City of Duluth
Water Supply Plan
Third Generation - 2016

Formerly called Water Emergency & Water Conservation Plan

WSP_Duluth_1988-2066_31DEC2016

Cover photo by Molly Shodeen

For more information on this Water Supply Plan Template, please contact the DNR Division of Ecological and Water Resources at (651) 259-5034 or (651) 259-5100.

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DEPARTMENT OF NATURAL RESOURCES – DIVISION OF ECOLOGICAL AND WATER RESOURCES AND METROPOLITAN COUNCIL

INTRODUCTION TO WATER SUPPLY PLANS (WSP)

Who needs to complete a Water Supply Plan

Public water suppliers serving more than 1,000 people, and large private water suppliers in designated Groundwater Management Areas, and all water suppliers in the Twin Cities metropolitan area, are required to prepare and submit a water supply plan.

The goal of the WSP is to help water suppliers: 1) implement long term water sustainability and conservation measures; and 2) develop critical emergency preparedness measures. Your community needs to know what measures will be implemented in case of a water crisis. A lot of emergencies can be avoided or mitigated if long term sustainability measures are implemented.

Groundwater Management Areas (GWMA)

The DNR has designated three areas of the state as Groundwater Management Areas (GWMAs) to focus groundwater management efforts in specific geographies where there is an added risk of overuse or water quality degradation. A plan directing the DNRs actions within each GWMA has been prepared. Although there are no specific additional requirements with respect to the water supply planning for communities within designated GWMAs, communities should be aware of the issues and actions planned if they are within the boundary of one of the GWMAs. The three GWMAs are the North and East Metro GWMA (Twin Cities Metro), the Bonanza Valley GWMA and the Straight River GWMA (near Park Rapids). Additional information and maps are included in the DNR webpage at http://www.dnr.state.mn.us/gwmp/areas.html

Benefits of completing a WSP

Completing a WSP using this template, fulfills a water supplier's statutory obligations under M.S. M.S.103G.291 to complete a water supply plan. For water suppliers in the metropolitan area, the WSP will help local governmental units to fulfill their requirements under M.S. 473.859 to complete a local comprehensive plan. Additional benefits of completing WSP template:

- The standardized format allows for quicker and easier review and approval
- Help water suppliers prepare for droughts and water emergencies.
- Create eligibility for funding requests to the Minnesota Department of Health (MDH) for the Drinking Water Revolving Fund.
- Allow water suppliers to submit requests for new wells or expanded capacity of existing wells.
- Simplify the development of county comprehensive water plans and watershed plans.
- Fulfill the contingency plan provisions required in the MDH wellhead protection and surface water protection plans.
- Fulfill the demand reduction requirements of Minnesota Statutes, section 103G.291 subd 3 and 4.

- Upon implementation, contribute to maintaining aquifer levels, reducing potential well interference and water use conflicts, and reducing the need to drill new wells or expand system capacity.
- Enable DNR to compile and analyze water use and conservation data to help guide decisions.
- Conserve Minnesota's water resources

If your community needs assistance completing the Water Supply Plan, assistance is available from your area hydrologist or groundwater specialist, the MN Rural Waters Association circuit rider program, or in the metropolitan area from Metropolitan Council staff. Many private consultants are also available.

WSP Approval Process

10 Basic Steps for completing a 10-Year Water Supply Plan

1. Download the DNR/Metropolitan Council Water Supply Plan Template www.mndnr.gov/watersupplyplans
2. Save the document with a file name with this naming convention: WSP_cityname_permitnumber_date.doc.
3. The template is a form that should be completed electronically.
4. Compile the required water use data (Part 1) and emergency procedures information (Part 2)
5. The Water Conservation section (Part 3) may need discussion with the water department, council, or planning commission, if your community does not already have an active water conservation program.
6. Communities in the seven-county Twin Cities metropolitan area should complete all the information discussed in Part 4. The Metropolitan Council has additional guidance information on their webpage http://www.metrocouncil.org/Handbook/Plan-Elements/Water-Resources/Water-Supply.aspx. All out-state water suppliers do *not* need to complete the content addressed in Part 4.
7. Use the Plan instructions and Checklist document to insure all data is complete and attachments are included. This will allow for a quicker approval process. www.mndnr.gov/watersupplyplans
8. Plans should be submitted electronically – no paper documents are required. https://webapps11.dnr.state.mn.us/mpars/public/authentication/login
9. DNR hydrologist will review plans (in cooperation with Metropolitan Council in Metro area) and approve the plan or make recommendations.
10. Once approved, communities should complete a Certification of Adoption form, and send a copy to the DNR.

Complete Table 1 with information about the public water supply system covered by this WSP.

Table 1. General information regarding this WSP

Requested Information	Description
DNR Water Appropriation Permit Number(s)	**1981-2066**
Ownership	**Public**
Metropolitan Council Area	**No** (St. Louis County)
Street Address	**520 Garfield Ave**
City, State, Zip	**Duluth MN 55802**
Contact Person Name	Mark Proulx
Title	Utility Operations Supervisor
Phone Number	218-730-4161 (c: 952-240-2023)
MDH Supplier Classification	**Municipal**

PART 1. WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION

The first step in any water supply analysis is to assess the current status of demand and availability. Information summarized in Part 1 can be used to develop Emergency Preparedness Procedures (Part 2) and the Water Conservation Plan (Part 3). This data is also needed to track progress for water efficiency measures.

A. Analysis of Water Demand

Complete Table 2 showing the past 10 years of water demand data.

- Some of this information may be in your Wellhead Protection Plan.
- If you do not have this information, do your best, call your engineer for assistance or if necessary leave blank.

If your customer categories are different than the ones listed in Table 2, please describe the differences below:

- We have not tracked *WATER SUPPLIER SERVICES (MG).*
- Non-essential water use (carwashes, golf course and park irrigation, fountains, etc.) is metered at the customer meter.

Table 2. Historic water demand (see definitions in the glossary after Part 4 of this template)

Year	Pop. Served	Total Connections	Residential Water Delivered (MG)	C/I/I Water Delivered (MG)	Water used for Non-essential	Wholesale Deliveries (MG)	Total Water Delivered (MG)	Total Water Pumped (MG)	Water Supplier Services	Percent Unmetered/ Unaccounted	Average Daily Demand (MGD)	Max. Daily Demand (MGD)	Date of Max. Demand	Residential Per Capita Demand (GPCD)	Total per capita Demand (GPCD)
2005	101,951	27,885	1,504.4	3,417.0		364.8	5,286.2	6,136.0		13.85%	16.81			40.4	164.9
2006	101,442	27,973	1,511.0	3,333.9		375.0	5,219.9	6,180.0		15.54%	16.93	28.0	8/3/2006	40.8	166.9
2007	101,821	28,087	1,492.3	3,171.7		916.8	5,580.8	6,328.2		11.81%	17.34	28.7	8/3/2007	40.2	170.3
2008	101,657	28,016					4,495.6	6,178.6		27.24%	16.93			0.0	166.5
2009	102,216	27,950	1,624.9	963.5		2,303.7	4,892.1	6,201.7		21.12%	16.99	22.6	7/7/2009	43.6	166.2
2010	102,831	30,317	1,499.7	1,347.5		2,130.8	4,978.1	5,783.5		13.93%	15.85	22.9	8/5/2010	40.0	154.1
2011	102,944	29,069	1,472.5	1,346.7		1,590.7	4,409.9	5,533.7		20.31%	15.16	23.0	7/17/2011	39.2	147.3
2012	102,773	28,076	1,535.1	1,318.7		1,966.5	4,820.4	5,618.0		14.20%	15.39	24.1	8/1/2012	40.9	149.8
2013	102,934	28,051	1,485.5	1,108.8		1,938.5	4,532.8	5,205.5		12.92%	14.26	25.4	4/5/2013	39.5	138.6
2014	103,293	28,075	1,422.7	1,033.9		1,964.3	4,420.9	5,204.1		15.05%	14.26	23.8	8/15/2014	37.7	138.0
2015	103,534	28,134	1,446.1	1,044.7		1,921.6	4,412.4	5,179.4		14.81%	14.19	23.9	8/4/2015	38.3	137.1
Average 2010-2015	103,052	28,620	1,476.9	1,200.1		1,918.7	4,595.7	5,420.7		15.22%	14.85	23.9		39.3	142.1

MG – Million Gallons **MGD –** Million Gallons per Day **GPCD** – Gallons per Capita per Day

- Data for 2007 & 2008 were derived from the City's Annual report information, not DNR permit submissions.

Complete Table 3 by listing the top 10 water users by volume, from largest to smallest. For each user, include information about the category of use (residential, commercial, industrial, institutional, or wholesale), the amount of water used in gallons per year, the percent of total water delivered, and the status of water conservation measures.

Table 3. Large volume users

Customer	Use Category (Residential, Industrial, Commercial, Institutional, Wholesale)	Amount Used (Gallons per Year)	Percent of Total Annual Water Delivered	Implementing Water Conservation Measures? (Yes/No/Unknown)
1 NEW PAGE SYSTEMS INC.	INDUSTRIAL	1,612,873,309	36.6%	UNKNOWN
2 CITY OF HERMANTOWN	WHOLESALE	170,344,145	3.9%	UNKNOWN
3 DULUTH STEAM	INDUSTRIAL	65,117,174	1.5%	UNKNOWN
4 PROCTOR PUBLIC UTILITIES	WHOLESALE	57,958,317	1.3%	UNKNOWN
5 TATE & LYLE	INDUSTRIAL	47,015,813	1.1%	UNKNOWN
6 SMDC/ESSENTIA HEALTH	COMMERCIAL	43,090,748	1.0%	UNKNOWN
7 WESTERN LAKE SUPERIOR SANITARY DISTRICT	INDUSTRIAL	37,935,210	0.9%	UNKNOWN
8 MILLER DWAN MEDICAL CENTER	COMMERCIAL	30,001,371	0.7%	UNKNOWN
9 US BANK	COMMERCIAL	29,471,751	0.7%	UNKNOWN
10 UMD	COMMERCIAL	23,783,564	0.5%	UNKNOWN

B. Treatment and Storage Capacity

Complete Table 4 with a description of where water is treated, the year treatment facilities were constructed, water treatment capacity, the treatment methods (i.e. chemical addition, reverse osmosis, coagulation, sedimentation, etc.) and treatment types used (i.e. fluoridation, softening, chlorination, Fe/MN removal, coagulation, etc.). Also describe the annual amount and method of disposal of treatment residuals. Add rows to the table as needed.

Table 4. Water treatment capacity and treatment processes

Treatment Site ID (Plant Name or Well ID)	Year Constructed	Treatment Capacity (GPD)	Treatment Method	Treatment Type	Annual Amount of Residuals	Disposal Process for Residuals	Do You Reclaim Filter Backwash Water?
Lakewood Water Plant	1974	32,000,000	Sedimentation & Filtration	Filtration	NA	NA Lagoons	Yes
Total	NA		NA	NA		NA	

Complete Table 5 with information about storage structures. Describe the type (i.e. elevated, ground, etc.), the storage capacity of each type of structure, the year each structure was constructed, and the primary material for each structure. Add rows to the table as needed.

Table 5. Storage capacity, as of the end of the last calendar year

Structure Name	Type of Storage Structure	Year Constructed	Primary Material	Storage Capacity (Gallons)
LAKESIDE TANK	Ground Storage	1961	Steel	100,000
34TH AVE EAST "RESERVOIR A"	Ground Storage	1898/1938	Concrete	16,320,000
ENDION RESERVOIR	Ground Storage	1922/1966/1988	Concrete	14,140,000
WEST END RESERVOIRS #1-6	Ground Storage	1953	Concrete	10,200,000
WEST DULUTH RESERVOIR	Ground Storage	1906/1925/2014	Concrete	10,000,000
MIDDLE SYSTEM RESERVOIR #1	Ground Storage	1913/1928/1988	Concrete	5,171,000
MIDDLE SYSTEM RESERVOIR #2	Ground Storage	1951	Concrete	5,131,000
WOODLAND RESERVOIR #1	Ground Storage	1915/1939/2002	Concrete	1,021,000
WOODLAND RESERVOIR #2	Ground Storage	1950/2000/2002	Concrete	2,015,000
ARLINGTON RESERVOIR #1	Ground Storage	1925	Concrete	240,490
ARLINGTON RESERVOIR #2	Ground Storage	1950	Concrete	1,534,000
ORPHANAGE TANK #1	Elevated Tower	1994	Steel	400,000
HIGHLAND WATER TOWER	Elevated Tower	2011	Steel	1,000,000
BAYVIEW HEIGHTS STEEL TANK	Ground Storage	1972	Steel	100,000
PROCTOR TANK	Elevated Tower	1989	Steel	400,000

Treatment and storage capacity versus demand

It is recommended that total storage equal or exceed the average daily demand.

Discuss the difference between current storage and treatment capacity versus the water supplier's projected average water demand over the next 10 years (see Table 7 for projected water demand):

Minimal growth is projected and the system capacity is more than twice the projected maximum daily demand.

