2024 Annual Report - Water and Wastewater Capacity

Town of Grand Valley
5 Main Street North
Grand Valley ON L9W 5S6

R.J. Burnside & Associates Limited
292 Speedvale Avenue West Unit 20
Guelph ON N1H 1C4 CANADA

May 2025
300060140.0000

1.0 Introduction

At the request of the Town of Grand Valley (Town), R.J. Burnside & Associates Limited (Burnside) is reporting on the available capacity of the water supply / storage and wastewater collection and treatment systems, for the year ending December 31, 2024. This report will:

- Examine the historical and existing serviced population as well as the historical and existing water demands and wastewater generation rates;
- Evaluate the infrastructure, its ability to accommodate allocated units, and its ability to accommodate additional units. The infrastructure reviewed includes:
  - Existing water supply wells;
  - Existing water storage;
  - Emma Street Sewage Pumping Station (Emma St. SPS); and
  - Wastewater Pollution Control Plant (WPCP).

For this report, the detailed analysis has been included in the appendices as follows:

Appendix A: Includes the assessment of population and units committed for future growth that are currently unbuilt or unoccupied.

Appendix B: Includes the detailed assessment of the wastewater related infrastructure.

Appendix C: Includes the detailed assessment of the water related infrastructure.

2.0 Infrastructure Upgrades in 2024

The following infrastructure upgrades took place in 2024:

- Well PW5 was fully commissioned in July 2024 which now means the Town has four municipal wells supplying the water system (Well PW4 was previously removed from service due to its low capacity). Well PW5 has the second highest capacity, much closer to the Town's highest rated well (Well PW1 at the Cooper Street pumphouse). This means that the Town's firm capacity has more than doubled from the former 1,962 m^3/day to 4,191 m^3/day. The "firm capacity" of the system is intended to meet maximum demands in the event of the Town's largest well is taken out of service.
- Once Well PW5 was up and running, the Town was able to complete the Water Tower Restoration Project. The main tasks completed included interior overcoat, exterior overcoat, and the addition of a mixing system.

3.0 Results of the 2024 Annual Report

3.1 Available Allocation

- The Town **does not** have available sewage capacity to accommodate all allocated units (single detached equivalents – SDEs) due to a significantly higher average day flow compared to previous years which formed the basis of the former commitments. If, the historical trends had continued as we had expected, the Town would be in a good position, being able to accommodate 525 additional SDEs.
- The Town **does** have water allocation available.

	Sewage	Water
Can Committed Allocated units be accommodated?	Only 384 of the 544 units committed can be accommodated	Yes
How many more units can be accommodated?	None	154 units (SDEs) are available (limited by storage availability)

3.2 High Wastewater Flows

As noted in the 2023 Annual Report, beginning in late 2022, wastewater flows significantly increased and have not returned to the levels we would have anticipated based on historical flows. However, the water demand does not follow the same trend.

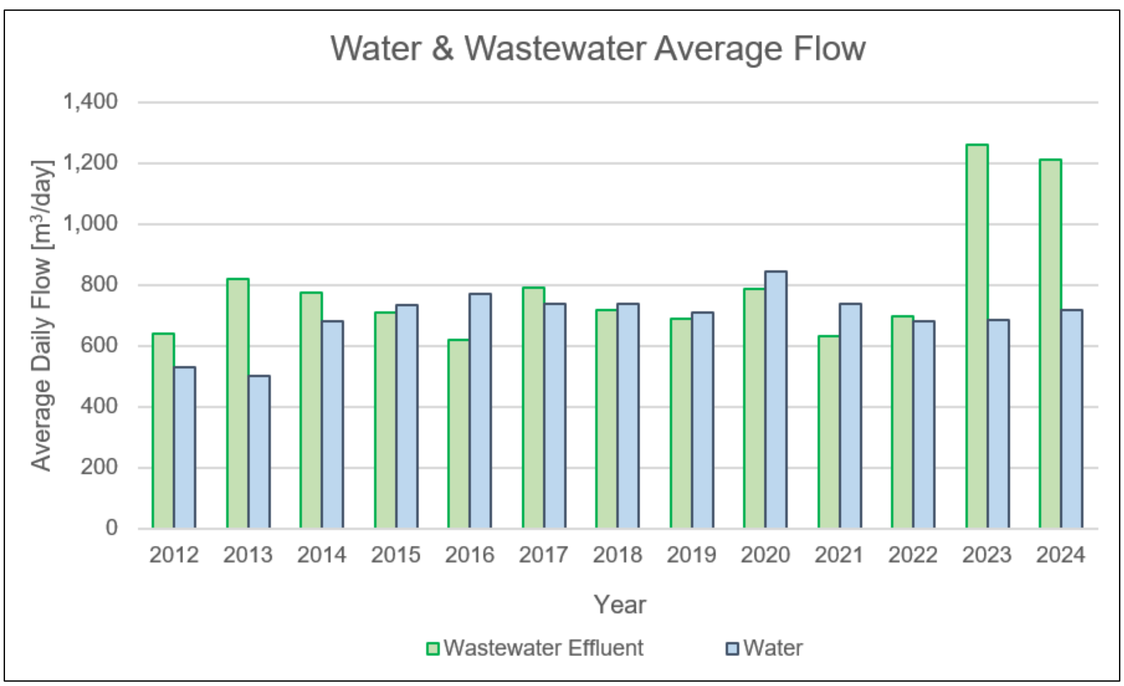

Figure 1: Water and Wastewater Average Flow

What do we know?

