
Subject: 2020 Reserve Water and Wastewater Treatment Capacities

Report to: Planning and Economic Development Committee

Report date: Wednesday, April 14, 2021

Recommendations

1. That Report PDS 20-2021 **BE RECEIVED** for information; and
2. That Report PDS 20-2021 **BE CIRCULATED** to the Ministry of the Environment, Conservation and Parks and Local Area Municipalities.

Key Facts

- The purpose of this report is to inform Council of the reserve treatment capacities at Niagara's Water and Wastewater Treatment facilities. This reporting is required by the Ministry of Environment, Conservation and Parks (MECP).
- The data contained in this report assists in commenting on new development proposals and related servicing as well as planning for future treatment capacity.
- All of Niagara Water Treatment Plants (WTPs) and Wastewater Treatment Plants (WWTPs) are positioned to accept growth beyond the minimum 10 year horizon.

Financial Considerations

This report provides Council with historical and projected treatment capacity and flow data. There are no direct financial implications in receiving this report.

The reserve treatment capacities at the water and wastewater (W&WW) facilities are considered in commenting on new development proposals and related servicing and, as a result, could result in a financial impact related to specific future applications.

Analysis

The Infrastructure Planning and Development Engineering section of Planning and Development Services Department annually reports on an assessment of the average daily W&WW flows based on the previous five years, as recorded at our various facilities compared to MECP rated capacities for the facilities. Included in the analysis are the 10-year growth projections in accordance with Niagara 2041 (*How we Grow, Flow and Go*).

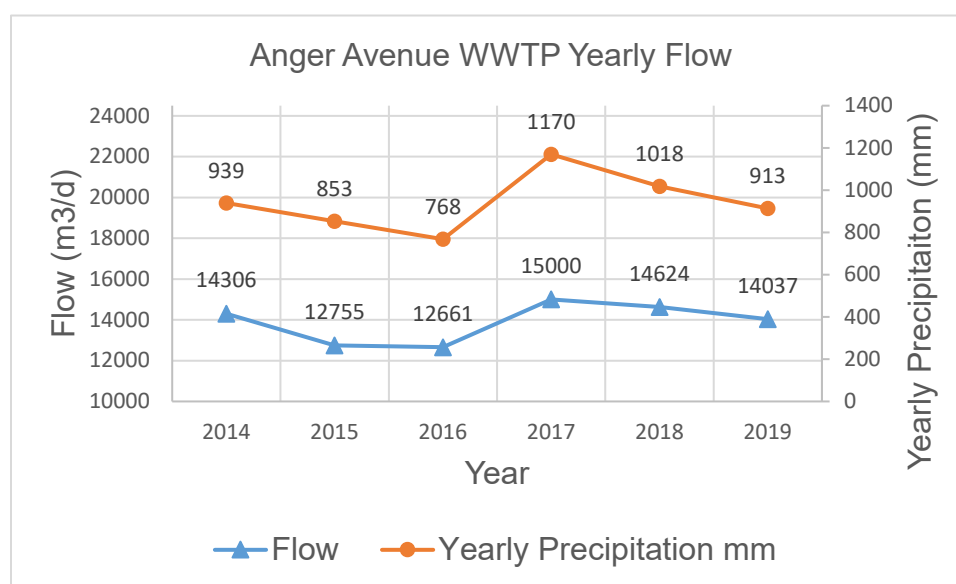
A key objective of this report is to highlight potential capacity constraints and allow sufficient lead time to plan for future capacity increases through the W&WW capital programs so that development may continue unencumbered. This is a 'desktop' exercise, which compares five-year (annual) average flows to the respective MECP Environmental Compliance Approval(s), formerly known as Certificate of Approval(s) for each facility, then incorporates 10-year growth forecasts into the calculation. Ongoing phasing and staging strategy works with our local municipal partners will further refine this assessment for understanding development capacity.

This assessment does not reflect specific compliance, quality, sustainability, risk, or operational deficiencies at the treatment plants or trunk conveyance/transmission systems, which may affect the Region's ability to approve new development or permit servicing extensions.

For municipal wastewater treatment, weather is the key factor that results in peak wet weather flows, which impacts the collection and trunk sewers in both local and regional systems through "Rainfall Derived Inflow and Infiltration" (RDI&I). Even though, it is expected to record higher flows due to population growth, the annual average daily flows to the WWTPs are higher due to the wet weather flows entering the systems.

Just for an example, Figure 1 illustrates a direct correlation of wastewater plant flows and yearly precipitation at Anger Avenue WWTP.