C. Water Sources

Complete Table 6 by listing all types of water sources that supply water to the system, including groundwater, surface water, interconnections with other water suppliers, or others. Provide the name

of each source (aquifer name, river or lake name, name of interconnecting water supplier) and the Minnesota unique well number or intake ID, as appropriate. Report the year the source was installed or established and the current capacity. Provide information about the depth of all wells. Describe the status of the source (active, inactive, emergency only, retail/wholesale interconnection) and if the source facilities have a dedicated emergency power source. Add rows to the table as needed for each installation.

Include copies of well records and maintenance summary for each well that has occurred since your last approved plan in **Appendix 1.**

Table 6. Water sources and status

Resource Type (Groundwater, Surface water, Interconnection)	Resource Name	MN Unique Well # or Intake ID	Year Installed	Capacity (Gallons per Minute)	Well Depth (Feet)	Status of Normal and Emergency Operations (active, inactive, emergency only, retail/wholesale interconnection))	Does this Source have a Dedicated Emergency Power Source? (Yes or No)
Surface Water	Lake Superior	160000100	1898	22,222	72	Normal Active	Dual Power Sources

Limits on Emergency Interconnections

Discuss any limitations on the use of the water sources (e.g. not to be operated simultaneously, limitations due to blending, aquifer recovery issues etc.) and the use of interconnections, including capacity limits or timing constraints (i.e. only 200 gallons per minute are available from the City of Prior Lake, and it is estimated to take 6 hours to establish the emergency connection). If there are no limitations, list none.

Duluth has no interconnection from any other system.

D. Future Demand Projections – *Key Metropolitan Council Benchmark*

Water Use Trends

Use the data in Table 2 to describe trends in 1) population served; 2) total per capita water demand; 3) average daily demand; 4) maximum daily demand. Then explain the causes for upward or downward trends. For example, over the ten years has the average daily demand trended up or down? Why is this occurring?

Population growth was minimal at about 1%. Per capita water demand has held steady at around 40 gpcd. Average daily demand and maximum daily demand are reducing presumably from a tighter distribution system.

Use the water use trend information discussed above to complete Table 7 with projected annual demand for the next ten years. Communities in the seven-county Twin Cities metropolitan area must also include projections for 2030 and 2040 as part of their local comprehensive planning.

Projected demand should be consistent with trends evident in the historical data in Table 2, as discussed above. Projected demand should also reflect state demographer population projections and/or other planning projections.

Table 7. Projected annual water demand

Year	Projected Total Population (St Louis County per State Demographers Office)	Projected Population Served	Projected Total Per Capita Water Demand (GPCD)	Projected Average Daily Demand (MGD)	Projected Maximum Daily Demand (MGD)
2016	200,217	103,365	137.20	14.18	23.31
2017		103,438	137.29	14.20	23.33
2018		103,510	137.39	14.22	23.35
2019		103,583	137.48	14.24	23.37
2020	200,794	103,655	137.58	14.26	23.39
2021		103,728	137.68	14.28	23.41
2022		103,800	137.77	14.30	23.43
2023		103,873	137.87	14.32	23.45
2024		103,946	137.97	14.34	23.47
2025	201,472	104,018	138.06	14.36	23.49

GPCD – Gallons per Capita per Day **MGD** – Million Gallons per Day

Projection Method

Describe the method used to project water demand, including assumptions for population and business growth and how water conservation and efficiency programs affect projected water demand:

The actual 2015 data was used as the baseline for all calculations. State demographer's projection at 5 year increments was +0.35% for St. Louis County, MN for the decade between 2015-2025.
The *Projected Total Population* was taken direct from the state demographer's projections for St. Louis County, and the *Projected Population Served* was calculated with growth of 0.0007% per year for a total growth of 0.35%. *Projected Total Per Capita Water Demand* was calculated as a function of population growth at 0.0007% per year as well.
Projected Average Daily Demand was calculated by *Projected Population Served* multiplied by *Projected Per Capita Water Demand*.
Projected Maximum Daily Demand was calculated as the *Projected Daily Average* plus the average difference of *Projected Average Daily Demand* and the *Maximum Daily Demand* for the previous 10 years (2005-2015).

E. Resource Sustainability

Monitoring – *Key DNR Benchmark*

Complete Table 8 by inserting information about source water quality monitoring efforts. The list should include all production wells, observation wells, and source water intakes or reservoirs. Additional information on groundwater level monitoring program at: http://www.dnr.state.mn.us/waters/groundwater_section/obwell/index.html Add rows to the table as needed.

Table 8. Information about source water quality monitoring

MN Unique Well # or Surface Water ID	Type of monitoring point	Monitoring program	Frequency of monitoring	Monitoring Method
16000100 LAKE SUPERIOR	☐ production well ☐ observation well ☒ source water intake ☐ source water reservoir	☒Routine MDH sampling ☒Routine water utility sampling ☐ other	☒continuous ☒hourly ☒ daily ☒ monthly ☒quarterly ☐annually	☒SCADA ☒ grab sampling ☐ steel tape ☐ stream gauge

Water Level Data

A water level monitoring plan that includes monitoring locations and a schedule for water level readings must be submitted as **Appendix 2**. If one does not already exist, it needs to be prepared and submitted with the WSP. Ideally, all production and observation wells are monitored at least monthly.

Complete Table 9 to summarize water level data for each well being monitored. Provide the name of the aquifer and a brief description of how much water levels vary over the season (the difference between the highest and lowest water levels measured during the year) and the long-term trends for each well. If water levels are not measured and recorded on a routine basis, then provide the static water level when each well was constructed and the most recent water level measured during the same season the well was constructed. Also include all water level data taken during any well and pump maintenance. Add rows to the table as needed.

Provide water level data graphs for each well in **Appendix 3** for the life of the well, or for as many years as water levels have been measured. See DNR website for Date Time Water Level http://www.dnr.state.mn.us/waters/groundwater_section/obwell/waterleveldata.html

Table 9. Water level data

Unique Well Number or Well ID	Aquifer Name	Seasonal Variation (Feet)	Long-term Trend in water level data	Water level measured during well/pumping maintenance
			☐ Falling	MM/DD/YY:____
				:____
				:____
				:____
				:____
				:____
				:____
				:____
				:____
				:____
				:____
			☐ Rising	MM/DD/YY:____

The City of Duluth's Water Treatment Plant does not monitor water level data for Lake Superior. That data is available at NOAA. Station 9099064, Duluth MN is used from the website:

http://tidesandcurrents.noaa.gov/

NOAA data for 2006-2015 Levels of Lake Superior is attached in Appendix 2 & 3

Potential Water Supply Issues & Natural Resource Impacts – *Key DNR & Metropolitan Council Benchmark*

Complete Table 10 by listing the types of natural resources that are or could be impacted by permitted water withdrawals. If known, provide the name of specific resources that may be impacted. Identify what the greatest risks to the resource are and how the risks are being assessed. Identify any resource protection thresholds – formal or informal – that have been established to identify when actions should be taken to mitigate impacts. Provide information about the potential mitigation actions that may be taken, if a resource protection threshold is crossed. Add additional rows to the table as needed. See the glossary at the end of the template for definitions.

Some of this baseline data should have been in your earlier water supply plans or county comprehensive water plans. When filling out this table, think of what are the water supply risks, identify the resources, determine the threshold and then determine what your community will do to mitigate the impacts.

Your DNR area hydrologist is available to assist with this table.

For communities in the seven-county Twin Cities metropolitan area, the *Master Water Supply Plan Appendix 1 (Water Supply Profiles*, provides information about potential water supply issues and natural resource impacts for your community.

Table 10. Natural resource impacts

Resource Type	Resource Name	Risk	Risk Assessed Through	Describe Resource Protection Threshold*	Mitigation Measure or Management Plan	Describe How Changes to Thresholds are Monitored
☐ River or stream		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	
☐ Calcareous fen		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	
☒ Lake	Lake Superior	☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ GIS analysis ☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___	The volume of Lake Superior will be unaffected by City of Duluth water usage	☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	The City of Duluth is constantly seeking ways to increase water conservation and reduce usage through partnerships with community agencies. (CSK)
☐ Wetland		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	
☐ Trout Stream		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	
☐ Aquifer		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	

Resource Type	Resource Name	Risk	Risk Assessed Through	Describe Resource Protection Threshold*	Mitigation Measure or Management Plan	Describe How Changes to Thresholds are Monitored
☐ Endangered, threatened, or special concern species habitat, other Natural resource impacts						

* Examples of thresholds: a lower limit on acceptable flow in a river or stream; water quality outside of an accepted range; a lower limit on acceptable aquifer level decline at one or more monitoring wells; withdrawals that exceed some percent of the total amount available from a source; or a lower limit on acceptable changes to a protected habitat.

Wellhead Protection (WHP) and Source Water Protection (SWP) Plans

Complete Table 11 to provide status information about WHP and SWP plans.

The emergency procedures in this plan are intended to comply with the contingency plan provisions required in the Minnesota Department of Health's (MDH) Wellhead Protection (WHP) Plan and Surface Water Protection (SWP) Plan.

Table 11. Status of Wellhead Protection and Source Water Protection Plans

Plan Type	Status	Date Adopted	Date for Update
WHP	☐ In Process ☐Completed ☒ Not Applicable		
SWP	☒ In Process ☐ Completed ☐ Not Applicable		

WHP – Wellhead Protection Plan **SWP** – Source Water Protection Plan

*The City has a comprehensive Stormwater Pollution Prevention Program in place

F. Capital Improvement Plan (CIP)

Please note that any wells that received approval under a ten-year permit, but that were not built, are now expired and must submit a water appropriations permit.

Adequacy of Water Supply System

Complete Table 12 with information about the adequacy of wells and/or intakes, storage facilities, treatment facilities, and distribution systems to sustain current and projected demands. List planned capital improvements for any system components, in chronological order. Communities in the seven-county Twin Cities metropolitan area should also include information about plans through 2040.

The assessment can be the general status by category; it is not necessary to identify every single well, storage facility, treatment facility, lift station, and mile of pipe.

Please attach your latest Capital Improvement Plan as **Appendix 4**.

Table 12. Adequacy of Water Supply System

System Component	Planned action	Anticipated Construction Year	Notes
Wells/Intakes	☐ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		
Water Storage Facilities	☐ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		
Water Treatment Facilities Replenish filter media	☐ No action planned - adequate ☒ Repair/replacement ☐ Expansion/addition	2017	
Distribution Systems (pipes, valves, etc.)	☐ No action planned - adequate ☒ Repair/replacement ☐ Expansion/addition	ongoing	The City is allocating approximately $1 Million for pipe replacement per year. (2017-2021)
Pressure Zones	☐ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		
Other: Transmission main survey	☐ No action planned - adequate ☒ Repair/replacement Survey ☐ Expansion/addition	2018	

Proposed Future Water Sources

Complete Table 13 to identify new water source installation planned over the next ten years. Add rows to the table as needed.

Table 13. Proposed future installations/sources

Source	Installation Location (approximate)	Resource Name	Proposed Pumping Capacity (gpm)	Planned Installation Year	Planned Partnerships
Groundwater					
Surface Water					
Interconnection to another supplier					

None

Water Source Alternatives - *Key Metropolitan Council Benchmark*

Do you anticipate the need for alternative water sources in the next 10 years? __ Yes _x_ No

For metro communities, will you need alternative water sources by the year 2040? __ Yes __ No

If you answered yes for either question, then complete table 14. If no, insert NA.

Complete Table 14 by checking the box next to alternative approaches that your community is considering, including approximate locations (if known), the estimated amount of future demand that could be met through the approach, the estimated timeframe to implement the approach, potential partnerships, and the major benefits and challenges of the approach. Add rows to the table as needed.

For communities in the seven-county Twin Cities metropolitan area, these alternatives should include approaches the community is considering to meet projected 2040 water demand.

Table 14. Alternative water sources

Alternative Source Considered	Source and/or Installation Location (approximate)	Estimated Amount of Future Demand (%)	Timeframe to Implement (YYYY)	Potential Partners	Benefits	Challenges
☐ Groundwater						
☐ Surface Water						
☐ Reclaimed Stormwater						
☐ Reclaimed Wastewater						
☐ Interconnection to another supplier						

Not Applicable

Part 2. Emergency Preparedness Procedures

The emergency preparedness procedures outlined in this plan are intended to comply with the contingency plan provisions required by MDH in the WHP and SWP. Water emergencies can occur as a result of vandalism, sabotage, accidental contamination, mechanical problems, power failings, drought, flooding, and other natural disasters. The purpose of emergency planning is to develop emergency response procedures and to identify actions needed to improve emergency preparedness. In the case of a municipality, these procedures should be in support of, and part of, an all-hazard emergency operations plan. Municipalities that already have written procedures dealing with water emergencies should review the following information and update existing procedures to address these water supply protection measures.

A. Federal Emergency Response Plan

Section 1433(b) of the Safe Drinking Water Act, (Public Law 107-188, Title IV- Drinking Water Security and Safety) requires community water suppliers serving over 3,300 people to prepare an Emergency Response Plan.

