.00	0%
	19-07 Transmission Watermain Leak Detection- Phase 1		0.00	0.00	0.00	230,000.00	-230,000.00	0%
	19-08 Flow Restruction/Chamber Removal Project(x6)		0.00	0.00	0.00	175,000.00	-175,000.00	0%
	Tasks carried over from 2018	33,944.60	0.00	593,095.57	644,672.88	5,157,383.00	-53,545.02	11%
	14-03 Polymer Systeme Replacement		0.00	1,967.71	0.00	0.00	1,967.71	
	14-09 Main Plant HVAC		0.00	0.00	73,422.88	587,383.00	-73,422.88	0%
	17-05 Engineering Design for Emergency Generators		0.00	20,606.40	31,250.00	250,000.00	-10,643.60	8%
	18-01 Rebuild 32" Ross Valve at WLBS		0.00	0.00	8,750.00	70,000.00	-8,750.00	0%
	18-02 New Generators Replacement (Including Air Louvers		0.00	276,560.89	500,000.00	4,000,000.00	-223,439.11	7%
	18-03 SCADA Radio Replacement Work (Installation)	19,062.70	0.00	246,326.87	18,750.00	150,000.00	227,576.87	164%
	18-04 Engineering Studies	14,881.90	0.00	47,633.70	12,500.00	100,000.00	35,133.70	48%
					0.00			
5150	Distribution Repairs	2,977.49	3,000.00	33,188.55	25,000.00	200,000.00	8,188.55	17%
5175	Facility Maintenance	5,950.42	6,000.00	5,950.42	3,750.00	30,000.00	2,200.42	

5125

	August Actual	Month Budget	YTD - ACTUAL	YTD - Budget	Annual Budget	Variance	Percent of Budget Used
Major Maintenance	0.00	0.00	71,324.47	15,458.33	240,000.00	55,866.14	30%
MM19-01 WTP HMI Computer Replacement		0.00	0.00	833.33	10,000.00	-833.33	0%
MM19-02 WTP Crack Injection Leak Sealing		0.00	0.00	3,583.33	43,000.00	-3,583.33	0%
MM19-03 WTP Emergency Lights Sealing		0.00	0.00	125.00	1,500.00	-125.00	0%
MM19-04 WTP Sluice gate Inspection and Maintenance		0.00	35,942.44	1,250.00	15,000.00	34,692.44	240%
MM19-05 WTP EQ Tank Cleanout Inspection		0.00	0.00	833.33	10,000.00	-833.33	0%
MM19-06 WTP Eye Wash Station Upgrade		0.00	11,031.63	1,666.67	20,000.00	9,364.96	55%
MM19-07 WLPS Electrical Inspection- 3rd Party Contractor		0.00	0.00	833.33	10,000.00	-833.33	0%
MM19-08 WLPS Motor HLP-2 (VFD Compliant)		0.00	0.00	2,083.33	25,000.00	-2,083.33	0%
MM19-09 WLPS Louvre Actuator Standby Generator Room		0.00	0.00	2,083.33	25,000.00	-2,083.33	0%
MM19-10 ELPS Pump #1 (Watford) Refurbishment		0.00	0.00	833.33	10,000.00	-833.33	0%
MM19-11 ELPS Electrical Inspection- 3rd Party Contractor		0.00	4,149.77	416.67	5,000.00	3,733.10	83%
MM19-12 Vibration Monitoring Program		0.00	0.00	83.33	1,000.00	-83.33	0%
MM19-13 Valve 16" at Camalchie Rd and London Line		0.00	0.00	833.33	10,000.00	-833.33	0%
MM19-14 Hydrant installation London Line (blow off)		0.00	0.00	1,250.00	15,000.00	-1,250.00	0%
MM19-15 Chamber (flow) abandonment		0.00	8,276.93	1,250.00	15,000.00	7,026.93	55%
MM19-16 Waterline Makers Rural		0.00	3,347.37	250.00	3,000.00	3,097.37	112%
MM19-17 Air Relief valves		0.00	1,110.20	125.00	1,500.00	985.20	74%
MM19-18 Concrete Pipe end closures and 20" lengths		0.00	0.00	833.33	10,000.00	-833.33	0%
MM19-19 Repair Clamps & Appurtenances		0.00	7,466.13	833.33	10,000.00	6,632.80	75%
OCWA Operating & Maintenance	368,284.00	368,284.00	2,946,272.00	368,261.92	4,419,143.00	2,578,010.08	67%
Flow Reconciliations		0.00	0.00	12,500.00	150,000.00	-12,500.00	0%
LAWSS Wages & Benefits	32,736.48	32,736.48	103,573.41	20,833.33	250,000.00	82,740.08	41%
WSIB		0.00	578.99	125.00	1,500.00	453.99	39%
Audit Fees		0.00	14,265.23	1,166.67	14,000.00	13,098.56	102%
Consulting		1.00	1,989.12	208.33	2,500.00		
Accounting & Legal	709.78	1,419.50	11,871.80	1,666.67	20,000.00	10,205.13	59%
Advertising & Promotions		0.00	1,060.53	16.67	200.00	1,043.86	0%
Membership Fees		0.00	407.04	166.67	2,000.00	240.37	20%
Education / Conference		1,550.00	3,842.41	333.33	4,000.00	3,509.08	96%
Courier & Postage		0.00	112.25	41.67	500.00	70.58	22%
Income Taxes		0.00	0.00	0.00	0.00	0.00	0%
Property Taxes	83,990.23	9,000.00	171,957.68	14,583.33	175,000.00	157,374.35	98%
Property Administration	185.35	300.00	1,027.61	1,250.00	15,000.00	-222.39	7%
Insurance		0.00	21,772.80	1,750.00	21,000.00	20,022.80	104%
Interest & Bank Charges		0.00	0.00	8.33	100.00	-8.33	0%
Office Supplies	57.31	0.00	4,361.31	250.00	3,000.00	4,111.31	145%
Computer Software	142.45	13,000.00	18,478.58	1,333.33	16,000.00	17,145.25	115%
Internet	85.43	85.00	598.01	125.00	1,500.00	473.01	40%
GIS and Internet Services		0.00	0.00	183.33	2,200.00	-183.33	0%
Travel (Includes Mileage)	85.10	18.50	772.02	125.00	1,500.00	647.02	51%
Vehicle Expenses		0.00	0.00	1,041.67	12,500.00	-1,041.67	0%
Telephone	168.48	140.00	1,092.07	125.00	1,500.00	967.07	73%
Mobile Phone	112.18	375.00	1,818.24	125.00	1,500.00	1,693.24	121%
Meals & Entertainment		76.00	1,373.49	208.33	2,500.00	1,165.16	55%
Miscellaneous Expense		270.00	1,250.00	166.67	2,000.00	1,083.33	63%
St.Clair Conservation Consult		0.00	0.00	2,500.00	30,000.00		
Total Expenses	586,665.25	430,255.48	4,275,902.28	2,314,357.67	20,223,909.00	2,880,098.55	21%

Lambton Area Water Supply System
Cash Balance Sheet as at August 31,2019

LAWSS Bank Account on August 1, 2019	<u>9,755,220.66</u>
LAWSS Accounts Receivable - Received	<u>842,623.35</u>
	<u>10,597,844.01</u>
LAWSS Accounts Payable - Paid	348,966.21
LAWSS Accounts Payable - Outstanding	<u>47,735.33</u>
	<u>396,701.54</u>
LAWSS Bank Account on August 31, 2019	<u>10,248,877.80</u>
Adjusted Bank Balance on August 31,2019	<u>10,201,142.47</u>
Cash in Reserve	<u>1,994,873.22</u>

Capital Project	Budget Approved	Board Approved	Total	Consultant/Contractor	PO/Contract Fee	Spent	Unspent	Status
19-01 Eng Studies - WTP HVAC Dehumidification	\$ 20,000.00		\$ 20,000.00			\$26,859.55	-\$6,859.55	In Progress
19-02 Eng Studies- WTP SCADA Mitigation (Filtration Controls)	\$ 5,000.00		\$ 5,000.00			\$0.00	\$5,000.00	Planning
19-03 Eng Studies- WLPS Tank Re-Coating	\$ 30,000.00		\$ 30,000.00			\$0.00	\$30,000.00	Planning
19-04 HVAC Admin Replacement Project	\$ 250,000.00		\$ 250,000.00			\$237,009.13	\$12,990.87	In Progress
19-05 WTP PLC Conversion /upgrade construction	\$ 150,000.00		\$ 150,000.00			\$0.00	\$150,000.00	Planning
19-06 WTP Exterior Transformers	\$ 500,000.00		\$ 500,000.00			\$0.00	\$500,000.00	Planning
19-07 Transmission Watermain Leak Detection- Phase 1	\$ 230,000.00		\$ 230,000.00			\$0.00	\$230,000.00	Planning
19-08 Flow Restruction/Chamber Removal Project(x6)	\$ 175,000.00		\$ 175,000.00			\$0.00	\$175,000.00	Planning
			\$ -					
Projects Carry forward								
14-03 Polymer System Replacement						\$ 1,967.71		Complete
14-09 Main Plant HVAC	\$587,383.00		\$ 587,383.00	Efficiency Engineering, Landon Mechanical, Building Innovations	PO00236	\$609,092.92	-\$21,709.92	In Progress
17-05 Engineering Design for Emergency Generators	\$250,000.00	\$115,000.00	\$ 365,000.00	EXP Services Inc.,	PO0228	\$62,569.91	\$302,430.09	In Progress
18-01 Rebuild 32" Ross Valve at WLBS	\$ 70,000.00		\$ 70,000.00			\$0.00	\$70,000.00	RFP Development
18-02 New Generators Replacement (Including Air Louvers)	\$ 4,000,000.00	\$ 1,500,000.00	\$ 5,500,000.00			\$ 553,121.78	\$4,946,878.22	RFP Development
18-03 SCADA Radio Replacement Work (Installation)	\$ 150,000.00	\$ 362,156.60	\$ 512,156.60	Experteers	PO00237, PO0233	\$298,718.98	\$213,437.62	In Progress
18-04 Engineering Studies	\$ 100,000.00	\$ 22,525.42	\$ 122,525.42	WSP,AECOM, Megacomm	PO00238	\$122,187.84	\$337.58	In Progress
Major Maintenance								
MM19-01 WTP HMI Computer Replacement	\$ 10,000.00		\$ 10,000.00	OCWA			\$10,000.00	In Progress
MM19-02 WTP Crack Injection Leak Sealing	\$ 43,000.00		\$ 43,000.00	OCWA			\$43,000.00	In Progress
MM19-03 WTP Emergency Lights Sealing	\$ 1,500.00		\$ 1,500.00	OCWA			\$1,500.00	In Progress
MM19-04 WTP Sluice gate Inspection and Maintenance	\$ 15,000.00		\$ 15,000.00	OCWA		\$ 35,942.44	-\$20,942.44	In Progress
MM19-05 WTP EQ Tank Cleanout Inspection	\$ 10,000.00		\$ 10,000.00	OCWA			\$10,000.00	In Progress
MM19-06 WTP Eye Wash Station Upgrade	\$ 20,000.00		\$ 20,000.00	OCWA		\$11,031.63	\$8,968.37	In Progress
MM19-07 WLPS Electrical Inspection- 3rd Party Contractor	\$ 10,000.00		\$ 10,000.00	OCWA			\$10,000.00	In Progress
MM19-08 WLPS Motor HLP-2 (VFD Compliant)	\$ 25,000.00		\$ 25,000.00	OCWA			\$25,000.00	In Progress
MM19-09 WLPS Louvre Actuator Standby Generator Room	\$ 25,000.00		\$ 25,000.00	OCWA,			\$25,000.00	In Progress
MM19-10 ELPS Pump #1 (Watford) Refurbishment	\$ 10,000.00		\$ 10,000.00	OCWA			\$10,000.00	In Progress
MM19-11 ELPS Electrical Inspection- 3rd Party Contractor	\$ 5,000.00		\$ 5,000.00	OCWA		\$4,149.77	\$850.23	In Progress
MM19-12 Vibration Monitoring Program	\$ 1,000.00		\$ 1,000.00	OCWA			\$1,000.00	In Progress
MM19-13 Valve 16" at Camalchie Rd and London Line	\$ 10,000.00		\$ 10,000.00	OCWA			\$10,000.00	In Progress
MM19-14 Hydrant installation London Line (blow off)	\$ 15,000.00		\$ 15,000.00	OCWA			\$15,000.00	In Progress
MM19-15 Chamber (flow) abandonment	\$ 15,000.00		\$ 15,000.00	OCWA		\$8,276.93	\$6,723.07	In Progress
MM19-16 Waterline Makers Rural	\$ 3,000.00		\$ 3,000.00	OCWA		\$3,347.37	-\$347.37	Complete
MM19-17 Air Relief valves	\$ 1,500.00		\$ 1,500.00	OCWA		\$1,110.20	\$389.80	Complete
MM19-18 Concrete Pipe end closures and 20" lengths	\$ 10,000.00		\$ 10,000.00	OCWA			\$10,000.00	In Progress
MM19-19 Repair Clamps & Appurtenances	\$ 10,000.00		\$ 10,000.00	OCWA		\$7,466.13	\$2,533.87	In Progress



Ontario Clean Water Agency
Agence Ontarienne Des Eaux

2019 Client Monthly Operations Report

Lambton Area Water Supply System

September 30, 2019

Facility Description

Facility Name:	Lambton Area Water Supply System
Facility Type:	Municipal
Classification:	Class 4 Water Treatment Class 4 Water Distribution
Title Holder:	Municipality
Operation Status:	OCWA
Sr. Operations Manager:	Dave Hunt (519) 344-7429 Ext. 251
Business Development Manager:	Susan Budden
Capacity (m3/d):	181844
Service Area:	City of Sarnia, Village of Point Edward, Township of St. Clair, Township of Warwick-Watford, Municipality of Lambton Shores, Town of Plympton-Wyoming
Service Population:	104,162
In service Date:	1975

Operational Description

The Lambton WTP is a direct filtration surface water facility consisting of chemically assisted filtration with disinfection. The facility consists of an intake system (and alternate intake), a low lift pump station, a treatment system and distribution pumping system situated in the City of Sarnia. Water is drawn into the plant (a zebra mussel system is available as needed) and screened at the surge wells (pre-disinfection is utilized). Water flows to the pump wells where a total of 4 vertical turbine pumps are located and used as needed which pump to a discharge header. Coagulant is added, flashed mixed (PAC is also applied at this location when needed) the raw water is then flocculated (Polymer is added at the flocculation trains as needed) and diverted to filtration (10 dual media filters). The gravity fed filter effluents combine into two clear wells where sodium hypochlorite is injected. To maximize the contact time the water is diverted to the two baffled reservoirs (in series). Six vertical turbine pumps are available for supplying the distribution demand as needed. The entire water treatment system is continuously monitored (via SCADA) with continuous on-line analyzers equipped throughout the processes. The utility serves a large part of Lambton County and has over 250 kilometers of pipeline of various sizes and materials. There is also the East Lambton Booster Station with 9,000 cubic meters of storage capacity which is remotely monitored and controlled from the Lambton WTP via SCADA. During the 1997 calendar year the West Lambton Pumping Station, with the largest above ground water storage in the province with a capacity of 90,000m³, was brought on-line. This pumping station is also remotely monitored and controlled from Lambton WTP via SCADA. The LAWSS distribution system has 5 towers/elevated tanks that the utility monitors via SCADA. In 2007 the Residual Management System (RMS) which treats backwash effluent was brought on-line.

Treatment Process

Pre-treatment Chemicals:	Prechlorination (sodium hypochlorite); Zebra mussel control
Coagulation/Flocculation:	Aluminum Sulphate (Clar+Ion A7)
Filtration:	Dual Media; Filter Aid polymer
Disinfection Method:	Sodium hypochlorite
Post Treatment Chemical Addition:	Fluoride
Waste Residue Management:	Filter backwash effluent is treated by an Actiflo system.
Waste effluent/residue Disposal:	Sludge is hauled to Sarnia WPCP on a needed basis.

Inspections: Sept 18: Annual ESA inspection at the water treatment plant and East Lambton Pumping Station.

Maintenance, Operations & Distribution Works Summary 2019

Maintenance

September:

Date	(P)reventative Capital Major Mtc (C)orrective	Description
Sept 3	P	Annual inspection of PLC panel #1 in the RMS is complete.
Sept 3	P	Annual inspection of the PLC panel in the PLC Control Room is complete.
Sept 3	C	Cleared reset warning log on chlorine analyzer for Station 5.
Sept 3	P	Completed monthly inspection of water treatment plant compressor.
Sept 3	P	Completed annual inspection of air dryer at the water treatment plant.
Sept 3	P	Annual test of UPS at West Lambton Pumping Station is complete.
Sept 4	C	Polair in to look at HVAC system at West Lambton Pumping Station.
Sept 4	P	Completed monthly maintenance on East Lambton Pumping Station chlorine analyzers.
Sept 4	P	Completed annual calibration of East Lambton pressure transmitters.
Sept 4	P	Completed monthly inspection of eyewash and emergency showers at the water treatment plant.
Sept 4	P	Tested generator at East Lambton Pumping Station.
Sept 5	P	Tested closing and opening operation of all valves in the

		Valve House at West Lambton Pumping Station.
Sept 5	P	Completed annual inspection of Butterfly valve 21 on the high lift discharge header.
Sept 5	C	Ainsworth in to inspect generator batteries at the water treatment plant.
Sept 5	P	Conducted annual inspection of SCADA control panel at Indian Rd Tower.
Sept 5	P	Conducted annual calibration of Indian Rd Tower pressure transmitter.
Sept 5	P	Completed monthly maintenance of West Lambton Pumping Station chlorine analyzers.
Sept 5	P	Completed annual inspection of the hot water cleanout system in the polymer room of the water treatment plant.
Sept 6	P	Completed annual inspection of meter chamber control panels.
Sept 9	P	Completed annual inspection of Port Lambton SCADA panel.
Sept 9	P	Completed monthly maintenance on all water treatment plant chlorine analyzers.
Sept 9	P	Completed monthly inspection of the vacuum priming system at East Lambton Pumping Station.
Sept 9	P	Completed annual inspection of diaphragm valve #518 at East Lambton Pumping Station.
Sept 9	P	Completed annual inspection of Forest and Watford surge tanks at East Lambton Pumping Station.
Sept 9	P	Completed annual inspection of compressor at East Lambton Pumping Station.
Sept 10	P	Conducted monthly maintenance on the lab turbidity meter.
Sept 10	P	Completed monthly maintenance on all water treatment plant online turbidity meters.
Sept 10-11	C	Repaired East and West flocculator exhaust fan motor.
Sept 10	C	UPS battery at West Lambton Pumping Station replaced.
Sept 11	C	Repaired leak on the South Clearwell Injector.
Sept 11	P	Conducted monthly maintenance on both streaming current meters.
Sept 16	C	Replaced batteries on generator #5.
Sept 16	Capital	In meeting with LAWSS GM in regards to the radio project.
Sept 16-17	P	Completed monthly inspection on all flocculator gear drives.
Sept 17	Major Mtc	ASL Roteq on site to do vibration analysis on all low lift pumps, highlift pumps, flocculators and East and West Lambton Pumping Station pumps.
Sept 17	P	Albert's Generator Service on site do annual inspection of generator at East Lambton Pumping Station.
Sept 17	P	Completed quarterly maintenance on fluoride analyzer.
Sept 17	P	Conducted monthly maintenance on Stations 5 and 7 pH probes.
Sept 18	P	Conducted monthly maintenance on Stations 1 and 2 pH

		probes.
Sept 18	P	Annual ESA inspection at East Lambton Pumping Station and the water treatment plant.
Sept 18	C	Completed site security audit default repairs at East Lambton Pumping Station and Indian Rd Tower.
Sept 18	C	Replaced Station 1 sample pump.
Sept 19	P	Conducted monthly verification of all Hach Pocket Colorimeters.
Sept 19	C	Completed site security audit default repairs at West Lambton Pumping Station and Watford Standpipe.
Sept 20	P	Tested generators at West Lambton Pumping Station.
Sept 23	P	West alum tank cleaned out.
Sept 24	P	Replaced hinges on East Travelling Screens observation hatch door.
Sept 25	P	Conducted monthly maintenance on travelling screens.
Sept 26	C	Repaired HFS transfer pump #1 controls.
Sept 27	C	Replaced belt cover on AHU #4 in the high lift pump area.
Sept 27	P	Conducted annual panel inspection of water treatment plant polymer system.
Sept 30	P	Working with Damar Security on mapping out of security system at the water treatment plant.
Sept 30	C	Repaired faulting sodium bisulphite pump #1.

Operations and Compliance

September:

Sept 1	Pre chlorine pump failed with airlock. Reset pump and panel with no issues.
Sept 1	Surface wash on filter #7 failed to reach limit during backwash. Valve was closed.
Sept 3	DWSP samples taken.
Sept 3	Monthly sample for TSS taken from the Actiflo effluent in the Residual Management System.
Sept 4	Ravenswood interconnect opened and closed same day to let Lambton Shores take water.
Sept 4	Pre chlorine pump failed with airlock. Reset pump and panel with no issues.
Sept 8	Power bump at the water treatment plant. Reset all pumps no issues.
Sept 11	Conducted annual risk assessment for DWQMS.
Sept 11	Power bump at the water treatment plant. Reset all pumps no issues.
Sept 12	Internal audit corrective actions for OFIs completed.
Sept 12-16	Reviewed O & M Manual. Adding in new polymer system.
Sept 12	North Clearwell level transmitter no longer working. Transmitter has been placed out of service.
Sept 14	Pre chlorine pump #3 failed with airlock. Reset pump and panel with no

	issues.
Sept 15	Pre chlorine pump #3 failed with airlock. Reset pump and panel with no issues.
Sept 17	Ravenswood interconnect opened and closed same day to let Lambton Shores take water.
Sept 17	Conducted monthly test of RMS Actiflo effluent for chlorine residuals.
Sept 18	Switched low lift sample pump station.
Sept 18	Switched from alum pump #1 to alum pump #2.
Sept 18	Switch Stations 5 & 6 sample pumps. Station 5 sample pump did not work. Work order created.
Sept 18	Start summer 2019 lead sampling.
Sept 20	Customer complaint from homeowner at 4910 Lakeshore Rd in Plympton Wyoming. Issue appears to be with homeowners PRV and not LAWSS watermain.
Sept 20	Summer 2019 lead sampling is complete
Sept 24	Created new Critical Control Limits for alum and sodium hypochlorite tank levels.
Sept 25-26	Emergency test of SCADA/PLC contingency
Sept 26	Power bump at the West Lambton Pumping Station. No issues.
Sept 27	Staff meeting.
Sept 27	Pre chlorine pump #3 failed with airlock. Reset pump and panel with no issues.
Sept 27	Created new SOPs for operating chemical dosing pump in manual and for running HL#6 in manual. Adjusted Working Alone SOP.
Sept 28	Pre chlorine pump #3 failed with airlock. Reset pump and panel with no issues.
Sept 29	South Clearwell pump faulted. Pump and panel was reset with no issues.

Distribution

September:

Sept 5	Onsite for third party work by Vink near LAWSS 42" main on Venetian Blvd in Point Edward.
Sept 6-12	Flushing in St Clair Township.
Sept 9	Onsite for third party work for the exposure of LAWSS main on Bickford Line.
Sept 10	Onsite for third party work near LAWSS main at LaSalle Line and Highway 40.
Sept 10	Flushing hydrants on Confederation Line.
Sept 10	Investigated possible hydrant leak at 3955 Leeland Drive in St. Clair Township.
Sept 11	Onsite for third party work for the exposure of LAWSS main on Bickford Line.
Sept 11	Emergency locate at 621 French Line. #20193718722
Sept 13	Flushing hydrants in Lambton Shores.
Sept 16	Onsite for third party work for the exposure of LAWSS main on Bickford Line.

Sept 17	Flushing hydrants in City of Sarnia.
Sept 17	Onsite for third party work for crossing of LAWSS main on Queen St.
Sept 23	Onsite for third party work for the exposure of LAWSS main on Bickford Line.
Sept 24	Flushing in Plympton-Wyoming and Lambton Shores.
Sept 25	Onsite for third party work for the exposure of LAWSS main on Bickford Line.
Sept 26	Flushing in Plympton-Wyoming.
Sept 27	Site meet at Indian Rd Overpass with LAWSS GM.

Call Outs 2019

September: Sept 14: Callout for failed bisulphite pump. Pump #1 failed for no reason. Pump was reset and tested.

Sept 14: Call out for afterhours emergency locate #20193729791.

Sept 21: Called out to take emergency bacteriological samples for the City of Sarnia.

One Call Utility Locates

These numbers represent the number of locate notifications that were cleared from LAWSS assets

Number of Locates/Month

YEAR	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
2018	50	64	107	149	189	166	163	146	141	163	111	58
2019	69	62	104	164	189	149	182	153	121			

RMS Sludge Haulage

These numbers represent total monthly amounts of sludge produced by the Residual Management System and hauled to Sarnia WPCP

Amount of sludge produced per month in m³

YEAR	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2018	493	300	239	320	230	318	240	240	79	227	238	234
2019	236	158	237	236	216	158	313	237	160			

Required Monthly Reports

Monthly System Flows- see separate attached summary report

Workplace Management System Reports – see separate attached reports

Performance Data and Compliance – See separate attached report

Required Financial Reports

Quarterly Financial Summary –Q3 due October 30

Semi-Annual “Schedule G” Reconcilable Commodities Report –Due January 30, 2020

Ontario Clean Water Agency
Time Series Info Report

Report extracted 10/03/2019 09:46

From: 01/01/2019 to 30/09/2019

Facility Org Number: 5544
Facility Works Number: 210000906
Facility Name: LAMBTON AREA WATER SUPPLY SYSTEM (LAWSS)
Facility Owner: Local Services Board: LAMBTON AREA WATER SUPPLY SYSTEM
Facility Classification: Class 4 Water Treatment
Receiver:
Service Population: 100000.0
Total Design Capacity: 181844.0 m3/day

	01/2019	02/2019	03/2019	04/2019	05/2019	06/2019	07/2019	08/2019	09/2019	Total	Avg	Max	Min
Coagulation/Floculation / Coagulant Dosage-Calculated - mg/L													
Max IH	38.605	29.517	32.268	31.172	26.559	26.095	23.836	25.822	22.272			38.605	
Mean IH	26.801	24.002	23.839	22.375	22.91	21.551	20.805	20.898	19.819		22.554		
Min IH	21.912	18.131	18.009	17.868	19.041	18.452	18.086	19.041	17.621				17.621
Coagulation/Floculation / Coagulant Used - kg													
Max IH	1792	1408	1651.2	1241.6	1344	2150.4	2060.8	1804.8	1356.8			2150.4	
Mean IH	1220.542	1167.086	1160.671	1009.067	1129.29	1339.307	1594.632	1397.677	1108.139		1237.952		
Min IH	972.8	947.2	832	768	934.4	921.6	1088	1100.8	844.8				768
Total IH	37836.8	32678.4	35980.8	30272	35008	40179.2	49433.6	43328	33244.16	337961			
Coagulation/Floculation / Coagulant Volume Used - m³													
Max IH	1.4	1.1	1.29	0.97	1.05	1.68	1.61	1.41	1.06			1.68	
Mean IH	0.954	0.912	0.907	0.788	0.882	1.046	1.246	1.092	0.866		0.967		
Min IH	0.76	0.74	0.65	0.6	0.73	0.72	0.85	0.86	0.66				0.6
Total IH	29560	25530	28110	23650	27350	31390	38620	33850	25972	264032			
Coagulation/Floculation / Polymer Dosage - mg/L													
Max IH	0.042			0.024								0.042	
Mean IH	0.02			0.024							0.021		
Min IH	0.002			0.024									0.002
Coagulation/Floculation / Polymer Used - kg													
Max IH	2.1			1.1								2.1	
Mean IH	1.025			1.1							1.04		
Min IH	0.1			1.1									0.1
Total IH	4.1			1.1						5.2			
DW THM Data / Trihalomethane: Total - µg/l													
Max Lab		30			37			58				58	
Mean Lab		27			31.667			52.667			37.111		
Min Lab		24			25			46					24
East Lambton Booster Station / CI Residual: Inlet Free - mg/L													
Max OL	1.74	2.49	1.68	1.58	1.43	1.4	1.36	1.29	1.56			2.49	
Mean OL	1.535	1.401	1.428	1.388	1.3	1.277	1.22	1.124	1.344		1.335		
Min OL	0	0	0	0	0	0	0	0	0				0
Filter Backwash / Backwash Volume - m³													
Max IH	4792	2408	2992	3006	3004	3004	2998	3002	2418			4792	
Mean IH	2268.323	1929.786	2028.194	1927.733	1900.774	2043	2095.032	2056.903	1966.067		2025.509		
Min IH	1794	1788	1794	1198	1204	1792	1788	1059	1796				1059

HFS / Fluoride Dosage - mg/L															
Max IH	0.64	0.644	0.614	0.622	0.592	0.628	0.612	0.589	0.573			0.644			
Mean IH	0.556	0.557	0.559	0.557	0.542	0.548	0.535	0.537	0.531		0.547				
Min IH	0.46	0.417	0.482	0.487	0.486	0.464	0.486	0.49	0.474					0.417	
HFS / Fluoride Used - l															
Max IH	108.877	97.419	97.419	94.553	100.284	186.246	171.916	143.263	117.475			186.246			
Mean IH	85.495	87.63	89.655	83.952	90.041	115.949	139.658	123.298	101.43		102.074				
Min IH	65.901	66.384	71.631	71.631	74.497	88.823	111.745	103.149	85.957					65.901	
Total IH	2650.36	2453.634	2779.305	2518.562	2791.284	3478.466	4329.406	3822.244	3042.903	27866.17					
HFS / HFS (kg) - kg															
Max IH	132.83	118.851	118.851	115.355	122.347	227.22	209.737	174.781	143.32			227.22			
Mean IH	104.304	106.908	109.379	102.422	109.851	141.458	170.383	150.424	123.745		124.53				
Min IH	80.399	80.989	87.39	87.39	90.886	108.364	136.329	125.842	104.868					80.399	
Total IH	3233.439	2993.434	3390.752	3072.646	3405.367	4243.728	5281.875	4663.138	3712.342	33996.72					
HFS / Treated Water Fluoride Residual - mg/L															
Max OL	0.71	0.7	0.7	2	0.84	0.82	0.79	0.7	0.68			2			
Mean OL	0.631	0.601	0.578	0.597	0.611	0.575	0.63	0.611	0.576		0.601				
Min OL	0.56	0.54	0.51	0	0.51	0.24	0.49	0.55	0.42					0	
Post Disinfection / Chlorine Dosage - mg/L															
Max IH	1.668	1.854	1.682	1.832	1.795	3.071	2.185	2.463	2.654			3.071			
Mean IH	1.434	1.391	1.458	1.468	1.535	1.696	1.952	2.087	2.142		1.687				
Min IH	1.215	0.891	1.048	1.271	1.05	1.097	1.594	1.842	1.522					0.891	
Post Disinfection / Hypochlorite Dosage - mg/L															
Max IH	13.899	15.45	14.016	15.268	14.96	25.593	18.208	20.526	22.113			25.593			
Mean IH	11.947	11.588	12.152	12.232	12.79	14.136	16.268	17.39	17.847		14.058				
Min IH	10.126	7.428	8.737	10.593	8.747	9.142	13.282	15.347	12.686					7.428	
Post Disinfection / Hypochlorite Used - kg															
Max IH	653.3	665.05	681.5	706.175	808.4	1975.175	1590.95	1434.675	1257.25			1975.175			
Mean IH	543.456	564	590.191	552.994	632.264	885.167	1241.672	1162.454	997.614		799.034				
Min IH	444.15	326.65	454.725	407.725	431.225	460.6	956.45	930.6	689.725					326.65	
Total IH	16847.15	15792	18295.93	16589.83	19600.18	26555	38491.83	36036.08	29928.43	218136.4					
Post Disinfection / Hypochlorite Volume-Total - m³															
Max IH	0.556	0.566	0.58	0.601	0.688	1.681	1.354	1.221	1.07			1.681			
Mean IH	0.463	0.48	0.502	0.471	0.538	0.753	1.057	0.989	0.849		0.68				
Min IH	0.378	0.278	0.387	0.347	0.367	0.392	0.814	0.792	0.587					0.278	
Total IH	14338	13440	15571	14119	16681	22600	32759	30669	25471	185648					
Post Disinfection / Station 7 Cl Residual: Free - mg/L															
Max OL	1.89	1.85	1.92	1.78	1.71	1.75	5	1.76	1.91			5			
Mean OL	1.699	1.712	1.716	1.608	1.521	1.504	1.533	1.562	1.716		1.619				
Min OL	1.52	1.54	1.53	1.4	1.29	0	1.26	1.33	1.44					0	
PrTr / P.A.C. Dosage - mg/L															
Max IH						0.464	0.367	0.54	0.624			0.624			
Mean IH						0.338	0.291	0.409	0.525		0.396				
Min IH						0.176	0.218	0.274	0.431					0.176	
PrTr / P.A.C. Used - kg															
Max IH						28.9	25.634	29.462	29.452			29.462			
Mean IH						22.199	21.929	26.752	29.152		25.331				
Min IH						12.27	16.36	22.089	26.179					12.27	
Total IH						377.381	679.812	829.31	874.545	2761.048					
Pre-chlorination / Chlorine Dosage - mg/L															
Max IH	1.248	1.52	1.193	1.467								1.52			