- We know that it is not a metering issue. Both meters at Emma Street SPS and the WPCP are showing similar results. Burnside completed a drawdown test at Emma St. SPS which confirmed the flows. Flow monitoring also confirmed flows entering Emma St. SPS.
- Raw sewage sampling shows 'diluted' results which points to the influence of groundwater as being a contributor.
- The flows are consistent, not only happening during wet weather months / events.
- Water demand did not increase to these levels. Therefore, groundwater (infiltration or through illegal discharges to the sanitary sewer) is anticipated to be the cause.

What has been investigated?

- The Sanitary Sewer that was replaced on Emma Street has contributed to some of the increases. Construction commenced in late 2022 and finished in the Summer of 2023.
  - During the construction, the old overflow from the former WPCP was connected to the SPS which caused water from the Grand River to backflow into the SPS. This connection was plugged in July 2023. This was anticipated to solve the significant increase, but it only marginally reduced the issue. This plug continued to leak (small leak) and was removed on May 14, 2025.
  - An ongoing review of this sewer segment on Emma Street has been completed by the Town / Burnside, which included:
    - Manhole (MH) inspections on June 4, 2024 – infiltration identified;
    - Late night CCTV (video of sewer) in October 2024 – Infiltration identified;
    - MH inspections on November 22, 2024 – Infiltration identified;
    - MH inspections on March 18, 2025 after the road was clear of flooding – infiltration identified in a number of new MH's that were replaced;
    - A private sanitary connection was investigated by Bylaw and Burnside and confirmed there was no illegal connection.
- All maintenance holes in Town were lifted and inspected on November 27, 2024, March 18, 2025 and April 3, 2025 – no unusual high flows or infiltration observed in the rest of the Town's sanitary sewer system.

Why is it challenging to find?

- The additional flow entering the sanitary sewer system approximately 300 m^3/day (3.5 L/s or 55 USGPM) is equivalent to approximately eight (8) garden hoses running into the system (24 hours, 7 days a week).
- There are many sources of inflow and infiltration including but not limited to:
  - Leaking mainline sewers;
  - Leaking service laterals;
  - Leaking manholes;

  - Downspout connections;
  - Weeping tile / foundation drain connections; and
  - Sump pump connections.
- The sanitary system consists of 235 manholes and 13 km of gravity sewer piping.
- The average homeowner sump pump is between 1/3 and 1/2 horsepower with an average discharge flowrate around 1.6 L/s or 25 USGPM. The additional flow would be equivalent to two to three sump pumps discharging into the sanitary sewer system at all times.
- CCTV of sewers and service laterals is very expensive.

What are the next steps?

- Complete the required studies to expand Wastewater Capacity:
  - The assimilative capacity study (needed for a future wastewater treatment plant expansion) has been initiated. This is a critical study in evaluating options to expand the system to increase capacity via a Master Water / Wastewater Study.
  - Master Water / Wastewater Study has been initiated.
- Other steps for consideration by the Town:
  - Education / Outreach;
  - Enhancing Sewer Use By-Law with fines for illegal connections, perform house inspections;
  - Maintenance work on Emma Street to repair leaks; and
  - Continue to complete CCTV of sewer system.

4.0 Summary

The increase in wastewater flows has significantly impacted the Town's plans and accommodation for growth.

Should you wish to discuss further please contact us.

R.J. Burnside & Associates Limited

Jeff Paznar, P.Eng. EP
JP/CD/SG:mp

Enclosures	Appendix A	Population
	Appendix B	Wastewater
	Appendix C	Water

Appendix A

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Appendix A

Population

1.0 Population

The existing population is an important factor in determining the water demand required as well as the remaining capacity at the existing Emma St. SPS and WPCP. Over the past several years Burnside has used occupancy permits to determine the Town's population. With the latest census occurring in 2021, Burnside used the available data from the census (Statistics Canada) to accurately reset the population and housing requirements in 2021.

Table 1 summarizes the existing population data for the area serviced by the communal water and wastewater systems.

We note the historic significance of the population number 2,950 which represented the mature state population of the Official Plan up until 2011. This was therefore the design population for the WPCP and the water supply and distribution system. The 2019 Master Plan identified works to achieve the 2031 population. Increased water supply (via the new Well PW5 added in 2024) was included in the plan.

2.0 Units Already Committed (Not Built or Unoccupied)

Table 2 summarizes units that have been allocated but not yet built or occupied.

