Combined Sewer Overflows

Presentation to Niagara Region Public Works Committee
February 11, 2019

Niagara Region

Presentation outline

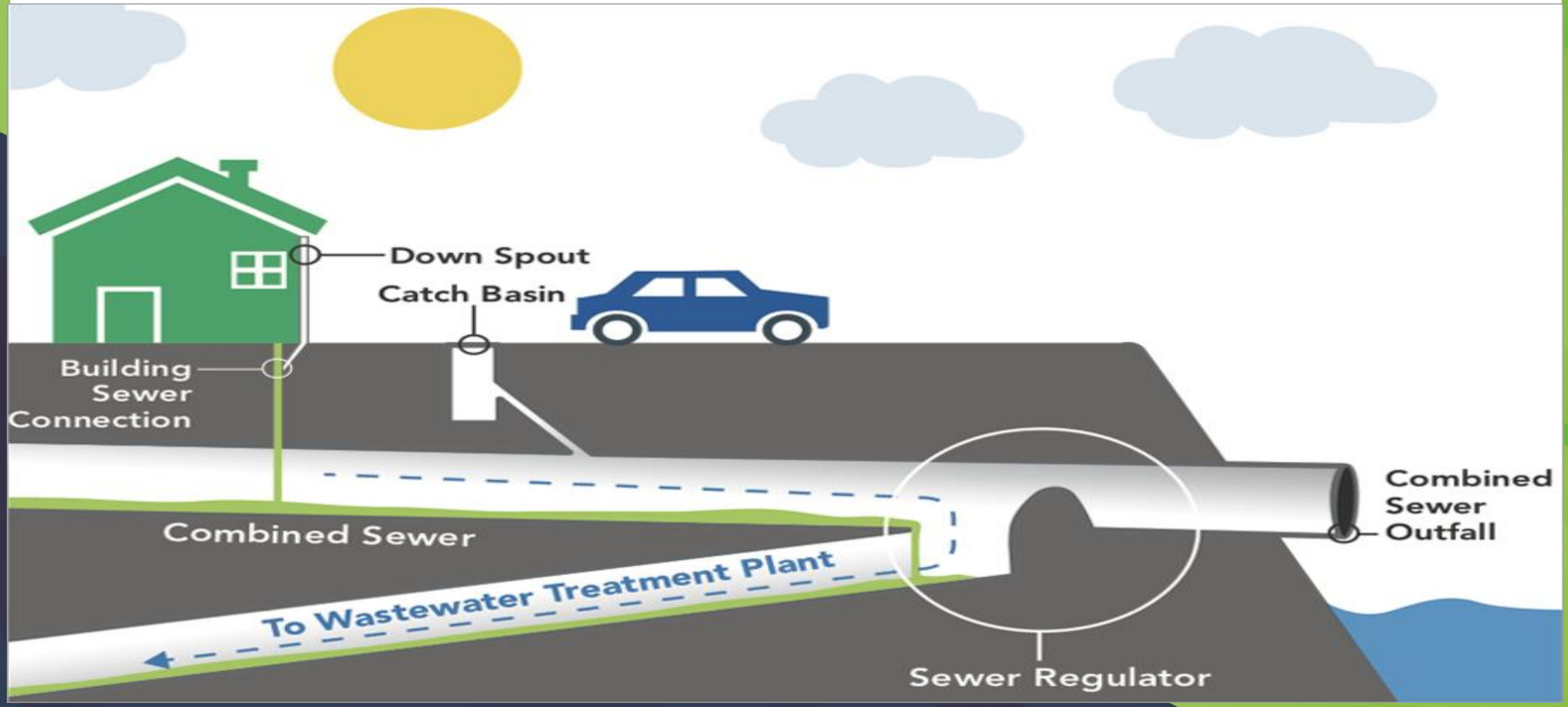
- Definitions
- Combined Sewers
- Impact of Precipitation on overflows and bypasses in Niagara
- Treatment of dry weather and wet weather
- Characteristics of Sewage and Combined Sewage
- Locations of overflows in the WW collection system
- Monitoring of Overflows and Bypasses
- Regulatory Compliance
- Prevention and mitigation strategies (CSO Tanks / High Rate Treatment)
- Questions

