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Water Supply Plan

North Mankato, Minnesota

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City of North Mankato
Water Supply Plan

Formerly called Water Emergency & Water Conservation Plan

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.

This information is available in an alternative format upon request.

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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)	754230
Ownership	Public CITY OF NORTH MANKATO
Metropolitan Council Area	No, (Nicollet and Blue Earth County)
Street Address	1001 Belgrade Avenue
City, State, Zip	North Mankato, MN, 56003
Contact Person Name	Duane Rader
Title	Water Superintendent
Phone Number	507-625-3382
MDH Supplier Classification	Municipal Non-municipal transient, non-municipal non-transient, etc.

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:

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)
2006	12,557	5907	373.36	93.28	0.65	0	503.04	523.44	36.40	3.90%	1.434	2.696	2-Jun	81.46	114.21
2007	12,817	6083	351.65	95.82	0.89	0	480.61	541.46	33.14	11.24%	1.483	2.845	3-Aug	75.17	115.74
2008	12,935	6196	320.61	100.06	0.82	0	452.85	516.65	32.17	12.35%	1.415	3.045	11-Jul	67.91	109.43
2009	13,003	4751	332.75	81.84	0.79	0	443.46	500.63	28.86	11.42%	1.372	2.809	19-May	70.11	105.48
2010	13,045	4799	315.06	81.71	1.00	0	427.82	467.21	31.04	8.43%	1.280	2.466	20-Apr	66.17	98.12
2011	13,394	6375	337.63	73.29	0.57	0	442.11	468.07	31.19	5.55%	1.282	2.267	28-Apr	69.06	95.74
2012	13,426	6480	351.57	77.29	1.12	0	460.26	533.98	31.40	13.81%	1.463	3.030	3-Jul	71.74	108.96
2013	13,462	6572	316.10	80.03	6.68	0	432.28	510.65	36.16	15.35%	1.399	2.420	29-Aug	64.33	103.93
2014	13,520	6682	298.02	80.63	5.34	0	412.21	548.81	33.56	24.89%	1.504	2.871	24-Jul	60.39	111.21
2015	13,610	6799	274.39	103.49	4.22	0	410.48	479.87	32.60	14.46%	1.315	2.503	6-May	55.24	96.60
Avg. 2010-2015	13,410	6285	315.46	82.74	3.16	0	430.86	501.43	32.66	13.75%	1.374	2.593	-	64.49	102.43

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

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 Coloplast Corp	Commercial	5,500,600	1.46%	Unknown
2 Camelot Park	Residential	3,444,010	0.91%	Unknown
3 Four Season Truck Wash	Commercial	3,428,600	0.91%	Unknown
4 Cliff Viessman Inc	Commercial	3,408,800	0.90%	Unknown
5 Best Western	Commercial	3,174,000	0.84%	Unknown
6 Navitor Midwest	Commercial	2,513,640	0.67%	Unknown
7 Kato Engineering	Commercial	2,335,900	0.62%	Unknown
8 Wis-Pak	Commercial	2,241,000	0.59%	Unknown
9 Kwik Trip	Commercial	2,137,720	0.57%	Unknown
10 Nath & Associates	Commercial	1,862,600	0.49%	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?
Water Treatment Plant No. 1	1959 (re-habilitated in 1994)	1,800,000	Gravity Filter	Fe removal, Chlorination, Fluoridation	4.95 MG	Discharge to Wastewater Treatment Facility	No
Water Treatment Plant No. 2	1971 (re-habilitated in 2001)	2,640,000	Gravity Filter	Fe/Mn removal & Radium removal, Chlorination, Fluoridation, Poly-phosphate	11.53 MG	Discharge to Wastewater Treatment Facility	No
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)
1 Water Tower 1	Elevated storage	2009	Steel	500,000
2 Water Tower 2	Elevated storage	1993	Steel	500,000
3 Ground Storage Reservoir 1	Ground storage	1959	Concrete	500,000
4 Hillside Reservoir 1	Ground storage	1959	Concrete	190,000
5 Hillside Reservoir 2	Ground storage	1959	Concrete	60,000
6 Ground Storage Reservoir 2	Ground storage	1971	Concrete	750,000
7	Other -			
Total	NA	NA	NA	2,500,000

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):

Current well and water treatment capacities are sufficient to meet future projected average daily and maximum day demands. Current well firm capacities are 1.6 MGD and 3.2 MGD in the lower and upper systems respectively. Treatment capacity of Plant No. 1 is 1.8 MGD and Plant No. 2 is 2.6 MGD for a combined treatment of 4.4 MGD, while the future peak demand is estimated at 3.46 MGD.

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)
Groundwater	Well No. 5	209823	1950	1000	680	Active*	No
Groundwater	Well No. 6	209821	1959	1440	687	Active	No
Groundwater	Well No. 7	112207	1975	1100	860	Active	Yes
Groundwater	Well No. 8	415943	1986	1100	845	Active	Yes
Groundwater	Well No. 9	809695	2015	1100	845	Active	Yes
Interconnection	Mankato Water System	N/A		1500	N/A	Emergency interconnection	N/A
Interconnection	Wis-Pak Bottling	N/A		900	N/A	Emergency interconnection	N/A
* The City is capable of providing water from the upper system to the lower system, where Well No.5 is, in the event of an emergency.							

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.

The City of North Mankato must request the use of the interconnection with the City of Mankato, there is a limit of 2.16 MGD.

The interconnection with Wis-Pak Bottling would require temporary pipe modifications and has a limit of 1.296 MGD.

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?

1) The population served has been steadily increasing at an annual rate of 0.9%, this is because North Mankato and Mankato are the regional center and largest cities of the surrounding counties.

2) The total per capita water demand has fluctuated between 95.7 and 115.7, staying relatively stable at 102.4 with a standard deviation of 7.2 gpcd. This is likely due to annual variation in rainfall and lawn watering practices.

3) The average day demand has fluctuated between 1.28 and 1.50, staying relatively stable at 1.37 with a standard deviation of 0.08 MGD.

4) The maximum day demand has fluctuated between 2.27 and 3.05, staying relatively stable at 2.59 with a standard deviation of 0.27 MGD. The average and max day demand trends are again likely due to variations in rainfall and lawn watering practices.

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	Projected Population Served	Projected Total Per Capita Water Demand (GPCD)	Projected Average Daily Demand (MGD)	Projected Maximum Daily Demand (MGD)
2016	14149	14149	102.43	1.45	2.90
2017	14333	14333	102.43	1.47	2.94
2018	14519	14519	102.43	1.49	2.97
2019	14708	14708	102.43	1.51	3.01
2020	14899	14899	102.43	1.53	3.05
2021	15090	15090	102.43	1.55	3.09
2022	15283	15283	102.43	1.57	3.13
2023	15479	15479	102.43	1.59	3.17
2024	15677	15677	102.43	1.61	3.21
2025	15904	15904	102.43	1.63	3.26
2030	16900	16900	102.43	1.73	3.46
2040	18970	18970	102.43	1.94	3.89

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:

Projected population was determined by the average of the City Census growth trend of 1.28% annually and the average portion of the City/Nicollet County census population multiplied with the MN State Demographics Office population projections for Nicollet County.
The average Total per Capita Demand and Peaking Factor from the past 6 years were used to determine Average Daily and Maximum Day Demands.

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
209823	☒ 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
209821	☒ 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
112207	☒ 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
415943	☒ 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
809695	☒ 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
209823	Mt. Simon	N/A*	☐ Falling ☐ Stable ☐ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____
209821	Mt. Simon	39	☐ Falling ☐ Stable ☒ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____
112207	Mt. Simon	41	☒ Falling ☐ Stable ☐ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____
415943	Mt. Simon	26	☒ Falling ☐ Stable ☐ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____
809695	Mt. Simon	N/A**	☐ Falling ☐ Stable ☐ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____
* Well No. 5 (209823) became an active well in 2016 and is manually monitored quarterly, 2006-2015 it was an emergency well and no data was collected. **Well No. 9 (809695) was constructed in 2016, therefore a trend has not yet been observed.				

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	1) Minnesota River (M-055) 2) Blue Earth River (M-055-076) 3) Le Sueur River (M-055-076-001) 4) Minneopa Creek (M-055-078) 5) Unnamed (M-055-072) 6) Unnamed (M-055-073) 7) Unnamed (M-055-074) 8) Unnamed (M-055-075) 9) Unnamed (M-055-076-011) 10)Unnamed (M-055-080) 11)Unnamed (M-055-071.5-003) 12)Unnamed (M-055-071.5-001) 13)Unnamed (M-055-081) 14)Unnamed (M-055-072-002)	☐ 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: No impacts are anticipated because municipal well water is appropriated from a confined aquifer with very limited or no connectivity with surface waters.	☐ GIS analysis ☐ Modeling ☐ Mapping ☐Monitoring ☐ Aquifer testing ☒ Other: Inferred	Q90 (the 90% exceedance flow)	☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☒ Other: No Impact; no mitigation measure or management plan needed	N/A
☒ Calcareous fen	Lime 30 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: No impacts are anticipated because the Lime 30 Fen is dependent upon upwelling water from the Jordan Aquifer. The city appropriates water from the much deeper Mt. Simon aquifer.	☐ GIS analysis ☒ Modeling (DNR) ☒ Mapping (DNR) ☐ Monitoring ☐ Aquifer testing ☐ Other: ___	State Law prohibits any activity that may negatively impact a calcareous fen	☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☒ Other: No impact; no mitigation measure or management plan needed	N/A

Resource Type	Resource Name	Risk	Risk Assessed Through	Describe Resource Protection Threshold*	Mitigation Measure or Management Plan	Describe How Changes to Thresholds are Monitored
☒ Lakes and Wetlands	1) Hiniker (7-147P) 2) Spring (52-2W) 3) Unnamed (52-63W) 4) Unnamed (7-71W) 5) Unnamed (7-73W)	☐ 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: No risk due to distance from production wells and because municipal well water is Appropriated from a Confined aquifer with very limited or no connectivity with surface waters	☐ GIS analysis ☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☒ Other: Inferred	N/A	☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☒ Other: N/A	N/A
☒ Trout Stream (and designated tributaries)	1)Unnamed (M-055-081) 2)Unnamed (M-055-81-002) 3)Unnamed (M-055-071.5-003)	☐ 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: No impacts are Anticipated because municipal well water is appropriated from a confined aquifer with very limited or no connectivity with surface waters.	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☒ Other: Inferred	State law prohibits any activity that may negatively impact a trout stream or designated trout stream tributary	☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☒ Other: No impact; no mitigation measure or management plan needed	N/A

Resource Type	Resource Name	Risk	Risk Assessed Through	Describe Resource Protection Threshold*	Mitigation Measure or Management Plan	Describe How Changes to Thresholds are Monitored
☒ Aquifer	1)Sh sand and gravel (QBAA) 2)Sm sand and gravel (QBAA) 3)Se sand and gravel (QBAA) 4)St sand and gravel (QBAA) 5)Ss surficial sand and gravel (QWTA) 6)Os Shakopee (Prairie du Chien) 7)Ej Jordan 8)Etc upper Tunnel City 9)Ew Wonewok 10) Em Mount Simon	☒ 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: The city impacts/pumps water from the Mount Simon Aquifer. No impacts are anticipated to other aquifers because of very limited, or no, connectivity with those aquifers.	☐ GIS analysis ☐ Modeling ☐ Mapping ☒ Monitoring ☐ Aquifer testing ☐ Other: ___	No threshold for Mount Simon at this time; DNR in investigating	☐ Revise permit ☐ Change groundwater pumping ☒ Increase conservation ☐ Other	Aquifer static and pumping water levels will be monitored with the SCADA system. Declines in water levels will be reviewed with the proper state agencies. The DNR's Mount Simon Users Group is under contract to monitor the wells, separate from the City monitoring.

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	Various	☐ 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: No impacts are anticipated. Endangered species are vascular plants dependent on soil moisture and not water level	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☒ Other: Inferred	Endangered and threatened species may not be impacted without a DNR Takings Permit	☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☒ Other: No impact; no mitigation measure or management plan needed	N/A

* 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

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	As needed	Periodic repairs and replacements as required.
Water Storage Facilities	☐ No action planned - adequate ☒ Repair/replacement ☐ Expansion/addition	As needed	Ground storage reservoirs to be drained, inspected, and maintained every 3 to 5 years.
Water Treatment Facilities	☐ No action planned - adequate ☒ Repair/replacement ☐ Expansion/addition	As needed	Both WTFs likely to be rehabilitated or reconstructed. At time of significant rehabilitation, consider expanding WTF No. 2 and decommissioning WTF No. 1.
Distribution Systems (pipes, valves, etc.)	☐ No action planned - adequate ☒ Repair/replacement ☐ Expansion/addition	As needed	Older portions to be replaced and increase size as required. Watermains evaluated for improvement and/or replacement during street reconstruction.
Pressure Zones	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		
Other:	☐ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		

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	N/A	N/A	N/A	N/A	N/A
Surface Water	N/A	N/A	N/A	N/A	N/A
Interconnection to another supplier	N/A	N/A	N/A	N/A	N/A

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	NA	NA	NA	NA	NA	NA
☐ Surface Water	NA	NA	NA	NA	NA	NA
☐ Reclaimed Stormwater	NA	NA	NA	NA	NA	NA
☐ Reclaimed Wastewater	NA	NA	NA	NA	NA	NA
☐ Interconnection to another supplier	NA	NA	NA	NA	NA	NA

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? May 12, 2004

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	CHRIS BOYER	507-625-4141	701@NMPD.ORG
Alternate Emergency Response Lead	BRAD SWANSON	507-625-4601	BSWANSON@NORTHMANKATO.COM

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
CITY OF MANKATO	1500/2.16	MUST REQUEST USE	
WIS-PAK BOTTLING	900/1.296	TEMPORARY PIPE MODIFICATIONS	

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
N/A	N/A	N/A	N/A	N/A

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

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)	Short-Term Emergency Demand Reduction Potential (GPD)
Residential	1	896,203	144,450
Institutional	1	33,411	13,760
Commercial & Industrial	2 & 3	204,245	37,750
Irrigation	4		
Wholesale	5		
Non-Essential	6		
TOTAL	-	1,133,859	186,960

GPD – Gallons per Day

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 Emergency Wells/ interconnections ☒ 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 public notification ☐ Meet with large water users to discuss their contingency plan.	☒ Supply augmentation through Emergency Wells/ interconnections ☒ 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 public notification ☒ 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 ☒ As Needed	
☒ 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 ☒ As Needed	
☒ Governor's Critical water deficiency 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 ☒ As Needed	

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

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

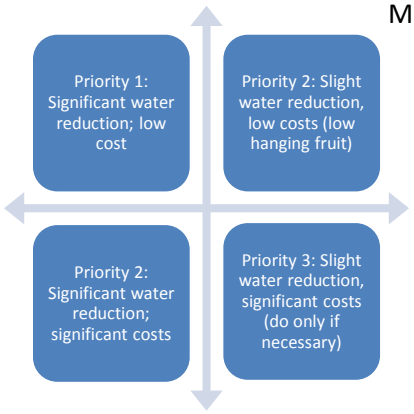
If no, the municipality must adopt such an official control within 6 months of submitting this WSP and submit it to the DNR as an amendment to this WSP.

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: Mayor and Utility Manager.

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.

The City of North Mankato distributes a yearly Consumer Confidence Report and two Community Newsletters per year. The public works department continues to work on locating and fixing leaks and other sources of unaccounted water. A conservation neutral rate structure is currently in use.

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?

Due to the new leak detection methods used since the summer 2015, unaccounted water has gone down. 10 leaks were found in 2015 and 4 leaks have been found in 2016 (up to October 2016). Chemical injectors have been metered since 9/2014 and has noticeably reduced unaccounted water usage.

With the implementation of the rate structure, water usage has also declined.

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 emergency wells/ interconnections ☒ Water allocation through public notification ☐ 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 Unsustainable Groundwater Supply	☒ Describe Evaluate Surface Water Supply

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)

Until 2016 the City surveyed 10% of the system every year and periodically as needed. In 2015 the City began testing 100% of the system yearly for leaks.

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? 2015.

Frequency of water audits: ☒ yearly ☐ other (specify frequency) _____
Leak detection and survey: ☐ every year ☐ every other year ☒ periodic as needed
***Leak detection will be done on a yearly basis after 2016.**
Year last leak detection survey completed: Summer 2016.

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

The 5-year average unaccounted water for North Mankato is 14.70%. The City will continue to locate and seal water leaks. With the introduction of yearly detecting leaks in 100% of the system, it is expected that the amount of unaccounted water will decrease. A portion of the unaccounted water is unmetered water that is used by public drinking fountains, irrigation systems for City Hall and planters at Wheeler Park.

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	6,395	6,395	6,395	As needed	N/A
Irrigation meters					___ / ___
Institutional					___ / ___
Commercial	257	257	257	As needed	N/A
Industrial					___ / ___
Public Facilities	30	30	30	As needed	N/A
Other					___ / ___
TOTALS	6,682	6,682	6,682	NA	NA

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.

There are no known unmetered connections at this time.

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)	5	2	5	NA / 15 years
Treatment Plant	2	2	2	NA / 15 years

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? 64.5 g/capita/day

Describe the water use trend over that timeframe:

Overall the trend has been decreasing since 2006.

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

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. 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	As needed
☐ Offer free or reduced cost water use audits) for residential customers.	
☒ Implement a notification system to inform customers when water availability conditions change.	Implemented
☐ 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.	Implemented
☐ 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, fruit and vegetable, beverage, textiles, paper/pulp, metals, technology, petroleum refining etc.),	
☐ Install water conservation fixtures and appliances or change processes to conserve water	
☒ 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.)	
☐ 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.

Residential per capita demand has been decreasing since 2005. It may continue to decrease, but will eventually plateau as there is a minimal per capita demand. C/I/I per capita use had also been decreasing from 2005 to 2014, but has increased above 2004 levels in 2015.

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: 1.89

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 ____ 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: December 1, 2015.

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 ☐ Other (describe)	☒ Uniform ☐ Odd/Even day watering	☐ Service charge based on water volume ☐ Declining block ☐ Flat ☐ 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 ☐ Flat ☐ 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:

A uniform rate was implemented to eliminate the declining block rate and to avoid the increasing block rate.

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 <u>least two</u> 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?

Observing a reduction in unaccounted water usage. Observing an increase (regenerating) in water table levels. Achieving a lower per capita water usage.

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.

C. 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

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
☐ 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

D. 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.):

Low flush toilets are required by code.

E. 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	Conservation tips on water bill when space is available	Varies	☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Consumer Confidence Reports	Description of source water and treatment, results of monitoring	1	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Press releases to traditional local news outlets (e.g., newspapers, radio and TV)			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Social media distribution (e.g., emails, Facebook, Twitter)	Facebook page		☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Paid advertisements (e.g., billboards, print media, TV, radio, web sites, etc.)			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Presentations to community groups			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Staff training	Process controls and water efficiency		☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Facility tours	Describe treatment processes	Varies	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Displays and exhibits			☐ 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	Dates of hydrant flushing	2	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Direct mailings (water audit/retrofit kits, showerheads, brochures)			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies

Education Methods	General summary of topics	#/Year	Frequency
Information kiosk at utility and public buildings			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Public Service Announcements			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Cable TV Programs			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Demonstration projects (landscaping or plumbing)			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
K-12 Education programs (Project Wet, Drinking Water Institute, presentations)			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Community Events (children's water festivals, environmental fairs)			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Community education classes			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Water Week promotions			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Website (include address: https://www.northmankato.com/citynorthmankato/water-department)	In design stage. Water personnel, description of distribution system, states daily sampling and testing is done.		☒ 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			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies

Education Methods	General summary of topics	#/Year	Frequency
Other: Flyers handed out to new homeowners and citizens with high usage	Causes of high water use, conservation tips, utility rates		☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies

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

None at this time.