Mean IH	1.173	1.106	1.07	1.111									1.115			
Min IH	1.061	0.931	0.91	0.972											0.91	
Pre-chlorination / Cl Residual: Free - mg/L																
Max IH	0.74	0.74	0.68	0.7										0.74		
Mean IH	0.632	0.657	0.623	0.623								0.634				
Min IH	0.55	0.59	0.5	0.56											0.5	
Pre-chlorination / Cl Residual: Total - mg/L																
Max IH	0.91	0.89	0.83	0.84										0.91		
Mean IH	0.783	0.824	0.774	0.783								0.79				
Min IH	0.69	0.78	0.66	0.72											0.66	
Pre-chlorination / Hypochlorite Dosage - mg/L																
Max IH	10.399	12.665	9.939	12.221										12.665		
Mean IH	9.773	9.216	8.92	9.258								9.294				
Min IH	8.838	7.76	7.581	8.098											7.581	
Pre-chlorination / Hypochlorite Used - kg																
Max IH	524.05	556.95	511.125	560.475										560.475		
Mean IH	443.657	447.717	433.461	417.692								435.629				
Min IH	383.05	394.8	340.75	338.4											338.4	
Total IH	13753.38	12536.08	13437.3	12113.08							51839.83					
Pre-chlorination / Hypochlorite Volume-Total-1 - m³																
Max IH	0.446	0.474	0.435	0.477										0.477		
Mean IH	0.378	0.381	0.369	0.355								0.371				
Min IH	0.326	0.336	0.29	0.288											0.288	
Total IH	11705	10669	11436	10309							44119					
Raw Water / Background - cfu/100mL																
Max Lab	160	82	82	410	260	720	2800	2800	8600					8600		
Mean Lab	69.2	33.25	21.5	105.8	69.25	346.25	751.2	1137.5	4243.333			626.105				
Min Lab	18	0	1	13	0	0	0	0	1930						0	
Raw Water / Conductivity - µS/cm																
Max IH	228.5	223.2	231.5	232.3	243.7	238.2	238.8	236.2	235.2					243.7		
Mean IH	221.019	219.725	222.174	225.038	233.042	232.617	236.165	235.252	231.17			228.55				
Min IH	217.8	218	217.9	170	222.6	228.5	232.2	234.1	223.8						170	
Raw Water / E. Coli: EC - cfu/100mL																
Max Lab	1	0	0	1	0	0	10	< 10	< 10				< 10			
Mean Lab	0.4	0	0	0.2	0	0	3.8	< 3.25	< 3.667			< 1.211				
Min Lab	0	0	0	0	0	0	0	< 0	0						< 0	
Raw Water / Raw Flow Daily - m³/d																
Max IH	52987	56479	56245	51694	56670	100783	98594	80666	61463					100783		
Mean IH	45445.45	48755.75	48621.65	45139.4	49348.52	62028.87	76680.9	66893.58	55870.33			55505.54				
Min IH	40082	40763	41664	36877	42212	47569	60157	54511	47226						36877	
Raw Water / Raw Flow Rate - l/s																
Max IH	613.27	653.69	650.98	598.31	654.75	1166.47	1141.13	933.63	926.67					1166.47		
Mean IH	526.72	565.27	562.75	522.45	571.13	717.93	887.51	774.13	653.31			643.32				
Min IH	463.91	471.79	482.22	426.82	488.56	550.57	696.26	630.91	546.6						426.82	
Raw Water / Raw Water Turbidity - NTU																
Max OL	21.4	7.14	13.7	12.2	6.8	3.1	7	2.17	2.4					21.4		
Mean OL	2.887	1.135	2.448	2.458	1.769	1.08	0.97	0.75	0.785			1.587				
Min OL	0.46	0.23	0.201	0.57	0.445	0.365	0.33	0.34	0.2						0.2	
Raw Water / Raw Water pH - ---																
Max IH	8.22	8.12	8.2	8.9	8.35	8.35	8.41	8.41	8.39					8.9		
Mean IH	8.045	8.008	8.056	8.197	8.239	8.269	8.331	8.355	8.307			8.202				

Min IH	7.94	7.88	7.86	8.09	8.18	8.2	8.26	8.26	8.22				7.86
Raw Water / Temperature - °C													
Max IH	8.01	6	8	11.5	13.1	18.5	23	25	22.5			25	
Mean IH	6.396	5.025	5.653	9.285	11.661	15.612	21.142	23.064	19.033		13.055		
Min IH	3	3.25	4	7	10	13	17.8	22	16				3
Raw Water / Total Coliform: TC - cfu/100mL													
Max Lab	39	15	10	31	4	2	100	71	< 66		< 100		
Mean Lab	10.2	4.5	2.5	8.2	1.25	0.75	23.6	< 20.25	< 40		< 11.763		
Min Lab	2	0	0	0	0	0	0	< 0	< 10			< 0	
Treated Water / Background - cfu/100mL													
Max Lab	0	0	0	0	0	0	0	0	0		0		
Mean Lab	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0			0	
Treated Water / E. Coli: EC - cfu/100mL													
Max Lab	0	0	0	0	0	0	0	0	0		0		
Mean Lab	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0			0	
Treated Water / Electrical Consumption - kWh													
Total IH	963849.2	1042697	1022817	1067361	931726.5	922742.6	979665.2	1081486	978235.3	8990579			
Treated Water / Flow: Total of All Sources - m³/d													
Max IH	51137	53292	51967	49343	52401	97988	96442	77634	64029			97988	
Mean IH	44841	46364	46748.23	44048.37	48460.74	61126.97	76220.23	67154.84	56044.43		54655.53		
Min IH	41397	41527	41284	39452	41184	41283	60988	56137	50125				39452
Total IH	1390071	1298192	1449195	1321451	1502283	1833809	2362827	2081800	1681333	14920961			
Treated Water / HPC - cfu/mL													
Max Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10		< 10		
Mean Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10		< 10		
Min Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10			< 10	
Treated Water / Total Coliform: TC - cfu/100mL													
Max Lab	0	0	0	0	0	0	0	0	0		0		
Mean Lab	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0			0	
Treated Water / Turbidity - NTU													
Max OL	0.117	0.08	0.1	0.082	0.11	0.095	0.096	0.097	0.096			0.117	
Mean OL	0.062	0.063	0.065	0.063	0.064	0.066	0.066	0.067	0.067		0.065		
Min OL	0.043	0.047	0.046	0.047	0.046	0.046	0.049	0.052	0.052				0.043
West Lambton Booster Station / Cl Residual: Outlet Free - mg/L													
Max OL	2.19	1.86	1.83	1.8	1.6	1.62	4.99	1.67	2.17			4.99	
Mean OL	1.684	1.685	1.595	1.586	1.429	1.413	1.395	1.395	1.651		1.537		
Min OL	0	0	0	0	0	0	0	0	0				0
Zebra Mussel Control / Chlorine Dosage - mg/L													
Max IH				1.125	1.173	1.25	1.327	1.29	1.218			1.327	
Mean IH				1.125	1.068	1.127	1.158	1.206	1.126		1.137		
Min IH				1.125	0.955	1.01	1.028	1.113	0.948				0.948
Zebra Mussel Control / Cl Residual: Free - mg/L													
Max IH				0.36	0.67	0.66	0.63	0.64	0.64			0.67	
Mean IH				0.36	0.6	0.588	0.559	0.586	0.59		0.583		
Min IH				0.36	0.44	0.52	0.39	0.52	0.52				0.36
Zebra Mussel Control / Cl Residual: Total - mg/L													
Max IH				0.54	0.81	0.8	0.79	0.79	0.81			0.81	
Mean IH				0.54	0.746	0.712	0.679	0.72	0.736		0.717		

Min IH						0.54	0.55	0.63	0.51	0.66	0.66					0.51	
Zebra Mussel Control / Hypochlorite Dosage - mg/L																	
Max IH						9.374	9.777	10.417	11.057	10.753	10.149				11.057		
Mean IH						9.374	8.898	9.392	9.649	10.049	9.382			9.474			
Min IH						9.374	7.961	8.418	8.569	9.277	7.9						7.9
Zebra Mussel Control / Hypochlorite Used - kg																	
Max IH						433.575	514.65	848.35	851.875	774.325	598.075				851.875		
Mean IH						433.575	439.147	582.408	735.512	670.735	524.246			589.873			
Min IH						433.575	336.05	444.15	619.225	538.15	413.6						336.05
Total IH						433.575	13613.55	17472.25	22800.88	20792.8	15727.38	90840.43					
Zebra Mussel Control / Hypochlorite Volume-Total-1 - m³																	
Max IH						0.369	0.438	0.722	0.725	0.659	0.509				0.725		
Mean IH						0.369	0.374	0.496	0.626	0.571	0.446			0.502			
Min IH						0.369	0.286	0.378	0.527	0.458	0.352						0.286
Total IH						369	11586	14870	19405	17696	13385	77311					

Health & Safety Work Order Summary by Facility

Start Date: 2019-09-01

End Date: 2019-09-30

Hub: Lambton

Cluster	ORG ID	Facility ID	Health and Safety					Closure Rate		
			Initiated	Approved	Completed	Total Labor Hrs	Total Cost \$	Target	Actual	Variance
LAWSS (133000)	Lambton Area Water Treatment	5544, East Lambton Distribution (5544-WDEL)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, East Lambton PS (5544-WPEL)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, Forrest Standpipe (5544-WDFS)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, Indian Road Tower (5544-WDIR)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, Lambton Area RMS (5544-WWLA)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, Lambton Area WTP (5544-WTLA)	4	4	4	8.50	337.59	85.00%	100.00%	-15.00%
		5544, Port Lambton Standpipe (5544-WDPL)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, Watford Standpipe (5544-WDWF)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, West Lambton Booster Stn (5544-WPWL)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, West ST.Clair Distribution (5544-WDWS)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		Lambton Area Water Treatment Plant (5544)	2	2	1	12.75	678.66	85.00%	50.00%	35.00%
Total			6	6	5	21.25	1016.25	85.00%	83.33%	1.67%

Key Column	Colour	Meaning
Init		No Work Orders initialized
Closed		Closure Rate between 20-50%
Closed		Closure Rate less than 20%

10/16/19 13:01:29

Health & Safety Work Order Summary by Facility

Start Date: 2019-01-01

End Date: 2019-09-30

Hub: Lambton

Cluster	ORG ID	Facility ID	Health and Safety					Closure Rate		
			Initiated	Approved	Completed	Total Labor Hrs	Total Cost \$	Target	Actual	Variance
LAWSS (133000)	Lambton Area Water Treatment Plant (5544)	5544, East Lambton Distribution (5544-WDEL)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, East Lambton PS (5544-WPEL)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, Forrest Standpipe (5544-WDFS)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, Indian Road Tower (5544-WDIR)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, Lambton Area RMS (5544-WWLA)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, Lambton Area WTP (5544-WTLA)	34	34	34	66.00	2726.60	85.00%	100.00%	-15.00%
		5544, Port Lambton Standpipe (5544-WDPL)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, Watford Standpipe (5544-WDWF)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, West Lambton Booster Stn (5544-WPWL)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		5544, West ST.Clair Distribution (5544-WDWS)	0	0	0	0.00	0.00	85.00%	100.00%	-15.00%
		Lambton Area Water Treatment Plant (5544)	5	5	4	19.50	1048.92	85.00%	80.00%	5.00%
		Total			39	39	38	85.50	3775.52	85.00%

Key Column	Colour	Meaning
Init		No Work Orders initialized
Closed		Closure Rate between 20-50%
Closed		Closure Rate less than 20%

10/16/19 13:11:21

Work Order Summary by Facility

Start Date: 2019-09-01
End Date: 2019-09-30
Hub: Lambton

Key Col	Colour	Meaning
Init		No Work Orders initialized
Closed		Closure Rate between 20-50%
Closed		Closure Rate less than 20%

			Corrective Maintenance					Emergency Maintenance					Call Back				
			Init	Approved	Completed	Total Labor Hrs	Total Cost \$	Init	Approved	Completed	Total Labor Hrs	Total Cost \$	Init	Approved	Completed	Total Labor Hrs	Total Cost \$
LAWSS (133000)	Lambton Area Water Treatment Plant (5544)	5544, East Lambton Distribution (5544-WDEL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		5544, East Lambton PS (5544-WPEL)	5	5	2	14	539.14	0	0	0	0	0	0	0	0	0	0
		5544, Lambton Area RMS (5544-WWLA)	2	2	1	14	816.99	0	0	0	0	0	0	0	0	0	0
		5544, Lambton Area WTP (5544-WTLA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		5544, West Lambton Booster Stn (5544-WPWL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		5544, West ST.Clair Distribution (5544-WDWS)	1	1	1	4	169.68	0	0	0	0	0	1	1	1	15	662.4
		Lambton Area Water Treatment Plant (5544)	8	8	6	63.5	2606.65	0	0	0	0	0	0	0	0	0	0
Grand Total			16	16	10	95.5	4132.46	0	0	0	0.00	0.00	1	1	1	15.00	662.40

0
0

Work Order Summary by Facility

Start Date: 2019-09-01
End Date: 2019-09-30
Hub: Lambton

Key Col	Colour	Meaning
Init		No Work Orders initialized
Closed		Closure Rate between 20-50%
Closed		Closure Rate less than 20%

			Preventive Maintenance					Operational					Capital/Project Work					Closure Rate		
			Init	Approved	Completed	Total Labor Hrs	Total Cost \$	Init	Approved	Completed	Total Labor Hrs	Total Cost \$	Init	Approved	Completed	Total Labor Hrs	Total Cost \$	Target	Actual	Variance
LAWSS (133000)	Lambton Area Water Treatment Plant (5544)	5544, East Lambton Distribution (5544-WDEL)	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1795.2	85%	100%	-15.0%
		5544, East Lambton PS (5544-WPEL)	0	0	0	0	0	4	4	4	7	307.36	0	0	0	0	0	85%	66.66%	18.33%
		5544, Lambton Area RMS (5544-WWLA)	8	8	8	12.25	550.61	2	2	2	13	657.21	0	0	0	0	0	85%	91.66%	-6.66%
		5544, Lambton Area WTP (5544-WTLA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85%	100%	-15.0%
		5544, West Lambton Booster Stn (5544-WPWL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85%	100%	-15.0%
		5544, West ST.Clair Distribution (5544-WDWS)	2	2	2	7	323.63	2	2	2	1.25	45.1	0	0	0	0	0	85%	100%	-15.0%
		Lambton Area Water Treatment Plant (5544)	35	35	29	109	6268.23	11	11	11	1513.5	39341.09	0	0	0	0	0	85%	85.18%	-0.18%
Grand Total			45	45	39	128.25	7142.47	19	19	19	1534.75	40350.76	1	1	1	0	1795.2	85%	100%	-15.0%

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Work Order Summary by Facility

Start Date: 2019-01-01
End Date: 2019-09-30
Hub: Lambton

Key Col	Colour	Meaning
Init		No Work Orders initialized
Closed		Closure Rate between 20-50%
Closed		Closure Rate less than 20%

			Corrective Maintenance					Emergency Maintenance					Call Back				
			Init	Approved	Completed	Total Labor Hrs	Total Cost \$	Init	Approved	Completed	Total Labor Hrs	Total Cost \$	Init	Approved	Completed	Total Labor Hrs	Total Cost \$
LAWSS (133000)	Lambton Area Water Treatment Plant (5544)	5544, East Lambton Distribution (5544-WDEL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		5544, East Lambton PS (5544-WPEL)	14	14	11	122.5	5651.11	5	5	4	12.5	669.28	0	0	0	0	0
		5544, Lambton Area RMS (5544-WWLA)	6	6	5	32	1526.41	0	0	0	0	0	0	0	0	0	0
		5544, Lambton Area WTP (5544-WTLA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		5544, West Lambton Booster Stn (5544-WPWL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		5544, West ST.Clair Distribution (5544-WDWS)	8	8	8	70	2928.54	0	0	0	0	0	1	1	1	15	662.4
		Lambton Area Water Treatment Plant (5544)	40	40	34	295	13303.75	1	1	1	1	46.68	4	4	4	36	1505.9
Grand Total			68	68	58	519.5	23409.81	6	6	5	13.50	715.96	5	5	5	51.00	2168.30

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Work Order Summary by Facility

Start Date: 2019-01-01
End Date: 2019-09-30
Hub: Lambton

Key Col	Colour	Meaning
Init		No Work Orders initialized
Closed		Closure Rate between 20-50%
Closed		Closure Rate less than 20%

			Preventive Maintenance					Operational					Capital/Project Work					Closure Rate		
			Init	Approved	Completed	Total Labor Hrs	Total Cost \$	Init	Approved	Completed	Total Labor Hrs	Total Cost \$	Init	Approved	Completed	Total Labor Hrs	Total Cost \$	Target	Actual	Variance
LAWSS (133000)	Lambton Area Water Treatment Plant (5544)	5544, East Lambton Distribution (5544-WDEL)	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1795.2	85%	100%	-15.0%
		5544, East Lambton PS (5544-WPEL)	9	9	6	17	1006.35	38	38	38	109.25	4789.76	5	4	1	36.25	11116.61	85%	89.39%	-4.39%
		5544, Lambton Area RMS (5544-WWLA)	50	50	50	103.75	5102.18	19	19	19	77.5	3610.2	0	0	0	0	0	85%	98.66%	-13.6%
		5544, Lambton Area WTP (5544-WTLA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85%	100%	-15.0%
		5544, West Lambton Booster Stn (5544-WPWL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85%	100%	-15.0%
		5544, West ST.Clair Distribution (5544-WDWS)	22	22	22	40.75	1874.84	18	18	18	29.25	1180.74	1	1	1	27.25	22007.7	85%	100%	-15.0%
		Lambton Area Water Treatment Plant (5544)	311	311	296	1202.5	64136.22	112	112	110	14459.25	375423.7	5	4	2	138.25	52408.68	85%	95.08%	-10.0%
Grand Total			392	392	374	1364	72119.59	187	187	185	14675.25	385004.4	12	10	5	201.75	87328.19	85%	100%	-15.0%

0
0

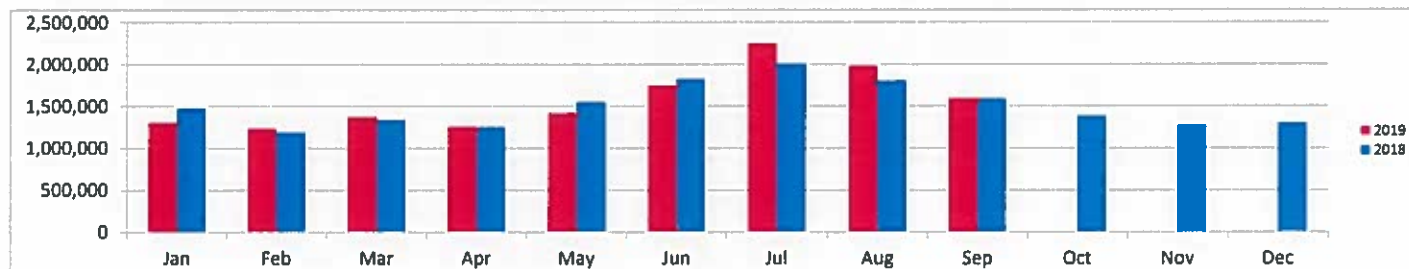
LAWSS Flow Summary

Draft

Total Flows as of Sep 2019

Total % Total
Year To Date for:
Jan - Sep

LAWSS Member		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Sarnia	2019	763,540	710,071	793,833	772,802	859,360	928,004	1,306,982	1,232,482	958,219	0	0	0	8,325,294	59.23
	2018	847,619	716,829	792,231	722,416	903,800	1,090,866	1,140,761	992,451	914,117	808,898	717,749	743,262	10,390,999	58.34
Point Edward	2019	27,627	25,262	28,086	27,709	32,081	38,498	50,463	53,100	36,311	0	0	0	319,138	2.27
	2018	29,104	24,457	27,752	27,203	39,328	47,078	54,106	49,612	41,322	34,228	26,687	26,579	427,456	2.40
St. Clair	2019	407,497	389,310	437,481	329,430	376,717	607,849	669,638	489,505	432,613	0	0	0	4,140,041	29.45
	2018	420,890	328,358	381,560	356,736	416,692	475,796	604,876	568,576	499,609	420,941	409,299	420,293	5,303,627	29.78
Plympton/Wyoming	2019	60,624	55,794	61,245	63,800	73,513	86,825	126,745	108,289	79,740	0	0	0	716,574	5.10
	2018	63,990	52,511	56,621	60,990	83,851	102,062	116,025	89,396	74,865	66,964	58,463	61,040	886,779	4.98
Lambton Shores	2019	12,193	15,213	12,491	14,747	28,233	32,872	43,978	43,586	42,789	0	0	0	246,102	1.75
	2018	37,681	23,324	25,198	31,014	30,618	34,312	39,802	63,896	14,903	16,800	14,901	12,241	344,689	1.94
Watford/Warwick	2019	29,976	28,550	30,013	31,163	35,804	35,885	41,573	41,590	34,374	0	0	0	308,930	2.20
	2018	39,195	35,905	39,130	37,248	45,667	46,959	46,842	37,035	37,798	32,988	30,508	29,142	458,416	2.57
														2019	14056078
Others														2018	17811967
Alvinston	2019	7,072	6,668	10,291	12,120	16,322	18,398	15,460	11,028	8,694	0	0	0	106,053	0.75
	2018	10,209	6,415	7,160	7,177	7,951	7,484	7,326	5,996	6,317	6,411	6,293	7,174	85,913	0.48
Petrolia	2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
	2018	25,392	2,810	10,788	4,496	0	24,533	0	0	0	0	0	0	68,019	0.38
Chatham-Kent	2019	0	1,071	0	778	129	0	0	0	0	0	0	0	1,978	0.01
	2018	0	0	0	0	20,782	0	0	0	0	0	0	0	20,782	0.12
Totals	2019	1,308,530	1,231,940	1,373,440	1,252,550	1,422,160	1,748,330	2,254,838	1,979,580	1,592,740	0	0	0	14,164,109	
	2018	1,474,080	1,190,611	1,340,440	1,247,280	1,548,690	1,829,090	2,009,738	1,806,962	1,588,930	1,387,230	1,263,900	1,299,730	17,986,681	



Note:

Work Sheet Revision Date: 07-Jan-2019

Current Year 2019
Last month entered Sep

Year to Date
Total

LAWSS Members	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan - Sep
City of Sarnia:	763,540	710,071	793,833	772,802	859,360	928,004	1,306,982	1,232,482	958,219	0	0	0	8,325,294
Point Edward:	27,627	25,262	28,086	27,709	32,081	38,498	50,463	53,100	36,311	0	0	0	319,138
St. Clair Township:	407,497	389,310	437,481	329,430	376,717	607,849	669,638	489,505	432,613	0	0	0	4,140,041
Plympton/Wyoming:	60,624	55,794	61,245	63,800	73,513	86,825	126,745	108,289	79,740	0	0	0	716,574
Lambton Shores:	12,193	15,213	12,491	14,747	28,233	32,872	43,978	43,586	42,789	0	0	0	246,102
Watford/Warwick:	29,976	28,550	30,013	31,163	35,804	35,885	41,573	41,590	34,374	0	0	0	308,930
	1,301,458	1,224,201	1,363,150	1,239,652	1,405,708	1,729,932	2,239,379	1,968,552	1,584,046	0	0	0	14,056,078
Others													
Town of Alvinston:	7,072	6,668	10,291	12,120	16,322	18,398	15,460	11,028	8,694	0	0	0	106,053
Town of Petrolia:	0	0	0	0	0	0	0	0	0	0	0	0	0
Chatham-Kent:	0	1,071	0	778	129	0	0	0	0	0	0	0	1,978
	1,308,530	1,231,940	1,373,440	1,252,550	1,422,160	1,748,330	2,254,838	1,979,580	1,592,740	0	0	0	
	1,308,530	1,231,940	1,373,440	1,252,550	1,422,160	1,748,330	2,254,838	1,979,580	1,592,740	0	0	0	14,164,109

Last Years Data 2018

LAWSS Members													
City of Sarnia:	847,619	716,829	792,231	722,416	903,800	1,090,866	1,140,761	992,451	914,117	808,898	717,749	743,262	10,390,999
Point Edward:	29,104	24,457	27,752	27,203	39,328	47,078	54,106	49,612	41,322	34,228	26,687	26,579	427,456
St. Clair Township:	420,890	328,358	381,560	356,736	416,692	475,796	604,876	568,576	499,609	420,941	409,299	420,293	5,303,627
Plympton/Wyoming:	63,990	52,511	56,621	60,990	83,851	102,062	116,025	89,396	74,865	66,964	58,463	61,040	886,779
Lambton Shores:	37,681	23,324	25,198	31,014	30,618	34,312	39,802	63,896	14,903	16,800	14,901	12,241	344,689
Watford/Warwick:	39,195	35,905	39,130	37,248	45,667	46,959	46,842	37,035	37,798	32,988	30,508	29,142	458,416
	1,438,479	1,181,386	1,322,492	1,235,607	1,519,957	1,797,073	2,002,412	1,800,966	1,582,613	1,380,819	1,257,607	1,292,556	17,811,967
Others													
Town of Alvinston:	10,209	6,415	7,160	7,177	7,951	7,484	7,326	5,996	6,317	6,411	6,293	7,174	85,913
Town of Petrolia:	25,392	2,810	10,788	4,496	0	24,533	0	0	0	0	0	0	68,019
Chatham-Kent:	0	0	0	0	20,782	0	0	0	0	0	0	0	20,782
	1,474,080	1,190,611	1,340,440	1,247,280	1,548,690	1,829,090	2,009,738	1,806,962	1,588,930	1,387,230	1,263,900	1,299,730	
	1,474,080	1,190,611	1,340,440	1,247,280	1,548,690	1,829,090	2,009,738	1,806,962	1,588,930	1,387,230	1,263,900	1,299,730	17,986,681

Work Sheet Revision Date: 07-Jan-2019

LAWSS Water used by the

Lambton Area Water Supply System

1215 Fort St. Sarnia, On N7V 1M1

Phone: (519) 344-7429

Fax: (519) 344-4337

City of Sarnia

For the Month of: September 2019

Meter num	Meter Location	Read date 30-Sep-19	Last Read date 31-Aug-19	Difference	Calibration Adjustments As Found	As Left	X	Flow
15	HighL High Net Flow Totalizer	1,928,466.1	1,928,466.1	0			1	0
13	HighL Low Net Flow Totalizer	187,430,960.0	185,838,220.0	1,592,740			1	1,592,740

Entering Sarnia: 1,592,740

Members Monthly % Used

Leaving Sarnia to LAWSS Members:

Village of Point Edward - Grand Total:	36,311	2.3
St. Clair Township - Grand Total:	432,613	27.3
Plympton/Wyoming - Grand Total:	79,740	5.0
Lambton Shores - Grand Total:	42,789	2.7
Village of Watford/Township of Warwick - Grand Total:	34,374	2.2

Leaving Sarnia to Others:

Town of Alvinston - Grand Total:	8,694
Town of Petrolia - Grand Total:	0
Chatham-Kent Area Water - Grand Total:	0

Metered Consumption: 958,219**Adjustments:****Reason for Adjustment:****City of Sarnia - Total Consumption:** 958,219**Leakage rate adjustment** 0% 0**City of Sarnia - Grand Total:** 958,219 60.5**Overall Grand Total:** 1,592,740 100.0.....
Dave Hunt (Operations Manager)

LAWSS Water used by the

Village of Point Edward

For the Month of: **September 2019**

Lambton Area Water Supply System

1215 Fort St. Sarnia, On N7V 1M1

Phone: (519) 344-7429

Fax: (519) 344-4337

Meter num	Meter Location	Read date 30-Sep-19	Last Read date 31-Aug-19	Difference	Calibration Adjustments		X	Flow	%
					As Found	As Left			
CH01	Venetian Vill (Mag)	446,953.0	435,769.0	11,184			1	11,184	32.0
CH02	Ven & Exmouth (Mag)	40,268.4	39,734.9	534			1	534	1.5
CH03	Michigan & Monk (Mag)	1,008,574.6	986,722.4	21,852			1	21,852	62.6
CH04	Michigan & Front (Mag)	130,825.8	129,481.0	1,345			1	1,345	3.9

Reason for Adjustment:

Metered Consumption: 34,915 100.0
Adjustments:

Village of Point Edward - Total Consumption: 34,915
Leakage rate adjustment 4% 1,397
Village of Point Edward - Grand Total: 36,311

Dave Hunt

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Dave Hunt (Operations Manager)

LAWSS Water used by the

Lambton Area Water Supply System

1215 Fort St. Sarnia, On N7V 1M1

Phone: (519) 344-7429

Fax: (519) 344-4337

St. Clair TownshipFor the Month of: **September 2019**

Meter num	Meter Location	Read date 30-Sep-19	Last Read date 31-Aug-19	Difference	Calibration Adjustments As Found	As Left	X	Flow	%
WL-O	WL High Net Flow - West Lambton	37,018,524.0	36,598,952.0	419,572			1	419,572	100.9
3100	Plank Road (3/4)	0	3,325	-3,325			1	-3,325	-0.8
Back to Sarnia									
1100	LaSalle & Parkway	8,441	8,220	221			1	221	0.1
1090	LaSalle & Tashmoo	4,088	4,036	52			1	52	0.0
Entering St. Clair Township:								416,247	100.1
Leaving St. Clair Township									
Back to Sarnia:								273	0.1
Chatham-Kent Area Water - Total Consumption:								0	
Metered Consumption:								415,974	100.0
Adjustments:									

Reason for Adjustment:

St. Clair Township - Total Consumption: 415,974

Leakage rate adjustment 4% 16,639

St. Clair Township - Grand Total: 432,613



Dave Hunt (Operations Manager)