Do you have a federal emergency response plan? ☒ Yes ☐ No

If yes, what was the date it was certified? _01 DECEMBER 2015_

Complete Table 15 by inserting the noted information regarding your completed Federal Emergency Response Plan.

Table 15. Emergency Preparedness Plan contact information

Emergency Response Plan Role	Contact Person	Contact Phone Number	Contact Email
Emergency Response Lead	HOWARD JACOBSON	218-730-4061	HJACOBSON@DULUTHMN.GOV
Alternate Emergency Response Lead	ERIC SHAFFER	218-730-5072	ESHAFFER@DULUTHMN.GOV

B. Operational Contingency Plan

All utilities should have a written operational contingency plan that describes measures to be taken for water supply mainline breaks and other common system failures as well as routine maintenance.

Do you have a written operational contingency plan? ☒ Yes ☐ No

At a minimum, a water supplier should prepare and maintain an emergency contact list of contractors and suppliers.

C. Emergency Response Procedures

Water suppliers must meet the requirements of MN Rules 4720.5280 . Accordingly, the Minnesota Department of Natural Resources (DNR) requires public water suppliers serving more than 1,000 people to submit Emergency and Conservation Plans. Water emergency and conservation plans that have been

approved by the DNR, under provisions of Minnesota Statute 186 and Minnesota Rules, part 6115.0770, will be considered equivalent to an approved WHP contingency plan.

Emergency Telephone List

Prepare and attach a list of emergency contacts, including the MN Duty Officer (1-800-422-0798), as **Appendix 5**. A template is available at www.mndnr.gov/watersupplyplans

The list should include key utility and community personnel, contacts in adjacent water suppliers, and appropriate local, state and federal emergency contacts. Please be sure to verify and update the contacts on the emergency telephone list and date it. Thereafter, update on a regular basis (once a year is recommended). In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the Emergency Manager for that community. Responsibilities and services for each contact should be defined.

Current Water Sources and Service Area

Quick access to concise and detailed information on water sources, water treatment, and the distribution system may be needed in an emergency. System operation and maintenance records should be maintained in secured central and back-up locations so that the records are accessible for emergency purposes. A detailed map of the system showing the treatment plants, water sources, storage facilities, supply lines, interconnections, and other information that would be useful in an emergency should also be readily available. It is critical that public water supplier representatives and emergency response personnel communicate about the response procedures and be able to easily obtain this kind of information both in electronic and hard copy formats (in case of a power outage).

Do records and maps exist? ☒ Yes ☐ No

Can staff access records and maps from a central secured location in the event of an emergency?

☒ Yes ☐ No

Does the appropriate staff know where the materials are located?

☒ Yes ☐ No

Procedure for Augmenting Water Supplies

Complete Tables 16 – 17 by listing all available sources of water that can be used to augment or replace existing sources in an emergency. Add rows to the tables as needed.

In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the warning point for that community. Municipalities are encouraged to execute cooperative agreements for potential emergency water services and copies should be included in **Appendix 6**. Outstate Communities may consider using nearby high capacity wells (industry, golf course) as emergency water sources.

WSP should include information on any physical or chemical problems that may limit interconnections to other sources of water. Approvals from the MDH are required for interconnections or the reuse of water.

Table 16. Interconnections with other water supply systems to supply water in an emergency

Other Water Supply System Owner	Capacity (GPM & MGD)	Note Any Limitations On Use	List of services, equipment, supplies available to respond

No interconnections

GPM – Gallons per minute MGD – million gallons per day

Table 17. Utilizing surface water as an alternative source

Surface Water Source Name	Capacity (GPM)	Capacity (MGD)	Treatment Needs	Note Any Limitations On Use

Not Applicable

If not covered above, describe additional emergency measures for providing water (obtaining bottled water, or steps to obtain National Guard services, etc.)

In the event of an extreme water emergency, the City of Duluth Fire Department could pump water from the lake to the Treatment Plant clear well. Additionally, each pump station is equipped with fire truck pumper fittings which allow emergency pumping in the event of a total pump station failure.

Allocation and Demand Reduction Procedures

Complete Table 18 by adding information about how decisions will be made to allocate water and reduce demand during an emergency. Provide information for each customer category, including its priority ranking, average day demand, and demand reduction potential for each customer category. Modify the customer categories as needed, and add additional lines if necessary.

Water use categories should be prioritized in a way that is consistent with Minnesota Statutes 103G.261 (#1 is highest priority) as follows:

1. Water use for human needs such as cooking, cleaning, drinking, washing and waste disposal; use for on-farm livestock watering; and use for power production that meets contingency requirements.
2. Water use involving consumption of less than 10,000 gallons per day (usually from private wells or surface water intakes)

3. Water use for agricultural irrigation and processing of agricultural products involving consumption of more than 10,000 gallons per day (usually from private high-capacity wells or surface water intakes)
4. Water use for power production above the use provided for in the contingency plan.
5. All other water use involving consumption of more than 10,000 gallons per day.
6. Nonessential uses – car washes, golf courses, etc.

Water used for human needs at hospitals, nursing homes and similar types of facilities should be designated as a high priority to be maintained in an emergency. Lower priority uses will need to address water used for human needs at other types of facilities such as hotels, office buildings, and manufacturing plants. The volume of water and other types of water uses at these facilities must be carefully considered. After reviewing the data, common sense should dictate local allocation priorities to protect domestic requirements over certain types of economic needs. Water use for lawn sprinkling, vehicle washing, golf courses, and recreation are legislatively considered non-essential.

Table 18. Water use priorities

Customer Category	Allocation Priority	Average Daily Demand (GDP) 2015-2012 (DNR Annual Report)	Short-Term Emergency Demand Reduction Potential (GPD)**
Residential	1	4,033,827.43	1,085,819.63
Institutional	2	2,695,286.53	723,769.50
Commercial	2		
Industrial	5	391,194.27	104,888.15
Irrigation	6	N/A	N/A
Wholesale	4	5,336,242.76	1,437,538.84
Non-Essential	7	N/A	N/A
TOTAL	NA	NA	3,352,016.12

GPD – Gallons per Day

**S-T Emergency Demand Reduction Calculation: (August Demand minus January Demand, divided by 31 days)

Tip: Calculating Emergency Demand Reduction Potential

The emergency demand reduction potential for all uses will typically equal the difference between maximum use (summer demand) and base use (winter demand). In extreme emergency situations, lower priority water uses must be restricted or eliminated to protect priority domestic water requirements. Emergency demand reduction potential should be based on average day demands for customer categories within each priority class. Use the tables in Part 3 on water conservation to help you determine strategies.

Complete Table 19 by selecting the triggers and actions during water supply disruption conditions.

Table 19. Emergency demand reduction conditions, triggers and actions (Select all that may apply and describe)

Emergency Triggers	Short-term Actions	Long-term Actions
☒Contamination ☒Loss of production ☒Infrastructure failure ☒Executive order by Governor ☐ Other: _____	☐ Supply augmentation through ____ ☐ Adopt (if not already) and enforce a critical water deficiency ordinance to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☐ Water allocation through____ ☒Meet with large water users to discuss their contingency plan.	☐ Supply augmentation through ____ ☐ Adopt (if not already) and enforce a critical water deficiency ordinance to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☐ Water allocation through____ ☒Meet with large water users to discuss their contingency plan.

Notification Procedures

Complete Table 20 by selecting trigger for informing customers regarding conservation requests, water use restrictions, and suspensions; notification frequencies; and partners that may assist in the notification process. Add rows to the table as needed.

Table 20. Plan to inform customers regarding conservation requests, water use restrictions, and suspensions

Notification Trigger(s)	Methods (select all that apply)	Update Frequency	Partners
☒Short-term demand reduction declared (< 1 year)	☒Website ☒Email list serve ☒Social media (e.g. Twitter, Facebook) ☐ Direct customer mailing, ☒Press release (TV, radio, newspaper), ☒Meeting with large water users (> 10% of total city use) ☐ Other: _____	☒Daily ☐ Weekly ☐ Monthly ☐ Annually	
☒Long-term Ongoing demand reduction declared	☒Website ☒Email list serve ☒Social media (e.g. Twitter, Facebook) ☒Direct customer mailing, ☒Press release (TV, radio, newspaper), ☒Meeting with large water users (> 10% of total city use) ☐ Other: _____	☐ Daily ☒Weekly ☒Monthly ☐ Annually	
☒Governor's Critical water deficiency declared	☒Website ☒Email list serve ☒Social media (e.g. Twitter, Facebook) ☐ Direct customer mailing,	☒Daily ☐ Weekly ☐ Monthly ☐ Annually	

Notification Trigger(s)	Methods (select all that apply)	Update Frequency	Partners
	☒Press release (TV, radio, newspaper), ☒Meeting with large water users (> 10% of total city use) ☐ Other: _____		

Enforcement

Prior to a water emergency, municipal water suppliers must adopt regulations that restrict water use and outline the enforcement response plan. The enforcement response plan must outline how conditions will be monitored to know when enforcement actions are triggered, what enforcement tools will be used, who will be responsible for enforcement, and what timelines for corrective actions will be expected.

Affected operations, communications, and enforcement staff must then be trained to rapidly implement those provisions during emergency conditions.

Important Note: Disregard of critical water deficiency orders, even though total appropriation remains less than permitted, is adequate grounds for immediate modification of a public water supply authority's water use permit (2013 MN Statutes 103G.291)

Does the city have a critical water deficiency restriction/official control in place that includes provisions to restrict water use and enforce the restrictions? (This restriction may be an ordinance, rule, regulation, policy under a council directive, or other official control) ☒Yes ☐ No Duluth, MN-Legislative Code / Chapter 48 – Water and Gas (Sec. 48.2)

If yes, attach the official control document to this WSP as **Appendix 7**.

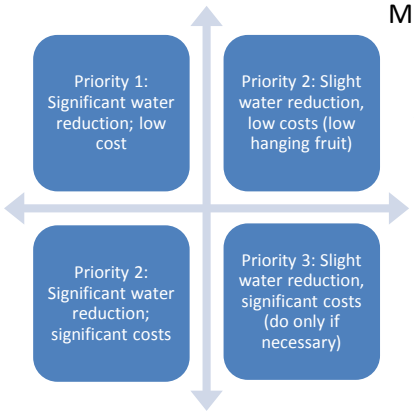
If no, the municipality must adopt such an official control within 6 months of submitting this WSP and submit it to the DNR as an amendment to this WSP.

Irrespective of whether a critical water deficiency control is in place, does the public water supply utility, city manager, mayor, or emergency manager have standing authority to implement water restrictions? ☒ Yes ☐ No

If yes, cite the regulatory authority reference: Director of Public Works & Utilities, Mayor.

If no, who has authority to implement water use restrictions in an emergency?

PART 3. WATER CONSERVATION PLAN



Minnesotans have historically benefited from the state's abundant water supplies, reducing the need for conservation. There are however, limits to the available supplies of water and increasing threats to the quality of our drinking water. Causes of water supply limitation may include: population increases, economic trends, uneven statewide availability of groundwater, climatic changes, and degraded water quality. Examples of threats to drinking water quality include: the presence of contaminant plumes from past land use activities, exceedances of water quality standards from natural and human sources, contaminants of emerging concern, and increasing pollutant trends from nonpoint sources.

There are many incentives for conserving water; conservation:

- reduces the potential for pumping-induced transfer of contaminants into the deeper aquifers, which can add treatment costs
- reduces the need for capital projects to expand system capacity
- reduces the likelihood of water use conflicts, like well interference, aquatic habitat loss, and declining lake levels
- conserves energy, because less energy is needed to extract, treat and distribute water (and less energy production also conserves water since water is use to produce energy)
- maintains water supplies that can then be available during times of drought

It is therefore imperative that water suppliers implement water conservation plans. The first step in water conservation is identifying opportunities for behavioral or engineering changes that could be made to reduce water use by conducting a thorough analysis of:

- Water use by customer
- Extraction, treatment, distribution and irrigation system efficiencies
- Industrial processing system efficiencies
- Regulatory and barriers to conservation
- Cultural barriers to conservation
- Water reuse opportunities

Once accurate data is compiled, water suppliers can set achievable goals for reducing water use. A successful water conservation plan follows a logical sequence of events. The plan should address both conservation on the supply side (leak detection and repairs, metering), as well as on the demand side (reductions in usage). Implementation should be conducted in phases, starting with the most obvious and lowest-cost options. In some cases one of the early steps will be reviewing regulatory constraints to water conservation, such as lawn irrigation requirements. Outside funding and grants may be available for implementation of projects. Engage water system operators and maintenance staff and customers in brainstorming opportunities to reduce water use. Ask the question: "How can I help save water?"

Progress since 2006

Is this your community's first Water Supply Plan? ☐ Yes ☒ No

If yes, describe conservation practices that you are already implementing, such as: pricing, system improvements, education, regulation, appliance retrofitting, enforcement, etc.

If no, complete Table 21 to summarize conservation actions taken since the adoption of the 2006 water supply plan.

