

Ministry of the Environment,  
Conservation and Parks

# Water and Air Monitoring Results 282 & 285 Ontario St.

St. Catharines City Council

December 22, 2020

# Purpose

- To provide St. Catharines City Council with the results from the ministry's surface water and air monitoring surveys conducted to assess for any off-site impacts from the former GM site.

# Agenda

- Overview of the Ministry of the Environment, Conservation and Parks' (MECP) role
- Site background
- Surface water monitoring results
- Air survey results
- Public Health Unit review of results

# MECP Role and Brownfield Development Process

## Ministry Role

- Respond to complaints and reports of pollution incidents and assess potential impacts to human health or the natural environment.
- Where there is evidence that indicates off-site impacts from a property, the ministry will use its authority to require action be taken by the property owner.
- Review submissions related to brownfield risk assessments and/or Records of Site Condition and ensure that the owners and responsible parties of contaminated sites in Ontario follow applicable regulations and guidelines to protect human health and the environment.

## Brownfield Development Process

- Brownfield remediations are proponent driven.
- If a property owner wishes to convert a brownfield property from industrial/commercial or community use to a more sensitive land-use, such as residential, the property owner must file a Record of Site Condition (RSC) with the ministry prior to proceeding with the change in land-use.
- Filing an RSC ensures that any potential on-site risks to human health or the environment are identified and appropriately addressed before the land-use change.
- In Order to file an RSC, a proponent may choose to clean-up a site to ministry standards or conduct a risk assessment and recommend risk management measures to protect human health and the environment.

# Background

- General Motors began operations at this site in 1929. The site closed in 2010.
- On-site oil/grit separators are used to collect and treat stormwater before being discharged off-site. The west separator discharges directly to 12 Mile Creek. The east discharges to the municipal sewer.
- Municipal catch basins and sewers direct city road run-off stormwater to Twelve Mile Creek.
- The ministry inspected the site regularly during operation.
- The site was purchased in 2014 by Bayshore Group Inc. for brownfield redevelopment.
- PCBs, hazardous and liquid industrial wastes were removed from the site prior to demolition activities
- The ministry received five complaints during the initial demolition phase (2015 – 2017) related predominantly to dust. The ministry required the company to implement dust management measures.
- The City of St. Catharines contacted the ministry in January 2020 as a result of concerns raised by the community and requested ministry assistance to assess concerns regarding off-site impacts due to dust and run-off from the site.



0.1 0 0.13 0.3 Kilometers

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# Surface Water Monitoring Survey

Sampling Events	Parameters Tested
February 13, 2020 – snow melt September 23, 2020 – dry event October 20, 2020 – rain event November 23, 2020 – rain event (results pending) December 1, 2020 – rain event (results pending)	General chemistry, <b>Metals*</b> Volatile Organic Compounds Acid base neutrals (semi-volatiles) <b>Polycyclic aromatic hydrocarbons (PAH)*</b> <b>Polychlorinated biphenyls (PCB)*</b>

- Parameters were selected based on review of environmental assessment reports for the property.
- Analysis results were compared to the following benchmarks, where applicable:
  - Provincial Water Quality Objectives (PWQO)
  - Canadian Water Quality Guidelines (CWQG)
  - Typical urban stormwater and dry weather water quality
  - Twelve Mile Creek Trackdown monitoring data

**\*Results indicated exceedances of metals, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs).**

# How are Provincial Water Quality Objectives (PWQOs) set?

Review of global aquatic toxicological literature

Determine range of concentrations where effects are observed  
(e.g., toxicity, bioaccumulation, mutagenicity, odour etc...)



Select the lowest effect level

(e.g., Effects occur between concentrations of 10 – 100ug/L – select 10ug/L as lowest effect level)