Definitions

- Sanitary sewers convey black water and grey water (toilet wastes and domestic wastewater from laundry, showering etc) to our wastewater treatment plants (WWTPs)
- Storm sewers contain stormwater, road drainage etc and convey drainage to water bodies like the canal, Welland and Niagara River, Lake Erie and Lake Ontario etc. No treatment occurs at the end of the pipe.
- Combined Sewer systems were designed to carry both toilet wastes and storm water in a single pipe. When it rains, the stormwater and sanitary sewage in these sewers is called Combined Sewage. Combined sewers are connected to WWTPs.
- CSO-Combined Sewer Overflow-The overflow from a combined sewer during rainfall events.
- CSO Tank – A tank, usually large and underground, designed to hold the volume from a combined sewer during rainfall events.

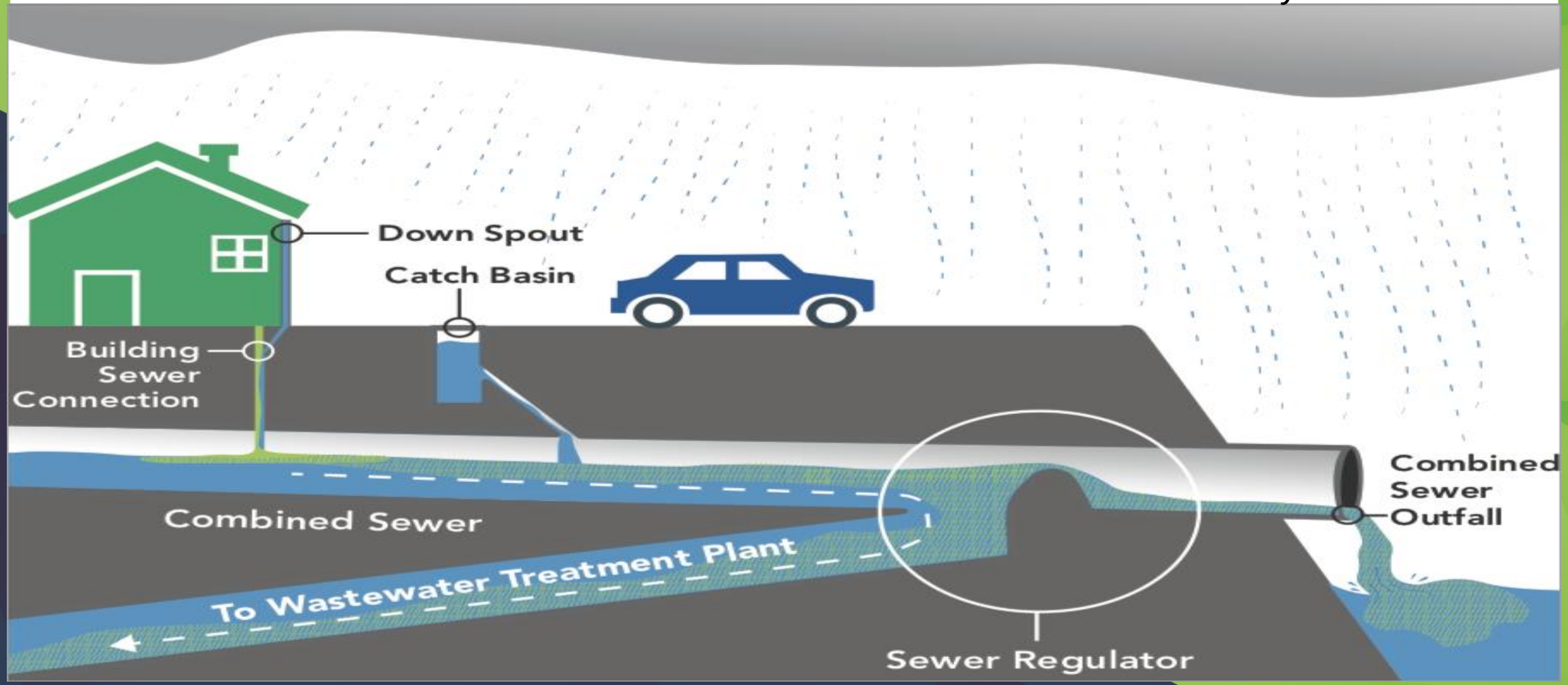
Combined Sewer on a Dry Weather Day

Courtesy NYC-DEP



Combined Sewer – Wet Day- Overflow occurring during rainfall

Courtesy NYC-DEP



Impact of precipitation on bypasses

WWTP	ML Treated		Total ML Bypassed (System and Plant)		Total Precipitation (mm)		Number of Precip Events	
	2016	2017	2016	2017	2016	2017	2016	2017
Queenston	83	86	0	0	519	876	68	46
Stevensville Lagoon	482	597	0	0	768	1,170	83	58
N.O.T.L.	1,445	1,665	0	0	525	851	69	47
Crystal Beach	1,676	2,159	0	1	710	1,009	74	61
Seaway	3,412	4,410	0	18	632	956	77	44
Anger Avenue (Fort Erie)	4,630	5,475	1	72	768	1,170	83	58