Township of Plympton / Village of Wyoming

For the Month of: September 2019

Meter num	Meter Location	Read date 30-Sep-19	Last Read date 31-Aug-19	Difference	Calibration Adjustments As Found	As Left	X	Flow	%
Entering Plympton									
5001	Ch05 Low Net Flow - Maundaumin	57,809.0	57,809.0	0			1	0	
5002	Ch05 High Net Flow - Maundaumin	17,736,684.0	17,577,122.0	159,562			1	159,562	
Village of Wyoming									
8001	Wyoming	432,670	432,670	0			1	0	
8002	Wyoming	6,518	5,439	1,079			10	10,790	
Back to Sarnia									
1005	Brights Grove (Sarnia)	610	610	0			0.1	0	
1006	Brights Grove (Sarnia)	81,540	81,540	0			10	0	

Entering Plympton: 159,562**Leaving Plympton**

Village of Wyoming: 10,790

Back to Sarnia: 0

Lambton Shores - Total Consumption: 41,143

Watford/Warwick - Total Consumption: 33,052

Town of Alvinston - Total Consumption: 8,694

Town of Petrolia - Total Consumption: 0

Metered Consumption For Plympton: 65,883

Village of Wyoming: 10,790

Adjustments:**Reason for Adjustment:****Plympton/Wyoming - Total Consumption:** 76,673

Leakage rate adjustment 4% 3,067

Plympton/Wyoming - Grand Total: 79,740

Dave Hunt (Operations Manager)

LAWSS Water used by the

Lambton Shores

For the Month of: September 2019

Lambton Area Water Supply System

1215 Fort St. Sarnia, On N7V 1M1

Phone:(519)344-7429

Fax: (519)344-4337

Meter num	Meter Location	Read date 30-Sep-19	Last Read date 31-Aug-19	Difference	Calibration Adjustments		X	Flow	%
					As Found	As Left			
7003	Ch07 High Net Flow - Townsend	3,523,052.2	3,483,863.2	39,189			1	39,189	
7004	Ch07 Low Net Flow - Townsend	243,943.5	241,989.5	1,954			1	1,954	

Reason for Adjustment:

Metered Consumption: 41,143
Adjustments:



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Dave Hunt (Operations Manager)

Lambton Shores - Total Consumption: 41,143
Leakage rate adjustment 4% 1,646
Lambton Shores - Grand Total: 42,789

Village of Watford/Township of Warwick

For the Month of: September 2019

Meter num	Meter Location	Read date 30-Sep-19	Last Read date 31-Aug-19	Difference	Calibration Adjustments As Found	As Left	X	Flow	%
Entering Watford/Warwick									
9001	Ch10 High Net Flow - London Line	6,535,558.0	6,487,555.5	48,003			1	48,003	
9002	Ch10 Low Net Flow - London Line	620,230.5	616,288.8	3,942			1	3,942	
9003	Ch11 High Net Flow - Confederation	1,099,103.4	1,088,674.8	10,429			1	10,429	
9004	Ch11 Low Net Flow - Confederation	60,849.1	62,022.7	-1,174			1	-1,174	
Leaving Watford/Warwick									
5013	Ch09 High Net Flow - Egremont	2,646,773.0	2,627,320.2	19,453			1	19,453	
AF	Alvin High Net Flow Totalizer	1,504,781.6	1,496,087.6	8,694			1	8,694	

Entering Watford/Warwick: 61,199Leaving Watford/Warwick: 28,147Metered Consumption: 33,052

Reason for Adjustment:

Adjustments:

Watford/Warwick - Total Consumption: 33,052

Leakage rate adjustment 4% 1,322

Village of Watford/Township of Warwick - Grand Total: 34,374-----
Dave Hunt (Operations Manager)

LAWSS Water used by the

Lambton Area Water Supply System

1215 Fort St. Sarnia, On N7V 1M1

Phone:(519)344-7429

Fax: (519)344-4337

Town of Alvinston

For the Month of: September 2019

Meter num	Meter Location	Read date	Last Read date	Difference	Calibration Adjustments	X	Flow	%
AF	Alvin High Net Flow Totalizer	30-Sep-19	31-Aug-19	8,694	As Found	As Left	1	8,694

Metered Consumption: 8,694

Reason for Adjustment:

Adjustments:

Town of Alvinston - Total Consumption: 8,694

Leakage rate adjustment 0% 0

Town of Alvinston - Grand Total: 8,694



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Dave Hunt (Operations Manager)

LAWSS Water used by the

Town of Petrolia

For the Month of: September 2019

Lambton Area Water Supply System

1215 Fort St. Sarnia, On N7V 1M1

Phone:(519)344-7429

Fax: (519)344-4337

Meter num	Meter Location	Read date	Last Read date	Difference	Calibration Adjustments	X	Flow	%
PF	Petrolia Flows	30-Sep-19	31-Aug-19	133,549	133,549	0		
					As Found	As Left		

Metered Consumption: 0

Reason for Adjustment:

Adjustments:

Town of Petrolia - Total Consumption: 0

Leakage rate adjustment 0% 0

Town of Petrolia - Grand Total: 0



Dave Hunt (Operations Manager)

LAWSS Water used by the

Chatham-Kent Area Water

For the Month of: September 2019

Lambton Area Water Supply System

1215 Fort St. Sarnia, On N7V 1M1

Phone: (519) 344-7429

Fax: (519) 344-4337

Meter num	Meter Location	Read date	Last Read date	Difference	Calibration Adjustments	X	Flow	%
CKF	Chatham-Kent Flows	30-Sep-19	31-Aug-19		As Found	As Left		
		907	907	0			1	0

Metered Consumption: 0

Reason for Adjustment:

Adjustments:

Chatham-Kent Area Water - Total Consumption: 0

Leakage rate adjustment 0% 0

Chatham-Kent Area Water - Grand Total: 0



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Dave Hunt (Operations Manager)

Report No.: 2019-10-01
Report Page: Page 1 of 2
Meeting Date: October 31, 2019
File No.:



To: Chair and Members
Lambton Area Water Supply System Joint Board of Management

From: Clinton Harper
General Manager

Subject: Information Report

Recommendation

That the Information Report, dated October 2019, **BE RECEIVED** for the information of the Board of Management.

Project:

Generator and Switchgear Replacement Project

Project is progressing on schedule. Toromont units selected by the Board are currently under construction and are expected to arrive at Toromont's Burlington facility by mid-December to begin testing. The tender for General Contractor Pre-selection closes on November 8th at 1pm. Main Plan Switchgear RFQ is being finalized.

LAWSS Master Water Plan Update

On October 15th an RFP for the LAWSS Master Water Plan Update was forwarded to 6 major engineering consultants. Project timeline is as follows:

Event	Date
Pre-Bid Information Meeting	Wednesday, October 30, 2019 @ 11am
Questions, Inquires and Clarification Deadline;	Monday, November 11, 2019 @ 2pm
RFP Closing Date and Time;	Tuesday, November 19, 2019 @ 2pm
Review & Evaluation of RFP Submissions;	Week of November 25, 2019
Interviews & Presentations (if required);	Week of December 2, 2019
Award Successful Proponent;	Thursday, December 19, 2019
Kick-off Meeting / commencement of Project; and	Week of January 6, 2019
Final Report Submission	Friday, June 26, 2019

Report No.: 2019-10-01
Report Page: Page 2 of 2
Meeting Date: October 31, 2019
File No.:



This plan will encompass a detailed analysis of the previous Master Water Plan document, the 20yr Growth Plan, as well as historical water demand for the system as determined from the available data, census data, and population projections. As well, this Master Water Plan shall examine current regulations and anticipated future trends in regulation involving the water supply industry in Ontario.

The issues identified in the 20-year plan, along with the updated modeling, will be key information needed to complete the update. The alternatives that were identified and explored in the 20-year plan will likely need to be at least partially re-explored in an effort to satisfy the Environmental Assessment Process.

This report was prepared by Clinton Harper, General Manager

Attachment(s): none

Report No.: 2019-10-03
Report Page: Page 1 of 2
Meeting Date: October 31, 2019
File No.:



To: Chair and Members
Lambton Area Water Supply System Joint Board of Management

From: Clinton Harper
General Manager

Subject: Thallium Shipment Information Request

Recommendation

That the Thallium Shipment Information Request Report **BE RECEIVED** for information by the Board of Management.

Background:

Clean Harbors Lambton Incinerator Facility has several active Environmental Compliance Approvals (ECA) for waste to be received at the site. Most applicable are the approvals for the landfill and for their incinerator. The ECAs specify the types and quantities of wastes that can be received at the site and how monitoring and reporting is required. Wastes that are landfilled must also meet the land disposal restriction (LDR) requirements specified in O. Reg. 347. ECA's are publicly available at <http://www.accessenvironment.ene.gov.on.ca>.

Landfill ECA No. A031806
Incinerator ECA No. A031813

The Company is required to submit an annual report that is reviewed by the MECP's technical specialists. All reports are prepared by a third party. The company also has several reporting requirements in their ECA which includes weekly site inspection by the MECP. The MECP representative reports that the company is in compliance and addresses issues identified by the Ministry.

The Clear Harbors Lambton Incinerator Facility is one of 2 sites in Canada equipped to dispose of Thallium. When transported in Canada, Thallium is classified as a Class 6.1 (Toxic Substance) Hazardous Material under the Federal Transportation of Dangerous Goods Act. In addition to material classification, the Federal Transportation of Dangerous Good Act identifies explosive limits, maximum quantity permitted to be transported, a need for Emergency Response Assistance Plan, and if the material is designated as a marine pollutant as described by the International Maritime Dangerous Goods Code

Report No.: 2019-10-03
Report Page: Page 2 of 2
Meeting Date: October 31, 2019
File No.:



As previously reported to the Board, it is Ontario legislation that all spills are reported to the MECP's Spills Action Centre (SAC). SAC would then determine the potential for spills to enter surface or ground water and affect source water protection zones. SAC has procedures in place to notify parties of potential impacts.

The Board requested that staff follow-up to determine the status of a shipment of Thallium to the Clean Harbor Lambton Incineration Facility.

Comments:

In 2017, Clean Harbors Lambton Incinerator Facility submitted an application to the MECP (Formerly MOE) to dispose thallium waste at their landfill. This summer (2019), the MECP officially denied the company's request to accept the waste. The Company can revise their proposal and resubmit their application to the MECP. The MECP completes a technical review of all applications submitted and ensures all waste received and processed is in compliance with provincial regulations and policies.

The MECP Representative responsible for site inspections of the Company recommends attendance of the Company's Liaison Meetings as a way for LAWSS to stay updated on Clean Harbor's plans for future submission.

Consultation:

This report was prepared in consultation with the Ministry of Environment, Conservation and Parks Southwestern Regional staff.

Financial Implications:

none

This report was prepared by Clinton Harper, General Manager

Attachment(s): none

Report No.: 2019-10-02
Report Page: Page 1 of 4
Meeting Date: October 31, 2019
File No.:



To: Chair and Members
Lambton Area Water Supply System Joint Board of Management

From: Clinton Harper
General Manager

Subject: Emerging Issues- Plastics

Recommendation

That the Emerging Issues- Plastics Report, and its accompanying documentation, **BE RECEIVED** for the information by the Board.

Background:

Previously, the Board had asked staff to prepare a letter to the Province of Ontario requesting details on what was being done to address plastics in source water.

Comments:

The Ministry of Environment Conservation and Parks prepares a "Minister's Annual Report" that provides an overview of the Province's programs, policies and initiatives to protect drinking water in Ontario. The Report stated the following on the subject of Plastics in drinking water:

"Concentrations of various size plastics have been found to be particularly high near-shore around densely populated areas in the Great Lakes, and there is increasing public and scientific concern. Plastic pollution (food packaging, cigarette butts, plastic bags and plastic bottles) can break down into "micro-plastics". Micro-plastics are pieces of plastic ranging in size from 100 nanometres (or a tenth of the width of a human hair) to 5 millimetres (length of a red ant). Micro-plastics can come in the form of fragments, microbeads, line/fibres, foam, film and production pellets. In addition to the breakdown of litter, micro-plastics may come from personal care products, clothing fibers and building materials.

Monitoring and collaborative research in Lake Ontario and Lake Erie have found a variety of micro-plastics in lakes, streams, wastewater, sand and fish.

In 2017 the province began collaborating with academic partners to examine sources of micro-plastics in Lake Simcoe and Lake Ontario to examine how micro-plastics may affect the safety of fish that people eat. We expect to complete the study by 2020 and it

Report No.: 2019-10-02
Report Page: Page 2 of 4
Meeting Date: October 31, 2019
File No.:

will contribute to better management of micro-plastics in freshwater to protect fish and human health.

The ministry is following Health Canada's initiatives on micro-plastics in the environment and will monitor research aimed at methods to analyze micro-plastics in drinking water as well as the effectiveness of treatment methods to remove micro-plastics in drinking water systems. Although the understanding of the human health impacts of exposure to micro-plastics via food and water is in its early stages, the ministry is following the work of agencies such as the World Health Organization and research reports in academic journals aimed at improving our understanding of micro-plastics.

Through the environment plan, our government is committed to reduce plastic waste in Ontario. We will work with other provinces, territories and the federal government to develop a plastics strategy to reduce plastic waste and limit micro-plastics that can end up in our lakes and rivers. We will seek federal commitment to implement national standards to address recyclability and labelling for plastic products and packaging, to improve recycling and to reduce costs of recycling in Ontario. We will also work to ensure the Great Lakes and other inland waters are included in national and international agreements, charters and strategies that deal with plastic waste and have implications for Ontario." (<https://www.ontario.ca/page/ministers-annual-report-drinking-water-2018>)

Attached is the MECP's "A Made-in-Ontario Environment Plan".

Canada's Plastic Science Agenda (CaPSA) is a call to coordinated action on plastics science priorities. It is designed to help all Canadian researchers and research funders understand the key plastics science needs in Canada. CaPSA is a framework that spans the lifecycle of plastics to inform future science and research investments for:

- detecting plastics in the environment
- understanding and mitigating potential impacts on wildlife, human health and the environment
- advancing sustainable plastic production, recycling and recovery
- providing the evidence needed to support decision making as we move toward a zero plastic waste future.

"The Government of Canada has taken an action-oriented leadership approach to addressing plastic waste and pollution. As part of its 2018 G7 presidency, it spearheaded the Ocean Plastics Charter, which contains commitments and targets aimed at stopping plastic waste and the flow of plastics into the environment. Work on this front is continuing through the G7 and Canada continues to play an active role in advancing international collaborative efforts on plastics.

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Domestically, the Government worked with provinces and territories through the Canadian Council of Ministers of the Environment (CCME) to develop the Canada-wide Strategy on Zero Plastic Waste, which Ministers approved in principle in November 2018. The Strategy contains ten results areas that span the lifecycle of plastics, from product design to collection and recycling to clean-up. It also includes a specific focus on effective research and monitoring systems to inform decision making and measure performance.” (<https://www.canada.ca/en/environment-climate-change/services/science-technology/canada-science-plastic-agenda.html>)

The Canadian Council of Ministers of the Environment’s Current Priorities for Strategy on Zero Plastic Waste is stated as follows:

“Plastic waste and marine litter have emerged alongside climate change as a global environmental priority. In November 2018 environment ministers agreed to work collectively toward a common goal of zero plastic waste. To this end, they approved in principle a Canada-wide strategy on zero plastic waste, which outlines a vision to keep all plastics in the economy and out of the environment.

The Strategy outlines areas where changes are needed across the plastic lifecycle, from design to collection, clean-up and value recovery, and underscores the economic and business opportunities resulting from long-lasting and durable plastics. It is expected to be a driver for innovation and to create opportunities that will increase competitiveness in new business models, product design solutions, and waste prevention and recovery technologies.

CCME will develop an action plan that sets out the measures and actions needed to implement the strategy for ministers to consider in 2019. The plan will be developed in collaboration with stakeholders from across the plastics value chain and with a range of other interested parties.”

In June 2019, Environment Ministers approved the first phase of the Canada-wide Strategy on Zero Plastic Waste. This first phase identifies the government activates that will support the implementation of the strategy. A second phase will follow in 2020 to address the last five key areas of the strategy.

(<https://www.canada.ca/en/services/environment/pollution-waste-management/zero-plastic-waste/canada-action.html>)

Attached is Canada’s Plastic Agenda, the CCME Strategy on Zero Plastic Waste, and the CCME Phase one of the Zero Plastic Waster Strategy.

Consultation:

none

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Financial Implications:

none

This report was prepared by Clinton Harper, General Manager

Attachment(s): A Made-in-Ontario Environment Plan
 Canada's Plastic Science Agenda
 CCME- Strategy on Zero Plastic Waste
 CCME- Canada-Wide Action Plan on Zero Plastic Waste Phase 1



Preserving and Protecting our Environment for Future Generations

A Made-in-Ontario Environment Plan



Minister's Message



Rod Phillips

Minister of the Environment,
Conservation and Parks

The people of Ontario are passionate about the great outdoors and the natural spaces our communities offer. We recognize the importance of a clean environment to our health, our wellbeing and our economic prosperity for future generations. We also recognize the important responsibility we all have to our environment.

Ontario boasts hundreds of thousands of parks, hiking trails and forests to explore with our families and friends. Ontarians can camp in protected areas like Quetico Provincial Park in Northern Ontario and see firsthand the magnificence of a moose. We can also enjoy a family picnic at Victoria Park in Kitchener and enjoy local fresh fruits, vegetables and dairy products that were grown and produced on nearby farms. Ontario is home to hundreds of thousands of lakes, rivers and waterways that are the lifeblood of our province, where people fish, kayak and swim. We also rely on our waters to transport goods, feed our crops, and have a safe, reliable source of drinking water.

These waterways are under increasing pressure as urban development expands along their shorelines, invasive species expand on land and in water, and climate change causes changing weather patterns that can bring heavier rains resulting in damage to homes, businesses and public infrastructure.

Preserving and protecting our environment begins with a new vision for Ontario. One where hardworking taxpayers are protected and respected, and where environmental stewardship connects with the people of this province.

I am pleased to present the following made-in-Ontario plan to keep our province beautiful by protecting our air, land and water, preventing and reducing litter and waste, supporting Ontarians to continue to do their share to reduce greenhouse gas emissions, and helping communities and families prepare for climate change.

This plan will ensure we balance a healthy environment with a healthy economy, and will be reviewed on a four-year basis.

This is a plan that represents a clean break from the status quo.

We understand the pressure Ontarians feel with rising costs of living as well as skyrocketing energy costs that have hurt our economy and our competitiveness. They are understandably frustrated to see their hard-earned tax-dollars being put towards policies and programs that don't deliver results.

That's why a cap-and-trade program or carbon tax that seeks to punish people for heating their home or driving their cars remains unacceptable to the people of Ontario.

When the government does invest in environmental programs, taxpayers should not have to watch their hard-earned dollars be diverted towards expensive, ineffective policies and programs that do not deliver results.

The people of Ontario deserve recognition for the sacrifices they have made and the ones they continue to pay for.

Our plan reflects our province's specific needs and opportunities, and it does not include a carbon tax. We will continue to do our share to reduce greenhouse gases and we will help communities and families prepare to address climate change. With hard work, innovation and commitment, we will ensure Ontario achieves emissions reductions in line with Canada's 2030 greenhouse gas reduction targets under the Paris Agreement.

We will tap into the resourcefulness and creativity of our diverse and thriving private sector by helping them invest in and develop clean solutions to today's environmental challenges.

We have consulted extensively with the public, receiving more than 8,000 ideas and recommendations through our online portal. These comments have been considered alongside submissions from stakeholders and information from Indigenous communities who provided feedback on fighting climate change and other areas of environmental focus. We will continue to consult and engage on the proposals contained within this plan in the coming weeks and months.

All of us have a role to play in protecting the environment, and there are many great ideas across our province and country. It will be important that we continue to have constructive dialogue with other jurisdictions to tackle these environmental challenges together. One thing that has become particularly clear over the past few months is the fact that no one solution fits all provinces, regions or communities.

Our plan describes the actions Ontario is proposing to take and the ways we will enable industry, business, communities and people to continue to do their part.

Ontario families understand that we have a personal responsibility to leave behind a province better off than the one we inherited; not just environmentally, but financially as well.

I invite you to read our plan and join with us today, and every day, to create a better future for Ontario.

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Our Province Today

Those of us who call Ontario home couldn't ask for a better place to live, work and raise a family. The quality of life in our communities and the success of our businesses depends to a great extent on the clean air we breathe, the safe water we drink, and the well-protected lands and parks we enjoy.

Today, the people of Ontario are breathing cleaner air with large reductions in levels of many harmful pollutants. In 2001, Ontario began the process of closing its coal plants and in the years since, we have significantly reduced pollutants such as nitrogen dioxide, sulphur dioxide, mercury and particulate matter.

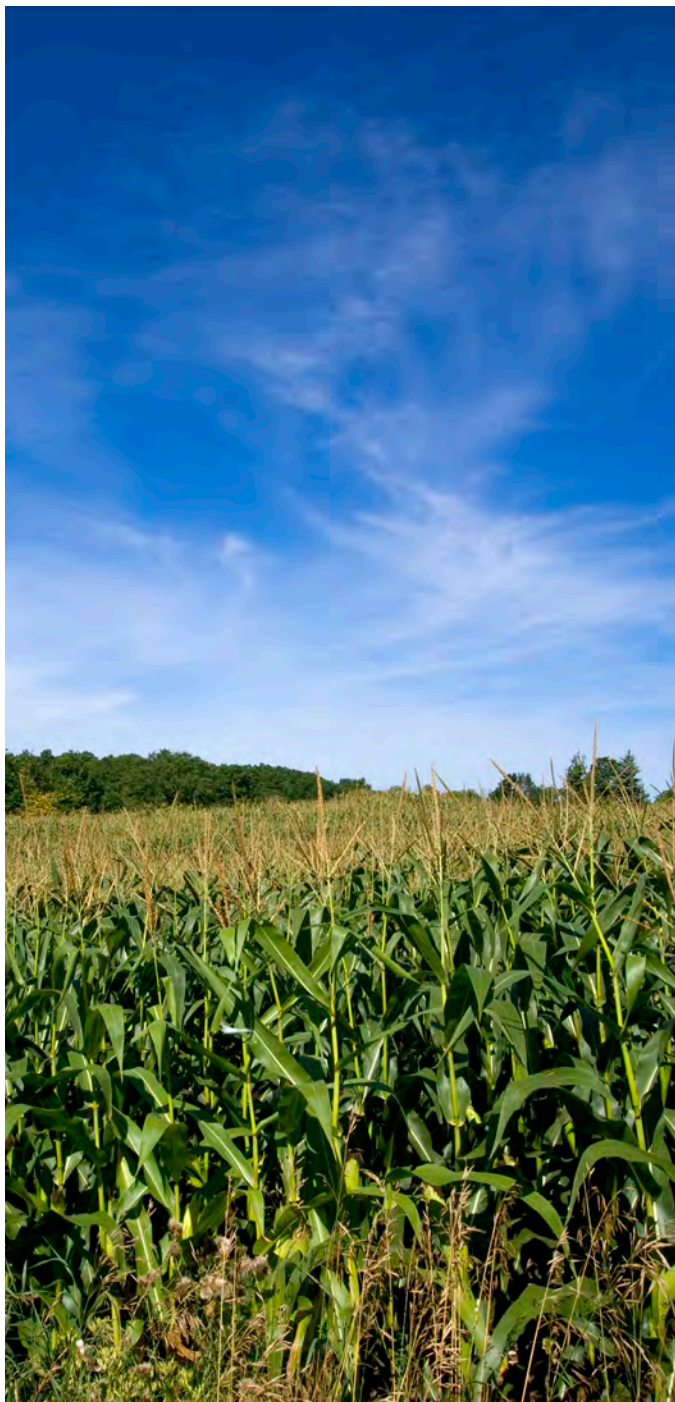
Our Great Lakes attract millions of residents and visitors to waterfront communities around the province each year. These lakes provide safe drinking water to more than 70% of Ontarians and their watersheds are home to more than 4,000 species of fish, birds and other living things. They, along with all of our waterways and groundwater, underpin our province's economic prosperity and wellbeing – supporting Ontario's manufacturing, power generation, fisheries, tourism, agriculture and drinking water.

Parks and greenspace across our province provide individuals, families and tourists with opportunities to canoe in lakes, hike in forests and camp on protected lands.



THE CHALLENGE AHEAD

At the same time, climate change threatens these resources and our homes, communities and businesses, infrastructure, and our locally grown food and crops. It also threatens food security and road access for remote First Nations, as well as the health of ecosystems across our great province.



We can do more to protect ourselves from the extreme weather events that have flooded houses, buildings and roads, overwhelmed aging stormwater and wastewater systems, damaged crops, and brought heavy ice and wind storms that knocked out power for hundreds of thousands of people, including those who are most vulnerable.

Heat waves and recent drought conditions in some areas of the province, coupled with anticipated impacts of climate change and population growth, have intensified concerns related to water security for farmers, Indigenous communities, industry and municipalities.

We also recognize that there is much more that can still be done to keep our lands and waterways clean and free of litter. Nobody wants to see plastic and litter polluting our waterways, neighbourhoods and parks. No one wants sewage and wastewater overflowing into our lakes and rivers or salt making its way into our waterways. These issues are happening now and need to be addressed. There is also a need to address specific air quality concerns in communities that continue to face air quality challenges. True environmentalism begins with a sense of civic responsibility that we foster through meaningful action close to home.

Our environment plan reflects our government's commitment to addressing these pressing challenges. We will use the best science, real-time monitoring where available, and strong, transparent enforcement to protect our air, land and water, prevent and reduce litter and waste, support Ontarians to continue to do their share to reduce greenhouse gas emissions, and help communities and families prepare for climate change.

DOING OUR PART

In 2001, the government of the day announced the closure of the Lakeview Generating Station, setting the stage for the phase out of coal-fired electricity generation which remains the largest single greenhouse gas reduction in Canadian history. Ontario's low-emission combination of hydroelectric, nuclear, natural gas and non-hydro renewable generating capacity has enabled the province to avoid up to 30 megatonnes of annual greenhouse gas emissions, equivalent to taking up to seven million vehicles off our roads. In 2017, approximately 96% of the electricity generated in Ontario was emissions-free.

The combination of nuclear, hydro, other renewables and efficient natural gas has given Ontario one of the cleanest energy grids in North America. Ontario's supply of clean electricity is one of its unique strengths. Ontario is currently a net exporter of electricity, with our clean power offsetting a higher emitting mix of coal and natural gas generation in neighbouring states, such as Michigan and New York.

Measured against the same base year of Canada's target under the Paris Agreement (2005), the province's total greenhouse gas emissions have dropped by 22% – even while the rest of Canada saw emissions increase by 3% during that same time.

Doing Canada's heavy lifting on greenhouse gas emission reductions came at a cost that was too high for Ontario families and businesses. In 2017, prior to the introduction of the Fair Hydro Plan Act, 2017, the cost associated with transitioning to Ontario's low emission electricity system was an estimated \$33 per month for a typical residential electricity consumer and about \$435 per month

for a small business, such as a restaurant. Since 2005, about \$40 billion has been spent in capital investments to transition the province to an electricity system that is virtually emissions-free. Now is not the time to add further costs to the price of electricity that is already very clean.

We will continue to do our share to address climate change and protect our environment. We will do so in a way that protects our economy and respects the people.

We will hold polluters accountable by ensuring strong enforcement with real consequences and penalties, especially for repeat offenders.

We will also help our urban and rural communities and landscapes become more sustainable and resilient. We will help others do their part, whether it's leveraging private sector investments to drive environmental solutions or making it easier for people and companies to go the extra mile to reduce emissions, clean up their communities, protect waterways, conserve lands and restore habitats.

Ontario has a long history of working cooperatively with other provinces and territories, as well as with the federal government through formal agreements such as the Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health and through intergovernmental forums such as the Canadian Council of Ministers of the Environment. There are also global environmental issues on which Ontario will continue collaborating with the federal government and participating in international meetings and agreements.

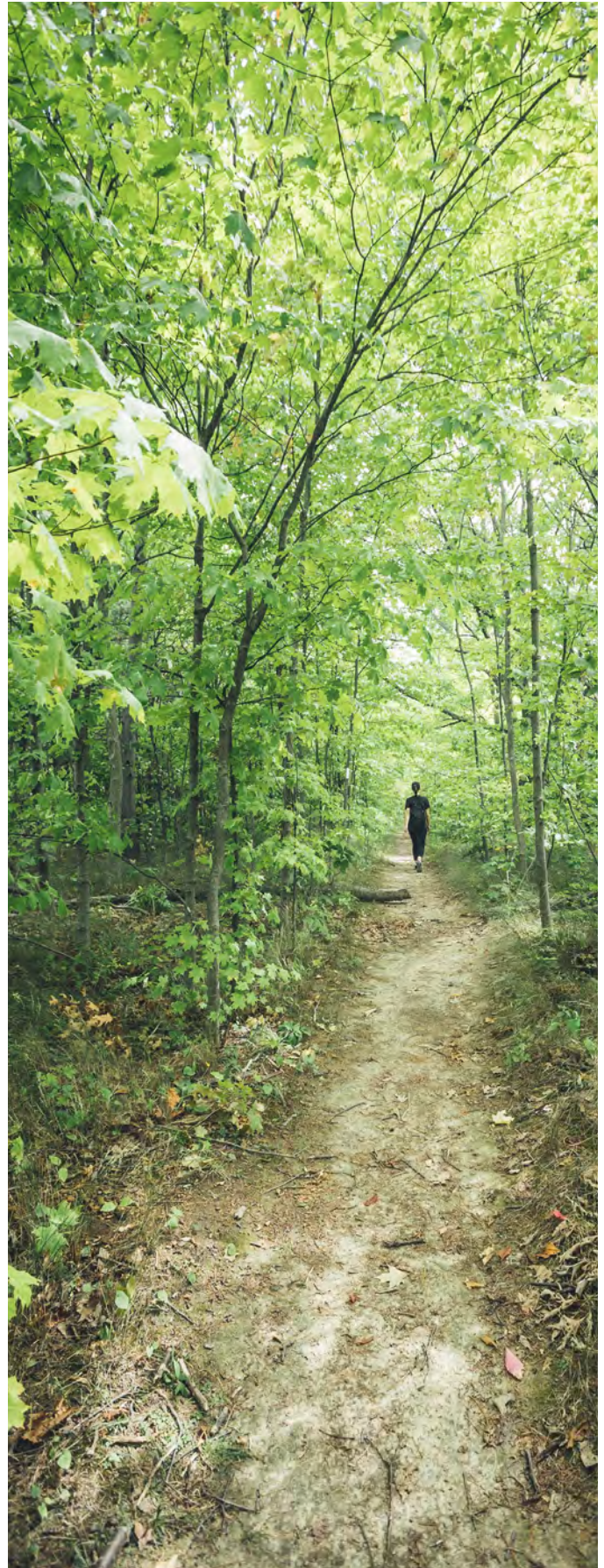
Protecting the environment is a responsibility of all of us who call Ontario home.

We will continue to work in partnership with other provinces, neighbouring jurisdictions, the federal government, municipalities, Indigenous communities, business and local partners to help protect our environment and ensure we pass on a cleaner environment to future generations.

GUIDING PRINCIPLES

Our guiding principles will help us address our most serious environmental challenges in a responsible, effective, measurable and balanced way.

- **Clear Rules and Strong Enforcement:** We will ensure that polluters are held accountable with tougher penalties, while reducing regulatory burden for responsible businesses.
- **Trust and Transparency:** We will provide Ontarians with the information and tools required – with a particular focus on real-time monitoring – to understand the current environmental challenges we face and how these challenges impact individuals, businesses and communities across the province.
- **Resilient Communities and Local Solutions:** We recognize that environmental impacts faced by communities across Ontario may be very different. We will work with these communities and use best scientific practices and other evidence-based methods to develop unique solutions to their challenges.