Table 21. Implementation of previous ten-year Conservation Plan

2006 Plan Commitments	Action Taken?
Change Water Rates Structure to provide conservation pricing	☒ Yes ☐ No
Water Supply System Improvements (e.g. leak repairs, valve replacements, etc.)	☒Yes ☐ No
Educational Efforts	☒ Yes ☐ No
New water conservation ordinances	☐ Yes ☒ No
Rebate or retrofitting Program (e.g. for toilet, faucets, appliances, showerheads, dish washers, washing machines, irrigation systems, rain barrels, water softeners, etc.	☒ Yes ☐ No
Enforcement	☐ Yes ☒ No
Describe Other	☐ Yes ☐ No

What are the results you have seen from the actions in Table 21 and how were results measured?

The new uniform water rate structure took effect January 1, 2013. No evaluation has been done to determine its effect on water consumption. Educational efforts at public events remind and inform customers how to conserve water. During conservation assessments in 2015, 91 low flow shower heads, 112 bath faucet aerators, and 63 kitchen aerators were installed in customer homes. Approximately energy conservation kits were distributed to low income customers at the Duluth Energy Awareness Expo in 2015. The kits included a low flow showerhead and bathroom faucet aerators.

A. Triggers for Allocation and Demand Reduction Actions

Complete table 22 by checking each trigger below, as appropriate, and the actions to be taken at various levels or stages of severity. Add in additional rows to the table as needed.

Table 22. Short and long-term demand reduction conditions, triggers and actions

Objective	Triggers	Actions
Protect Surface Water Flows	☐ Low stream flow conditions ☐ Reports of declining wetland and lake levels ☐ Other: _____	☐ Increase promotion of conservation measures ☐ Other: _____
Short-term demand reduction (less than 1 year	☐ Extremely high seasonal water demand (more than double winter demand) ☒Loss of treatment capacity ☒Lack of water in storage ☐ State drought plan ☐ Well interference ☐ Other: _____	☐ Adopt (if not already) and enforce the critical water deficiency ordinance to restrict or prohibit lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☐ Supply augmentation through ____ ☐ Water allocation through____ ☒Meet with large water users to discuss user's contingency plan.
Long-term demand reduction (>1 year)	☐ Per capita demand increasing ☐ Total demand increase (higher population or more industry) Water level in well(s) below elevation of _____ ☐ Other: _____	☐ Develop a critical water deficiency ordinance that is or can be quickly adopted to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☐ Enact a water waste ordinance that targets overwatering (causing water to flow off the landscape into streets, parking lots, or similar), watering impervious surfaces (streets, driveways or other hardscape areas), and negligence of known leaks, breaks, or malfunctions. ☐ Meet with large water users to discuss user's contingency plan. ☐ Enhanced monitoring and reporting: audits, meters, billing, etc.
Governor's "Critical Water Deficiency Order" declared	☒Describe: Any Official Declaration	☒Describe: Follow the guidelines of the Declaration as needed.

B. Conservation Objectives and Strategies – *Key benchmark for DNR*

This section establishes water conservation objectives and strategies for eight major areas of water use.

Objective 1: Reduce Unaccounted (Non-Revenue) Water loss to Less than 10%

The Minnesota Rural Waters Association, the Metropolitan Council and the Department of Natural Resources recommend that all water uses be metered. Metering can help identify high use locations and times, along with leaks within buildings that have multiple meters.

It is difficult to quantify specific unmetered water use such as that associated with firefighting and system flushing or system leaks. Typically, water suppliers subtract metered water use from total water pumped to calculate unaccounted or non-revenue water loss.

Is your ten-year average (2005-2014) unaccounted Water Use in Table 2 higher than 10%?

☒ Yes ☐ No

What is your leak detection monitoring schedule? (e.g. monitor 1/3rd of the city lines per year)

Monitored on an as needed basis.

Water Audits - are intended to identify, quantify and verify water and revenue losses. The volume of unaccounted-for water should be evaluated each billing cycle. The American Water Works Association (AWWA) recommends that ten percent or less of pumped water is unaccounted-for water. Water audit procedures are available from the AWWA and MN Rural Water Association www.mrwa.com . Drinking Water Revolving Loan Funds are available for purchase of new meters when new plants are built.

What is the date of your most recent water audit? Unknown

Frequency of water audits: ☐ **yearly** ☐ **other (specify frequency) _____**
Leak detection and survey: ☐ **every year** ☐ **every other year** ☒**periodic as needed**
Year last leak detection survey completed: _____

If Table 2 shows annual water losses over 10% or an increasing trend over time, describe what actions will be taken to reach the <10% loss objective and within what timeframe

We are making our distribution system tighter, and we are now accounting for unallocated water, such as on main breaks, fire suppression, community parks, etc.

Metering -AWWA recommends that every water supplier install meters to account for all water taken into its system, along with all water distributed from its system at each customer's point of service. An effective metering program relies upon periodic performance testing, repair, maintenance or replacement of all meters. AWWA also recommends that water suppliers conduct regular water audits to ensure accountability. Some cities install separate meters for interior and exterior water use, but some research suggests that this may not result in water conservation.

Complete Table 23 by adding the requested information regarding the number, types, testing and maintenance of customer meters.

Table 23. Information about customer meters

Customer Category	Number of Customers	Number of Metered Connections	Number of Automated Meter Readers	Meter testing intervals (years)	Average age/meter replacement schedule (years
Residential	26,134	26,134	26,134	20 years	20 / 20
~~Irrigation meters~~	N/A	N/A	N/A	N/A	N/A
Institutional		1,984			20 / 20
Commercial					
Industrial		14			20 / 20

Customer Category	Number of Customers	Number of Metered Connections	Number of Automated Meter Readers	Meter testing intervals (years)	Average age/meter replacement schedule (years
Public Facilities	N/A	N/A	N/A	N/A	N/A
Other: Wholesale		6			20 / 20
TOTALS	28,138	28,138	28,138	N/A	N/A

For unmetered systems, describe any plans to install meters or replace current meters with advanced technology meters. Provide an estimate of the cost to implement the plan and the projected water savings from implementing the plan.

N/A

Table 24. Water source meters

	Number of Meters	Meter testing schedule (years)	Number of Automated Meter Readers	Average age/meter replacement schedule (years
Water Source (wells/intakes)	2	As needed		___ / ___
Treatment Plant	2	As needed		4 yrs / as needed

Objective 2: Achieve Less than 75 Residential Gallons per Capita Demand (GPCD)

The 2002 average residential per capita demand in the Twin Cities Metropolitan area was 75 gallons per capita per day.

Is your average 2010-2015 residential per capita water demand in Table 2 more than 75? ☐ Yes ☒ No

What was your 2005 – 2014 ten-year average residential per capita water demand? 40.1 g/person/day

Describe the water use trend over that timeframe:

The per capita water demand has had a minute downturn over the last ten-year period, but has been fairly steady at 40 gpcd, which is well under the objective goal of 75 gpcd.

Complete Table 25 by checking which strategies you will use to continue reducing residential per capita demand and project a likely timeframe for completing each checked strategy (Select all that apply and add rows for additional strategies):

Table 25. Strategies and timeframe to reduce residential per capita demand Not Applicable-already declining.

Strategy to reduce residential per capita demand	Timeframe for completing work
☐ Revise city ordinances/codes to encourage or require water efficient landscaping.	
☐ Revise city ordinance/codes to permit water reuse options, especially for non-potable purposes like irrigation, groundwater recharge, and industrial use.	

Strategy to reduce residential per capita demand	Timeframe for completing work
Check with plumbing authority to see if internal buildings reuse is permitted	
☐ Revise ordinances to limit irrigation. Describe the restricted irrigation plan:	
☐ Revise outdoor irrigation installations codes to require high efficiency systems (e.g. those with soil moisture sensors or programmable watering areas) in new installations or system replacements.	
☐ Make water system infrastructure improvements	
☐ Offer free or reduced cost water use audits) for residential customers.	
☐ Implement a notification system to inform customers when water availability conditions change.	
☐ Provide rebates or incentives for installing water efficient appliances and/or fixtures indoors (e.g., low flow toilets, high efficiency dish washers and washing machines, showerhead and faucet aerators, water softeners, etc.)	
☐ Provide rebates or incentives to reduce outdoor water use (e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.)	
☐ Identify supplemental Water Resources	
☐ Conduct audience-appropriate water conservation education and outreach.	
☐ Describe other plans	

Objective 3: Achieve at least a 1.5% per year water reduction for Institutional, Industrial, Commercial, and Agricultural GPCD over the next 10 years or a 15% reduction in ten years.

Complete Table 26 by checking which strategies you will used to continue reducing non-residential customer use demand and project a likely timeframe for completing each checked strategy (add rows for additional strategies).

Where possible, substitute recycled water used in one process for reuse in another. (For example, spent rinse water can often be reused in a cooling tower.) Keep in mind the true cost of water is the amount on the water bill PLUS the expenses to heat, cool, treat, pump, and dispose of/discharge the water. Don't just calculate the initial investment. Many conservation retrofits that appear to be prohibitively expensive are actually very cost-effective when amortized over the life of the equipment. Often reducing water use also saves electrical and other utility costs. Note: as of 2015, water reuse, and is not allowed by the state plumbing code, M.R. 4715 (a variance is needed). However, several state agencies are addressing this issue.

Table 26. Strategies and timeframe to reduce institutional, commercial industrial, and agricultural and non-revenue use demand

Strategy to reduce total business, industry, agricultural demand	Timeframe for completing work
☐ Conduct a facility water use audit for both indoor and outdoor use, including system components	
☐ Install enhanced meters capable of automated readings to detect spikes in consumption	
☐ Compare facility water use to related industry benchmarks, if available (e.g., meat processing, dairy,	

Strategy to reduce total business, industry, agricultural demand	Timeframe for completing work
fruit and vegetable, beverage, textiles, paper/pulp, metals, technology, petroleum refining etc.),	
☒Install water conservation fixtures ~~and appliances~~ or change processes to conserve water	As needed
☒Repair leaking system components (e.g., pipes, valves)	As needed
☐ Investigate the reuse of reclaimed water (e.g., stormwater, wastewater effluent, process wastewater, etc.)	
☒Reduce outdoor water use (e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.)	To be addressed in the Stormwater Plan
☐ Train employees how to conserve water	
☐ Implement a notification system to inform non-residential customers when water availability conditions change.	
☐ [Rainwater catchment systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, industrial processes, water features, vehicle washing facilities, cooling tower makeup, and similar uses shall be approved by the commissioner. Proposed plumbing code 4714.1702.1 http://www.dli.mn.gov/PDF/docket/4714rule.pdf	
☐ Describe other plans:	

Objective 4: Achieve a Decreasing Trend in Total Per Capita Demand

Include as **Appendix 8** one graph showing total per capita water demand for each customer category (i.e., residential, institutional, commercial, industrial) from 2005-2014 and add the calculated/estimated linear trend for the next 10 years.

Describe the trend for each customer category; explain the reason(s) for the trends, and where trends are increasing.

All categories are downward trending, industrial has been pretty stable. There were some mid-decade spikes due to less precipitation in the area for a number of years. These spikes were minimal and did not significantly increase the total per capita demand for those timeframes.

Objective 5: Reduce Peak Day Demand so that the Ratio of Average Maximum day to the Average Day is less than 2.6

Is the ratio of average 2005-2014 maximum day demand to average 2005-2014 average day demand reported in Table 2 more than 2.6? ☐ Yes ☒ No

Calculate a ten year average (2005 – 2014) of the ratio of maximum day demand to average day demand: 1.56

The position of the DNR has been that a peak day/average day ratio that is above 2.6 for in summer indicates that the water being used for irrigation by the residents in a community is too large and that efforts should be made to reduce the peak day use by the community.

It should be noted that by reducing the peak day use, communities can also reduce the amount of infrastructure that is required to meet the peak day use. This infrastructure includes new wells, new water towers which can be costly items.

Objective 6: Implement a Conservation Water Rate Structure and/or a Uniform Rate Structure with a Water Conservation Program

Water Conservation Program

Municipal water suppliers serving over 1,000 people are required to adopt demand reduction measures that include a conservation rate structure, or a uniform rate structure with a conservation program that achieves demand reduction. These measures must achieve demand reduction in ways that reduce water demand, water losses, peak water demands, and nonessential water uses. These measures must be approved before a community may request well construction approval from the Department of Health or before requesting an increase in water appropriations permit volume (*Minnesota Statutes*, section 103G.291, subd. 3 and 4). Rates should be adjusted on a regular basis to ensure that revenue of the system is adequate under reduced demand scenarios. If a municipal water supplier intends to use a Uniform Rate Structure, a community-wide Water Conservation Program that will achieve demand reduction must be provided.

Current Water Rates

Include a copy of the actual rate structure in **Appendix 9** or list current water rates including base/service fees and volume charges below.