Add in a safety factor

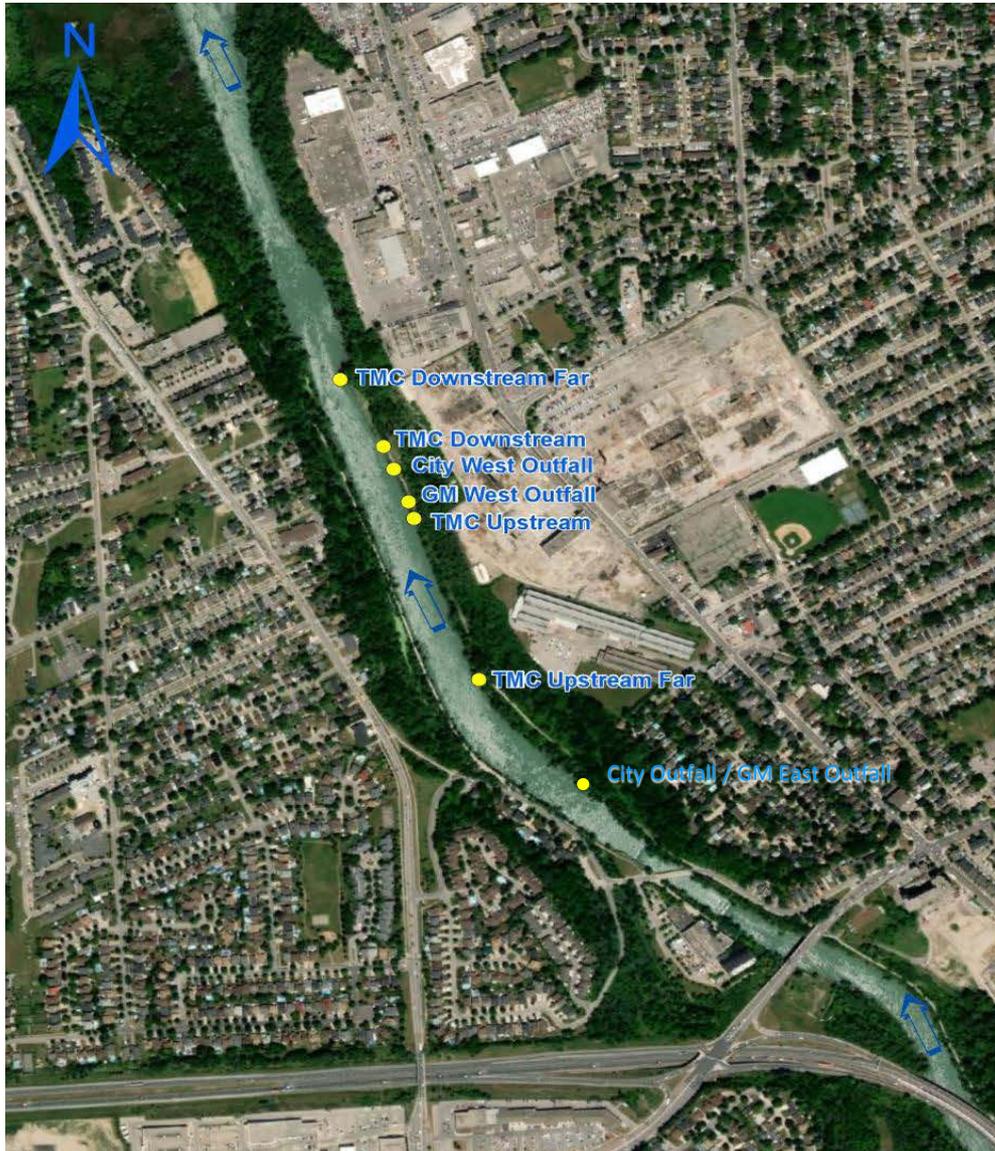
(e.g., Lowest effect level of 10ug/L divided by safety factor of 10 = PQWO of 1 ug/L)

**\*PWQOs are not set considering laboratory detection limits and may be lower than can be detected.**

# Urban Stormwater Quality

- **Urban stormwater is expected to contain contaminants such as metals and Polycyclic Aromatic Hydrocarbons (PAHs) due to:**
  - vehicular traffic accounts for much of the buildup of contaminants on road surfaces (tire wear, brake pad wear, engine oil and lubricant drippings, corrosion)
  - asphalt pavement deterioration
  - road and driveway maintenance (asphalt repair, road salting, driveway sealant)
  - industrial and commercial activities (loading/unloading areas, storage, vehicle maintenance); and
  - air pollution fallout (vehicle emissions, industrial sources, wind erosion)

