

2023 ANNUAL REPORT OF
WATER USE,
WATER DIVERSION AND
RETURN FLOW
FOR THE CITY OF
NEW BERLIN, WISCONSIN

CITY OF NEW BERLIN
WAUKESHA COUNTY, WISCONSIN
MARCH 2024



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2023 ANNUAL REPORT OF WATER USE, WATER DIVERSION AND RETURN FLOW FOR THE CITY OF NEW BERLIN, WISCONSIN

INTRODUCTION

The information contained in this document provides the needed data and related explanations of the data required to satisfy the conditions of the WATER SUPPLY SERVICE AREA PLAN AND DIVERSION APPROVAL issued by the Wisconsin Department of Natural Resources (DNR) dated May 21, 2009. In particular, the data and explanations report the following information for calendar year 2023 for the City of New Berlin (CITY):

1. The total amount of water purchased from Milwaukee on a monthly basis.

NOTE: All water used by New Berlin Utility customers is purchase from the City of Milwaukee.

ALL CITY OF NEW BERLIN WELS ARE OUT OF SERVICE.

2. The amount of water sold to each category and the subcategory of customer on a quarterly basis within the City limits.
3. The amount of water sold to each category and the subcategory of customer on a quarterly basis within the approved diversion area.
4. Average residential per capita use.
5. There is currently NO water pumped from City of New Berlin wells. All wells are out of service.
6. Average residential per capita use.
7. A description of the efforts made by the City to improve water conservation and efficiency and minimize the infiltration and inflow into the sanitary system.
8. Estimates of the total monthly sewerage flow within the City.
9. Estimates of the monthly sewerage return flow from within the approved water supply service area and approved diversion area.

The information is presented in nine sections with titles identical to those above. Data is presented in a tabulated format preceded by an explanation of each table how the data was obtained and how the data was interpreted using estimating techniques, engineering judgment and data analysis. Table titles first contain the section number they refer to then the number of the table.

SECTION 1 – THE TOTAL AMOUNT OF WATER PURCHASED FROM THE CITY OF MILWAUKEE

The City of Milwaukee provides all of the water used by the CITY. In 2009, the CITY still used groundwater until July for some of their water needs. In July 2009, the improvements needed to allow the entire CITY to be served with Lake Michigan water via the City of Milwaukee were completed following the Diversion Approval. All CITY's groundwater wells are abandoned. (Appendix E)

Table 1-1 provides the “Total Amount of Water Purchased from the City of Milwaukee” as measured by Milwaukee and billed to the CITY. Table 1-1 contains 4 columns, the first listing the month. The second representing the cubic feet of water purchased and the third, the number of gallons purchased from the City of Milwaukee and the average daily use. All of these totals are determined by the amount of water purchased (and measured) from the City of Milwaukee Water Works. NOTE: Milwaukee water had an inaccurate meter in 2014.

SECTION 2 – THE AMOUNT OF WATER SOLD TO EACH CATEGORY AND SUBCATEGORY OF CUSTOMER ON A QUARTERLY BASIS WITHIN THE CITY LIMITS

The CITY records and reports all water sold in a report to the Wisconsin Public Service Commission (PSC) by customer class each year. The four customer classes are Residential, Commercial, Industrial and Public. The CITY can further break these water sales records down by geographic location east and west of the sub continental divide and by residential units comprised of condominiums and apartments that are tracked as commercial establishments. Table 2-1 provides a breakdown of these water sales on a quarterly basis for the entire City and by the standard PSC customer classes and the subcategories tracked by the CITY.

SECTION 3 – THE AMOUNT OF WATER SOLD TO EACH CATEGORY AND SUBCATEGORY OF CUSTOMER ON A QUARTERLY BASIS WITHIN THE APPROVED DIVERSION AREA

Table 3-1 reports only water used in the Mississippi river basin on a quarterly basis and provides a breakdown of residential use by condominiums and apartments in the Mississippi Basin.

SECTION 4 – THE AMOUNT OF WATER DIVERTED TO THE APPROVED DIVERSION AREA ON A MONTHLY BASIS (TO BE ESTIMATED BY THE CITY)

Table 4-1 provides the estimates of the diversion amounts. The estimates are based on actual percentages of total water use determined by applying on average factor of 57.3 percent groundwater pumpage and 42.7 percent Lake Michigan water usage in 2009. This approximates the water use patterns where the groundwater pumpage was Mississippi River basin pumpage and the Lake Michigan pumping stations was Great Lakes basin pumpage. For the year, total usage was multiplied by 0.573 to estimate the diverted amount. The CITY previously maximized the area where Lake Michigan water was provided to customers, so this method provides a reliable estimate of diverted water pumpage.

SECTION 5 – THE AMOUNT OF WATER PUMPED FROM EACH MUNICIPAL WELL WITHIN THE CITY LIMITS ON A QUARTERLY BASIS, NOTHING THE BASIN IN WHICH EACH WELL IS LOCATED

Table 5-1 provides a list of all the CITY's wells that were disconnected in 2009 per the DNR after the diversion request was approved. All the CITY's groundwater wells have been abandoned.

SECTION 6 – AVERAGE RESIDENTIAL PER CAPITA USE

Table 6-1 provides a calculation of average residential per capita use. That calculation shows residential per capita used to be 53.01 gallons per capita per day City wide. The calculation takes into account single family residential, condominium residential, and apartment residential and also breaks the information down by basin. The per capita residency occupation rate of 2.59 in 2023 is from the MMSD Operating Manual. The calculation method used in Table 6-1 to determine the population serviced by the water system has been added at the bottom of the page. Information from the MMSD Cost Recovery Manual is found in Appendix E.

SECTION 7 – A DESCRIPTION OF THE EFFORTS MADE BY THE CITY TO IMPROVE WATER CONSERVATION AND EFFICIENCY AND MINIMIZE INFILTRATION AND INFLOW TO THE SANITARY SEWER SYSTEM.

Water Conservation

The CITY adopted a Water Conservation Plan on December 8, 2009. A copy of the plan is attached to this document in Appendix A and includes the revisions made in 2013. The Plan has six distinct goals to promote water conservation.

- The CITY has reduced it's per capita residential water consumption from January 1, 2008 by not less than ten (10) percent by the year 2020 per our goal for utility customers as per an agreement between the City of New Berlin and the Wisconsin Department of Natural Resources (WDNR). This goal has been met, and the new goal is to continue to offer the service of helping residents to locate leaks and offering the toilet rebate to replace high usage toilets.
- Enable the CITY to meet the future needs of our growing population.
- Protect Ground and Surface water supplies from unsustainable depletion. Since acquiring Milwaukee water, the Utility was able to reduce hydrant flushing to once per year. This practice alone has saved substantial water each year (Appendix E).
- Eliminate unnecessary waste in water use practices. The Water Conservation Plan provides the necessary authority to li it lawn sprinkling on an odd/even day and time of day schedule. The dry conditions during the summer in 2012 prompted a Press Release limiting water sprinkling (Appendix E). The summer of 2015 provided adequate rainfall to assist our water conservation efforts. The Utility posts information on the website, newsletter and Utility bill in an effort to educate customers in water conservation measures (Appendix E).
- Reduce wastewater treatment volume and associated municipal expenditures.

- Promote the increased use of harvested and recycled water for irrigation needs through the use of cisterns where appropriate for commercial and industrial development. The CITY has had a Rain Garden display at the recycling center for several years. This display includes a working rain barrel. Information on the various native plants, where to obtain rain barrels and lists of classes are included on the City’s website:

<http://www.newberlin.org/index.aspx?nid=422>

The Water Resources Management Utility has also used rain gardens and bio retention in several of their projects (Appendix E).

In 2017, the CITY eliminated the Third Quarter Sewer Credit to residential Customers.

Specific accomplishments include the preparation of the plan near the end of the reporting year. That plan includes a savings projected of 9.4 million gallons of water per year by not using water softeners in the diversion and a savings of 8.7 million gallons by reducing hydrant flushing from twice per year to once per year for a total estimated annual savings of 18.1 million gallons. Hydrant flushing is performed in the spring and the fall. Every other hydrant is flushed in spring and the remaining ones in the fall. This ensures that each hydrant is flushed annually on a scheduled basis for maximum efficiency. The CITY also adopted sprinkling restrictions for residents to follow year round. Per capita residential water use decreased city wide from 68.03 in 2007 down to 53.01 in 2023. (Table 6-1).

Beginning in April of 2010 the CITY has a toilet rebate program designed to provide incentives for utility customers to abandon 5 gallon per use toilets and install a water sense 1.3 gallon per flush toilets. The amount of the rebate is \$100 per toilet.

<u>Toilet Replacements By Year</u>							
2010	78	2014	7	2018	6	2022	3
2011	45	2015	10	2019	3	2023	0
2012	12	2016	7	2020	4		
2013	6	2017	9	2021	1		

The PSC approved the toilet rebate program to continue in 2023. The CITY also performed 50 leak detection tests in 2023 and provides this service free of charge to utility customers. In addition, the Badger Meter RTR/Neptune Meter system that we now use can verify whether a customer has a leak. This allows us to notify the customer to set up an appointment to perform a free leak inspection to help reduce the amount of water that is wasted. Our numbers are down as to follow the COVID-19 guidelines.

In 2013, the CITY began offering customers free toilet leak dye tablets available at City Hall, the Utility Office and the Library. This continued in 2023 and will be offered in 2024. The CITY’s website advertised the EPA’s WaterSense “Fix a Leak Week” which gives tips on checking for and fixing leaks. (Appendix D)

The CITY has implemented the Cross Connection Inspection Program that was mandated by the DNR for commercial and industrial customers and has been inspecting residential customers since 2012 when meters are replaced or when answering a customer service call. In 2023 there were 949 residential inspections conducted. The CITY began documenting if customers are operating water softeners or have removed or disconnected the unit. Since March 2012, Utility personnel that perform meter pulls have documented whether softeners have been disconnected or removed from residences. They have found over 90% of softeners were not in use. In 2005 and 2009 when Milwaukee water was delivered to Utility customers on various sides of the continental divide, letters were sent to customers that provided information regarding the changes in water, including water hardness data and encouraged customers to disconnect their softeners. Based on estimates and an average softener regeneration of once a week, the average residential customer would save over 2600 gallons per year. (Appendix E) Realized in 2011, because of variables such as weather, occupancy rates, economic conditions and the fact that meters are read quarterly in thousand-gallon increments, it is difficult to provide an actual water savings disconnection of water softeners. Hydrant flushing water usage had reduced since we began this program (Appendix E). A 5 Year Water Use Analysis is listed in Appendix E.

The CITY became a member of the Alliance for Water Efficiency in 2013 and began using the AWE tracking tool to monitor conservation efforts. The Utility teamed with the Energy Efficiency Program's Focus on Energy, sponsored by WE Energies to provided residential citizens with a no-cost energy savings program that provided high efficiency faucet aerators, showerheads, kitchen flop aerators, insulation of hot and cold water heater pipes and water heater temperature setback assistance. The results were impressive with 943 homes responding to the program for a total water savings of 5,772,429 gallons.

The CITY repaired 13 water main breaks, repaired 3 leaking service lines, performed 7 valve replacement and repairs, and replaced 3 hydrants.

In 2022 the CITY hired Mid-City Corporation and Michels Corporation to perform the largest water main relining project to date in the State of Wisconsin. With this Project, on the list below indicates the total feet of water main relining, the number of gate valves and butterfly valves replaced or added, and the number of hydrants and hydrant valves that were replaced, along with the number of feet of 1" of copper laterals that were abandoned.

Moorland Road Relining Totals					
	Replaced	Added New	Total		New Water Main
4" Gate Valve	1		1	6" PVC	30'
6" Gate Valve	18	1	19	8" PVC	2,265'
Hydrant	22		22	1 1/4 Service Line	20
6" Hyd Gate Valve	23		23	1 1/4 Curb Stop	20
8" Gate Valve	5		5	8" Gate Valve	4
10" Gate Valve	1		1	6" Gate Valve	1
12" Butterfly Valve	3		3	Hydrant	2
16" Butterfly Valve	29	8	37	6" Gate Valve Hyd	2
6" Water Main Relined	192'		192'		
8" Water Main Relined	78'		78'	2,200' of Abandoned 1" Copper	
12" Water Main Relined	372'		372'	Laterals	
16" Water Main Relined	7,763'		7,763'		

With the completion of the conservation plan and use of the CITY web site to provide public education on the need for water conservation, CITY is committed to continuing to educate the public. Along with the Water Conservation Plan, Utility personnel use a “Residential Demand Management Program” to monitor high consumption, show customers the amount of water caused by leaks, and provide informational material on water conservation. (Appendix E) Many studies have shown the value of public education is an important component of water conservation efforts. The CITY’s website contains educational information with kid’s pages for water conservation activities and links to a drip calculator and other resources to provide helpful information to utility customers.

The CITY also provides classes to schools and businesses and hands out coloring books and water usage wheels to promote water conservation and information on Water Smart Landscape Designs on the website. (Appendix D)

INFILTRATION AND INFLOW (I/I)

The CITY has an annual I/I program that has been in place since 1997. The CITY spent \$1,231,486 in 2023 on I/I reduction. Table 7-1 lists the I/I reduction projects starting from 2009. The Utility has invested an average of \$583,519 per year from 2000-2023 in I & I reduction. (Appendix B) Private I & I investigation and implementation began in 2013.

Infiltration and Inflow (I/I) occurs in all sanitary sewerage systems. Infiltration refers to rainwater and groundwater that seeps into the system through defective pipes and joints. Inflow refers to storm water and surface water that enters the sewer directly. Both cause “clear water” to enter the system and increase treatment costs, cause sewer backups, bypassing and overflows.

Wastewater systems all have differing designs, construction and ages and are located in varying climates. With this in mind, there are no national standards for allowable I/I. Rather, the EPA has required through the NPDES permit program that all wastewater overflows be eliminated. This requirement has prompted many sewerage systems to take active measures to reduce I/I. The Milwaukee Metro Sewerage District (MMSD) is one of these.