2024 Annual Report - Water and Wastewater Capacity
Appendix A Population
May 2025

Table 1: Existing Population

Year	Population	Occupancy Permits				Private Dwellings Occupied by Usual Residents	Source
		Single	Multi-Res	Apartments			
				One Bed	Two Bed+		
2019	2,465	36	27	0	0	944	Occupancy Permits Spreadsheet provided by Jane Wilson on March 17, 2020, and Burnside familiarity.
2020	2,581	35	0	0	0	979	Building Permit Spreadsheet and MPAC Reports provided by Mark Kluge in March 2021.
2021(1)	2,720	42	0	0	0	1,021	Population and dwelling units referenced from Statistics Canada 2021 Census. Occupancy permit number based on water meter connections.
2022(1)	2,862	43	0	0	0	1,064	Current Water Meter Install and Occupancy Date data provided by Mark Kluge in April 2023.
2023(1)	2,931	14	7	3	1	1,089	Current Water Meter Install and Occupancy Date data provided by Mark Kluge in April 2024.
2024(2)	3,007	18	5	0	0	1,112	Current Water Meter Install and Occupancy Date data provided by Mark Kluge in April 2025.

Notes:

(1) A housing density of 3.304 has been used for single and semi-detached dwellings, 2.564 for townhouses, 1.146 for one-bedroom and 1.693 for two-bedroom apartments (2021 Development Charges Update Study completed by Watson & Associates Economists Ltd. in March 2021).

(2) A housing density of 3.388 has been used for single and semi-detached dwellings, 2.951 for townhouses, 2.065 for apartments (2024 Development Charge Background Study completed by Watson & Associates Economists Ltd. in May 2024).

Table 2: Committed Units

Parcel	Single Detached Equivalent Units (SDEs) Remaining
152 Main Street North	10
Thomasfield Infill (Scott Street Agreement)	6
Thomasfield (Mayberry Phase 3A – 111 SDEs total) • 111 water SDEs allocated via Surge Tank Agreement	7
Thomasfield (Mayberry Phase 3B – 205 SDEs total) • 205 SDEs allocated by Council on April 27, 2021 confirmed via the DC Agreement for the Well 5 Pumphouse and Southeast SPS (prior calculations noted 198 SDEs for Phase 3B, however it was intended to be 205 SDEs)	188
Scott Street Development • 5 water SDEs were allocated via Surge Tank Agreement • 14 SDEs allocated via Council October 13, 2020	19
Moco (196 SDEs) • 40 water SDEs allocated via Surge Tank Agreement • 67 SDEs (2009 Moco Allocation) • Remaining SDEs allocated by Council on May 31, 2021 confirmed via the DC Agreement for the Well 5 Pumphouse and Southeast SPS	196
Corseed (118 SDEs) • 35 water SDEs allocated via Surge Tank Agreement • Remaining SDEs allocated by Council on May 31, 2021 confirmed via the DC Agreement for Well 5 Pumphouse and Southeast SPS.	118
Total	**544**
Population	**(544 SDEs x 3.388 ppu) = 1,844 people**

Notes:
(1) ppu = people per unit
(2) 152 Main Street North will consist of 12 townhomes which is equivalent to 10 SDEs.
(3) Mayberry Phase 3A will consist of 98 single detached and 17 townhomes which is equivalent to 111 SDEs.
(4) Mayberry Phase 3B will consist of 159 single detached and 57 townhouses which is equivalent to 205 SDEs.
(5) Scott Street Development will consist of 11 single detached and 13 townhomes which is equivalent to 21 SDE. Two existing houses had been existing, therefore 19 SDEs total.
(6) Moco Subdivision will consist of 96 single detached, 97 townhomes, and Mixed use with 23 SDEs which total 196 SDEs.
(7) Corseed Subdivision will consist of 73 single detached, 25 townhomes, Mixed use with 8 SDEs, Commercial with 17 SDEs which total 118 SDEs.
(8) The Surge tank is in place and therefore the table below has been included to show the status of the 475 units and the remaining SDEs to be occupied.

<table>
<tr><th>Developer</th><th>SDE's</th><th>Notes</th></tr>
<tr><td>Thomasfield</td><td>263</td><td>
<table>
<tr><th></th><th>Mayberry Phase 3A</th><th>Mayberry Phase 3B</th><th>Totals</th></tr>
<tr><td>Allocated</td><td>111 SDE</td><td>152 SDE</td><td>263 SDE</td></tr>
<tr><td></td><td>41 SDEs occupied in 2021</td><td>17 SDEs occupied in 2024</td><td></td></tr>
<tr><td></td><td>39 SDEs occupied in 2022</td><td></td><td></td></tr>
<tr><td></td><td>19 SDEs occupied in 2023</td><td></td><td></td></tr>
<tr><td></td><td>5 SDEs occupied in 2024</td><td></td><td></td></tr>
<tr><td>Remaining</td><td>7 SDEs</td><td>135 SDEs</td><td>142 SDEs</td></tr>
</table>
</td></tr>
<tr><td>Hrcyna</td><td>12</td><td></td></tr>
<tr><td>Moco</td><td>95</td><td></td></tr>
<tr><td>Corseed</td><td>83</td><td></td></tr>
<tr><td>Cachet</td><td>22</td><td>Used by Cachet in 2020</td></tr>
<tr><td></td><td>475</td><td>(200 of the 475 had been loaned via a 2018 amendment ahead of surge tank completion, however with the surge tank now in place, the advanced loan is no longer referenced within the report)</td></tr>
</table>