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

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

INVOICE

REMIT TO:

THEIN WELL

P.O. BOX 778 SPICER, MN 56288 (320) 796-2111
www.theinwell.com

WELLS – PUMPS
SALES – SERVICE
Since 1893

DATE: 4/7/08
INVOICE NO.: 2835
TERMS: Net 30 Days
DUE DATE: 5/7/08

SOLD TO:

CITY OF NORTH MANKATO
PO BOX 2055
NORTH MANKATO, MN 56003

NORTHMANKATO

CREDIT CARD PAYMENT AUTHORIZATION

☐ MasterCard _____ CARD ACCOUNT NUMBER

☐ VISA _____ EXPIRATION DATE

_____ CARD HOLDER SIGNATURE

PLEASE DETACH & RETURN THIS PORTION WITH PAYMENT

$ _____ AMOUNT ENCLOSED

QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
1.00	WELL #5 MAINTENANCE		
1.00	PULL PUMP & MOTOR ASSEMBLY, TRANSPORT TO SHOP, INSPECT & REPORT, REINSTALL PUMP	4,000.00	4,000.00
1.00	75 HP MOTOR	4,417.00	4,417.00
1.00	MOTOR INSPECTION	300.00	300.00
2.00	PACKING	35.00	35.00
3.00	REPLACE BEARING INSERTS	15.00	30.00
1.00	SHOP LABOR - CLEAN & STRAIGHTEN SHAFTS	78.00	234.00
1.00	PAINT DISCHARGE HEAD	200.00	200.00
1.00	PAINT COLUMN	900.00	900.00
1.00	PAINT COUPLINGS	300.00	300.00
3.00	PAINT BOWLS	300.00	300.00
1.00	REPLACE WEAR RINGS	150.00	450.00
1.00	MACHINE PUMP & INSTALL WEAR RINGS	200.00	200.00
5.00	MACHINING HEADSHAFT	128.00	128.00
1.00	SHOP LABOR	78.00	390.00
1.00	TELEVISE WELL	1,000.00	1,000.00
1.00	8" GASKET	12.00	12.00
	STUFFING BOX GASKET	10.00	10.00

Thank You

We will add finance charges on invoices more than 30 days overdue.

MBER THEIN WELL P.O. BOX 778 SPICER

INVOICE

INVOICE NO.
19158

BERGERSON-CASWELL, INC.
WELL DRILLING AND PUMPS
[illegible]
Maple Plain, MN 55359
PH: 763-479-[illegible]
FX: 763-[illegible]

BILL TO
City of North Mankato
1001 Belgrade Ave
P.O. Box 2055
North Mankato, MN 56002

JOB
33660T-North Mankato Well-#5&6
1001 Belgrade Ave
P.O. Box 2055
North Mankato, MN 56002

CUSTOMER	PURCHASE ORDER NO.			BILL THRU	TERMS	INVOICE DATE	PAGE
NORTH MA					Net 30	1/30/15	1

ITEM NO.	QUANTITY	DESCRIPTION	UNIT PRICE	EXTENDED PRICE
		Job# 33660T		
		RE: Well #5 Isolating and pump testing project.		
		*All applicable State and Federal Taxes have been paid on all Installed Materials for this Installation and are included in the Material Prices.		
	1	LS Mobilize/demobilize	8,000.00	8,000.00
	1	LS Remove pump installation	1,750.00	1,750.00
	1	LS Video tape the well	950.00	950.00
	1	LS Ream well casing to clear any sharp objects	1,750.00	1,750.00
	1	LS Install packer with cap pipe and test pump	4,000.00	4,000.00
	4	HR Inflate packer and run test pump in FIG formation	250.00	1,000.00
	1	LS Remove and reinstall packer without cap for testing Mt. Simon	3,500.00	3,500.00
	4	HR Inflate packer and run test pump in Mt. Simon	250.00	1,000.00
	2	LS Collect water samples	500.00	1,000.00
	2	LS Send water samples to laboratory for analysis	800.00	1,600.00
	1	LS Remove packers and testing equipment	1,000.00	1,000.00
	1	LS Reinstall pumping equipment and test	1,750.00	1,750.00
	1	LS Disinfect the well	100.00	100.00
	1	LS Bacteriological sample to place well back into service	100.00	100.00

	SALE AMOUNT	
	TOTAL	

INVOICE

INVOICE NO 19158

BERGERSON-CASWELL, INC.
WELL DRILLING AND PUMPS
[illegible]
PH: [illegible]
FX: [illegible]

BILL TO

City of North Mankato
1001 Belgrade Ave
P.O. Box 2055
North Mankato, MN 56002

JOB

33660T-North Mankato Well-#5&6
1001 Belgrade Ave
P.O. Box 2055
North Mankato, MN 56002

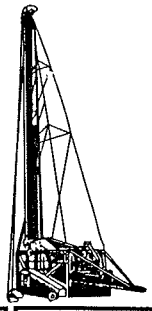
CUSTOMER	PURCHASE ORDER NO	BILL THRU	TERMS	INVOICE DATE	PAGE
NORTH MA			Net 30	1/30/15	2

ITEM NO.	QUANTITY	DESCRIPTION	UNIT PRICE	EXTENDED PRICE
	4	EA 10' Section (epoxy coated column, shaft, & spider)	800.00	3,200.00
	1	LS Shop Labor clean the surfaces of the spider assemblies,and clean,straighten line shafting	1,500.00	1,500.00
	1	LS Modify the well head and install 1" drawdown tubing	250.00	250.00
	1	LS Re-video well once all work has been completed	950.00	950.00
	1	LS Rebuild pump bowl: Jacuzzi 12 MCZ-3 stage 1,100 GPM @ 170' TDH, set of bowl bearings	600.00	600.00
	4	EA Replace rubber bearings in spider assemblies	25.00	100.00
	1	EA 5'x10" Tailpipe welded to excisting tailpipe	450.00	450.00
	1	EA 10" SIS Conestrainer	825.00	825.00
	1	EA Delivery and installation cost	500.00	500.00

THANK YOU FOR YOUR BUSINESS!

PAST DUE ACCOUNTS SUBJECT TO 1.5% FINANCE CHARGES PER MONTH PLUS ALL COLLECTION COSTS.

SALE AMOUNT	35,875.00
TOTAL	$35,875.00



BERGERSON - CASWELL INC.

Commercial • Municipal • Residential
Geothermal • Irrigation
Submersible & Turbine Pumps
Environmental Drillers

Well Drilling, Abandonment & Repair Since 1948

Certified Well Drillers
Certified Pump Installers

January 11, 2008

CITY OF NORTH MANKATO
Attn: Mr. Rich Peterson
P.O. Box 2055 (507) 381-6604
North Mankato, MN 56002 (507) 625-4151

RE: TOTAL PROJECT INVOICE AMOUNT FOR WELL & PUMP #6

Dear Mr. Peterson, Bergerson Caswell Inc. appreciates the opportunity to assist you with your well and pump needs. We have completed the project at well #6, and below is an itemized breakdown of the project costs to complete.

PROJECT COST

Labor & Equipment to remove, and inspect owner's pump(shaft clamps):	
9.5 hrs @ $235.00/hr, and 9 hrs @ $175.00	$ 3,807.50
Video Investigation (10-26-07)	$ 750.00
Brush 20" well Casing (10-27-07)	$ 1,750.00
Furnish, Install, & Remove Air-Lifting Equipment (680')	$ 5,500.00
Operate air lift; 40.5 hrs @ $240.00/hr	$ 9,720.00
Field labor Fishing metal debris (2 men): 26 hrs @ $175.00/hr;	$ 4,550.00
Shop labor to load / unload material required for project $ 65.00/hr; 11 hrs	$ 715.00
Re-Video investigate well when project is complete (12-17-07)	$ 750.00
Room & Board (out of town work) 4 days @ $175.00/day	$ 700.00
Pump Repairs	
1) Pump Motor: General Maintenance and bearing replacement	$ 2,650.00
2) Column Pipe: Replace 185'x 10" column pipe @ 49.00 ft	$ 9,065.00
Furnish New Lakos PPS-825-I sand separator (tail pipe)	$ 5,900.00
3) Pump Shafts and components	
Replace head bushing/ bearing	$ 150.00
Replace packing	$ 65.00
Replace 1.685"x 10' SS Line-shaft (10 tpi)	$ 495.00
Replace 1.685"x 5' SS Line-shaft (10 tpi)	$ 380.00
Replace 1.685" Head shaft assembly	$ 650.00
Furnish & Install (20) each line-shaft sleeves, @ $70.00/each	$ 1,400.00
Replace (5) shaft couplings @ $75.00/each (1.685"x 10 tpi. SS)	$ 375.00
Replace 10 each Spider bearing assemblies @ $225.00/each	$ 2,250.00
Replace 9 each Spider bearing inserts @ $30.00/each	$ 270.00
Recondition discharge head (Sandblast & paint, gaskets)	$ 280.00
Sandblast & Paint Column Pipe & Couplings (2 part Epoxy)	$ 1,650.00
Sandblast & Paint Pump Bowl, & sand separator (2 part Epoxy)	$ 450.00
4) Replace pump bowl assembly with American Marsh 13 MC 5 stage	$ 5,275.00
Designed to produce 1400 GPM @ 320'TDH	
Shop Labor to clean & straighten line shaft 25 hrs @ $65.00/hr	$ 1,625.00
5) Labor & Equipment to reinstall well pump, start up, test and balance:	$ 2,800.00
TOTAL PROJECT INVOICE AMOUNT	**$ 63,972.50**

I have enclosed all paper work relating to this project along with this invoice. If you have any questions, require additional information; or would like to discuss this project, please do not hesitate to contact us at (763) 479-3121 ext210, cell # (612) 369-3652.

Sincerely, **BERGERSON CASWELL INC.** Tim Berquam Project Manager

INVOICE

INVOICE NO. 19159

BERGERSON-CASWELL, INC.
WELL DRILLING AND PUMPS
5115 Industrial Street
Maple Plain, MN 55359
PH: 763-479-3121
FX: 763-479-2183

BILL TO
City of North Mankato
1001 Belgrade Ave
P.O. Box 2055
North Mankato, MN 56002

JOB
33660T-North Mankato Well-#5&6
1001 Belgrade Ave
P.O. Box 2055
North Mankato, MN 56002

CUSTOMER	PURCHASE ORDER NO.	BILL THRU	TERMS	INVOICE DATE	PAGE
ORTH MA			Net 30	1/30/15	1

ITEM NO.	QUANTITY	DESCRIPTION	UNIT PRICE	EXTENDED PRICE
		Job #33660T		
		RE: Well#6 Isolating and pump testing project		
		*All applicable State and Federal Taxes have been paid on all Installed Materials for this Installation and are included in the Material Prices.		
	1	LS Mobilize/demobilize	19,000.00	19,000.00
	1	LS Remove pump installation	1,750.00	1,750.00
	1	LS Video tape the well	950.00	950.00
	1	LS Ream well casing to clear any sharp objects	2,000.00	2,000.00
	1	LS Install packer with cap pipe and test pump	4,000.00	4,000.00
	4	HR Inflate packer and run test pump in FIG formation	250.00	1,000.00
	1	LS Remove & reinstall packer without cap for testing Mt. Simon	4,000.00	4,000.00
	4	LS Inflate packer and run test pump in Mt. Simon	250.00	1,000.00
	2	EA Collect water samples	500.00	1,000.00
	1	LS Send water samples to laboratory for analysis	1,600.00	1,600.00
	1	LS Remove packers and testing equipment	1,000.00	1,000.00
	1	LS Reinstall pumping equipment and test	1,750.00	1,750.00
	1	LS Disinfect the well	100.00	100.00
	1	LS Bacteriological sample to place well back into service	100.00	100.00

SALE AMOUNT	
TOTAL	

INVOICE

INVOICE NO. 19159

BERGERSON-CASWELL, INC.
WELL DRILLING AND PUMPS
5115 Industrial Street
Maple Plain, MN 55359
PH: 763-479-3121
FX: 763-479-2183

BILL TO
City of North Mankato
1001 Belgrade Ave
P.O. Box 2055
North Mankato, MN 56002

JOB
33660T-North Mankato Well-#5&6
1001 Belgrade Ave
P.O. Box 2055
North Mankato, MN 56002

CUSTOMER	PURCHASE ORDER NO.	BILL THRU	TERMS	INVOICE DATE	PAGE
NORTH MA			Net 30	1/30/15	2

ITEM NO.	QUANTITY	DESCRIPTION	UNIT PRICE	EXTENDED PRICE
	8	EA Replace 10"x10' column sections	600.00	4,800.00
	1	EA Replace 10"x5' Column section	450.00	450.00
	85	FT Epoxy coat column pipe 85'	12.00	1,020.00
	1	LS Replace rubber boot on sand separator	200.00	200.00
	1	LS Shop labor	1,500.00	1,500.00
	1	LS Revideo well after all work has been completed	950.00	950.00
	5	EA Rebuild the pump bowl assembly, machine impeller and install wear ring; 5 stages	350.00	1,750.00
	1	LS Set of bowls bearings	650.00	650.00
	1	LS Bowl Shaft	650.00	650.00

THANK YOU FOR YOUR BUSINESS!

PAST DUE ACCOUNTS SUBJECT TO 1.5% FINANCE CHARGES PER MONTH PLUS ALL COLLECTION COSTS.

SALE AMOUNT	51,220.00
TOTAL	$51,220.00

BERGERSON-CASWELL
INCORPORATED

Bergerson - Caswell Inc.
5115 Industrial Street
Maple Plain, MN 55359

August 27, 2009

CITY OF NORTH MANKATO
Attn: Mr. Rich Peterson
P.O. Box 2055
North Mankato, MN 56002

(507) 381-6604
(507) 625-4151

RE: **INVOICE FOR REPAIRING WELL PUMP #7**

Dear Mr. Peterson;
Bergerson Caswell Inc. appreciates the opportunity to assist you with your well and pump needs. As requested we have repaired and reinstalled this installation as described and broken down below.

PROJECT COST

Labor & Equipment to remove, and inspect owner's pump(shaft clamps): 14.5 hrs @ $235.00/hr, and 7 hrs @ $75.00	$ 3,932.50
Video Investigation (8-19-09, & 8-21-09)	$ 1,450.00
Field labor Fishing tail pipe and pump case (2 men): 14 hrs @ $175.00/hr;	$ 2,450.00
Shop labor to load / unload, clean & evaluate materials for project $ 75.00/hr; 24 hrs	$ 1,800.00
1) Pump Motor: General Maintenance and bearing replacement	$ 3,250.00
2) Column Pipe: Replace 350'x 10" column pipe @ 63.50 ft	$ 22,225.00
Replace tail pipe and bleed back check valve	$ 2,100.00
3) Pump Shafts and components	
Replace head bushing/ bearing & packing	$ 225.00
Replace Column flange adapter	$ 925.00
Replace 1.685"x 5' SS Line-shaft (10 tpi)	$ 380.00
Replace 1.685" Head shaft assembly	$ 650.00
Furnish & Install (10) each line-shaft sleeves, @ $70.00/each	$ 700.00
Replace (3) shaft couplings @ $75.00/each (1.685"x 10 tpi. SS)	$ 225.00
Replace 2 each Spider bearing assemblies @ $125.00/each	$ 250.00
Replace 35 each Spider bearing inserts @ $25.00/each	$ 875.00
Recondition discharge head (Sandblast & paint, gaskets)	$ 280.00
(2) each 1" poly tubes for water level monitoring @ 1.00/ft (700')	$ 700.00
4) Replace pump bowl assembly American Marsh 13 MC 5 stage Designed to produce 1100 GPM @ 385'TDH	$ 6,375.00
Shop Labor to clean & straighten line shaft 25 hrs @ $65.00/hr	$ 1,625.00
5) Labor & Equipment to reinstall well pump, start up, test and balance:	$ 3,400.00
TOTAL PROJECT INVOICE AMOUNT	**$ 53,817.50**

If you have any questions, require additional information, or would like to discuss this project, please do not hesitate to contact us at (763) 479-3121 ext210, cell # (612) 369-3652.
Sincerely,
BERGERSON CASWELL INC. Tim Berquam - Project Manager

TURBINE PUMP
(MOTOR, PUMP, PERFORMANCE RECORD)

(AS INSTALLED) DATE: August 26, 2009

GENERAL INFO:

Customer/Owner: City of North Mankato Well/Pump 7

Address/Location: Treatment Plant

Persons on Job Site Duane, Rich, Tom - Electric

MOTOR INFO:

Horsepower 200 Stand Still Volts 494/496/491 Running Volt 490/488/490

Manufacturer US R.P.M 1770 Full Load Amps 228 S.F.Amps 1.15

BOWL DESIGN: G.P.M. 1100 T.D.H. 385' Megger Reading 1000

PERFORMANCE TEST: Static Water Level 238' Well Diameter 20" Well Depth 836'

Test #1: HZ ____	AMPS	149/152/146	G.P.M.	1250	Water Level	288'	P.S.I. 47	T.D.H. 396'
Test #2: HZ ____	AMPS	149/150/138	G.P.M.	1100	Water Level	287'	P.S.I. 55	T.D.H. 414'
Test #3: HZ ____	AMPS		G.P.M.		Water Level		P.S.I.	T.D.H.

T.D.H. = Pumping Water Level in Feet + (P.S.I. reading x 2.31) + Friction Loss In Column + Fittings

Example: Information Given: 1000 G.P.M., 150' Water Level, 50 P.S.I.,3.5' Friction Loss

Therefore: 150' + (50# x 2.31 or 115.5') + 3.5' = 269' T.G.H.

OR

The pump is producing 1000 G.P.M. at 269' T.D.H.

Does Well Pump Sand? Yes / NO If So, How Much? Test #1 1/2" " in Gallon Jar

Test #2 1/4" " in Gallon Jar

Test #3 " in Gallon Jar

Closed Valve Test: P.S.I. Reading Water Level

Vibration Record: Vibration in Mils:

A	0.9	90* from Discharge
B	0.8	In Line with Discharge
C	0.6	90* from Discharge
D	0.6	In Line with Discharge

Tested By: Tom D., Eugene D., Mike Tashe

Problems/Comments: This installation ran extremly smooth.

Customer/Owner Comment:

INVOICE

THEIN WELL

REMIT TO:

P.O. BOX 778 SPICER, MN 56288 (320) 796-2111
www.theinwell.com

WELLS – PUMPS
SALES – SERVICE
Since 1893

DATE: 12/22/11
INVOICE NO.: 3993
TERMS: Net 30 Days

SOLD TO:

CITY OF NORTH MANKATO
PO BOX 2055
NORTH MANKATO, MN 56003

NORTHMANKATO

CREDIT CARD PAYMENT AUTHORIZATION

☐ MasterCard _____ CARD ACCOUNT NUMBER

_____ EXPIRATION DATE

☐ VISA _____ CARD HOLDER SIGNATURE

$ _____ AMOUNT ENCLOSED

PLEASE DETACH & RETURN THIS PORTION WITH PAYMENT

QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
	PO #11612 WELL #8		
1.00	PULL PUMP & MOTOR ASSEMBLY - INSTALL, DISINFECT & RETURN TO SERVICE	9,400.00	9,400.00
1.00	GENERAL MAINTENANCE OF MOTOR	1,500.00	1,500.00
1.00	REPLACE BEARINGS	700.00	700.00
1.00	ADDITIONAL COST FOR THRUST BEARING	290.00	290.00
1.00	MOTOR GUIDE BEARING	200.00	200.00
105.00	FEET - 10" COLUMN PIPE	50.00	5,250.00
10.00	FEET - 10" TAILPIPE	40.00	400.00
1.00	PACKING	75.00	75.00
1.00	SHAFT SLEEVE	50.00	50.00
1.00	SANDBLAST & PAINT DISCHARGE HEAD	300.00	300.00
1.00	SANDBLAST COLUMN PIPE - PRIME & PAINT	1,000.00	1,000.00
1.00	SANDBLAST PUMP - PRIME & PAINT	250.00	250.00
1.00	REMOVE & REINSTALL POLY WATER LEVEL LINE	100.00	100.00
1.00	1" POLY TUBE FOR WATER LEVEL MONITORING	350.00	350.00
1.00	12" GASKET	18.00	18.00
1.00	7/8" AND 3/4" BOLTS & NUTS	45.00	45.00
2.00	ROLLS - PIPE WRAP	17.50	35.00

Thank You

We will add finance charges on invoices more than 30 days overdue.

Subtotal	19,963.00
Total Invoice Amount	$19,963.00
Payment/Credit Applied	
TOTAL	$19,963.00

Check/Credit Memo No:

Appendix 2:

Water Level Monitoring Plan

The City of North Mankato monitors water levels in Wells 6, 7, 8, and 9 continuously through a SCADA system and manual drawdown tests are performed twice a year. Well 5 has manual drawdown tests every two months.