<p>MMSD ADDRESSES I/I REDUCTION BY PLACING LIMITS ON PEAK HOURLY FLOW RATES. IF A METERED AREA EXCEEDS THE LIMITS, I/I REDUCTION IS REQUIRED. THE REQUIREMENTS FOR THESE METERED AREAS, ALSO CALLED “METER SHEDS” AS LISTED IN THE MMSD 2035 FACILITY PLAN ARE:</p>	
<p><u>SANITARY METER SHED AREA (ACRES)</u></p>	<p>MAXIMUM ALLOWABLE PEAK HOURLY FLOW RATE <u>(GALLONS PER ACRE PER DAY)</u></p>
<p>LESS THAN 250</p>	<p>18,400</p>
<p>250 TO 499</p>	<p>17,700</p>
<p>500 TO 999</p>	<p>16,400</p>
<p>1,000 TO 2,499</p>	<p>13,700</p>
<p>2,500 TO 4,999</p>	<p>9,400</p>
<p>GREATER THAN 5,000</p>	<p>4,000</p>

Based upon the MMSD Facility Plan sewer flows for the CITY, all areas of the CITY are currently in compliance with the above limits.

The CITY annually contracts with a consultant to monitor sewer flows during wet periods and prepares a report qualifying I/I. Preliminary results of the 2009 flow monitoring plan and analysis of flows by the CITY's consultant and 2010-2023 results are provided in Appendix C.

Precise quantification of I/I is impossible with today's technology. Area and velocity flow meters are used annually by the CITY to derive estimates of I/I by basin and sub-basin. These meters replace older style "level only" meters and are considered to be more accurate. Still, the environment in which they are placed has flooding, toxic gases, high levels of solids and other impairments which readily affect the meters performance. Data that is collected must be collated and suspect data discarded. The remaining reliable data is then professionally analyzed and reasonable professional estimates of I/I can then be made. This is the program used by the CITY.

The most current estimates of I/I by the CITY's consultant indicate that total average daily sewer flows are 7.88 MGD. The attached email correspondence from the City and R.A. Smith indicates how they arrived at this figure. Using basin monitors, this flow can be divided into flow east and west of the sub continental divide. This was determined by using all of the flow from basins 5 and 6 (Meter 5A) and 50 percent of the flow from basin 7 (Meter 7B). Based upon 2015 metered water use and estimates of sewerage flow the following average daily flows and I/I estimates can be derived.

These are the most current and accurate estimates I/I available for the CITY. These volumes change regularly and there will be differing estimates each year depending on a number of factors including groundwater levels and precipitation amounts and severity of precipitation events.

The CITY has spent over \$20 million since 1997 on I/I reduction efforts. This includes all capital projects for manhole rehabilitation, studies and sanitary sewer replacement or relining. They received only 1 of 2 awards given by MMSD for their I/I reduction efforts in 2003. Listings of past projects are listed in Table 7-1. Future projects will focus on higher I/I areas as identified by annual studies.

It is important to realize that the I/I will occur and transmit some quantity of water across the basin divide. It is more important to realize that approval of the diversion has eliminated about 2.0 MGD of pumped water from outside the basin flowing into the basin daily. This, coupled with the strong commitment to reducing I/I by New Berlin, as evidenced above, absolutely minimizes the amount of water entering the basin from outside the basin.

Going forward, the CITY proposes to monitor the amount of water used inside and outside the basin by customer water meter. Further, they propose to continue with the annual I/I quantification studies and will use the results of those studies to estimate I/I on both sides of the divide. This information will be available on an annual basis for the previous year.

SECTION 8 – ESTIMATES OF TOTAL MONTHLY SEWERAGE FLOW WITHIN THE CITY

Appendix C contains excerpts from an email provided by R.A. Smith to the City on Sewerage Flows. These estimates were developed based upon metering performed by that firm and by MMSD during 2011-2023.

SECTION 9 – ESTIMATES OF THE MONTHLY SEWERAGE RETURN FLOW FROM WITHIN THE APPROVED WATER SUPPLY SERVICE AREA AND DIVERSION AREA

Table 9-1 provided by R.A. Smith estimated flows both in the Great Lakes basin and Mississippi basin. The estimates assume all of basins 5 and 6 are 50 percent of basin 7 provide sewerage flows from the Mississippi Basin and the remaining flow is from the Great Lakes Basin.

Table 1-1

**Total Amount of Water Purchased From the City of Milwaukee
Annual Report of Water Use, Water Diversion and Return Flow - 2023
City of New Berlin, Wisconsin**

Month	Cubic Feet	Monthly Total Amount of Water Purchased From The City of Milwaukee	Average Daily Usage (SCADA)
January	101,381	75,838,260	2,446,395
February	86,204	64,485,075	2,303,038
March	95,853	71,703,028	2,313,001
April	88,058	65,871,963	2,195,732
May	115,580	86,459,850	2,789,027
June	133,992	100,232,984	3,341,099
July	123,315	92,246,032	2,975,678
August	122,367	91,536,879	2,952,803
September	109,443	81,869,055	2,728,969
October	96,783	72,398,717	2,335,442
November	88,890	66,494,342	2,216,478
December	84,171	62,964,285	2,031,106
Total Annual Pumpage	1,246,037	932,100,470	30,628,770

Source: City of Milwaukee, Wisconsin Public Service Commission, and SCADA

Note: ALL of water used by the City of New Berlin Utility customers was purchased from the City of Milwaukee. New Berlin wells are no longer in service

Average: 2,554 thousand gallons per day
77,675 thousand gallons per month

Highest Day: June 2, 2023 4,384 thousand gallons

Lowest Day: May 14, 2023 1,965 thousand gallons

Table 2-1

**Amount of Water Sold to Each Category and Subcategory of Customer on a Quarterly Basis Within the City Limits 2023
Annual Report of Water Use, Water Diversion and Return Flow - 2023
City of New Berlin, Wisconsin**

	Major Category (Gallons Sold in Thousands)				
	Residential	Commercial	Industrial	Public	Total
1st Quarter 2023	89,604	73,146	15,365	1,965	180,080
2nd Quarter 2023	86,293	73,687	16,935	1,921	178,836
3rd Quarter 2023	154,305	84,316	19,217	5,960	263,798
4th Quarter 2023	104,722	77,322	17,060	2,961	202,065
Total	434,924	308,471	68,577	12,807	824,779

	Residential Subcategory (Gallons Sold in Thousands)		
	Great Lakes Basin	Mississippi Basin	Totals
1st Quarter 2023	59,152	30,452	89,604
2nd Quarter 2023	56,794	29,499	86,293
3rd Quarter 2023	106,614	47,691	154,305
4th Quarter 2023	71,312	33,410	104,722
Total	293,872	141,052	434,924

	Condominium and Apartment Subcategory of Commercial Category (Gallons Sold in Thousands)		
	Great Lakes Basin	Mississippi Basin	Totals
1st Quarter 2023	14,392	20,224	34,616
2nd Quarter 2023	14,360	19,861	34,221
3rd Quarter 2023	15,683	21,745	37,428
4th Quarter 2023	14,714	19,362	34,076
Total	59,149	81,192	140,341

Source: City of New Berlin, Wisconsin

Table 3-1

**Amount of Water Sold to Each Category and Subcategory of Customer on a Quarterly Basis Within the Approved
Diversion Area 2023**

Annual Report of Water Use, Water Diversion and Return Flow - 2023

City of New Berlin, Wisconsin

Major Category Mississippi Basin (Gallons Sold in Thousands)					
	Residential	Commercial	Industrial	Public	Total
1st Quarter 2023	30,452	51,251	13,730	1,414	96,847
2nd Quarter 2023	29,499	51,883	15,586	1,299	98,267
3rd Quarter 2023	47,691	58,600	15,442	5,403	127,136
4th Quarter 2023	33,410	54,253	14,694	14,694	117,051
Total	141,052	215,987	59,452	22,810	439,301

Condominium and Apartment Subcategory of Commercial (Gallons Sold in Thousands)	
	Mississippi Basin
1st Quarter 2023	20,224
2nd Quarter 2023	19,861
3rd Quarter 2023	21,745
4th Quarter 2023	19,362
Total	81,192

Source: City of New Berlin, Wisconsin

Table 4-1
Amount of Water Diverted to the Approved Diversion Area
on a Monthly Basis

Annual Report of Water Use, Water Diversion and Return Flow - 2023

City of New Berlin, Wisconsin

Month	Estimated Amount Diverted in Gallons
January	43,455,323
February	36,949,948
March	41,085,835
April	37,744,635
May	49,541,494
June	57,433,500
July	52,856,976
August	52,450,632
September	46,910,969
October	41,484,465
November	38,101,258
December	36,078,535
Total	534,093,570

Source: City of New Berlin, Wisconsin and Ruckert & Mielke, inc.

Table 5-1

All water provided to City of New Berlin Utility customers are serviced by City of Milwaukee water.

There are NO New Berlin ground water wells in service.

We have abandoned wells 1, 2, 3, 4, 5, 7, 8, 9, 10 and 11

All wells were disconnected when we received permission for our diversion request and all water is provided by Milwaukee Water.

Table 6-1

**Average Residential Per Capita Use
Annual Report of Water Use, Water Diversion and Return Flow - 2023
City of New Berlin, Wisconsin**

		2023 Quarter (Use in Thousands)				Total	Population	Average Residential Per capita Use in Gallons per Day
Basin	Cust Class	1st Cons	2nd Cons	3rd Cons	4th Cons			
Great Lakes	C-CONDO/APT	14,392	14,360	15,682	14,714	59,148	3,511	
Great Lakes	R Residential	59,152	56,794	106,614	71,312	293,872	13,734	
	TOTALS					353,020	17,246	56.08
Mississippi	C-CONDO/APT	20,224	19,861	21,745	19,362	81,192	4,797	
Mississippi	R Residential	30,452	29,499	47,691	33,410	141,052	7,692	
	TOTALS					222,244	12,489	48.76
Combined City Wide Residential Per Capita Water Use						575,264	29,734	53.01

Source: City of New Berlin, Milwaukee Metropolitan Sewerage District

Calculations: We took the average number of residential connections and multiplied it by the occupancy factor. Then, we broke down the number of bedrooms and multiplied that by the appropriate occupancy factor and finally added the number of condos multiplied by their occupancy factors. We took the occupancy factors out of MMSD's Cost Recovery Manual. The calculation is complicated by two factors; 1) a significant portion of the city is not served by municipal water and 2) the PSC & DNR have different classification methods for residential customers specific to condo and apartment units. (See Table 6-1, P.2)

Table 6-1, P.2

2023 Connections

		Q1	Q2	Q3	Q4			
Basin	Customer Class	Count	Count	Count	Count	Average	Occupancy Factor	Population
MILW	C-CONDO/APT	173	173	173	173			
MILW	R Residential	5251	5256	5258	5265	5,258	2.59	13,617
MISB	C-CONDO/APT	819	819	819	819			
MISB	R Residential	2937	2937	2938	2938	2,938	2.59	7,608

2023 Condo/Apartment Population Calculation

Basin	Bedroom	Units	Factor	Population	Total	
MILW	Apartment	1	458	1.50	687	
MILW	Apartment	2	937	2.50	2,343	
MILW	Apartment	3	79	2.59	205	
MILW	Condo		110	2.50	275	3,509
MISB	Apartment	1	398	1.50	597	
MISB	Apartment	2	897	2.50	2,243	
MISB	Apartment	3	21	2.59	54	
MISB	Condo		761	2.50	1,903	4,796

29,531

Factors are from MMSD Cost Recovery Manual

Table 7-1
Water Conservation Efforts and I/I Reduction Efforts
Annual Report of Water Use, Water Diversion and Return Flow - 2023
City of New Berlin, Wisconsin

Year	Project Title	Work Involved	Project Expenditures
2009	Glendale Road	Sewer Rehabilitation, Relining and Manhole Repairs to Reduce I/I	\$711,000
2009	Deer Creek Interceptor	Sewer Rehabilitation, Relining and Manhole Repairs to Reduce I/I	\$247,945
2010	Various Areas	Sewer Rehabilitation, Relining and Manhole Repairs to Reduce I/I	\$352,785
2011	Greenridge/various	Sewer Rehabilitation, Relining and Manhole Repairs to Reduce I/I	\$283,000
2012	124th & Greenfield	Relay Section of sewer main, Relining and Manhole Repairs to Reduce I/I	\$73,000
2013	Various Areas	Dye Testing/Leak Inspection for PPI/I	\$460,000
2013	Citywide	Manhole Grouting (areas identified from dye testing results)	\$2,400
2013	Citywide	Manhole Grouting (areas identified from dye testing results)	\$36,056
2014	Citywide	Grant Work	\$5,000
2015	Citywide	Manhole Grouting	\$15,212
2015	Calhoun Road	Boot Installation	\$846
2015	Various Areas	Dye Testing/Leak inspection for PPI/I	\$233,258
2016	Citywide	Manhole & Lateral Grouting	\$13,740
2016	Citywide	Boot Installation	\$24,586
2016	Citywide	Manhole Lid Replacement	\$10,287
2017	Hearthridge Drive	Sewer Relining	\$24,890
2017	124th & Cleveland	Sewer Obstruction Removal & Lining	\$22,523
2018	Citywide	Manhole Grouting	\$4,000
2018	Rogers Drive	Sectional Relining	\$21,400
2018	124th & Howard	Sanitary Frame Replacement	\$7,500
2018	Linnie Lac Lift Station	MH Deck Replacement	\$7,500
2018		PPI/I Program Lateral Lining	\$937,419
2019	Moorland Rd	Sewer Relining	\$78,979
2019	124th Cleveland	Sewer Relining	\$16,165
2019	Citywide	Manhole Grouting	\$48,500
2019	Citywide	Grant Work	\$32,301
2020	Citywide	Recoat Manholes (36 total)	\$126,469
2020	Karrington	Mid City Repair Annular Space in Manholes	\$29,625
2021	Hargrove Drive	Relining	\$8,625
2022	Rogers Drive	Grouting/Relining	\$348,860
2022	Greenridge	Dye Testing	\$59,119
2023	Regal Manor	PPI/I Program Lateral Lining	\$1,231,486
	Total		\$4,242,990

Source: City of New Berlin Utility Department

Table 8- 1 & 9-1

**Estimates of the Monthly sewerage return Flow From Within the Approved Water Supply
Service Area and approved Diversion Area
Annual Report of Water Use, Water Diversion and Return Flow - 2023
City of New Berlin, Wisconsin**

Basin	Average Daily Flow (MGD)	Monthly (30-Day Flow Gallons)	Annual Flow (Gallons)
Great Lakes Basin	3.25	98,854,167	1,186,250,000
Mississippi River Basin	4.63	140,829,167	1,689,950,000
Total	7.88	239,683,334	2,876,200,000

Source:

R.A. Smith and Milwaukee Metropolitan Sewerage District

APPENDIX A

WATER CONSERVATION PLAN

INCLUDED IN REPORT:

- WATER CONSERVATION PLAN

CITY OF NEW BERLIN

WATER CONSERVATION PLAN



ADOPTED BY THE NEW BERLIN COMMON COUNCIL ON DECEMBER 8, 2009

UPDATED FEBRUARY, 2024

WATER CONSERVATION PLAN MISSION STATEMENT

To promote water conservation and protection measures throughout the City of New Berlin to ensure a viable and healthy water supply for future generations.