3.0 Upcoming Developments (Council HAS NOT provided allocation)

The files in Table 3 below are in the planning process and will require allocation in the future. We are including this table for general awareness.

Table 3: Planned Developments without Allocation

Development Name	Stage in Planning Process	SDE's required (subject to change)
River's Edge	In Draft Plan Stage (have submitted to the Town one submission)	284
40 to 60 Emma Street	In Planning Stage (Zoning Amendment)	12
Emma Commercial/Res	Lost allocation as no construction commenced. Development upgrades required.	18

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Appendix B

Wastewater

1.0 Wastewater Flows

1.1 Emma St. SPS

The Emma St. SPS was constructed in 2011 and is located on the west side of Emma Street at the site of the former wastewater treatment plant (WWTP). The wastewater generated from the Town is collected via gravity sewers and directed to the pumping station wetwell. The wastewater is then pumped through a 1,100 m long, 250 mm diameter PVC forcemain to the WPCP for treatment. The SPS was designed to pump a peak instantaneous flow of 88.9 L/s (7,680 m^3/d).

Burnside requested daily flow and wetwell level data from the WPCP operations staff (i.e., Ontario Clean Water Agency or OCWA). More detailed data (minute by minute) was requested for specific date ranges where the highest flows were recorded to calculate the peak hour flow entering the SPS and compare the peak flow for 2024 to the previous three years (2021-2023). High flow periods were considered days when the total volume pumped in a day exceeded the WPCP's rated capacity of 1,555 m^3/d.

There is no flow measurement on the incoming sewer into the wetwell. As a result, the incoming flow was calculated for each minute based on the pumped volume (totalized flow measured by the flow meter on the outlet) and the change in wetwell level (using the wetwell area of 11.4 m^2 to determine the volume). Based on the incoming flow calculated for each minute, this data was used to determine the peak flow over each 60-minute period during a given high flow event. The result of this analysis is summarized in Table 4 which identifies the highest peak hour flows calculated for the past four years. The peak flow calculated for each respective year has occurred in late winter / early spring when snowmelt is typically contributing to infiltration and inflow (I&I).

Table 4: Emma St. SPS Annual Peak Hour Flows (2021-2024)

Year	Date	Calculated Peak Hour Flow [L/s]
2021	March 12, 2021	36.0
2022	March 20, 2022	31.0
2023	April 1, 2023	51.2
2024	April 14, 2024	30.0

Based on the historical peak flow analysis described above and the peak pumping capacity of 88.9 L/s, the Emma St. SPS has enough capacity to handle the current catchment area.

The total sewage flows increased significantly in 2023 compared to previous years based on the data provided by OCWA. While peak hour flow in 2024 decreased compared to 2023, the average daily flow (ADF) was still elevated and is summarized in Table 5.

Table 5: Emma St. SPS Daily Flow Increase

	Flow [m^3/d]	Flow Per Capita [L/p/d]
2022 ADF	722	252
2023 ADF	1,110	379
2022 to 2023 % Increase	**54%**	**50%**
2024 ADF	1,032	343
2022 to 2024 % Increase	**43%**	**36%**

Based on the average flows measured and peak flows calculated, the peak hour factor (PHF) for each year from 2021 to 2024 has been summarized in Table 6.

Table 6: Emma St. SPS Peaking Factors

Year	Average Daily Flow (L/s)	Peak Hour Flow (L/s)	Peak Hour Factor
2021	7.5	36.0	4.8
2022	8.4	31.0	3.7
2023	12.8	51.2	4.0
2024	11.9	30.0	2.5

The Emma St. SPS's ability to handle flows associated with future development is analyzed in Section 2.1.

1.2 WPCP

The reported flows since the WPCP opening are summarized in Table 7, including the flows from the Emma St. SPS and the final effluent flow from the WPCP.

Table 7: Reported Flows Since WPCP Opening

	Emma St. SPS Average Flow [m^3/day][(1)]	Final Effluent Average Flow (Output) [m^3/day]
2012	701	642
2013	1,321	821
2014	832	775
2015	466	710
2016	552	619
2017	740	793
2018	648	718
2019	619	690

	Emma St. SPS Average Flow [m^3/day][1]	Final Effluent Average Flow (Output) [m^3/day]
2020	583	787
2021	646	632
2022	722	697
2023	1,110	1,262
2024	1,032	1,211

Notes:
(1) Emma St. SPS Flow is from the Emma St. SPS only, this flow does not include the wastewater associated with the water utilized at the WPCP (measured by the water meter) or the Septage Receiving at the WPCP.