2016 Water Supply Plan

City of North Mankato

Appendix 2

August, 2016

Water Plant 2, Well 7, & Ground Storage Reservoirs (750,000 Gal)

Well 9

Well 8

Water Tower 2 (500,000 Gal)

Hillside Reservoirs (190,000 Gal & 60,000 Gal)

Ground Storage Reservoir (500,000 Gal)

Well 6

Water Plant 1

Well 5

Water Tower 1 (500,000 Gal)

Hiniker Pond

Spring Lake Park

Minnesota River

City of Mankato

City of Mankato

CH 77

CH 13

CR 13/LOOKOUT DR.

CH 41/ROCKFORD RD.

512TH ST.

415TH AVE.

409TH AVE.

KERNS DR.

LOR RAY DR.

LEE BLVD.

LOOKOUT DR.

US 14

US 169

US 169 MN 60

LAKE ST.

COUNTY 71 ROAD

Legend

- Existing Well
- Existing Resevoir
- Existing Tower
- Existing Watermain
- City Limits
- Parcels

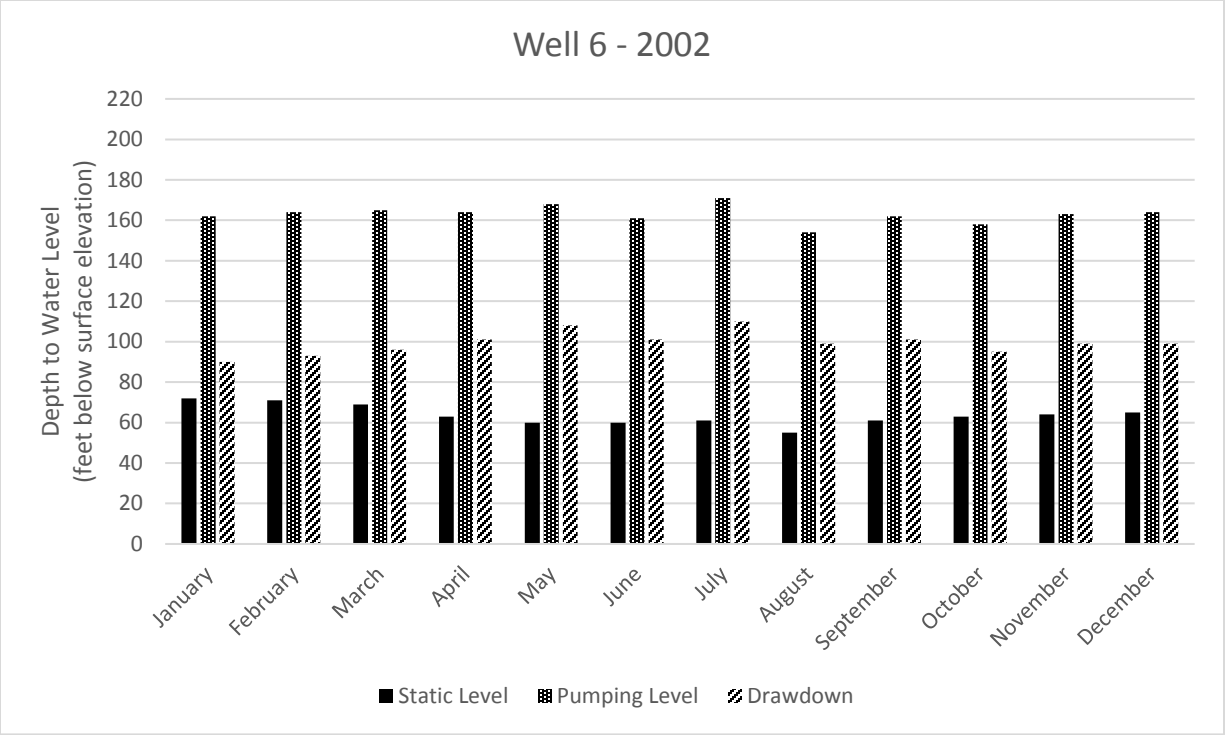
0 2,000 Feet

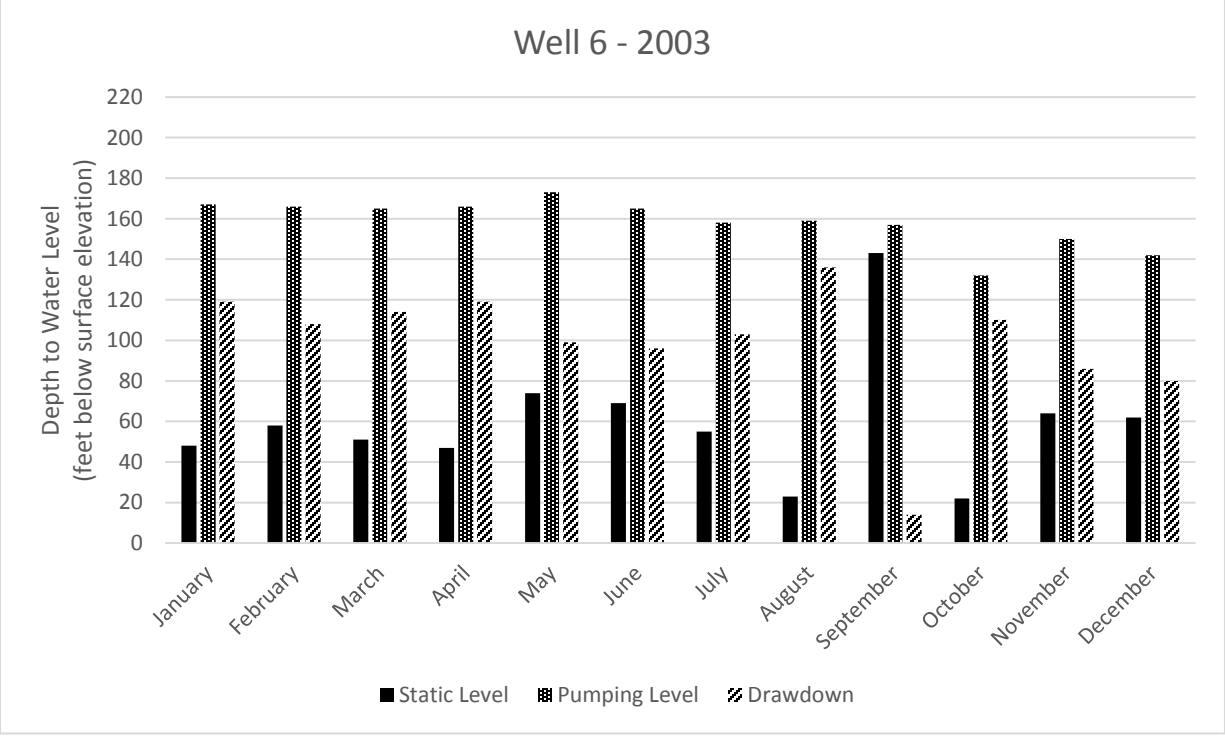
Source: Nicollet County, MnDNR, Google - Satellite - Imagery ©2016, DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency

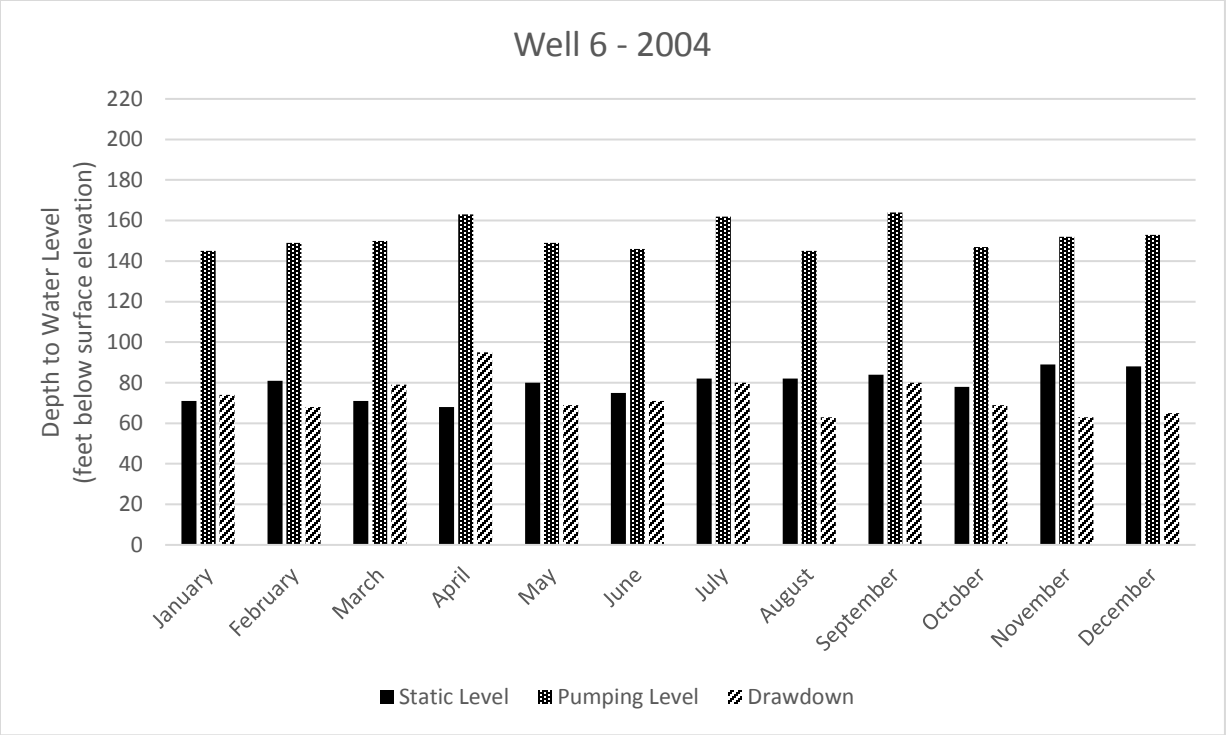
Map Document: \\arcserver1\GIS\NMAN_Basemap\ESRI\Maps\2016\Nman_2016_WaterSupply_11x17.mxd
Date Saved: 8/4/2016 9:13:29 AM

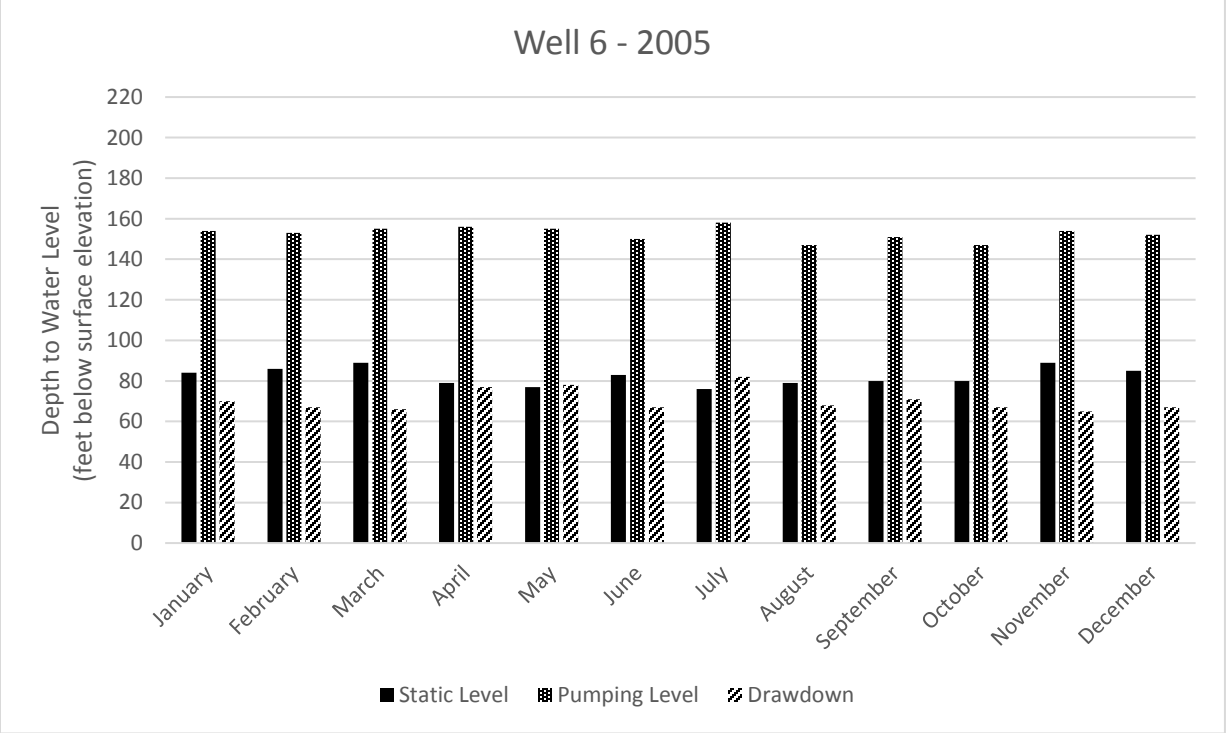
Appendix 3:

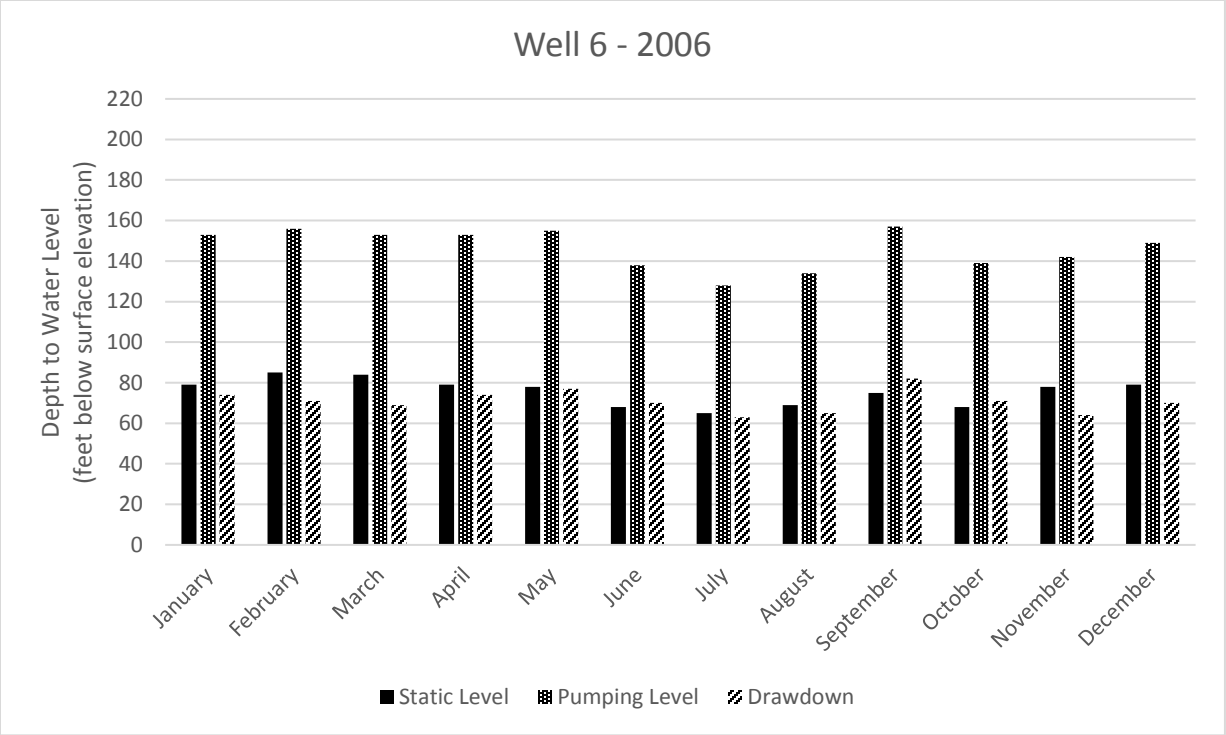
Water Level Graphs for each Water Supply Well

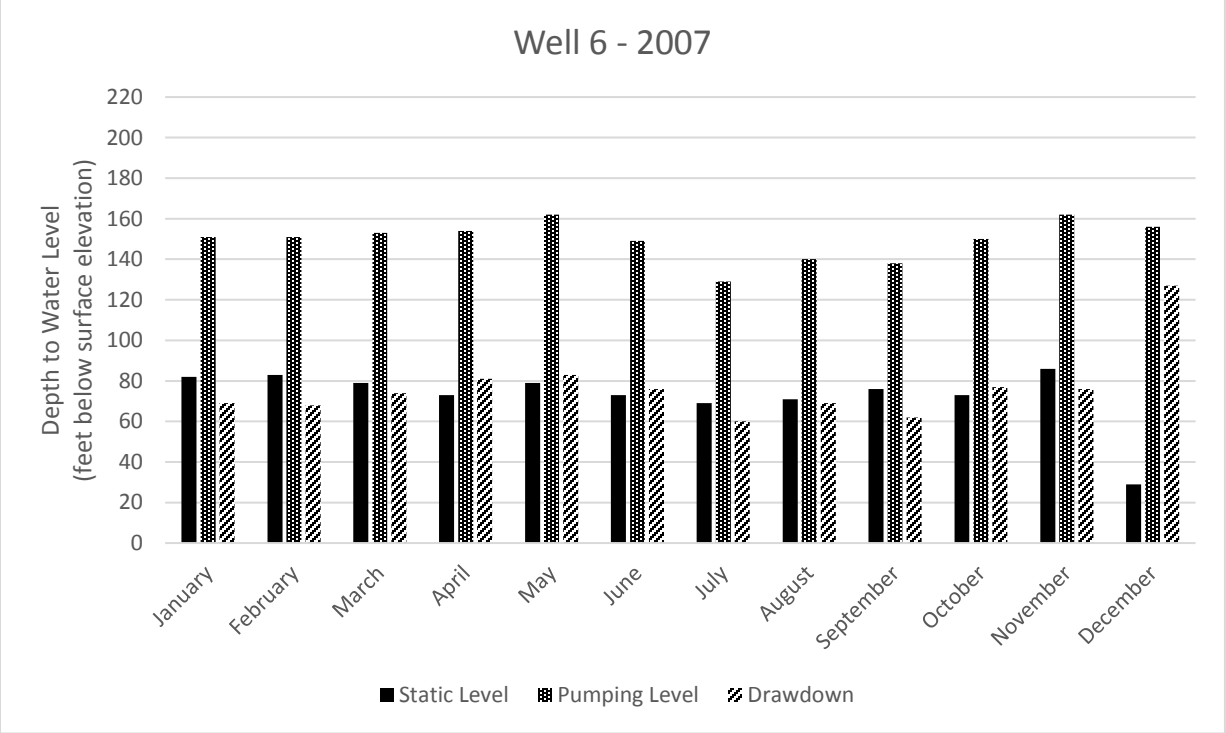

Well 6 - 2002
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December
Static Level
Pumping Level
Drawdown

