2014 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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2014 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 2014 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 purchased 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 9 sections with titles identical to those above. Data is presented in a tabular 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, thus allowing for discontinuance of groundwater supplies. These projects were completed following the Diversion Approval. All City of New Berlin groundwater wells are abandoned. (Appendix E – pgs 1-6)

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 3 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. 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 upon actual percentages of total water use determined by applying an 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 pumpage 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, NOTING 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 – pages 1-6)

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 59.58 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 2.63 is 2014 is from the MMSD Operating Manual. The calculation method used in Table 6-1 to determine the population served 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, pages 33-35..

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.

- Reduce per capita residential water consumption from January 1, 2008 by 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).
- 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 – page 7).
- 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 summer in 2012 prompted a Press Release limiting water sprinkling (Appendix E - page 8). The summer of 2014 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 – page 9)
- 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 bioretention in several of their projects (Appendix E - page 10-12)

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 area 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 spring and 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 55.74 in 2014. Adequate rainfall this summer assisted water conservation efforts. (Appendix E – page 36A)

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 1.3 gallon per flush toilets. The amount of the rebate is $100 per toilet. There were 78 toilets replaced in 2010, 45 toilets in 2011, 12 in 2012, 6 in 2013, 7 in 2014. Customers installed Water Sense 1.28 low flow toilets to replace 3.5 or 5 gallon toilets they currently had. The PSC approved the program to continue in 2015. (For Examples of reduced water consumption after low flow toilet installation, Appendix E - pages 13-18)The Utility also performed 66 leak detection tests in 2014 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. (Appendix E – page 37)

In 2013 the Utility began offering customers free toilet leak dye tablets available at City Hall and the Library. This continued in 2014 and will be offered in 2015. The City's website advertised the EPA's WaterSense "Fix A Leak Week" which gives tips on checking for and fixing leaks.(Appendix D–pgs 21-23)

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 2014 there were 544 residential inspections of which 541 were compliant, 3 rechecks for non-compliant in spring due to irrigation systems.(Appendix E - pages 19-22) 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 - page 23) 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 - pages 24-27) Based on estimates and an average softener regeneration of once a week, the average residential customer would save over 2,600 gallons per year. (Appendix E - pages 28-29). 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 realized in 2011 through disconnection of water softeners. Hydrant flushing water usage has reduced since we began this program. (Appendix E - page 7). A 5 Year Water Use Analysis is also listed (see Appendix E - pages 30-31)

The City of New Berlin began 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 provide residential citizens with a no-cost energy savings program that provided high efficiency faucet aerators, showerheads, kitchen flip 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. (See Appendix E – pages 44-50)

In 2014 Kaempfer and Associates conducted a new water study of the entire Utility area. The Utility has a 20 year project schedule to improve reliability and conservation.

In 2015 the Utility will undertake two water projects that will improve reliability and reduce high pressure areas. This will help eliminate faucet and fixture breaks, reduce water consumption and reduce the number of water main breaks with the lower pressure to a larger area.

The Utility repaired 14 water main breaks, performed 4 valve replacement and repairs and replaced 2 hydrants. During road projects the Utility had 13 hydrants and valves replaced, 15 street valves replaced and 6 service line curb stops replaced.

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 - page 32) 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 resource 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 (see Appendix D pages 21-26)

Infiltration and Inflow (I/I)

The City has an annual I/I program that has been in place since 1997. The City spent $498,456 in 2013 on I/I reduction. Table 7-1 lists the I/I reduction projects from 2013. The Utility has invested an average of $764,012 per year from 2000-2013 in I & I reduction. (Appendix B, page 6) Private I & I investigation and implementation began in 2013. In 2014 the Utility performed I & I Grant work city-wide.