Table 8 summarizes the monthly flows from the Emma St. SPS from 2022, 2023, and 2024 as well as corresponding precipitation data. This table highlights the increase in flows seen between 2022 / 2023 and 2022 / 2024. The higher flows observed in 2023 continued throughout 2024 as well.

Table 8: Monthly Average Flows and Precipitation Data for 2022, 2023 and 2024

	2022		2023		Percent Increase in Emma St. Flows between 2022 and 2023	2024		Percent Increase in Emma St. Flows between 2022 and 2024
	Emma St. SPS Average Flow [m³/day][(1)]	Total Precipitation [mm]	Emma St. SPS Average Flow [m³/day][(1)]	Total Precipitation [mm]		Emma St. SPS Average Flow [m³/day][(1)]	Total Precipitation [mm]	
Jan	647	43.6	1,178	76.8	82%	1,046	113.1	62%
Feb	813	125.4	1,291	73.8	59%	1,111	39.2	37%
Mar	1,211	75.1	1,483	128.3	22%	1,316	91.8	9%
Apr	953	55.1	1,867	79.2	96%	1,516	121.2	59%
May	723	62.8	1,290	38.2	78%	1,213	91.2	68%
June	626	59.4	987	98.5	58%	937	111.4	50%
July	545	46.5	1,036	140.9	90%	932	118.8	71%
Aug	555	119.1	873	108.4	57%	871	61.7	57%
Sept	544	35.1	801	20.0	47%	805	36.9	48%
Oct	544	43.2	772	77.8	42%	790	32.8	45%
Nov	591	63.4	822	71.3	39%	828	63.2	40%
Dec	918	79.1	939	69.5	2%	1,028	103.8	12%
Average	**722**	**67.3**	**1,110**	**81.9**	**54%**	**1,032**	**82.1**	**43%**

Notes:
(1) Emma St. SPS Flow is from the Emma St. SPS only, this flow does not include the wastewater associated with the water utilized at the WPCP (measured by the water meter) or the Septage Receiving at the WPCP.

It should be noted that though flows in December 2023 seemed to be back in line with flows that occurred December 2022, the annual flows in 2024 are over 40% higher on average than flows seen in 2022. Additionally, the flows in December 2022 are elevated compared to Decembers in previous years, and this is approximately when the flows started to increase significantly.

For clarity, the total flow entering the WPCP is determined as follows:

Total Influent Flow to WPCP = Emma St. SPS + Septage Receiving Station + WPCP Domestic Water Usage

All three of the contributing flows to the WPCP are measured by an electromagnetic flow meter and are accurate to 0.5%.

The effluent flow at the WPCP is measured in an open channel downstream of the Ultraviolet Disinfection Units (UVs) before discharging to the Grand River. This flow is measured by a Milltronics OCM III which calculates the flow over a fixed 90-degree V-notch weir. The accuracy of this flow measurement is typically within 5-15%.

Therefore, the flows used for calculating capacity of the WPCP are now based on the total influent flow.

Table 9 provides a summary of the existing wastewater flows, per capita flows and related population and occupancy permits. For the purposes of this report, average day flows determined based on the summation of the measured influent flows as outlined above are denoted as (I) in the table.

Table 9: Existing Wastewater Flows

Year	Precipitation [mm] (2)	Average Day Flow [m^3/day] (3)	Per Capita Flow [L/cap/d]	Max Day Flow [m^3/d] (5)	Max Day Factor	Population (4)	Occupancy Permits
2019	853	690(E)	280	1,606	2.3	2,465	63
2020(1)	1,017	787(E)	305	2,848	3.6	2,581	35
2021	879	667(I)	245	2,578(6)	3.9	2,720	42
2022	808	735(I)	257	2,106(6)	2.9	2,862	43
2023	983	1,118(I)	382	3,872(6)	3.5	2,931	25
2024	985	1,044(I)	347	2,189(6)	2.1	3,007	23

Notes:

(1) Leap year
(2) Precipitation values were referenced from Fergus Shand Dam Data
(3) (E) represents Measured Effluent Flow and (I) represents Calculated Influent Flow (Emma Street Effluent Flow + Septage Receiving + Water Meter)
(4) For data between 2021 and 2023, a housing density of 3.304 has been used for single and semi-detached dwellings, 2.564 for townhouses, 1.146 for one-bedroom and 1.693 for two-bedroom apartments (2021 Development Charges Update Study completed by Watson & Associates Economists Ltd. in March 2021). For 2024, a density of 3.388 has been used for single and semi-detached dwellings, 2.951 for townhouses, 2.065 for apartments, respectively.
(5) Unless otherwise indicated, the flows are based on the flow measurements taken at the effluent flow meter.
(6) Based on Calculated Influent Flow
(7) The pandemic affected most of 2020 and 2021 with more people working from home and using local services.

