
Subject: 2021 Reserve Water and Wastewater Treatment Capacities

Report to: Planning and Economic Development Committee

Report date: Wednesday, April 6, 2022

Recommendations

1. That this Report **BE RECEIVED** for information; and
2. That this Report **BE CIRCULATED** to the Ministry of the Environment, Conservation and Parks and Local 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. 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.

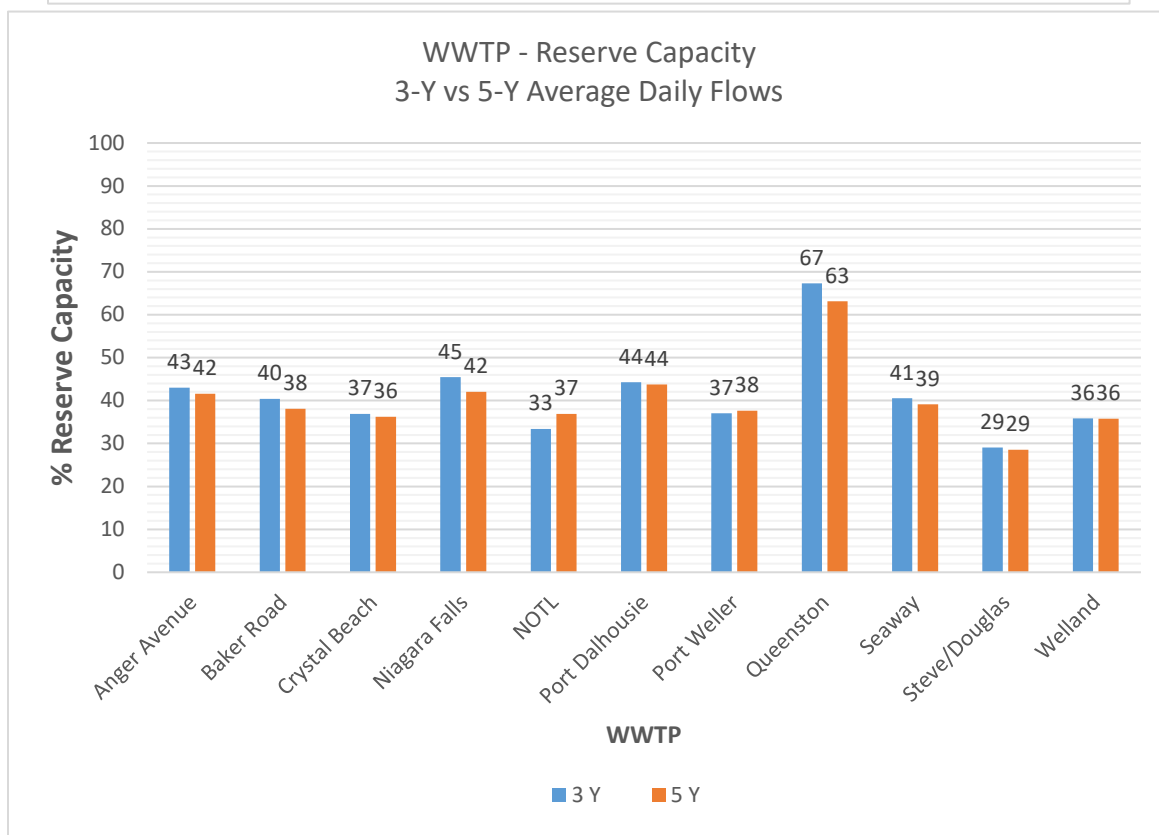
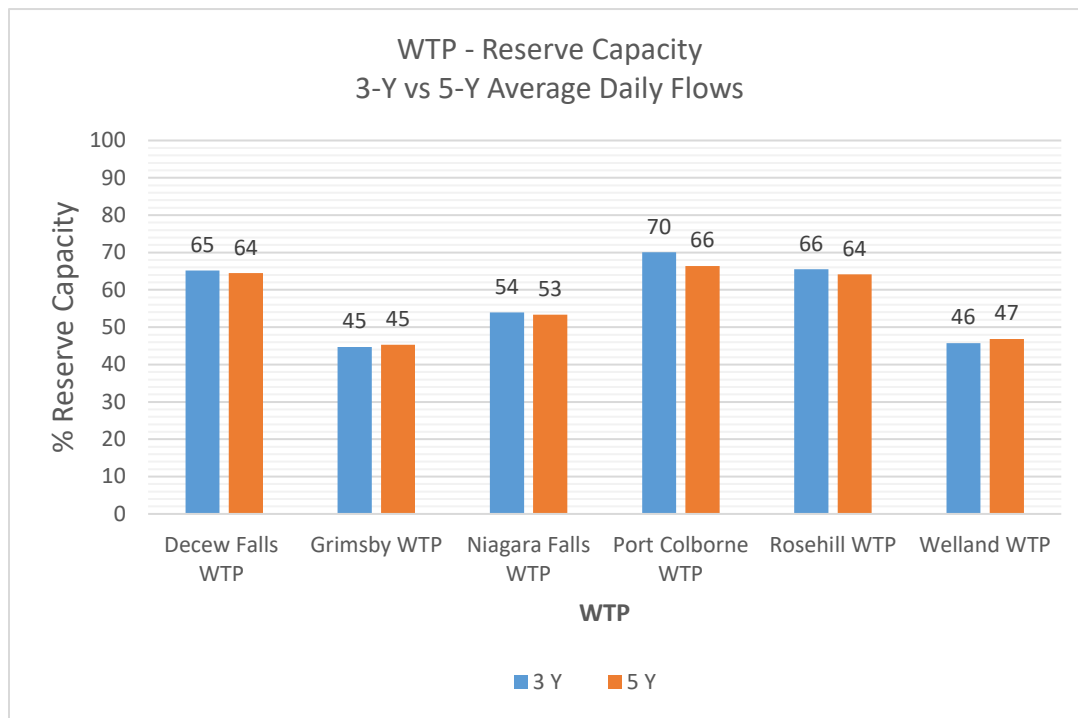
For municipal wastewater treatment, weather is the key factor that results in peak wet weather flow, which impacts the collection and trunk sewers in both local and regional systems through "Rainfall Derived Inflow and Infiltration" (RDI&I). Wet weather flows can have substantial impact on available 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, five and three-year average flows from 2017 to 2021 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 growth rates in recent years show an increase compared to time before, which consequently can affect the way this desktop exercise conducts the reserve capacity calculations. This can create a skewed sense of a greater reserve capacity available for the future if the annual daily flows are averaged over longer period. With a higher growth rate seen recently in the Region, it would be expected that Reserve Capacities averaged over a 3-year period are less than averaged over a 5-year period. Due to COVID over the last 2 years, there may have been some impacts on flows. However, averaging daily flows over a 5-year period versus a 3-year period in the Reserve Capacity calculations for 2021 does not show a compelling difference or significant trend.