Volume included in base rate or service charge: 0 ~~gallons or~~ X cubic feet ___ other

Frequency of billing: ☒ Monthly ☐ Bimonthly ☐ Quarterly ☐ Other: _____

Water Rate Evaluation Frequency: ☐ every year ☐ every ___ years ☒no schedule

Date of last rate change: May 1, 2016

Table 27. Rate structures for each customer category (Select all that apply and add additional rows as needed)

Customer Category	Conservation Billing Strategies in Use *	Conservation Neutral Billing Strategies in Use **	Non-Conserving Billing Strategies in Use ***
Residential	☒ Monthly Billing ☐ Increasing block rates (volume tiered rates) ☐ Seasonal rates ☐ Time of Use rates ☐ Water bills reported in gallons ☐ Individualized goal rates ☐ Excess Use rates ☐ Drought surcharge ☐ Use water bill to provide comparisons ☒ Service charge not based on water volume	☐ Uniform ☐ Odd/Even day watering	☐ Service charge based on water volume ☒ Declining block ☐ Flat ☐ Other (describe)

Customer Category	Conservation Billing Strategies in Use *	Conservation Neutral Billing Strategies in Use **	Non-Conserving Billing Strategies in Use ***
	☐ Other (describe)		
Commercial/ Industrial/ Institutional	☒Monthly Billing ☐ Increasing block rates ☐ Seasonal rates ☐ Time of Use rates ☐ Bill water use in gallons ☐ Individualized goal rates ☐ Excess Use rates ☐ Drought surcharge ☐ Use water bill to provide comparisons ☐ Service charge not based on water volume ☐ Other (describe)	☐ Uniform	☐ Service charge based on water volume ☒ Declining block ☐ Other (describe)
☐ Other			

*** Rate Structures components that may promote water conservation:**

- **Monthly billing:** is encouraged to help people see their water usage so they can consider changing behavior.
- **Increasing block rates (also known as a tiered residential rate structure):** Typically, these have at least three tiers: should have at least three tiers.
    - The first tier is for the winter average water use.
    - The second tier is the year-round average use, which is lower than typical summer use. This rate should be set to cover the full cost of service.
    - The third tier should be above the average annual use and should be priced high enough to encourage conservation, as should any higher tiers. For this to be effective, the difference in block rates should be significant.
- **Seasonal rate:** higher rates in summer to reduce peak demands
- **Time of Use rates:** lower rates for off peak water use
- **Bill water use in gallons:** this allows customers to compare their use to average rates
- **Individualized goal rates:** typically used for industry, business or other large water users to promote water conservation if they keep within agreed upon goals.
- **Excess Use rates**: if water use goes above an agreed upon amount this higher rate is charged
- **Drought surcharge:** an extra fee is charged for guaranteed water use during drought
- **Use water bill to provide comparisons**: simple graphics comparing individual use over time or compare individual use to others.
- **Service charge or base fee that does not include a water volume** – a base charge or fee to cover universal city expenses that are not customer dependent and/or to provide minimal water at a lower rate (e.g., an amount less than the average residential per capita demand for the water supplier for the last 5 years)
- **Emergency rates** -A community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help to protect the city budgets during times of significantly less water usage.

****Conservation Neutral****

- **Uniform rate**: rate per unit used is the same regardless of the volume used
- **Odd/even day watering** –This approach reduces peak demand on a daily basis for system operation, but it does not reduce overall water use.

***** Non-Conserving *****

- **Service charge or base fee with water volume:** an amount of water larger than the average residential per capita demand for the water supplier for the last 5 years
- **Declining block rate:** the rate per unit used decreases as water use increases.
- **Flat rate:** one fee regardless of how much water is used (usually unmetered).

Provide justification for any conservation neutral or non-conserving rate structures. If intending to adopt a conservation rate structure, include the timeframe to do so:

Our rates are set by the Duluth Public Utilities Commission, further our GPCD is relatively low already.

Objective 7: Additional strategies to Reduce Water Use and Support Wellhead Protection Planning

Development and redevelopment projects can provide additional water conservation opportunities, such as the actions listed below. If a Uniform Rate Structure is in place, the water supplier must provide a Water Conservation Program that includes at least two of the actions listed below. Check those actions that you intent to implement within the next 10 years.

Table 28. Additional strategies to Reduce Water Use & Support Wellhead Protection

☒	Participate in the GreenStep Cities Program, including implementation of at least one of the 20 "Best Practices" for water
☐	Prepare a Master Plan for Smart Growth (compact urban growth that avoids sprawl)
☒	Prepare a Comprehensive Open Space Plan (areas for parks, green spaces, natural areas)
☐	Adopt a Water Use Restriction Ordinance (lawn irrigation, car washing, pools, etc.)
☐	Adopt an Outdoor Lawn Irrigation Ordinance
☐	Adopt a Private well Ordinance (private wells in a city must comply with water restrictions)
☒	Implement a Stormwater Management Program
☐	Adopt Non-Zoning Wetlands Ordinance (can further protect wetlands beyond state/federal laws-for vernal pools, buffer areas, restrictions on filling or alterations)
☐	Adopt a Water Offset Program (primarily for new development or expansion)
☐	Implement a Water Conservation Outreach Program
☐	Hire a Water Conservation Coordinator (part-time)
☐	Implement a Rebate program for water efficient appliances, fixtures, or outdoor water management
☐	Other

Objective 8: Tracking Success: How will you track or measure success through the next ten years?

The City will develop and implement tracking mechanisms to document water loss through Department uses, water main breaks, and municipal uses. The City will conduct water audits on a more regular basis. The City will develop and propose regulations to the City Council in regards to water conservation, water use and emergency operations.

The Department will increase educational efforts.

Tip: The process to monitor demand reduction and/or a rate structure includes:

a) The DNR District Hydrologist or Groundwater Appropriation Hydrologist will call or visit the community the first 1-3 years after the water supply plan is completed.
b) They will discuss what activities the community is doing to conserve water and if they feel their actions are successful. The Water Supply Plan, Part 3 tables and responses will guide the discussion. For example, they will discuss efforts to reduce unaccounted for water loss if that is a problem, or go through Tables 33, 34 and 35 to discuss new initiatives.
c) The city representative and the hydrologist will discuss total per capita water use, residential per capita water use, and business/industry use. They will note trends.
d) They will also discuss options for improvement and/or collect case studies of success stories to share with other communities. One option may be to change the rate structure, but there are many other paths to successful water conservation.
e) If appropriate, they will cooperatively develop a simple work plan for the next few years, targeting a couple areas where the city might focus efforts.

A. Regulation

Complete Table 29 by selecting which regulations are used to reduce demand and improve water efficiencies. Add additional rows as needed.

Copies of adopted regulations or proposed restrictions or should be included in **Appendix 10** (a list with hyperlinks is acceptable).

Table 29. Regulations for short-term reductions in demand and long-term improvements in water efficiencies

None at this time.

Regulations Utilized	When is it applied (in effect)?
☐ Rainfall sensors required on landscape irrigation systems	☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
☐ Water efficient plumbing fixtures required	☐ New Development ☐ Replacement ☐ Rebate Programs
☐ Critical/Emergency Water Deficiency ordinance	☐ Only during declared Emergencies
☐ Watering restriction requirements (time of day, allowable days, etc.)	☐ Odd/Even ☐ 2 days/week ☐ Only during declared Emergencies
☐ Water waste prohibited (for example, having a fine for irrigators spraying on the street)	☐ -Ongoing ☐ Seasonal ☐ Only during declared Emergencies
☐ Limitations on turf areas (requiring lots to have 10% - 25% of the space in natural areas)	☐ New Development ☐ Shoreland/zoning ☐ Other
☐ Soil preparation requirement s (after construction, requiring topsoil to be applied to promote good root growth)	☐ New Development ☐ Construction Projects ☐ Other

Regulations Utilized	When is it applied (in effect)?
☐ Tree ratios (requiring a certain number of trees per square foot of lawn)	☐ New development ☐ Shoreland/zoning ☐ Other
☐ Permit to fill swimming pool and/or requiring pools to be covered (to prevent evaporation)	☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
☐ Ordinances that permit stormwater irrigation, reuse of water, or other alternative water use (Note: be sure to check current plumbing codes for updates)	☐ Describe

B. Retrofitting Programs

Education and incentive programs aimed at replacing inefficient plumbing fixtures and appliances can help reduce per capita water use, as well as energy costs. It is recommended that municipal water suppliers develop a long-term plan to retrofit public buildings with water efficient plumbing fixtures and appliances. Some water suppliers have developed partnerships with organizations having similar conservation goals, such as electric or gas suppliers, to develop cooperative rebate and retrofit programs.

A study by the AWWA Research Foundation (Residential End Uses of Water, 1999) found that the average indoor water use for a non-conserving home is 69.3 gallons per capita per day (gpcd). The average indoor water use in a conserving home is 45.2 gpcd and most of the decrease in water use is related to water efficient plumbing fixtures and appliances that can reduce water, sewer and energy costs. In Minnesota, certain electric and gas providers are required (Minnesota Statute 216B.241) to fund programs that will conserve energy resources and some utilities have distributed water efficient showerheads to customers to help reduce energy demands required to supply hot water.

Retrofitting Programs

Complete Table 30 by checking which water uses are targeted, the outreach methods used, the measures used to identify success, and any participating partners.

Table 30. Retrofitting programs (Select all that apply)

Water Use Targets	Outreach Methods	Partners
☐ low flush toilets, ☒ toilet leak tablets, ☒ low flow showerheads, ☒ faucet aerators;	☐ Education about ☒ free distribution of ☐ rebate for ☐ other	☒ Gas company ☒ Electric company ☐ Watershed organization
☐ water conserving washing machines, ☐ dish washers, ☐ water softeners;	☐ Education about ☐ free distribution of ☐ rebate for ☐ other	☐ Gas company ☐ Electric company ☐ Watershed organization
☒ rain gardens, ☒ rain barrels, ☒ Native/drought tolerant landscaping, etc.	☒ Education about ☐ free distribution of ☒ rebate for ☐ other	☐ Gas company ☐ Electric company ☒ Watershed organization

Briefly discuss measures of success from the above table (e.g. number of items distributed, dollar value of rebates, gallons of water conserved, etc.):

In 2015, 91 low flow shower heads, 112 bath faucet aerators, and 63 kitchen faucet aerators were installed in customers' homes. Approximately 700 energy conservation kits with a low flow shower head and faucet aerator were distributed to low income residents at the Energy Awareness Expo in 2015.

C. Education and Information Programs

Customer education should take place in three different circumstances. First, customers should be provided information on how to conserve water and improve water use efficiencies. Second, information should be provided at appropriate times to address peak demands. Third, emergency notices and educational materials about how to reduce water use should be available for quick distribution during an emergency.

Proposed Education Programs

Complete Table 31 by selecting which methods are used to provide water conservation and information, including the frequency of program components. Select all that apply and add additional lines as needed.

Table 31. Current and Proposed Education Programs

Education Methods	General summary of topics	#/Year	Frequency
Billing inserts or tips printed on the actual bill	Road sand clean-up	1	☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Consumer Confidence Reports	Water quality, lead contamination information	3	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Press releases to traditional local news outlets (e.g., newspapers, radio and TV)	Project Dependent Requests to curtail water usage	4 2	☒ Ongoing ☐ Seasonal ☒ Only during declared Emergencies
Social media distribution (e.g., emails, Facebook, Twitter)	RSPT Facebook & Twitter (Regional Stormwater Protection Team)	12	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Paid advertisements (e.g., billboards, print media, TV, radio, web sites, etc.)	Billboards, bus ads, posters PSAs	1	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Presentations to community groups	Monthly	12	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies

Education Methods	General summary of topics	#/Year	Frequency
Staff training	At least annually, illicit discharge identification	1	☒Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Facility tours	Water and wastewater treatment	1	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Displays and exhibits	Attendance at all events, festivals, fairs, etc.	6	☐ Ongoing ☒ Seasonal ☐ Only during declared Emergencies
Marketing rebate programs (e.g., indoor fixtures & appliances and outdoor practices)			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Community news letters	Neighborhood newsletters – stormwater pollution info.	6	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Direct mailings (water audit/retrofit kits, showerheads, brochures)	Residential energy audits are performed and low flow shower heads and faucet aerators are installed free of charge	200	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Information kiosk at utility and public buildings	Information is available at the business office. Blue Stormwater Kiosk		☒ Ongoing ☒ Seasonal ☐ Only during declared Emergencies
Public Service Announcements	TV and websites	12	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Cable TV Programs			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Demonstration projects (landscaping or plumbing)	Raingarden, winter maintenance or turf workshop annually	2	☐ Ongoing ☒ Seasonal ☐ Only during declared Emergencies
K-12 Education programs (Project Wet, Drinking Water Institute, presentations)	Presentations to classrooms	12	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Community Events (children's water festivals, environmental fairs)	Inform customers about conservation and distribute moisture meters, toilet bladders, leak gauges, faucet	3	☐ Ongoing ☒ Seasonal ☐ Only during declared Emergencies

Education Methods	General summary of topics	#/Year	Frequency
	aerators, kitchen aerators, low flow shower heads Ongoing events as listed above.		
Community education classes			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Water Week promotions			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Website (include address:)	www.lakesuperiorstreams.org www.comfortsystemsduluth.com		☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Targeted efforts (large volume users, users with large increases)			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Notices of ordinances			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Emergency conservation notices	When reduced water consumption is necessary radio, TV, door hangers are used in the affected area.		☐ Ongoing ☐ Seasonal ☒ Only during declared Emergencies
Other:			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies

Briefly discuss what future education and information activities your community is considering in the future:

To be developed by the department at a later date.