To determine if the WPCP can accommodate future growth in the Town, a Ministry of the Environment, Conservation and Parks (MECP) Procedure is used to calculate the uncommitted reserve capacity. It recommends utilizing historical average flows over three to five (3 – 5) years. One to five-year averages are shown in Table 10 below.

Table 10: 1- to 5-year Average Wastewater Flows

	Average Day Flow [m^3/day]	Average Population	Per Capita Flow for Future Development [L/cap/d]
5-year average (2020 - 2024)	870	2,820	309
4-year average (2021 - 2024)	891	2,880	309
3-year average (2022 - 2024)	966	2,933	329
2-year average (2023 - 2024)	1,081	2,969	364
1-year average (2024)	1,044	3,007	347

The WPCP's ability to handle the flows associated with the future projected flows is analyzed in Section 2.2.

2.0 Sewage Allocation and Available Capacity

To ensure that the sewage allocation for new growth is calculated accurately, the wastewater flow rate required for committed SDEs was accounted for in addition to the existing flow being treated at the plant.

Historical data from the last three to five years was utilized to complete the flow projections. However, since the flows have increased significantly and this has lasted for the past two consecutive years (i.e., 2023 does not appear to be an outlier as the flows were still consistently high through 2024), the two-year average has been utilized for the projections to avoid underestimating the future flows.

Table 11 provides a summary of the SDEs already committed to future growth. Using the same housing densities as described in Appendix A and the two-year average per capita wastewater flow of 364 L/cap/day, a wastewater flow of 671 m^3/day is required to service the committed SDEs.

Table 11: SDEs Committed for Future Growth (Currently Unbuilt or Unoccupied)

Committed Single Detached Equivalent Units (SDEs)[(1)]	544
Wastewater Flow for Committed SDEs[(2)]	(544 SDEs x 3.388 ppu) x 0.364 m^3/cap/day **= 671 m^3/day**

Notes:
(1) Refer to Appendix A Table 2 for the full breakdown of the Committed SDEs.
(2) ppu = people per unit.

2.1 Emma St. SPS

The projected flows that will be directed to the Emma St SPS need to be reviewed to consider it will require upgrades to accommodate future growth. While there are plans for new SPS(s) associated with some future development areas to pump to the WPCP, some of the new development areas will be connected to the existing Emma St. SPS. Table 12 provides a summary of the SDEs already committed to future growth that will feed into the existing Emma St. SPS.

Table 12: SDEs Committed for Future Growth (Currently Unbuilt or Unoccupied)

Parcel	Committed SDEs to be Serviced by Emma St. SPS
Scott Street Development	19
152 Main Street North	10
Thomasfield Infill (Scott Street)	6
Thomasfield (Mayberry Phase 3A)	7
Thomasfield (Mayberry Phase 3B)	188
Overall Total	**230**

The following table provides a summary of the population associated with the committed SDEs to date.

Table 13: Emma St. SPS Catchment Population Growth

2024 Population	3,007
Population Growth from Developments to be Serviced by Emma St. SPS	230 SDEs x 3.388 ppu = 780
Population Associated with Existing Service Area and Committed SDEs for Emma St. SPS	3,007 + 780 = 3,787

Based on the two-year (2023-2024) average flows and the peak hour factor from 2023 (4.0), the peak hour flow was projected for the future growth in Table 14.

Table 14: Emma St. SPS Flow Projections

2023-2024 Per Capita Demand [L/p/d]	361
ADF (Based on Population Associated with Current and Committed SDEs – 3,787) [L/s]	15.8
Peak Hour Factor	4.0
Peak Hour Flow [L/s]	63.3

The peak hour factors for the historical flows are based on the existing catchment area and population values which were then applied to the future average flows. This method of projection could be considered conservative given that the peaking factor typically decreases as population increases and that average flows should be lower for newly constructed buildings which have improved water efficiency than older buildings. Furthermore, there should be less I&I per capita with the new infrastructure as there should be proper manhole waterproofing in the sewage system and separate storm sewers. Additionally, the theoretical peak hour factor for the projected future population of 3,787 people would be 3.44 based on the Harmon Formula.

Based on the calculations shown in Table 14, the peak hour flow projections for committed SDEs are within the design capacity of the Emma St. SPS and immediate upgrades are not required based on the pumps' design capacities (an assessment of the equipment's existing condition has not been completed at this time). It is recommended that pumping tests be completed to confirm the actual current peak capacity of each of pumps since pump performance can deteriorate over time with wear and the pumps will eventually need to be rebuilt or replaced.

2.2 WPCP

On July 27, 2022, an amended Environmental Compliance Approval (ECA) Number 9611-CFVLRG was issued for the facility. The ECA shows the increase in the plant's rated capacity from 1,244 m^3/day to 1,555 m^3/day. The upgrade works for the re-rating of the WPCP was completed in May 2022.