Protecting our Air, Lakes and Rivers

Ontario's water and air are life support systems for our province and our people. Pollution in our air and water increases healthcare costs, affects the enjoyment of our outdoors and contributes to lost economic opportunity. We will protect these critical systems by keeping our water and air clean while growing our economy.



Our plan will make it easier for people to report pollution that is impacting their lives by developing an online platform for reporting incidents that allows photos or video to be sent in, as well as reporting an incident by e-mail, phone or through an app.

Additionally, we will put in place an improved complaint response system that sets out the services Ontarians can expect from inspectors and investigators when they file a complaint, and new standards on the response time they can expect based on the type of incident they report. We will be transparent about pollution incidents and spills, and provide real-time information where it is available so that people can see if a spill or incident has already been reported, as well as the status of the ministry's response.

CLEAN AIR

Although Ontario's air quality has improved significantly, some areas of the province still experience poorer air quality due to pollution. We are committed to protecting our air, ensuring we have strong environmental standards that are protective of human health and the environment, and taking action to enforce local air quality standards.

Quick Fact: Ontario initiated the first closure of a coal plant in 2001. This action and the subsequent closure of 19 coal-fired units in five plants contributed to reducing the number of smog days in Ontario from a peak of 53 in 2005 to zero in 2017.

Actions

Improve air quality in communities by creating unique solutions to their individual challenges

- Focus on parts of the province that continue to experience air quality challenges due to pollution from transportation, industry and other sources.
- Work in partnership with municipalities, industry, public health units, other community stakeholders and Indigenous communities to address local air quality concerns and achieve clean air objectives.

Reduce emissions from heavy-duty vehicles

- Redesign the emissions testing program for heavy-duty vehicles (e.g. commercial transport trucks) and strengthen on-road enforcement of emissions standards.

Improve understanding of different sources of air pollution and their impact

- Monitor pollutants to evaluate long-term trends so we can gather the information we need to take action on air pollution.

- Increase road-side monitoring of traffic pollution and expand road-side monitoring of pollutants beyond the Greater Toronto Area to other heavily urbanized communities such as Sarnia, Sudbury and Hamilton.

Strengthen collaboration on addressing air pollution that comes from outside of Ontario's borders

- Call on the federal government to proactively address the impacts of air pollution from outside Ontario, including from the United States and international sources, and ensure continued cooperation and commitment to improve air quality.
- Expand collaboration with Michigan and Ohio to reduce the emission of contaminants of concern that impact southern Ontario, Michigan and Ohio airsheds.



Success story: Sarnia's air quality is improving

In partnership with industry, the Clean Air Sarnia and Area (CASA) advisory panel launched the website cleanairsarniaandarea.com so users could view contaminant levels from seven air monitoring stations in the Sarnia community. Air quality information is refreshed every hour on an interactive map so users can find out whether air quality is good, moderate or poor compared to provincial standards. While Ontario and industry have been monitoring air quality in the Sarnia area for decades, the CASA initiative marks the first time that data has been accessible to the public in real-time and in one location.

Ontario is also moving forward with a Sarnia Area Environmental Health Project to help address concerns about air pollution and other environmental stressors from local industries in the Sarnia area. The project will help enhance our understanding of the links between the environment and health in the community, with a focus on assessing exposures to air contaminants.

These projects are great examples of the collaborative efforts of local industry, the municipality, the Aamjiwnaang First Nation and interested community groups.

CLEAN WATER

Our lakes, waterways and groundwater are the foundation of Ontario's economic prosperity and wellbeing – supplying water to our communities, sustaining traditional activities of Indigenous peoples, supporting Ontario's economy, and providing healthy ecosystems for recreation and tourism.

Over past decades, Ontario has seen significant improvements in Great Lakes water quality due to efforts by governments and other partners. These partnerships have achieved a 90% reduction in releases of mercury, dioxins and polychlorinated biphenyls (PCBs), resulting in fish that are safer to eat, clean-up of polluted areas and the restoration of species.



Water resources in Ontario are facing many pressures. Population growth, rapid urban development, aging infrastructure and invasive species are threatening our waterways through pollution and loss of natural heritage. For example, excess road salt can damage roads, cause vehicle corrosion and be harmful to fish in our waterways. The changing climate is compounding these stresses with droughts, floods and extreme storms. Declining ice cover is causing shoreline erosion, warmer water is creating conditions for blooms of harmful algae, and shifting water conditions are changing when and where fish spawn.

Working together, we can help conserve and manage our water resources. Ontario's drinking water, for example, is among the best protected in the world as a result of the province's strong monitoring, reporting and enforcement activities and programs.

We will take strong enforcement action to protect our lakes, waterways and groundwater from pollution.

We will also work with municipalities and other partners to increase transparency through real-time monitoring of the sewage overflows from municipal wastewater systems, which too often flow into Ontario's lakes and rivers. We must step up efforts to ensure the public is aware and that proper monitoring occurs.

Quick Fact: 99.8% of more than 518,000 test results from municipal residential drinking water systems meet Ontario's strict drinking water quality standards.

Our plan focuses on key areas of action to protect our waters and keep our beaches clean for swimming, recreation, enjoyment and traditional use.

Actions

Continue work to restore and protect our Great Lakes

- Build on previous successes and continue efforts to protect water quality and ecosystems of the Great Lakes. This includes keeping coastlines and beaches clean, protecting native species and safeguarding against invasive species such as Asian carp or Phragmites, and reducing harmful algae by continuing partnerships and negotiations with the federal government under agreements and plans such as the [Canada-Ontario Great Lakes Agreement](#) (COA) and the [Canada-Ontario Lake Erie Action Plan](#). Since signing the eighth COA in 2014, Ontario has directly invested \$15.3 million per year in programs. This includes supporting the Lake Erie Action Plan and restoring geographic areas, known as areas of concern, where significant impairment or contamination has occurred as a result of human activities at the local level.
- Review and update [Ontario's Great Lakes Strategy](#) to continue to protect fish, parks, beaches, coastal wetlands and water by reducing plastic litter, excess algae and contaminants along our shorelines, and reducing salt entering waterways to protect our aquatic ecosystems.

Asian Carp:

A threat to the Great Lakes Fisheries and Economy

Asian carp typically weigh two to four kilograms but can weigh up to 50 kilograms and can grow to a length of more than one metre. They consume a significant amount of food and can eat up to 20% of their body weight each day, which harms the Great Lakes ecosystem. Asian carp were introduced to aquaculture facilities in the southern U.S. in the 1970s to remove algae and suspended solids from their ponds. They escaped when the Mississippi River flooded and have spread northward in the Mississippi watershed towards the Great Lakes.

Asian carp pose a significant threat to recreational and commercial fisheries in Ontario which are worth almost \$2.5 billion combined. Ontario is working with many partners including the Asian Carp Regional Coordinating Committee, a committee including all Great Lakes states and provinces, U.S. federal agencies, and Fisheries and Oceans Canada to facilitate collaboration on prevention, early detection, response, and monitoring activities.

Quick Fact: Ontario's more than 250,000 lakes, including the Great Lakes, contain about one fifth of the world's fresh water.

Continue to protect and identify vulnerable waterways and inland waters

- Build on previous successes and continue to implement the [Lake Simcoe Protection Plan](#) to protect and restore important natural areas and features of the lake. Ontario has invested annually in the implementation of the Lake Simcoe Protection Plan.
- Protect the quality of the Lake of the Woods by continuing to work with partners on reducing phosphorus that, in excessive quantities, can cause toxic blue-green algae.
- Build on the ministry's monitoring and drinking water source protection activities to ensure that environmental impacts from road salt use are minimized. Work with municipalities, conservation authorities, the private sector and other partners to promote best management practices, certification and road salt alternatives.
- Work with Indigenous communities and stakeholders, including the public, on the remediation of mercury contaminated sediments in the St. Clair and English-Wabigoon Rivers, including efforts such as:
 - ensuring clean-up of the remaining mercury contaminated sediments located in three areas downstream of the former Dow Chemical site.
 - participating in the work of the English and Wabigoon Rivers Remediation Panel to fund remediation activities from a trust that was established with \$85 million under the *English and Wabigoon Rivers Remediation Funding Act, 2017*.

Action in Progress:

Protecting the Muskoka watershed

Through the Muskoka Watershed Conservation and Management Initiative, the community and province will work together to protect this vital area by identifying the issues facing the region. Ontario will invest \$5 million and commit up to an additional \$5 million in matching contributions.



Effective watershed management is important to the people in our communities, especially at times when watersheds are facing stresses such as increased development and flooding caused by severe weather events.

This initiative will also help us develop a more comprehensive approach to watershed management, which can inform current actions and future development.

Success story: Celebrating recovery of freshwater fish in Lake Simcoe



Over the years, many organizations alongside the provincial and federal governments have worked hard to protect and restore the Lake Simcoe watershed against contaminants and excess nutrients like road salt and phosphorus that have had a negative effect on water quality. The Lake Simcoe ecosystem is showing encouraging signs of recovery and demonstrating that efforts to restore and protect the lake are having an impact. For example, populations of sensitive aquatic life such as lake trout, lake whitefish and cisco are trending upward.

Ensure sustainable water use and water security for future generations

- Thoroughly review the province's water taking policies, programs and science tools to ensure that vital water resources are adequately protected and sustainably used.
- Enhance how we manage water takings to ensure we have sustainable water resources in the face of a changing climate and continued population growth. We will do this by examining approaches to assessing and managing multiple water takings, establishing priorities for different water uses, and preparing and responding to drought conditions.
- Ensure the knowledge gained through the drinking water source protection program helps inform our water management programs.

Quick Fact: Thanks to local source protection committees and conservation authorities, Ontario has source protection plans being implemented across 38 watershed-based areas. These locally developed plans identify and protect areas where drinking water is vulnerable to contamination and depletion.

- Encourage targeted investment and innovation in managing wastewater that overflows into our lakes and rivers.

Quick Fact: There were a total of 1,327 bypasses and/or overflows from all municipal wastewater sources in the 2017/18 fiscal year, as reported to the Ministry of the Environment, Conservation and Parks.

Help people conserve water and save money

- Promote the use of technologies and practices to ensure water is used more efficiently. This includes water conservation planning; water use tracking and reporting; improving standards for household fixtures and appliances, such as dishwashers or washing machines; and profiling provincial and broader public sector leadership in this area.

Improve municipal wastewater and stormwater management and reporting

- Increase transparency through real-time monitoring of sewage overflows from municipal wastewater systems into Ontario's lakes and rivers. Work with municipalities to ensure that proper monitoring occurs, and that the public is aware of overflow incidents.
- Update policies related to municipal wastewater and stormwater to make them easier to understand. We will consider how wastewater and stormwater financing could be updated to improve investment and support new and innovative technologies and practices.

Success story: City of Kingston shows environmental leadership



Utilities Kingston and the City of Kingston have shown leadership by providing real-time public reporting of sewage overflows, reducing pollution, and working with partners such as Swim Drink Fish Canada and the W. Garfield Weston Foundation to create the Gord Edgar Downie Pier at Breakwater Park, giving the community a new place to swim and enjoy a cleaner Lake Ontario waterfront.

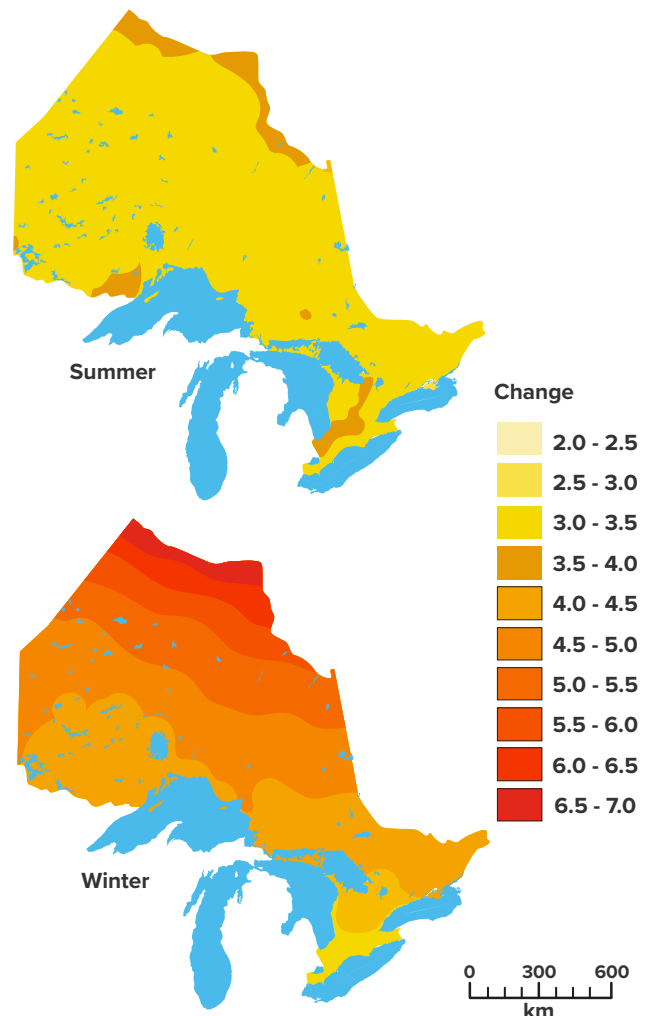
Addressing Climate Change

Quick Fact: As of 2013, Canada is responsible for 1.6% of global emissions, with Ontario responsible for less than 0.4% of global emissions.

The climate is changing. Severe rain, ice and wind storms, prolonged heat waves and milder winters are much more common. Forests, waters and wildlife across the province are and will continue to be significantly impacted by these changes. People across the province – especially Northern communities – and all sectors of the economy are feeling the impacts of climate change and paying more and more for the costs associated with those impacts.



The following graph shows projected seasonal summer and winter temperature changes in Ontario by the 2050s.



Source: Ontario Climate Data Portal – http://lamps.math.yorku.ca/OntarioClimate/index_v18.htm. Projected seasonal (summer and winter) temperature changes by the 2050s (relative to the average of 1986-2005), under the Inter-governmental Panel for Climate Change (IPCC) 5th assessment report (AR5) business as usual emission scenario (RCP8.5).

The people of Ontario have already made significant contributions to meaningful climate action. We have played an important role in fighting climate change and mitigating the threats to our prosperity and way of life, implementing significant changes to drastically reduce our greenhouse gas emissions.

The government of the day initiated the first closure of a coal plant in 2001. This action and the subsequent closure of 19 coal fired units in five plants by 2014 led to the largest single reduction of greenhouse gas emissions, not just in Ontario, but across Canada. It was also one of the largest actions to reduce emissions in North America.

Emission-free electricity generation also plays a significant role in Ontario. Nuclear power, along with our hydroelectric fleet, continues to generate the lion's share of our clean electricity.

Today, Ontario has one of North America's cleanest electricity grids. We also have effective natural gas conservation programs, helping homeowners, businesses and industry reduce their carbon footprint.

Quick Fact: Almost all of Canada's progress towards its 2030 Paris Agreement targets has been driven by Ontario.

But doing Canada's heavy lifting on greenhouse gas emission reductions has come at a cost to Ontario families. Our government understands the part that Ontarians have played and continue to play in reducing their emissions.

We have already been a leader when it comes to climate. **Indeed, we are on track to meet Canada's commitment under the Copenhagen Accord of 17% below 2005 levels by 2020.**

Now, we must look to find a balanced approach to reducing our emissions and prepare families for the impact of climate change in order to maintain both a healthy economy and healthy environment. This plan is our alternative to a carbon tax. It means finding effective and affordable ways to slow down climate change and build more resilient communities to prepare for its effects.

Ontario and the Rest of Canada's Greenhouse Gas Emissions from 2005 to 2016



We will work to unlock private capital to give Ontario businesses and residents new and more affordable ways to invest in energy efficiency, save money and reduce greenhouse gas emissions. One of the most effective ways we can combat climate change is encouraging innovation and reducing regulatory barriers to climate solutions. Through this plan, our government will focus on smart regulatory and policy approaches to facilitate and enable innovation rather than hindering it.

The following chapter of our environment plan acts as Ontario's climate change plan, which fulfills our commitment under the *Cap and Trade Cancellation Act, 2018*.

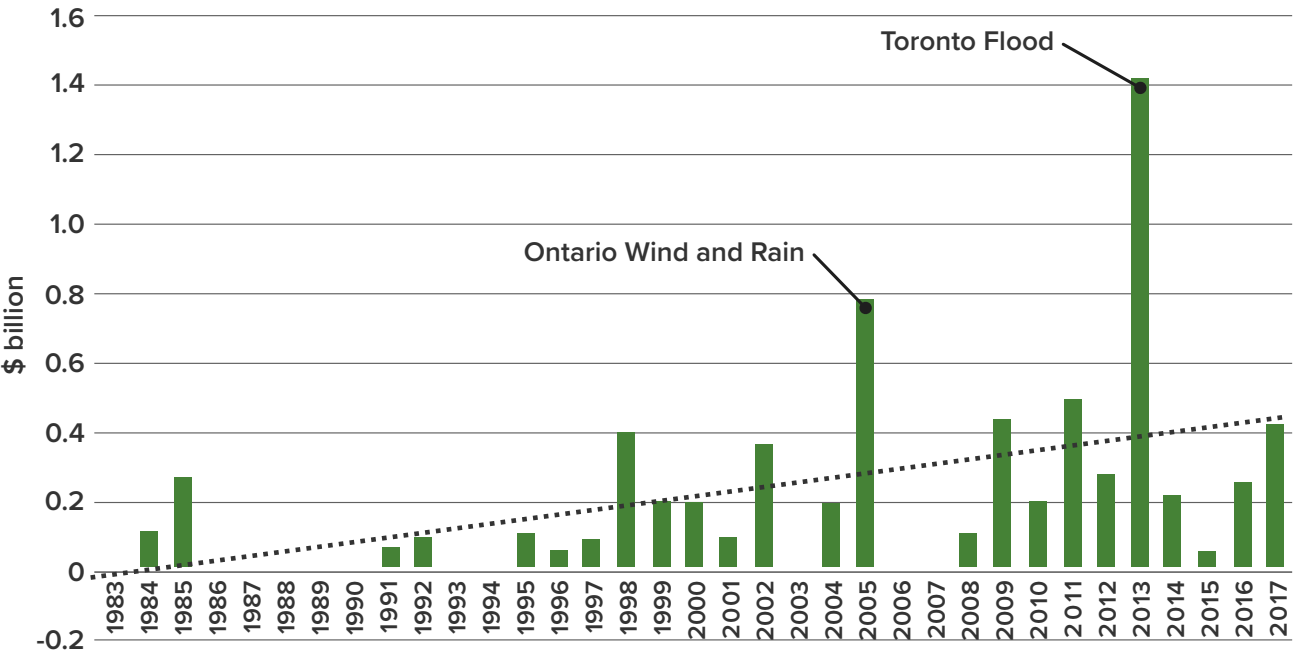
BUILDING RESILIENCE: Helping Families and Communities Prepare

We are committed to preparing families and communities for the costs and impacts of climate change, and to protecting our natural environment, communities, businesses and municipalities.

While our actions are important in the global fight to reduce emissions, we all understand the need to strengthen our resilience to the impacts of climate change such as more frequent extreme weather events.

The following graph shows the rising costs of insured property damage in Ontario between 1983 and 2017, providing an indication of the costs of climate change. The financial costs associated with extreme weather events in Ontario have increased over this period. Chief among factors affecting the increasing costs to Ontarians is the phenomenon of flooding, and more specifically, residential basement flooding.

Costs of Insured Property Damage in Ontario Between 1983 and 2017



Source: Insurance Bureau of Canada.

Building resilience is about having the right information, tools and resources to adapt and respond to our changing climate. We will access the best science and information to better understand where the province is vulnerable and know which regions and economic sectors are most likely to be impacted. Through this enhanced understanding, the province, local communities, businesses, Indigenous communities and the public will be more prepared for the impacts of a changing climate.

Case study:

Climate change impact assessments

Ontario has never completed a provincial-level climate change impact assessment. Since 2008, the United Kingdom has conducted two assessments using best available data and an up-to-date understanding of climate science and future climate impacts. Each assessment provides detailed analysis of the risks, vulnerabilities and impacts of climate change on key economic sectors, infrastructure, the environment and societal health and well-being.

Each assessment gives the government a roadmap to “high” and “low” climate change risks now and in future years.

Actions

Improve our understanding of how climate change will impact Ontario

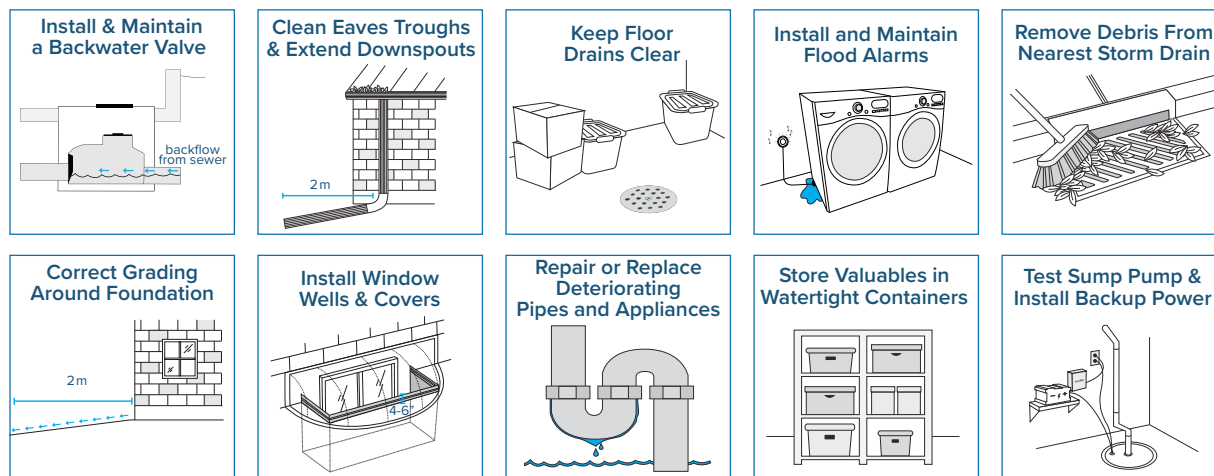
- Undertake a provincial impact assessment to identify where and how climate change is likely to impact Ontario’s communities, critical infrastructure, economies and natural environment. The assessment would provide risk-based evidence to government, municipalities, businesses, Indigenous communities and Ontarians and guide future decision making.
- Undertake impact and vulnerability assessments for key sectors, such as transportation, water, agriculture and energy distribution.

Help Ontarians understand the impacts of climate change

- Develop a user-friendly online tool that makes practical climate change impact information available for the public and private sectors. This tool will help developers, planners, educators, homeowners and others understand the potential impacts of climate change in their communities.
- Work closely with climate science modelling experts, researchers, Indigenous communities, and existing climate service providers to identify and create adaptation solutions.
- Support communities by demonstrating how climate science can be applied in decision making to improve resilience.

The graphics below illustrate practical actions that homeowners can take – simply and affordably – to lower their risk of basement flooding. Home flood protection can include property level initiatives such as disconnecting downspouts from weeping tile systems, placing plastic covers over window wells, outfitting sump pumps with battery back-up supply, and installing back water valves on drain lines.

10 Ways to Prevent Home Basement Floods



Source: Home Flood Protection Program, Intact Centre on Climate Adaptation, University of Waterloo

Ontario will work with the real estate and insurance industries to raise awareness among homeowners about the increasing risk of flooding as we experience more frequent extreme weather events. Flooding damage is the leading cause of insured property damage in Ontario. The risk of home flooding is also increasingly the reason why homeowners are unable to adequately insure their homes.

Flood damages can cost homeowners tens of thousands of dollars to repair. According to the National Flood Insurance Program in the U.S., a 15-centimetre flood in a 2,000-square-foot home is likely to cause about USD \$40,000 in flood damage. Once flooding occurs, securing insurance will become more difficult and may become unaffordable for individual homeowners.

However, simple steps, such as removing debris from nearby storm drains, ensuring correct grading around home foundations, clearing eaves troughs, and installing extended downspouts and window well covers can significantly mitigate basement flood risks.

Update government policies and build partnerships to improve local climate resilience

- Modernize the Building Code to better equip homes and buildings to be better able to withstand extreme weather events. This could include affordable adaptation measures such as requiring backwater valves in new homes that are at risk of backflow, which would significantly reduce the impacts of basement flooding.
- Review the Municipal Disaster Recovery Assistance program to encourage municipalities to incorporate climate resilience improvements when repairing or replacing damaged infrastructure after a natural disaster. Since the Municipal Disaster Recovery Assistance program was launched in 2016, over \$2.6 million has been provided to 11 municipalities.
- Consult on tax policy options to support homeowners in adopting measures to protect their homes against extreme weather events, such as ice and wind storms and home flooding.

- Review land use planning policies and laws to update policy direction on climate resilience. This will help make the way our communities are planned and designed more responsive and adaptive to changing weather conditions, such as improving the way that stormwater is managed.
- Build resilience in the province's critical infrastructure, through better technology as well as back-up generation and energy storage options, so that our vital services and infrastructure, such as hospitals, can better withstand and remain operational during extreme weather events.
- Support improvements to existing winter roads where they may be required to replace roads that are deteriorating as a result of changing weather conditions and shortened winter seasons, and develop a strategy to enhance all-season road connections to northern communities.
- Continue to support programs and partnerships intended to make the agriculture and food sectors more resilient to current and future climate impacts. We will support on-farm soil and water quality programming and work with partners to improve agricultural management practices.

Lake Erie Action Plan and 4R Nutrient Stewardship

Ontario's farmers continue to demonstrate leadership in environmental stewardship, which is important to their livelihood. Farmers are also embracing and championing innovative farming practices, such as 4R Nutrient Stewardship (Right Source @ the Right Rate, Right Time, and Right Place®), and other initiatives under the [Canada-Ontario Lake Erie Action Plan](#), that are designed to enhance environmental protection and improve sustainability.

CONTINUING TO DO OUR SHARE: Achieving the Paris Agreement Target

One of the key ways we are defining our vision for climate action in Ontario is by setting an achievable greenhouse gas reduction target. This will help us focus our efforts and provide a benchmark for our province to assess its progress on the climate change mitigation components of our plan.

Ontario will reduce its emissions by 30% below 2005 levels by 2030.

This target aligns Ontario with Canada's 2030 target under the Paris Agreement.

This is Ontario's proposed target for the reduction of greenhouse gas emissions, which fulfills our commitment under the *Cap and Trade Cancellation Act, 2018*.

Quick Fact: The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change. Its goal is to keep the increase in global average temperature to well below 2 °C above pre-industrial levels, and pursue efforts to limit the increase even further to 1.5 °C, in order to reduce the risks and impacts of climate change.

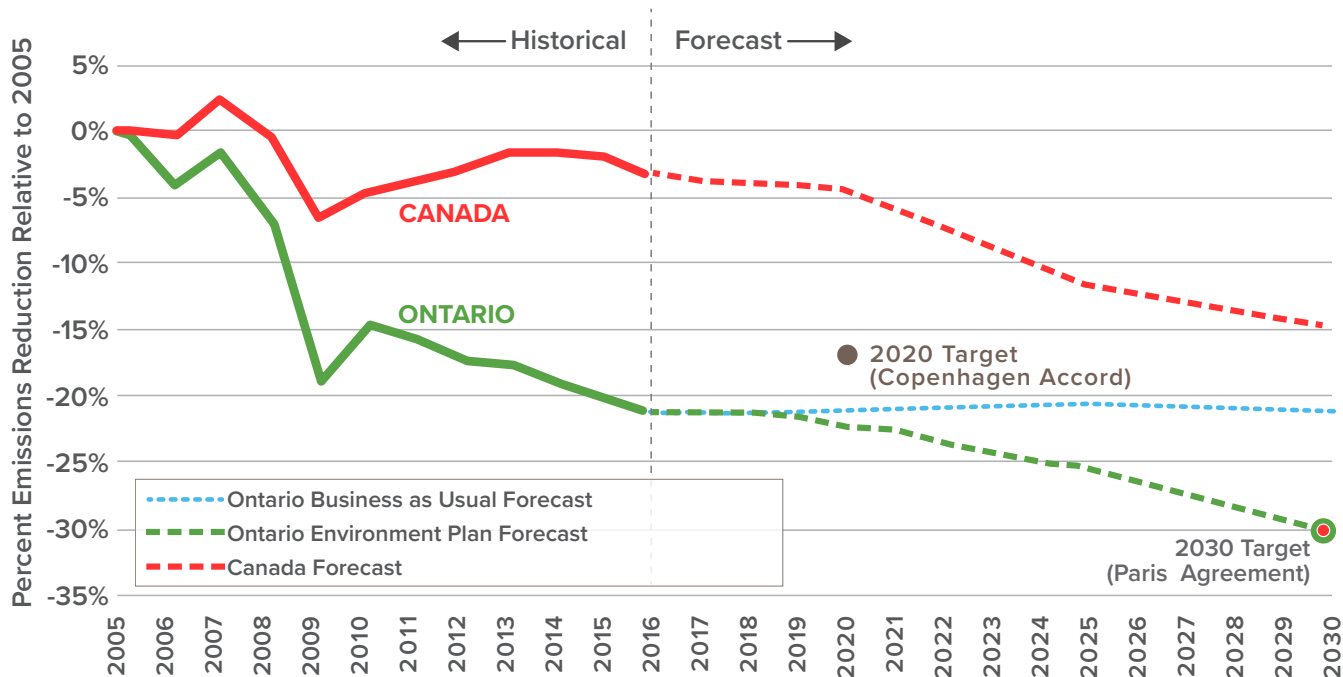
This target takes into consideration the commitment the people of Ontario have already shown in reducing emissions, as well as our commitment to growing Ontario's economy while doing our part to tackle climate change.

There has been a steep decline in emissions from 2005, driven in large part by improvements in the electricity sector, including closing coal-fired

electricity generation. As a result, we are on track to do better than the federal 2020 target set under the Copenhagen Accord in 2010.

The following graph shows our 2030 target is achievable. The policies within this plan will put us on the path to meet our 2030 target, and we will continue to develop and improve them over the next 12 years. This plan will be reviewed and revised on a four-year basis.