GOALS:

- Reduce overall water consumption
- Enact water protection / conservation ordinances and codes
- Protect wellhead recharge areas
- Provide incentives for water conservation
- Promote 3-Dimensional (groundwater, stormwater and surface-water) water management
- Implement good stormwater Best Management Practices (“BMPs”) that enhance recharge areas

INTRODUCTION

This document presents the city of New Berlin’s (“City”) Water Conservation Plan. Over the years, the City, as well as the Southeastern Wisconsin Regional Planning Commission (SEWRPC) have conducted a number of water supply studies. All of these studies are referenced in one form or another throughout this document.

New Berlin is uniquely positioned within southeast Wisconsin as it straddles the “sub-Continental Divide” which runs north-south through the eastern part of the City. Nearly 27 square miles in the western part of the City, or about 73 percent of the City’s total land area is located in the Fox River Watershed. This portion is west of the Sub—Continental Divide and part of the Mississippi River Watershed. The remaining City land area is tributary to the Great Lakes / St. Lawrence River drainage basin.

The Utility Service Area is supplied with water from Lake Michigan which is purchased from the Milwaukee Water Works. In this portion of the City wastewater is returned to Lake Michigan via the Milwaukee Metropolitan Sewerage District sewer system. The western portions of the City, outside of the Utility Service Area, use groundwater / private wells as their water supply source.

New Berlin is located within Waukesha County, one of the fastest growing counties within the southeast Wisconsin region. The County’s population in 2005 was 377,348. New Berlin is the sixth largest city in terms of land area in the state and the third most populated municipality in the County with a 2005 population of 38,969. Population trends for New Berlin indicate an approximate two to three percent increase in five year increments out to 2020. At that point in time, the estimated New Berlin population is expected to be 42, 228. The City has experienced steady, moderate growth over the past 20 years. The population for 2021 was 40,821.

There are three City entities that are involved with water conservation and water resource protection; they include the Water utility, Department of Community Development (DCD) and the Water Resources Management Utility (a division of the DCD).

THE MISSION

The Mission of the Water Utility is to be the responsible custodian for and to provide a good quality, potable water supply at adequate pressures and in sufficient quantity for consumption and fire protection purposes, to all current and future Utility customers consistent with State/Federal Regulations and water industry practices and standards, in the most cost effective manner possible, and to educate the public about the benefits of being a good water use steward.

The Department of Community Development promotes and maintains the careful development of land and preservation of the natural resources in the City of New Berlin. To accomplish this, the Department is involved in both current and long-range land use planning, engineering, building and capital improvement planning. This department regulates every aspect of the development/construction process. DCD reviews documents, permits, regulates and inspects all developments/construction activity in the city. These efforts include reviewing and documenting development, economic development, geographic information systems (GIS)/land information systems (LIS), zoning enforcement, building inspection, construction/field inspections for new development, capital planning, mapping and in-house capital project design. It also includes the dissemination of this information to the public working and coordinating with county, regional, state and federal officials.

The long-term vision of the Water Resources Management Utility is to “Promote a three-dimensional approach to efficiently and effectively manage stormwater and to protect the water resource needs of the City of New Berlin”. The Utility’s Mission is dedicated to the management, construction, maintenance, protections, control, regulation, use and enhancement of storm & surface water systems, flood protection, water quality, and groundwater recharge through education, coordination, development, maintenance and management of projects & programs in concert with other community development programming in an efficient and cost effective manner that considers the needs for protection of public health, private property, the natural environment, and economic development.

PURPOSE OF THE PLAN

The City has developed a Water Conservation Plan in order to be good stewards of a finite resource. Its loss can impact the quality of life for residents and dramatically affect policy decisions. In order to maintain quality of life and economic activity, a sustainable water supply is needed. To be good stewards, the City should conserve water by working closely with all residents and businesses to promote water conservation, and work with other governmental jurisdictions in the region to effectively manage water resources.

To this end, the City views water resource management three- dimensionally. That is the protection and management of our groundwater, surface water and stormwater through various means and methods. The City has set the following Plan goals to promote water conservation:

- Reduce per capital residential water consumption from January 1, 2008 y not less than ten (10_ percent by the Year 2020 for Utility customers as per an agreement between the City of New Berlin and the Wisconsin Department of Natural Resources (WDNR). This goal has been met, and the new goal is to continue to maintain residential water consumption at its current rate.
- Enable the City to meet future needs of our growing population
- Protect ground and surface water supplies from unsustainable depletion
- Eliminate unnecessary waste in water use practices
- Reduce wastewater treatment volume and associated municipal expenditures
- Promote the increased use of harvested and recycled water for irrigation needs through the use of cisterns where appropriate for commercial and industrial development

Much of this Plan was developed by referencing the numerous water studies and current, relevant industry materials that are available. According to our Department's records, twenty-two (22) studies at a cost of over 4500,000 have been conducted analyzing and studying water issues in New Berlin. A comprehensive list of recent water studies conducted for New Berlin can be found in Appendix A.

WATER UTILITY ACCOMPLISHMENTS

The Water Utility has worked hard to reduce water usage to help conserve a very valuable resource. We have in place an odd-even sprinkling schedule citywide to reduce water usage to lawns and gardens. In addition, we have a program in place whereby we change out water meters on a 15-year cycle. Changing the meters on a 10-year cycle ensures more accurate water consumption usage totals. Now that water utility customers are supplied with Milwaukee Water throughout the entire service area, the Water Utility will see reductions in water usage as follows:

1. 90% of all customers will NOT USE water softeners
 - 180 gallons of water passes through every time the softener runs
 - 9.4 million gallons of water will be saved by not using softeners
2. 8.7 million gallons will be saved annually due to the reduction of hydrant flushing from twice per year to once per year

A total of 18.1 million gallons of water will be saved annually with just these two changes since 2006, the Utility has seen a decrease in the total water usage by approximately 21%.

CURRENT REGULATIONS AND ACTIVITIES

Current development standards, regulations and activities are already being implemented within the City. The goal of this plan is to expand on the current City actions and implement additional water conservation strategies. Below is a list of current City initiatives:

- **Codes/Ordinances** – Numerous City regulations are in place to protect water quality and quantity. These ordinances follow DNR requirements for stormwater management.
- **Sprinkling Restrictions** – The Utility Department has enacted sprinkling restrictions for residents to follow year-round. The restrictions are as follows:
 - Even numbered addresses water on even days of each month
 - Odd numbered addresses water on odd days of each month
- **Utility Activities** – The Utility Department utilizes the City webpage to provide information to residents. The webpage includes information on water conservation, kids’ activities to learn more about water, a water drip calculator and sprinkling restrictions. The Utility Department has also placed informational articles in the City’s “leaflet” quarterly newsletter, and has included conservation techniques in the City’s Annual Water Quality Report. The department also offers free “leak test” for customers to have their toilets or water softeners tested for leaks. New meters that are currently being installed have a “leak detection” feature on them for residential and industrial usages.
- **Developmental Use Regulations** – The Department of Community Development encourages Low Impact Development (LID) techniques when reviewing projects. The Zoning Code has a minimum open space requirement to limit the amount of impervious surface on development sites. Alternative stormwater Best Management Practices (BMPs”) that use vegetation to naturally infiltrate the ground is also encouraged.
- **Wellhead Protection** – The City also has a Wellhead Protection Area in the southeast portion of the City. This area is important to groundwater recharge and regulations are in place to protect the groundwater in this area.
- **3-D Stormwater regulations (groundwater, surface water and stormwater)** – The City’s ordinances and codes are in place to protect the City’s water resources. The regulations work to promote protection of groundwater, surface water and stormwater. The DNR regulates many activities surrounding these resources and the City’s regulations adhere to the DNR requirements. Currently the City has a stormwater management ordinance (Ord. #2193) to set stormwater management requirements, an erosion control Ordinance (Ord. #2268 to prevent erosion from construction sites and a post-construction stormwater management ordinance (Ord. #2267) to prevent erosion for the long-term after construction. The city also has an illicit discharge ordinance to prevent and remedy any illegal discharges to the storm drain system.

- Public Awareness/Education – Aside from the Utility Department’s activities, the City utilizes the website, “Leaflet” newsletter and mailing inserts to promote water conservation and protection. The Water Resources Management Utility (WRM) has partnered with a number of other communities from Kenosha, Racine, Milwaukee and Waukesha counties (known as the Root-Pike Watershed Initiative Network) to conduct programming to work to protect, restore, and sustain the ecosystems of the Root River and Pike River. The City has hosted a Rain Garden Workshop that educates participants on ways of keeping stormwater runoff from polluting streams, rivers and lakes by learning how to build and maintain a rain garden. The WRM is also involved in a number of their educational initiatives in relation to the City’s Wisconsin Pollutant Discharge Elimination System Permit (WPDES) ranging from neighborhood meetings, development reviews to discussing local water resource issues to newsletter articles.

Wisconsin’s Great Lakes Compact

The Great Lakes Basin is comprised of Lake Erie, Lake Huron, Lake Michigan, Lake Ontario, Lake Superior and the St. Lawrence River – represented by eight (8) Great Lakes states and two (2) Canadian Provinces (Minnesota, Wisconsin, Illinois, Indiana, Ohio, Michigan, Pennsylvania, New York, Quebec and Ontario). The Compact, in and of itself is significant as it encompasses ten (10) jurisdictions across international boundaries that have collectively agreed to manage the largest surface freshwater resource in the world. This is the first multi-jurisdictional agreement of this type in the world.

Each state and/or province adopted statutes further implemented the Compact within their respective jurisdictions. The Wisconsin Legislature adopted Act 227 in early 2008 Governor Doyle signed the law into effect on May 27, 2008. Wisconsin Act 227 adopts text of the Compact into state statute and provides implementation provisions for both pre and post Compact. In summary, Act 227 now regulates:

- “Interbasin Transfers”
- New Statewide Water Supply Planning for Public Water Supply Systems
- New Statewide Water Use Regulations & Reporting System
- New in-basin Water Use Permitting System; and
- New water Conservation and Efficiency Program

As a complimentary document to Wisconsin Act 227, the Southeastern Wisconsin Regional Planning Commission (SEWRPC) has prepared a draft Regional Water Supply Study. The complete study can be referenced on the SEWRPC website via the following link: www.sewrpc.org/water/watersuplystudy The scope of this study is as follows:

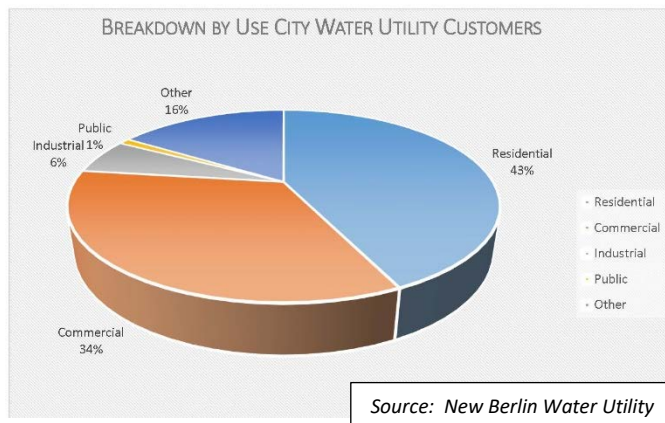
- Forecast future water use demand in the Region
- Consider potential of water conservation to reduce future demand
- Identify groundwater recharge areas which should be protected from development
- Assess potential for shallow groundwater recharge through infiltration of stormwater runoff
- Consider potential alternative sources of supply
 - Shallow groundwater
 - Lake Michigan water replacing groundwater east of the sub-continental divide
 - Lake Michigan water replacing groundwater in “straddling communities” which already have “return flow”
 - Lake Michigan water replacing groundwater in “straddling communities” and “communities in straddling counties” and providing for “return flow”
- Estimate costs and impact of alternatives
 - Groundwater-Surface Water Interdependence and Impacts
- Identify any development constraints necessary to assure water supply sustainability
- Amend regional land use plan if necessary

The Regional Water Supply Study has identified and evaluated seven (7) different scenarios for providing adequate and clean water supplies to the region. It is important that this Plan be used as a guide as future water resource planning and conservation policy decision are made.

