2022 ANNUAL REPORT OF WATER USE, WATER DIVERSION AND RETURN FLOW FOR THE CITY OF NEW BERLIN, WISCONSIN

CITY OF NEW BERLIN
WAUKESHA COUNTY, WISCONSIN

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Prepared By: City of New Berlin Utility
3805 S Casper Drive
New Berlin, Wisconsin 53151

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2022 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 2022 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 WELLS 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 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 of new Berlin 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 also 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, the total usage was multiplied by .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 City of New Berlin wells were disconnected in 2009 per the DNR after the diversion request was approved. All City of New Berlin groundwater wells have been abandoned. (Appendix E)

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 use to be 51.29 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 2.62 in 2022 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 of New Berlin 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 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. The City of New Berlin continues 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 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 limit 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 of New Berlin has 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 51.29 in 2022. Adequate rainfall this summer assisted water conservation efforts (Appendix E).

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 toiles and install a water sense 1.3 gallon per flush toilets. The amount of the rebate is $100 per toilet.

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

The PSC approved the program to continue in 2022. For Examples of reduced water consumption after low flow toilet installation toilet flow history. The Utility also performed 29 leak detection tests in 2022 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 we continue to follow the COVID-19 guidelines.

In 2013, the Utility began offering customers free toilet leak dye tablets available at City Hall, the Utility Office and the Library. This continued in 2022 and will be offered in 2023. The City's website advertised the EPA's WaterSense "Fix a Leak Week" which give tips on checking for and fixing leaks. (Appendix D)

The Utility 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 2022 there were 847 residential inspections conducted. (Appendix E) The Utility 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. (Appendix E) In 2005 and also in 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. (Appendix E) 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 also listed in Appendix E.

The City of New Berlin 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 WAE 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 Utility repaired 9 water main breaks, repaired 3 leaking service lines, performed 8 valve replacements and repairs, replaced 8 hydrants, and repaired 1 leaking hydrant lead.

As part of a future road project, the City of New Berlin Utility 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, New Berlin 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 sand links to a drip calculator and other resources to provide helpful information to utility customers.

The Utility 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 $407,979.00 in 2022 on I/I reduction. Table 7-1 lists the I/I reduction projects from 2009. The Utility has invested an average of $555,347 per year from 2000-2022 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.

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:

SANITARY METER SHED AREA (ACRES)	MAXIMUM ALLOWABLE PEAK HOURLY FLOW RATE (GALLONS PER ACRE PER DAY)
LESS THAN 250	18,400
250 TO 499	17,700
500 TO 999	16,400
1,000 TO 2,499	13,700
2,500 TO 4,999	9,400
GREATER THAN 5,000	4,000

Based upon the MMSD Facility Plan sewer flows for New Berlin, all area of the City are currently in compliance with the above limits.

The City of New Berlin 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 2010-2022 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 New Berlin.

The most current estimates of I/I by the City's consultant indicate that total average daily sewer flows are 6.54 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 f I/I available for the City of New Berlin. These volumes change regularly and there will be differing estimate4s 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.

New Berlin ranks 5th out of 29 communities in expenditures for I/I reduction. This places then well ahead of many larger and older communities with more I/I.

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 on a daily basis. This, coupled with the strong commitment to reducing I/I by New Berlin, has evidenced above, absolutely minimizes the amount of water entering the basin from outside the basin.

Going forward, New Berlin 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 2011-2022.

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 basin 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.

Note: Additional Appendix informational pages will be supplied upon request.