Part 4. ITEMS FOR METROPOLITAN AREA COMMUNITIES

Minnesota Statute 473.859 requires WSPs to be completed for all local units of government in the seven-county Metropolitan Area as part of the local comprehensive planning process.

Much of the information in Parts 1-3 addresses water demand for the next 10 years. However, additional information is needed to address water demand through 2040, which will make the WSP consistent with the Metropolitan Land Use Planning Act, upon which the local comprehensive plans are based.

This Part 4 provides guidance to complete the WSP in a way that addresses plans for water supply through 2040.

A. Water Demand Projections through 2040

Complete Table 7 in Part 1D by filling in information about long-term water demand projections through 2040. Total Community Population projections should be consistent with the community's system statement, which can be found on the Metropolitan Council's website and which was sent to the community in September 2015.

Projected Average Day, Maximum Day, and Annual Water Demands may either be calculated using the method outlined in *Appendix 2* of the *2015 Master Water Supply Plan* or by a method developed by the individual water supplier.

B. Potential Water Supply Issues

Complete Table 10 in Part 1E by providing information about the potential water supply issues in your community, including those that might occur due to 2040 projected water use.

The *Master Water Supply Plan* provides information about potential issues for your community in *Appendix 1 (Water Supply Profiles).* This resource may be useful in completing Table 10.

You may document results of local work done to evaluate impact of planned uses by attaching a feasibility assessment or providing a citation and link to where the plan is available electronically.

C. Proposed Alternative Approaches to Meet Extended Water Demand Projections

Complete Table 12 in Part 1F with information about potential water supply infrastructure impacts (such as replacements, expansions or additions to wells/intakes, water storage and treatment capacity, distribution systems, and emergency interconnections) of extended plans for development and redevelopment, in 10-year increments through 2040. It may be useful to refer to information in the community's local Land Use Plan, if available.

Complete Table 14 in Part 1F by checking each approach your community is considering to meet future demand. For each approach your community is considering, provide information about the amount of

future water demand to be met using that approach, the timeframe to implement the approach, potential partners, and current understanding of the key benefits and challenges of the approach.

As challenges are being discussed, consider the need for: evaluation of geologic conditions (mapping, aquifer tests, modeling), identification of areas where domestic wells could be impacted, measurement and analysis of water levels & pumping rates, triggers & associated actions to protect water levels, etc.

D. Value-Added Water Supply Planning Efforts (Optional)

The following information is not required to be completed as part of the local water supply plan, but completing this can help strengthen source water protection throughout the region and help Metropolitan Council and partners in the region to better support local efforts.

Source Water Protection Strategies

Does a Drinking Water Supply Management Area for a neighboring public water supplier overlap your community? ☐ Yes ☐ No

If you answered no, skip this section. If you answered yes, please complete Table 32 with information about new water demand or land use planning-related local controls that are being considered to provide additional protection in this area.

Table 32. Local controls and schedule to protect Drinking Water Supply Management Areas

Local Control	Schedule to Implement	Potential Partners
☐ None at this time		
☐ Comprehensive planning that guides development in vulnerable drinking water supply management areas		
☐ Zoning overlay		
☐ Other:		

Technical assistance

From your community's perspective, what are the most important topics for the Metropolitan Council to address, guided by the region's Metropolitan Area Water Supply Advisory Committee and Technical Advisory Committee, as part of its ongoing water supply planning role?

- ☐ Coordination of state, regional and local water supply planning roles
- ☐ Regional water use goals
- ☐ Water use reporting standards
- ☐ Regional and sub-regional partnership opportunities
- ☐ Identifying and prioritizing data gaps and input for regional and sub-regional analyses
- ☐ Others: _____

GLOSSARY

Agricultural/Irrigation Water Use - Water used for crop and non-crop irrigation, livestock watering, chemigation, golf course irrigation, landscape and athletic field irrigation.

Average Daily Demand - The total water pumped during the year divided by 365 days.

Calcareous Fen - Calcareous fens are rare and distinctive wetlands dependent on a constant supply of cold groundwater. Because they are dependent on groundwater and are one of the rarest natural communities in the United States, they are a protected resource in MN. Approximately 200 have been located in Minnesota. They may not be filled, drained or otherwise degraded.

Commercial/Institutional Water Use - Water used by motels, hotels, restaurants, office buildings, commercial facilities and institutions (both civilian and military). Consider maintaining separate institutional water use records for emergency planning and allocation purposes. Water used by multi-family dwellings, apartment buildings, senior housing complexes, and mobile home parks should be reported as Residential Water Use.

Commercial/Institutional/Industrial (C/I/I) Water Sold - The sum of water delivered for commercial/institutional or industrial purposes.

Conservation Rate Structure - A rate structure that encourages conservation and may include increasing block rates, seasonal rates, time of use rates, individualized goal rates, or excess use rates. If a conservation rate is applied to multifamily dwellings, the rate structure must consider each residential unit as an individual user. A community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help to protect the city budgets during times of significantly less water usage.

Date of Maximum Daily Demand - The date of the maximum (highest) water demand. Typically this is a day in July or August.

Declining Rate Structure - Under a declining block rate structure, a consumer pays less per additional unit of water as usage increases. This rate structure does not promote water conservation.

Distribution System - Water distribution systems consist of an interconnected series of pipes, valves, storage facilities (water tanks, water towers, reservoirs), water purification facilities, pumping stations, flushing hydrants, and components that convey drinking water and meeting fire protection needs for cities, homes, schools, hospitals, businesses, industries and other facilities.

Flat Rate Structure - Flat fee rates do not vary by customer characteristics or water usage. This rate structure does not promote water conservation.

Industrial Water Use - Water used for thermonuclear power (electric utility generation) and other industrial use such as steel, chemical and allied products, paper and allied products, mining, and petroleum refining.

Low Flow Fixtures/Appliances - Plumbing fixtures and appliances that significantly reduce the amount of water released per use are labeled “low flow”. These fixtures and appliances use just enough water to be effective, saving excess, clean drinking water that usually goes down the drain.

Maximum Daily Demand - The maximum (highest) amount of water used in one day.

Metered Residential Connections - The number of residential connections to the water system that have meters. For multifamily dwellings, report each residential unit as an individual user.

Percent Unmetered/Unaccounted For - Unaccounted for water use is the volume of water withdrawn from all sources minus the volume of water delivered. This value represents water “lost” by miscalculated water use due to inaccurate meters, water lost through leaks, or water that is used but unmetered or otherwise undocumented. Water used for public services such as hydrant flushing, ice skating rinks, and public swimming pools should be reported under the category “Water Supplier Services”.

Population Served - The number of people who are served by the community’s public water supply system. This includes the number of people in the community who are connected to the public water supply system, as well as people in neighboring communities who use water supplied by the community’s public water supply system. It should not include residents in the community who have private wells or get their water from neighboring water supply.

Residential Connections - The total number of residential connections to the water system. For multifamily dwellings, report each residential unit as an individual user.

Residential Per Capita Demand - The total residential water delivered during the year divided by the population served divided by 365 days.

Residential Water Use - Water used for normal household purposes such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Should include all water delivered to single family private residences, multi-family dwellings, apartment buildings, senior housing complexes, mobile home parks, etc.

Smart Meter - Smart meters can be used by municipalities or by individual homeowners. Smart metering generally indicates the presence of one or more of the following:

- Smart irrigation water meters are controllers that look at factors such as weather, soil, slope, etc. and adjust watering time up or down based on data. Smart controllers in a typical summer will reduce water use by 30%-50%. Just changing the spray nozzle to new efficient models can reduce water use by 40%.
- Smart Meters on customer premises that measure consumption during specific time periods and communicate it to the utility, often on a daily basis.
- A communication channel that permits the utility, at a minimum, to obtain meter reads on demand, to ascertain whether water has recently been flowing through the meter and onto the

premises, and to issue commands to the meter to perform specific tasks such as disconnecting or restricting water flow.

Total Connections - The number of connections to the public water supply system.

Total Per Capita Demand - The total amount of water withdrawn from all water supply sources during the year divided by the population served divided by 365 days.

Total Water Pumped - The cumulative amount of water withdrawn from all water supply sources during the year.

Total Water Delivered - The sum of residential, commercial, industrial, institutional, water supplier services, wholesale and other water delivered.

Ultimate (Full Build-Out) - Time period representing the community's estimated total amount and location of potential development, or when the community is fully built out at the final planned density.

Unaccounted (Non-revenue) Loss - See definitions for "percent unmetered/unaccounted for loss".

Uniform Rate Structure - A uniform rate structure charges the same price-per-unit for water usage beyond the fixed customer charge, which covers some fixed costs. The rate sends a price signal to the customer because the water bill will vary by usage. Uniform rates by class charge the same price-per-unit for all customers within a customer class (e.g. residential or non-residential). This price structure is generally considered less effective in encouraging water conservation.

Water Supplier Services - Water used for public services such as hydrant flushing, ice skating rinks, public swimming pools, city park irrigation, back-flushing at water treatment facilities, and/or other uses.

Water Used for Nonessential Purposes - Water used for lawn irrigation, golf course and park irrigation, car washes, ornamental fountains, and other non-essential uses.

Wholesale Deliveries - The amount of water delivered in bulk to other public water suppliers.

Acronyms and Initialisms

AWWA – American Water Works Association

C/I/I – Commercial/Institutional/Industrial

CIP – Capital Improvement Plan

GIS – Geographic Information System

GPCD – Gallons per capita per day

GWMA – Groundwater Management Area – North and East Metro, Straight River, Bonanza,

MDH – Minnesota Department of Health

MGD – Million gallons per day

MG – Million gallons

MGL – Maximum Contaminant Level

MnTAP – Minnesota Technical Assistance Program (University of Minnesota)

MPARS – MN/DNR Permitting and Reporting System (new electronic permitting system)

MRWA – Minnesota Rural Waters Association

SWP – Source Water Protection

WHP – Wellhead Protection

APPENDICES TO BE SUBMITTED BY THE WATER SUPPLIER

Appendix 1: Well records and maintenance summaries ***– see Part 1C***

Appendix 2: Water level monitoring plan ***– see Part 1E***

Appendix 3: Water level graphs for each water supply well ***- see Part 1E***

Appendix 4: Capital Improvement Plan - ***see Part 1E***

Appendix 5: Emergency Telephone List ***– see Part 2C***

Appendix 6: Cooperative Agreements for Emergency Services ***– see Part 2C***

Appendix 7: Municipal Critical Water Deficiency Ordinance ***– see Part 2C***

Appendix 8: Graph showing annual per capita water demand for each customer category during the last ten-years ***– see Part 3 Objective 4***

Appendix 9: Water Rate Structure ***– see Part 3 Objective 6***

Appendix 10: Adopted or proposed regulations to reduce demand or improve water efficiency ***– see Part 3 Objective 7***

Appendix 11: Implementation Checklist – summary of all the actions that a community is doing, or proposes to do, including estimated implementation dates – ***see www.mndnr.gov/watersupplyplans***

Appendix 1: Well records and maintenance summaries – see Part 1C

Appendix 1

Well Records & Maintenance Summaries per Well

Not Applicable: The City of Duluth does not draw any source water from wells.