# Surface Water Monitoring Locations



Sample Location	Location Description
TMC Downstream Far	Twelve Mile Creek downstream of the former GM Property and located just upstream of an old railway bridge abutment
TMC Downstream	Twelve Mile Creek downstream of storm sewer outfalls and adjacent to the former GM Property
City West Outfall	Municipal storm sewer outfall (two drain outlets)
GM West Outfall	Storm sewer outfall from the west plant oil/grit separator on the former GM property
TMC Upstream	Twelve Mile Creek adjacent to the former GM Property and appropriately 20m upstream of GM West Outfall. Location across from groundwater monitoring well
TMC Upstream Far	Twelve Mile Creek upstream of the former GM Property
City Outfall / GM East Outfall	Municipal storm sewer outfall that receives east plant stormwater discharge

# Overview of Metal Sampling Results

## City Municipal Storm Sewer Outfall:

- Aluminum, chromium, cobalt, copper, iron and zinc exceeded PWQO in the snow melt event.
- Chromium and copper exceeded the PWQO from the City outfall in the rain event.
- **The metal concentrations in the municipal storm sewer is considered typical of urban stormwater.**

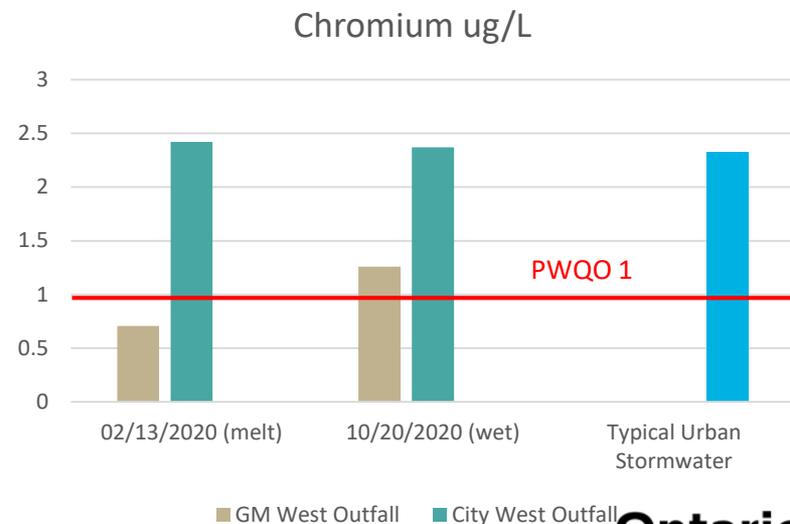
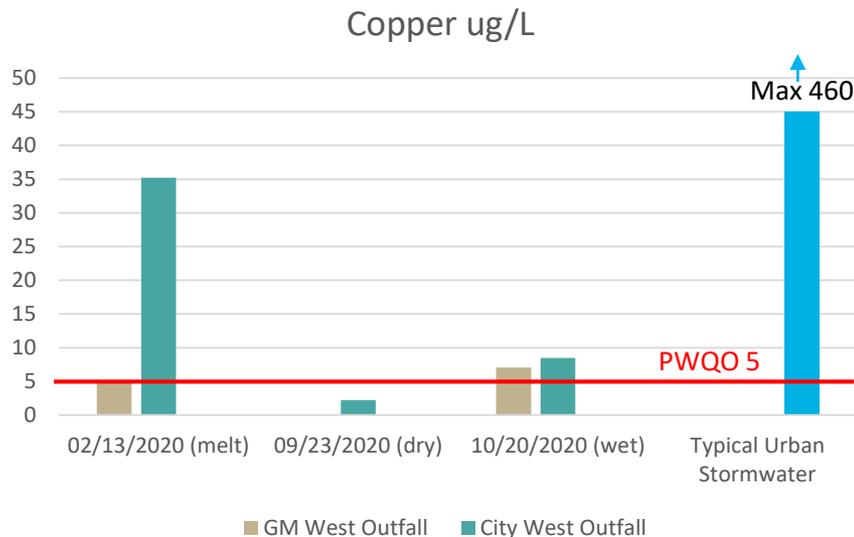
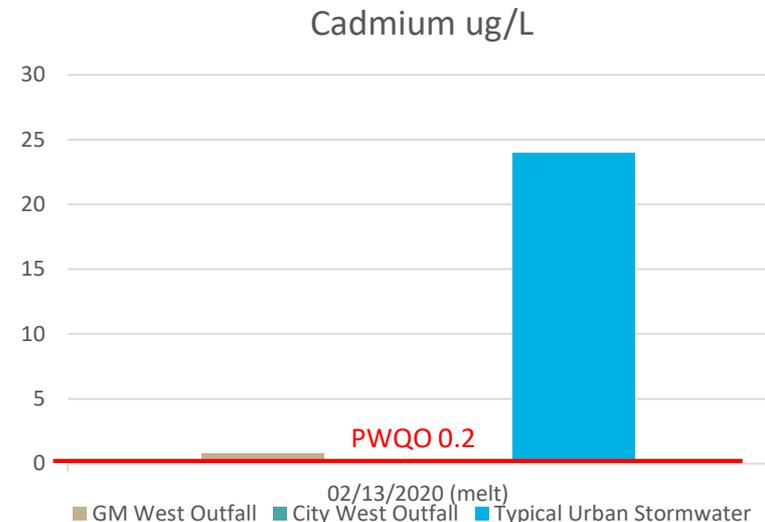
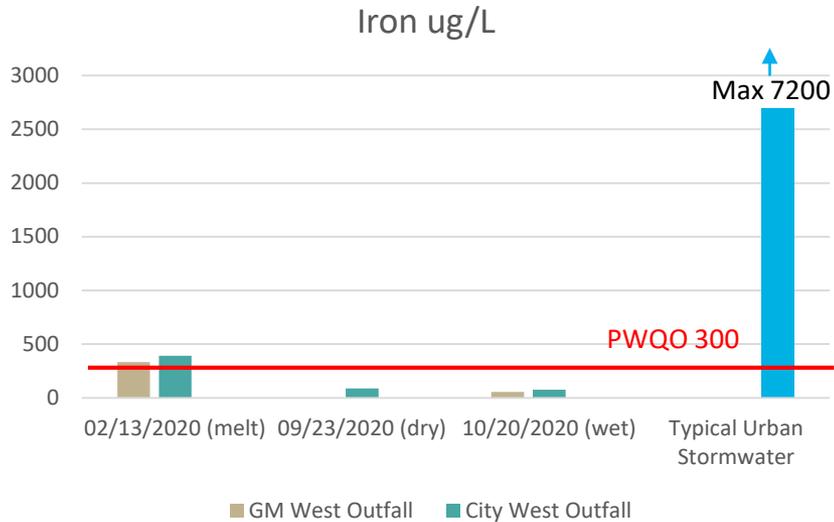
## Former GM West Outfall:

- Iron and cadmium exceeded the PWQO during the snow melt event.
- Chromium and copper exceeded the PWQO in the rain event.
- No ongoing discharge during dry weather
- **The metals in the former GM West outfall are either not a surface water concern or were lower than typical urban stormwater.**

## Twelve Mile Creek – Upstream and Downstream:

- Aluminum concentrations during the dry and rain events exceeded PWQO in both the upstream and downstream creek samples. This is not a concern as aluminum levels are naturally elevated in the watershed due to geological features on the area.
- **All other metal concentrations in the upstream and downstream creek samples were below PWQOs and are not a surface water concern.**

# Metals Exceeding PWQO – Former GM West Outfall



# PAH exceeding PWQO – City Storm Sewer

- PAHs are chemicals that occur naturally in coal, crude oil, and gasoline and are also produced when coal, oil, gas, wood, garbage, and tobacco are burned.
- Many urban sources of PAH come from vehicles, asphalt, engine oil drips and tire wear.
- **The city storm sewer did exceed several PAH PWQOs, however, these results were below values typically seen in urban roadway runoff.**
- **The former GM West outfall discharge PAH concentrations were below PWQO/CWQG for all sample events and are not a concern.**
- **Twelve Mile Creek up and downstream results were all below PAH PWQOs.**