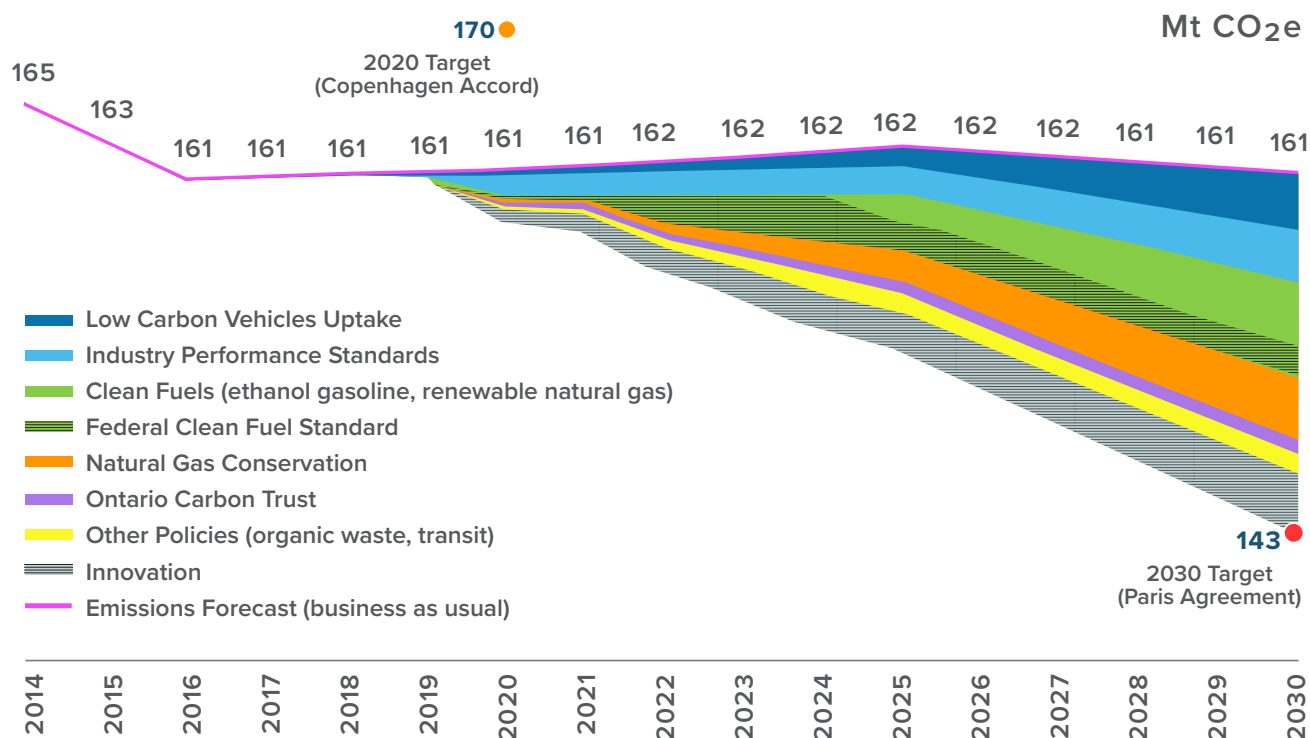
Past and Projected Greenhouse Gas Emission Reductions for Canada and Ontario



Source: Environment and Climate Change Canada (2018) National Inventory Report 1990-2016: Greenhouse Gas Sources and Sinks in Canada. Canada 2017 Biennial Report and internal Ontario modelling.



Path to Meeting Ontario's 2030 Emission Reduction Target



The chart above shows where we expect Ontario's emissions to be if we take no action (161 megatonnes) compared to where we expect our emissions to go if we take actions in specific sectors. Our target is equivalent to 143 megatonnes in 2030 and we will need reductions in key sectors identified in the graph to get there.

The coloured portions of the chart above refer to emissions reductions we expect to see from actions in this plan and the shaded portions represent the potential we have to enhance some of those actions.

The actual reductions achieved will depend on how actions identified in our plan are finalized based on feedback we get from businesses and communities. The estimated reductions are explained in more detail below.

The **Low Carbon Vehicles** uptake portion refers primarily to electric vehicle adoption in Ontario and in small part to the expansion of compressed natural gas in trucking.

Industry Performance Standards refer to our proposed approach to regulate large emitters of greenhouse gas emissions, as described later in this plan. The final impact of this approach will depend on consultation with industry partners.

Clean Fuels refer to increasing the ethanol content of gasoline to 15% as early as 2025, and encouraging uptake of renewable natural gas and the use of lower carbon fuels.

The Federal **Clean Fuel Standard** is an estimate of the additional impact of the proposed federal standards, which could expand the use of a broad range of low-carbon fuels, energy sources and technologies, such as ethanol, renewable natural gas, greener diesel, electricity, and renewable hydrogen.

The Natural Gas Conservation action reflects programs that are well established in Ontario to conserve energy and save people money. This case assumes a gradual expansion of programs delivered by utilities, which would be subject to discussions with the Ontario Energy Board.

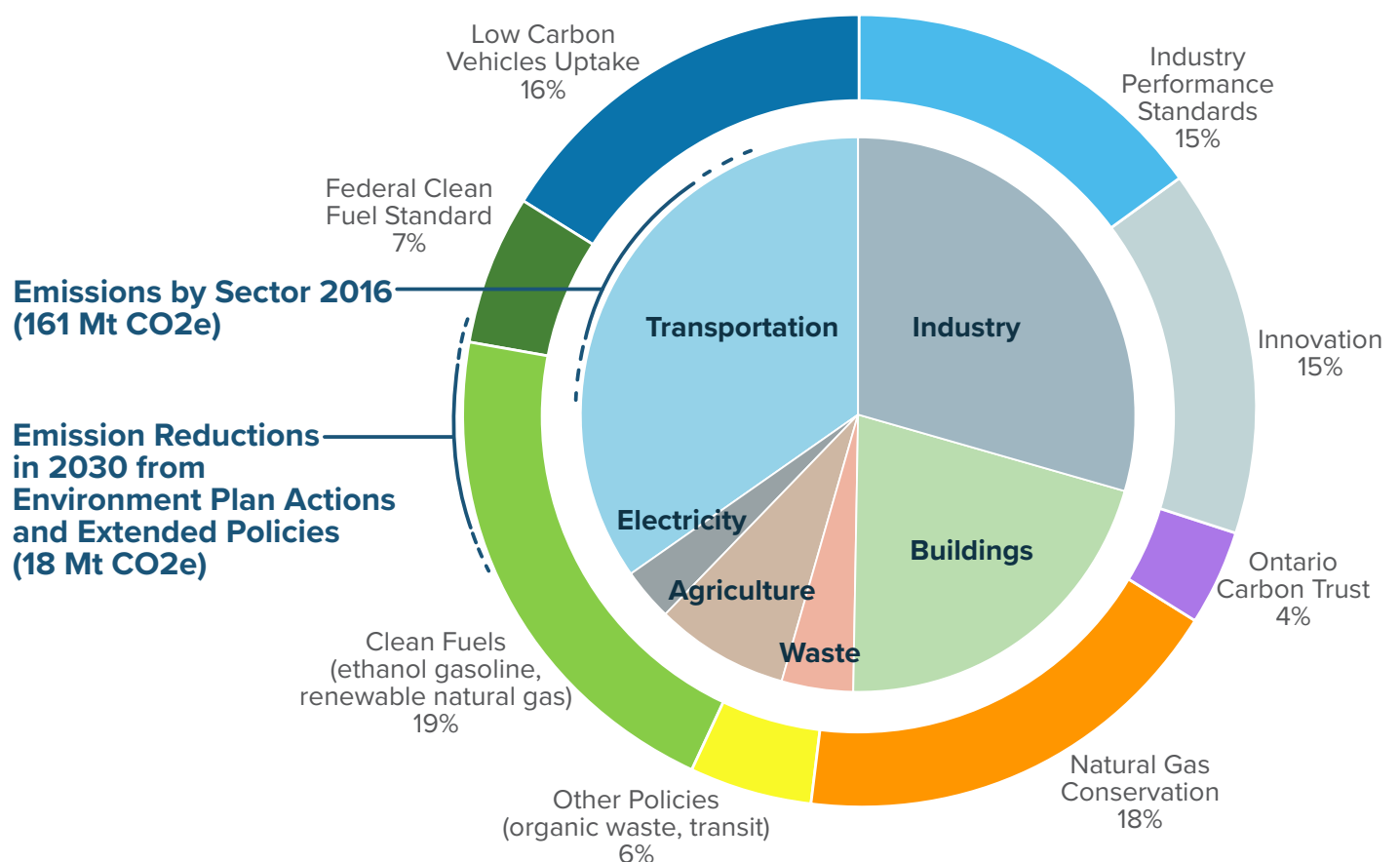
■ The **Ontario Carbon Trust** is an emission reduction fund that will use public funds to leverage private investment in clean technologies that are commercially viable. For this action we estimate a fund of \$350 million will be used to leverage private capital at a 4:1 ratio. Estimates will depend on the final design and mandate of the trust. The estimates also include the potential emission reductions associated with a \$50 million Ontario Reverse Auction designed to attract lowest-cost greenhouse gas emission reduction projects.

■ **Other policies** include the emission reductions associated with investments in public transit, and our commitment to improve diversion of food and organic waste from landfills, as described later in this plan.

■ **Innovation** includes potential advancements in energy storage and cost-effective fuel switching from high intensive fuels in buildings to electricity and lower carbon fuels.

As part of our commitment to transparency, the government is committed to updating and reporting on these estimates once program details are finalized to ensure we are making progress to the 2030 targets.

Planned Emission Reductions in 2030 by Sector



The chart above shows how the plan is tailored to address Ontario's greenhouse gas emissions. The inner pie shows the breakdown of Ontario's 2016 greenhouse gas emissions by sector. The outer ring colours show the policies from the environment plan that are targeted at reducing emissions in each sector.

The government is committed to balancing emissions reductions and economic growth. Ontario's economy has been growing, even as emissions are declining.

Tracking this improvement is an important part of Ontario's climate change plan. In coming months we will consult on the development of an economy wide carbon intensity target as a complementary metric to our absolute emissions target and to ensure that our climate change plan helps us to continue this positive trend.

The below areas are where we will focus our initiatives and actions to tackle and be more resilient to climate change and to meet our balanced target.

MAKE POLLUTERS ACCOUNTABLE

We know job creators in this province have made great strides to reduce greenhouse gas emissions, some leading their industry globally. We will ensure polluters pay their fair share for their greenhouse gas emissions, while also ensuring industry continues to make advances to help Ontario achieve its share of reductions.

Greenhouse gas emissions from the industrial sector, including smaller industrial facilities, accounted for 29% of Ontario's total emissions in 2016. We plan to regulate large emitters with a system that is tough but fair, cost-effective and flexible to the needs and circumstances of our province and its job creators. We will also ensure strong enforcement of these rules.

This system will recognize the unique situation of Canada's manufacturing and industrial heartland. Ontario depends on many industries that compete internationally. Our made-in-Ontario standards will consider factors such as trade-exposure, competitiveness and process-emissions, and allow the province to grant across-the-board exemptions for industries of particular concern, like the auto sector, as needed.



Actions

Implement emission performance standards for large emitters

We will create and establish emission performance standards to achieve greenhouse gas emissions reductions from large emitters. Each large industrial emitter will be required to demonstrate compliance on a regular basis. The program may include compliance flexibility mechanisms such as offset credits and/or payment of an amount to achieve compliance.

An emissions performance standard establishes emission levels that industrial facilities are required to meet and is tied to their level of output or production. This approach does not enforce a blanket cap on emissions across Ontario and takes into consideration specific industry and facility conditions while allowing for economic growth. It also recognizes industries in Ontario that are best-in-class while requiring improvements from sectors that have room to improve.

Case study: Saskatchewan's output-based performance standards (OBPS) system



In December 2017, Saskatchewan introduced a comprehensive Prairie Resilience climate change strategy, which included a plan to implement an OBPS system in 2019. The OBPS will apply to facilities in regulated sectors that emit more than 25,000 tonnes of greenhouse gas emissions per year. The OBPS is expected to be implemented by January 1, 2019, and the Government of Saskatchewan estimates it will cut annual emissions of covered sectors by 10% by 2030.

In addition, Saskatchewan is regulating emissions from electricity generation to achieve a 40% reduction in electricity emissions, and is regulating flared and vented methane emissions in the upstream oil and gas sector, which will lead to additional annual reductions of 40 to 45% in that sector by 2025.



ACTIVATE THE PRIVATE SECTOR

Ontario is home to the hub of the Canadian financial industry – banks, investment firms, pension funds and insurance companies. Ontario hosts the head offices of Canada’s five largest banks, three of which rank among the world’s largest 25 banks by market capitalization.

We recognize that our private sector has the capital, capability and know-how to transform clean technology markets and transition Ontario to a low-carbon economy. This is why we intend to help facilitate the private sector’s best projects and ideas to drive emission reductions at the lowest cost to taxpayers. Our plan will ensure the prudent and responsible use of public resources to drive private sector investment.

We also want to enable consistent disclosure about financial risks associated with climate change so that companies can provide information to investors, lenders, insurers and other stakeholders.

Together, these actions will help improve the capacity of the sustainable finance sector in Ontario and position us as a global leader in this area.

Actions

Launch an emission reduction fund – The Ontario Carbon Trust – and a reverse auction to encourage private investment in clean technology solutions

Ontario will commit to ensuring funding of \$400 million over four years. These funds will complement penalties paid into The Ontario Carbon Trust by polluters. This will ensure that over the next four years, The Ontario Carbon Trust should be able to leverage over \$400 million to unlock over \$1 billion of private capital.

If Canada’s federal government returns to the Pan-Canadian Framework agreement with the people of Ontario, The Ontario Carbon Trust could be increased by \$420 million through the Low Carbon Economy Leadership Fund. This would increase the fund to \$820 million and unlock more than \$2 billion of private capital. It would also ensure that the people of Ontario are provided the most cost-effective approach to reducing greenhouse gas emissions. Canada’s commitment to partner with the people of Ontario through supporting The Ontario Carbon Trust would allow Ontario to reduce emissions beyond what is forecasted in this plan, and help Canada meet its Paris target.

The Ontario Carbon Trust will use innovative financing techniques and market development tools in partnership with the private sector to speed up the deployment of low-carbon solutions. It will use public funds to leverage private investment in clean technologies that are commercially viable and will have a widespread presence. It will also seek to reduce energy costs for ratepayers, stimulate private sector investment and economic activity, and accelerate the transition to a low-carbon economy.

The Ontario Carbon Trust could consider investing in cost-effective projects from various sectors, such as transportation, industry, residential, business and municipal.

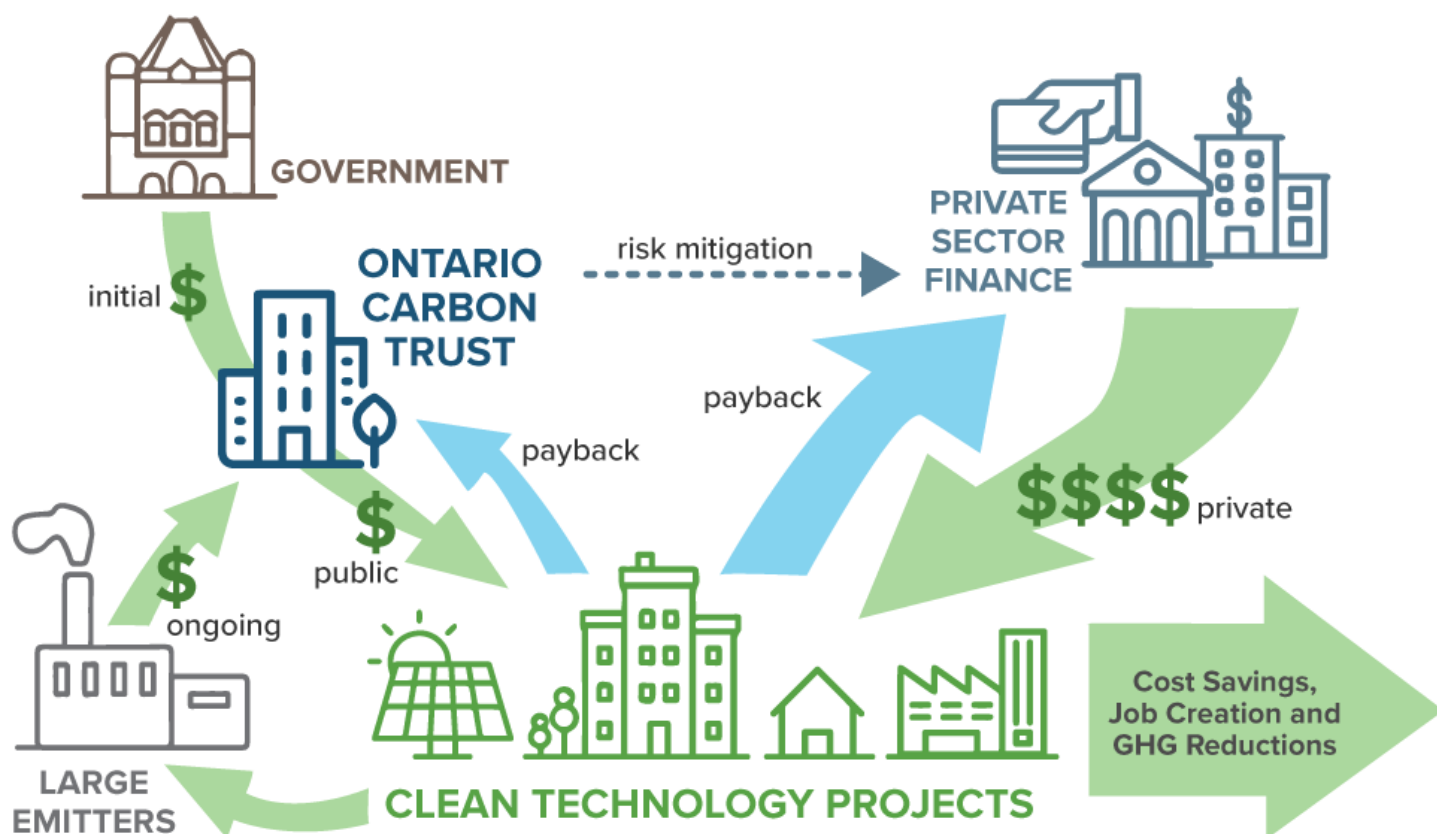
We will establish an independent board with the appropriate expertise, with a mandate to form The Ontario Carbon Trust, which will be tasked with working with the private sector to identify projects that will reduce emissions and deliver cost savings. We will:

- Create an emission reduction fund to support and encourage investments across the province for initiatives that reduce greenhouse gas emissions. The fund will leverage an initial

investment from the government (\$350 million) to attract funds from the private sector in order to drive investment in clean technologies.

- Launch an Ontario Reverse Auction (\$50 million), allowing bidders to send proposals for emissions reduction projects and compete for contracts based on the lowest-cost greenhouse gas emission reductions.

The Ontario Carbon Trust



Source: Adapted from Coalition for Green Capital, Growing Clean Energy Markets with Green Bank Financing: White Paper, page 2, <http://coalitionforgreencapital.com/wp-content/uploads/2015/08/CGC-Green-Bank-White-Paper.pdf>.

Case study: NY Green Bank

Created as a division of the New York State Energy Research and Development Authority, NY Green Bank is a state-sponsored, specialized financial entity that works with the private sector to increase investments in clean energy markets.

NY Green Bank's flexible approach to clean energy financing helps reduce the need for government support and increase investments into New York's clean energy markets, creating a more efficient, reliable and sustainable energy system.

By investing funds at market rates, NY Green Bank is able to cover its own costs and keep its funding base for future projects. As of September 30, 2018, NY Green Bank has committed \$580.1 million to support clean energy projects with a total cost of between \$1.44 and \$1.68 billion.

Enhance corporate disclosure and information sharing

- Work with the financial sector to promote climate-related disclosures in Ontario.
- Encourage the Ontario Securities Commission to improve guidance on climate-related disclosures.

Globally, many financial institutions are adopting the recommendations of the Task Force on Climate-Related Financial Disclosures. Ontario's financial sector is also working to improve disclosures.

What is a reverse auction? The buyer, in this case government, sends out a request for proposals, services or contracts. Bids are assessed and chosen based on the lowest cost, which in this case is the lowest cost per tonne of greenhouse gas emission reductions. The "bidders" in the auction compete to win the project or contract, often underbidding each other, resulting in lower costs for the buyer.

Encourage private investments in clean technologies and green infrastructure

- Ontario will parallel federal changes to the Accelerated Capital Cost Allowance, which will make technology investments in clean energy generation and energy conservation equipment more attractive.
- Work with the Ontario Financing Authority to issue Green Bonds by the end of the fiscal year, after realigning the Green Bond program to support our approach to addressing environmental challenges. This action was included in the Fall Economic Statement.
- Consider tax policy options to encourage the creation of clean technology manufacturing jobs in Ontario.

Green Bonds serve as an important tool to help finance projects that will help us address our environmental challenges. Project categories include transit initiatives, extreme-weather resistant infrastructure, and energy conservation and efficiency projects (including health and education-related projects). By capitalizing on low interest rates, Ontario's Green Bonds enable the Province to raise funds while respecting the taxpayers of Ontario and without adversely impacting businesses.

Success story: Algae carbon capture



In 2012, Pond Technologies, an Ontario technology company, partnered with St. Marys Cement to run a pilot using CO₂ generated by its cement plant to grow algae. Like plants, algae absorb carbon as they grow. Revenue generated from the sale of algae-derived bioproducts provide the economic basis for the adoption of this technology. Pond's pilot proved that reducing greenhouse gas emissions can generate revenue.

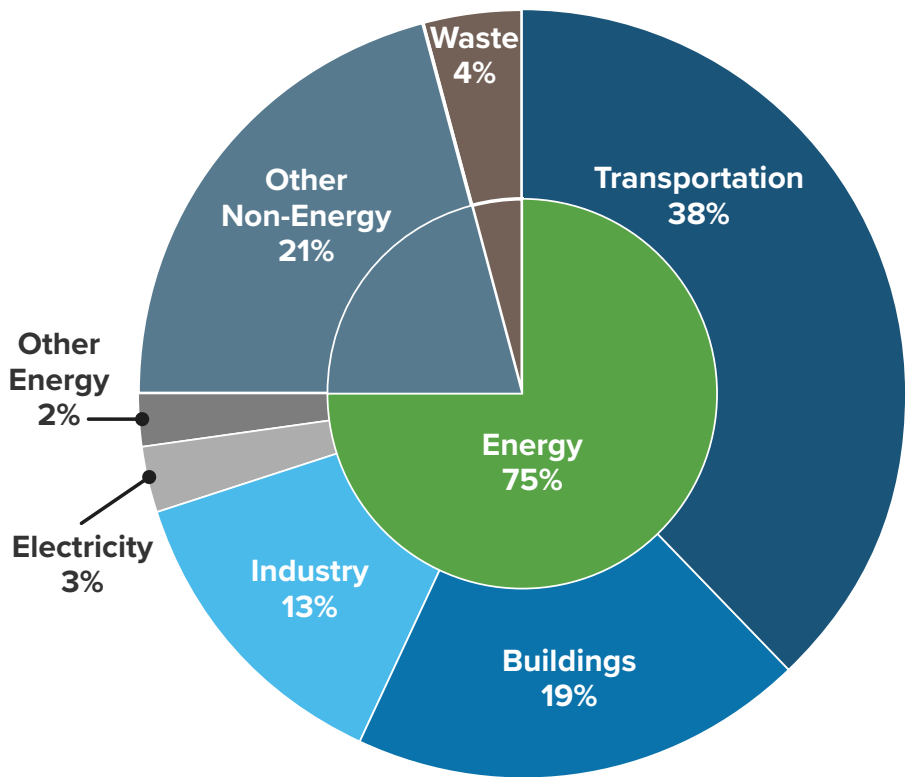


USE ENERGY AND RESOURCES
WISELY

We will develop climate solutions that will save energy, resources and money.

About 75% of Ontario's greenhouse gas emissions come from using energy in our homes, buildings, vehicles and industry while 4% comes from waste.

Ontario's Energy Use by Sector



Source: Data from Environment and Climate Change Canada, 2018 National Inventory Report

We use gasoline and diesel fuel almost exclusively for transportation, while our main energy source for space and water heating is natural gas. Even though Ontario's vehicles have become more efficient, the number of vehicles on the road has increased.

Today, the transportation sector remains our largest source of emissions. That means we need to focus on using energy more efficiently, including in transportation, on expanding access to cleaner energy.

Our government will ensure the Ontario Energy Board keeps pace with consumer demands and the adoption of innovative energy solutions in this time of unprecedented technological change.

We also know that just over 60% of Ontario's food and organic waste is sent to landfills. In a landfill, it breaks down to create methane, a potent greenhouse gas that contributes to climate change. In fact, methane is 25 times more potent as a greenhouse gas than carbon dioxide. When food and organic waste is sent to landfill, opportunities are lost to preserve valuable resources that could be used to heat our homes, support healthy soils and reduce greenhouse gas emissions.

We will work with partners on ways to make it easier for residents and businesses to waste less food or reuse it for beneficial purposes such as compost.

Quick Fact: About 60% of Ontario's food and organic waste is sent to landfills which emits methane – a potent greenhouse gas – when it decomposes. Efficient diversion of household waste from landfills is an important tool in the fight against climate change. To read more about our plan to fight litter and waste, see page 40.

Actions

Conserve energy in homes and buildings to cut costs and reduce emissions

- Increase the availability and accessibility of information on energy and water consumption so that households, businesses and governments understand their energy use (e.g. collection of data related to electric vehicles, household-level energy and water consumption data). For example, provide customers with access to their energy data by working with electricity and natural gas utilities to implement the [Green Button data standard](#). We will support water utilities to implement Green Button on a voluntary basis.
- Work with the Ontario Real Estate Association to encourage the voluntary display of home energy efficiency information on real estate listings to better inform buyers and encourage energy-efficiency measures.

- Review the Building Code and support the adoption of cost effective energy efficiency measures that can lower the cost of electricity and natural gas needed to operate buildings. Ontario is currently a leading jurisdiction in Canada when it comes to energy efficiency standards in its Building Code. Today, Ontario's Building Code ensures new homes built after 2017 use 50% less energy to heat and cool than houses built before 2005, resulting in a much lower carbon footprint than older homes.
- Work with the Ontario Energy Board and natural gas utilities to increase the cost-effective conservation of natural gas to simultaneously reduce emissions and lower energy bills.
- Ensure Ontario's energy-efficiency standards for appliances and equipment continue to be among the highest in North America.

Quick Fact: Enbridge Gas Distribution and Union Gas offer gas conservation programs that offer incentives for homeowners to complete upgrades that make their homes more energy efficient. Each dollar spent results in up to \$2.67 in reduced energy bills for program participants.

Increase access to clean and affordable energy for families

- Continue to support connecting Indigenous communities in Northern Ontario to Ontario's clean electricity grid, to replace local diesel and other types of electricity generation.
- Increase the renewable content requirement (e.g. ethanol) in gasoline to 15% as early as 2025 through the Greener Gasoline regulation, and reduce emissions without increasing the price at the pump, based on current ethanol and gasoline prices.
- Encourage the use of heat pumps for space and water heating where it makes sense, as well as innovative community-based systems like district energy.
- Require natural gas utilities to implement a voluntary renewable natural gas option for customers. We will also consult on the appropriateness of clean content requirements in this space.
- Consult on tax policy options to make it easier for homeowners to increase energy efficiency and save money.
- Streamline and prioritize environmental approvals for businesses that use low-carbon

technology, while maintaining high standards for environmental protection.

- Support the integration of emerging smart grid technologies and distributed resources – including energy storage – to harness and make best use of Ontario's clean electricity.
- Improve rules and remove regulatory barriers that block private investors from deploying low-carbon refueling infrastructure that will help increase the uptake of electric, hydrogen, propane, autonomous and other low-carbon vehicles without government subsidies.
- Collaborate with the private sector to remove barriers to expanding 24/7 compressed natural gas refueling stations for trucks along the 400-series highways, and maintain the existing tax exemption (gasoline and fuel tax) on natural gas as a transportation fuel. This will provide heavy-duty vehicles (such as transport trucks) with a cost-effective path to lower on-road transportation emissions.

Quick Fact: Natural gas is exempt from the fuel tax in Ontario, and natural gas trucks have a smaller carbon footprint compared to diesel trucks.





Success story:
**Niagara Falls pump
generating station produces
zero-emissions power**

Ontario Power Generation's Sir Adam Beck Pump Generating Station is an important source of flexible zero-emissions power for Ontarians. The station fills a 750-acre reservoir when demand for power is low, storing the equivalent amount of energy as 100,000 electric car batteries. The filled reservoir can then be used to generate hydroelectric power when needed, displacing 600 megawatts of fossil fuel generation for up to eight hours.



Success story:
**Partnering to fuel lower-
carbon heavy-duty
transportation**

In April 2018, Union Energy Solutions Limited Partnership, an unregulated affiliate of Union Gas Limited (an Enbridge Company), announced a partnership with Clean Energy to build three compressed natural gas fueling stations along Ontario's Highway 401. The initiative will enable heavy-duty vehicles (such as transport trucks) that use natural gas as a transportation fuel to travel and refuel along the 401, leading to lower on-road transportation emissions.

Case study:
**Electrify Canada building an electric vehicle
charging network**

Electrify Canada is a new company that will build ultra-fast charging networks for electric vehicles across Canada, which are anticipated to be operational starting in 2019. This includes the installation of 32 electric vehicle charging sites near major highways and in major metro areas in British Columbia, Alberta, Ontario and Quebec.

DOING OUR PART: Government Leadership

Ontario is committed to doing its part to address climate change. This includes leading by example. We will encourage local leadership on climate change, including municipal governments, the broader public sector, business associations, community groups, Indigenous communities and voluntary organizations to develop and promote climate solutions for their members and communities. We will continue to engage on international climate issues by providing Ontario's perspective to Canada's international climate negotiations.

As part of the government's commitment to curriculum renewal we will explore changes that embed learning about the environment in the classroom. Learning about protecting our air,

land and water, addressing climate change, and reducing the amount of litter and waste in our communities will not only raise awareness in schools, it will also enable students to pass on this knowledge to their families.

Partnering with and enabling people, businesses, municipalities and schools will help us find ways to address local issues and needs, save energy and costs, and minimize climate risks to our schools, hospitals, highways and critical infrastructure.

Actions

Make climate change a cross-government priority

- Improve our ability to consider climate change when we make decisions about government policies and operations by developing a Climate Change Governance Framework that will:
 - Establish clear responsibilities and requirements for ministries to track and report on climate change measures.
 - Consider climate change when we purchase goods and services across government, where it is cost-effective (i.e. low-carbon intensity steel and cement).
 - Explore opportunities to enhance coordination and guidance for municipalities to help them consider climate change in their decision-making.
 - Update Statements of Environmental Values to reflect Ontario's environmental plan.



- Continue to execute a high-performance building automation strategy for government buildings. This strategy uses advanced automation and integration to measure, monitor, and control operations and maintenance at the lowest cost, also reducing greenhouse gas emissions during day-to-day building operations. The strategy includes, but is not limited to, HVAC and lighting controls, security, elevators, fire protection, and life safety systems in order to improve performance and to reduce energy consumption.
- Ensure investments in future renovations of government buildings maximize energy cost savings. For instance, Ontario is building new correctional facilities to meet LEED standards, which ensures high environmental performance and will improve efficiency while saving money.
- Undertake a review of government office space, with an eye to optimizing our physical and carbon footprint. Ontario will reduce its per employee real estate footprint to reduce energy costs and emissions, as recommended in the Auditor General's 2017 Report.
- Support the adoption of low-carbon technologies and climate resilience measures by working to reduce costly and time-consuming regulatory and operational barriers.
- Encourage the federal government to ensure that climate negotiations under Article 6 of the Paris Agreement improve our cleantech sector's access to emerging global markets for low-carbon technologies. Ontario is a leader in clean technology and more access to global markets will help our local companies create new green jobs in Ontario.
- Develop tools to help decision makers

understand the climate impacts of government activities. For example, we will identify and report on emissions reductions from school capital investments and enable school boards to access energy efficiency data to inform their investment decisions.

- Provide guidance to public property owners of heritage buildings to help them reduce their energy use and save on operating costs while continuing to conserve these important cultural heritage resources for future generations.
- Continue to support the purchase of electric ferries which will be in service in 2020 and 2021 connecting Wolfe and Amherst Islands to the mainland.

Quick fact: The government's annual procurement budget to purchase goods and services is \$6 billion.

**Success story:
Ontario's private sector
leads the country in
cleantech**



Ontario has the largest and fastest-growing cleantech sector in Canada, with \$19.8 billion in annual revenues and over 5,000 companies employing 130,000 people.

Ontario is home to 35% of Canada's innovative cleantech companies.

Ontario is a leading hub for water technologies with over 900 companies and 22,000 employees.



**Success story:
Government building
renovations to save energy
and money**

The Queen's Park Reconstruction Project is an eight-year initiative that involves the extensive reconstruction of the Macdonald Block Complex, which is located in downtown Toronto and includes the Macdonald Block Podium, Hearst, Hepburn, Mowat and Ferguson Towers.