Appendix 2: Water Level Monitoring Plan – See Part 1E

Appendix 2

Source Water Monitoring Plan

The City of Duluth does not collect water level data for Lake Superior. The City reviews information from NOAA, Station 9099064, Duluth, MN as published on their website:

http://tidesandcurrents.noaa.gov

Appendix 3: Water Level Graphs for each water supply well – See Part 1E

Appendix 3

Source Water Monitoring Data

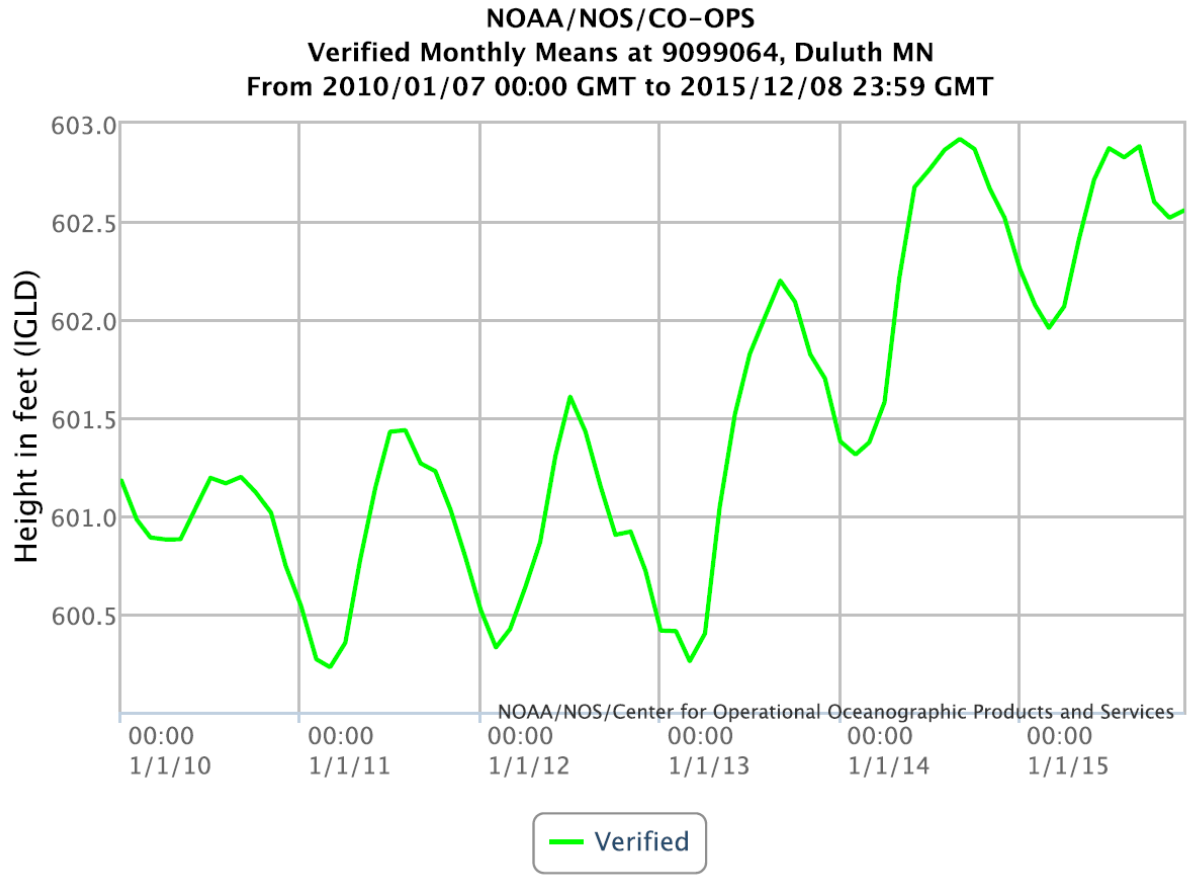
The City of Duluth reviews information from NOAA, Station 9099064, Duluth, MN as published on their website, below. Information for levels between 2006-2015 are attached herein.

http://tidesandcurrents.noaa.gov

Numeric Data – Lake Superior Water Levels per NOAA (2006-2015)

Year	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
Month	1	2	3	4	5	6	7	8	9	10	11	12
Highest	602.047	601.601	601.562	601.716	602.044	601.978	602.208	602.123	601.942	601.503	601.286	600.909
MSL	601.321	601.008	600.921	601.111	601.367	601.542	601.559	601.574	601.295	600.856	600.649	600.413
Lowest	600.719	600.4	600.253	600.512	600.843	601.217	601.145	601.115	600.689	599.659	600.072	599.836
Year	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month	1	2	3	4	5	6	7	8	9	10	11	12
Highest	600.823	600.781	601.161	600.722	600.617	600.912	600.915	601.027	601.152	602.1	601.755	601.867
MSL	600.187	599.908	599.913	600.042	600.228	600.391	600.543	600.583	600.61	601.162	601.033	600.879
Lowest	599.508	599.373	599.078	599.554	599.544	599.898	599.642	600.164	599.839	600.01	600.184	600.233
Year	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008
Month	1	2	3	4	5	6	7	8	9	10	11	12
Highest	601.378	601.102	601.007	600.659	601.437	602.297	602.438	602.32	602.238	602.169	602.254	602.27
MSL	600.7	600.565	600.463	600.31	601.257	601.566	601.873	601.929	601.768	601.584	601.404	601.122
Lowest	599.678	599.596	599.888	600.075	600.948	601.014	601.339	601.499	601.339	600.935	600.915	600.279
Year	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009
Month	1	2	3	4	5	6	7	8	9	10	11	12
Highest	601.729	601.729	601.706	601.857	602.08	602.028	602.27	602.375	602.267	602.9	602.238	602.713
MSL	600.928	600.857	600.925	600.985	601.394	601.552	601.625	601.801	601.957	601.785	601.716	601.523
Lowest	600.312	600.138	599.954	600.459	600.604	600.974	601.171	601.325	601.289	601.037	601.099	600.984
Year	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
Month	1	2	3	4	5	6	7	8	9	10	11	12
Highest	601.66	601.467	601.365	601.486	601.411	601.591	601.795	601.552	601.955	601.988	601.827	601.401
MSL	601.179	600.981	600.889	600.879	600.88	601.04	601.193	601.165	601.198	601.119	601.016	600.744
Lowest	600.614	600.63	600.423	600.23	600.348	600.515	600.682	600.659	600.561	600.22	599.954	600.125
Year	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011
Month	1	2	3	4	5	6	7	8	9	10	11	12
Highest	601.332	601.257	601.293	601.158	601.926	601.87	601.946	601.811	601.719	601.634	601.726	601.224
MSL	600.541	600.269	600.228	600.353	600.772	601.142	601.428	601.436	601.267	601.227	601.03	600.79
Lowest	599.59	599.012	599.531	599.596	600.069	600.128	600.348	600.932	600.725	600.489	600.394	600.256
Year	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012
Month	1	2	3	4	5	6	7	8	9	10	11	12
Highest	601.06	601.558	601.06	601.611	601.752	602.421	602.054	601.932	601.654	601.457	601.677	601.289
MSL	600.522	600.329	600.423	600.637	600.865	601.303	601.607	601.429	601.148	600.903	600.919	600.721
Lowest	599.816	599.747	599.695	600.003	600.302	600.666	601.024	600.919	600.518	600.118	600.354	600.151
Year	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013
Month	1	2	3	4	5	6	7	8	9	10	11	12
Highest	601.04	601.342	600.81	601.194	601.972	602.07	602.329	602.398	602.598	603.068	602.464	602.838
MSL	600.415	600.412	600.259	600.4	601.045	601.518	601.824	602.013	602.198	602.09	601.822	601.699
Lowest	599.446	599.783	599.557	599.619	600.325	600.981	601.23	601.594	601.634	601.562	601.099	600.928
Year	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014
Month	1	2	3	4	5	6	7	8	9	10	11	12
Highest	601.903	601.923	602.119	602.713	602.736	603.225	603.156	603.307	603.497	603.396	603.245	602.999
MSL	601.379	601.312	601.374	601.579	602.211	602.675	602.763	602.864	602.92	602.868	602.666	602.518
Lowest	600.571	600.696	600.922	601.047	601.486	602.103	602.339	602.457	601.975	602.264	601.946	601.729
Year	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015
Month	1	2	3	4	5	6	7	8	9	10	11	12
Highest	602.835	603.022	602.559	602.605	602.969	603.159	603.284	603.419	603.281	603.274	603.307	603.392
MSL	602.258	602.073	601.957	602.066	602.407	602.713	602.873	602.826	602.883	602.599	602.518	602.556
Lowest	601.48	601.496	601.293	601.473	601.831	602.228	602.434	602.218	602.329	601.978	601.801	601.512

Graphic Data – Lake Superior Water Levels per NOAA (2010-2015)



Appendix 4: Capital Improvement Plane – See Part 1E

Appendix 4

Capital Improvement Plan

The City of Duluth Capital Improvement DRAFT Plan for the Water Utility, fiscal years 2017-2021 is attached herein.

2017 BUDGET

Project No	Project	Total Project Cost	Water cash	Water bond
	4th Street reconstruction by County	$1,124,000	$1,124,000	
	Michigan Street with MN Power	$650,000	$650,000	
	2nd Ave for Mesaba	$250,000	$250,000	
	Replace missing Lakewood filter anthracite	$250,000	$250,000	
	Water Main repair on East Superior Street	$70,000	$70,000	

2018 BUDGET

Project No	Project	Total Project Cost	Water cash	Water bond
	Superior Street water main	$1,400,000	$1,400,000	
	Superior Street & Mesaba MNDOT	$550,000	$550,000	
	Ramsey Street in existing casing	$100,000	$100,000	
	Cathodic protection system on 42-inch steel (study)	$80,000	$80,000	
	Fascia repairs at main pump building	$50,000	$50,000	

2019 BUDGET

Project No	Project	Total Project Cost	Water cash	Water bond
	Superior Street water main replacement	$1,600,000	$1,600,000	
	Water main replacement- Hidden Valley Phase 2	$1,050,000	$1,050,000	
	McCuen Street MNDOT	$225,000	$225,000	
		$0		

2020 BUDGET

Project No	Project	Total Project Cost	Water cash	Water bond
	Superior Street water main replacement	$2,000,000	$2,000,000	
	Far East Superior Street water main- services off 42-inch	$600,000	$600,000	
	Lakewood Pump #4 study	$50,000	$50,000	
		$0		

2021 BUDGET

	Electrical upgrades at Lakewood Treatment Plant	$1,500,000	$1,500,000	
	Far East Superior Street water main- services off 42-inch	$700,000	$700,000	
	42-inch riveted steel inspection	$550,000	$550,000	
	Middle Pump Station Design	$200,000	$200,000	
	Gogebic Creek MNDOT	$200,000	$200,000	
	US Steel Creek MNDOT	$120,000	$120,000	
	Cathodic protection system on 42-inch steel (construction)	$100,000	$100,000	

Appendix 5: Emergency Telephone List – See Part 2C

Appendix 5

Emergency Telephone List

The City of Duluth, Mutual Aid Partners and Stakeholders contact information.

Emergency Telephone List 2016

Emergency Response Team	Name	Work Telephone	Alternate Telephone
Emergency Response Lead	Howard Jacobson Manager, Utility Operations	218-730-4004	218-269-1054
Alternate Emergency Response Lead	Eric Shaffer Chief Engineer, Utilities	218-730-5072	218-355-1172
Water Operator	Lakewood Water Treatment Plant	218-730-4160	
Alternate Water Operator	Mark Proulx	218-730-4161	952-240-2023
Public Communications	Pakou Ly	218-730-5309	

State and Local Emergency Response Contacts	Name	Work Telephone	Alternate Telephone
State Incident Duty Officer	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro
County Emergency Director	St. Louis County Sheriff	218-625-3960	
National Guard	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro
Mayor/Board Chair	Emily Larson	218-730-5317	
Fire Chief	Chief Dennis Edwards	218-730-4390	
Sheriff	Sheriff Ross Litman	218-726-2340	
Police Chief	Chief Mike Tusken	218-730-5020	218-625-3581
Ambulance	Gold Cross Ambulance	218-722-0807	
Hospital	Essentia Health	218-786-4000	888-825-5818
Alternate Medical Facility	St. Luke's Hospital	218-249-5555	800-321-3790

State and Local Agencies	Name	Work Telephone	Alternate Telephone
MDH District Engineer	Michael Luhrsen	218-302-6178	
MDH	Drinking Water Protection	651-201-4700	
State Testing Laboratory	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro

MPCA	Suzanne Hanson	218-302-6614	
DNR Area Hydrologist	Patricia Fowler	218-834-1442	
County Water Planner			

Utilities	**Name**	**Work Telephone**	**Alternate Telephone**
Electric Company	Minnesota Power	218-722-1972 ext 2525	218-722-2625
Gas Company	City of Duluth Public Works & Utilities (ComfortSystems)	218-730-4100	218-730-4000
Telephone Company	Qwest	800-922-7987	
Gopher State One Call	Utility Locations	800-252-1166	651-454-0002
Highway Department	1123 Mesaba Ave Duluth MN 55811	218-725-2700	

Mutual Aid Agreements	**Name**	**Work Telephone**	**Alternate Telephone**
Neighboring Water System	Superior Water Light & Power	715-394-2300	715-398-0987
Emergency Water Connection	n/a		
Materials			

Technical/Contracted Services/Supplies	**Name**	**Work Telephone**	**Alternate Telephone**
MRWA Technical Services	MN Rural Water Association	800-367-6792	
Well Driller/Repair	City of Duluth Public Works & Utilities Dept.	218-730-4130	
Pump Repair	City of Duluth Public Works & Utilities Dept.	218-730-4130	
Electrician	Scott Olson	218-730-4160	218-591-6655
Plumber	City of Duluth Public Works & Utilities Dept.	218-730-4130	
Backhoe	City of Duluth Public Works & Utilities Dept.	218-730-4130	

Chemical Feed	City of Duluth Public Works & Utilities Dept.	218-730-4130	
Meter Repair	City of Duluth Public Works & Utilities Dept.	218-730-4130	
Generator	City of Duluth Public Works & Utilities Dept.	218-730-4130	
Valves	City of Duluth Public Works & Utilities Dept.	218-730-4130	
Pipe & Fittings	City of Duluth Public Works & Utilities Dept.	218-730-4130	
Water Storage	City of Duluth Public Works & Utilities Dept.	218-730-4130	
Laboratory	City of Duluth Public Works & Utilities Dept.	218-730-4130	
Engineering firm	City of Duluth Public Works & Utilities Dept.	218-730-4130	218-730-5200

Communications	**Name**	**Work Telephone**	**Alternate Telephone**
News Paper			
Radio Station			
School Superintendent	William Gronseth	218-336-8752	
Property & Casualty Insurance			
City of Duluth Communications Office	Pakou Ly	218-730-5309	

Critical Water Users	**Name**	**Work Telephone**	**Alternate Telephone**
Hospital Critical Use:			
Nursing Home Critical Use:			
Public Shelter Critical Use:			

Appendix 6: Cooperative Agreements for Emergency Services – See Part 2C

Appendix 6

Cooperative Agreements for Emergency Water Services

The City of Duluth has not executed any cooperative agreements for emergency water services. The contingency plan for failed pumping from the source water is contained in our O&M Manual, Section 4.