Figure 1: Correlation of Wastewater Flows with Precipitation



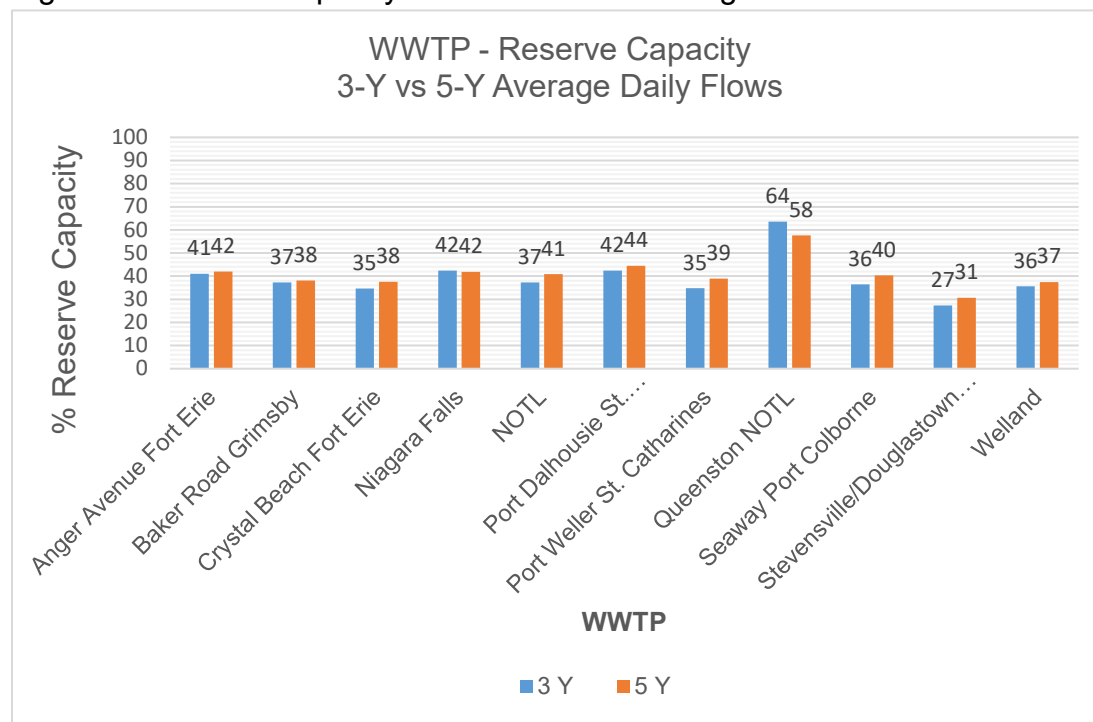
Wet weather flows can have substantial impact on available WWTP capacities and a direct impact on the limitations of available servicing capacity for future growth.

Appendix 1 and 2 provide the annual average daily flows from 2016 to 2020 as well as the three-year and five-year averages for the water and wastewater treatment plants, respectively. Appendices 3 and 4 provide a summary of Niagara's six water treatment facilities and eleven wastewater treatment facilities presenting their respective reserve capacities.

It is worth noting that the greater growth rates in recent years in Niagara show a more consistent increase in flows over the last few years, which consequently can impact the way this 'desktop' exercise conducts the reserve capacity calculations. If the annual daily flows are averaged over longer period of time, it can potentially create a skewed sense of greater reserve capacity. Therefore, an analysis of the three-year and five-year annual average daily flows for reserve capacity was completed to better understand this potential impact.

As shown on Figure 2 below, in general, the three-year average of Reserve Capacity for WWTP were slightly less than the five-year (except for Queenston NOTL WWTP); however, this was not a significant difference.

Figure 2: Reserve Capacity – Annual Flows Averaged over 3-Year and 5-Year Period



Going forward, the annual average daily flows over the last 3-years and 5-years will be compared and analyzed to understand if a more significant difference in Reserve Capacity develops.

At present, all of Niagara's WTPs and WWTPs are positioned to accept growth beyond the minimum 10-year period (Appendix 3 and Appendix 4).

Wet Weather Management

In order to accommodate the anticipated growth from Niagara 2041, the 2016 W&WW Master Servicing Plan (MSP) investigated capacity upgrades (upgrades to trunk sewers, pumping station capacities, etc.), upstream management (storage, peak shaving, diversion), and peak flow management (flow reduction, Inflow & infiltration (I&I) reduction projects) for every wastewater system. Based on this review, there are wet weather projects listed with identified areas for targeted I&I removal to offset the requirement to upgrade and expand more expensive infrastructure all the way to the WWTPs. It is crucial to achieve the I&I reductions in order to offset the capacity needs from growth, to protect the environment, and mitigate potential basement flooding.