Evaluation of Historical Water Usage and Past & Current Conservation Measures

In 2015, the breakdown by use, for City Water Utility Customers is as follows:

- Residential 43%
- Commercial 34%
- Industrial 6%
- Public 1%
- Other 16%
- Hydrant Flushing, Equipment Malfunction, Lost Water, Meter Inaccuracies)



According to numbers provided by the City’s Water Utility Department, the total yearly usage was as follows:

2016	1,004,682,932	2019	897,864,383	2022	922,752,066
2017	940,313,792	2020	943,567,359	2023	932,100,470
2018	959,770,020	2021	954,678,914		

The maximum usage in gallons, highest day for the last 4 years were:

2020	4,838,000	08.20.2020
2021	5,298,000	06.12.2021
2022	4,528,000	07.01.2022
2023	4,384,000	06.02.2023

Source: New Berlin Water Utility

Water usage is tracked by quarterly billing to show high consumption with a high/low report for residential and industrial usage. The average residential water use per residential customer in New Berlin for 2007 was 70 gallons per customer per day (GPCD). The 2021 average is 55.77 gallons per customer per day.

New Berlin has moved ahead with its water conservation measures whether it be through promoting and/or limiting water usage and loss or through land use planning, stormwater management and development review.

Utility activities implemented to date include:

- Sprinkling restriction in effect year round
- Notices of sprinkling restrictions are on the City’s website, quarterly leaflet, utility billings and on the local access cable channel
- Leaflets available on the City website and references in the annual Consumer Confidence Report (CCR)
- Rain Barrels
- Fixture replacement rebate program
- Conduct annual water audits assessing utility system water losses
- Leak detection program

- Flag significant quarterly changes in water meter readings
- Meter individual multi-family and residential condominium units
- Replace water meters on a 15-year cycle
- A water rate service charge that includes certain fixed charges but no water use, encouraging even those with lower water to conserve
- Adoption of the Stormwater Management Ordinances
- Water rate requests to the Public Service Commission reflecting full cost pricing

LAND USE PLANNING, STORMWATER MANAGEMENT AND DEVELOPMENT REVIEW MEASURES

The following is a summary of several ways that the Department of Community Development (DCD) furthers water conservation efforts here in New Berlin. Through the regulation of land use, stormwater management and construction activities. Many of these items described below are not directly related to water conservation “per se” but, they do reflect our efforts surrounding water preservation and improving water quality.

The Department of Community Development (DCD) literally aids in the coordination and regulation of all construction activity within the city. The DCD also establishes and coordinates compliance with all stormwater regulations. The DCD practices what we call “three-dimensional water resource planning”. Focusing efforts on protection of groundwater, surface water and stormwater resources.

Many of the water studies listed in Appendix A of this report have been utilized over the years in refining the City’s Comprehensive Plan and utility needs. This was especially true during the preparation of the Growth and Development Master Plan update to the City’s 1987 Comprehensive Plan. Since that time, DCD has been involved in the following initiatives and/or ways of promoting Low Impact Development (LID in order to preserve our water resources.

- The Department promotes the use of alternative “Best Management Practices” (“BMPs”) for handling stormwater. The encouragement of “green-roofs”, bio-retention swales, rain gardens, rain barrels and “prairie restorations”, all promote habitat restoration and groundwater recharge. The Department has effectively promoted these ideals over the past few years. For example, the Settler’s Ridge Subdivision located off of Wehr Road is 15 lots on 75 acres. Our Department required the developer to restore and enhance the open space into a “prairie habitat” that will be forever preserved offering not only visual benefits but functional as well, for overland flow of stormwater allowing for groundwater recharge.

- The Department has over the past several years, developed a number of ordinances and policies to assist in our efforts to promote “Three-Dimensional Water Resource Planning”. This is the protection of groundwater, surface water and managing stormwater conveyance. With assistance from Randal Arendt (one of the nation’s foremost experts in conservation subdivision design & development)., the City developed a conservation subdivision ordinance requiring that 75% of lands in any given conservation subdivision to be set aside for permanent open space preservation for those without public utilities. For those conservation subdivisions with public utilities, our ordinance requires that 65% of the land be set-aside for permanent preservation. To the best of our knowledge, this is one of, if not the strictest conservation requirements within the State in terms of minimum open space requirements. Our ordinance also allows a transfer of density option in order to preserve additional open lands while allowing compensation to the parcels giving away their development rights. In the past, the Department has proposed a purchase of development rights program, however, that program was not funded.
- Another example of how “BMPs” have been incorporated into a new development is the recent Living Word Church project. They are installing bio-infiltration swales that will contain engineered soils. These swales will be planted to follow DNR Technical Standards. They will also have temporary diversion swales during construction, which will protect the bio-infiltration swales.
- The recently approved Crossroads Community Church is an additional example of the incorporation of the “BMPs”. This project will include bio-infiltration swales with engineered soils. A portion of the parking that will be used for larger church services will be grass covered with geo-blocks. This will help treat runoff as it comes off the parking lot before it enters the storm water ponds.
- A recent project in the New Berlin Industrial Park was a Dog Day Care. This was a new use to the City. In working with the applicant, Staff had some concern about the amount of animal waste and runoff from chemicals that this site would generate. Working collectively, DCD staff, DNR staff and the applicant worked on incorporating a rain garden and the proper use of environmentally friendly chemicals that do not degrade water quality and do not negatively impact the drainage ways and watershed.
- Through continuing education, the Department is beginning to learn more about applying the standards found under the leadership in Energy Efficient Design (LEED) program. With the recently approved Willowtree Development, an approximately 350,000 square foot building, the developer coordinated with our Department and was able to incorporate stormwater “BMPs” into the site design and also various LEED design criteria. Besides incorporating energy efficient elements into the building’s construction, the property will be used from

the site's retention pond to reduce water usage by 50% or more. In addition, a portion of the parking lot used for overflow parking will be grass covered with geo-blocks, further allowing infiltration and treating runoff prior to reaching the retention pond.

- Another project that is promoting groundwater recharge, enhancing aquatic habitat, and helping to protect our water resource assists is the Underwood Creek "Prospect Parkway" project being managed by the City's Water Resources Management Utility. Depending upon funding availability, this project is incorporating rain gardens, bio-retention swales, infiltration basins and trenches, native / prairie plantings and providing for additional wetland plantings that will Help absorb additional water and pollutants and detaining additional water from entering the creek causing flooding problems downstream.
- The current study underway for the redevelopment of the New Valley Sand and Gravel Quarry (Mill Valley Business Center is being site designed to support 100% groundwater recharge of all stormwater. In addition, LEED standards will be recommended for new development.
- The City's upcoming Comprehensive Plan update will focus on neighborhood planning efforts and identification of significant environmental features in the city and ways to preserve their integrity and further our three-dimensional water resource planning ideals.
- In 2001, the Department conducted and prepared an Urban Ecological Analysis report. The project used the CITYgreen software that American Forests utilize to examine the environmental and economic benefits of trees and green spaces within the City. This information is currently used on various maps within the City including the Map of Potential Conservation Land and the Departments front count maps to help staff and others quickly see areas of the City and their associated tree canopy.
- The Department promotes water quality management measures to meet the City's WPDES Permit requirements by administering and enforcing the provisions of the City's Stormwater Ordinance No. 2193, the Illicit Discharge Ordinance No. 2269, the Erosion Control Ordinance No. 2268 and the Post Construction Ordinance No. 2267. The intent of this enforcement is to reduce the amount of sediment and other pollutants reaching the waters of the State. Our Department, through the Water Resource Management Utility have implemented a strong code compliance program to monitor all on-site construction activities related to

erosion control and stormwater management to ensure that all construction sites are in compliance with federal, state and local laws regulating water quality and stormwater. All of which ultimately protects our water resources.

- In addition, our Department is responsible for inspecting all plumbing devices pursuant to Comm 84.20 regarding flow control and flow restricting devices. Members of our Department also serve on various statewide or regional boards or commissions that focus on improving land use planning and / or improving watershed and water resource management.

Due to increasing and complicated legislation and regulations relating to water resource protection, there needs to be a change in community development programming at all levels of government. Managing water resources is critical in high-quality land use planning and the overall health and integrity of these vital resources.

CONSERVATION MEASURES

Programs or activities to achieve water conservation can be classified into three categories:

1. Program Actions
2. Voluntary
3. Mandatory

Program actions are those activities that can be directly taken up by the City. Voluntary activities are those that use education or incentives to promote water conservation. Mandatory activities are those that use regulations and ordinances. These measures can be combined or phased in over time.

Suggested/Recommended “Program” Actions

- Install more rain gardens at public buildings
- Install low flow fixtures at City Hall or other City buildings and monitor decrease in water usage
- Install a rain barrel at City Hall
- Remove obstacles in the zoning and building code to allow for rain harvesting tanks in all zoning districts. Encourage new subdivisions through homeowner association declarations of restrictions to allow them as well
- Encourage all new subdivisions to plan tees and use water harvesting for landscape irrigation
- Reduce hydrant flushing from two times to one time per year

- Detect and reduce leakage in the New Berlin water system. Leakage from the water system provides an opportunity to reduce the amount of water that is being used by utility customers. The New Berlin Water Utility should institute a more detailed water audit for the system to identify priority areas for water main replacement. Reducing leaks increases water pressure within the system and reduces energy costs for water pumping.

Suggested/Recommended “Voluntary” Actions

- When brushing your teeth, do not let the water run
- Use water conserving shower heads and replace them as necessary
- Check every faucet in your home for leaks (just a slow drip can waste 15 – 20 gallons per day)
- Install rain barrels
- Use native planting in landscaping
- Install a rain garden
- Install low-flow fixtures with rebate assistance from the Utility for installation of water efficient fixtures
- Bypass water softener system
- Do not water lawns, gardens and landscaping between the hours of 9:00 a.m. and 9:00 p.m.
- Cleaning of side paths, driveways, parking areas, tennis courts, patios, decks or other hard-surface areas should be accomplished with brooms – the use of water should be avoided
- Limit the outdoor use of any water-play apparatus connected to a water source to one hour per day
- The operation of outdoor misting systems used to cool people or areas should be avoided unless their use is necessary to alleviate an immediate threat to a person’s health or safety
- Water obtained by means of a fire hydrant shall not be used for cleaning equipment of any kind
- Pools larger than 500 cubic feet should be supplied with water *obtained* from a source on that property’s side of the sub-continental divide
- The watering of gardens, trees and landscaping (except invasive species) through the use of a hand-held watering can or other hand-held container or hose is encouraged, provided any such watering device is utilized manually and in conjunction with an automatic hand-held shut-off valve
- The watering or irrigation of new landscaping would also be allowed
- Avoid showering, doing laundry or running a dishwasher during a rain storm

Suggested/Recommended “Mandatory” Actions

- Sprinkling Ordinance – impose fines when not followed (odd/even days)
- Sprinkling Ordinance – prohibit sprinkling during a significant portion of the mid-day hours when evaporation rates are high
- Require an automatic hand-held shut-off valve for all outdoor domestic water hose use
- Require rain and moisture sensors on all new lawn irrigation systems
- Require low flow fixtures

The simplest application to minimize impact on City residents is to require conservation measures for all new development, so that it is incorporated from the outset. As new technology becomes available, it’s implementation into our codes and wide spread use should be encouraged.

PROGRAM IMPLEMENTATION

The City designates the Water Utility and the Department of Community Development (Including the WRM) as the responsible departments for implementing this Water Conservation Plan. Each department would work cooperatively in administering education and implementing the programs and policies identified herein. To further the Plans’ implementation, the City should set city-wide and household conservation goals and publicize them.

New Berlin should act as a role model for water for water conservation. Some of the areas where the City can lead by example are as follows:

- Continue to promote three-dimensional water resource planning
- Implement best management practices (“BMPs”) for conservation and utilize public lands as pilot projects
- Actively coordinate all land use planning elements thru sound community development; and
- Provide water resource utility fee credits to property owners who utilize “BMPs” on their property (i.e. Pervious paving, rain gardens, bio swales, etc.).

REDUCING WATER USE

Reduce per capita residential water consumption from January 1, 2008 by not less than 10(ten) percent by the Year 2020 for Utility customers as per an agreement between the City of New Berlin and the Wisconsin Department of Natural Resources (WDNR). This goal I based

on prior experience with other municipal water conservation programs. New Berlin is also seeking to reduce peak water demand by 1MGD through controls in water sprinkling. The city will develop a program that provides monetary and other programs to encourage water use reductions. This is usually done in tandem with a change in the rate structure that discourages increases in water usage.

INCENTIVE PROGRAM FOR RESIDENTS (TOILET AND FIXTURE REPLACEMENTS)

The City of New Berlin Water Utility has developed a program to offer rebates of up to \$100 for residential customer who replace their high water using toilets with EPA WaterSense-rated High Efficiency Toilet (HET) models. This program is part of the utility's Water Conservation Plan to reduce per capita residential water usage by 10 (ten) percent.

Toilets eligible for rebate must be HFTs (which use an average of 1.28 gallons per flush) and must be on the Environmental Protection Agency's (EPA) WaterSense list. Any toilet that meets the criteria and is purchased after January 1, 2010 will be eligible. Rebates will be in the form of checks sent to the customer's residence of record: the check amount will not exceed the purchase price of the toilet.

To apply for the rebate, an applicant must submit two items: the original, dated sales receipt for the toilet showing the manufacturer's model name and number and the completed application form that can be found on the newberlin.org website. These items would be submitted to the City's Inspection Department who would then complete the inspection. They then would send the paperwork to the City of New Berlin's Utility Department for payment.

ELIGIBILITY

Participants in the program must be residential customers of the New Berlin Water Utility, and the installation address must be in the customer service area of the utility. Qualified customers are those who live in single-family homes, condos, or apartments in buildings no larger than two units. Rebates are for replacement of existing larger-capacity toilets, and re not for new construction. Rebates are first-come, first-served, until funding is exhausted. The program is for only two toilet rebates per household. Eligible replacement toilets must be HETs listed on the EPA WaterSense website:

<https://lookforwatersense.epa.gov/products/Product-Search-Results-Toilets.html>

Installation

Homeowners may install the toilets themselves, or they may hire a plumber or contractor to do the job. Owners are responsible for proper installation and associated costs. All applicable building and/or plumbing permits shall be obtained from the Department of Community Development – Inspection Services Division and pass all inspections. Installations may also be

subject to verification by water utility personnel. Toilets may be purchased at any supplier as long as they are on the WaterSense list of HETs. Where applicable, permit fees may be waived for these installations

Rebates

Rebate checks of up to \$100/toilet (not to exceed actual purchase price) will be sent to the customer's address four to six weeks after applications are processed and the Utility has received notification that the installation has passed inspection. Rebates are not available for the costs of installation. The program will be based upon a "first come-first served" basis and will be limited to the amount budgeted within a given year.