Baker Road (Grimsby)	6,238	7,627	21	141	488	871	72	53
Port Weller	10,874	11,713	69	723	492	840	68	46
Port Dalhousie	10,939	12,710	86	572	510	840	68	46
Welland	10,949	12,924	432	1,235	609	1,048	83	52
Niagara Falls	13,444	16,310	107	834	521	876	68	46
Totals	**64,171**	**75,675**	**716**	**3,597**				
Average / Day	175.81	207.33						

Niagara Region

Overflows and Bypasses

WWTP	ML Treated				Total ML Bypassed (System and Plant)				% Flow Bypassed			
	2016	2017	2018	2019	2016	2017	2018	2019	2016	2017	2018	2019
Queenston	83	86	72	77	0	0	0	0	0%	0%	0%	0%
Stevensville Lagoon	482	597	610	630	0	0	0	0	0%	0%	0%	0.00%
N.O.T.L.	1,445	1,665	1,711	2,287	0	0	57	61	0%	0%	3.20%	2.60%
Crystal Beach	1,676	2,159	2,144	2,287	0	1	3	0	0%	0.10%	0.10%	0.00%
Seaway	3,412	4,410	4,592	4,909	0	18	38	0	0%	0.40%	0.80%	0.00%
Anger Avenue (Fort Erie)	4,630	5,475	5,338	5,519	1	72	45	34	0%	1.30%	0.80%	0.60%
Baker Road (Grimsby)	6,238	7,627	7,291	7,620	21	141	88	56	0.30%	1.80%	1.20%	0.70%
Port Weller	10,874	11,713	13,462	14,291	69	723	372	321	0.60%	5.80%	2.70%	2.20%
Port Dalhousie	10,939	12,710	12,810	13,367	86	572	403	272	0.80%	4.30%	3.10%	1.90%
Welland	10,949	12,924	12,645	13,531	432	1,235	1,422	1,206	3.80%	8.70%	10.10%	8.20%
Niagara Falls	13,444	16,310	15,144	15,072	107	834	488	373	0.80%	4.90%	3.10%	2.40%
Totals	**64,171**	**75,675**	**75,816**	**79,589**	**716**	**3,597**	**2,915**	**2,323**	**1.10%**	**4.50%**	**3.70%**	**2.80%**