The 47-year-old Macdonald Block Complex is home to the largest concentration of political and public service individuals in the province. It has never undergone a major renovation and the building's core systems, including electrical, water, cooling and heating, have reached the end of their useful life.

Following advice from an independent third-party expert panel, the government's Macdonald Block Complex is undergoing extensive reconstruction to achieve significant long-term cost and energy savings for the province over the next 50 years. Those savings will be achieved through reduced operating costs, lower energy and capital maintenance expenditures, and the reduction of costly third-party leases across the downtown Toronto core. The reconstructed Macdonald Block Complex will meet LEED silver certification.



**Success story:
City of Toronto Green Fleet**

The City of Toronto's Green Fleet Plan focuses on reducing emissions from almost 10,000 vehicles as well as by equipment owned and operated by the city. The consolidated plan, led by the Fleet Services Division, brings together all five major City of Toronto fleets – City of Toronto Fleet Services Division, Emergency Medical Services, Toronto Fire Services, Toronto Police Service, and Toronto Transit Commission – under one plan.

As of 2017, the city had 2,091 green vehicles and pieces of equipment in its fleet, representing 24% of the total number of vehicles in the city's fleet.

Empower effective local leadership on climate change

- Work with municipalities to develop climate and energy plans and initiatives to support building climate resilience and transformation to the low-carbon future.
- Support the efforts of Indigenous communities to integrate climate action into local plans and initiatives for community power, economic development, health and sustainability.
- Encourage local leadership by forming stronger partnerships and sharing best practices with community groups and business associations.

Improve public transportation to expand commuter choices and support communities

Commit \$5 billion more for subways and relief lines. Ontario will also invest in a two-way GO transit service to Niagara Falls, as part of the existing plan to build a regional transportation system.

- Establish a public education and awareness program to make people more aware of the environmental, financial and health impacts of their transportation choices.
- Develop a plan to upload the responsibility for Toronto Transit Commission (TTC) subway infrastructure from the City of Toronto to Ontario. An upload would enable the province to implement a more efficient regional transit system, and build transit faster. Moreover, this would allow the province to fund and deliver new transit projects sooner.



Support green infrastructure projects

We're also greening the government's fleet of vehicles. The Ontario Public Service currently has 1,632 hybrid, plug-in hybrid and full battery electric vehicles, which represent 70% of its entire passenger vehicle fleet.

Work with federal and municipal governments through the green stream of the Investing in Canada Infrastructure Program to invest up to \$7 billion in federal, provincial and municipal funding over the next 10 years. Funding could be for projects that lower greenhouse gas emissions, reduce pollution, and help make community infrastructure more resilient. Example investments could include improvements to transit and transportation infrastructure and improved local water, wastewater and stormwater systems.

Early actions: GO Train Service Increase

This government is expanding GO service and making it easier for commuters and members of the community to move around the GTHA. More riders in seats relieves congestion on the roads. We're providing more reliable, predictable journeys across the region – greatly improving the daily transit experience. These improvements bring us a step closer to our vision to deliver two-way, all-day GO service.

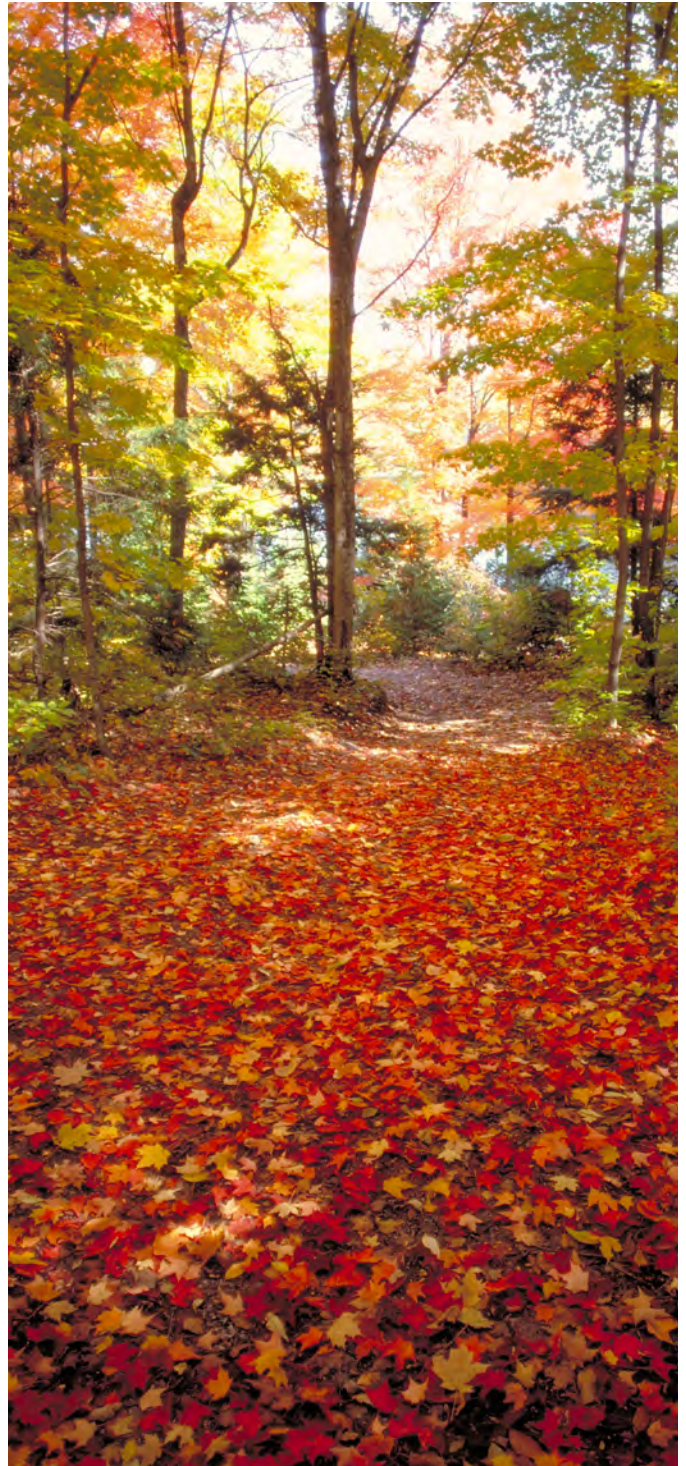
Reducing Litter and Waste in Our Communities & Keeping our Land and Soil Clean

Currently, Ontario generates nearly a tonne of waste per person every year and our overall diversion rate has stalled below 30% over the last 15 years. Ontario needs to reduce the amount of waste we generate and divert more waste from landfill through proven methods like Ontario's curbside Blue Box Program, existing and emerging municipal green bin programs and other waste recovery options. Existing and emerging technologies are increasingly allowing us to recover and recycle materials back into our economy rather than sending them to landfills. This is helping us to better protect our communities and keep our air, land and water clean and healthy.

To keep our land and water clean, we will take strong enforcement action to ensure waste, including hazardous waste, is properly stored, transported, recycled, recovered or disposed.

We are looking at proposed ways to:

- Reduce the amount of waste going to landfills or becoming litter
- Increase opportunities for Ontarians to participate in efforts to reduce waste
- Increase opportunities to use technologies, such as thermal treatment, to recover valuable resources in waste
- Manage excess soil and hauled sewage
- Redevelop brownfield sites to better protect human health and the environment



REDUCE LITTER AND WASTE

Today, some of the highest waste diversion rates in the province are in our homes. Ontarians divert almost 50% of their own household waste, through sorting what they throw away into their blue bin and, increasingly, their green bin.

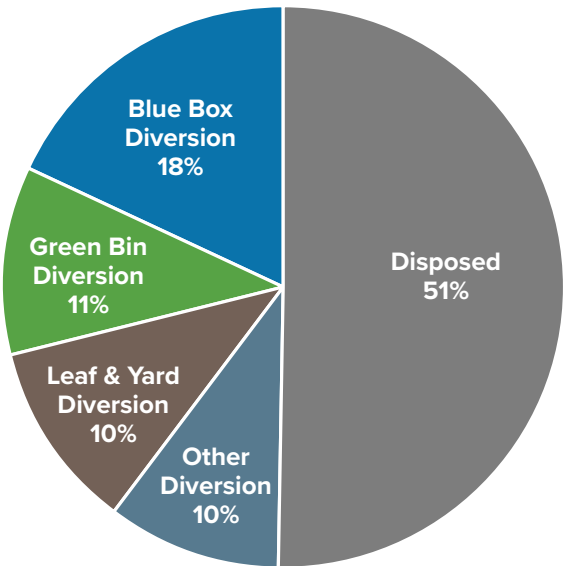
However, Ontario's general waste diversion rate (residential, commercial and industrial) has been stalled at below 30% over the past 15 years – meaning that over 70% of our waste materials continue to end up in landfills. Such heavy reliance on landfills will require the province to either focus on siting new landfills or look for new ways to reduce what we send to them.

While some individual municipalities and businesses have shown leadership, Ontarians

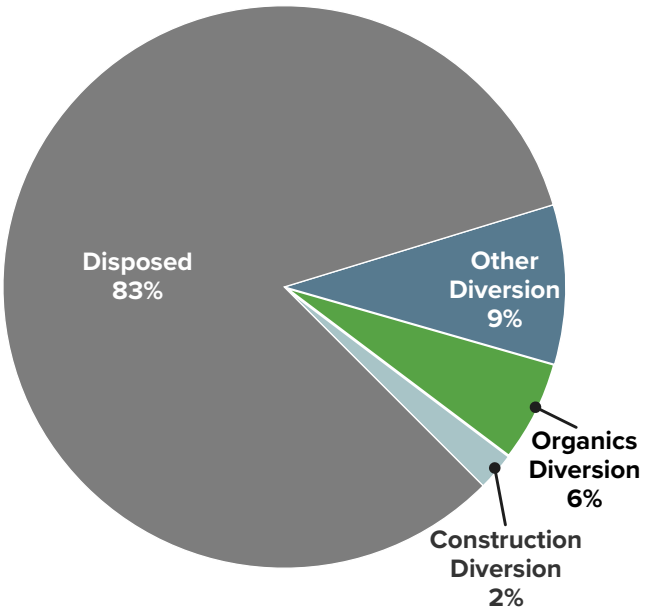
know there is still a lot more that can be done to reduce the amount of waste we produce, recover valuable resources from our waste and better manage organics.

We believe that producers should be responsible for managing the waste they produce. Placing responsibility squarely on those who produce the waste will help unleash the creative talents and energies of the private sector. Making producers responsible for the full life-cycle of their products and the waste they produce will help companies to consider what materials they use in and to package their products, and find new and innovative cost-effective ways to recycle them and lower costs for consumers. It can also make recycling easier and more accessible right across the province, keeping it clean and beautiful.

Ontario's Residential and Industrial, Commercial and Institutional Waste Management



Residential Waste: Managed by municipalities. Includes waste generated by residents in single-family homes, some apartments and some small businesses. Mix of mandatory and voluntary diversion programs.



Business Waste: Managed by the private sector. Includes food processing sites, manufacturing facilities, schools, hospitals, offices, restaurants, retail sites and some apartments. Largely voluntary diversion programs.

Sources: Statistics Canada, Waste Management Industry Survey 2016 for non-residential data; Resource Productivity and Recovery Authority, Datacall data and residential diversion rates for residential data. Data on organic waste from 2018 study prepared for MECP by 2cg.

Actions

Reduce and divert food and organic waste from households and businesses

- Expand green bin or similar collection systems in large cities and to relevant businesses.
- Develop a proposal to ban food waste from landfill and consult with key partners such as municipalities, businesses and the waste industry.
- Educate the public and business about reducing and diverting food and organic waste.
- Develop best practices for safe food donation.



Success story: Farmers receive support for food donations

The rescue of surplus food helps ensure food does not go to waste. Ontario supports these efforts through the following mechanisms:

- The Ontario Community Food Program Donation Tax Credit for Farmers provides tax credits up to 25% to farmers who recover and donate agricultural products to eligible programs.
- The Ontario Donation of Food Act, 1994, encourages donations, with certain limitations, and protects food donors from liability as a result of injuries caused by the consumption of donated food.



Success story: City of Stratford turning organic waste into natural gas

Stratford, Ontario, is improving its wastewater treatment infrastructure to produce renewable natural gas from organic waste and feed it back into the local gas distribution system. Renewable natural gas is a clean, carbon-neutral energy source.

Reduce plastic waste

- Work with other provinces, territories and the federal government to develop a plastics strategy to reduce plastic waste and limit micro-plastics that can end up in our lakes and rivers.
- Seek federal commitment to implement national standards that address recyclability and labelling for plastic products and packaging to reduce the cost of recycling in Ontario.
- Work to ensure the Great Lakes and other inland waters are included in national and international agreements, charters and strategies that deal with plastic waste in the environment.

Reduce litter in our neighbourhoods and parks

Our environment plan reflects our government's commitment to keep our neighbourhoods, parks and waterways clean and free of litter and waste. When Ontarians walk their dog or take their children to the park they expect their time outdoors to be litter-free.

Ontario will establish an official day focused on cleanup of litter in Ontario, coordinated with schools, municipalities and businesses, to raise awareness about the impacts of waste in our neighbourhoods, in our waterways and in our green spaces.

- Work with municipal partners to take strong action against those who illegally dump waste or litter in our neighbourhoods, parks and coastal areas.



- Develop future conservation leaders through supporting programs that will actively clean up litter in Ontario's green spaces, including provincial parks, conservation areas and municipalities.
- Connect students with recognized organizations that encourage environmental stewardship so they could earn volunteer hours by cleaning up parks, planting trees and participating in other conservation initiatives.

Increase opportunities for Ontarians to participate in waste reduction efforts

- Work with municipalities and producers to provide more consistency across the province regarding what can and cannot be accepted in the Blue Box program.
- Explore additional opportunities to reduce and recycle waste in our businesses and institutions.

Make producers responsible for the waste generated from their products and packaging

- Move Ontario's existing waste diversion programs to the producer responsibility model. This will provide relief for taxpayers and make producers of packaging and products more efficient by better connecting them with the markets that recycle what they produce.

Explore opportunities to recover the value of resources in waste

- Investigate options to recover resources from waste, such as chemical recycling or thermal treatment, which have an important role – along with reduction, reuse and recycling – in ensuring that the valuable resources in waste do not end up in landfills.
- Encourage increased recycling and new projects or technologies that recover the value of waste (such as hard to recycle materials).

Provide clear rules for compostable products and packaging

- Ensure new compostable packaging materials in Ontario are accepted by existing and emerging green bin programs across the province, by working with municipalities and private composting facilities to build a consensus around requirements for emerging compostable materials.
- Consider making producers responsible for the end of life management of their products and packaging.



Success story: Making products compostable to reduce waste

Club Coffee makes a compostable coffee pod used by brands including Loblaw Companies Limited (President's Choice), Ethical Bean, Muskoka Roastery, Melitta Canada and Jumping Bean. Club Coffee works with municipalities so coffee drinkers can put these pods in their green bins; however they are not yet accepted in every program. We will work to support businesses that are trying to do the right thing and with leading municipalities that are working to reduce waste going to landfills. This will include working with industry and municipal partners to help ensure contamination of the Blue Box and green bin programs is minimized and that the public is provided with accurate information on how to properly manage compostable products and packaging.

Support competitive and sustainable end-markets for Ontario's waste

- Cut regulatory red tape and modernize environmental approvals to support sustainable end markets for waste and new waste processing infrastructure.
- Provide municipalities and the communities they represent with a say in landfill siting approvals. While we work to reduce the amount of waste we produce, it is recognized that there will be a need for landfills in the future. The province will look for opportunities to enhance municipal say while continuing to ensure that proposals for new and expanded landfills are subject to rigorous assessment processes and strict requirements for design, operation, closure, post-closure care and financial assurance.

CLEAN SOIL

Rural and urban communities benefit from healthy soil and land. Soils with contaminants need to be cleaned up to ensure new home owners or property users are safe, and contaminated soils are not relocated to farms where our food is grown. Having clear rules and standards around how extra soil from construction projects is managed, relocated and reused makes it easier for construction businesses to know what soils they can reuse and what soils need to be disposed of or treated before reusing.

Proper management of excess soil can reduce construction costs and unnecessary landfilling while ensuring soil from construction projects is safe for the environment and human health. By clarifying what soil can be reused locally, we can also reduce greenhouse gas emissions generated by trucking soil from place to place unnecessarily.



Redevelopment of underused, often contaminated sites (brownfields) also provides an opportunity to clean up historical contamination and put vacant prime land back into good use.

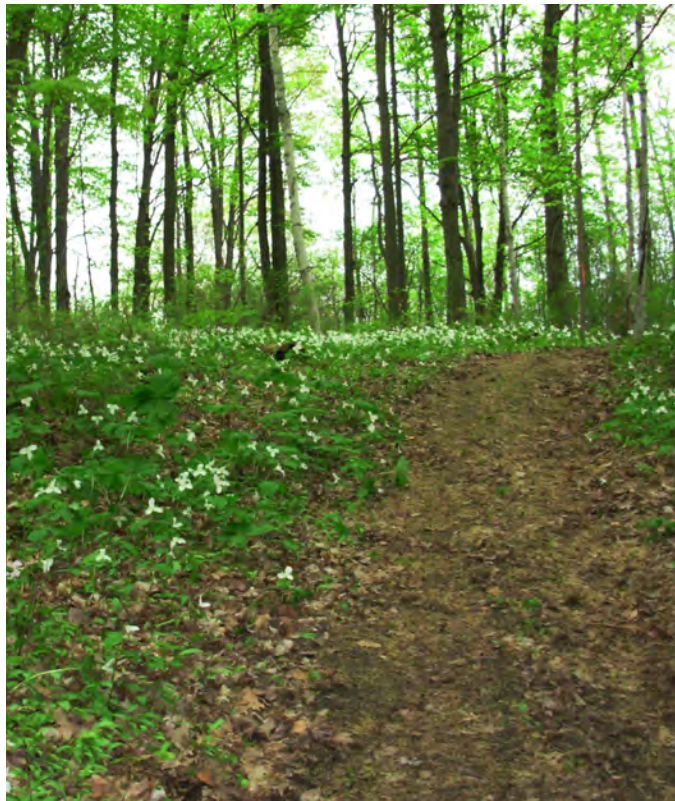
Actions

Increase the redevelopment and clean-up of contaminated lands in Ontario to put land back into good use

- Revise the brownfields regulation and the record of site condition guide to reduce barriers to redevelop and revitalize historically contaminated lands, putting vacant prime land back to good use.

Make it easier and safer to reuse excess soil

- Recognize that excess soil is often a resource that can be reused. Set clear rules to allow industry to reduce construction costs, limit soil being sent to landfill and lower greenhouse gas emissions from trucking by supporting beneficial reuses of safe soils.



- Work with municipalities, conservation authorities, other law enforcement agencies and stakeholders to increase enforcement on illegal dumping of excess soil.

Economic benefits of reusing soil

Traditional excess soil management using “dig and dump” approaches is substantially more expensive than using best practices for reusing soil from construction. According to a recent industry study, projects that use excess soil management best practices for reuse experienced an average of 9% in cost savings (Ontario Society of Professional Engineers, Greater Toronto Sewer and Watermain Contractors Association, Residential and Civil Construction Alliance of Ontario). Savings are due to reduced hauling distances and diverting soils away from landfills.

Improve management of hauled sewage

- Consider approaches for the management and spreading of hauled sewage to better protect human health and the environment (including land and waterways) from the impacts of nutrients and pathogens.

Conserving Land and Greenspace

People travel from around the world to experience the natural wonders that we often take for granted in the province of Ontario. The natural spaces across Ontario, such as forests, wetlands and parks purify our air and water, protect biodiversity and natural heritage, provide recreational opportunities and support Indigenous traditional practices.

We as Ontarians have a long history of putting a strong focus on expanding Ontario's parks and protected areas. In 1999, Ontario's Living Legacy Land Use Strategy was announced. A clear and major goal of this plan was to complete Ontario's

system of parks and protected areas. Our government remains dedicated to maintaining the natural beauty of our province.

As mentioned earlier in the plan, we know that climate change poses a serious threat to Ontario's natural areas and that conservation of these areas can play an important role in mitigating and adapting to climate change. We will protect and enhance our natural areas, support conservation efforts, continue to conserve species at risk, develop adaptation strategies, and promote the importance of healthy natural spaces for future generations to use and enjoy.



Quick Fact: Ontario's Living Legacy commitment was one of the greatest expansions of Ontario's provincial parks and conservation reserves in recent history. Over the immediate years that followed, the commitment resulted in the creation of 58 new provincial parks and 268 new conservation reserves, a total area of 1,996,214 hectares.

Action Areas

Improve the resilience of natural ecosystems

- Collaborate with partners to conserve and restore natural ecosystems such as wetlands, and ensure that climate change impacts are considered when developing plans for their protection.
- Strengthen and expand grassland habitats by implementing the province's Grassland Stewardship Initiative that supports on-farm conservation activities to benefit grassland birds at risk.
- Protect against wildland fire incidents through the ongoing development of Community Wildfire Protection Plans and update technical guidance to protect people and property from flooding and water-related hazards.

- Work with leaders in land and water conservation, like Ducks Unlimited Canada and the Nature Conservancy of Canada, to preserve areas of significant environmental and ecological importance.

Success story:

Innovative Wetland in Middlesex County protects Lake Erie



Ducks Unlimited Canada, the Municipality of Southwest Middlesex, Ontario NativeScape and the Ministry of Natural Resources and Forestry built three retention ponds to capture water draining from more than 200 acres of farmland. The wetland acts as a filter to reduce excess nutrients (such as phosphorus that can create harmful algal blooms in water) reaching the Thames River and eventually Lake Erie.

Forest fires increase in Ontario in 2018

Prolonged dry conditions throughout Ontario made 2018 one of the most active forest fire seasons in recent years, with more than 1,300 forest fires burning over 265,000 hectares of forest, nearly double the 10-year average. While the number and intensity of fires varies greatly from year to year and it is difficult to connect any given forest fire to the effects of climate change, most research suggests that Ontario will experience more fires and longer fire seasons in the years ahead. While forest fires pose a serious threat to public safety, communities, and infrastructure, they are also an important natural process in Ontario's forest ecosystems. Managing forest fires in Ontario is about balancing the benefits of forest fires, and protecting public safety and communities.

Support conservation and environmental planning

- Work in collaboration with municipalities and stakeholders to ensure that conservation authorities focus and deliver on their core mandate of protecting people and property from flooding and other natural hazards, and conserving natural resources.
- Look to modernize Ontario's environmental assessment process, which dates back to the 1970s, to address duplication, streamline processes, improve service standards to reduce delays, and better recognize other planning processes.
- Protect vulnerable or sensitive natural areas such as wetlands and other important habitats through good policy, strong science, stewardship and partnerships.
- Improve coordination of land use planning and environmental approval processes by updating ministry guidelines to help municipalities avoid the impacts of conflicting land uses.

The Ontario government is committed to protecting the Greenbelt for future generations. The Greenbelt consists of over two million acres of land in the Greater Golden Horseshoe including farmland, forests, wetlands and watersheds. It includes the Oak Ridges Moraine and the Niagara Escarpment, and provides resilience to extreme weather events by protecting its natural systems and features.





Promote parks and increase recreational opportunities

- Support the creation of new trails across the province.
- Provide Ontario families with more opportunities to enjoy provincial parks and increase the number of Ontarians taking advantage of parks by 10% or approximately one million more visitors while protecting the natural environment.
- Look for opportunities to expand access to parks throughout the province, but ensure Ontario Parks has the tools it needs to conduct its business and create a world-class parks experience.
- Work to ensure that all fish and wildlife licence fees, fines and royalties collected in the Special Purpose Account go towards its stated purpose of conservation, with transparency for hunters and anglers in Ontario.
- Promote the link between nature and human health by supporting the worldwide movement for Healthy Parks Healthy People through

Ontario Parks' events, education, and the development of a discussion paper to engage the public.

- Review management of provincial parks and conservation reserves to ensure effectiveness by exploring internationally recognized tools and best practices.
- Share the responsibility of conserving Ontario's protected lands by continuing to partner with municipalities, conservation authorities, Indigenous communities, conservation organizations and other community groups such as trail groups.

Conservation of Ontario's rich biodiversity and natural resources is a shared responsibility - success relies on Ontario working together with First Nation and Métis communities, hunters and anglers, conservation groups and other partners to achieve positive outcomes for our environment.

Quick Fact: Ontario manages and protects 340 provincial parks and 295 conservation reserves totalling 9.8 million hectares or 9% of the province – an area larger than the entire province of New Brunswick. In 2018, Ontario celebrated the 125th anniversary of the provincial parks system and of Algonquin Provincial Park.

- Increase the use of Ontario timber in building, construction and renovation to reduce emissions and increase long-term carbon storage.

What is carbon storage? Carbon storage refers to capturing carbon dioxide – and other greenhouse gases in the atmosphere – through vegetation and soils. Practices that remove carbon dioxide from the atmosphere include sustainable forest management, conserving and restoring natural ecosystems, and enhancing soil carbon in agriculture.

Forests begin to emit greenhouse gases as the trees age and die, while younger forests that are growing vigorously sequester carbon from the atmosphere. Sustainable forestry practices can encourage forests to grow and to increase carbon stored in forests and harvested wood products.

Sustainable Forest Management

- Work with Indigenous organizations, the forestry industry and communities involved in managing Ontario's forests under sustainable forest management plans. Ontario will support forest managers to further reduce emissions and increase carbon storage in forests and harvested wood products. Ontario's sustainable forest management provides for the long-term health of Ontario's forests by providing potential opportunities to reduce and store greenhouse gases as trees capture and store carbon dioxide.
- Promote the use of renewable forest biomass, for example, in the steel industry and as heating fuel for northern, rural and Indigenous communities.
- Improve data and information, informed by Indigenous Traditional Knowledge where offered, on greenhouse gas emissions and carbon storage from forests, the changing landscape and permafrost.

Quick Fact: Sandbanks Provincial Park is one of the busiest parks in the province, welcoming over 750,000 visitors every summer. To meet a growing demand for camping, Ontario Parks opened a new campground in Sandbanks Provincial Park in May 2017, featuring 75 campsites.

Protect species at risk and respond to invasive species

- Reaffirm our commitment to protect species at risk and their habitats, as we mark the 10th anniversary of Ontario's Endangered Species Act. We are committed to ensuring that the legislation provides stringent protections for species at risk, while continuing to work with stakeholders to improve the effectiveness of the program.
- Protect our natural environment from invasive species by working with partners and other governments and using tools to prevent, detect and respond to invasions.



Invasive species impact fish and wildlife, and hurt Ontario's economy

Invasive species like the emerald ash borer are killing our trees, phragmites (a type of grass) are taking over wetlands, and zebra mussels are clogging water intakes for industry and cottagers. Second to habitat loss, invasive species are recognized as the second leading global cause to the loss of biodiversity. In addition, invasive species are impacting our recreational opportunities such as boating, swimming, angling, and hunting, and their economic costs are staggering. A recent study estimated impacts of invasive species in Ontario at \$3.6 billion annually with municipalities spending at least \$38 million in 2017/18.

Preventing invasive species from arriving and establishing themselves is the single most effective and least costly method to manage invasive species. Ontario is working with a number of conservation partners to coordinate prevention, control, research and management activities to help address this serious threat. Raising public awareness and engaging individuals in taking preventive action is key in preventing new species from arriving and surviving.

Next Steps

IMPLEMENTING OUR PLAN

Ontario's environment plan presents new direction for addressing the pressing challenges we face to protect our air, land and water, clean up litter and waste, build resiliency and reduce our greenhouse gas emissions.

Our plan includes proposed incentives to stimulate growth in clean technologies, enhance leadership and collaboration to build a province-wide commitment to protecting the environment, and take action on climate change.

Our plan will help people and businesses across Ontario take actions that will save money, enhance communities, create new jobs and grow the economy.

Next steps

As part of our work on this plan, we are also undertaking several important steps to finalize our environment actions for Ontario. Over the coming months, we will:

- **Continue to consult with the public and engage with Indigenous communities**

Throughout the environment plan we have identified areas of action and key initiatives. These are areas where we are engaging with stakeholders and Indigenous communities to develop new approaches that support our common goals for environmental and climate leadership.



- **Establish an advisory panel on climate change**

An advisory panel on climate change will be established to provide advice to the Minister on implementation and further development of actions and activities in our plan specific to climate change.

- **Begin implementing priority initiatives**

In the plan we have identified a number of priority initiatives. Some of these initiatives are already underway and we will begin implementation of the remaining initiatives following consultation.

- **Measure and report on progress**

We want Ontarians to see how our plan is helping them save money and improve the quality of their lives and communities. We are committed to reporting regularly on the progress we make on our plan and to developing key indicators of progress because we believe that transparency is important to the success of this plan. We are also committed to reviewing the environment plan every four years.

Our consultations and engagement with various stakeholders, Indigenous communities and the public will help refine our environment initiatives by incorporating valuable insights that ensure the actions we adopt reflect the needs of Ontarians.

Comments, ideas and suggestions on the actions and initiatives in Ontario's plan to protect the environment can be made on the [Environmental Registry](#).





CANADA'S PLASTICS SCIENCE AGENDA



If you are referring to this report in another publication, please reference it as:

Environment and Climate Change Canada. (2019). *Canada's Plastics Science Agenda*.
Retrieved from: <https://www.canada.ca/en/environment-climate-change/services/science-technology.html>

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CONTEXT

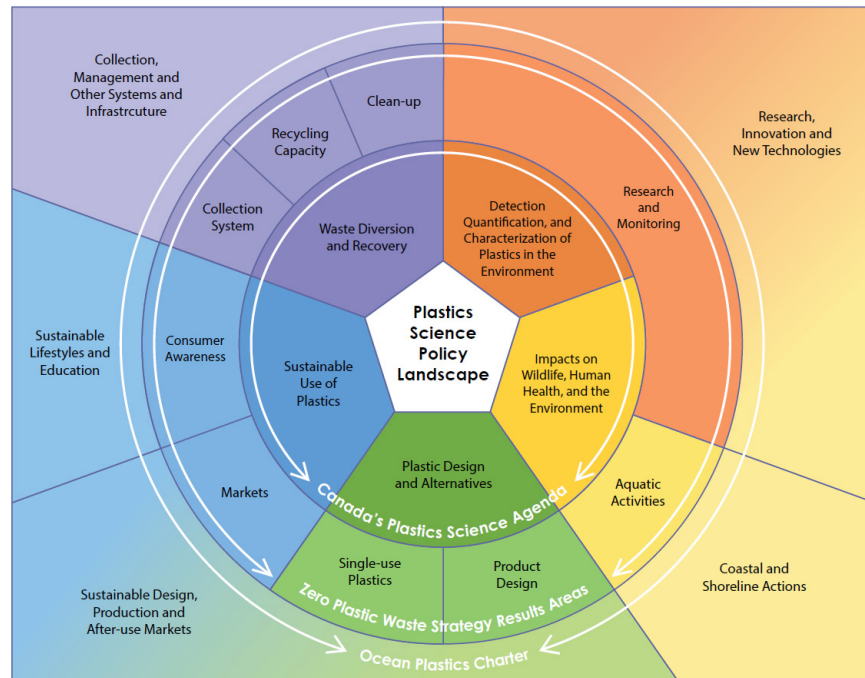
Plastics play an important role in the everyday lives of Canadians. As an affordable and versatile material, plastics are found in a wide range of personal and industrial products, such as pharmaceuticals, food packaging, textiles, and construction materials. However, plastic pollution is found almost everywhere on the planet, including uninhabited pristine environments, and is impacting the environment, wildlife, and potentially human health. Plastics overflow our landfills and incinerators, litter our parks and streets, and crowd our rivers, lakes, and oceans. Plastic pollution has become one of the greatest global challenges of our time, and we have reached a defining moment and urgent action is needed.