Figure 1 shows a comparison of the percentage of remaining reserve capacities for WTPs and WWTPs when daily flows are averaged over the last 3 and 5 years.

Figure 1: Reserve Capacity – Annual Flows Averaged over 3-Year and 5-Year Period



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 Local 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 Local 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 Local Municipalities.

The available funding for the 2022 CSO Control Program has been fully utilized and subscribed with applications from the Local Municipalities. A future report on the 2022 CSO Control Program is anticipated to be presented to the Planning & Economic Development Committee in the next month.

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 stakeholders to move forward with a consistent approach for the review the flow monitoring of new subdivisions.

New South Niagara Falls Wastewater Treatment Plant

Although this report identifies there is short term capacity available at the existing Niagara Falls WWTP, it only considers the treatment capacity at the plant for the next 10 years. It does not consider the constraints in the existing sanitary collection system, wet weather flow issues, consideration for development demands and longer term growth, or the required infrastructure improvements to get the flows to the plant.

As part of Niagara 2041, there was an update to the Water and Wastewater Master Servicing Plan (MSP). Niagara Region retained GM BluePlan Engineering Ltd. (GMBP) to review, evaluate and develop water and wastewater servicing strategies for all servicing within the urban areas of the Region. The MSP Update used updated population and employment growth forecasts based on a 2041 planning horizon. Niagara Region is now working on the current 2021 MSP Update which is looking at potential growth out to 2051. Based on the Niagara 2051 planning review, the implementation and timing of the preferred solution for the new South Niagara Falls Wastewater Treatment Plant and Servicing Solution (SNF Servicing Solution) continues to be supported and is necessary to accommodate growth.

In Niagara Falls, there is not enough capacity in the existing sewer system nor at the existing treatment plant to meet the increasing system demands resulting from growth as well as the increased wet weather flows due to aging infrastructure and climate change. The SNF Servicing Solution is essential to unlocking the development potential in the broader South Niagara area. The ability to redirect existing flows to the south, provide additional capacity in the new trunk sewer, provide flexibility for storage in the trunk sewer, and ultimately treat the wastewater flows at the new WWTP all contribute to a significant wet weather management program. In addition, the location of the new WWTP will provide flexibility for the potential for additional wet weather management through potential connections of other service areas such as Chippawa. Through the analysis undertaken as part of the Class EA process, it is estimated that the new South Niagara Wastewater Solutions strategy, will result in a reduction of over 60% of wet weather volume overflow to the environment.

This new WWTP is integral to the overall growth servicing strategy that supports the anticipated residential and employment growth in the Niagara Falls, NOTL, and Thorold South service areas. This total growth is estimated to be over 75,000 people and jobs in the area out to the year 2051 with the new WWTP servicing approximately half of this growth along with the existing residents and businesses in South Niagara Falls and Thorold South. The new WWTP and collection system strategy is also considering

potential long term growth beyond 2051. The capital program to support the new WWTP will provide greater flexibility for development servicing in St. Catharines, Niagara Falls, Thorold, and Niagara-on-the-Lake.

Alternatives Reviewed

An alternative to use a 3-year average daily flow in the reserve capacity calculation was reviewed. Since no significant difference or trend was found for the 2021 Reserve Capacity calculations, a 5-year average daily flow continued to be used.

Relationship to Council Strategic Priorities

The report aligns with Council's Priority of Responsible Growth and Infrastructure Planning by highlighting the reserve capacity available for 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

- PW 39-2021, September 9, 2021, South Niagara Falls Wastewater Treatment Plant – Budget and Property
- PDS 22-2021, April 14, 2021, 2020 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

Appendix 1	Annual Average Daily Flow 2017 to 2021 WTP
Appendix 2	Annual Average Daily Flow 2017 to 2021 WWTP
Appendix 3	Water Reserve Capacity Calculations for 2021
Appendix 4	Wastewater Reserve Capacity Calculations for 2021

Appendix 1: WTP Annual Average Daily Flow 2017 - 2021

Water Treatment Plant	Rated Capacity (m ³ /d)	Average Daily Flow (m ³ /d)					5 Year Average 2017 / 21	3 Year Average 2019 / 21
		2017	2018	2019	2020	2021		
Decew Falls WTP	227,300	54,349	56,090	53,303	53,390	50,824	53,591	52,506
Grimsby WTP	44,000	14,032	14,919	14,029	15,726	14,872	14,716	14,876
Niagara Falls WTP	145,584	44,924	44,835	43,400	40,145	40,125	42,686	41,223
Port Colborne WTP	36,000	8,735	8,864	7,282	6,870	6,387	7,628	6,846
Rosehill WTP	50,026	12,395	12,872	11,188	11,024	11,710	11,838	11,307
Welland WTP	65,000	21,594	22,538	22,579	24,670	24,675	23,211	23,975