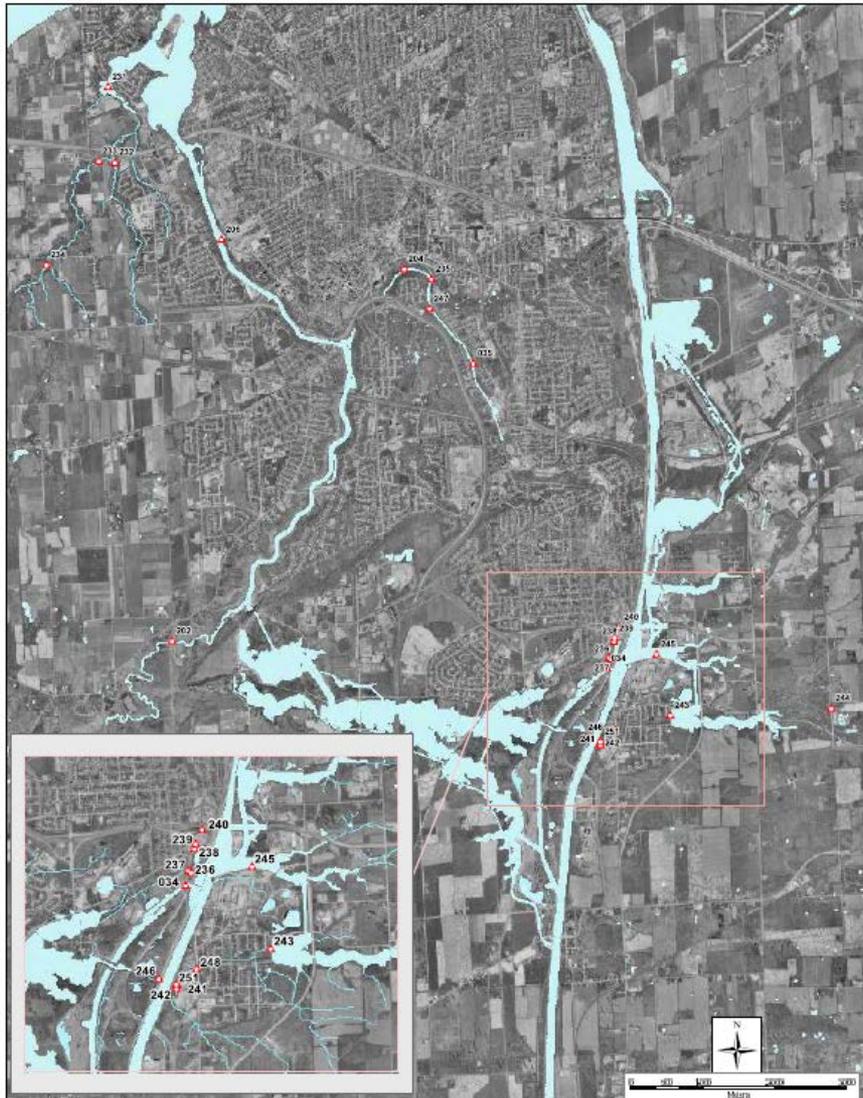
PAH (ng/L)	Former GM outfall	City storm sewer	Urban Street Runoff (mean)	PWQO/CWQG
Benzo(a)pyrene	4 (wet event)	33 (snow melt)	290	<b>15</b>
Chrysene	<detection limit	93 (snow melt)	230	0.1
Fluoranthene	13 (wet event)	210 (snow melt)	640	<b>.8/40</b>
Phenanthrene	<detection limit	130 (snow melt)	310	<b>30/400</b>
Pyrene	12 (wet event)	180 (snow melt)	500	<b>25</b>

# Polychlorinated Biphenyls (PCBs)

- PCBs were used as coolants and lubricants in electrical equipment and widely used in many industrial materials, such as caulk, paint, sealants, gasket materials and even carbonless copy paper.
- Although banned in 1977, due to its persistence and widespread use, it is found in waterways throughout the country.
- To minimize exposure to PCBs in the environment, the ministry's Guide to Eating Ontario Fish provides consumption advice based on guidelines provided by Health Canada.