The Government of Canada has taken an action-oriented leadership approach to addressing plastic waste and pollution. As part of its 2018 G7 presidency, it spearheaded the Ocean Plastics Charter, which contains commitments and targets aimed at stopping plastic waste and the flow of plastics into the environment. Work on this front is continuing through the G7 and Canada continues to play an active role in advancing international collaborative efforts on plastics.

Domestically, the Government worked with provinces and territories through the Canadian Council of Ministers of the Environment (CCME) to develop the Canada-wide Strategy on Zero Plastic Waste, which Ministers approved in principle in November 2018. The Strategy contains ten results areas that span the lifecycle of plastics, from product design to collection and recycling to clean-up. It also includes a specific focus on effective research and monitoring systems to inform decision making and measure performance.

The Government also launched both the G7 and Canada's Plastics Challenges in September 2018, which were designed to help drive Canadian companies to find new ways to reduce plastic waste by rethinking how plastic is made, used, transported, removed from the environment, and recycled across its lifecycle. Additionally, to reduce the amount of plastic microbeads entering Canadian freshwater and marine ecosystems, Canada prohibited the manufacture and import of all toiletries that contain plastic microbeads as of July 1, 2018, with entry into force of the complete ban on July 1, 2019.

Canada's actions on plastics will contribute to moving the country towards a circular economy, keeping plastics and plastic products in use as long as possible, maximizing their value, and closing the loop in terms of resource use by reducing, reusing, repairing, remanufacturing, recycling, and composting plastics or, if no other option exists, recovering energy at their end of life. This will keep all plastics in the economy and out of landfills and the environment, which will result in significant environmental, socio-economic, and health benefits for Canadians.



Canada's Plastics Science Agenda in the context of the broader plastics science policy landscape

Continuing to advance science is critical to effectively address plastic pollution and support the development of a circular plastics economy. World-class, robust science informs evidence-based decisions, helps spur innovation, and enables tracking of progress. The environmental and wildlife health impacts of large plastic debris (macroplastics) are often observable; however, the environmental and health effects of micro- and nanoplastics are less understood. Although there are knowledge gaps in plastics science, the urgency of the plastic pollution challenge requires that science and policy evolve rapidly. As plastics science advances, it will better inform policy development and improve the ability to track the effectiveness of actions taken. Despite research undertaken by governments, academia, industry, and non-governmental organizations across Canada, much of this important work is fragmented and inconsistent, creating a patchwork of information.

Canada's Plastics Science Agenda (CaPSA) addresses this challenge by identifying opportunities for current and future research across a range of disciplines. Work under these priority research areas will strengthen the plastics-related evidence base for decision-making and help build a circular plastics economy that protects the environment and human health. CaPSA represents a framework of mission-critical, multi-disciplinary science needs. It is positioned to inform science and research investments for detecting plastics in the environment, understanding and mitigating potential impacts on wildlife, human health, and the environment, and advancing sustainable plastic production, recycling, and recovery. CaPSA spans the lifecycle of plastics and adopts a comprehensive approach that will provide the evidence base needed to accelerate the transition to sustainable design and develop innovative recycling and recovery approaches.

CaPSA is a reflection of discussions held with a wide range of partners, including science and policy experts from federal, provincial, and territorial governments, academia, Indigenous organizations, and industry. These discussions include two fora held in November 2018 (*Best Brains Exchange on the Ecological and Human Health Fate and Effects of Microplastic Pollution* and the *Canadian Science Symposium on Plastics*), a stocktaking of federal scientific activities, and additional direct engagement with a range of partners.

The *Best Brains Exchange* allowed participants to discuss relevant scientific knowledge on microplastics and identify knowledge gaps regarding the health-related fate and effects of microplastic pollution. Similarly, the *Canadian Science Symposium on Plastics* was aimed at identifying priority science gaps and needs across various themes and proposing activities for moving forward. The federal stocktaking exercise provided a broader picture of plastics-related scientific research being performed and funded by the federal government. Finally, federal engagement with industry, provincial, territorial and Indigenous partners sought to collect input on the state of plastics science in their respective areas, as well as their perspectives on the actions needed to support the implementation of the CCME Canada-wide Strategy on Zero Plastic Waste.

CaPSA is a call to coordinated action on plastics science priorities. It is designed to help all Canadian researchers and research funders understand the key plastics science needs in Canada. By proposing several goals and activities that range from the short term to the longer term, it will also serve as a roadmap for guiding Canada's scientific efforts towards a zero plastic waste future, supporting the Canada-wide Strategy on Zero Plastic Waste and Action Plan, as well as Canada's commitments under the Ocean Plastics Charter.

PRIORITIES AND NEEDS

CaPSA builds on the plastics science already underway in Canada and internationally. Its framework represents the priority science needed to identify and address the effects of macro-, micro- and nanoplastic plastic pollution, and to achieve a circular economy for plastics. CaPSA's science goals and needs are categorized into five complementary themes, highlighting areas requiring more collective attention going forward. These five themes cover the entire lifecycle of plastics and are:

1. **Detection, quantification, and characterization of plastics¹ in the environment** – Harmonizing / standardizing the detection, monitoring, and characterization of the sources, pathways, concentrations, and fate of plastics in the environment.
2. **Impacts on wildlife, human health, and the environment** – Increasing understanding of the impacts of plastics on wildlife, human health, and the environment.
3. **Plastic design and alternatives** – Decreasing the environmental footprint of plastics by improving their design and enabling value recovery.
4. **Sustainable use of plastics** – Supporting the informed and responsible usage and sustainable management of plastics.
5. **Waste diversion and recovery** – Innovating to enhance the capture and value recovery of existing and future plastics.

¹ For the purpose of this document, references to plastics include macro-, micro- and nanoplastics, unless otherwise specified.

Currently, efforts are being made to address many of these needs. However, there is significant potential for collaboration and leadership among scientists—including all levels of government, academia and research institutes, non-profit and Indigenous organizations, and industry—to achieve the goals of the framework.

Theme 1: Detection, quantification, and characterization of plastics in the environment

Under Theme 1, the overarching goal is to **detect, quantify, and characterize the sources, pathways, concentrations, and fate of plastics in the environment**. Action under this theme will provide a strong foundation for work under Themes 2 through 5.

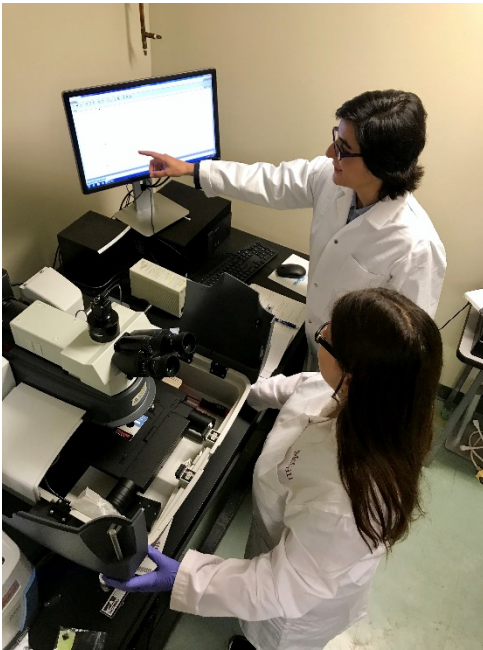
The **harmonization (and in some cases standardization) of methodologies and reference data** for the sampling, detection, quantification, analysis, and risk assessment for specific environmental compartments² will be fundamental in fulfilling this goal. It will contribute to reducing lab and field contamination and establishing quality control in research pursuits. While harmonization is critical to routine monitoring, flexible method development and application will still be necessary for emerging research on humans, wildlife, and environmental receptors.

These harmonized methodologies should ensure that data are accurate, representative, and reproducible, and should recognize that plastics behave differently across the ecosystems and environmental compartments in which they are found. These methods should also be complemented by a more robust understanding of the influence these environments have on plastics over their lifecycle (e.g., susceptibility to weathering). To compare research results across studies, track trends over time, and effectively assess cumulative environmental effects, the development and harmonization of methodologies and reference data is critical. Considering that plastics differ widely in terms of size, composition, and other characteristics, as well as the fact that new methodologies are being developed to fit monitoring and research questions, minimum reporting criteria should be established to facilitate comparability between studies (e.g., size, shape, polymer type, etc.). Finally, the contamination of samples is a significant challenge with respect to the quality and reliability of data given the ubiquity of plastics. As such, quality control and quality assurance procedures need to be developed and standardized for use by the plastics research community.

Methodological advancements in the study of plastics

Dr. Nathalie Tufenkji and her colleagues at McGill University are working to advance the methods used to study microplastics and nanoplastics to better understand the way these materials are formed and move through the environment, aggregate, and pick up other pollutants. For example, their work provides insights into the degradation of bulk plastics into smaller microplastic and nanoplastic fractions. Their work has also advanced toxicity studies by accounting for the various additives present in microplastics that are produced specifically for laboratory studies, which can skew the results.

² For the purpose of this document, “environmental compartments” will include air (indoor and outdoor), water (fresh and marine), soil, sediments, ice, and biota.



Dr. Nathalie Tufenkji in her lab with student Laura Hernandez (Photo courtesy of Raphaella Allgayer)

Harmonized and/or standardized methodologies can provide a foundation for increased **research efforts, monitoring, and modelling** to determine the types, concentrations, sources, distribution, transport, degradation, and fate of plastics across different environmental compartments. The examination of the fate of plastics in controlled environments that can mimic naturally occurring processes will be helpful in following plastic pollution over both shorter and longer timescales. In addition, taking a lifecycle view—from source to fate—will be key in producing a comprehensive picture of plastics and ultimately informing targeted action. This includes a more rigorous examination of large single-source sectors for aquatic plastics, such as fishing, and a focus on freshwater systems that transport plastics and are a significant source of plastics in the world's oceans.

Applying a variety of research and monitoring techniques and methods will help develop **reliable modelling tools** for identifying sources of plastics and predicting their degradation and fate. Using space-based earth observation technologies and measuring

and modelling the transport and fate of plastics will also help identify hotspots for plastic pollution, including geographic accumulation zones and species with high accumulation rates. Overall, increased research, monitoring, and modelling will produce a better understanding of plastic pollution hotspots, and the levels of exposure for organisms and humans. This will guide the assessment of environmental and health risks under Theme 2, and inform future research and action.

Regional state of knowledge report

Dr. Max Liboiron and her colleagues at Memorial University are working on a report addressing the state of knowledge for plastic pollution in Newfoundland and Labrador. Their report will obtain, coordinate, and analyze all available data on plastic pollution in the province, enabling new analyses and visualizations and identifying areas of interest and intervention. Ultimately, the report is aimed at providing policy-makers, rights holders, and stakeholders with the information they need to make informed decisions regarding plastic pollution. This project builds on strong community collaborations and training and is an example of how to effectively work with local Indigenous and Inuit communities in research efforts.



*Shoreline plastics, Newfoundland and Labrador
(Photo courtesy of Dr. Max Liboiron)*

An important aspect of monitoring techniques is their contribution to **measuring the effectiveness of existing and proposed regulatory actions, and other policies and actions designed to tackle plastic pollution**. This area is particularly critical as plastic pollution continues to garner significant global attention and momentum, and with the acceleration of the development and implementation of policies relating to plastic pollution reduction. Science must play a fundamental role in developing, examining, adjusting, and validating current and future policies and actions.

Theme 2: Impacts on wildlife, human health, and the environment

Under Theme 2, the overarching goal is to increase **understanding of the impacts of plastics on wildlife, human health, and the environment**. Health extends beyond the absence of disease or harm, and includes the capacity of organisms for resilience in the face of environmental stress caused by plastic pollution, and cumulative effects from other stressors.

Understanding the characteristics of plastics exposure, and thus its potential effects, is crucial. Science related to the **exposure and occurrence of plastics** in humans, wildlife, and the environment will provide an improved understanding of where plastics originate and how they travel through the environment to organisms. Similarly, science to **characterize the hazard** posed by plastics will highlight which subpopulations may be more sensitive. To characterize the hazards posed by plastics, knowledge of the composition of plastics in food (including traditional subsistence foods), drinking water, and the environment is needed to inform appropriate toxicological studies (e.g., relevant ecological concentrations, appropriate polymers). Properly characterizing both exposure and hazard is essential for identifying subpopulations at risk of reaching a level of exposure where adverse effects may occur.

Understanding the role seabirds play in spreading microplastics

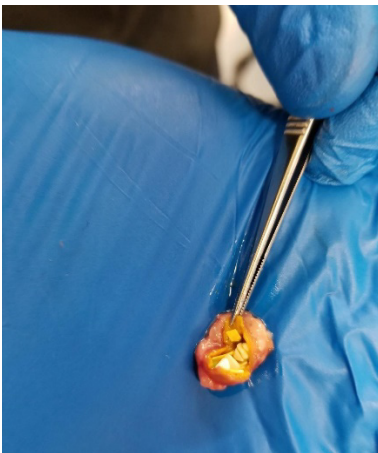
Ongoing collaborative research under the Northern Contaminants Program has been exploring the vulnerability of northern marine bird species to marine plastic pollution. New work from the research team—led by Drs. Jennifer Provencher (Environment and Climate Change Canada) and Mark Mallory (Acadia University)—is looking into how seabirds, in addition to ingesting plastics, might also spread microplastics in the environment through their guano. The researchers are analyzing air, water, sediment, mussel, and seabird samples collected by local Inuit community members in the areas around seabird colonies in order to understand how microplastics are distributed and move through Arctic ecosystems. The project also includes strong contributions from traditional knowledge.

In addition to the possible direct physical effects of plastic exposure, we know that plastics can also act as **vectors for chemical contaminant exposure** for both plastic-derived chemicals and environmental pollutants. Plastics can release chemicals used in their production, such as plasticizers, flame-retardants, and UV stabilizers, some of which have been linked to endocrine-disrupting activity and other adverse effects. Plastics have also been associated with

a high capacity to pick up other chemicals present in the environment, such as persistent organic pollutants (POPs) and trace metals, as well as biological contaminants such as bacteria and viruses. The extent to which plastics pick up and release contaminants depends on the type, size, and shape of plastic, its chemical properties, and the environmental conditions present, including the characteristics of an exposed organism. This growing field of research on the interactive effects of plastics with other pollutants will inform the range of health effects attributable to plastic pollution in wildlife and humans, and impacts on the environment, with a focus on both the organism and population levels.



Research campsite close to a seabird colony (Photo courtesy of Dr. Cody Dey)



Stomach of a Leach's storm petrel containing plastic (Photo courtesy of Dr. Jennifer Provencher)

There are several other priority research areas related to the impacts of plastics on human and wildlife health and the environment. Efforts to advance and harmonize methods (Theme 1) are fundamental to making progress in these priority areas. These additional priority research areas include mechanisms of transport (including through food webs), individual-, population-, and community-level effects, and short- and long-term studies to understand the acute and chronic effects of plastics. Monitoring programs focused on key sentinel species could provide an ongoing indicator of wildlife health, human health risks, and environmental impacts. Finally, research into the human health effects of plastics should include the mental health and socio-cultural impacts resulting from the contamination of country foods and from wildlife being harmed by plastic pollution, in recognition of the relationship to the land that exists in Indigenous, northern, and remote communities.

Theme 3: Plastic design and alternatives

Under Theme 3, the overarching goal is to **decrease the environmental footprint of plastics, including improving their design and enabling value recovery (e.g., reuse, repair, remanufacturing, recycling, and composting).**

Innovation in the **design and manufacturing of plastic resins, additives, and products** is ongoing, and there are thousands of different plastics and plastic-containing products on the market. Plastics and plastic products are often developed to meet specific performance requirements, such as to increase strength and durability, extend the shelf life of perishable food, or reduce transportation- and manufacturing-related greenhouse gas emissions by reducing their size and weight. These are important objectives to inform plastic design; however, meeting our goals will also require **introducing zero plastic waste principles and incentives into innovation and design.** A circular economy for plastics will require that these principles be a primary focus, along with other critical goals, such as climate change mitigation and resilience.

Achieving zero plastic waste starts from the beginning of the design process, and should be informed by data that assesses the health and environmental impacts of plastics across their entire lifecycle. This includes knowledge of the impacts of plastics, additives, alternative feedstocks, and manufacturing processes. It also includes insights derived from analyzing the plastic production and waste streams, as well as knowledge of end-of-life options for future value recovery. Better understanding of which plastic products are commonly found in the environment, such as microparticles from textiles or tire wear, can also inform product design to prevent unintended leakage and enhance value recovery.

Taken together, these insights can help inform the development of sustainable plastics and plastic products, support innovation, and inform business decision making at the earliest stages of product development. Market analysis on the reusability, reparability, refurbishment, remanufacturing, and recyclability of different plastics can also support business decisions related to product design. Incentivizing and promoting this holistic approach can help minimize unintended consequences (e.g., shifting environmental or health impacts from one category to another), support a circular plastics economy, and **focus research investments towards Canada's zero plastic waste goals.**

To further advance the sustainable design of plastics and plastic products, research is needed on the development of **alternative products that provide the beneficial functions of plastics while also reducing negative environmental and health impacts.** This can include use of alternative feedstocks like recycled materials, methane, forestry and food product wastes, and biomass, where validated by a comprehensive lifecycle assessment.

Innovation in bioplastic production

Dr. Trevor Charles, a microbiologist from the University of Waterloo and the company Metagenom Bio, has been conducting research on bioplastics. More specifically, his innovative research explores ways to use bacteria to convert waste such as methane to bioplastics. In producing these bioplastics, the method also makes use of a readily abundant waste product—and powerful greenhouse gas—from sources like landfills and wastewater treatment systems.

Further work is also needed to address difficult-to-recycle plastics, including those produced with additives such as dyes, hardening or softening agents, or flame-retardants, which can affect the recyclability, value, or safety of the recycled product. Designing plastics to reduce waste and enable circularity includes using chemistries that will enhance recyclability and reduce the use of potentially hazardous substances that could lead to human health and environmental risks. It also includes building on the concept of “safe-by-design.”

Sustainable design strategies for achieving zero plastic waste also include designing products for durability (e.g., longer use, less fragmentation during use), disassembly for reuse and repair, refurbishment, and remanufacturing into new products.

The development of new plastic resins, additives, and products is driven by industry. However, there are opportunities for science to play a supporting role in **advancing sustainable design**. This includes considering how design relates to risks (e.g., fragmentation, greenhouse gas emissions, exposure to hazardous substances) and how it can reduce waste and enhance value recovery. Zero waste goals and the analysis of lifecycle impacts should be priorities for collaboration and investment in the research and development of new plastics. The federal government and key partners also have a role to play in encouraging the development of scientific expertise in Canada, in order to build the capacity needed to provide scientific support for reaching Canada’s zero plastic waste goals. In support of CaPSA, the federal government will work with science collaborators, other organizations, and networks to leverage funding across sectors and accelerate sustainable plastic innovations to enable zero plastic waste solutions.

Theme 4: Sustainable use of plastics

Under Theme 4, the overarching goal is to **support the informed usage and sustainable management of plastics by all sectors, including industry, and citizens**. Understanding the benefits and impacts of plastics, as well as business and consumer motivations and behaviours, will help to inform their responsible use.

In most cases, the social sciences that will support progress in this area are newer and less developed than the natural sciences. They are, however, key to the successful implementation of policies to reduce plastic waste and pollution.

Research to **support behavioural change targeting industry and consumers** will encourage these groups to adopt sound practices for the consumption and management of plastic resources. It will provide the knowledge base to support efforts to treat plastics as a valuable resource and meet the ambitious plastic waste reduction targets laid out in the Ocean Plastics Charter. Leveraging and enhancing the participation of industry and consumers—with the help of research to understand their motivations, attitudes, and beliefs surrounding plastics—is vital to increasing the circularity of the plastics economy. Areas of focus may include: research into the effectiveness of behavioural interventions aimed at extending the useful life of plastics; encouraging the purchase of recycled, remanufactured, and alternative products; and encouraging the sound and sustainable use and disposal of plastic products. Additional areas of focus should include behavioural insights related to industry, in order to understand the drivers

and mechanisms of plastic use and function along the value chain, as well as the barriers and opportunities related to adopting more sustainable practices.

Using behavioural interventions to reduce plastic waste

Ocean Wise—a Vancouver-based non-profit active in promoting global ocean conservation through research, education, and engagement—has been working to mitigate plastic pollution through its Plastic Wise campaign. To assess the impact of this campaign and understand what sort of behavioural interventions are most effective in reducing plastic waste, Dr. Jiaying Zhao and colleagues from the University of British Columbia's Department of Psychology partnered with Ocean Wise to explore several different poster-style interventions in an office environment. These interventions ranged from simplified recycling signage to images of marine animals trapped in plastic waste to an invitation to sign a pledge to protect ocean life from plastic pollution. The study findings showed that animal images, combined with better recycling instructions, were most effective. Insights like these can help reduce plastic pollution by effectively targeting daily individual behaviours.

Similarly, **knowledge mobilization and science communication** are key components in supporting **informed decision making concerning the use, management, and disposal** of products containing plastic. The systems to manage plastic products are widespread and diverse, as are the effects of plastic pollution. Science must therefore consistently integrate knowledge specific to the local context from a variety of stakeholders. Similarly, scientific results must be effectively communicated across the same range of expertise and local contexts. In addition, understanding the current level of knowledge among administrations, industries, and consumers regarding the urgency and scale of the plastics problem, as well as the actions that can be taken, is needed to inform future interventions.

Finally, achieving zero plastic waste will have significant impacts for Canada's economic sectors. Gathering data and developing approaches to **quantify the economic impacts of a market transition to a circular economy for plastics** is crucial to informing its adoption by Canadian industry, consumers, and public administrations. In addition, understanding the barriers to market entry for innovative plastics and plastic products can also inform policies that incentivize the retention of plastics in the economy. Areas of research may include the development of economic modelling tools for the plastics economy, as well as cost-benefit analyses of different policy approaches to achieve zero plastic waste. Additionally, ongoing monitoring and reporting on the flow of plastics in the Canadian economy will help assess progress toward a circular plastics economy.

Facilitating research in these areas would provide strong foundational knowledge to ensure **informed usage and sustainable management of plastics by all Canadians**. Supporting the development of the social sciences relevant to moving towards a zero plastic waste economy will be crucial to the development of successful intervention strategies that are tailored to the Canadian context.

Theme 5: Waste diversion and recovery

Under Theme 5, the overarching goal is to **enhance the capture and value recovery of existing and future plastics**.

Science can support the development of mechanisms and technologies to increase the capture of used plastic products and prevent their leakage into the environment. Improving the capture of plastics will require a **better understanding of the current practices and opportunities for innovation**, particularly in sectors that produce large amounts of plastic waste. This includes, for example, the Industrial, Commercial, and Institutional (ICI), Construction, Renovation, and Demolition (CRD), and automotive sectors. A better understanding of how all sectors produce, use, collect, sort, and dispose of plastics is needed. This will inform the development of innovative systems, best practices, and incentives to improve diversion and enable value recovery, including the prevention of pellet and scrap loss during manufacturing or recycling.

Waste recovery facilities in Canada primarily use manual sorting of waste streams, which could be improved by digitalization. Additional research is needed for **advanced identification methods and sorting technology**, such as artificial intelligence, which will facilitate recyclability and value recovery by increasing the quantity and quality of useable feedstock from secondary materials. Science will also be needed to determine the feasibility and efficacy of scaling technological innovations throughout Canada, including for use in northern and remote areas.

Importantly, science is needed towards **more complete recovery of plastics from key entry points into the environment**, such as microfibers lost to the environment through wastewater and its by-products. For plastics that have already been lost to the environment, technology and innovation are needed to **collect and process plastic debris** from terrestrial and aquatic environments, such as fishing gear.

Following plastics throughout their lifecycle

Researchers at Polytechnique Montréal are working to identify and analyze the possible pathways that a particular product or material, like plastic, could take from its production to its disposal. The research, led by Drs. Sophie Bernard and Jean-Marc Frayret, will provide insight into why certain products do not always follow the intended pathway. The idea is to identify the ideal pathway, considering both the product's environmental and management costs, and then locate potential points of friction (e.g., gaps in policy, technology, market structure) that would push it off this path. Additional work is being done on the potential use and adoption of a tool for the traceability of materials and products. This tool could use new technologies like blockchain to provide key information about a product's impact (e.g., emissions, material consumption, end-of-life treatment) at each step in the value chain, and would support better decision making by consumers, industry, and governments.

Value recovery of captured plastic products includes repair, reuse, remanufacturing, refurbishment, recycling, and energy recovery (in order of desirability according to the CCME waste management hierarchy). Science can support advancements in recycling, composting, and conversion of plastics to fuel and energy, and will build on and complement work on the design of plastics (Theme 3).

Technologies to recycle plastics are in development, and can either be mechanically or chemically based. There is a need to better understand the use of these technologies at different scales and in different settings in terms of their efficacy, readiness, and optimal use throughout Canada. In addition, the other environmental consequences of these technologies should be properly evaluated, such as the energy- and water-intensive nature of some chemical recycling methods. Research is also needed on different recycling technologies to create a feedstock that can be recycled multiple times without a decrease in quality.

For plastic products that are designed to be **compostable**, additional research is needed to improve the technologies for identifying, sorting, and processing them, as well as research to improve the performance of the products themselves. In addition, research is needed on the biodegradability of these products in the natural environment and their potential contribution to plastic pollution and marine litter. This includes facilitating access to larger-scale facilities where laboratory results can be validated, ensuring there are no unintended consequences when these new compostable products move into real-world applications.

Converting plastics into fuel and energy is another area where research is needed, particularly in terms of undertaking these activities in an environmentally and economically responsible manner (e.g., technologies for fuels from landfill-diverted waste, plastics combustion in cement kilns). Focused research will help identify potential plastic feedstocks through economic and lifecycle analyses, develop the technologies needed to convert existing and future feedstocks into energy, and understand the fate of chemicals, such as POPs, in order to safely and responsibly convert plastics into energy.

Plastics science and northern realities

Plastics science in northern, Arctic, and remote communities intersects with many urgent social, cultural, environmental, and economic issues. For instance, access to clean drinking water in many of these communities remains a challenge, and residents must frequently rely on bottled water. In addition, country foods play an important role in promoting cultural identity and reducing food insecurity and reliance on food shipped from southern Canada, which is often expensive and of poor nutritional value. As the science on the wildlife and potential human health impacts of plastics advances (e.g., plastics in bottled water and country foods), there will be implications for Indigenous communities to be considered alongside basic infrastructure and food security issues.

In addition, northern and remote communities have different priorities for science that supports waste diversion and recovery, again tied to infrastructure issues. For example, proper waste disposal and recycling facilities that are viable in these communities will be a priority in order to keep plastic out of the environment. This work will also be informed by science related to detection aimed at determining where the various plastics present in northern communities originated (e.g., local sources versus long-range transport).

Given the isolation and vulnerability of many of these communities, it is vital that research efforts involve local communities and governance, and include a strong education, training, and capacity-building component. This will ensure community members have the skills and knowledge needed to make decisions based on the information being generated about plastics in their unique environment. An example of collaboration and community-based research is a project funded by the Northern Contaminants Program called “Community

monitoring of plastic pollution in wild food and environments in Nunatsiavut.” Through this project, Inuit organizations and university professors are working together to raise awareness about marine debris and microplastics pollution while training Inuit participants in a northern community to be co-researchers and lead sampling efforts.

HOW WE GET THERE

Canada is a global leader in plastics science, with significant work happening across the five key themes of the framework, and with participation from many sectors. Much of this work is fragmented, however, creating a patchwork of information and efforts. Mechanisms for collaboration, knowledge mobilization, and capacity building must be leveraged to increase coordination and best utilize resources and expertise to address all the priority research areas of the framework.

It will be critical for scientists and funders to **consider the priority science needs outlined in this agenda**, and how research can contribute to achieving the science goals in a way that is **aligned with ongoing initiatives**. A targeted multi-faceted approach to plastics science in Canada will address priority knowledge gaps, enhance capacity, capitalize on opportunities for innovation and growth, and provide the required evidence base to support sound decision making, including potential new regulations, policies, and programs.

1. Collaboration

Collaboration between federal departments and agencies, other levels of government, academia, industry, non-governmental organizations, Indigenous groups, and international organizations on plastics science is ongoing, and is amplified through the implementation of CaPSA. A cornerstone principle of CaPSA is that plastics science and research should combine **expertise from multiple sectors and disciplines**, wherever possible.

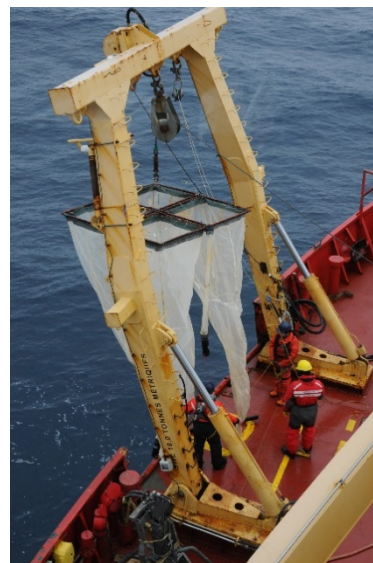
The **Canadian Science Symposium on Plastics** (November 2018) brought together federal government representatives and academic experts on plastics science to identify and prioritize key gaps, and propose activities to move forward. This forum also provided a venue to build networks and partnerships and connect science and policy experts. Given its success and the interest expressed by attendees, this Symposium will be a **regular event** that can be focused on **sharing results on specific plastics science questions**. Following the expert advice from the last Symposium, the next Symposium will focus on a foundational priority: the **development of harmonized methods and reference data** for the detection, quantification, and characterization of plastics across environmental compartments.

Interdisciplinarity and collaboration across all research sectors in Canada will help enhance Canada's plastics science capacity. For example, Health Canada, McGill University, the University of Toronto, and Environment and Climate Change Canada have an opportunity to work together to develop methods for the quantification and characterization of microplastics in environmental compartments, including water, soil, and food. The project aims to develop new, more advanced, and reliable techniques for identifying and quantifying microplastics in various media. The outcomes of this project will help better understand human exposure to microplastics and will inform risk assessment approaches and risk management strategies, as warranted.

Bringing the research community together in deliberate ways can serve to increase coordination and collaboration. Moving beyond regular workshops, researchers can be drawn together through funding programs that prioritize and incentivize collaboration, both within Canada and internationally. **Coordination can also be enabled through**

data sharing across research communities, through a central repository for current, planned, and completed work across disciplines and sectors, or through the creation of working groups or communities of practice that focus on specific problems in a holistic way. Existing networks and programs (e.g., Northern Contaminants Program) can also be leveraged by, for example, expanding existing monitoring efforts to include microplastics. In addition, innovative approaches to problem solving implemented elsewhere can be emulated in Canada. One notable example is an international collaborative effort to standardize methodologies between laboratories, supported by an interlaboratory network.³ This type of approach could be adapted to the Canadian context and used to address priority research questions.

On sustainable design and waste, more efforts can be made to bring together scientists, engineers, lifecycle analysis experts, and municipalities, as well as social and economic scientists, to work together on scoping out product development or waste conversion solutions. The goals in the Ocean Plastics Charter create an incentive for collaboration, and creating nimble research networks can help mobilize diverse expertise around a particular innovation or plastic pollution mitigation strategy.



Collecting zooplankton from the CCGS Amundsen (Photo courtesy of Dr. Liisa Jantunen)

³ The QUASIMEME/NORMAN Interlaboratory Study on the Analysis of Microplastics in Environmental Matrices.