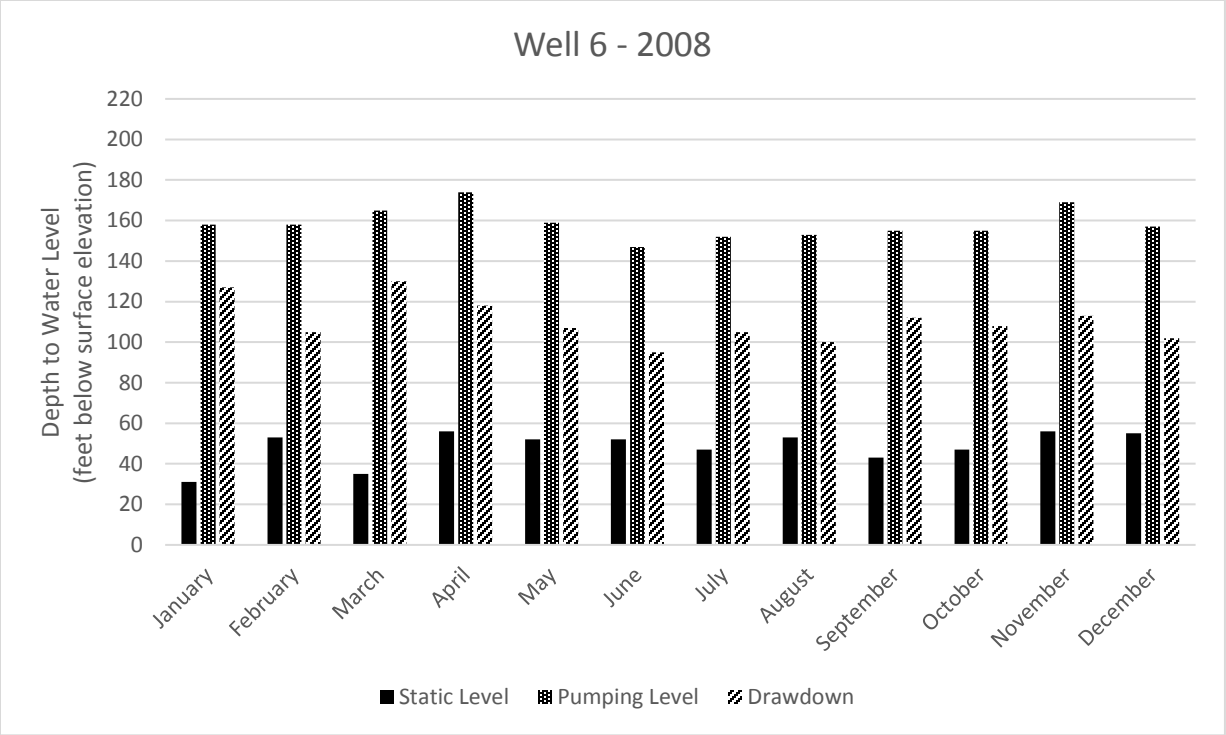

Well 6 - 2003
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December
Static Level
Pumping Level
Drawdown

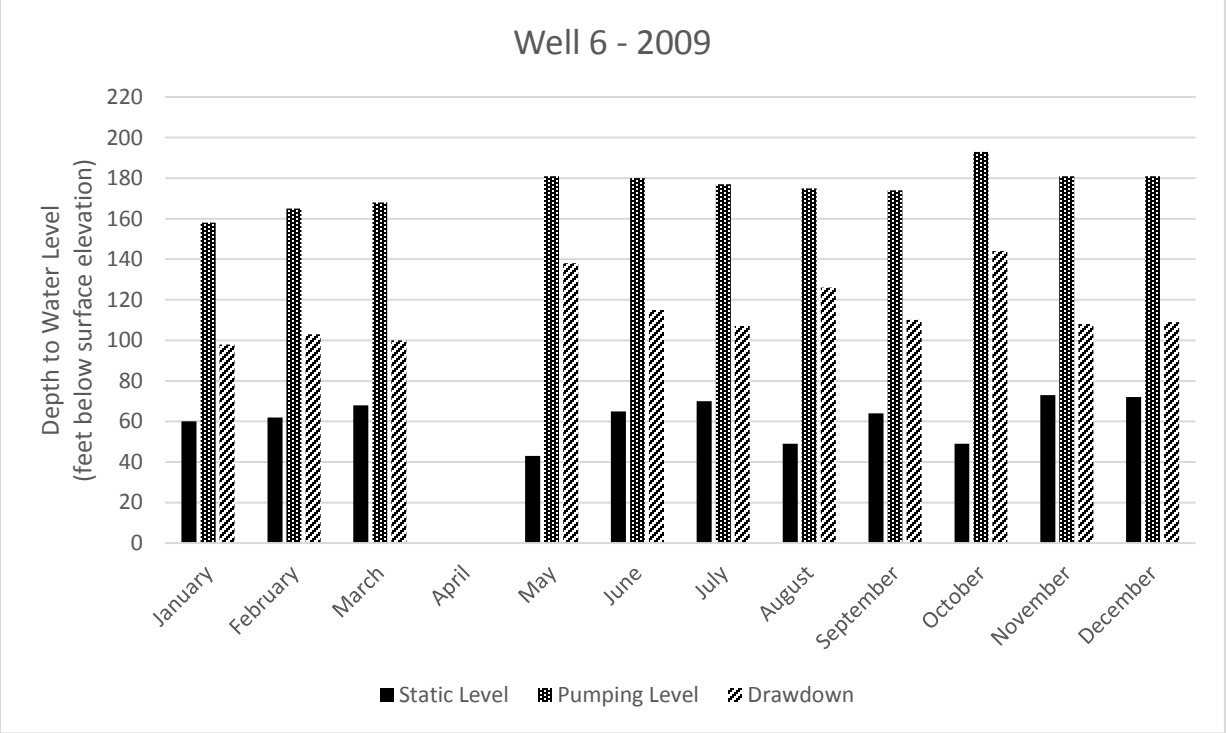

Well 6 - 2004
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December
Static Level
Pumping Level
Drawdown

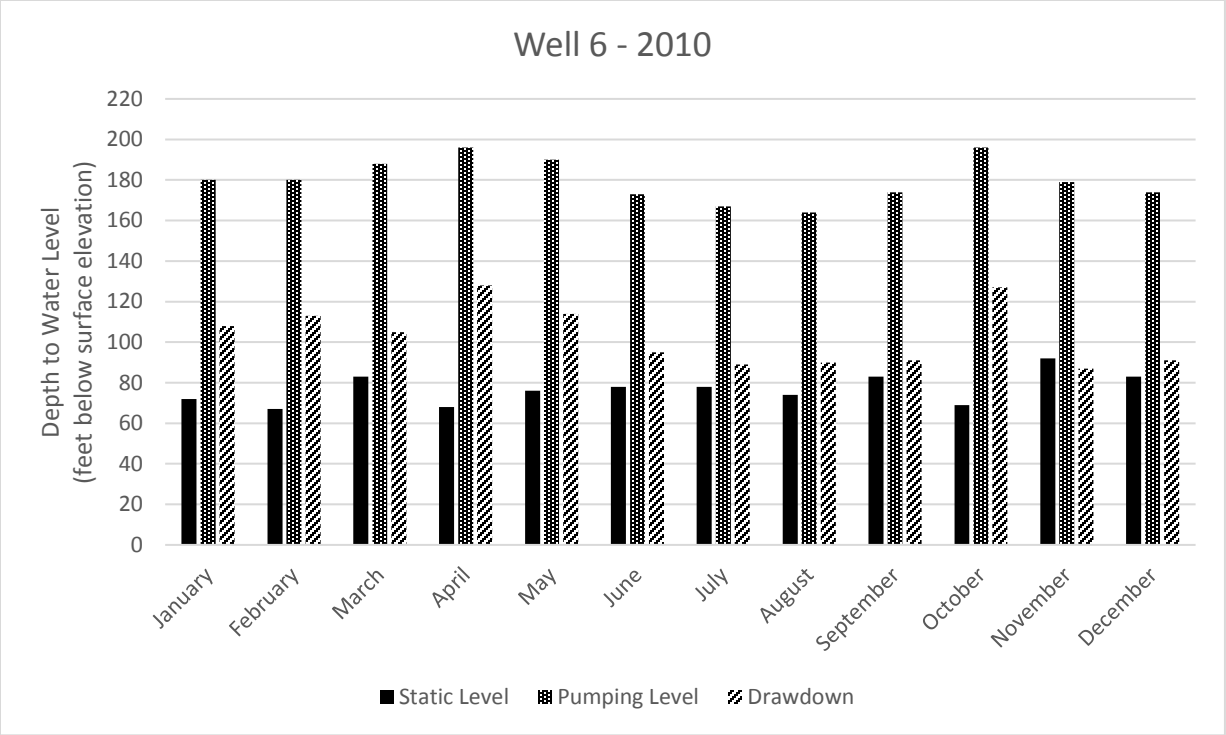

Well 6 - 2005
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December
Static Level
Pumping Level
Drawdown

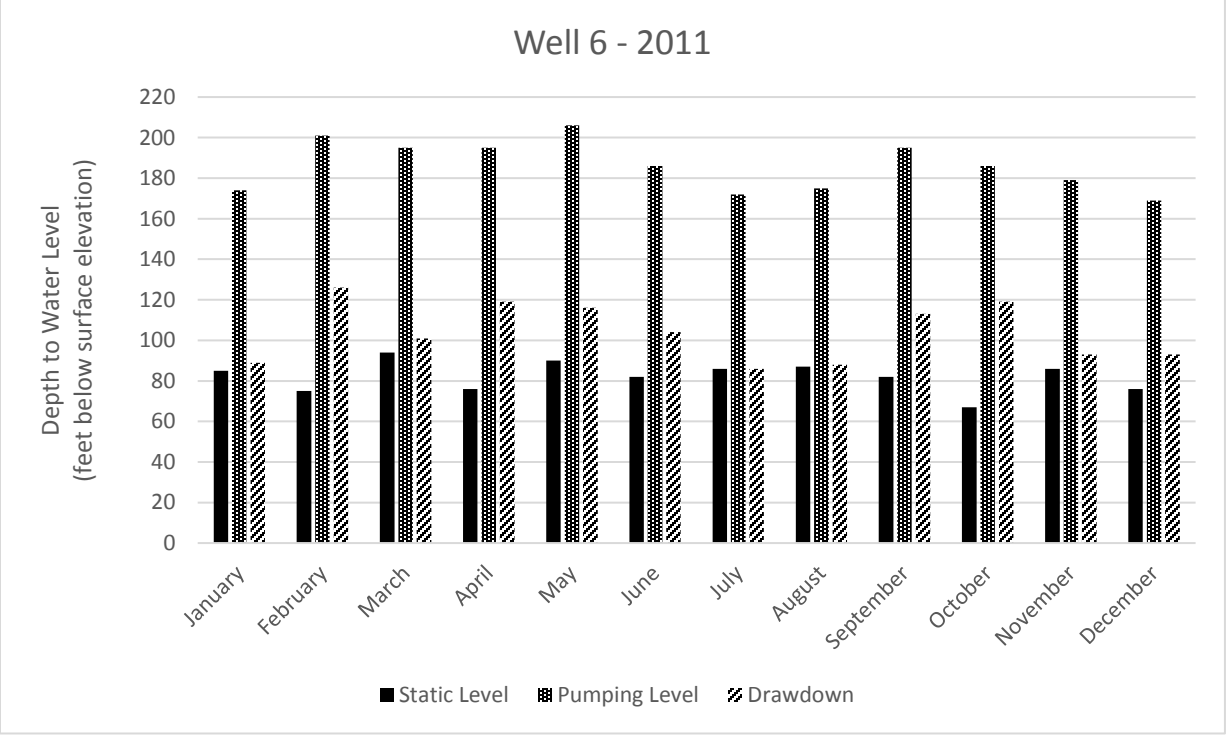

Well 6 - 2006
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December
Static Level
Pumping Level
Drawdown

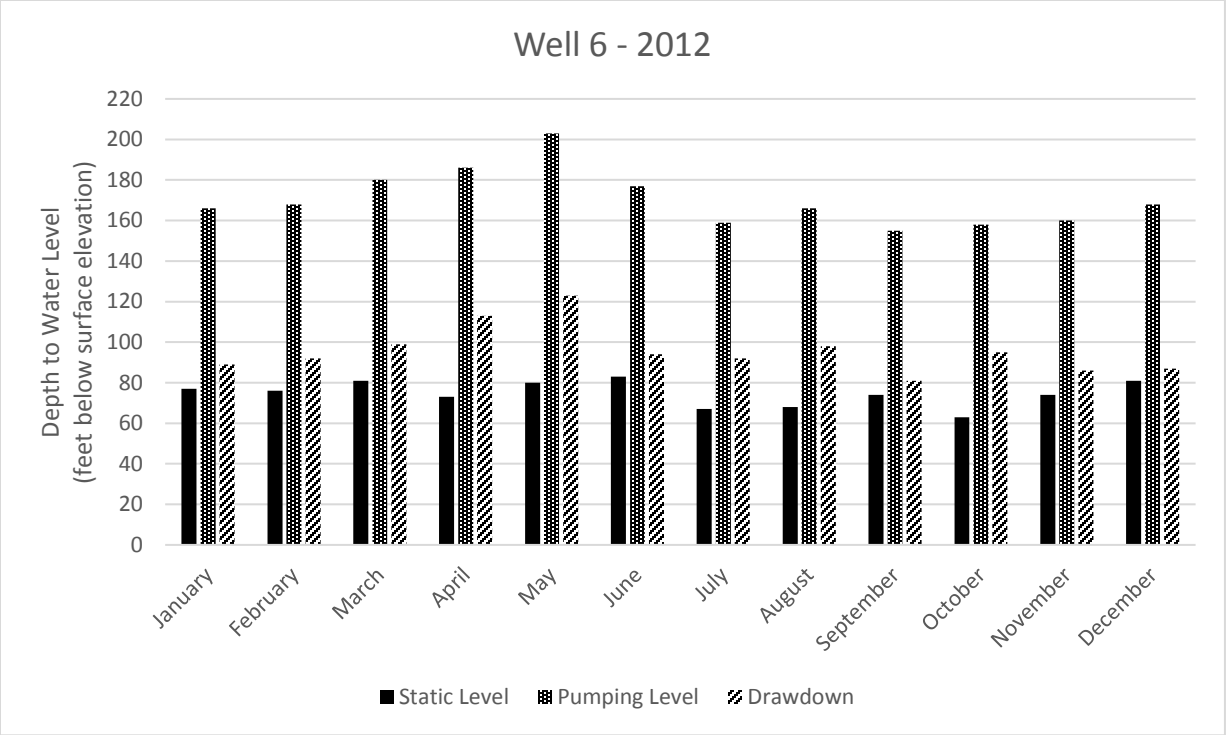

Well 6 - 2007
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December
Static Level
Pumping Level
Drawdown


Well 6 - 2008
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December
Static Level
Pumping Level
Drawdown


Well 6 - 2009
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December
Static Level
Pumping Level
Drawdown


Well 6 - 2010
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December
Static Level
Pumping Level
Drawdown


Well 6 - 2011
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December
Static Level
Pumping Level
Drawdown