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, ages and are located in varying climates. With this in mind, there are not national standards for allowable I/I. Rather, 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 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 areas 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 prepare a report quantifying I/I. Preliminary results of the 2009 flow monitoring plan and analysis of flows by the city's consultant and 2010-2014 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 4.966 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. We estimate 1.869 MGD of flow for the eastern portion and 1.26 MGD for the western portion of the sewer service area. 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 2014 metered water use and estimates of sewerage flow the following average daily flows and I/I estimates can be derived:

	Water Pumpage	Sewer Flows	I/I
East of Divide	1.057 MGD	2.728 MGD	1.309 MGD
West of Divide	1.418 MGD	2.238 MGD	.917 MGD
Basin 8			.12 MGD
Total	**2.477 MGD**	**4.966 MGD**	**2.238 MGD**

These are the most current and accurate estimates of I/I available for the City of New Berlin. 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 attached. 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 them 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, as 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 2011-2014

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 and 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 - 2014
City of New Berlin, Wisconsin

Month	Cubic Feet	Monthly Total Amount of Water Purchased From The City of Milwaukee
January	101,730	76,094,040
February	88,050	65,861,400
March	99,690	74,568,120
April	97,070	72,608,360
May	98,530	73,700,440
June	104,470	78,143,560
July	107,840	80,664,320
August	98,000	73,304,000
September	110,530	82,676,440
October	98,184	73,441,632
November	88,615	66,284,020
December	115,231	86,192,788
Total Annual Pumpage	1,207,940	903,539,120

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

Note: **ALL of water used by the City of New Berlin Utility customers in 2014 was purchased from the City of Milwaukee. New Berlin wells are no longer in service**

Notified by Milwaukee water in September that their meter was inaccurate. Meter replaced.

Average: 2.475 million gallons per day
75,294,927 gallons per month

Highest Day: April 19, 2014 - 4,420,000

Lowest Day: April 12, 2014 - 2,058,000

Table 2-1

Amount of Water Sold to Each Category and Subcategory of Customer on a Quarterly Basis Within the City Limits - 2014
Annual Report of Water Use, Water Diversion and Return Flow - 2014
City of New Berlin, Wisconsin

	Major Category (Gallons Sold in Thousands)				
	Residential	Commercial	Industrial	Public	Total
1st Quarter 2014	108,391	77,045	14,142	2,355	201,933
2nd Quarter 2014	85,754	76,190	13,719	2,134	177,797
3rd Quarter 2014	131,880	90,536	17,929	3,227	243,572
4th Quarter 2014	97,898	77,682	14,494	2,838	192,912
Total	423,923	321,453	60,284	10,554	816,214

	Residential Subcategory (Gallons Sold in Thousands)		
	Great Lakes Basin	Mississippi Basin	Totals
1st Quarter 2014	73,004	35,387	108,391
2nd Quarter 2014	56,787	28,967	85,754
3rd Quarter 2014	89,448	42,432	131,880
4th Quarter 2014	65,496	32,402	97,898
Total	284,735	139,188	423,923

	Condominium and Apartment Subcategory of Commercial Category (Gallons Sold in		
	Great Lakes Basin	Mississippi Basin	Totals
1st Quarter 2014	16,225	21,478	37,703
2nd Quarter 2014	13,444	18,497	31,941
3rd Quarter 2014	17,115	24,437	41,552
4th Quarter 2014	14,218	20,337	34,555
Total	61,002	84,749	145,751

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 - 2014
Annual Report of Water Use, Water Diversion and Return Flow - 2014
City of New Berlin, Wisconsin

	Major Category Mississippi Basin (Gallons Sold in Thousands)				
	Residential	Commercial	Industrial	Public	Total
1st Quarter 2014	35,387	54,032	13,743	1,736	104,898
2nd Quarter 2014	28,967	49,716	13,875	1,661	94,219
3rd Quarter 2014	42,432	61,020	18,141	2,725	124,318
4th Quarter 2014	32,402	51,957	14,855	2,289	101,503
Total	139,188	216,725	60,614	8,411	424,938