There is an opportunity to build on the many community-led cleanup activities already taking place across the country, integrating a **citizen science** angle to contribute to monitoring efforts. These types of activities are particularly well suited to the monitoring of large plastic debris, and should address land, freshwater and marine coasts, and nearshore areas. An existing example is the Great Canadian Shoreline Cleanup, delivered by Ocean Wise and World Wildlife Fund Canada. As part of this initiative, any Canadian can participate in a cleanup and the collected materials are tracked, providing information on the most prevalent types of plastic litter. An added benefit of this type of program is an increased awareness of plastic pollution among Canadians.



Lara Werbowski uses a Raman spectrometer in the Rochman Lab (Photo courtesy of Cole Brookson)

Bridging science and action to tackle plastic pollution

Dr. Chelsea Rochman and her research lab at the University of Toronto are working to understand the sources, fate, and impact of pollutants on aquatic ecosystems, with a focus on plastics. Their work includes a strong commitment to collaboration and knowledge mobilization, and they frequently partner with non-profit organizations and governments to ensure policies and actions to mitigate plastic pollution are informed by science. Dr. Rochman's lab is also active in outreach efforts, engaging the public in events like their annual #CleanUpTheDon event, where community members help clean up the Don River and learn about plastic pollution. These cleanup events also provide Dr. Rochman's lab with important data to inform their research efforts and future action.

2. Knowledge mobilization

Knowledge mobilization is another principle for CaPSA, to ensure that research investments and outputs have an impact on actions to reduce plastic waste, mitigate plastic pollution, and achieve circularity. There are critical knowledge gaps that must be addressed in order to better support evidence-based decision making and, given that this emerging issue is evolving rapidly, research will need to advance in tandem with policy and infrastructure planning.

There is a need to **connect researchers from a wide range of disciplines, policy-makers at all levels of government, and key influencers in other sectors** in innovative ways, creating linkages between scientists and the users of science. Sharing data through accessible mechanisms is one means of doing this, as access to data can help inform decision making. This could include monitoring data that is accessible to decision-makers and communities, or information on emerging Canadian innovations that can be utilized by industry or in recycling infrastructure. Many **open data** platforms already exist or are in development, but no platform specific to plastics research exists. There have been calls internationally, through the G7 and

the United Nations Environment Assembly, for example, to facilitate access to data on plastic pollution. The federal government is committed to continued cooperation with the Chief Science Advisors of the G7 and the European Union to advance scientific understanding and information sharing related to microplastics. The federal government can also play an important role in building a data-sharing community among researchers, and in raising awareness of the various platforms that could be used to share data.

Knowledge mobilization fora can bring the research and policy communities together to increase the impact of federal investments in plastics science. Policy Ignite and the Canadian Science Policy Conference are two possible mechanisms that could be leveraged for sharing research results with a policy audience. Regular knowledge sharing could be planned and leveraged to include an objective of informing policy-makers of science outputs and discussing evolving needs. The multi-partner approach of the *North American Caribou Workshop* could also serve as a model.



Art as knowledge mobilization (Detail of “In The Belly Of The Whale” by Julie Sperling)

Stimulating new innovation and supporting technology deployment will also be an important part of achieving Canada's zero plastic waste goals. Challenge competitions, for example those coordinated by Innovative Solutions Canada, have already proven that they are helpful in addressing specific aspects of the plastic pollution problem. Policy objectives set by all levels of government to help reduce waste, increase the capture of plastics, and advance green procurement can also incentivize innovation and investments aligned with achieving greater circularity in the plastics economy.

In situations where specific questions or challenges need to be addressed, task teams can also be struck to **develop targeted science advice or collaborate on technical challenges** to try to rapidly synthesize knowledge and identify solutions. In these situations there is a well-scoped problem and a clear user of the resulting information. One example of this is the incident report the Canadian Wildlife Health Cooperative submitted to federal decision-makers to inform action in response to the 2017 right whale die-off. These incident reports could be explored as one way to mobilize critical knowledge in a targeted and applied manner, including insights into priority issues.

Finally, social media has been a powerful tool in raising awareness about plastic pollution and encouraging action among citizens. It can also play a role in sharing science and mobilizing knowledge. There is a **growing community of scientists using social media**, both as part of their research (e.g., sharing their work, keeping abreast of the latest research, expanding their networks, cross-pollinating between disciplines) and as a way to communicate their work to

non-scientists. This momentum could be encouraged and leveraged to build and connect the plastics science community. Activities like “Ask A Scientist” or a plastics Twitter conference could be explored. Federally, the government could also explore developing a communications strategy for plastics science to help increase the impact of federally supported research.

3. Circular economy transition

The flow of materials and energy in the Canadian economy is mostly linear, as resources are extracted, transformed into products, and then disposed of as waste. In contrast, a circular economy aims to keep products and materials in use for as long as possible and to maximize their value. This system closes the loop in the use of natural resources by reducing, reusing, repairing, remanufacturing, recycling and composting materials or, if no other option exists, recovering energy at their end of life.

Plastics are an example of a lost value in the resource chain, with 91% either landfilled, incinerated, or lost to the environment in Canada today. To work towards fulfilling the objectives of the CCME’s Canada-wide Strategy on Zero Plastic Waste, the design, production, use, recovery, and adaptive recycling and reuse of most—and ideally all—plastic materials must be made sustainable through minimal or zero waste throughout the full lifecycle and value chain of products.

Science can further the transition to a circular economy for plastics by supporting informed substitution in the design of plastic resins, additives, and products; providing the analysis needed to support behavioural change interventions; and enhancing the mechanisms and technology for capture and value recovery of existing and future plastics.

A goal of CaPSA is for the principles of a circular economy to be advanced in any plastics-related research. An inventory of current federal investments related to plastics science highlighted that there may be additional opportunities to consider recyclability or compostability, where appropriate, in the early stages of product development when undertaking projects aimed at furthering other objectives (e.g., lightweighting cars to reduce greenhouse gas emissions, using bio-based polymers for the development of plastics materials). As part of its commitments to advancing circularity, the Government of Canada’s investments in science could further the principles of the circular economy in all projects or activities involving plastics materials, particularly by assuring that all materials are developed with comprehensive lifecycle analyses that fully consider the potential health and environmental risks of the products. It will also be important to gather lessons learned from the application of a circular economy lens to plastics in order to help inform its application to other materials and sectors. This could be accomplished, in part, by incorporating circular economy criteria into evaluation and monitoring efforts associated with applicable research initiatives.

4. Capacity building

According to a recent economic study commissioned by Environment and Climate Change Canada, Canadians throw away over 3 million tonnes of plastic waste every year. This represents an estimated lost economic opportunity of close to \$8 billion per year in Canada. Moving towards a circular economy for plastics is a significant economic opportunity. Part of this

shift will include a pull for **more capacity and expertise in Canada to perform research** on product development, recycling and recovery technologies, the socio-economic factors of market transition, and changes in plastic use and pollution in Canada.

Research funding through Canada's granting agencies and federal departments and agencies, for example, through jointly funded targeted calls on important themes, is one way to increase Canadian research capacity. This could include supporting multi-disciplinary projects to help develop the skills needed to address complex problems, or creating more opportunities for students to work in emerging areas of plastics science. The **Green Municipal Fund** is another avenue to harness and expand existing expertise to address specific plastic waste management problems at the municipal level. The **Science Horizons Youth Internship Program** is a federally supported program that helps to increase the workforce in science, technology, engineering, and mathematics (STEM) fields within the environmental and clean technology sectors. It is also important to build capacity by **involving local communities in research projects**. For instance, Ocean Wise's Ikaarvik program engages local youth, drawing on Inuit knowledge and science to address issues of local concern. The youth gain experience and skills that enable them not only to play a more active role in research being done in their communities, but also to better present community needs to researchers and communicate the research back to the community.

Other levels of government can also invest in STEM education and in supporting small and medium enterprises in Canada, which represent an area of significant potential job growth in the future circular plastics economy. Industry can also invest in research and development to support this science agenda. Through collaboration across different sectors and levels of government, **investment in research and development and skilled jobs will help increase capacity** to address the challenge of plastic pollution and Canada's zero plastic waste goals.

CONCLUSION

The Government of Canada has been a world leader on plastic pollution, through the Ocean Plastics Charter, the Canada-wide Strategy on Zero Plastic Waste and its corresponding Action Plan, the G7 and Canadian Plastic Innovation Challenge, the ban on microbeads, and a range of research and development initiatives, including support for on-the-ground initiatives and citizen science. In addition to leading by example, these initiatives are contributing to changing the way plastic products are manufactured, used, disposed of, and recovered, and are supplying important scientific knowledge to inform and support the decision- and policy-making that will shift Canada towards a circular plastics economy.

While government action and leadership is important, the scope and scale of the plastic pollution challenge will require collaborative and coordinated action across all sectors and regions, including all levels of government and Indigenous partners, industry, academia, the non-profit sector, and the general public. Science will be fundamental to informing this action, which is why the Government of Canada has worked with partners to produce Canada's Plastics Science Agenda.

CaPSA is meant to amplify the impact of Canadian plastics science by providing a framework that identifies gaps in current knowledge and the science needed to fill them, as well as policy-

relevant areas of focus. The hope is that CaPSA will encourage additional research in related areas of social and behavioural sciences, applied sciences and engineering, and beyond, inspire meaningful changes in consumer and industry behaviour, and inform policy and decision making at all levels.

The priority science needs identified in CaPSA begin with fundamental work to improve detection, sampling, and analysis of plastics across their lifecycle, as well as increased research, monitoring, and modelling to inform decision making and action. Building on this foundation, CaPSA also calls for a better understanding of the impacts of plastics on wildlife, human health, and the environment. In addition to addressing key methodological and health impact gaps, CaPSA identifies science needs that, once addressed, will contribute to decreasing the environmental footprint of plastics, as well as improving the capture and recovery of plastics, thereby working to address the problem before plastics enter the environment. There is also a strong social component to CaPSA, calling on the social and behavioural sciences to contribute knowledge and insights that can support behavioural change in industry and consumers. Taken together, the five themes identified under CaPSA will help drive science to support action across the entire lifecycle of plastics.

While Canada is a global leader in plastics science, much of the work underway is fragmented. It would benefit from increased collaboration, knowledge mobilization, and capacity building in order to increase coordination and make the best use of existing resources and expertise. CaPSA proposes several actions and models that could be explored in order to advance plastics science.

The call for action on plastic pollution is clear, and science will be fundamental to making meaningful progress on tackling this problem. CaPSA will serve as a guide for scientists and funders from all sectors, as they join efforts to advance the science needed to support action on plastic pollution.

ANNEX 1: CANADA'S PLASTICS SCIENCE AGENDA FRAMEWORK

Detection, quantification, and characterization of plastics in the environment	
<i>Goal: Detect, quantify, and characterize sources, pathways, and fate of plastics in the environment</i>	
Science needs to fulfill goal:	<ul style="list-style-type: none"> Standardized methodologies and reference data for detection, sampling, analysis, and risk assessment across media, including consideration of cumulative environmental effects Research, monitoring, and modelling to determine types, concentrations, sources, fate, distribution, transport, and degradation of plastics in air, soil, sediments, fresh and marine waters, and biota Monitoring of plastics in the environment to measure the performance of existing and proposed regulatory actions and other risk management actions, as warranted
Existing federal contributions:	<ul style="list-style-type: none"> Advancing sampling and characterization techniques (ECCC, NRC) Understanding microplastic movement (dispersion modelling, deposition, movement through food webs) (NRC, DFO, CIRNAC) Establishing environmental baselines (DFO) Understanding microfiber sources and distribution in freshwater and marine environments and fish (DFO, ECCC) Surveying and monitoring in key areas (e.g., coastal British Columbia, Gulf of St. Lawrence, Arctic) (DFO, PCA, ECCC, CIRNAC)
Impacts on wildlife, human health, and the environment	
<i>Goal: Understand the impacts of plastics on wildlife, human health, and the environment</i>	
Science needs to fulfill goal:	<ul style="list-style-type: none"> Pathways, levels, and exposure in human, wildlife, and environmental receptors Health effects on aquatic and terrestrial wildlife, humans, and effects on environmental receptors Ecotoxicology of plastics as vectors for contaminant exposure
Existing federal contributions:	<ul style="list-style-type: none"> Assessing and quantifying sources, exposure, and ingestion in key biota (e.g., seabirds) and ecosystems (e.g., Arctic, Great Lakes, Gulf of St. Lawrence) (DFO, ECCC) Testing and monitoring drinking water (HC) and wild foods (CIRNAC) Assessing the science of human health impacts from plastic exposure, including contribution to the World Health Organization report on health effects of microplastics in drinking water (HC) Understanding the effects of microfibers in fish (DFO) Monitoring and assessing effects of plastics on wildlife and other environmental receptors (e.g., seabirds, whales, fish, zooplankton, shellfish) (ECCC, DFO)
Plastic design and alternatives	
<i>Goal: Decrease the environmental footprint of plastics, including improved recyclability, value recovery, and compostability</i>	
Science needs to fulfill goal:	<ul style="list-style-type: none"> Design of plastic resins, additives, and products towards improved recyclability, value recovery, and compostability, including incorporation of bio-based and/or recycled feedstocks Lifecycle analysis of new products to minimize unintended consequences and to support a circular economy approach
Existing federal contributions:	<ul style="list-style-type: none"> Research and development to decrease the environmental footprint of plastics, including alternatives to petroleum-based feedstocks and design for recyclability and compostability (NRC) Advancing bio-based materials for commercial plastics, such as forestry products (NRC, NRCan, AAFC) Developing smart food packaging (ECCC) Reducing plastic construction waste (ECCC, NRC)
Sustainable use of plastics	
<i>Goal: Support informed usage and management of plastics</i>	
Science needs to fulfill goal:	<ul style="list-style-type: none"> Analysis to support behavioural change interventions targeted to industry and consumers Knowledge mobilization and science communication to support informed decision making, notably with regards to the use, management, and disposal of products containing plastic Data, information, and approaches to quantify the economic impacts of plastic waste and its pollution by sector, and to inform and support market transition to a circular economy
Existing federal contributions:	<ul style="list-style-type: none"> Reducing single-use plastics in government institutions (ECCC, TBS) Building community solutions for marine plastic litter, particularly in arctic communities (ECCC, CIRNAC)
Waste diversion and recovery	
<i>Goal: Enhance capture and value recovery of existing and future plastics</i>	
Science needs to fulfill goal:	<ul style="list-style-type: none"> Mechanisms and technology to prevent leakage, capture and recover plastics from the environment, and maximize value recovery of products, including improvement to infrastructure Capture of plastics from key environmental entry points, including wastewater and its by-products Assessment of effectiveness of capture and value recovery technologies and methods
Existing federal contributions:	<ul style="list-style-type: none"> Evaluating mechanisms to recover value from different types of hard to recycle plastics (NRC) Cleaning up marine plastic litter and developing ocean-to-plate plastic-free fisheries and aquaculture (DFO, PCA, ECCC) Improving the recycling of mixed plastics (ECCC)

(List of departmental acronyms on following page)

List of departmental acronyms:

AAFC – Agriculture and Agri-Food Canada
CIRNAC – Crown-Indigenous Relations and Northern Affairs Canada
DFO – Fisheries and Oceans Canada
ECCC – Environment and Climate Change Canada
HC – Health Canada
NRC – National Research Council Canada
NRCan – Natural Resources Canada
PCA – Parks Canada Agency
TBS – Treasury Board Secretariat

Lambton Area Water Supply System

BY-LAW Number 1 of 2019

Being a By-Law to confirm the proceedings of the Lambton Area Water Supply System

WHEREAS pursuant to the terms of Municipal Water and Sewage Transfer Act. 1997, as amended, and pursuant to the terms of the Minister's Transfer Order which outlined the provisions governing the Lambton Area Water Supply System (LAWSS) the powers of LAWSS shall be executed by its Joint Board of Management; and

WHEREAS pursuant to Part V of the Municipal Act, 2001, S.O. 2001, c.25 as amended, a municipal services board including a joint municipal services board shall be governed by the terms outlined by the member municipalities and the municipal services board's originating documents; and

WHEREAS the Lambton Area Water Supply System is joint municipal services board as defined in the Municipal Act, 2001 c.25 as amended; and

WHEREAS it is deemed expedient that a By-law be passed to authorize the execution of agreements and other documents and that the Proceedings of the Joint Board of Management of the Lambton Area Water Supply System at its meetings be confirmed and adopted by By-law; and

NOW THEREFORE the Joint Board of Management (Joint Board) of LAWSS enacts as follows:

1. **THAT** all actions of Joint Board in respect of all recommendations in reports and minutes of committees, all motions and resolutions and all actions passed and taken by the Joint Board, documents and transactions entered into during the calendar year of 2018 meetings of the Joint Board are hereby adopted and confirmed, as if the same were expressly contained in this By-law;
2. **THAT** the Chair and the General Manager of the Joint Board are hereby authorized and directed to do all things necessary to give effect to the actions of Joint Board during the said meetings referred to in Section 1 of this By-law;
3. **THAT** the Chair and the General Manager are hereby authorized and directed to execute all documents necessary to the actions taken by this Joint Board as described in Section 1.

By-Law read a first, second and third time and finally passed this 31st day of October, 2019.

Clinton Harper
LAWSS General Manager

Beverly Hand
Chair of Joint Board

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To:	Chair and Members Lambton Area Water Supply System Joint Board of Management
From:	Clinton Harper General Manager
Subject:	By-Law Number 2-2019 to regulate the proceedings of the Lambton Area Water Supply System Joint Board of Management

Recommendation

That the LAWSS Board repeal By-Law 2-2016 and replace with By-Law Number 2-2019 to regulate the proceedings of the Lambton Area Water Supply System Joint Board of Management.

Background:

For housekeeping purposes, from time to time it is necessary to update key By-Laws that regulate LAWSS administration and governance. By-Law 2-2019 is designed to replace the existing Procedural Bylaw.

Comments:

Below all the changes are detailed.

Section: 2
Repeal:
The regular meetings shall be held the last Thursday of each month at the LAWSS Water Treatment Plant at the hour of 10:00 a.m. standard time and daylight saving time when applicable or at the call of the Chair.
Replace with:
The regular meetings shall be held the last Thursday of each month at the Tourism Sarnia-Lambton Assembly Room, 1455 Venetian Blvd. Point Edward, ON N7T 7W77 at the hour of 12:00 p.m. standard time and daylight-saving time when applicable or at the call of the Chair.
Reason: Motion of the LAWSS Board affecting venue and time.

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Section: 7

Repeal:

The prepared Agenda shall include:

1. Declaration of pecuniary interest.
2. Adoption of Minutes of the previous meeting.
3. Delegations.
4. Business updates.
5. Financial reports.
6. Operational/capital update.
7. Reports of Committees.
8. Miscellaneous Reports.
9. Ongoing issues.
10. Correspondence.
11. New Business.
12. By-laws.
13. In Camera Items.

Replace with:

The prepared Agenda shall include:

1. Call to Order
 - 1.1 Disclosure of Pecuniary Interest
 - 1.2 Delegations
2. Adoption of Minutes
3. Consent Items
4. Items for Discussion
5. Deferred Matters/Additional Business
6. Upcoming Meeting Dates
7. Adjournment

Reason: This change will separate most items going to the board into two basic streams in an effort to simplify how items are presented. An example of an item presented to the Board for consent is The Monthly Operational Reports. Reports and documents the Board are accustomed to seeing monthly, and accepting as information, will be placed at the beginning of the Agenda as separate items.

Items are brought to the Board for discussion when direction on a specific matter is needed by the LAWSS General Manager. An example of an item brought to the Board for discussion when it is necessary to awarding a contract to a specific contractor or approving a specific By-Law. This change does not affect the General Manager's reporting requirements.

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Section 40:
Added new Section:
This By-Laws repeals the By-Law number 2-2016 and all amendments thereto. This By-Laws supersedes and corresponding By-Law of LAWSS, through inadvertence, might not have been repealed.
Reason: missing Section

Section 41:
Added new Section:
The short title for this By-Law is the "LAWSS Procedural By-Law".
Reason: missing Section

Consultation:

The City of Sarnia and Township of Warwick staff were consulted on the mechanics of this change.

Financial Implications:

none

This report was prepared by Clinton Harper, General Manager

Attachment(s): By-Law 2-2019 Procedural By-Law

Lambton Area Water Supply System

By-Law Number 2-2019

To regulate the proceedings of Lambton Area Water Supply System Joint Board of Management

The Board of the Lambton Area Water Supply System enact as follows:

General

1. In all proceedings at or taken in this Board, the following rules and regulations shall be observed and shall be the rules and regulations for the order and dispatch of business in the Board, and in the committees thereof, and all rules existing and inconsistent with this by-law (not including the governance agreement contained in the July 3, 2003 transfer order - #W1-R/2003) at the time of passing thereof are hereby repealed.

Convening Meetings of Board

2. The regular meetings shall be held the last Thursday of each month at the Tourism Sarnia-Lambton Assembly Room, 1455 Venetian Blvd. Point Edward, ON N7T 7W77 at the hour of 12:00 p.m. standard time and daylight-saving time when applicable or at the call of the Chair.
3. Except as otherwise provided by the Municipal Act or other statutes, Board may, by resolution, dispense with, alter the time, day or place of any meeting.

Notice of Meeting

4.
 - a. The LAWSS General Manager shall give notice of each regular and special meeting of Board and of each Committee to the members of the Board.
 - b. The Notice shall be accompanied by the Agenda and any matter, so far as known, to be brought before such a meeting.
5.
 - a. The Board Chair may, at any time, summon a special meeting.
 - b. The Board Chair shall summon a special meeting upon receipt of the petition of the majority of the Board members, for the purpose and at the time mentioned in the petition.
 - c. In either case, notice must be given to all members of Board by the General Manager, in writing, but if time does not allow, it may be by telephone but confirmed in writing.

It Shall be the Duty of the Manager

6. To prepare the Agenda of Board and Committees.
 - a. The Manager shall accept items for the Agenda from the members of Board.
 - b. The Manager may also receive petitions and communication from the public and if in his/her opinion shall place the petition or communication on the Agenda of the Board.
 - c. Copies of all correspondence and petitions or a short statement of its contents, as well as any required report, must be attached to all Board and Committee agendas or noted thereon and forwarded to all members of Board.
 - d. All items for the agendas shall be delivered in writing to the Manager not less than the Thursday prior to Board and Committee meetings.

The Manager Shall have prepared for the use of the members at regular meetings the "Order of the Day" as follows

7. The prepared Agenda shall include:
 1. Call to Order
 - 1.1 Disclosure of Pecuniary Interest
 - 1.2 Delegations
 2. Adoptions of Minutes
 3. Consent Items
 4. Items for Discussion
 5. Deferred Matters/Additional Business
 6. Upcoming Meeting Dates
 7. Adjournment

The Conduct of Proceedings at a Meeting of the Board

8. It shall be the duty of the Chair:
 - a. To open the meeting of Board by taking the chair and calling the members to Order;
 - b. To announce the business before the Board in the order of which it is to be acted upon;
 - c. To receive and submit, in the proper manner, all motions presented by the members of Board;

- d. To put to vote all questions, which are regularly moved and seconded, or necessarily arise in the course of the proceedings, and to announce the result;
- e. To decline to put to vote motions which infringe the rules of procedure;
- f. To restrain the members, when engaged in debate, within the rules of order;
- g. To enforce on all occasions the observance of order and decorum among the members,
- h. To call by name any member persisting in breach of the rules of order of the Board, thereby ordering him/her to vacate the Board Chamber;
- i. To receive all messages and other communications and announce them to the Board;
- j. To authenticate, by his signature, when necessary, all by-laws, resolutions, minutes of Board;
- k. To inform the Board, when necessary or when referred to for the purpose, in a point of order or usage;
- l. To select the members who are to serve on committees;
- m. To represent and support the Board, declaring its will, and implicitly obeying its decisions in all things;
- n. To ensure that the decisions of Board are in conformity with the laws and by-laws governing the activities of the Board;
- o. To adjourn the meeting when the business is concluded;
- p. To adjourn the meeting without question in the case of grave disorder arising in the Board Chamber.

Decorum

- 9. No member of Board shall:
 - a. Disturb another, or the Board itself, by any disorderly deportment disconcerting to any member speaking;
 - b. Resist the rules of Board or disobey the decisions of the Chair or of the Board on questions of order or practice or upon the interpretations of the rules of order of the Board;

- c. Be permitted to retake his seat at any meeting after being ordered by the Chair to vacate after committing a breach of any rule of order of the Board, without making apology and the consent of Board expressed by a majority vote of the other members present, determined without debate.

Rules of Debate

- 10. In directing the course of debate, the Chair shall:
 - a. Designate the member who has the floor when two or more members rise to speak;
 - b. Preserve order and decide questions or order;
 - c. Read all motions presented in writing and state all motions presented verbally before permitting debate on the question, except when otherwise provided in this by-law.

Members

- 11. In addressing the Board no member shall:
 - a. Speak disrespectfully of Her Majesty the Queen or any of the Royal Family, or of the Governor-General, Lieutenant Governor or any member of the Senate, the House of Commons of Canada or the Legislative Assembly of Ontario;
 - b. Use indecent, offensive, libelous or insulting language in or against the Board, its members or any person or group, staff, or delegation;
 - c. Interrupt the member who has the floor except to raise a point or order.
- 12.
 - a. Any member may require the question or motion under discussion to be read at any time during the debate, but not so as to interrupt a member while speaking.
 - b. Any member may appeal the decision of the Chair on a point of order to the Board which shall decide the question without debate upon a majority vote of the members present.

Motions

- 13. Introduction Without Notice.
 - a. A motion may be introduced without notice in which case it shall be set out in full in the minutes of the meeting of Board at which it is considered.

14. Must Be Seconded.
 - a. A motion must be formally seconded before the Chair can put the question or be recorded in the minutes.
15. Withdrawal.
 - a. After a motion is read or has been stated by the Chair, it shall be deemed to be in the possession of the Board and can be withdrawn before decision or amendment only with leave of the Board and expressed by resolution.
16. Priority of Disposition.
 - a. A motion properly before Board for decision must receive disposition before any other motion can be received except a motion to amend, for the previous question, to adjourn, to extend the hour of closing proceedings, to commit or on a matter of privilege.
17. To Amend.

A notice to amend:

 - a. Only one motion to amend an amendment to the question shall be allowed and any further amendment must be to the main question;
 - b. shall be relevant to the question to be received;
 - c. Shall not be received proposing a direct negative to the question;
 - d. Two separate distinct proposals of a question may be made;
 - e. Shall be put in the reverse order to that in which it is moved.
18. To Adjourn.

A notice to Adjourn:

 - a. The meeting shall always be in order except as provided in this paragraph and shall be put immediately without debate;
 - b. When resolved in the negative, cannot be made again until after some intermediate proceeding shall have been completed by the Board;
 - c. Is not in order when a member is speaking, nor during the verification of a vote;
 - d. Cannot be amended.

19. Repetition.
 - a. A motion called in the order in which it stands upon the Agenda of the routine of business of a meeting and which is not decided by Board, shall be allowed to stand retaining their precedence upon the agenda of the routine of business of the next ordinary meeting of Board
20. Reconsideration.
 - a. A motion for reconsideration of a question which has been decided upon but not acted upon may be made at any time by a member who voted thereon with the majority and until decided by Board no further discussion of the question shall be allowed, but no such motion for the previous question or postponement.
21. To Commit.
 - a. A motion to commit or recommit a question to a committee or committees with or without instructions may be amended but must receive disposition by Board before the question or an amendment to the question, and when made prior thereto, before decision on a motion for the previous question or postponement.
22. Verbal
 - a. Incidental motions in respect of a matter of special privilege, suspension of rules of procedure, adjournment, postponement, for the previous question, or commitment may be made verbally.
23. Divided Motions
 - a. A motion containing distinct proposals may be divided with leave of Board

Voting on Motions

24. Question Stated
 - a. Immediately preceding the taking of the vote thereon, the Chair may state a question in the form introduced and shall do so if required by a member except when a motion for the previous question has been resolved in the affirmative he shall state the question in the precise form in which it was recorded in the minutes.

25. No Interruption After Question Stated
 - a. After a question is finally put by the Chair no member shall speak to the question nor shall any other motion be made until after the vote is taken and the result has been declared.
26. Division of Question
 - a. A separate vote shall be taken upon each proposal contained in a question divided with leave of Board.
27. Vote of Chair
 - a. When the Chair determines to vote on a question, his vote shall be spoken, signified, polled and recorded after the votes of each member voting.
28. Abstention Recorded Negative
 - a. If any member of Board does not vote when a question is put and a recorded vote taken, he shall be deemed as voting in the negative except where the member is prohibited from voting from statute.
29. Vote May Not Be Allowed
 - a. A member not present before the result of a division on a question is declared may not be entitled to vote on that question as determined by the Chair.
30. Unrecorded Vote
 - a. The manner of determining the decision of Board on a motion shall be at the discretion of the Chair and may be by voice, show of hands, standing or otherwise.
31. Recorded Vote
 - a. Upon the request of the Chair or member and before a vote is taken on a motion, the Recording Secretary shall record, in the minutes, the names of each Board member present and each member's vote in the affirmative or negative to the motion.
32. Member Social Media Etiquette
 - a. During a meeting information shall not be posted to any Social Media outlet and videotaping of the meeting is prohibited unless approved by the LAWSS Board.

33. Order of Business

- a. The Manager shall have prepared a list of the items in order of the topics set out as the routine of business for the use of each member at an ordinary meeting.

34. Minutes

The minutes shall record:

- a. The place, date and time of meeting;
- b. The names of the Chair and of the members present;
- c. The reading, presentation, correction and adoption of the minutes of prior meetings.

35. Deputation

- a. Persons desiring to verbally present information on matters of fact or make a request of Board may be heard on leave of Board but shall be limited in speaking not more than ten minutes except that a deputation consisting of more than five person shall be limited to two speakers each limited to speaking not more than ten minutes. All speakers should submit their presentation in writing to the Manager not less than the Thursday prior to the Board meetings.

36. Committee Reports

- a. Shall be received upon leave of Board;
- b. May be recommitted to the same or a different Committee.

37. Unfinished Business

- a. The items listed in the order of the topics set out as the routine of business of prior meetings which have not been disposed of by Board and the date of their first appearance on the Order of Business shall be noted, and repeated on each subsequent Order of Business until disposed of by Board unless removed for the Order of Business by leave of Board.

38. In Camera Board Meetings

In accordance with the Municipal Act, a meeting or part of a meeting may be closed to the public only if the subject matter is as follows:

- a. The security of property.
- b. Personal matters about an identifiable individual.
- c. Acquisition or sale of property for municipal purposes.
- d. Labour relations or employee negotiations.
- e. Litigation or potential litigation.
- f. The receiving of advice subject to solicitor-client privilege.
- g. A matter authorized to be closed by another Act.
- h. A matter subject to the Municipal Freedom of Information and Right to Privacy Act.

Before holding an in camera meeting the Board shall state the following by resolution:

- a. the fact of the holding of the in-camera meeting
- b. the general nature of the matter to be considered at the closed

The only exceptions to the above would be as in the Municipal Act.

39. Points Not Provided For

- a. All points of order or procedure not provided for in these rules shall be decided in accordance with Robert's Rules of Order.

40. This By-Laws repeals the By-Law number 2-2016 and all amendments thereto. This By-Laws supersedes and corresponding By-Law of LAWSS, through inadvertence, might not have been repealed.

41. The short title for this By-Law is the "LAWSS Procedural By-Law".

Read a first, second and third time and finally passed this _____ day of _____, 2019.

Mayor Bev Hand, Chair

Mayor Steve Arnold, Vice-Chair