Well 6 - 2012
Depth to Water Level
(feet below surface elevation)
220
200
180
160
140
120
100
80
60
40
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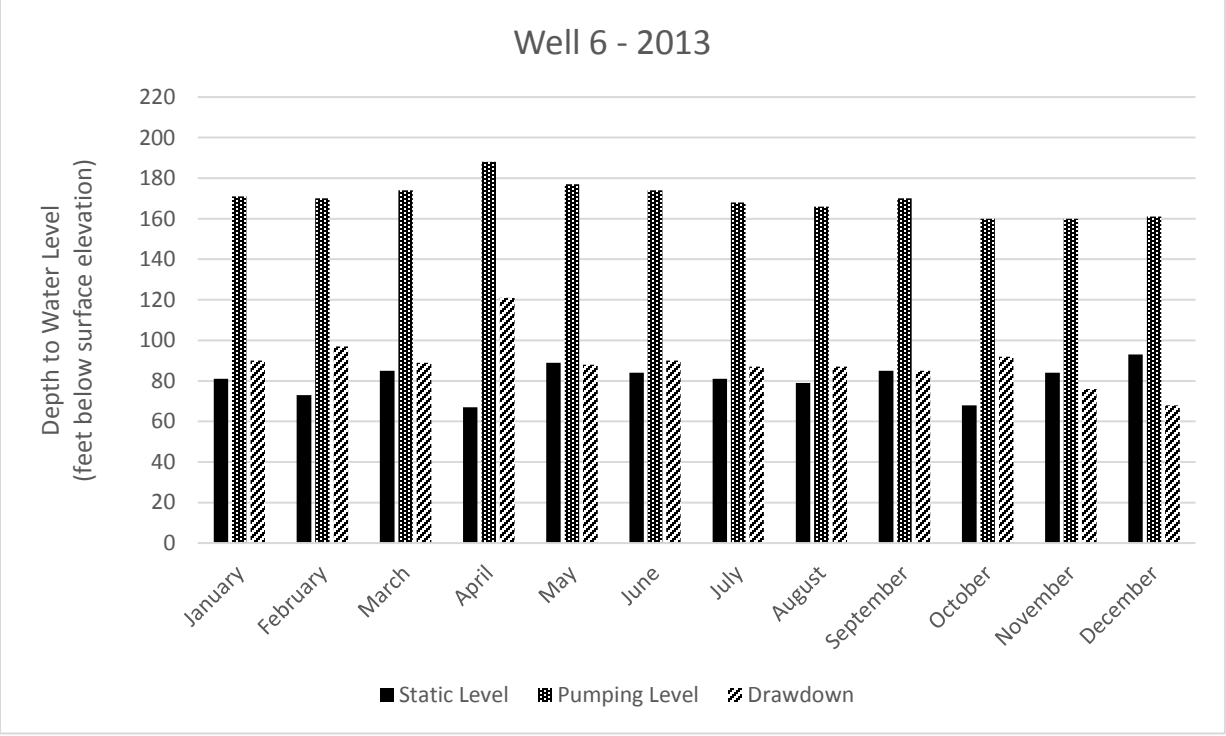
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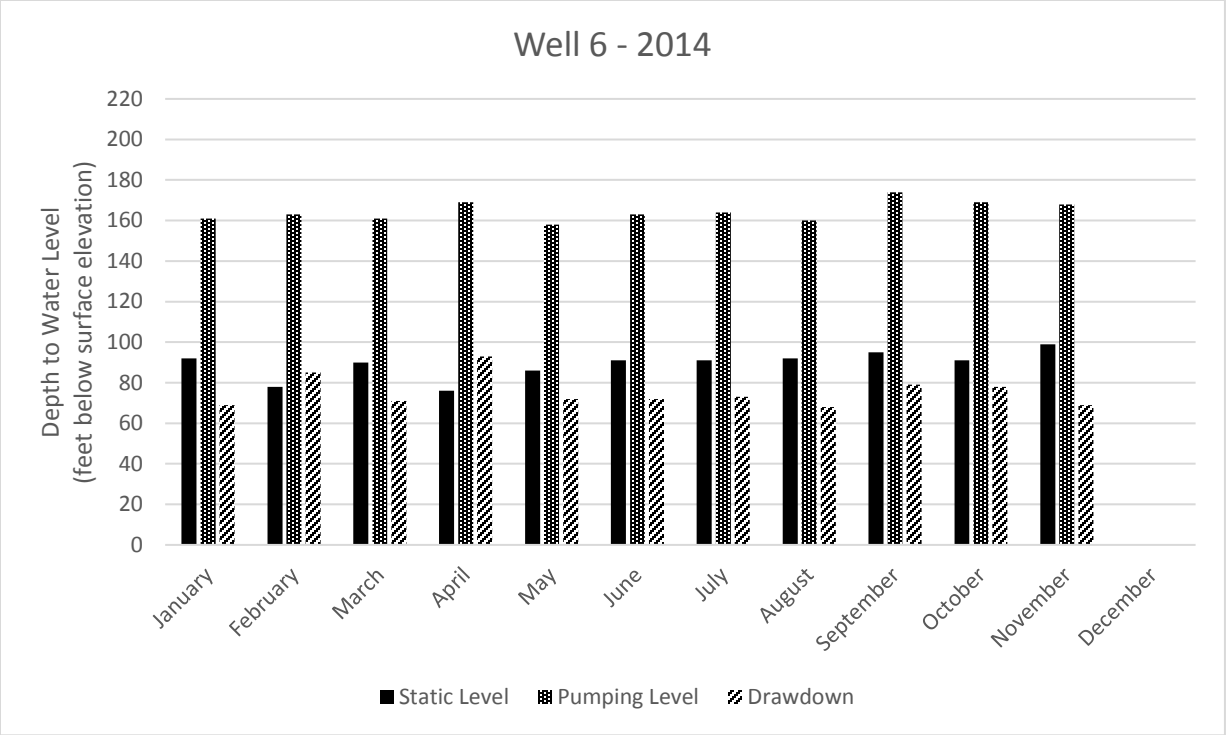
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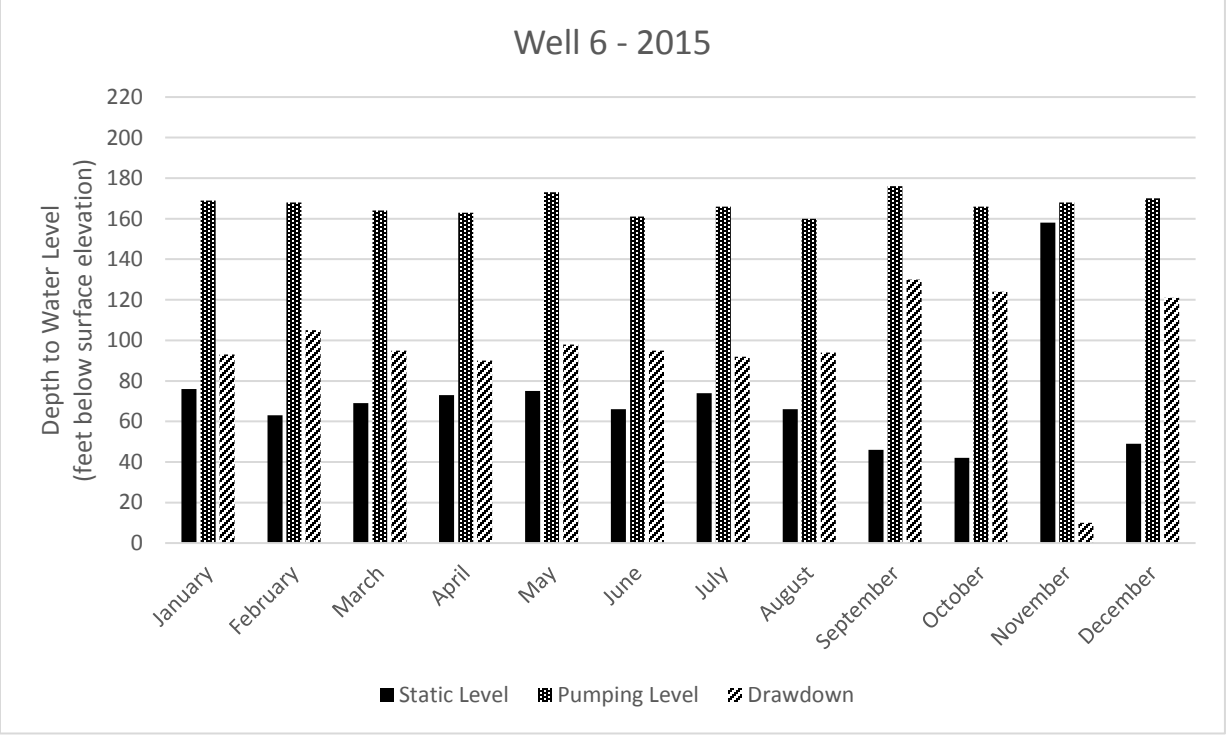
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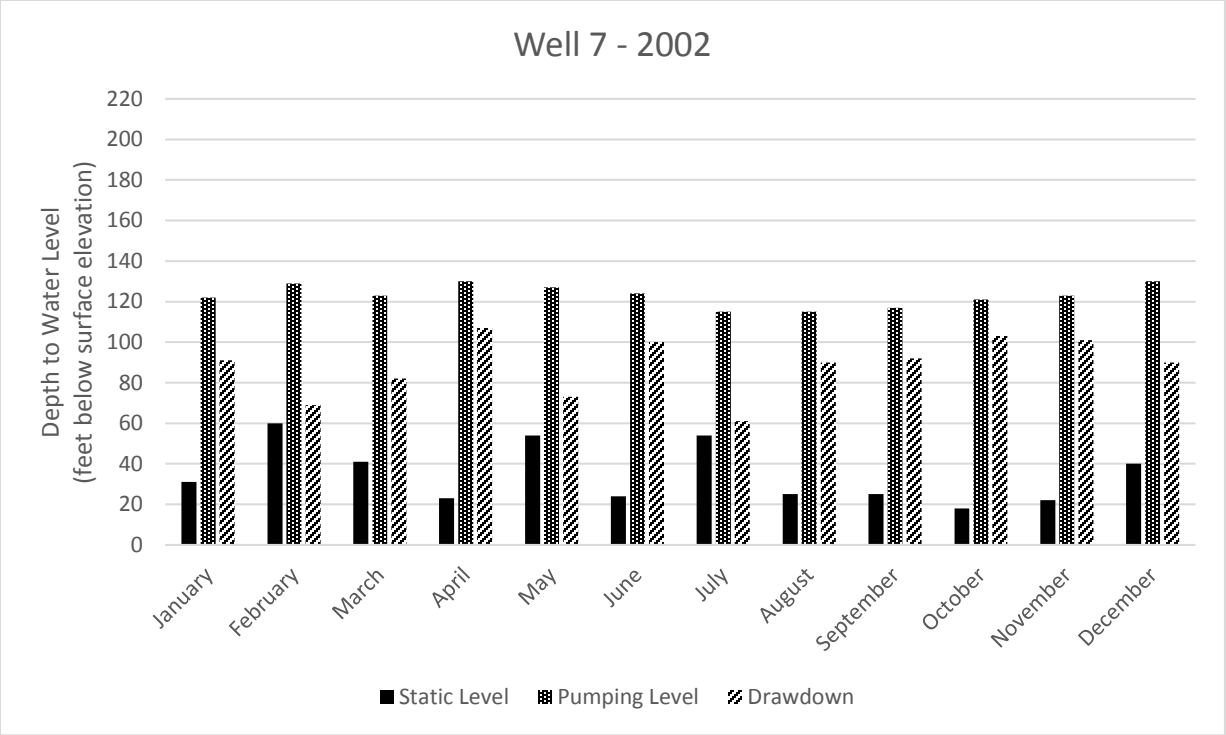
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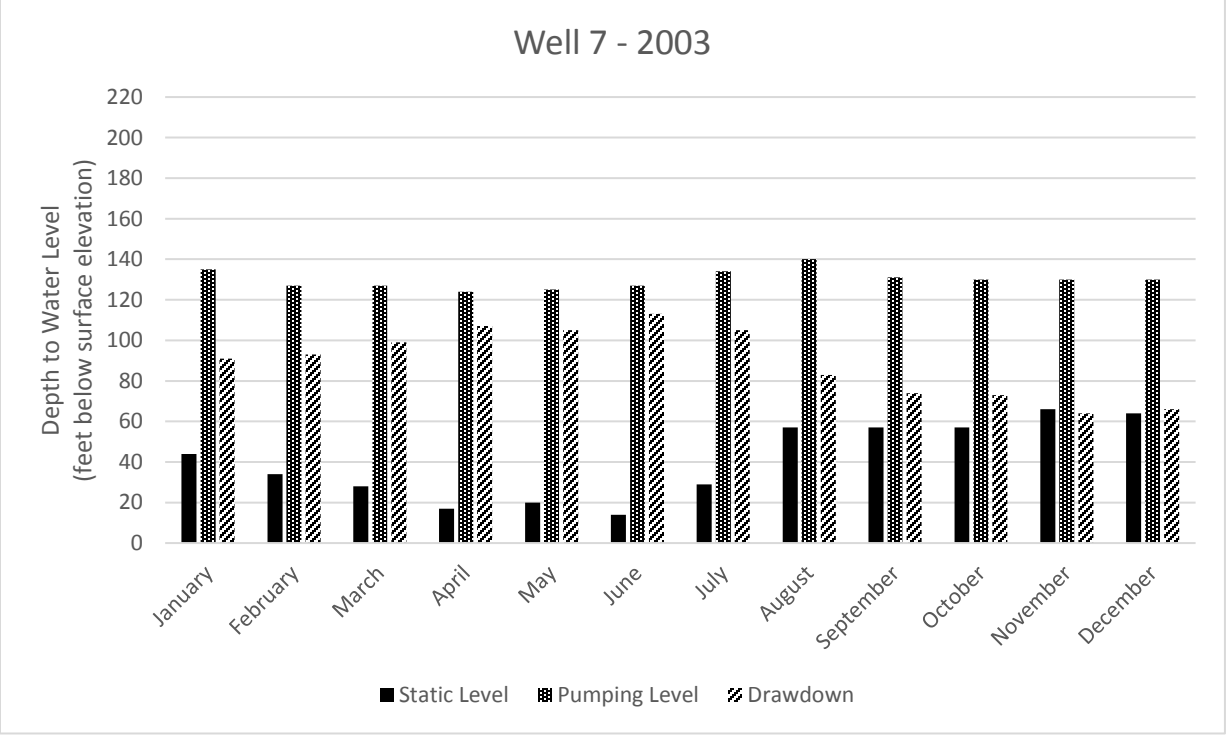
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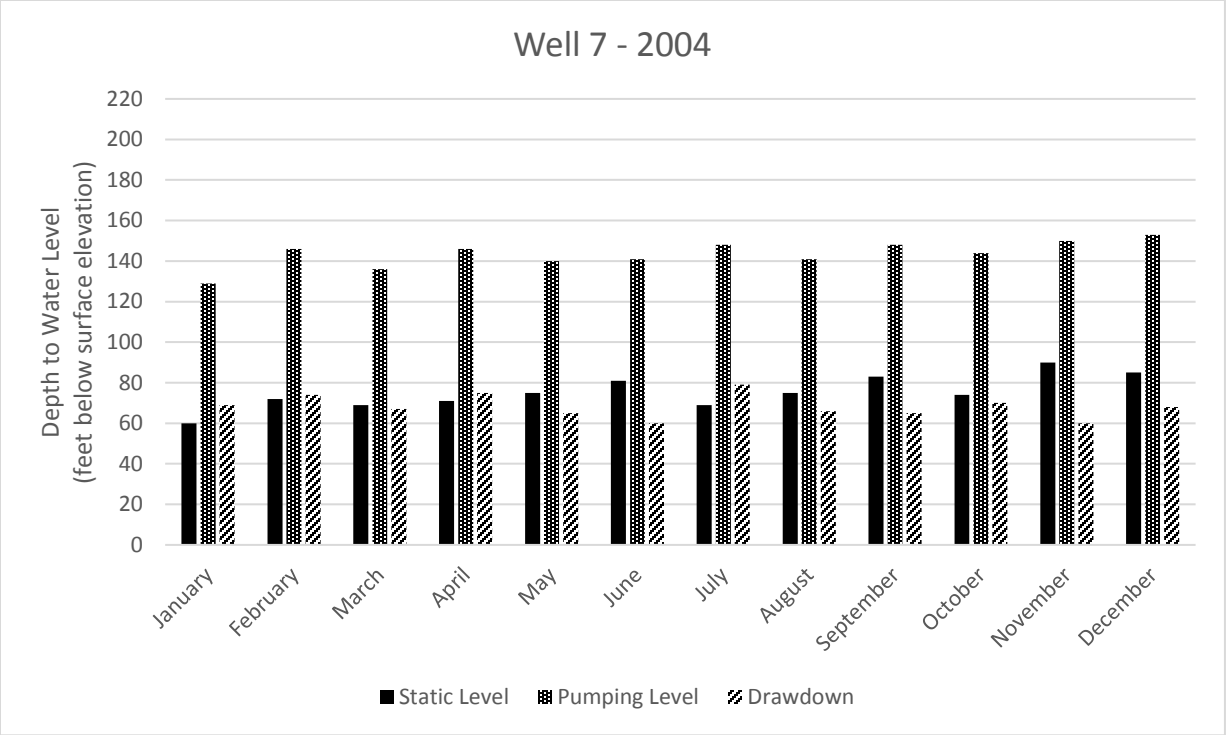
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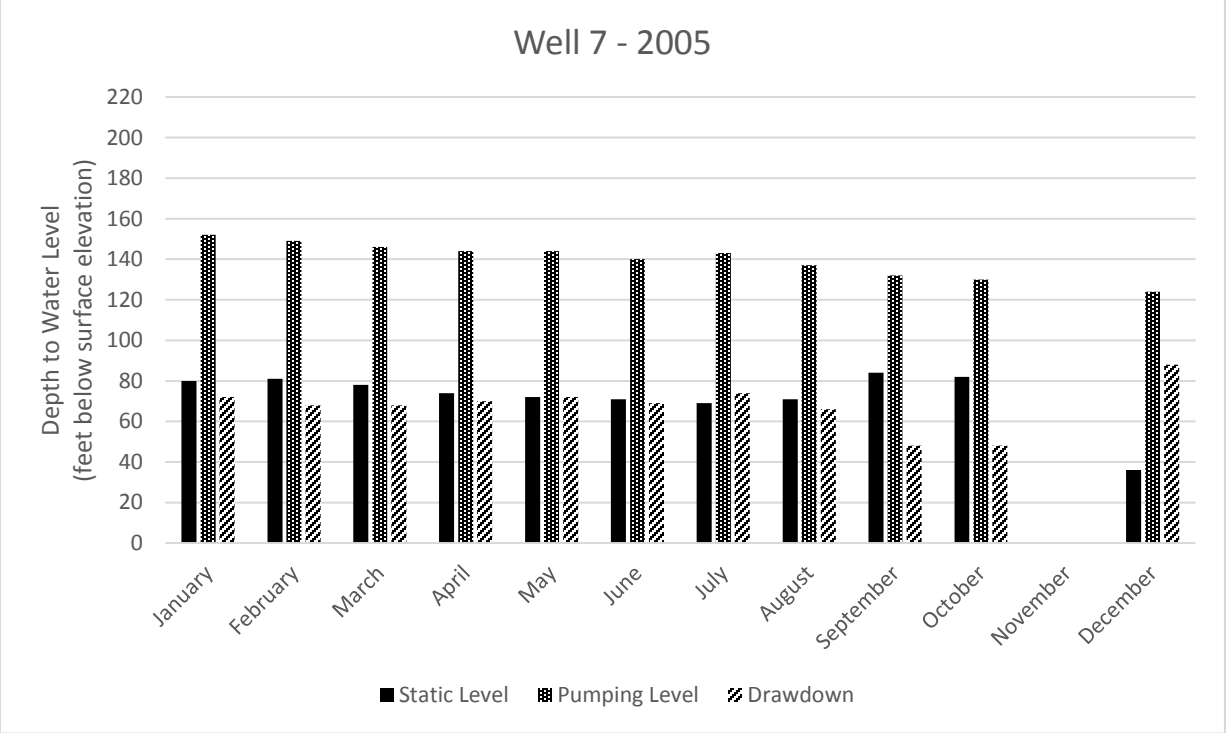