Appendix 7: Municipal Critical Water Deficiency Ordinance – See Part 2C

Appendix 7

Municipal Critical Water Deficiency Ordinance

The City of Duluth-City Council has related legislation located in Chapter 48 – Water and Gas of the Duluth, MN - Legislative Code, specifically Sec. 48.2.

https://www.municode.com/library/mn/duluth/codes/legislative_code?nodeId=Chapter%2048%20-%20Water%20and%20Gas

Duluth, MN Legislative Code

§ 48-2: ***Right of the Department to shut off water or gas supply when necessary.***

The right is reserved to the department to shut off water or gas supply at any time it may deem it necessary to avoid potential harm to persons or damage to property. (Ord. No. 6930, § 10.1; Ord 8704, 10-9-1984 § 2.)

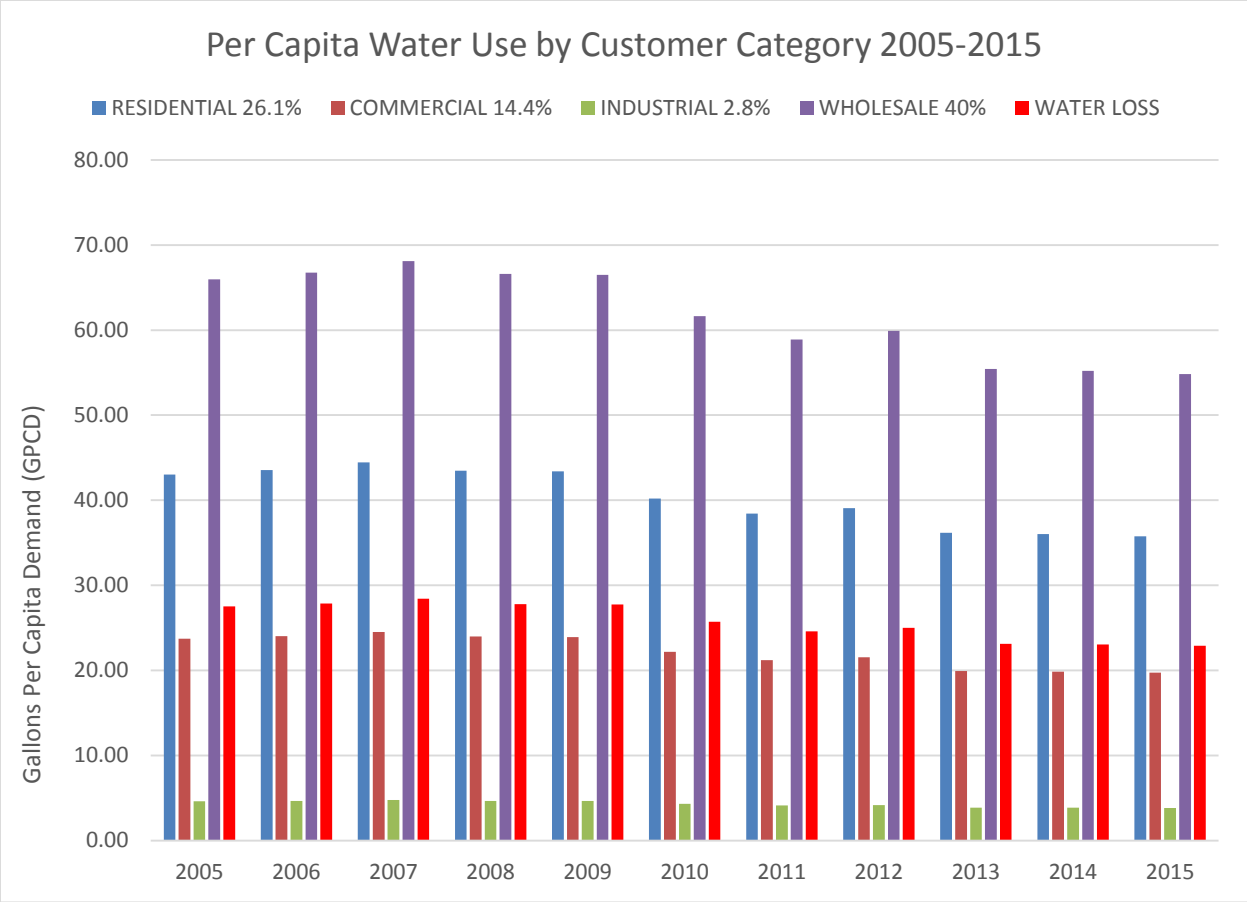
Appendix 8: Annual Per Capita Demand & Projected Per Capita Demand – See Part 3, Objective 4

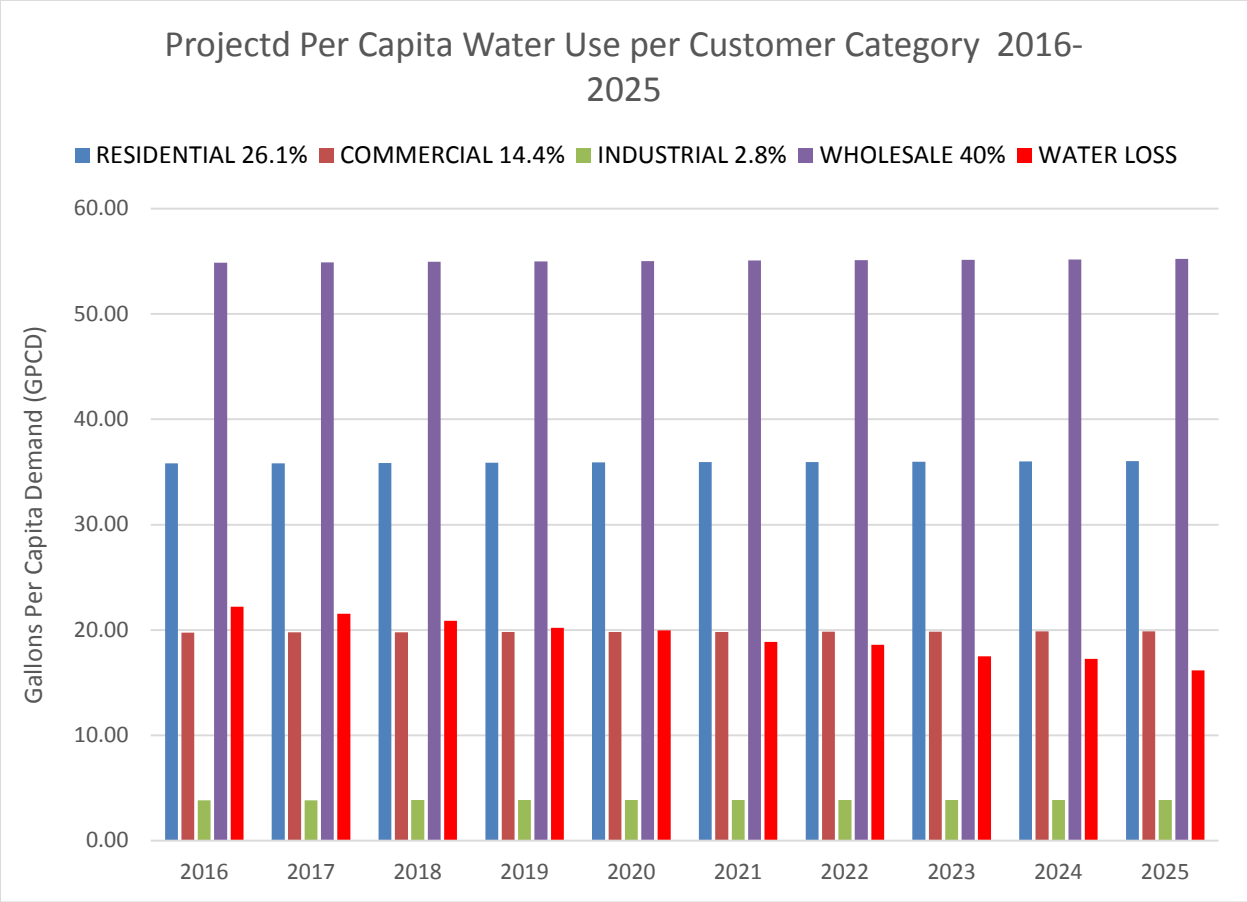
Appendix 8

Per Capita Water Use by Customer Category

Graph 1 – Per Capita Water Use by Customer Category 2005-2015

Graph 2 – Projected Per Capita Water Use by Customer Category 2016-2025


Per Capita Water Use by Customer Category 2005-2015
RESIDENTIAL 26.1%
COMMERCIAL 14.4%
INDUSTRIAL 2.8%
WHOLESALE 40%
WATER LOSS
Gallons Per Capita Demand (GPCD)
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


Projectd Per Capita Water Use per Customer Category 2016-2025
RESIDENTIAL 26.1%
COMMERCIAL 14.4%
INDUSTRIAL 2.8%
WHOLESALE 40%
WATER LOSS
Gallons Per Capita Demand (GPCD)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

Appendix 9: Water Rate Structure – See Part 3, Objective 6

Appendix 9

Water Rates

Current Water Rate Sheet

Water Rate Sheet

Monthly Rates as published on ComfortSystem's website:

http://www.comfortsystemsduluth.com/about-my-bill/rate-sheet/

Effective with meter readings after May 1, 2016
Fixed Charges this fixed monthly charge varies with the size of the meter

Up to 1"....$6.27	2"....$18.80	4"....$87.71	8"....$181.69
1.5"....$10.97	3"....$68.92	6"....$131.57	10"....$238.07

RESIDENTIAL A customer's residential rate class is determined by the average monthly metered volume of water they use, shown below:

RESIDENTIAL 1 (R1) Up to 3,200 cubic feet (32 CCF) ... $3.51 per CCF
RESIDENTIAL 2 (R2) More than 3,200 cubic feet (32 CCF) up to 8,000 cubic feet (80 CCF)... $3.29 per CCF
RESIDENTIAL 3 (R3) More than 8,000 cubic feet (80 CCF) up to 24,000 cubic feet (240 CCF)... $2.89 per CCF
RESIDENTIAL 4 (R4) More than 24,000 cubic feet (240 CCF)... $2.54 per CCF

COMMERCIAL/INDUSTRIAL A commercial/industrial customer's rate class is determined by the average monthly metered volume of water they use, show below:

Commercial/Industrial 1 (CI1)... $3.51 per CCF
Up to 4,000 cubic feet (40 CCF)
Commercial/Industrial 2 (CI2)... $2.94 per CCF
More than 4,000 cubic feet(40 CCF) of water up to 20,000 cubic feet (200 CCF)
Commercial/Industrial 3 (CI3)... $2.36 per CCF
More than 20,000 cubic feet (200 CCF) of water up to 100,000 cubic feet (1,000 CCF)
Commercial/Industrial 4 (CI4)... $2.05 per CCF
More than 100,000 cubic feet (1,000 CCF) of water up to 750,000 cubic feet (7,500 CCF)
Commercial/Industrial 5 (CI5) ... $1.82 per CCF
More than 750,000 cubic feet (7,500 CCF) of water
Commercial/Industrial 6 (CI6)... $1.54 per CCF
Those services that receive 90% of their annual volume within a three (3) month period in any twelve (12) month period for commercial snow making purposes

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WATER FOR INDIVIDUALS BEYOND CITY LIMITS per 100 cubic feet $4.37 per CCF

Monthly Clean Water Surcharge

$4.90 - Effective January 1, 2016

Annual Safe Water Fee

$6.36
The State of Minnesota requires Comfort Systems to collect this fee each June and send the funds directly to the state. The funds are used by the State to do additional water testing as required by the U.S. EPA.

Appendix 10: Adopted or Proposed Regulations to Reduce Demand or Improve Water Efficiency – See Part 3, Objective 7

Appendix 10

Proposed City Ordinances for Water Conservation & Demand Reduction

The City of Duluth Public Works & Utilities Department does not have any proposed regulation for water conservation at this time.

Appendix 11: Implementation Check List

Appendix 11

Implementation Checklist

Refer to Table 31. (P. 40-42)