<https://www.ontario.ca/environment-and-energy/eating-ontario-fish>

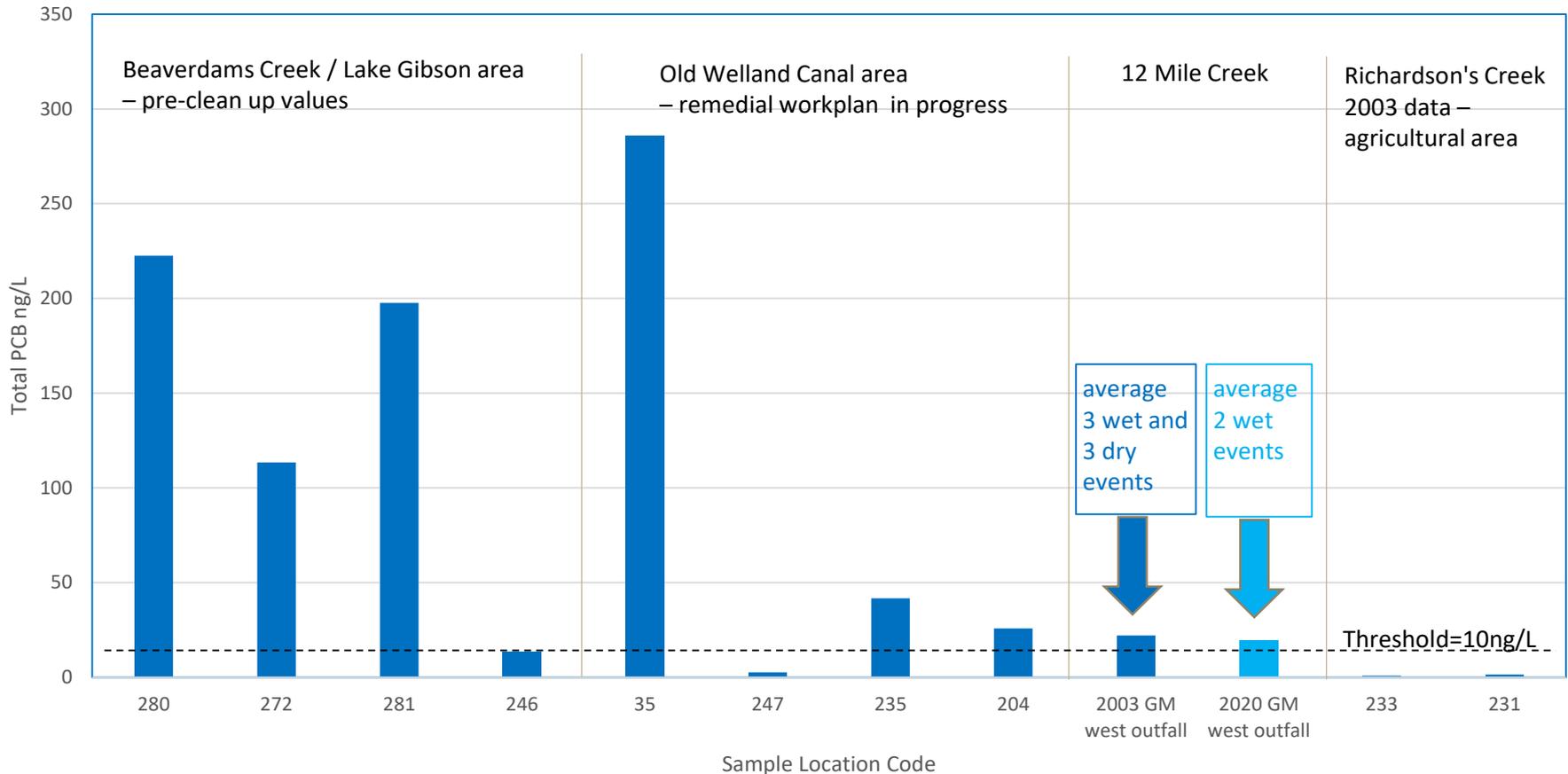
# PCB Project Trackdown - Twelve Mile Creek



- The ministry has been conducting investigative PCB trackdown monitoring in the Twelve Mile Creek Watershed since 2000.
- The trackdown resulted in 4 large remedial projects for significant sources of PCB contaminated sediments found in the upper reaches of the Twelve Mile Creek watershed.
- Work is also ongoing to address PCB sources to Twelve Mile Creek from historic landfills, upstream of the former General Motors property.
- Former GM site discharge monitored as part of the PCB trackdown studies and was found to contain typical urban stormwater concentrations of PCBs.
- Updates to stormwater management for the former GM property are required as part of the development activities including controlling PCB concentrations in the discharge.