Niagara Region

Raw Sewage Characteristics

- Suspended Solids 100 mg/L
- Biochemical Oxygen Demand 100 mg/L

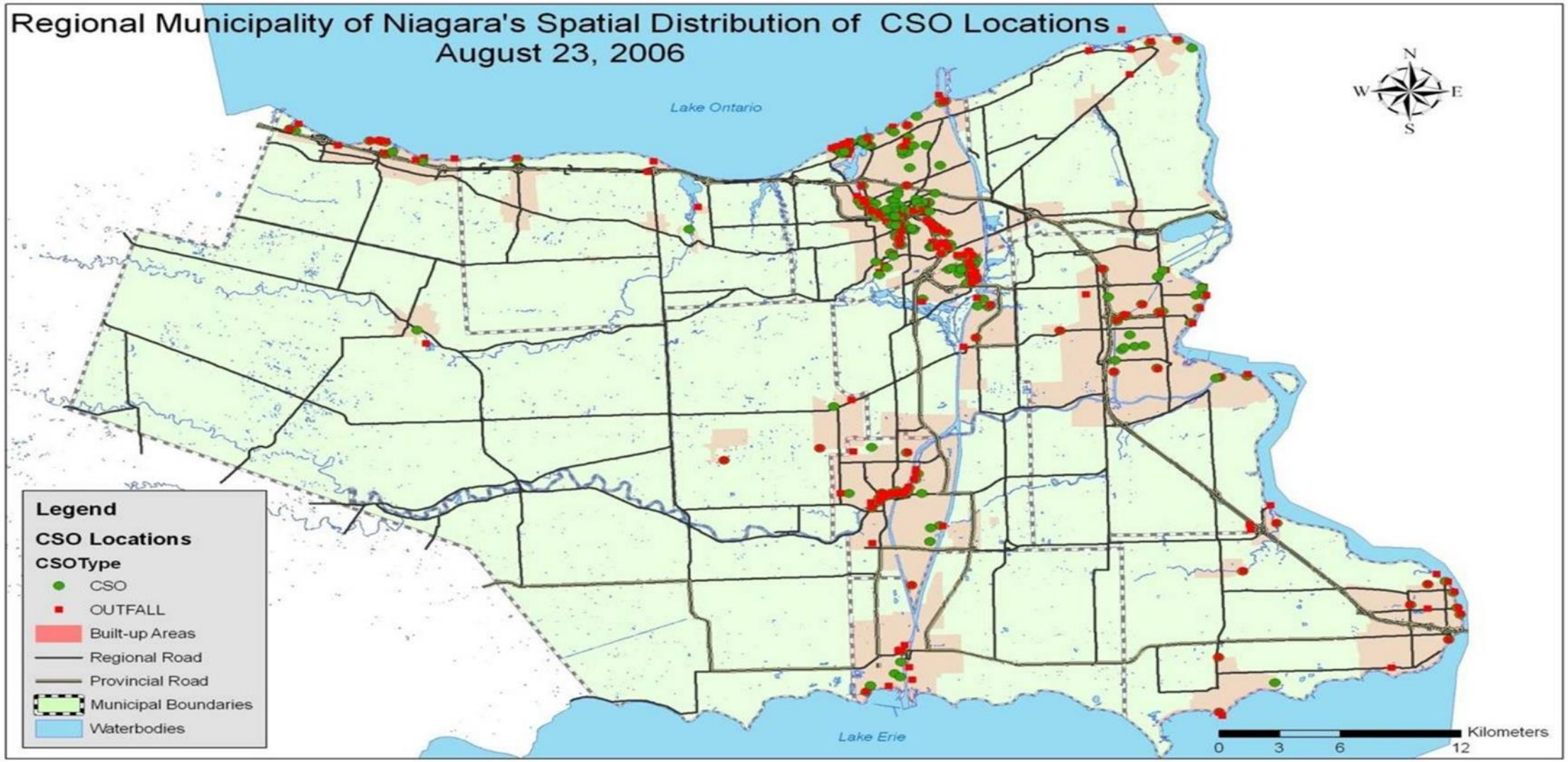
Combined Sewage Characteristics

- Suspended Solids <50 mg/L
- Biochemical Oxygen Demand <25 mg/L

Overflow Locations

Location	Niagara Region	Municipal	Total
Wainfleet	0	0	0
West Lincoln	1	0	1
Pelham	1	1	2
Lincoln	3	0	3
Niagara-on-the-Lake	5	1	6
Port Colborne	7	1	8
Fort Erie	8	4	12
Grimsby	7	5	12
Niagara Falls	10	19	29
Thorold	7	25	32
Welland	2	30	32
St. Catharines	11	121	132
Totals	**62**	**207**	**269**

CSO Locations



Monitoring of CSOs

- There are approximately 35 locations that routinely bypass and are monitored and sampled by the Region.
- All bypasses at the WWTPs are measured and samples are collected. MECP is contacted at the beginning and end of each bypass event.
- Overflows that occur at Niagara Region sewage pumpstations are also monitored and sampled but in many cases there is no metering equipment available to measure the volume of combined sewage that is bypassed.
- In cases where there is no measuring equipment, the events are reported to the MECP without the volume data. Estimates are made and reported later.