Fixture Replacement

Greater water savings are achieved when ALL fixtures are replaced with High Efficiency ones. In Addition to offering rebates for the installation of HETs, the Water Utility will also offer rebates for the installation of high efficiency showerheads and faucets.

For High Efficiency Showerheads (HES), participants will receive a \$10.00 rebate (not to exceed the purchase price) when they purchase and install 1.5 gallon per minute (gpm) showerheads maximum of two (2). Or participants may exchange their old showerheads for fee, maximum of two (2) for new high efficiency ones at the Department of Community Development – Permit Application Center. Where applicable, permit fees may be waived for these installations.

Regarding High Efficiency Faucets (HEF), participants may receive a \$25.00 rebate (not to exceed the purchase price) when they purchase and install a 1.5 gallon per minute kitchen/bathroom faucet, maximum of two (2). Faucets must be EPA WaterSense certified.

All rebates shall be granted on a first-come, first-served basis until program funds are exhausted. This program is subject to available funds and the City of New Berlin Utility Committee would reserve the right to alter program funding or program requirements at any time without notice. The Water Utility would not guarantee that program funding would be sufficient nor that all persons submitting applications shall receive a rebate.

Only High-Efficiency Toilets labeled as EPA's WaterSense and 1.5 gallons per minute showerheads and/or faucets qualify for a rebate. Proof of WaterSense labeled High Efficiency Faucet and/or proof of 1.5 gpm Showerhead is required to be submitted with application. No substitutions will be accepted under this Program. Original dated sales receipt for new showerhead or faucet must be submitted with the rebate application. New construction is not covered by this rebate. Rebate amount applies to purchase of approved toilets/faucets/showerheads only.

IMPLEMENT CONSERVATION PLAN / CONDUCT PUBLIC OUTREACH AND EDUCATION

The New Berlin Water Utility and Department of Community Development will implement the final conservation plan encompassing the information gathered. The City will circulate the plan to local stakeholders, government officials, and utility staff to generate support for and comment on the plan. The Department's will implement the plans measures and track progress.

The City will actively promote implementation of the conservation plan through public education and outreach in the New Berlin schools and press. The City will utilize existing educational and outreach materials available through: The California Urban Water Conservation Council – www.h2ouse.org; www.everydrop.org; and the American Water Works Association at www.awwa.org; www.waterwiser.org.

The Utility will also conduct an ongoing monitoring program to assess the effectiveness of water use reduction activities through actual water use savings, customer participation and costs of device maintenance.

APPENDIX A – NEW BERLIN WATER STUDIES

➤ City of New Berlin application for Water Diversion	2006
➤ Radium Compliance Study	2002
➤ Lake Michigan Water Study	2001
➤ Report on the Geophysical Logging Study on Well 8	2001
➤ Sand and Gravel Test Boring Results	2001
➤ New Berlin Energy Park Studies & Groundwater Monitoring	2000
➤ Report on the Geologic Reconnaissance Study for the	
➤ Siting of Shallow Sand and Gravel Wells	2000
➤ Water System Study Update for Impact Fees	1998
➤ Westbrook Water Service Study	1998
➤ Update Supply and Storage Analysis	1994
➤ Geothermal Survey for Dolomite Well Site – Valley View Park	1992
➤ Geothermal Survey for Locating a Dolomite Well Site- Westridge Subdivision	1992
➤ Shallow Geothermal Survey for Valley View Park Test Well Site	1992
➤ Report on the Phase II, Sand and Gravel Well Exploration Studies at the High Pointe and Woodfield Sites in the East half of the City of New Berlin	1991
➤ Report on the Phase I Study of the Groundwater Exploration Program for the East Half of the City of New Berlin	1991
➤ Water System Facilities Study	1989- '91
➤ Westbrook Water Service Study	1998
➤ Update Supply and Storage Analysis	1994
➤ Water System Facilities Study	1989- '91
➤ Radium Compliance Study	1986
➤ Section 25 Water Study	1985

APPENDIX B

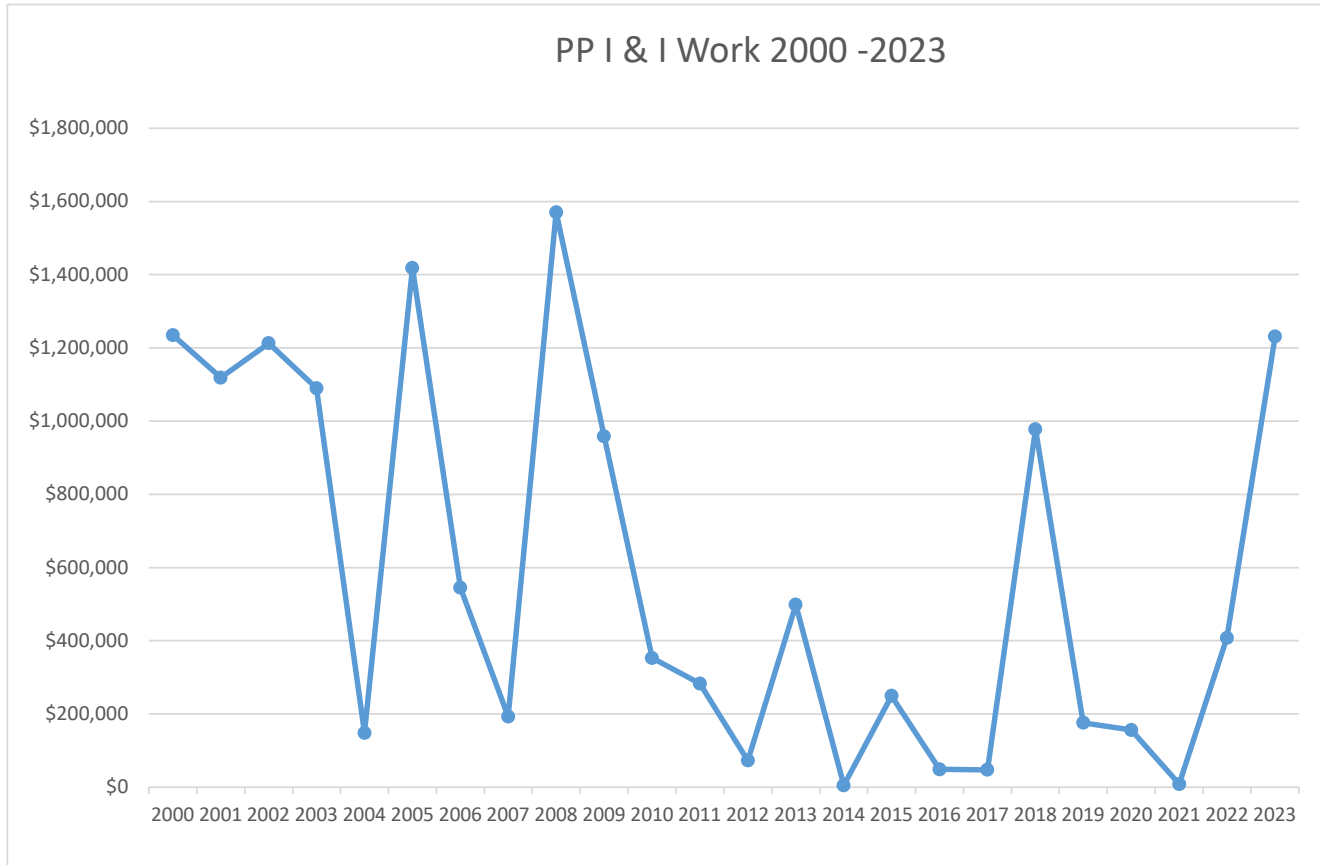
I/I REDUCTION EFFORTS

INCLUDED IN REPORT:

- PP I&I WORK GRAPH

Year	Amount
2000	\$1,234,824
2001	\$1,118,524
2002	\$1,212,340
2003	\$1,089,713
2004	\$148,310
2005	\$1,418,395
2006	\$544,788
2007	\$192,847
2008	\$1,570,444
2009	\$958,745
2010	\$352,785
2011	\$283,000
2012	\$73,000
2013	\$498,456
2014	\$5,000
2015	\$249,317
2016	\$48,613
2017	\$47,413
2018	\$977,819
2019	\$175,945
2020	\$156,094
2021	\$8,625
2022	\$407,979
2023	\$1,231,486

Total \$14,004,462



APPENDIX C
SEWAGE FLOW ESTIMATES
2019 TO 2023

INCLUDED IN REPORT:

- 2019 TO 2023

PRIOR REPORTS SUPPLIED UPON REQUEST:

- 2011 TO 2018

RA Smith 2023 Flow Report

Below is Table 9-1, which has been used in past reporting by the City, which estimates the monthly sewage return flow across the divide. As in past years, I've also included the methodology used to arrive at the numbers below for your reference later in this email.

Basin	Average Daily Flow (MGD)	Monthly (30-Day Flow Gallons)	Annual Flow (Gallons)
Great Lakes Basin	3.25	98,854,167	1,186,250,000
Mississippi River Basin	4.63	140,829,167	1,689,950,000
Total	7.88	239,683,334	2,876,200,000

Here is the formula and information for first calculating the total sewer flows and then once again across the divide...

The following information is a summary of metered information from the MMSD, City-wide flow monitoring, and lift station pumping data. The information below gives a conservative estimate of the flows from the City to MMSD in 2022.

Because MMSD has only two meters monitoring flows from the City, we needed to rely more heavily on Utility-Owned meters to estimate the flows below. The following are the average flows for the City during 2022.

MMSD Meter DC0306 (This is an area-velocity meter similar to what the utility uses. I trust the accuracy of this data. The average flow below is from January 2023 through November 2023.) (New Berlin Basins 1, 4, 5, and 6) = 4.38 MGD (2.292 in 2012, 2.479 in 2013, 2.00 in 2014, 1.66 in 2015, 2.05 in 2016, 2.21 in 2017, 2.06 in 2018, 2.47 in 2019, 2.18 in 2020, 1.75 in 2021, and 3.11 in 2022)

MMSD Meter MS0213 (This is an area-velocity meter similar to what the utility uses. I trust the accuracy of this data. The average flow below is from January 2023 through November 2023.) (New Berlin Basin 9) = 0.807 MGD (0.65 in 2012, 0.982 in 2013, 0.474 in 2014, 0.967 in 2015, 1.17 in 2016, 1.04 in 2017, 1.07 in 2018, 1.23 in 2019, 0.994 in 2020, 0.574 in 2021, and 0.632 in 2022)

(New Berlin Basin 2, utility owned meter 2002-A) = 0.200 MGD (0.084 in 2013, .095 in 2014, 0.141 in 2015, .075 in 2016, 0.146 in 2017, 0.14 in 2018, 0.158 in 2019, 0.123 in 2020, 0.335 in 2021, and 0.282 in 2022)

(New Berlin Basin 3, utility owned meters 2003-B and 2003-C) = 0.807 MGD (0.551 in 2014, 0.327 in 2015 .41 in 2016, 0.45 in 2017, 0.49 in 2018, 0.749 in 2019, 0.517 in 2020, 0.538 in 2021, and 0.501 in 2022)

(New Berlin Basins 7 and 10, utility owned meters 2007-B and 2010-A) = 1.666 MGD (1.420 in 2012, 2.527 in 2013, 1.834 in 2014, 1.55 in 2016, 1.88 in 2017, 1.89 in 2018, 2.01 in 2019, 1.87 in 2020, 1.209 in 2021, and 2.013 in 2022)

(New Berlin Basin 8, utility owned meter 2008-A) = 0.019 MGD (0.041 in 2015, 0.058 in 2016, 0.026 in 2017, 0.02 in 2018, 0.016 in 2019, 0.026 in 2020, 0.017 in 2021, and 0.042 in 2022)

Total 2023 Average Daily Flow = 7.88 MGD à * 365 = 2.9 Billion Gallons
(about a 20.8% increase from 2022 numbers and about a 80.1% increase from 2021 numbers)

Total 2022 Average Daily Flow = 6.54 MGD à * 365 = 2.4 Billion Gallons
(about a 49.1% increase from 2021 numbers and about a 15.38% increase from 2020 numbers)

Total 2021 Average Daily Flow = 4.42 MGD à * 365 = 1.61 Billion Gallons
(about a 22.6% decrease from 2020 numbers and about a 33.47% decrease from 2019 numbers)

Total 2020 Average Daily Flow = 5.71 MGD à * 365 = 2.08 Billion Gallons
(about a 14.0% decrease from 2019 numbers and about a .48% increase from 2018 numbers)

Total 2019 Average Daily Flow = 6.63 MGD à * 365 = 2.42 Billion Gallons
(about a 16.9% increase from 2018 numbers and about a 15.2% increase from 2017 numbers)

Total 2018 Average Daily Flow = 5.67 MGD à * 365 = 2.07 Billion Gallons
(about a 1.4% decrease from 2017 numbers and about a 6.78% increase from 2016 numbers)

Total 2017 Average Daily Flow = 5.75 MGD à * 365 = 2.10 Billion Gallons
(about a 8% increase from 2016 numbers and about a 16.2% increase from 2015 numbers)

Total 2016 Average Daily Flow = 5.31 MGD à * 365 = 1.94 Billion Gallons
(about a 8.6% increase from 2015 numbers and about a 6.9% increase from 2014 numbers)

Total 2015 Average Daily Flow = 4.89 MGD à * 365 = 1.785 Billion Gallons
(about a 1.5% decrease from 2014 numbers and about a 25.75% decrease from 2013 numbers)

Total 2014 Average Daily Flow = 4.966 MGD à * 365 = 1.813 Billion Gallons
(about a 25% decrease from 2013 numbers and about a 2% increase from 2012 numbers)

Total 2013 Average Daily Flow = 6.586 MGD à * 365 = 2.404 Billion Gallons
(about a 35% increase from 2012 numbers)

Total 2012 Average Daily Flow = 4.874 MGD à * 365 = 1.780 Billion Gallons
(about a 10% decrease from 2011 numbers)

Since the above indicates total flow from the City, we need to estimate what it is on each side of the divide... here is how we do it...