The Region and Area Municipalities are continuing to work collaboratively to facilitate ongoing development throughout the region and provide the requisite servicing and capacity allocation in a responsible way to service the communities.

In addition, the Region has been aiding Area Municipalities by funding the CSO Control program as a part of the overall Wet Weather Management Strategy to support various I&I related projects and programs on the municipal side. This program has been reducing the impacts of I&I and has been a benefit to both, the Region and the Area Municipalities.

Staff is working with the Development Industry including Public Works Officials, Building Officials, Developers, Consultants and Contractors to raise awareness on the wet weather management issues and potential upcoming changes to address this. The Region is also represented at the Expert Stakeholder Committee (ESC) for the *Guideline to Undertaking Flow Monitoring of New Construction* and will work with all stakeholder to review the flow monitoring of new subdivisions as mandatory.

Alternatives Reviewed

No alternatives were reviewed for this report.

Relationship to Council Strategic Priorities

The report aligns with Council's Priority of Responsible Growth and Infrastructure Planning by highlighting the reserve capacity available to growth at all Regional Water and Wastewater Treatment Facilities.

The report also provides MECP and local municipal partners operational summary and reserve capacity projections for Region's Water and Wastewater Treatment facilities

Other Pertinent Reports

- PDS 13-2020, April 8, 2020, 2019 Reserve Water and Wastewater Treatment Capacities
- PW 22-2017, May 30, 2017, 2016 Water and Wastewater Master Servicing Plan Update

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Appendices

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| Appendix 1 | Annual Average Daily Flow 2016 to 2020 WTP |
| Appendix 2 | Annual Average Daily Flow 2016 to 2020 WWTP |

Appendix 3 Water Reserve Capacity Calculations for 2020

Appendix 4 Wastewater Reserve Capacity Calculations for 2020

Appendix 1: WTP Annual Average Daily Flow 2016 - 2020

Water Treatment Plant	Rated Capacity (m ³ /d)	Average Daily Flow (m ³ /d)							3 to 5 Year % Change
		2016	2017	2018	2019	2020	5 Year 2016 - 2020	3 Year 2018 - 2020	
Decew Falls WTP	227,300	54,903	54,321	56,090	53,303	53,390	54,401	54,261	0%
Grimsby WTP	44,000	15,699	14,020	14,866	14,029	15,726	14,868	14,874	0%
Niagara Falls WTP	145,584	47,350	45,192	44,780	43,400	40,145	44,173	42,775	-3%
Port Colborne WTP	36,000	7,719	8,735	8,864	7,282	6,870	7,894	7,672	-3%
Rosehill WTP	50,026	13,148	12,388	12,862	11,188	11,024	12,122	11,691	-4%
Welland WTP	65,000	21,858	21,590	22,538	22,579	24,670	22,647	23,262	3%

Appendix 2: WWTP Annual Average Daily Flow 2016 - 2020

Wastewater Treatment Plant	Rated Capacity (m ³ /d)	Average Daily Flow (m ³ /d)							3 to 5 Year % Change
		2016	2017	2018	2019	2020	5 Year 2016 - 2020	3 Year 2018 - 2020	
Anger Avenue WWTP	24,500	12,661	15,000	14,624	15,146	13,580	14,202	14,450	2%
Baker Road WWTP	31,280	16,999	20,897	19,975	20,910	17,952	19,347	19,612	1%
Crystal Beach WWTP	9,100	4,676	5,915	5,874	6,276	5,688	5,686	5,946	4%
Niagara Falls WWTP	68,300	35,880	44,684	41,489	41,360	35,242	39,731	39,364	-1%
NOTL WWTP ⁽¹⁾	8,000	4,021	4,561	4,687	5,237	5,142	4,730	5,022	6%
Port Dalhousie WWTP	61,350	29,616	34,823	35,095	36,681	34,113	34,065	35,296	3%
Port Weller WWTP	56,180	29,650	32,090	36,881	39,211	33,751	34,317	36,614	6%
Queenston WWTP	500	278	234	198	213	135	212	182	-16%
Seaway WWTP	19,600	9,103	12,082	12,580	13,472	11,299	11,707	12,450	6%
Stevensville/Douglastown Lagoon	2,289	1,314	1,635	1,670	1,729	1,592	1,588	1,664	5%
Welland WWTP	54,550	29,728	35,407	34,643	37,137	33,617	34,107	35,133	3%

Note 1: Effluent discharge from NOTL WWTP started directly on January 6, 2020 after previously used lagoon was gradually decommissioned by January 16, 2020.