Condominium and Apartment Subcategory of Commercial (Gallons Sold in	
	Mississippi Basin
1st Quarter 2014	21,478
2nd Quarter 2014	18,497
3rd Quarter 2014	24,437
4th Quarter 2014	20,337
Total	84,749

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 - 2014
City of New Berlin, Wisconsin

Month	Estimated Amount Diverted In Gallons
January	43,601,885
February	37,738,582
March	42,727,533
April	41,604,591
May	42,230,352
June	44,776,260
July	46,220,655
August	42,003,192
September	47,373,577
October	42,082,055
November	37,980,743
December	49,388,468
Total	517,727,893

Source: City of New Berlin Utility

Estimated use based on 57.3% Mississippi River Basin
Source: 2009 Ruekert & Mielke Diversion Report

Table 5-1

Amount of Water Pumped From Each Municipal Well Within the City Limits on a Quarterly
Annual Report of Water Use, Water Diversion and Return Flow - 2014
City of New Berlin, Wisconsin

All City of New Berlin wells were disconnected in 2009

Well Number and Name	Basin Well is located In	Status
Well no. 1 - Forest View	Great Lakes-St Lawrence	abandoned
Well no. 2 - Glen Park	Mississippi River	abandoned
Well no. 3 - Rogers Drive	Mississippi River	abandoned
Well no. 4 - Greenridge	Great Lakes-St Lawrence	Well abandoned, converted into
		Milwaukee water pumping station
Well no. 5 - Regal Main	Mississippi River	abandoned
Well no. 7 - National Avenue	Mississippi River	abandoned
Well no. 8 - Valley View East *	Great Lakes-St Lawrence	abaonded 6/4/12
Well no. 9 - Valley View West *	Great Lakes-St Lawrence	abandoned 5/3/12
Well no. 10 - Westridge *	Mississippi River	abandoned 4/26/12
Well no. 11	Great Lakes-St Lawrence	abandoned

Source: City of New Berlin Water Utility

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. All are disconnected and abandoned.

*Copy of abandonment paperwork for Wells 8-10 have been included in Appendix E

Table 6-1

Average Residential Per Capita Use
Annual Report of Water Use, Water Diversion and Return Flow - 2014
City of New Berlin, Wisconsin

		2014 Quarter (Use in Thousands)						
		1st	2nd	3rd	4th	Total	Population	Average Residential Per capita Use in Gallons per Day
Basin	Cust Class	Cons	Cons	Cons	Cons			
Great Lakes	C-CONDO/APT	16,225	13,444	17,115	14,218	61,002	3,332	
Great Lakes	R Residential	73,004	56,787	89,448	65,496	284,735	13,462	
	TOTALS					345,737	16,794	56.40
Mississippi	C-CONDO/APT	21,478	18,497	24,437	20,337	84,749	3,880	
Mississippi	R Residential	35,387	28,967	42,432	32,402	139,188	7,325	
	TOTALS					223,937	11,206	54.75
	Combined City Wide Residential Per Capita Water Use					569,674	27,999	55.74

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 ocupancy 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)

2014 **Connections**

		Q1	Q2	Q3	Q4			
Basin	Customer Class	Count	Count	Count	Count	Average	Occupancy Factor	Population
MILW	C-CONDO/APT	289	289	289	289			
MILW	R Residential	5115	5116	5121	5122	5,119	2.63	13,462
MISB	C-CONDO/APT	959	961	961	963			
MISB	R Residential	2782	2782	2788	2789	2,785	2.63	7,325

2014 **Condo/Apartment Population Calculation**

Basin		Bedroom	Units	Factor	Population	Total
MILW	Apartment	1	458	1.50	687	
MILW	Apartment	2	909	2.50	2,273	
MILW	Apartment	3	79	2.63	208	
MILW	Condo		110	1.50	165	3,332
MISB	Apartment	1	360	1.50	540	
MISB	Apartment	2	863	2.50	2,158	
MISB	Apartment	3	18	2.63	47	
MISB	Condo		757	1.50	1,136	3,880
						27,999