Utilizing the re-rated WPCP capacity, the following table provides a summary of the remaining capacity in the wastewater treatment system accounting for the one-year average day flow and the flow for the committed SDEs.

Table 15: Determination of Remaining Capacity

Flow Allocation	Capacity [m^3/d]
Re-rated Capacity of the WPCP[(1)]	1,555
Two-Year Average Day Flow (based on 2023 and 2024)	1,081
Flow for Committed SDEs (based on two-year average day flow (2023 – 2024))	**671**
Remaining Capacity	1,555 – 1,081 – 671 = -197

Notes:
(1) The upgrade work at the WPCP to build the Surge Tank and increase plant capacity was completed May 2022.

Based on the 2023 and 2024 flows and the re-rated capacity of the WPCP, there is **not enough capacity to accommodate the committed SDEs**. Out of the 544 committed SDEs, approximately 384 of the SDEs could be connected to the wastewater system prior to reaching the capacity limit.

As noted above, the wastewater flow data from 2023 and 2024 is significantly higher than historical years. As noted in Table 9, the average day flow from 2022 was 735 m^3/day while the flow for 2024 was 1,044 m^3/day, which is a 42 percent increase.

Table 16 presents the capacity that would be remaining at the WPCP if the three-year average day flow from 2020-2022 were utilized. The theoretical results clearly demonstrate the impact the increase in flows has with respect to available capacity at the WPCP. Table 17 provides a summary of the two scenarios.

As shown in Table 16, prior data would not have led to a concern that the Town was overcommitted. The dramatic increase in flows in 2023 and 2024 has had a significant impact on this current report.

Table 16: Determination of Remaining Capacity with 2022 Annual Report Values

Flow Allocation	Capacity [m^3/d]
Re-rated Capacity of the WPCP(1)	1,555
Three-Year Average Day Flow (2020 – 2022)	729
Flow for Committed SDEs (based on three-year average day flow (2020 - 2022))	(544 SDEs x 3.388 ppu) x 0.268 m^3/cap/day = 494
Remaining Capacity	1,555 – 729 – 494 = 332

Table 17: Remaining Capacity Analysis Under 2022 & 2024 Flow Scenarios

	Scenario Using 2024 Average Day Flow	Scenario Using 2020-2022 Average Day Flow
Remaining Capacity	-197 m^3/d	332 m^3/d
SDEs that can be accommodated (Assuming 3.338 ppu)	384 (Prior to reaching capacity)	909
Associated Population that can be accommodated	1,301	3,080

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Water

Appendix C

2024 Annual Report - Water and Wastewater Capacity
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1.0 Water Demands

The historical water usage records from 2019 to 2024 were reviewed to determine the per capita average water demand. The historical data is summarized in the following table.

Table 18: Historical Water Use

Year	Average Day Demand [m^3/d]	Maximum Day Demand [m^3/d]	Max Day Demand Factor	Population Serviced	Per Capita Average Day Demand [L/cap/d]
2019	709	1,148	1.6	2,465	288
2020	846	1,491	1.8	2,581	328
2021	738	1,148	1.6	2,720	271
2022	680	1,573	2.3	2,862	238
2023	687	1,198	1.7	2,931	234
2024	717	1,676	2.3	3,007	239

Notes
(1) The pandemic affected most of 2020 and 2021 with more people working from home and using local services.

For the purposes of this capacity assessment, System Operator (Joe Miedema, Dufferin Water Co. Ltd.) removed days that coincided with system maintenance for the data sets from 2019 to 2024, so the maximum day water usage was as accurate as possible. System maintenance such as cleaning and inspections of the elevated tower or hydrant flushing significantly increases the water demand on any given day and reduces the accuracy of maximum day calculations. Ideally, removing maximum day water usage associated with system maintenance should be conducted annually to ensure the allocation and capacity calculations are realistic.

Table 19 below shows the one- to five-year averages associated with the scrubbed data from 2019 to 2024.

Table 19: 1- to 5-year Average Water Demands

	Average Day Demand [m^3/day]	Average Population	Per Capita Demand for Future Development [L/cap/d]
5-year average (2020 - 2024)	734	2,820	260
4-year average (2021 - 2024)	706	2,880	245
3-year average (2022 - 2024)	695	2,933	237
2-year average (2023 - 2024)	702	2,969	236
1-year average (2024)	717	3,007	239

2.0 Water Allocation and Remaining Capacity

Knowing that the data from 2019 through to 2024 was scrubbed to increase accuracy, a maximum day demand of 1,676 m^3/day was used in the capacity assessment. This maximum day demand is the highest demand measured over the past five (5) years, occurring in 2024. To ensure that the water allocation for new growth is calculated accurately, the flow rates required for the committed SDEs in current developments were accounted for in addition to the existing maximum day demand.

Table 20 provides a summary of the SDEs already committed to future growth.