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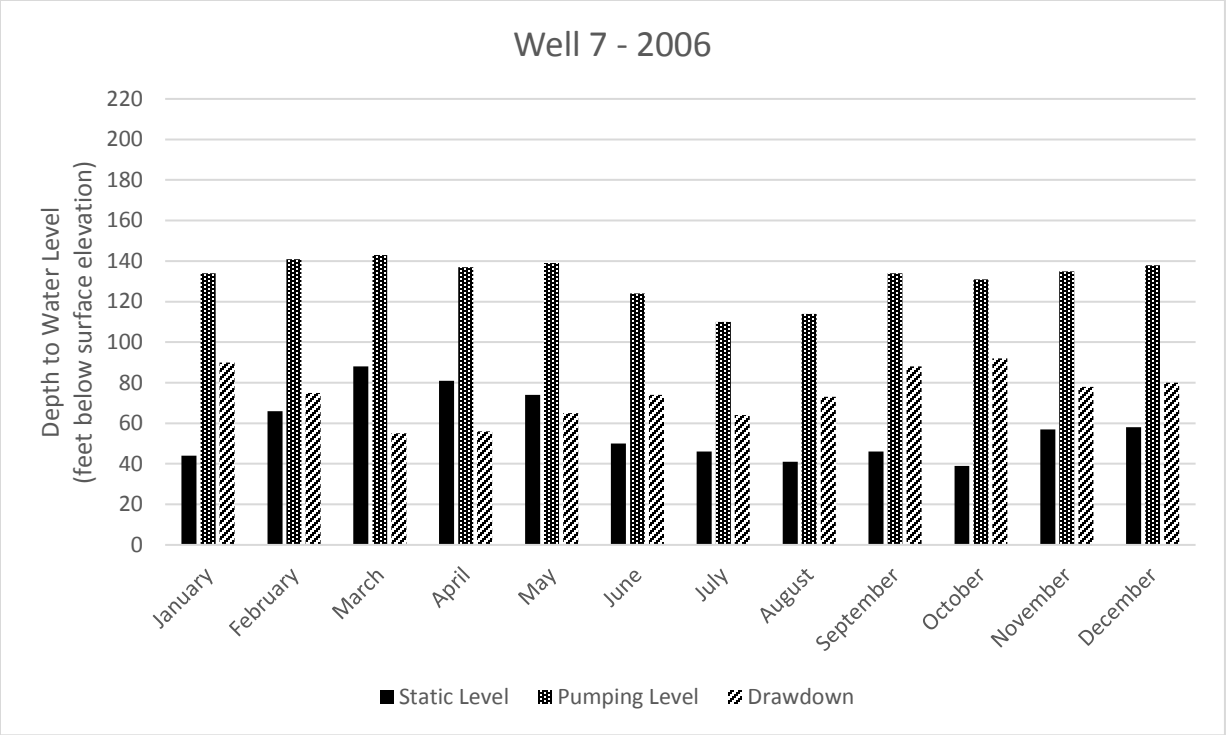
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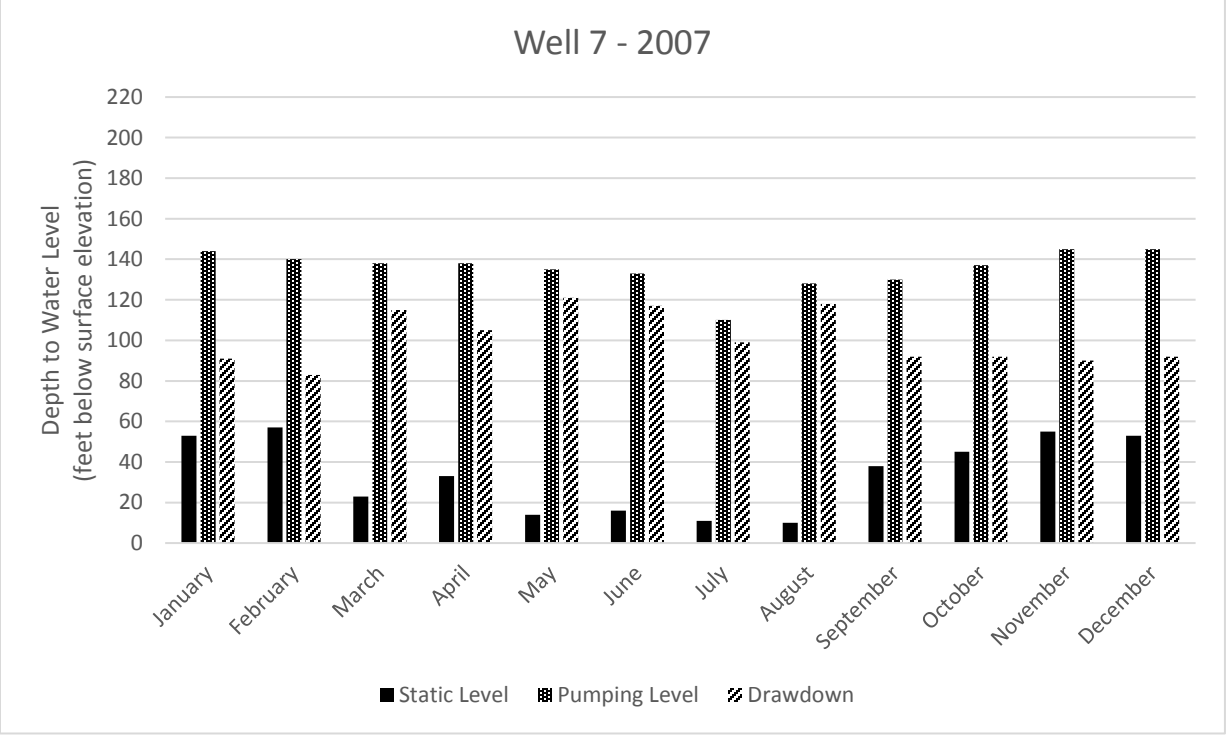
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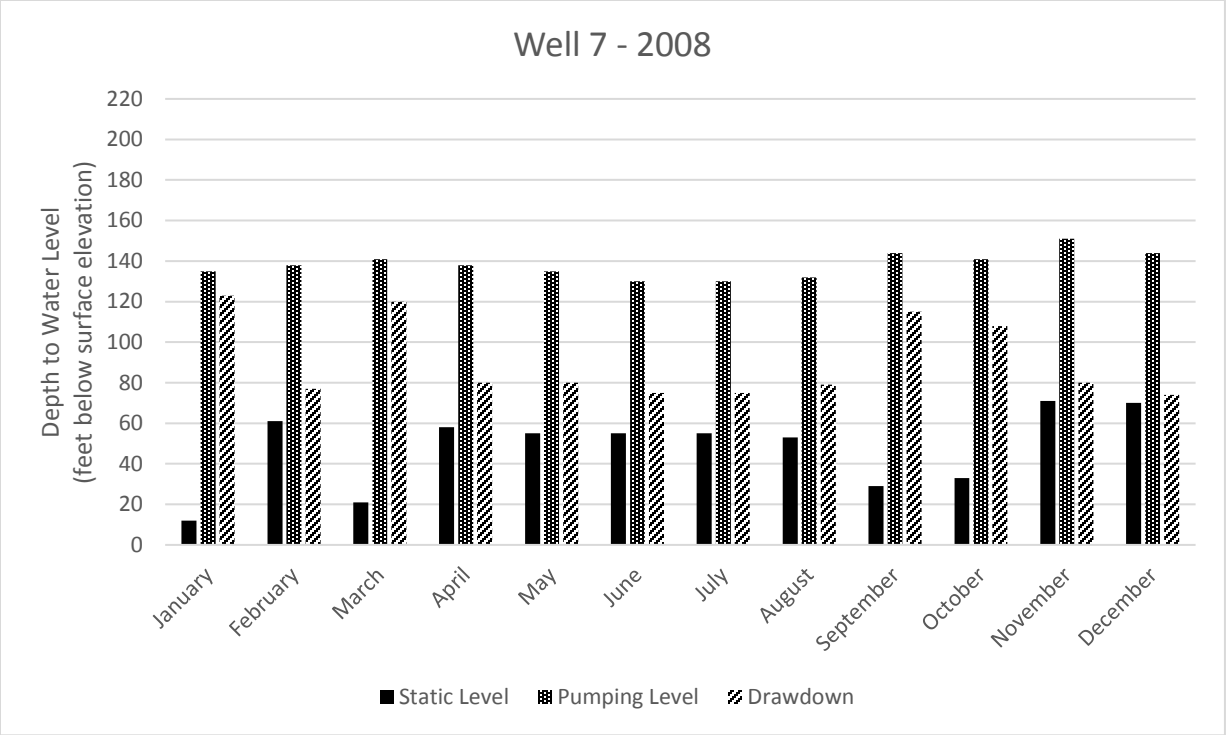
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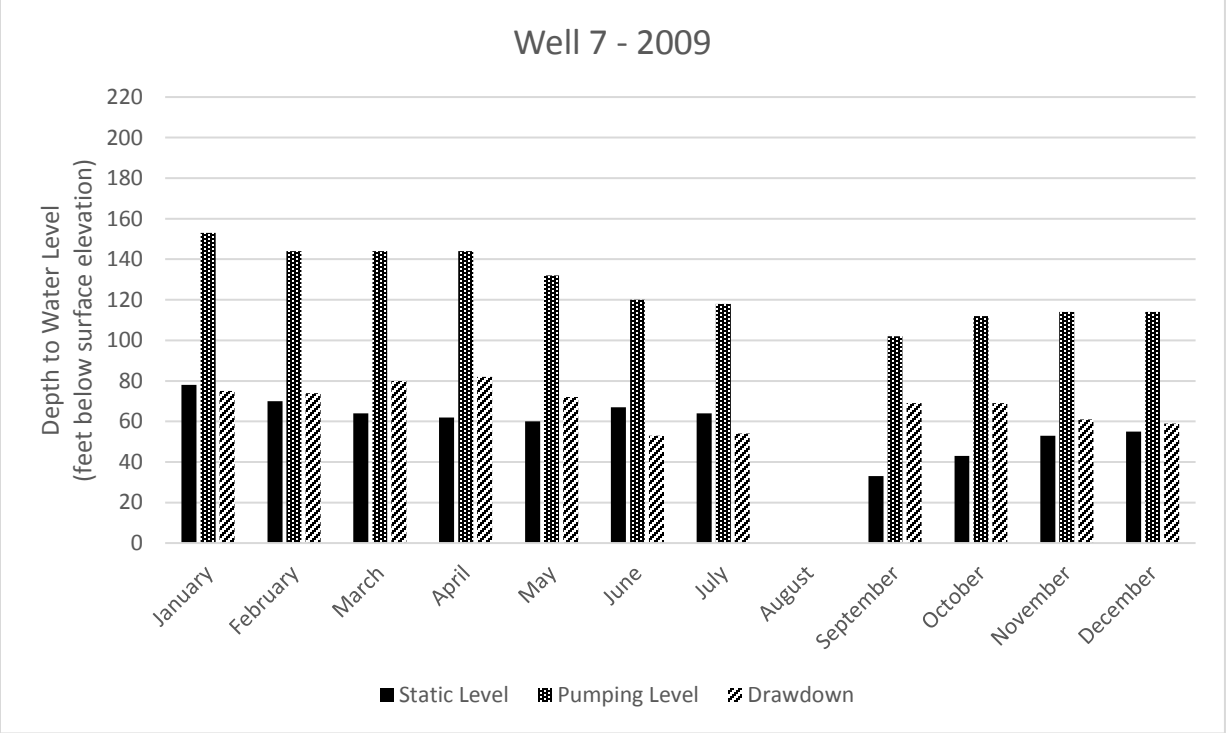
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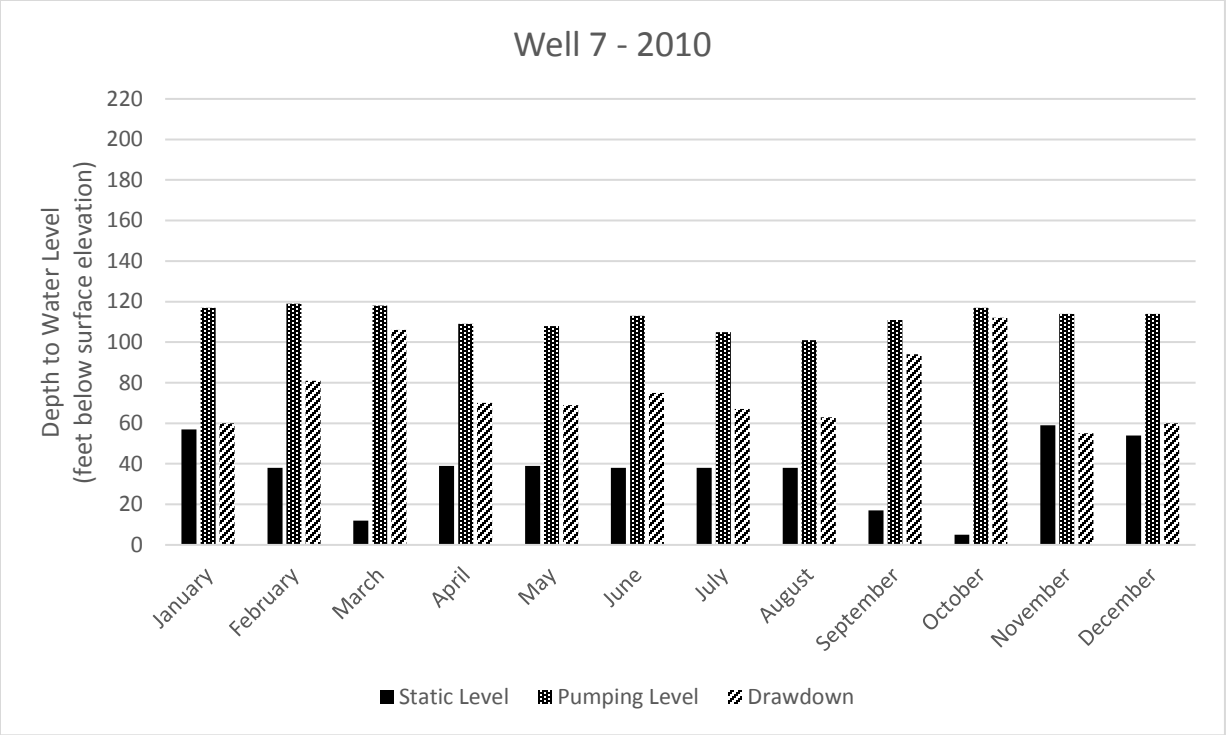
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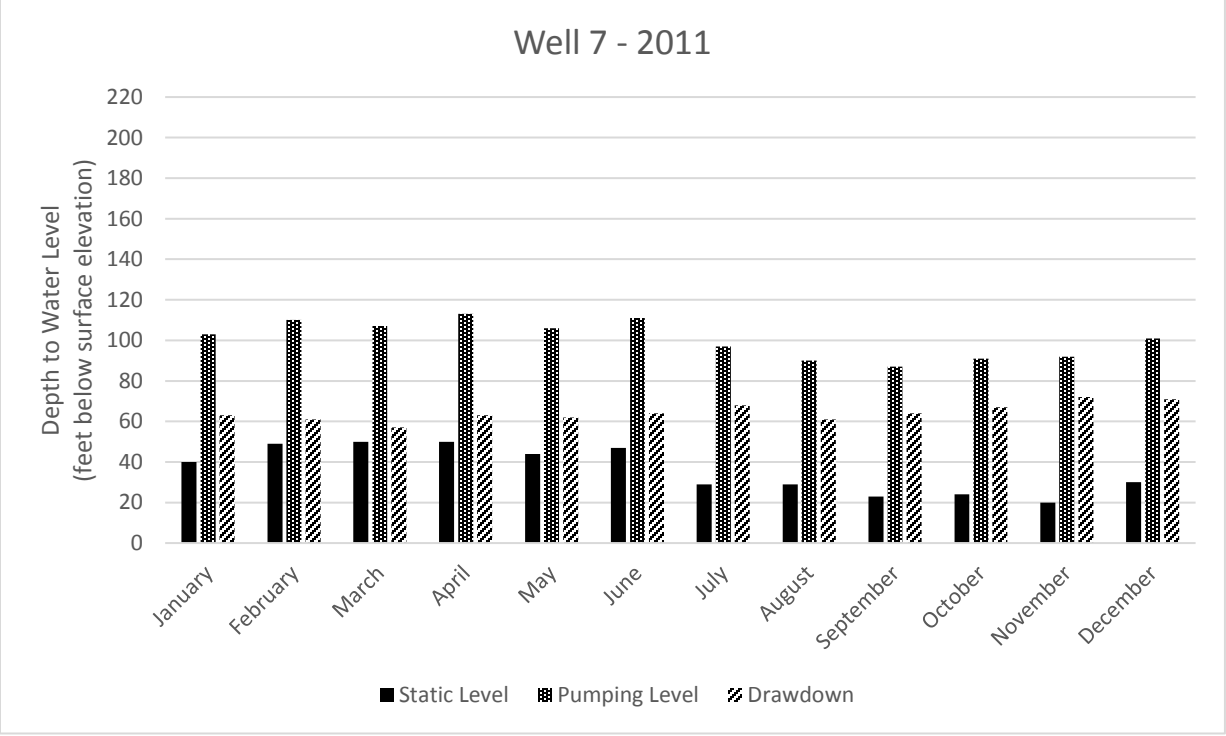
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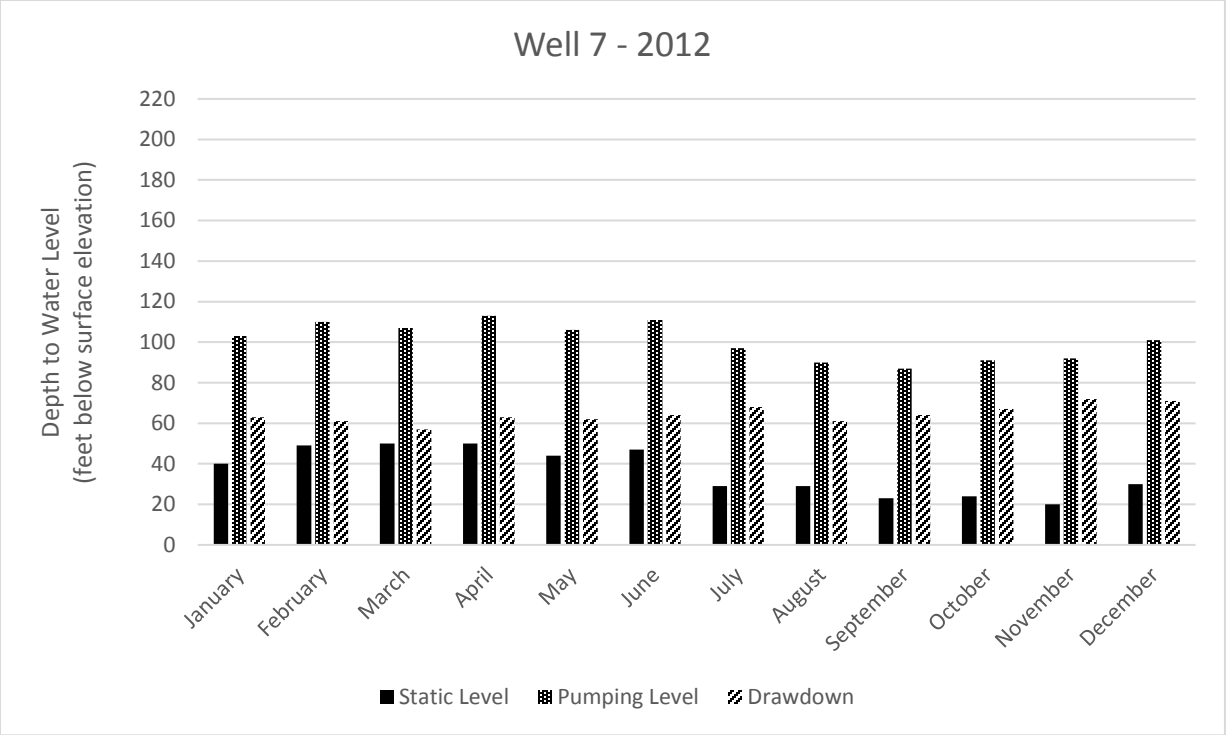
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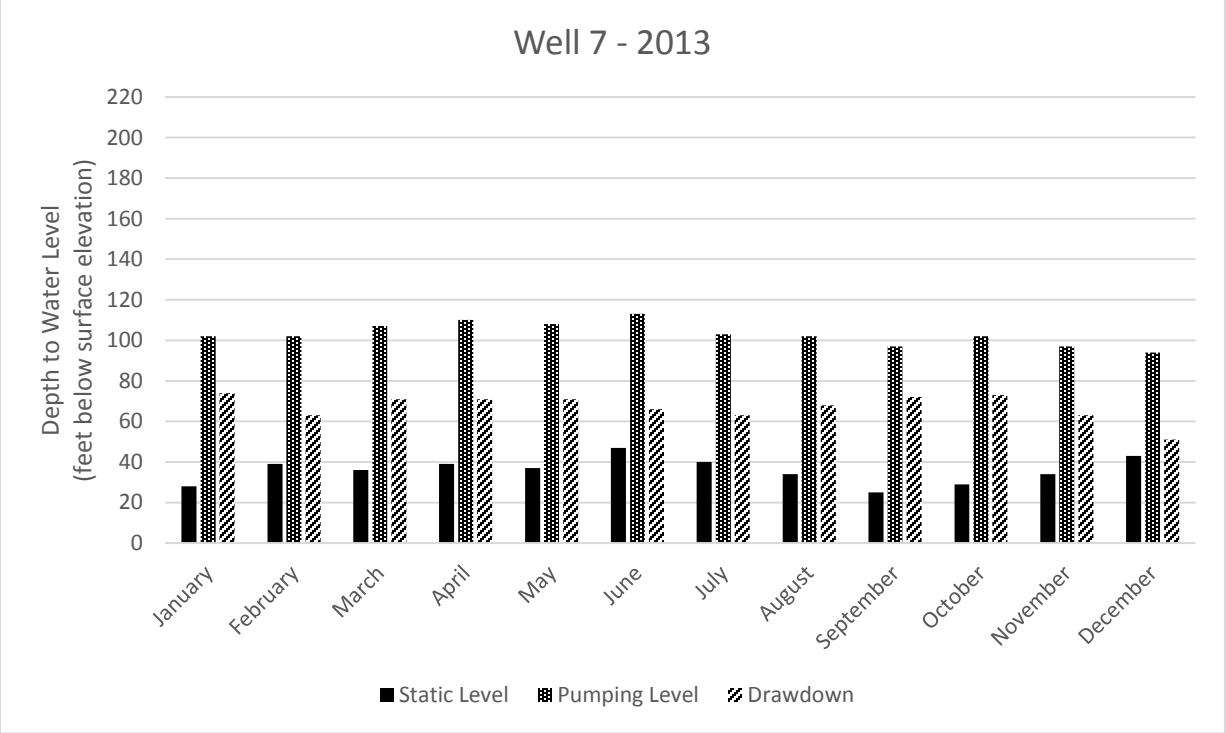