One MMSD meter measured flows from all of New Berlin Basins 1, 4, 5, and 6. Since we only wanted the flows from 5 and 6, I subtracted the flows recorded for 1 and 4 from the flow monitoring data that we have been collecting for the City every year. The result should give us a good idea of what flows basins 5 and 6 are contributing.

- MMSD Meter DC0306 = 4.38 MGD
 - New Berlin Flow Meter Basin 1 (utility meter 3001-G, 0.415 MGD) and Basin 4 (utility meter 3001-A, 0.188 MGD)
 - Resultant Basin 5 and 6 flows = 3.777 MGD

Assuming that half of flow from Basin 7 and 10 is pumped over the sub-divide line we get:

- New Berlin Basins 7 and 10 (utility owned meters 2007-B and 2010-A) = $1.666 \text{ MGD}/2 = \underline{0.833}$ MGD

Add Basin 8 (utility owned meter 2008-B), and the above two together and we get our number à $3.777 + 0.833 + 0.019 = \underline{4.629}$ MGD

Thanks and let me know if you have any questions.

Ben G. High, P.E.

Project Manager



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RA Smith 2022 Flow Report

Below is Table 9-1, which has been used in past reporting by the City, which estimates the monthly sewage return flow across the divide. As in past years, I've also included the methodology used to arrive at the numbers below for your reference later in this email.

Basin	Average Daily Flow (MGD)	Monthly (30-Day Flow Gallons)	Annual Flow (Gallons)
Great Lakes Basin	2.88	87,600,000	1,051,200,000
Mississippi River Basin	3.66	111,325,000	1,335,900,000
Total	6.54	198,925,000	2,387,100,000

Here is the formula and information for first calculating the total sewer flows and then once again across the divide...

The following information is a summary of metered information from the MMSD, City-wide flow monitoring, and lift station pumping data. The information below gives a conservative estimate of the flows from the City to MMSD in 2022.

Because MMSD has only two meters monitoring flows from the City, we needed to rely more heavily on Utility-Owned meters to estimate the flows below. The following are the average flows for the City during 2022.

MMSD Meter DC0306 (This is an area-velocity meter similar to what the utility uses. I trust the accuracy of this data. The average flow below is from January 2022 through November 2022.)

(New Berlin Basins 1, 4, 5, and 6) = 3.11 MGD (2.292 in 2012, 2.479 in 2013, 2.00 in 2014, 1.66 in 2015, 2.05 in 2016, 2.21 in 2017, 2.06 in 2018, 2.47 in 2019, 2.18 in 2020, and 1.75 in 2021)

MMSD Meter MS0213 (This is an area-velocity meter similar to what the utility uses. I trust the accuracy of this data. The average flow below is from January 2022 through November 2022.)

(New Berlin Basin 9) = 0.632 MGD (0.65 in 2012, 0.982 in 2013, 0.474 in 2014, 0.967 in 2015, 1.17 in 2016, 1.04 in 2017, 1.07 in 2018, 1.23 in 2019, 0.994 in 2020, and 0.574 in 2021)

(New Berlin Basin 2, utility owned meter 2002-A) = 0.282 MGD (0.084 in 2013, .095 in 2014, 0.141 in 2015, .075 in 2016, 0.146 in 2017, 0.14 in 2018, 0.158 in 2019, 0.123 in 2020, and 0.335 in 2021)

(New Berlin Basin 3, utility owned meters 2003-B and 2003-C) = 0.501 MGD (0.551 in 2014, 0.327 in 2015, .41 in 2016, 0.45 in 2017, 0.49 in 2018, 0.749 in 2019, 0.517 in 2020, and 0.538 in 2021)

(New Berlin Basins 7 and 10, utility owned meters 2007-B and 2010-A) = 2.013 MGD (1.420 in 2012, 2.527 in 2013, 1.834 in 2014, 1.55 in 2016, 1.88 in 2017, 1.89 in 2018, 2.01 in 2019, 1.87 in 2020, and 1.209 in 2021)

(New Berlin Basin 8, utility owned meter 2008-A) = 0.042 MGD (0.041 in 2015, 0.058 in 2016, 0.026 in 2017, 0.02 in 2018, 0.016 in 2019, 0.026 in 2020, and 0.017 in 2021)

Total 2022 Average Daily Flow = 6.54 MGD → * 365 = 2.4 Billion Gallons
(about a 49.1% increase from 2021 numbers and
about a 15.38% increase from 2020 numbers)

Total 2021 Average Daily Flow = 4.42 MGD → * 365 = 1.61 Billion Gallons
(about a 22.6% decrease from 2020 numbers
and about a 33.47% decrease from 2019 numbers)

Total 2020 Average Daily Flow = 5.71 MGD → * 365 = 2.08 Billion Gallons
(about a 14.0% decrease from 2019 numbers
and about a .48% increase from 2018 numbers)

Total 2019 Average Daily Flow = 6.63 MGD → * 365 = 2.42 Billion Gallons
(about a 16.9% increase from 2018 numbers and
about a 15.2% increase from 2017 numbers)

Total 2018 Average Daily Flow = 5.67 MGD → * 365 = 2.07 Billion Gallons
(about a 1.4% decrease from 2017 numbers and
about a 6.78% increase from 2016 numbers)

Total 2017 Average Daily Flow = 5.75 MGD → * 365 = 2.10 Billion Gallons
(about a 8% increase from 2016 numbers and
about a 16.2% increase from 2015 numbers)

Total 2016 Average Daily Flow = 5.31 MGD → * 365 = 1.94 Billion Gallons
(about a 8.6% increase from 2015 numbers and
about a 6.9% increase from 2014 numbers)

Total 2015 Average Daily Flow = 4.89 MGD → * 365 = 1.785 Billion Gallons
(about a 1.5% decrease from 2014 numbers and
about a 25.75% decrease from 2013 numbers)

Total 2014 Average Daily Flow = 4.966 MGD → * 365 = 1.813 Billion Gallons
(about a 25% decrease from 2013 numbers and
about a 2% increase from 2012 numbers)

Total 2013 Average Daily Flow = 6.586 MGD → * 365 = 2.404 Billion Gallons
(about a 35% increase from 2012 numbers)

Total 2012 Average Daily Flow = 4.874 MGD → * 365 = 1.780 Billion Gallons
(about a 10% decrease from 2011 numbers)

Since the above indicates total flow from the City, we need to estimate what it is on each side of the divide... here is how we do it...

One MMSD meter measured flows from all of New Berlin Basins 1, 4, 5, and 6. Since we only wanted the flows from 5 and 6, I subtracted the flows recorded for 1 and 4 from the flow monitoring data that we have been collecting for the City every year. The result should give us a good idea of what flows basins 5 and 6 are contributing.

- MMSD Meter DC0306 = 3.11 MGD
 - New Berlin Flow Meter Basin 1 (utility meter 3001-G, 0.344 MGD) and Basin 4 (utility meter 3001-A, 0.160 MGD)
 - Resultant Basin 5 and 6 flows = 2.606 MGD

Assuming that half of flow from Basin 7 and 10 is pumped over the sub-divide line we get:

- New Berlin Basins 7 and 10 (utility owned meters 2007-B and 2010-A) = 2.014 MGD/2 = 1.007 MGD

Add Basin 8 (utility owned meter 2008-B), and the above two together and we get our number → 2.606 + 1.007 + 0.042 = 3.655 MGD

Thanks and let me know if you have any questions.

Ben G. High, P.E.
Project Manager

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RA Smith Flow Report

See below for the flows across the divide. The 2021 flow for the Mississippi River Basin is about a 13.4% decrease from the value we calculated for the basin in 2020 (2.38 MGD). The 2021 flow for the Great Lakes Basin is about a 29.1% decrease from the reading we calculated for the basin in 2020 (3.33 MGD). The table is what needs to be submitted, but feel free to review the rest of the information, which we've always just used to justify the data we present.

Below is Table 9-1, which has been used in past reporting by the City, which estimates the monthly sewage return flow across the divide. As in past years, I've also included the methodology used to arrive at the numbers below for your reference later in this email.

Basin	Average Daily Flow (MGD)	Monthly (30-Day Flow Gallons)	Annual Flow (Gallons)
Great Lakes Basin	2.36	70,800,000	861,400,000
Mississippi River Basin	2.06	61,800,000	751,900,000
Total	4.42	132,600,000	1,613,300,000

Here is the formula and information for first calculating the total sewer flows and then once again across the divide...

The following information is a summary of metered information from the MMSD, City-wide flow monitoring, and lift station pumping data. The information below gives a conservative estimate of the flows from the City to MMSD in 2021.

Because MMSD has only two meters monitoring flows from the City, we needed to rely more heavily on Utility-Owned meters to estimate the flows below. The following are the average flows for the City during 2021.

MMSD Meter DC0306 (This is an area-velocity meter similar to what the utility uses. I trust the accuracy of this data. The average flow below is from January 2021 through November 2021.)

(New Berlin Basins 1, 4, 5, and 6) = 1.75 MGD (2.812 MGD in 2009, 2.766 in 2010, 2.430 in 2011, 2.292 in 2012, 2.479 in 2013, 2.00 in 2014, 1.66 in 2015, 2.05 in 2016, 2.21 in 2017, 2.06 in 2018, 2.47 in 2019, and 2.18 MGD in 2020)

MMSD Meter MS0213 (This is an area-velocity meter similar to what the utility uses. I trust the accuracy of this data. The average flow below is from January 2021 through November 2021.)

(New Berlin Basin 9) = 0.574 MGD (0.403 MGD in 2009, 0.452 in 2010, 0.369 in 2011, 0.65 in 2012, 0.982 in 2013, 0.474 in 2014, 0.967 in 2015, 1.17 in 2016, 1.04 in 2017, 1.07 in 2018, 1.23 in 2019, and 0.994 in 2020)

(New Berlin Basin 2, utility owned meter 2002-A) = 0.335 MGD (0.084 MGD in 2013, .095 in 2014, 0.141 in 2015, .075 in 2016, 0.146 in 2017, 0.14 in 2018, 0.158 in 2019, and 0.123 in 2020)

(New Berlin Basin 3, utility owned meters 2003-B and 2003-C) = 0.538 MGD (0.503 in 2009, 0.551 in 2014, 0.327 in 2015, .41 in 2016, 0.45 in 2017, 0.49 in 2018, 0.749 in 2019, and 0.517 in 2020)

(New Berlin Basins 7 and 10, utility owned meters 2007-B and 2010-A) = 1.209 MGD (2.292 MGD in 2009, 2.530 in 2010, 2.083 in 2011, 1.420 in 2012, 2.527 in 2013, 1.834 in 2014, 1.55 in 2016, 1.88 in 2017, 1.89 in 2018, 2.01 in 2019, and 1.87 in 2020)

(New Berlin Basin 8, utility owned meter 2008-A) = 0.017 MGD (0.041 MGD in 2015, 0.058 in 2016, 0.026 in 2017, 0.02 in 2018, 0.016 in 2019, and 0.026 in 2020)

Total 2021 Average Daily Flow = 4.42 MGD → * 365 = 1.61 Billion Gallons
(about a 22.6% decrease from 2020 numbers and about a 33.47% decrease from 2019 numbers)

Total 2020 Average Daily Flow = 5.71 MGD → * 365 = 2.08 Billion Gallons
(about a 14.0% decrease from 2019 numbers and about a .48% increase from 2018 numbers)

Total 2019 Average Daily Flow = 6.63 MGD → * 365 = 2.42 Billion Gallons
(about a 16.9% increase from 2018 numbers and about a 15.2% increase from 2017 numbers)

Total 2018 Average Daily Flow = 5.67 MGD → * 365 = 2.07 Billion Gallons
(about a 1.4% decrease from 2017 numbers and about a 6.78% increase from 2016 numbers)

Total 2017 Average Daily Flow = 5.75 MGD → * 365 = 2.10 Billion Gallons
(about a 8% increase from 2016 numbers and about a 16.2% increase from 2015 numbers)

Total 2016 Average Daily Flow = 5.31 MGD → * 365 = 1.94 Billion Gallons
(about a 8.6% increase from 2015 numbers and about a 6.9% increase from 2014 numbers)

Total 2015 Average Daily Flow = 4.89 MGD → * 365 = 1.785 Billion Gallons
(about a 1.5% decrease from 2014 numbers and about a 25.75% decrease from 2013 numbers)

Total 2014 Average Daily Flow = 4.966 MGD → * 365 = 1.813 Billion Gallons
(about a 25% decrease from 2013 numbers and about a 2% increase from 2012 numbers)

Total 2013 Average Daily Flow = 6.586 MGD → * 365 = 2.404 Billion Gallons
(about a 35% increase from 2012
numbers)

Total 2012 Average Daily Flow = 4.874 MGD → * 365 = 1.780 Billion Gallons
(about a 10% decrease from 2011
numbers)

Total 2011 Average Daily Flow = 5.397 MGD → * 365 = 1.970 Billion Gallons
(about a 10% decrease from 2010
numbers)

Total 2010 Average Daily Flow = 5.979 MGD → 5.979 * 365 = 2.182 Billion Gallons
(about a 1% decrease from 2009
numbers)

Total 2009 Average Daily Flow = 6.025 MGD → 6.025 * 365 = 2.199 Billion Gallons
(about a 10% increase from 2006
numbers)

Since the above indicates total flow from the City, we need to estimate what it is on each side of the divide... here is how we do it...