# PCBs in Twelve Mile Creek Watershed - 2003

MECP PCB Sampling Twelve Mile Creek Watershed- Total PCB's ng/L



- Efforts to control PCBs are warranted where a source can be identified.
- Bayshore has been instructed to update the stormwater controls on-site as part of the development of the property. Controlling the source of PCBs in the stormwater will be part of this work.

# Air Monitoring Survey - Parameter Selection

The air survey was designed to address resident concerns about potential dust impacts.

- Suspended particulate (dust) was measured by drawing a known volume of air through a filter for 24 hours to quantify the amount of dust in the air.
  - Metals were a potential component of the dust due to past operations and demolition activities and were also measured.
- Dustfall samples were collected monthly for a 3-month period
  - A dustfall sampler collects particles in the air that settle over a given area under the influence of gravity.
- Microscopic particle identification was conducted to determine the dust particle composition.
- Samples that had microscopic fibers identified were submitted for asbestos analysis.

# Air Monitoring Survey

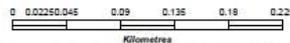
Sampling Events / predominant wind	Parameters tested
July 30, 2020 / North West wind	Suspended particulate
August 4, 2020 / North West wind	Metals
August 8, 2020 / South & North West wind	30-day dustfall (depositional particulate)
August 13, 2020 / North East wind	Microscopic particle identification
August 18, 2020 / North West wind	Asbestos
August 25, 2020 / North West & South West wind	
August 29, 2020 / West & South West wind	
October 7, 2020 / North West wind	
October 16, 2020 / North West, South West, South East	
October 24, 2020 / North West wind	

- Analysis results were compared to:
  1. Ontario Regulation 419/05 Air Pollution – Local Air Quality
  2. Ambient Air Quality Criteria (AAQC)
  3. Samples with microscopic synthetic fibers were tested for asbestos (3<sup>rd</sup> party lab accredited for asbestos analysis)

# MECP Air Monitoring Locations – Single Day Wind Rose



# MECP Air Monitoring Locations – Monthly Wind Rose



# MECP Air Hi-Vol Monitoring Results

All results are below air standards and Ambient Air Quality Criteria.

**Table 1: Summary of Monitoring Results at Station 27094 (Pumping Station)**

Sample Date	Predominant Wind Direction	Concentration ( $\mu\text{g}/\text{m}^3$ )									
		Suspended Particulate Matter	Copper	Nickel	Cadmium	Chromium	Lead	Iron	Manganese	Vanadium	Zinc
O. Reg. 419/05 24-hr Standard and Ambient Air Quality Criteria		120	50	0.2	0.025	0.5	0.5	4.0	0.4	2	120
30-Jul-20	NW	19	0.081	0.001	0.005	0.002	0.005	0.36	0.013	0.002	0.001
04-Aug-20	NW	6	0.054	0.001	0.005	0.002	0.005	0.1	0.005	0.002	0.001
08-Aug-20	S,NW	14	0.055	0.001	0.005	0.002	0.005	0.24	0.01	0.002	0.001
13-Aug-20	NE	60	0.34	0.001	0.005	0.0054	0.0053	0.95	0.032	0.003	0.001
18-Aug-20	NW	13	0.069	0.001	0.005	0.002	0.005	0.22	0.009	0.002	0.001
25-Aug-20	NW, SW	29	0.075	0.001	0.005	0.002	0.005	0.39	0.013	0.019	0.37
29-Aug-20	W, SW	4	0.041	0.001	0.005	0.002	0.005	0.13	0.007	0.022	0.36
07-Oct-20	NW	12	0.052	0.001	0.005	0.002	0.005	0.19	0.007	0.002	0.001
16-Oct-20	NW,SW,SE	21	0.06	0.001	0.005	0.002	0.005	0.27	0.01	0.002	0.001
24-Oct-20	NW	4	0.051	0.001	0.005	0.002	0.005	0.11	0.005	0.019	0.39