Using the same housing densities as described in Appendix A and the three-year average per capita demand (237 L/cap/d), an average water demand of 437 m^3/day is required for the committed SDEs. A maximum day factor of 2.00 was applied to the committed lot numbers, resulting in a maximum demand of 874 m^3/day. A maximum day factor of 2.00 was referenced from Table 3-1 (Peaking Factors) in the MECP Design Guidelines for Drinking-Water Systems for a population between 3,001 and 10,000 people.

Table 20: SDEs Committed for Future Growth (Currently Unbuilt or Unoccupied)

Committed Single Detached Equivalent Units (SDEs)(1)	544
Average Water Demand for Committed SDEs(2)	(544 SDEs x 3.388 ppu) x 0.237 m^3/cap/day = **437 m^3/day**
Maximum Day Water Demand for Committed SDEs	437 m^3/day x 2.00 = **874 m^3/day(3)**

Notes:
(1) Refer to Appendix ATable 2 for the full breakdown of the Committed SDEs.
(2) ppu = people per unit.
(3) Assumes a maximum day factor of 2.00 referenced from Table 3-1 (Peaking Factors) in the Design Guidelines for Drinking-Water Systems for a population between 3,001 and 10,000 people.

The following table provides a summary of the remaining capacity in the water supply system accounting for the 2024 maximum day demand and the flow required for the committed SDEs.

Table 21: Determination of Remaining Capacity (Well Supply)

Flow Allocation	Capacity [m^3/d]
Firm Capacity of Water Supply System	4,191
Existing Maximum Day Demand (based on data from 2020 - 2024)	1,676
Demand for Committed SDEs (based on three-year average day demand and a maximum day factor of 2.00)	874
Remaining Capacity	4,191 – 1,676 – 874 = 1,641

Notes:
(1) The “firm capacity” of the system is intended to meet maximum demands in the event of the Town’s largest well (Well PW1 at the Cooper Street pumphouse) is taken out of service.

Based on data above, there is sufficient water supply to accommodate the committed SDEs and additional SDEs.

3.0 Water Storage

In the Town of Grand Valley, water storage is provided by an elevated tower. The tower provides operating, emergency and fire storage for the water distribution system, so the well supply does not have to meet peak demands from the distribution system. The storage volume is calculated using the MECP’s ‘ABC’ formula noted below.

$$Storage = A + B + C$$

Where:

- A = Required fire flow volume, referred to as Fire Storage
- B = 25% of maximum day volume, referred to as Equalization Storage
- C = 25% of the sum of A and B, referred to as Emergency Storage

For systems where the well supply to the distribution system can meet or exceed peak hour demands, the ABC formula is modified as Equalization Storage is not required in the reservoir. The following table shows the system’s capability to meet peak hour demands.

Table 22: Water Supply Review with Respect to Peak Hour Demand

System Firm Capacity [m^3/day]	4,191
Average Day Flow [m^3/day] (based on three-year average)	695
Assumed Peak Hour Factor [-] (based on MECP Guidelines Table 3-1)	3.0
Assumed Peak Hourly Demand [m^3/day]	2,085
Peak Hour Demand Less Than System Firm Capacity	2,085 < 4,191 Yes

Table 23: Water Storage Capacity (Water Tower)

	2024 (Current)	**Current Plus Committed SDEs**	**Estimated SDEs that could be accommodated[(3)]**
Population	3,007	4,851	5,375
Total SDEs	1,112	1,656	1,810
Additional SDEs	-	544	698[(4)]
MECP Suggested Fire Flow Storage (Table 8-1 of Design Guidelines for Drinking-Water Systems 2008)			
Fire Storage [m^3][(1)]	793	1,017	1,280
Equalization Storage [m^3][(2)]	0	0	0
Emergency Storage [m^3]	199	255	320
Minimum Required Storage [m^3]	992	1,272	1,600
Existing Storage [m^3]	1,600	1,600	1,600
Required Additional Storage [m^3]	None	None	None

Notes:

(1) Fire Storage volumes were determined by interpolating the suggested fire flow in Table 8-1 of the Design Guidelines for Drinking-Water Systems 2008 based on the population noted. The fire flow duration was two hours for populations below 5,000 people and increased to three hours when the population exceeds 5,000.

(2) As noted previously, Equalization Storage is not required in the MECP's ABC formula for water storage when the water supply system is capable of meeting the peak hour system demand. As shown in Table 22, the system is capable of meeting the peak hour demand, therefore Equalization Storage has been set to 0 m^3.

(3) This column estimates the population and associated SDEs that theoretically could be added to the distribution network prior to requiring additional storage. The estimate assumes that the peak hourly demand at the higher population can still be met by the water supply system without storage.

(4) Includes the 544 committed SDEs. There are 154 additional SDEs that can be accommodated.

Based on our review of well supply and storage, the Town **can accommodate the committed 544 SDEs, as well as an additional 154 SDEs** assuming the peak hourly demand can still be met by the well supply system at the larger population.