One MMSD meter measured flows from all of New Berlin Basins 1, 4, 5, and 6. Since we only wanted the flows from 5 and 6, I subtracted the flows recorded for 1 and 4 from the flow monitoring data that we have been collecting for the City every year. The result should give us a good idea of what flows basins 5 and 6 are contributing.

- MMSD Meter DC0306 = 1.75 MGD
 - New Berlin Flow Meter Basin 1 (utility meter 3001-G, 0.38 MGD) and Basin 4 (utility meter 3001-A, 0.067 MGD)
 - Resultant Basin 5 and 6 flows = 1.437 MGD

Assuming that half of flow from Basin 7 and 10 is pumped over the sub-divide line we get:

- New Berlin Basins 7 and 10 (utility owned meters 2007-B and 2010-A) = 1.209 MGD/2 = 0.605 MGD

Add Basin 8 (utility owned meter 2008-B), and the above two together and we get our number → 1.437
+ 0.605 + 0.017 = 2.06 MGD

Thanks and let me know if you have any questions.

RA Smith 2020 Report

See below for the flows across the divide. The 2020 flow for the Mississippi River Basin is similar to the reading we calculated for the basin in 2019 (2.34 MGD). The 2020 flow for the Great Lakes Basin is about a 22% decrease from the reading we calculated for the basin in 2019 (4.29 MGD). The table is what needs to be submitted, but feel free to review the rest of the Information, which we've always just used to justify the data we present.

Below is Table 9-1, which has been used in past reporting by the City, which estimates the monthly sewage return flow across the divide. As in past years, I've also included the methodology used to arrive at the numbers below for your reference later in this email.

Basin	Average Daily Flow (MGD)	Monthly (30-Day Flow Gallons)	Annual Flow (Gallons)
Great Lakes Basin	3.33	99,900,000	1,198,800,000
Mississippi River Basin	2.38	71,400,000	856,800,000
Total	5.71	171,300,000	2,055,600,000

Here is the formula and information for first calculating the total sewer flows and then once again across the divide...

The following information is a summary of metered information from the MMSD, City-wide flow monitoring, and lift station pumping data. The information below gives a conservative estimate of the flows from the City to MMSD in 2020.

Because MMSD has only two meters monitoring flows from the City, we needed to rely more heavily on Utility-Owned meters to estimate the flows below. The following are the average flows for the City during 2020.

MMSD Meter DC0306 (This is an area-velocity meter similar to what the utility uses. I trust the accuracy of this data. The average flow below is from January 2020 through October 2020.)

(New Berlin Basins 1, 4, 5, and 6) = 2.18 MGD (2.812 MGD in 2009, 2.766 in 2010, 2.430 in 2011, 2.292 in 2012, 2.479 in 2013, 2.00 in 2014, 1.66 in 2015, 2.05 in 2016, 2.21 in 2017, 2.06 in 2018 and 2.47 in 2019)

MMSD Meter MS0213 (This is an area-velocity meter similar to what the utility uses. I trust the accuracy of this data. The average flow below is from January 2020 through October 2020.)

(New Berlin Basin 9) = 0.994 MGD (0.403 MGD in 2009, 0.452 in 2010, 0.369 in 2011, 0.65 in 2012, 0.982 in 2013, 0.474 in 2014, 0.967 in 2015, 1.17 in 2016, 1.04 in 2017, 1.07 in 2018 and 1.23 in 2019)

(New Berlin Basin 2, utility owned meter 2002-A) = 0.123 MGD (0.084 MGD in 2013, .095 in 2014, 0.141 in 2015, .075 in 2016, 0.146 in 2017, 0.14 in 2018, and 0.158 in 2019)

(New Berlin Basin 3, utility owned meters 2003-A and 2003-E) = 0.517 MGD (0.503 in 2009, 0.551 in 2014, 0.327 in 2015, .41 in 2016, 0.45 in 2017, 0.49 in 2018, and 0.749 in 2019)

RA Smith 2020 Report

(New Berlin Basins 7 and 10, utility owned meters 2007-B and 2010-A) = 1.87 MGD (2.292 MGD in 2009, 2.530 in 2010, 2.083 in 2011, 1.420 in 2012, 2.527 in 2013, 1.834 in 2014, 1.55 in 2016, 1.88 in 2017, 1.89 in 2018, and 2.01 in 2019)

(New Berlin Basin 8, utility owned meter 2008-C and lift station 6) = 0.026 MGD (0.041 MGD in 2015, 0.058 in 2016, 0.026 in 2017, 0.02 in 2018, and 0.016 in 2019)

Total 2020 Average Daily Flow = 5.71 MGD à * 365 = 2.08 Billion Gallons
(about a 14.0% decrease from 2019 numbers and about a .48% increase from 2018 numbers)

Total 2019 Average Daily Flow = 6.63 MGD à * 365 = 2.42 Billion Gallons
(about a 16.9% increase from 2018 numbers and about a 15.2% increase from 2017 numbers)

Total 2018 Average Daily Flow = 5.67 MGD à * 365 = 2.07 Billion Gallons
(about a 1.4% decrease from 2017 numbers and about a 6.78% increase from 2016 numbers)

Total 2017 Average Daily Flow = 5.75 MGD à * 365 = 2.10 Billion Gallons
(about a 8% increase from 2016 numbers and about a 16.2% increase from 2015 numbers)

Total 2016 Average Daily Flow = 5.31 MGD à * 365 = 1.94 Billion Gallons
(about a 8.6% increase from 2015 numbers and about a 6.9% increase from 2014 numbers)

Total 2015 Average Daily Flow = 4.89 MGD à * 365 = 1.785 Billion Gallons
(about a 1.5% decrease from 2014 numbers and about a 25.75% decrease from 2013 numbers)

Total 2014 Average Daily Flow = 4.966 MGD à * 365 = 1.813 Billion Gallons
(about a 25% decrease from 2013 numbers and about a 2% increase from 2012 numbers)

Total 2013 Average Daily Flow = 6.586 MGD à * 365 = 2.404 Billion Gallons
(about a 35% increase from 2012 numbers)

Total 2012 Average Daily Flow = 4.874 MGD à * 365 = 1.780 Billion Gallons
(about a 10% decrease from 2011 numbers)

RA Smith 2020 Report

Total 2011 Average Daily Flow = 5,397 MGD à * 365 = 1.970 Billion Gallons
(about a 10% decrease from 2010

numbers)

Total 2010 Average Daily Flow = 5.979 MGD à 5.979 * 365 = 2.182 Billion Gallons
(about a 1% decrease from 2009

numbers)

Total 2009 Average Daily Flow = 6.025 MGD à 6.025 * 365 = 2.199 Billion Gallons
(about a 10% increase from 2006

numbers)

Since the above indicates total flow from the City, we need to estimate what it is on each side of the divide... here is how we do it...

One MMSD meter measured flows from all of New Berlin Basins 1, 4, 5, and 6. Since we only wanted the flows from 5 and 6, I subtracted the flows recorded for 1 and 4 from the flow monitoring data that we have been collecting for the City every year. The result should give us a good idea of what flows basins 5 and 6 are contributing.

- MMSD Meter DC0306 = 2.18 MGD
 - New Berlin Flow Meter Basin 1 (utility meter 3001-G, 0.57 MGD) and Basin 4 (utility meter 3001-A, 0.191 MGD)
 - Resultant Basin 5 and 6 flows = 1.419 MGD

Assuming that half of flow from Basin 7 and 10 is pumped over the sub-divide line we get:

- New Berlin Basins 7 and 10 (utility owned meters 2007-B and 2010-A) = 1.87 MGD/2 = .935 MGD

Add Basin 8 (utility owned meter 2008-C and lift station 6), and the above two together and we get our number à 1.419 + 0.935 + 0.026 = 2.38 MGD

Thanks and let me know if you have any questions.

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See below for the flows across the divide. The average daily flow for the Great Lakes Basin has increased by about 24% from the 2018 value (3.24 MGD). The average daily flow for the Mississippi River Basin has decreased by about 4% from the 2018 value (2.43 MGD). The table is what needs to be submitted, but feel free to review the rest of the information, which we've always just used to justify the data we present.

Below is Table 9-1, which has been used in past reporting by the City, which estimates the monthly sewage return flow across the divide. As in past years, I've also included the methodology used to arrive at the numbers below for your reference later in this email.

Basin	Average Daily Flow (MGD)	Monthly (30-Day Flow Gallons)	Annual Flow (Gallons)
Great Lakes Basin	4.29	128,700,000	1,565,850,000
Mississippi River Basin	2.34	70,200,000	854,100,000
Total	6.63	198,900,000	2,419,950,000

Here is the formula and information for first calculating the total sewer flows and then once again across the divide...

The following information is a summary of metered information from the MMSD, City-wide flow monitoring, and lift station pumping data. The information below gives a conservative estimate of the flows from the City to MMSD in 2019.

Because MMSD has only two meters monitoring flows from the City, we needed to rely more heavily on Utility-Owned meters to estimate the flows below. The following are the average flows for the City during 2019.

MMSD Meter DC0306 (This is an area-velocity meter similar to what the utility uses. I trust the accuracy of this data. The average flow below is from March 2019 through October 2019.)
(New Berlin Basins 1, 4, 5, and 6) = 2.47 MGD (2.812 MGD in 2009, 2.766 in 2010, 2.430 in 2011, 2.292 in 2012, 2.479 in 2013, 2.00 in 2014, 1.66 in 2015, 2.05 in 2016, 2.21 in 2017 and 2.06 in 2018)

MMSD Meter MS0213 (This is an area-velocity meter similar to what the utility uses. I trust the accuracy of this data. The average flow below is from March 2019 through November 2019.)
(New Berlin Basin 9) = 1.23 MGD (0.403 MGD in 2009, 0.452 in 2010, 0.369 in 2011, 0.65 in 2012, 0.982 in 2013, 0.474 in 2014, 0.967 in 2015, 1.17 in 2016, 1.04 in 2017 and 1.07 in 2018)

(New Berlin Basin 2, utility owned meter 2002-A) = 0.158 MGD (0.084 MGD in 2013, .095 in 2014, 0.141 in 2015, .075 in 2016, 0.146 in 2017 and 0.14 in 2018)

(New Berlin Basin 3, utility owned meters 2003-B and 2003-C) = 0.749 MGD (0.503 in 2009, 0.551 in 2014, 0.327 in 2015, .41 in 2016, 0.45 in 2017 and 0.49 in 2018)

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(New Berlin Basins 7 and 10, utility owned meters 2007-B and 2010-A) = 2.01 MGD (2.292 MGD in 2009, 2.530 in 2010, 2.083 in 2011, 1.420 in 2012, 2.527 in 2013, 1.834 in 2014, 1.55 in 2016, 1.88 in 2017 and 1.89 in 2018)

(New Berlin Basin 8, utility owned meter 2008-C and lift station 6) = 0.016 MGD (0.041 MGD in 2015, 0.058 in 2016, 0.026 in 2017 and 0.02 in 2018)

Total 2019 Average Daily Flow = 6.63 MGD → * 365 = 2.42 Billion Gallons
(about a 16.9% increase from 2018 numbers and about a 15.2% increase from 2017 numbers)

Total 2018 Average Daily Flow = 5.67 MGD → * 365 = 2.07 Billion Gallons
(about a 1.4% decrease from 2017 numbers and about a 6.78% increase from 2016 numbers)

Total 2017 Average Daily Flow = 5.75 MGD → * 365 = 2.10 Billion Gallons
(about a 8% increase from 2016 numbers and about a 16.2% increase from 2015 numbers)

Total 2016 Average Daily Flow = 5.31 MGD → * 365 = 1.94 Billion Gallons
(about a 8.6% increase from 2015 numbers and about a 6.9% increase from 2014 numbers)

Total 2015 Average Daily Flow = 4.89 MGD → * 365 = 1.785 Billion Gallons
(about a 1.5% decrease from 2014 numbers and about a 25.75% decrease from 2013 numbers)

Total 2014 Average Daily Flow = 4.966 MGD → * 365 = 1.813 Billion Gallons
(about a 25% decrease from 2013 numbers and about a 2% increase from 2012 numbers)

Total 2013 Average Daily Flow = 6.586 MGD → * 365 = 2.404 Billion Gallons
(about a 35% increase from 2012 numbers)

Total 2012 Average Daily Flow = 4.874 MGD → * 365 = 1.780 Billion Gallons
(about a 10% decrease from 2011 numbers)

Total 2011 Average Daily Flow = 5.397 MGD → * 365 = 1.970 Billion Gallons
(about a 10% decrease from 2010 numbers)

2019 RA Smith Report

Total 2010 Average Daily Flow = 5,979 MGD → $5,979 * 365 = 2.182$ Billion Gallons
(about a 1% decrease from 2009

numbers)

Total 2009 Average Daily Flow = 6.025 MGD → $6,025 * 365 = 2.199$ Billion Gallons
(about a 10% increase from 2006

numbers)

Since the above indicates total flow from the City, we need to estimate what it is on each side of the divide... here is how we do it...

One MMSD meter measured flows from all of New Berlin Basins 1, 4, 5, and 6. Since we only wanted the flows from 5 and 6, I subtracted the flows recorded for 1 and 4 from the flow monitoring data that we have been collecting for the City every year. The result should give us a good idea of what flows basins 5 and 6 are contributing.

- MMSD Meter DC0306 = 2.47 MGD
 - New Berlin Flow Meter Basin 1 (utility meter 3001-G, 0.77 MGD) and Basin 4 (utility meter 3001-A, 0.336 MGD)
 - Resultant Basin 5 and 6 flows = 1.364 MGD

Assuming that half of flow from Basin 7 and 10 is pumped over the sub-divide line we get:

- New Berlin Basins 7 and 10 (utility owned meters 2007-B and 2010-A) = $2.01 \text{ MGD} / 2 = \underline{1.005}$ MGD

Add Basin 8 (utility owned meter 2008-C and lift station 6), and the above two together and we get our number → $1.364 + 1.005 + 0.016 = \underline{2.34}$ MGD

Thanks and let me know if you have any questions.