ECA Conditions for bypass

5. BY-PASSES

(1) Any By-pass of sewage from any portion of the Works is prohibited, except where:

(a) it is necessary to avoid loss of life, personal injury, **danger to public health or severe property damage;**

(b) the District Manager agrees that it is necessary for the purpose of carrying out essential maintenance and the District Manager has given prior written acknowledgment of the by-pass ; or

(c) the Regional Director has given prior written acknowledgment of the By-pass .

(2) The Owner shall collect at least one (1) grab sample of the By-pass and have it analyzed for the parameters outlined in Condition 7 using the protocols in Condition 9.

(3) The Owner shall maintain a logbook of all By-pass events which shall include, at a minimum, the time, location, duration, quantity of By-pass , the authority for By-pass pursuant to subsection (1), and the reasons for the occurrence.

(4) The Owner shall, in the event of a By-pass event pursuant to subsection (1), disinfect the by-passed effluent during the disinfection period of April 01 to October 31 prior to reaching the receiver such that the receiver is not negatively impacted.

Compliance with Legislation

- Environmental Compliance Approvals (ECA) for each facility contain conditions when a bypass or overflow is permitted
- Requirements to report to MECP, Environment Canada, Medical Officer of Health
- Publicly reported on Niagara Region Website
- MECP F-5-5 requirements during design of sewage works
- Between April 1 and October 31st, treat all the dry weather flow and 90% of the wet weather flow.
- Niagara meets this requirement all year.

CSO Tanks provide storage during wet weather

CSO Tanks and Volumes

Name	Owner	WW System	Municipality	Volume (m3)
Kelly St CSO Tank	Niagara Region	Welland WWTP	Thorold	200
Biggar Lagoon CSO Tank	Niagara Region	Baker Road WWTP	Grimsby	400
Cole Farm CSO Tank	City of St. Catharines	Port Dalhousie WWTP	St. Catharines	450
Grimsby Works Yard CSO Tank	Niagara Region	Baker Road WWTP	Grimsby	600
Peel St CSO Tank	City of Thorold	Port Weller WWTP	St. Catharines	600
Smithville CSO Tank	Niagara Region	Baker Road WWTP	West Lincoln	665
Eastside SPS	Niagara Region	Seaway WWTP	Port Colborne	700
Lakeside CSO Tank	City of St. Catharines	Port Dalhousie WWTP	St. Catharines	700
Beaver Street CSO Tank	City of Thorold	Port Weller WWTP	Thorold	750
William St CSO Tank	Town of N-O-T-L	NOTL WWTP	NOTL	900
Dain City CSO Tank	Niagara Region	Welland WWTP	Welland	1200
Central High Rate Treatment	City of Niagara Falls	Niagara Falls WWTP	Niagara Falls	1500
Baker Road WWTP	Niagara Region	Baker Road WWTP	Grimsby	2300
Port Dalhousie WWTP	Niagara Region	Port Dalhousie WWTP	St. Catharines	2500
Lockview CSO Tank	City of St. Catharines	Port Weller WWTP	St. Catharines	2750
Anger Avenue WWTP	Niagara Region	Anger Avenue WWTP	Fort Erie	4100
South Side Low Lift CSO Tank	City of Niagara Falls	Niagara Falls WWTP	Niagara Falls	4300
Seaway WWTP	Niagara Region	Seaway WWTP	Port Colborne	5701
			Total	**30,316**

Central SPS & High Rate Treatment Facility in Niagara Falls

Niagara Falls –Central SPS / High Rate Treatment Facility

- Dry Weather Operation

Niagara Falls Central SPS / High Rate Treatment Facility

- During Wet Weather

Niagara Falls Central SPS / High Rate Treatment Facility

- Vortex Units in Operation

Questions??