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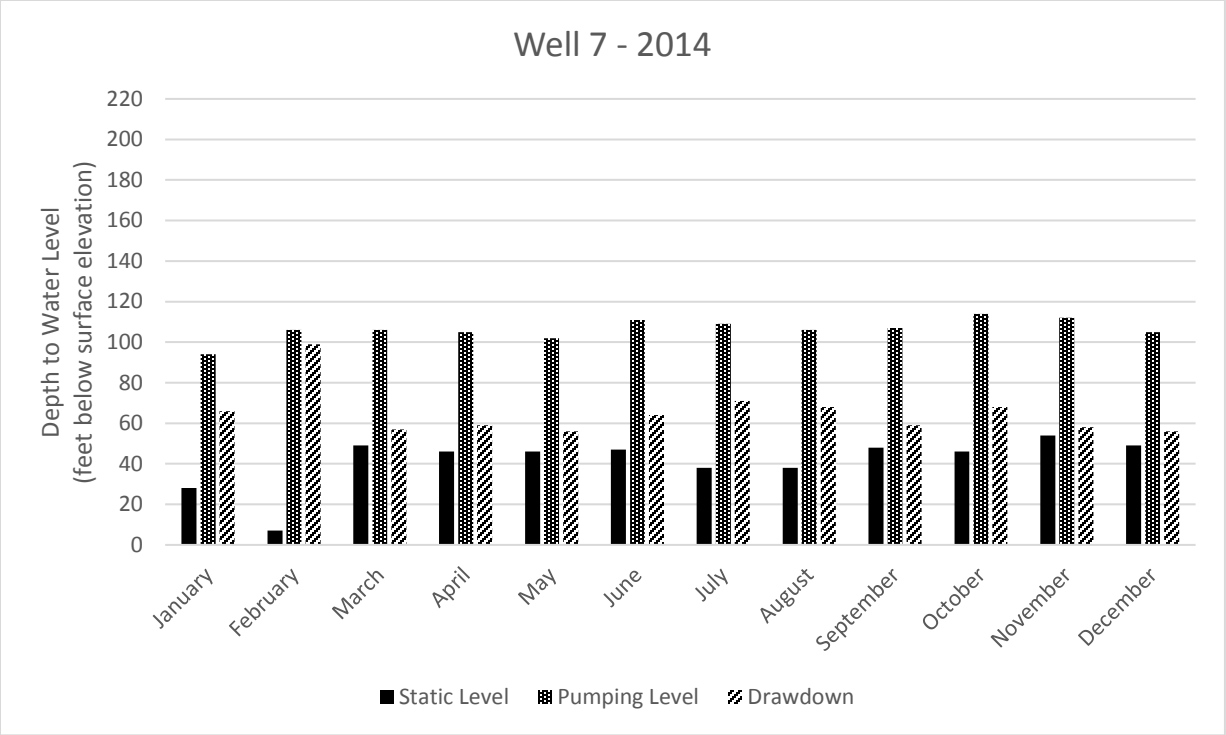
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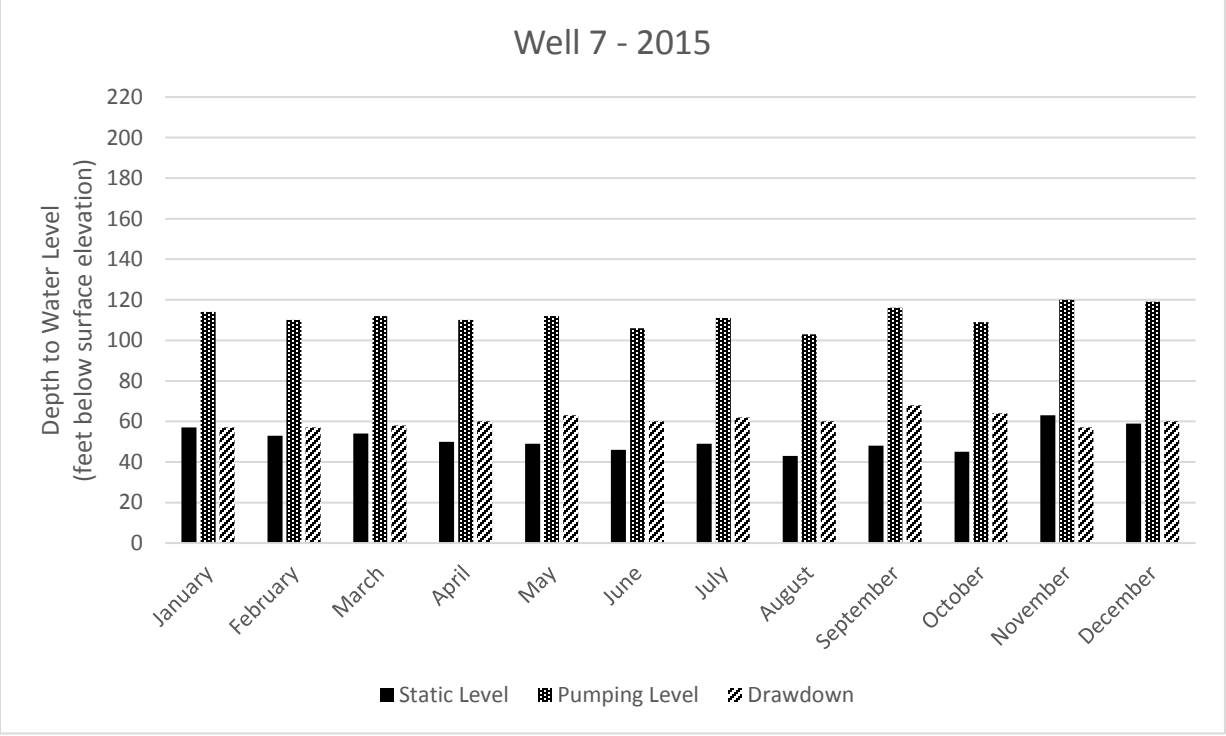
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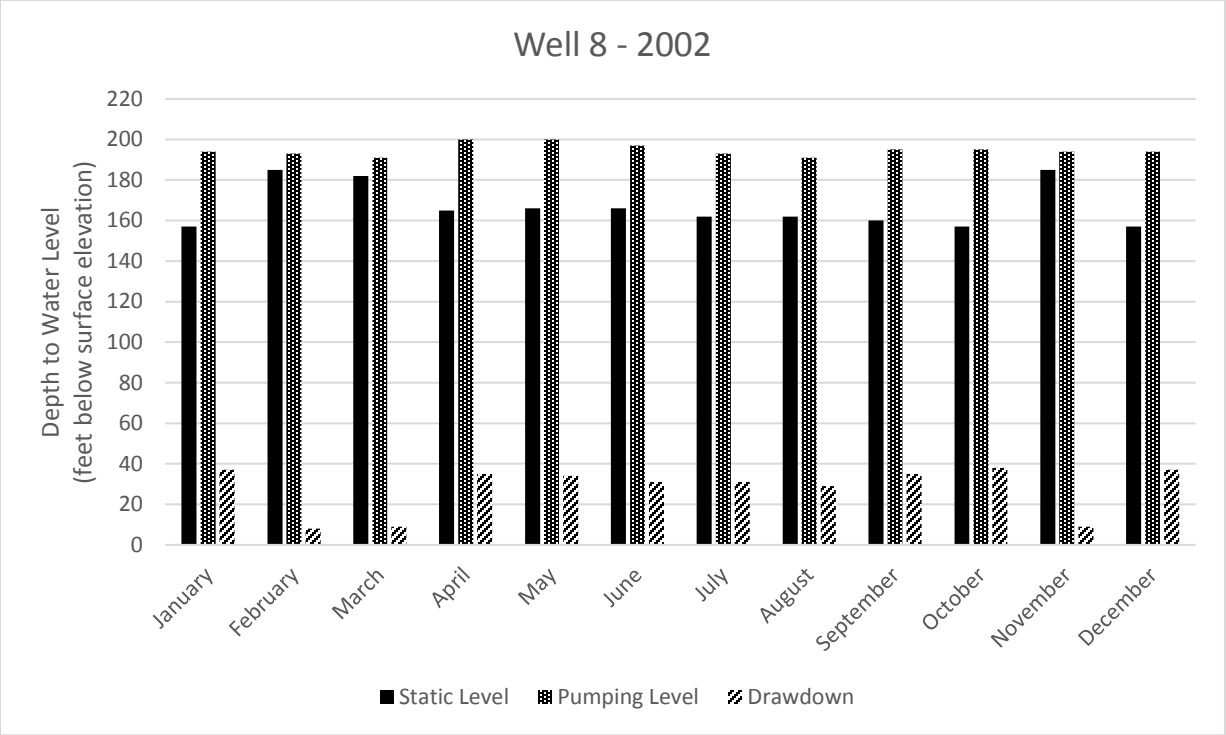
Well 8 - 2002
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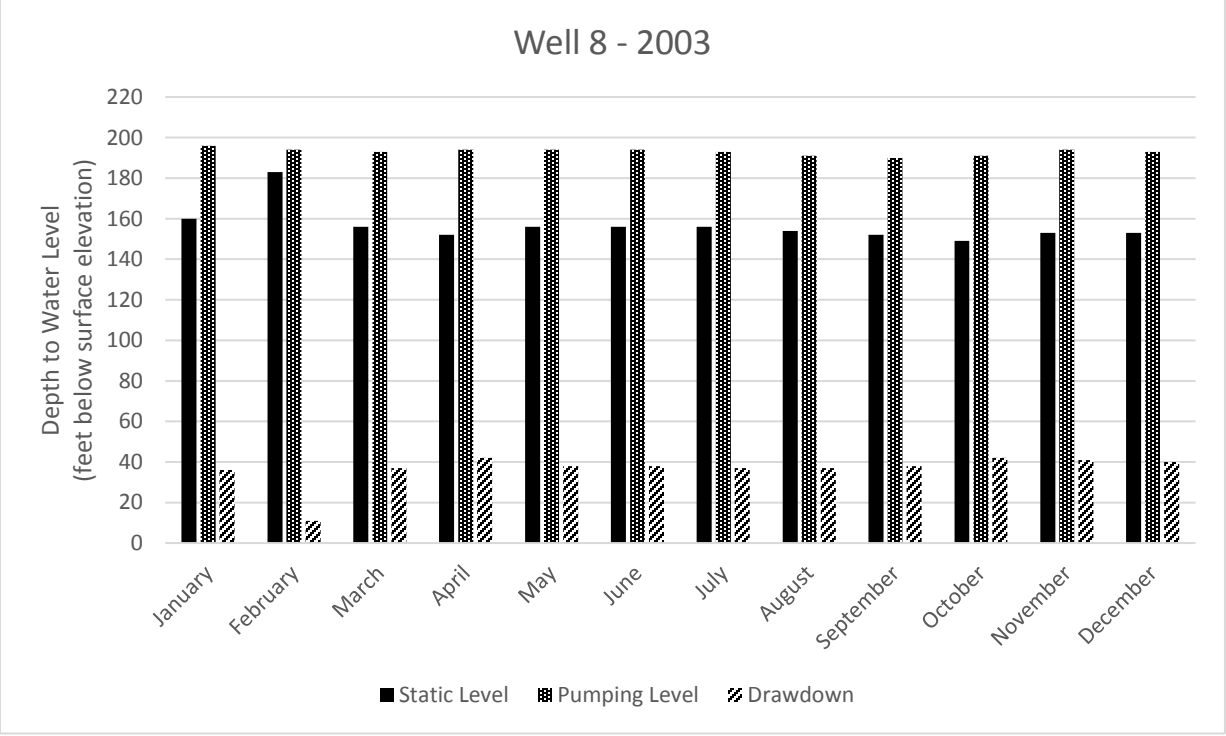
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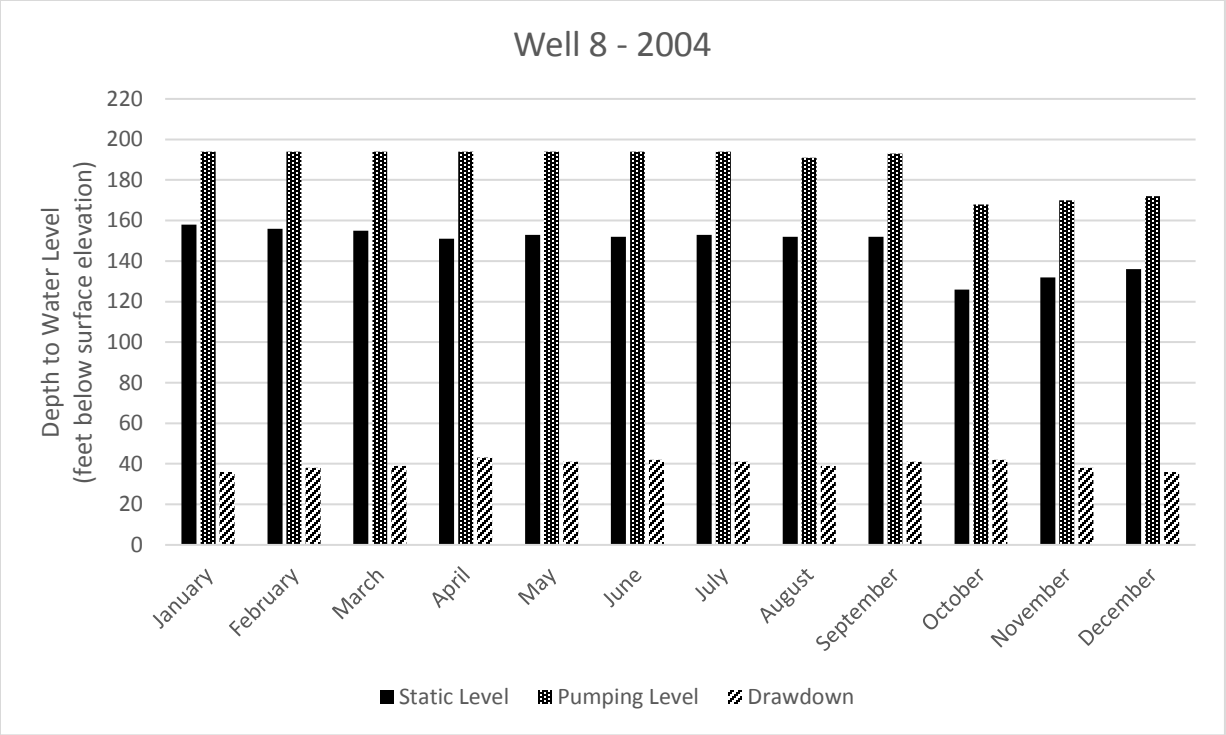
Well 8 - 2004
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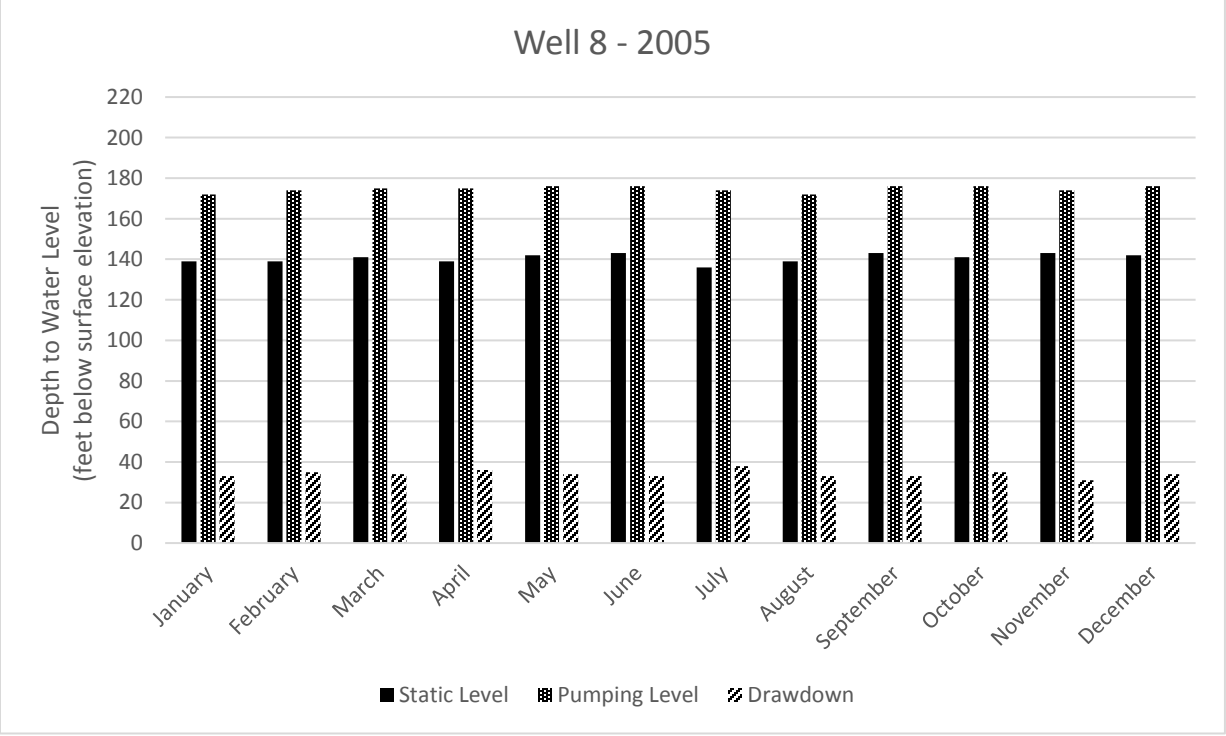
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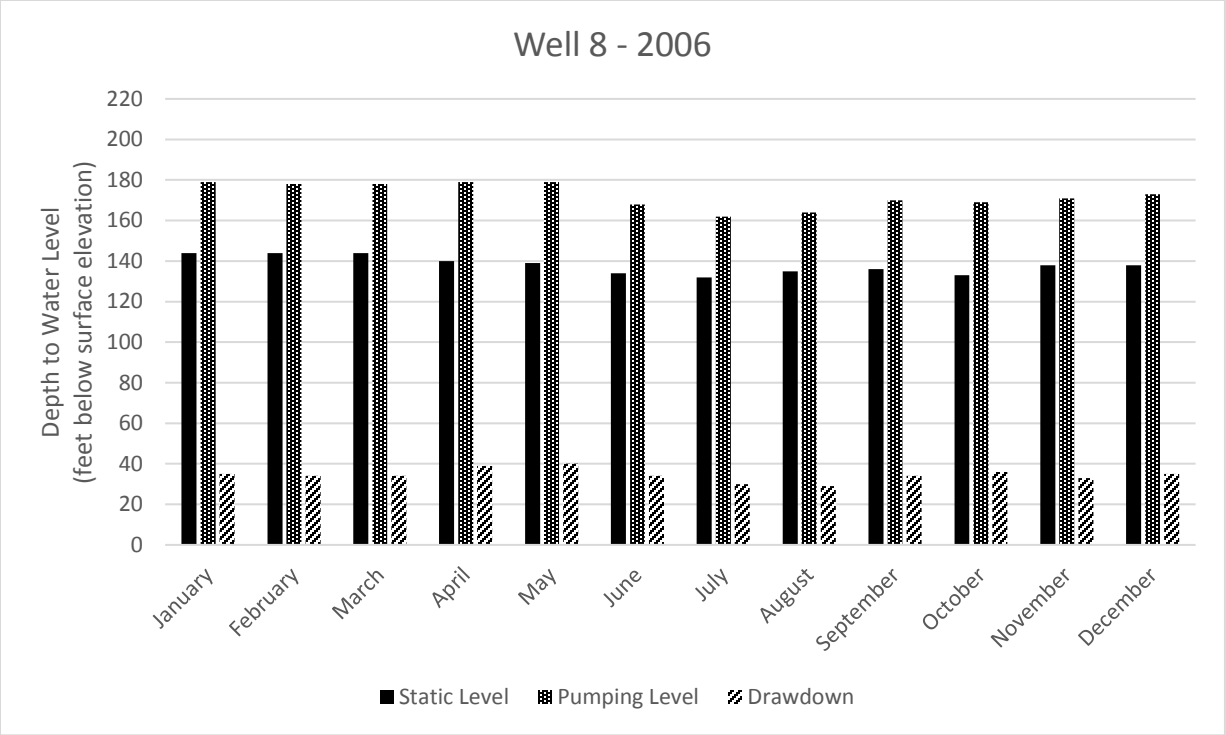
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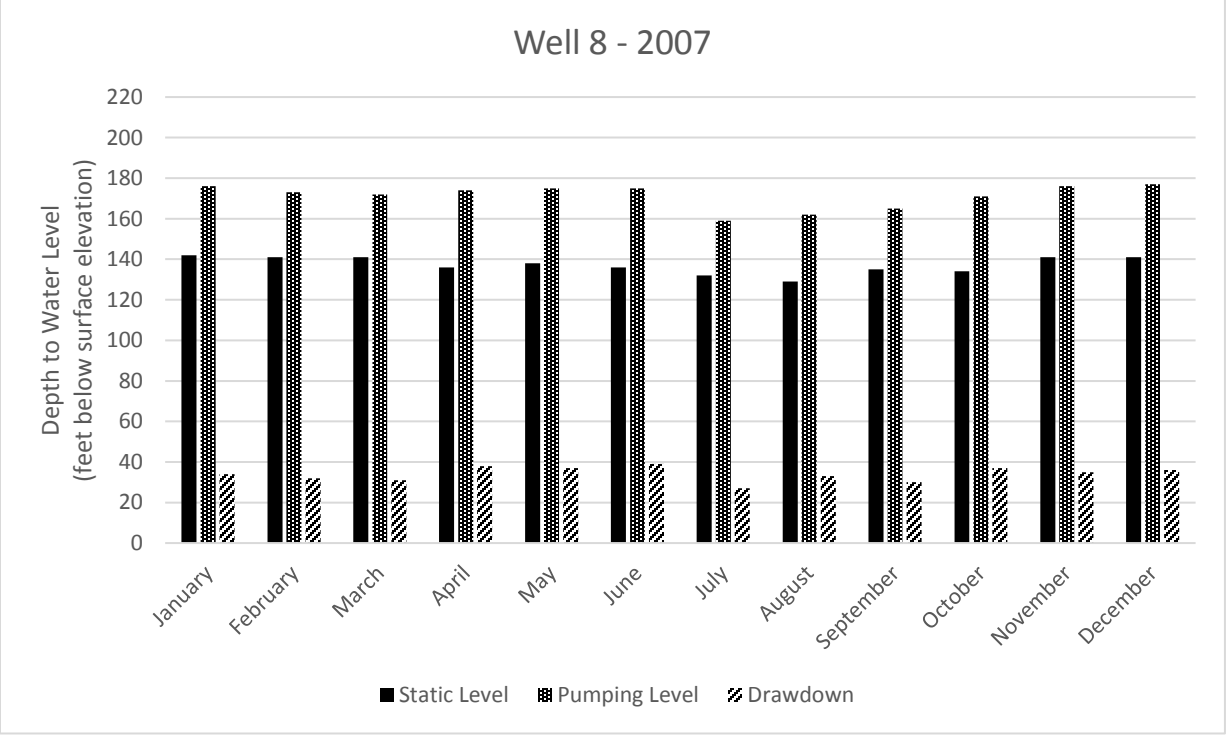