Appendix 3: WTP Reserve Capacities for 2020

Water Treatment Plant	Permit To Take Water ⁽¹⁾	Rated Treatment Capacity	Theoretical Average Day Capacity	90% of Average Day Capacity ⁽³⁾	5-Year Average Day Flow	Peaking Factor ⁽²⁾	Total Capacity Used	Reserve Treatment Capacity (90% base) MLD	Design Flow Rate (275 Lcd)	Reserve Serviceable Population Equivalents	10-Year Forecast For Population (Res & Emp)	Surplus Population 10-Year Projection
	MLD											
DeCew Falls WTP	227.0	227.3	143.4	129.1	54.4	1.585	38%	74.7	275	271,636	30,398	241,238
Grimsby WTP	44.0	44.0	26.5	23.9	14.9	1.658	56%	9.0	275	32,727	14,771	17,956
Niagara Falls WTP	145.5	145.6	88.2	79.4	44.2	1.650	50%	35.2	275	128,000	23,782	104,218
Port Colborne WTP	45.5	36.0	22.4	20.2	7.9	1.608	35%	12.3	275	44,727	1,552	43,175
Rosehill WTP	78.0	50.0	31.8	28.6	12.1	1.573	38%	16.5	275	60,000	6,375	53,625
Welland WTP	110.0	65.0	43.4	39.1	22.6	1.499	52%	16.4	275	59,636	12,292	47,344

Note 1: Original MOE approved quantity of raw water permitted (Permit To Take Water).

Note 2: The peaking factors used are based on an average of actual flow rates of maximum day versus average day flows over the past three years at each facility.

Note 3: Region's W&WW MSP (GM BluePlan, 2017) requires planning process for expansion when plant capacity exceeds 80%, and expansion should be completed when capacity exceeds 90%.

Appendix 4: WWTP Reserve Capacity for 2020

Wastewater Treatment Plant	MOE Plant Rated Capacity	90 % of Plant Capacity ⁽¹⁾	5-Year Average Daily Flow	Total Capacity Used	Reserve Treatment Capacity (90% base) (m³/d)	Design Flow Rate ⁽²⁾ (365 Lcd)	Reserve Serviceable Population Equivalents	10-Year Forecast For Population (Res & Emp)	Surplus Population 10-Year Projection
	(m³/d)								
Anger Avenue (Fort Erie) WWTP	24,500	22,050	14,202	58%	7,848	365	21,500	4,277	17,223
Baker Road (Grimsby) WWTP	31,280	28,152	19,347	62%	8,805	365	24,125	16,791	7,334
Crystal Beach (Fort Erie) WWTP	9,100	8,190	5,686	62%	2,504	365	6,861	1,443	5,418
Niagara Falls WWTP ⁽³⁾	68,300	61,470	39,731	58%	21,739	365	59,559	19,980	39,579
NOTL WWTP ⁽⁴⁾	8,000	7,200	4,730	59%	2,470	365	6,767	2,644	4,123
Port Dalhousie (St. Catharines) WWTP	61,350	55,215	34,065	56%	21,150	365	57,944	15,005	42,939
Port Weller (St. Catharines) WWTP	56,180	50,562	34,317	61%	16,245	365	44,508	10,052	34,456
Queenston (NOTL) WWTP ⁽⁵⁾	500	450	212	42%	238	365	653	99	554
Seaway (Port Colborne) WWTP	19,600	17,640	11,707	60%	5,933	365	16,254	1,622	14,632
Stevensville/Douglastown Lagoon	2,289	2,060	1,588	69%	472	365	1,293	795	498
Welland WWTP	54,550	49,095	34,107	63%	14,988	365	41,064	12,912	28,152

Note 1: Region's W&WW MSP (GM BluePlan, 2017) requires planning process for expansion when plant capacity exceeds 80%, and expansion should be completed when capacity exceeds 90%.

Note 2: Design Flow Rate incorporated 90 L/c/d of extraneous flow allowance

Note 3: The Niagara Falls WWTP assessment includes the sewage flows from the St. David's area of Niagara-on-the-Lake.

Note 4: Effluent discharge from NOTL WWTP started directly in January 2020 with previously used lagoon, decommissioned.

Note 5: The Queenston WWTP in Niagara-on-the-Lake has a unique capacity commitment of 226 m³/d for the following properties: Niagara Parks Commission (75 m³/d), Niagara Falls Bridge Commission (63 m³/d), Shalamar Campground (38 m³/d) and Ontario Power Generation (50 m³/d). Due to these commitments and limited UAB, limited residential growth is expected within the next 10 year period within the tributary area.