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 - 2014
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/II	$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
	Total		**$2,171,186**

Source: City of New Berlin Utility Department

Table 8-1

Estimates of the Monthly sewerage return Flow From Within the City
Annual Report of Water Use, Water Diversion and Return Flow - 2014
City of New Berlin, Wisconsin

Currently there is no sewer service in the southwest corner of the city that is within the approved MMSD Service area.
See Table 9-1 for sewer return flow in the approved Lake Water Service area and Expanded Lake Water Service area

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

Table 9-1

Estimates of the Monthly sewerage return Flow From Within the Approved Water Supply Service Area & approved Diversion Area
Annual Report of Water Use, Water Diversion and Return Flow - 2014
City of New Berlin, Wisconsin

Basin	Average Daily Flow (MGD)	Monthly (30-Day Flow Gallons)	Annual Flow (Gallons)
Great Lakes Basin	2.728	81,840,000	995,720,000
Mississippi River Basin	2.238	67,140,000	816,870,000
Total	4.966	148,980,000	1,812,590,000

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

Above 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 for your reference. Compared to 2013, 2014 was a much drier year which contributes to significantly lower total flows.

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 2014

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 the above time period.

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 April 2014 through November 2014.)
(New Berlin Basins 1, 4, 5, and 6) = 2.00 MGD (2.812 MGD in 2009, 2.766 in 2010, 2.430 in 2011, 2.292 in 2012, and 2.479 in 2013)

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 2014 through November 2014.)
(New Berlin Basin 9) = 0.474 MGD (0.403 MGD in 2009, 0.452 in 2010, 0.369 in 2011, 0.65 in 2012, and 0.982 in 2013)

(New Berlin Basin 2) = 0.095 MGD (0.084 MGD in 2013)

(New Berlin Basin 3, utility owned meters 2003-B and 2003-C) = 0.551 MGD (.503 in 2009)

New Berlin Meters 2007-B and 2010-A

-We installed a meter in basin 10A in 2014 to measure flows from Sections 35 and 36. This meter had been in place in prior programs.

We always had a meter at 7B (Cortez and LaSalle Drives) that gives us good data. Adding these 2 Utility meters together gives us a good approximation of what is coming from these areas
(New Berlin Basins 7 and 10) = 1.834 MGD (2.292 MGD in 2009, 2.530 in 2010, 2.083 in 2011, 1.420 in 2012 and 2.527 in 2013)

The flow from New Berlin Basin 8 (Lift Station 5 and 6 predominantly) flow unmetered through Muskego.

New Berlin Lift Station 5 = 0.005 MGD (0.012 MGD in 2009, 0.009 in 2010, 0.005 in 2011, 0.004 in 2012, and 0.005 in 2013)

New Berlin Lift Station 6 = 0.007 MGD (0.003 MGD in 2009, 0.007 in 2010, 0.007 in 2011, 0.005 in 2012, and 0.006 in 2013)

Total 2014 Average Daily Flow = 4.966 MGD → 4.966 * 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 → 6.586 * 365 = 2.404 Billion Gallons
(about a 35% increase from 2012 numbers)

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

Total 2011 Average Daily Flow = 5.397 MGD → 5.397 * 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 basin 5 and 6 are contributing.

MMSD 1, 4, 5, and 6 Meter = 2.000 MGD
New Berlin Flow Meter Basin 1 (0.498 MGD) and Basin 4 (0.193 MGD)
Resultant Basin 5 and 6 flows = 1.309 MGD

Another MMSD meter measures flows from all of New Berlin Basins 7 and 10. Assuming that half of this flow is pumped over the sub-divide line we get:

New Berlin 7B and 10A Meter = 1.834 → 1.834/2 = 0.917 MGD

Add Basin 8, and the above two together and we get our number → 0.917 + 1.309 + .0.12 = 2.238 MGD

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