Table 1-1

Total Amount of Water Purchased From the City of Milwaukee
Annual Report of Water Use, Water Diversion and Return Flow - 2022
City of New Berlin, Wisconsin

Month	Cubic Feet	Monthly Total Amount of Water Purchased From The City of Milwaukee Gallons	Average Daily Usage (SCADA)
January	97,405	72,864,005	2,350,452
February	88,000	65,828,576	2,351,021
March	95,375	71,345,460	2,301,466
April	90,146	67,433,896	2,247,797
May	109,572	81,965,554	2,644,050
June	118,169	88,396,557	2,946,552
July	116,547	87,183,216	2,812,362
August	129,783	97,084,433	3,131,756
September	106,191	79,436,390	2,647,880
October	98,846	73,941,948	2,385,224
November	92,013	68,830,509	2,294,350
December	91,493	68,441,522	2,207,791
Total Annual Pumpage	**1,233,540**	**922,752,066**	**30,320,701**

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:	2,528	million gallons per day
	76,896,005	gallons per month
Highest Day:	July 1, 2022	4,538,000 gallons per day
Lowest Day:	October 21, 2022	1,279,000 gallons per day

Table 2-1

Amount of Water Sold to Each Category and Subcategory of Customer on a Quarterly Basis Within the City Limits 2022
Annual Report of Water Use, Water Diversion and Return Flow - 2022
City of New Berlin, Wisconsin

	Major Category (Gallons Sold in Thousands)				
	Residential	Commercial	Industrial	Public	Total
1st Quarter 2022	93,351	74,718	15,054	1,792	184,915
2nd Quarter 2022	90,282	74,694	17,742	2,084	184,802
3rd Quarter 2022	129,275	83,560	19,618	1,840	234,293
4th Quarter 2022	99,681	77,403	16,720	2,291	196,095
Total	**412,589**	**310,375**	**69,134**	**8,007**	**800,105**

	Residential Subcategory (Gallons Sold in Thousands)		
	Great Lakes Basin	Mississippi Basin	Totals
1st Quarter 2022	61,526	31,825	93,351
2nd Quarter 2022	59,794	30,488	90,282
3rd Quarter 2022	88,585	40,690	129,275
4th Quarter 2022	67,488	32,193	99,681
Total	**277,393**	**135,196**	**412,589**

	Condominium and Apartment Subcategory of Commercial Category (Gallons Sold in Thousands)		
	Great Lakes Basin	Mississippi Basin	Totals
1st Quarter 2022	15,481	21,371	36,852
2nd Quarter 2022	15,294	20,264	35,558
3rd Quarter 2022	14,856	21,690	36,546
4th Quarter 2022	14,484	20,632	35,116
Total	**60,115**	**83,957**	**144,072**

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 2022

Annual Report of Water Use, Water Diversion and Return Flow - 2022

City of New Berlin, Wisconsin

	Major Category Mississippi Basin (Gallons Sold in Thousands)				
	Residential	Commercial	Industrial	Public	Total
1st Quarter 2022	31,825	51,652	13,651	1,192	98,320
2nd Quarter 2022	30,488	52,076	16,379	1,390	100,333
3rd Quarter 2022	40,690	58,950	16,662	1,429	117,731
4th Quarter 2022	32,193	54,039	15,031	1,658	102,921
Total	**135,196**	**216,717**	**61,723**	**5,669**	**419,305**

Condominium and Apartment Subcategory of Commercial (Gallons Sold in Thousands)	
	Mississippi Basin
1st Quarter 2022	21,371
2nd Quarter 2022	20,264
3rd Quarter 2022	21,690
4th Quarter 2022	20,632
Total	**83,957**

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 - 2022

City of New Berlin, Wisconsin

Month	Estimated Amount Diverted in Gallons
January	41,751,075
February	37,719,774
March	40,880,949
April	38,639,622
May	46,966,262
June	50,651,227
July	49,955,983
August	55,629,380
September	45,517,051
October	42,110,886
November	39,439,882
December	39,216,992
Total	**528,479,083**

Source: City of New Berlin, Wisconsin and Ruekert & 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 - 2022
City of New Berlin, Wisconsin