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Project Manager

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APPENDIX D
EDUCATIONAL EFFORTS
KIDS PAGES
&
TEACHER RESOURCES

INCLUDED IN REPORT:

- NEW BERLIN WEBSITE LINKS
 - UTILITIES MAIN PAGE
 - BEFORE YOU DIG
 - PAYMENT INFORMATION
 - TOILET REBATE PROGRAM
 - WASTEWATER
 - WATER
 - WATER CONSERVATION TIPS
 - CITY OF NEW BERLIN MAIN PAGE

REPORTS SENT UPON REQUEST:

- PRESS RELEASE: FREE PROGRAMS TO LEARN ABOUT WATER RESOURCES
- WATER CONSERVATION FOR KIDS
- WATER SENSE: FIX A LEAK
- AMERICAN WATER: LEARNING CENTER
- WISE WATER USE
- WATER SENSE KIDS
- WATER WHEEL



APPENDIX D & E

Utilities Main Page

<https://www.newberlinwi.gov/341/Utilities>

Before You Dig

<https://www.newberlinwi.gov/342/Before-You-Dig>

Payment Information

<https://www.newberlinwi.gov/343/Payment-and-Billing-Information>

Toilet Rebate Program

<https://www.newberlinwi.gov/499/Toilet-Rebate-Program>

Wastewater

<https://www.newberlinwi.gov/356/Wastewater>

Water

<https://www.newberlinwi.gov/357/Water>

Water Conservation Tips

<https://www.newberlinwi.gov/358/Water-Conservation-Tips>

City of New Berlin Main Page

<https://www.newberlinwi.gov/>

APPENDIX E

INFORMATION

FORMS

&

REPORTS

INCLUDED IN REPORT:

- 5 YEAR WATER USE ANALYSIS
- HYDRANT FLUSHING DATA
- CUSTOMER ANNUAL USAGE INFORMATION
- MMSD COST RECOVERY MANUAL

REPORTS SENT UPON REQUEST:

- WELL ABANDONMENT FORMS
- SPRINKLING SCHEDULE ISSUED
- STAY CONNECTED
- RAIN GARDEN DISPLAY
- TOILET REBATE EXAMPLE OF CONSUMPTION REDUCTION HISTORY
- CROSS CONNECTION INFORMATION PAMPHLET
- RESIDENTIAL CROSS CONNECTION SURVEY
- IMMEDIATE RELEASE: TAPPING LAKE MICHIGAN WATER JULY 13, 2005
- MILWAUKEE WATER WORKS COMPARISON OF WATER QUALITY CHARACTERISTICS
- WATER SUPPLY NOTICE, JUNE 26, 2009

City of New Berlin
5 Year Water Use Analysis
All Pumpages are in 1000's of Gallons

Year	2023	2022	2021	2020	2019
Water Source	Purchased Water	Purchased Water	Purchased Water	Purchased Water	Purchased Water
January	75,838	72,864	70,187	74,871	78,456
February	64,485	65,829	68,186	65,262	65,063
March	71,703	71,345	81,675	76,804	68,033
April	65,872	67,434	72,019	71,524	73,959
May	86,460	81,966	83,112	75,125	73,187
June	100,233	88,397	99,540	94,202	71,179
July	92,246	87,183	94,194	93,489	93,502
August	91,537	97,084	92,402	94,834	84,023
September	81,869	79,436	85,210	80,089	78,190
October	72,399	73,942	76,115	72,004	72,560
November	66,494	68,831	64,472	73,160	62,958
December	62,964	68,442	67,566	72,203	76,754
Total Annual Pumpage	932,100	922,753	954,678	943,567	897,864
Max Daily Pumpage	4,384	4,538	5,298	4,838	4,432
Max Daily Date	June 2nd	July 1st	June 12th	August 20th	July 15th
Average Day	2,554	2,528	2,616	2,578	2,360
Ave to Peak Ratio	1:1.72	1:1.80	1:2.03	1:1.87	1:1.81

City of New Berlin Utility
Hydrant Flushing Data
Water flushed in gallons

	Spring-Groundwater	Spring-Milwaukee Water	Fall - Groundwater	Fall - Milwaukee Water	Annual Total
2004	16,279,900		15,112,000		31,391,900
2005	18,417,200		8,477,300	4,851,500	31,746,000
2006	10,502,600	3,674,900	7,477,600	2,773,500	24,428,600
2007	4,631,400	2,749,900	6,919,600	2,847,800	17,148,700 *
2008	6,464,000	3,074,800	8,542,200	2,827,500	20,908,500
2009	5,421,100	3,365,600		5,721,000	14,507,700
2010		5,591,700		4,115,375	9,707,075 **
2011		5,089,600		5,207,800	10,297,400
2012		5,207,800		5,073,000	10,280,800
2013		4,554,200		4,844,600	9,398,800
2014		4,905,300		4,325,800	9,231,100
2015		5,093,700		4,971,800	10,065,500
2016		5,230,000		5,441,700	10,671,700
2017		4,954,500		5,066,300	10,020,800
2018		5,438,500		5,285,300	10,723,800
2019		6,224,200		5,578,400	11,802,600
2020		5,609,300		4,478,430	10,087,730
2021		4,697,500		4,555,000	9,252,500
2022		5,261,840		5,152,000	10,413,840
2023		5,425,100		7,262,400	12,687,500 ***

*Note: Milwaukee Water is pumped to Eastern portion of service area starting in July 2005

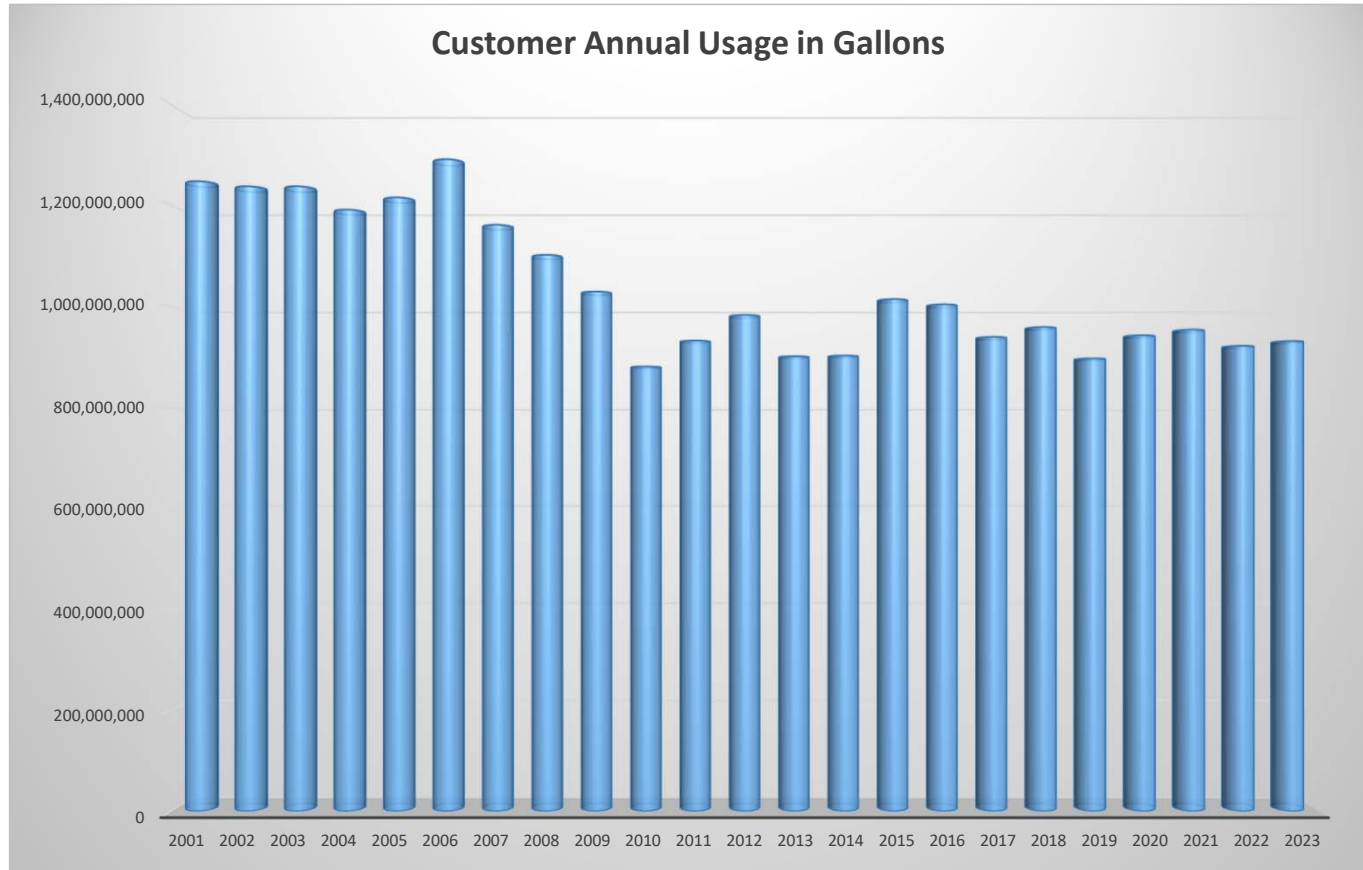
**Note: Milwaukee Water is pumped to entire service area starting in July 2009

***Note: Increase in 2023 due to completed new construction.

Significant drops of water usage were noted in 2006 and 2010 following the switch to Milwaukee Water.
 Each hydrant is now flushed once each year - either spring or fall since the groundwater wells were abandoned.

Customer Annual Usage Information

Year	Customer Annual Usage in Gallons
2001	1,248,214,000
2002	1,238,204,000
2003	1,238,189,000
2004	1,192,110,000
2005	1,216,117,000
2006	1,291,714,000
2007	1,162,095,000
2008	1,102,643,000
2009	1,030,084,000
2010	881,894,000
2011	933,145,000
2012	983,755,000
2013	902,230,120
2014	903,529,120
2015	1,015,102,572
2016	1,004,682,932
2017	940,313,792
2018	959,770,020
2019	897,864,383
2020	943,567,539
2021	954,678,914
2022	922,752,066
2023	932,100,470



Historical Average Annual Rainfall Totals for New Berlin is 34.07 inches

Rainfall Total for 2023 was 28.06 inches

Section: 2
 Title: Residential Occupancy Factors
 Reference: Secs. 17.103(18), 17.208, MMSD Rules, and Appendix A(1.0)(A)

The residential occupancy factor means the average number of people residing in each residential housing unit. The 2023 residential occupancy factor assigned to each municipality is based on housing and population data as of January 1, 2022, and further explained in Section 5 of this manual.

MMSD relies on municipal user data transmissions and an annual housing unit survey to update the housing unit count reported in the 2020 census. Municipal reports are subject to verification by MMSD as explained in Section 8 of this manual.

Total municipal population as of January 1 is reported in October by the Wisconsin Department of Administration. To determine a residential occupancy factor, total population must be allocated between the residential and commercial sewer user classes. The residential allocation is derived by subtracting commercial population from total population. Commercial population is classified as follows:

- Apartments - Occupancy factors and vacancy rates for metered apartments are from the census. Occupancy factors for unmetered apartments served by MMSD are assigned as follows:

<u>Bedrooms</u>	<u>People/Unit</u>
1	1.5
2	2.5
3	Residential Occupancy Factor
Unknown	2.5

In lieu of using the assigned occupancy factor for apartments, a municipality may report the actual occupant count for each unmetered apartment. This occupant count must include all unmetered apartments and be updated at least once each year.

- Mixed Apartment/Business - Includes apartments in mercantile buildings such as stores or taverns. MMSD assigns an occupancy factor of 1.25 to these apartments. The rental vacancy rate from the census is used to estimate the number of vacant units.

- Mobile Home Parks - Includes all mobile homes not classified residential. Occupancy factors and vacancy rates are from the census.
- Group Quarters - Includes nursing homes, convents and monasteries, boarding houses, correctional institutions, college dormitories and other facilities without separate living and dining areas. Estimated population is based on the state report of institutional population and municipal reports of other group quarters facilities. A factor of .75 people per room is used to estimate boarding house population.
- Mixed Home/Business - Includes a business in the home classified as commercial for sewer billing. These units are assigned the residential occupancy factor.

The Residential Occupancy Factor for the District is 2.53 people per unit, computed as follows:

$$\begin{array}{rcccl} \underline{2023 \text{ Population}} & \div & \underline{\text{Occupied Units}} & = & \underline{\text{People Per Unit}} \\ 817,347 & & 327,339 & & 2.50 \end{array}$$

Occupied residential units represent residential units reported to MMSD on municipal data transmissions including mixed home/business units. An update of the residential occupancy factor for each municipality is listed in Table 2-1 on page 2-3.

Table 2-1 -- RESIDENTIAL OCCUPANCY FACTORS

<u>Residential Billing Alternative</u>	<u>Municipality</u>	<u>People per Unit for UC Billings In:</u>	
		<u>2022</u>	<u>2023</u>
1 - 2 Family	Bayside	2.39	2.56
	Brookfield	2.57	2.63
	Brown Deer	2.36	2.36
	Caledonia	1.97	1.97
	Fox Point	2.45	2.51
	Franklin	2.83	2.74
	Glendale	2.10	2.37
	Muskego	2.65	2.60
	New Berlin	2.62	2.59
	Oak Creek	3.01	2.92
	Thiensville	2.26	2.35
	Wauwatosa	2.31	2.29
	West Allis	2.27	2.29
	West Milwaukee	2.30	2.27
1 - 4 Family	Butler	2.18	2.13
	Cudahy	2.13	2.13
	Elm Grove	2.44	2.73
	Germantown	2.51	2.49
	Greendale	2.65	2.75
	Greenfield	2.41	2.50
	Hales Corners	2.37	2.42
	Menomonee Falls	2.65	2.63
	Mequon	2.31	2.31
	Milwaukee	2.58	2.50
	River Hills	2.37	2.42
	Shorewood	2.21	2.29
	St. Francis	2.76	2.51
	Whitefish Bay	2.63	2.82