**Table 2: Summary of Monitoring Results at Station 27097 (Arena)**

Sample Date	Predominant Wind Direction	Concentration ( $\mu\text{g}/\text{m}^3$ )									
		Suspended Particulate Matter	Copper	Nickel	Cadmium	Chromium	Lead	Iron	Manganese	Vanadium	Zinc
O. Reg. 419/05 24-hr Standard and Ambient Air Quality Criteria		120	50	0.2	0.025	0.5	0.5	4.0	0.4	2	120
30-Jul-20	NW	19	0.045	0.001	0.005	0.0029	0.005	0.37	0.014	0.002	0.001
04-Aug-20	NW	8	0.052	0.001	0.005	0.002	0.005	0.11	0.009	0.002	0.001
08-Aug-20	S,NW	21	0.052	0.001	0.005	0.002	0.005	0.31	0.01	0.002	0.001
13-Aug-20	NE	40	0.051	0.001	0.005	0.0031	0.0065	0.69	0.027	0.002	0.001
18-Aug-20	NW	16	0.038	0.001	0.005	0.002	0.005	0.3	0.015	0.002	0.001
25-Aug-20	NW, SW	27	0.042	0.001	0.005	0.002	0.005	0.41	0.013	0.002	0.001
29-Aug-20	W, SW	12	0.037	0.001	0.005	0.002	0.005	0.14	0.003	0.018	0.35
07-Oct-20	NW	12	0.03	0.001	0.005	0.0022	0.005	0.21	0.008	0.002	0.001
16-Oct-20	NW,SW,SE	17	0.048	0.001	0.005	0.002	0.005	0.26	0.013	0.002	0.001
24-Oct-20	NW	5	0.029	0.001	0.005	0.002	0.005	0.098	0.003	0.02	0.37

# MECP Air Hi-Vol Monitoring Results

- All measurements were all significantly below their respective O. Reg. 419/05 24-hour standards and AAQC for suspended particulate matter and metals.
- Maximum measured 24-hour concentration of suspended particulate matter was 60 ug/m<sup>3</sup> and 40 ug/m<sup>3</sup> from the pumping station (27094) and arena (27097) respectively, well below Reg 419/05 standard of 120 ug/m<sup>3</sup>.
- On three dates (July 30, Oct 7 and Oct 24) the winds were from the northwest direction resulting in the pumping station being directly upwind and the arena being directly downwind of the GM property. Both stations measured approximately the same concentration of suspended particulate matter indicating that off site suspended particulate emissions from the GM property to the downwind area were not observed.
- Results of microscopic analysis determined that the hi-vol samples contained mainly road dust particles (minerals), biological materials, trace synthetic fibers, tire wear particles and trace metal fragments.
- Seven Hi-vol samples found with trace synthetic fibers were sent for asbestos analysis – **no asbestos** was detected in any the samples submitted.

# MECP Air Dustfall Monitoring Results

Sample Period	Total insoluble content (g/m <sup>2</sup> /30D)	Biological Material (vol%)	Minerals (vol%)
AAQC	7 g/m <sup>2</sup> per 30 days		
August 2020	2	65%	35%
September 2020	2.4	80%	20%
October 2020	3	70%	30%

# Water and Air Surveys Results Summary

- **Surface Water Survey Outcomes**

- No impacts to Twelve Mile Creek water quality were observed.
- Stormwater entering Twelve Mile Creek is typical of urban stormwater quality.
- No ongoing dry weather discharges are occurring from the former GM property to the creek.
- Oil/grit separators on the former GM property will be updated as part of development activities.
- Sanitary sewage discharge via municipal storm sewer identified and subsequently stopped by the City.

- **Air Monitoring Survey Outcomes**

- Samples mainly contained normal road dust.
- High volume air samples were below ministry standards and Ambient Air Quality Criteria.
- No asbestos was found in the air samples.
- Monthly dustfall was below Ambient Air Quality Criteria.
- Suspended particulate matter was similar in the samples upwind and downwind of the property suggesting no fugitive dust emissions from the property.

# Regional Public Health Review Comments

- Public Health has not detected any unusual health outcomes in the vicinity of the GM plant.
- Based on the thorough sampling and analysis conducted by MECP, the water in the vicinity of the GM Plant appears to be better in terms of harmful contaminants than is typically seen in urban areas. Likewise, the air quality shows contaminants well below standards meant to protect health.
- Based on this evidence, Public Health believes there is no increased risk of adverse health to persons living in the vicinity of the former GM plant.
- Public Health is also supportive of mitigation measures recommended by MECP (i.e., updating on-site oil grit separators) to further protect local residents from environmental contaminants.

**Questions?**