		2022 Quarter (Use in Thousands)						Average Residential Per capita Use in Gallons per Day
		1st	2nd	3rd	4th	Total	Population	
Basin	Cust Class	Cons	Cons	Cons	Cons			
Great Lakes	C-CONDO/APT	15,481	15,294	14,856	14,484	60,115	3,511	
Great Lakes	R Residential	61,526	59,794	88,585	67,488	277,393	13,734	
	TOTALS					337,508	17,246	**53.62**
Mississippi	C-CONDO/APT	21,371	20,264	21,690	20,632	83,957	4,797	
Mississippi	R Residential	31,825	30,488	40,690	32,193	135,196	7,692	
	TOTALS					219,153	12,489	**48.08**
	Combined City Wide Residential Per Capita Water Use					556,661	29,734	**51.29**

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

2022 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	5236	5241	5244	5247	5,242	2.62	13,734
MISB	C-CONDO/APT	819	819	819	819			
MISB	R Residential	2935	2935	2936	2937	2,936	2.62	7,692

2022 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	2.62	207	
MILW	Condo		110	2.50	275	**3,511**
MISB	Apartment	1	398	1.50	597	
MISB	Apartment	2	897	2.50	2,243	
MISB	Apartment	3	21	2.62	55	
MISB	Condo		761	2.50	1,903	**4,797**
						29,734

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 - 2022
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	$711,000.00
2009	Deer Creek Interceptor	Sewer Rehabilitation, Relining and Manhole Repairs to Reduce I/I	$247,945.00
2010	Various Areas	Sewer Rehabilitation, Relining and Manhole Repairs to Reduce I/I	$352,785.00
2011	Greenridge/various	Sewer Rehabilitation, Relining and Manhole Repairs to Reduce I/I	$283,000.00
2012	124th & Greenfield	Relay Section of sewer main, Relining and Manhole Repairs to Reduce I/I	$73,000.00
2013	Various Areas	Dye Testing/Leak Inspection for PPI/I	$460,000.00
2013	Citywide	Manhole Grouting (areas identified from dye testing results)	$2,400.00
2013	Citywide	Manhole Grouting (areas identified from dye testing results)	$36,056.00
2014	Citywide	Grant Work	$5,000.00
2015	Citywide	Manhole Grouting	$15,212.00
2015	Calhoun Road	Boot Installation	$846.00
2015	Various Areas	Dye Testing/Leak inspection for PPI/I	$233,258.00
2016	Citywide	Manhole & Lateral Grouting	$13,740.00
2016	Citywide	Boot Installation	$24,586.00
2016	Citywide	Manhole Lid Replacement	$10,287.00
2017	Hearthridge Drive	Sewer Relining	$24,890.00
2017	124th & Cleveland	Sewer Obstruction Removal & Lining	$22,523.00
2018	Citywide	Manhole Grouting	$4,000.00
2018	Rogers Drive	Sectional Relining	$21,400.00
2018	124th & Howard	Sanitary Frame Replacement	$7,500.00
2018	Linnie Lac Lift Station	MH Deck Replacement	$7,500.00
2018		PPI/I Program Lateral Lining	$937,419.35
2019	Moorland Rd	Sewer Relining	$78,979.00
2019	124th Cleveland	Sewer Relining	$16,165.00
2019	Citywide	Manhole Grouting	$48,500.00
2019	Citywide	Grant Work	$32,301.00
2020	Citywide	Recoat Manholes (36 total)	$126,469.00
2020	Karrington	Mid City Repair Annular Space in Manholes	$29,625.00
2021	Hargrove Drive	Relining	$8,625.00
2022	Rogers Drive	Grouting/Relining	$348,860.00
2022	Greenridge	Dye Testing	$59,119.00
	Total		**$4,242,990.35**

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 - 2022
City of New Berlin, Wisconsin

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	**6.540**	**198,925,000**	**2,387,100,000**

Source: R.A. Smith and Milwaukee Metropolitan Sewerage District

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.

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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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16745 West Bluemound Road, Brookfield, WI 53005-5938
direct: 262-317-3273
Ben.High@raSmith.com
LinkedIn
raSmith.com