Appendix 2: WWTP Annual Average Daily Flow 2017 - 2021

Wastewater Treatment Plant	Rated Capacity (m³/d)	Average Daily Flow (m³/d)					5 Year Average 2017 / 21	3 Year Average 2019 / 21
		2017	2018	2019	2020	2021		
Anger Avenue WWTP	24,500	15,000	14,624	15,146	13,580	13,171	14,304	13,966
Baker Road WWTP	31,280	20,897	19,975	20,910	17,952	17,081	19,363	18,648
Crystal Beach WWTP	9,100	5,915	5,874	6,276	5,688	5,256	5,802	5,740
Niagara Falls WWTP	68,300	44,684	41,489	41,360	35,242	35,197	39,594	37,266
NOTL WWTP	8,000	4,561	4,687	5,237	5,142	5,602	5,046	5,327
Port Dalhousie WWTP	61,350	34,823	35,095	36,681	34,113	31,793	34,501	34,196
Port Weller WWTP	56,180	32,090	36,881	39,211	33,751	33,176	35,022	35,379
Queenston WWTP	500	234	198	213	135	142	185	163
Seaway WWTP	19,600	12,082	12,580	13,472	11,299	10,200	11,927	11,657
Stevensville/Douglastown	2,289	1,635	1,670	1,729	1,592	1,552	1,636	1,624
Welland WWTP	54,550	35,407	34,643	37,137	33,617	34,288	35,019	35,014

Appendix 3: WTP Reserve Capacities for 2021

Water Treatment Plant	Permit To Take Water ⁽¹⁾	Rated Treatment Capacity	Theoretical Ave Day Capacity	90% of Ave Day Capacity ⁽²⁾	5-Year Ave Day Flow	Peaking Factor	Total Capacity Used	Reserve Treatment Capacity	Design Flow Rate	Reserve Serviceable Population	10-Year Forecast Population	Surplus Population
	MLD							90% MLD	275 Lpcd	Equivalents	Res & Emp	10-Year Projection
DeCew Falls	227.0	227.3	150.8	135.7	53.6	1.507	36%	82.1	275	298,545	30,398	268,147
Grimsby	44.0	44.0	26.9	24.2	14.7	1.637	55%	9.5	275	34,545	14,771	19,774
Niagara Falls	145.5	145.6	91.6	82.4	42.7	1.590	47%	39.8	275	144,727	23,782	120,945
Port Colborne	45.5	36.0	22.7	20.4	7.6	1.589	34%	12.8	275	46,545	1,552	44,993
Rosehill	78.0	50.0	33.0	29.7	11.8	1.514	36%	17.9	275	65,091	6,375	58,716
Welland	110.0	65.0	43.7	39.3	23.2	1.487	53%	16.1	275	58,545	12,292	46,253

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

Note 2: 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 2021

Wastewater Treatment Plant	MECP Rated Capacity	90% of Plant Capacity ⁽¹⁾	5-Year Average Daily Flow	Total Capacity Used	Reserve Treatment 90%Capacity m ³ /d	Design Flow Rate ⁽²⁾ 365 Lpcd	Reserve Serviceable Population Equivalents	10-Year Forecast Population Res & Emp	Surplus Population 10-Year Projection
	m ³ /d								
Anger Avenue (Fort Erie)	24,500	22,050	14,304	58%	7,746	365	21,221	4,277	16,944
Baker Road (Grimsby)	31,280	28,152	19,363	62%	8,789	365	24,080	16,791	7,289
Crystal Beach (Fort Erie)	9,100	8,190	5,802	64%	2,388	365	6,544	1,443	5,101
Niagara Falls ⁽³⁾	68,300	61,470	39,594	58%	21,876	365	59,933	19,980	39,953
NOTL	8,000	7,200	5,046	63%	2,154	365	5,902	2,644	3,258
Port Dalhousie (St. Catharines)	61,350	55,215	34,501	56%	20,714	365	56,751	15,005	41,746
Port Weller (St. Catharines)	56,180	50,562	35,022	62%	15,540	365	42,576	10,052	32,524
Queenston (NOTL) ⁽⁴⁾	500	450	185	37%	265	365	727	99	628
Seaway (Port Colborne)	19,600	17,640	11,927	61%	5,713	365	15,653	1,622	14,031
Stevensville/Douglastown	2,289	2,060	1,636	71%	424	365	1,163	795	368
Welland	54,550	49,095	35,019	64%	14,076	365	38,566	12,912	25,654

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: 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 years within the tributary area.