Well 8 - 2007
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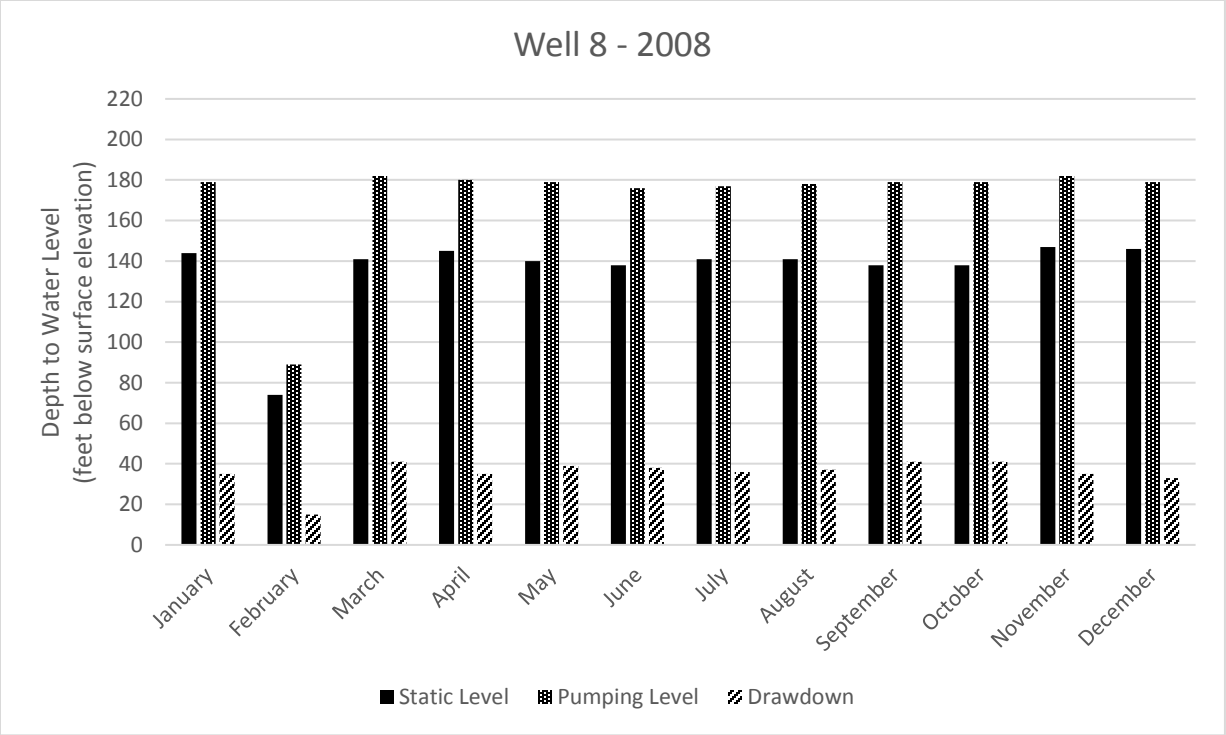
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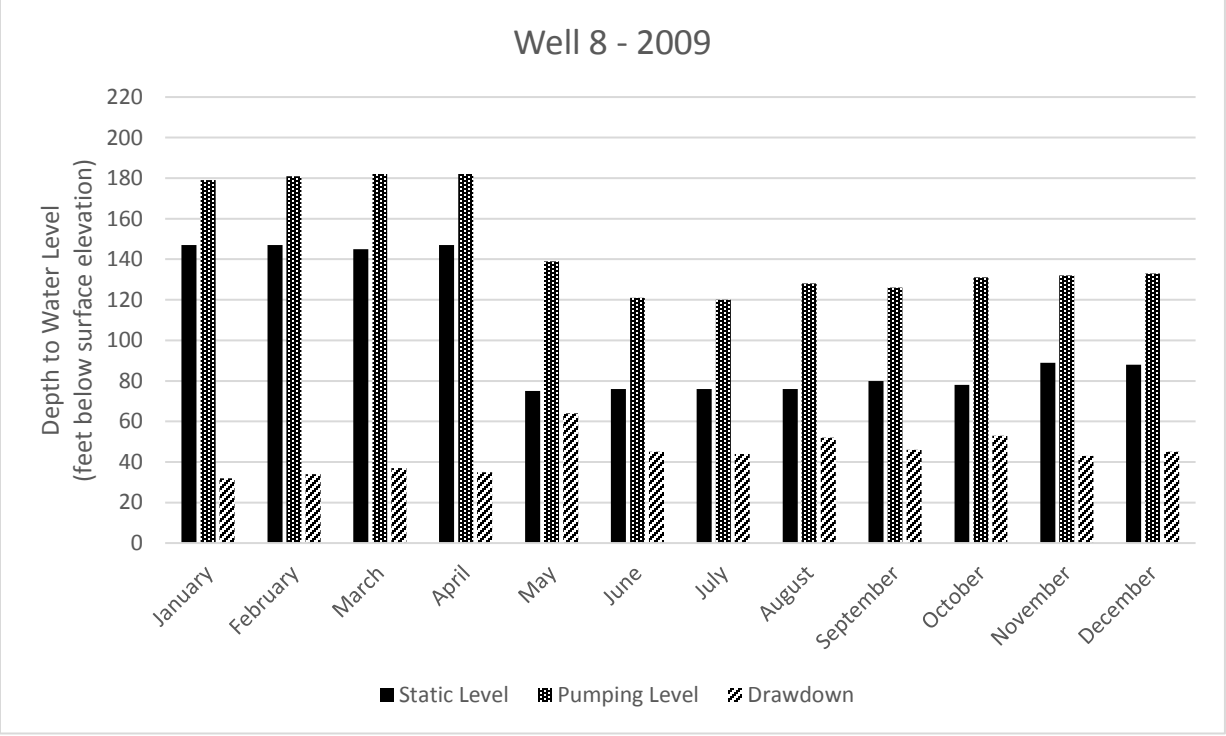
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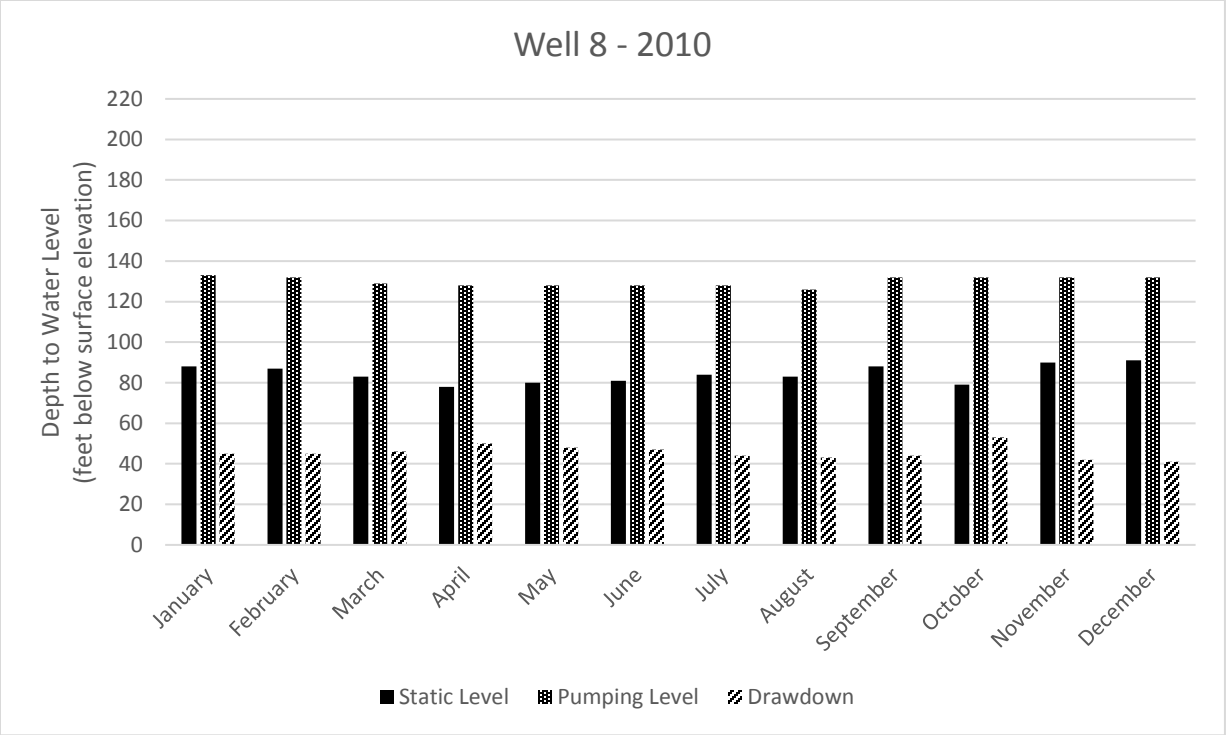
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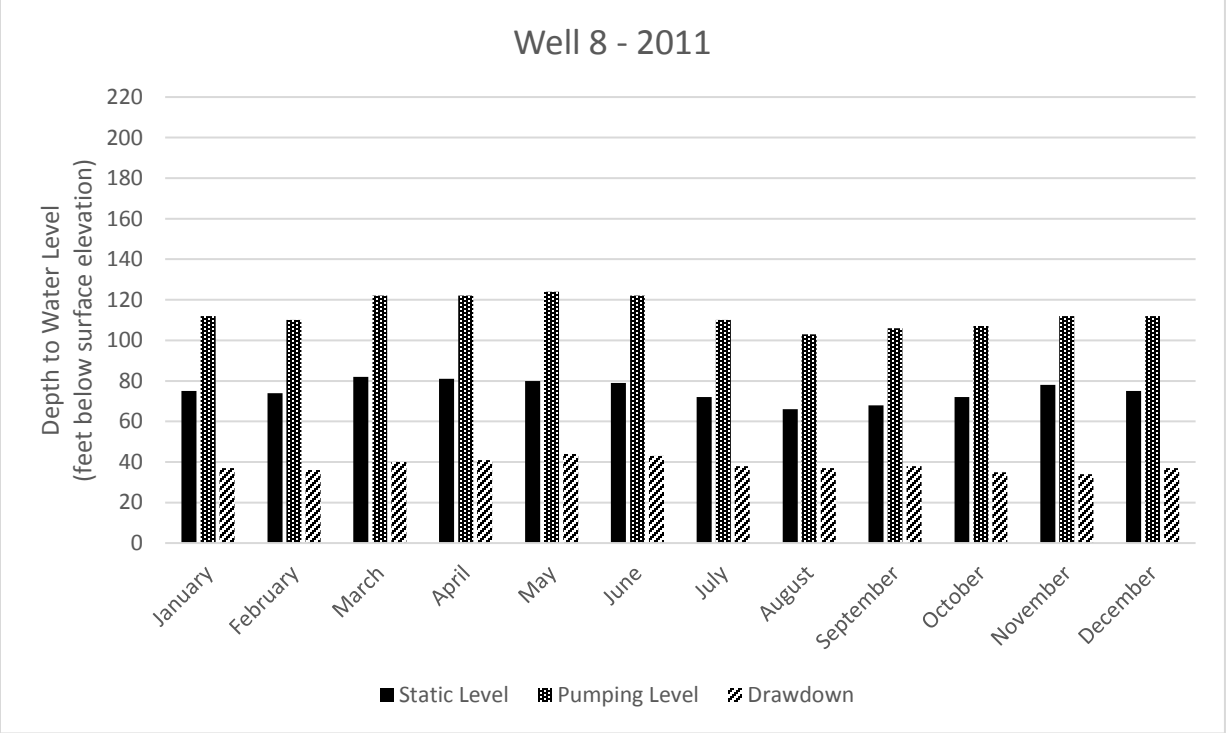
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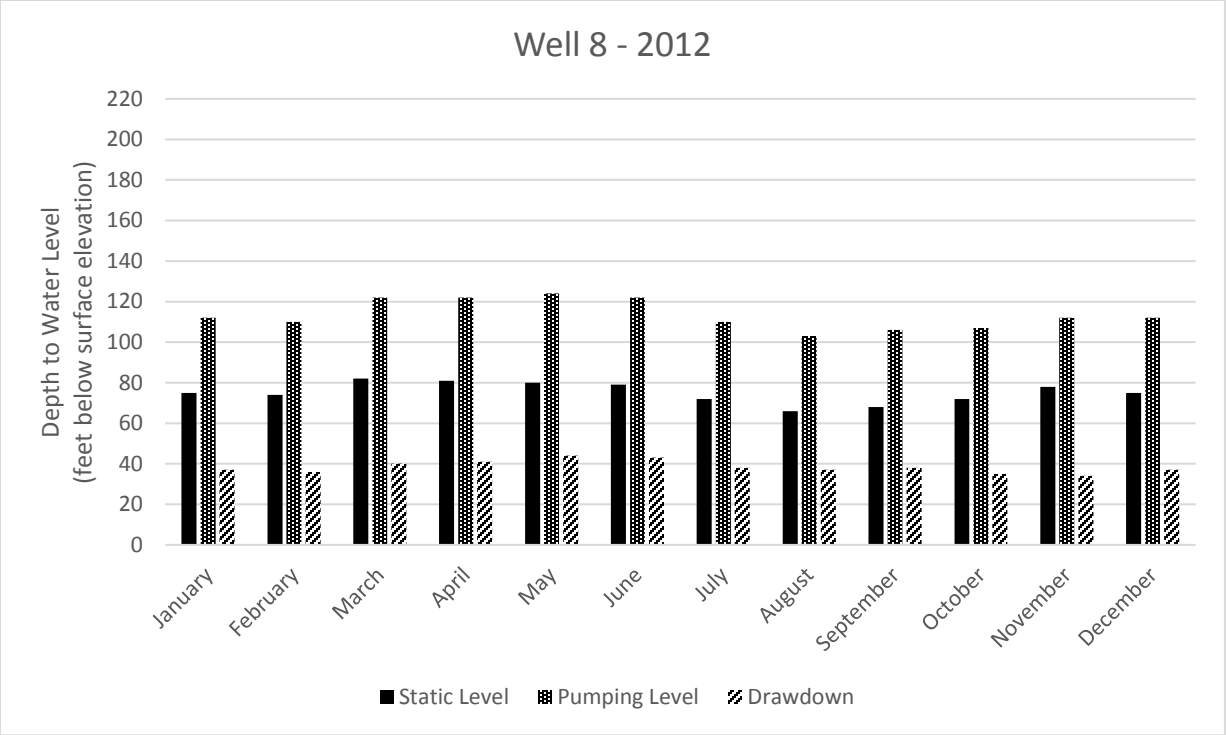
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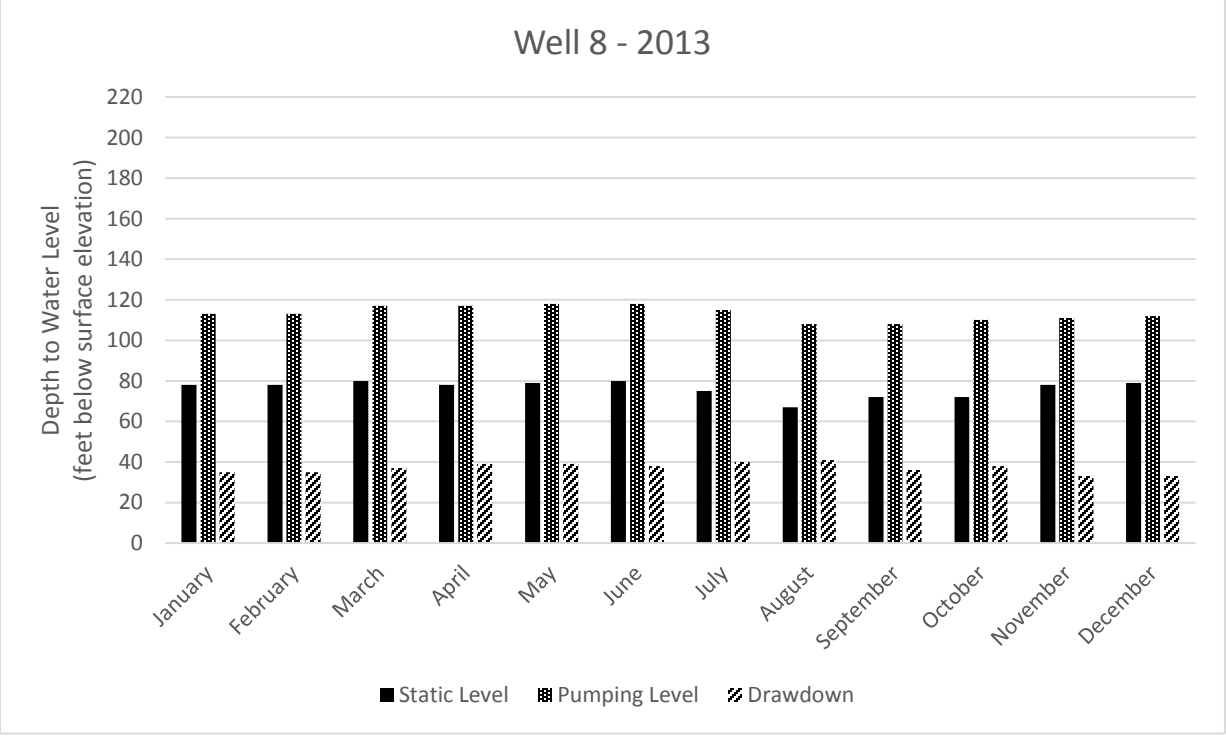
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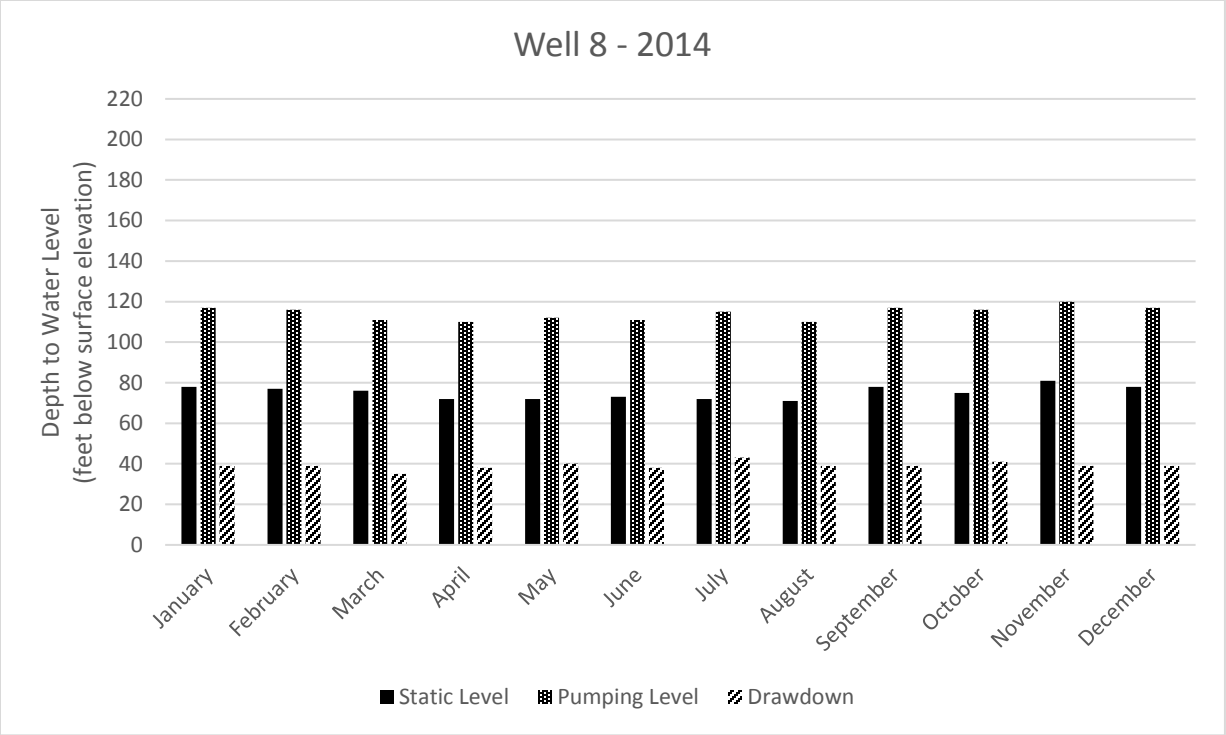
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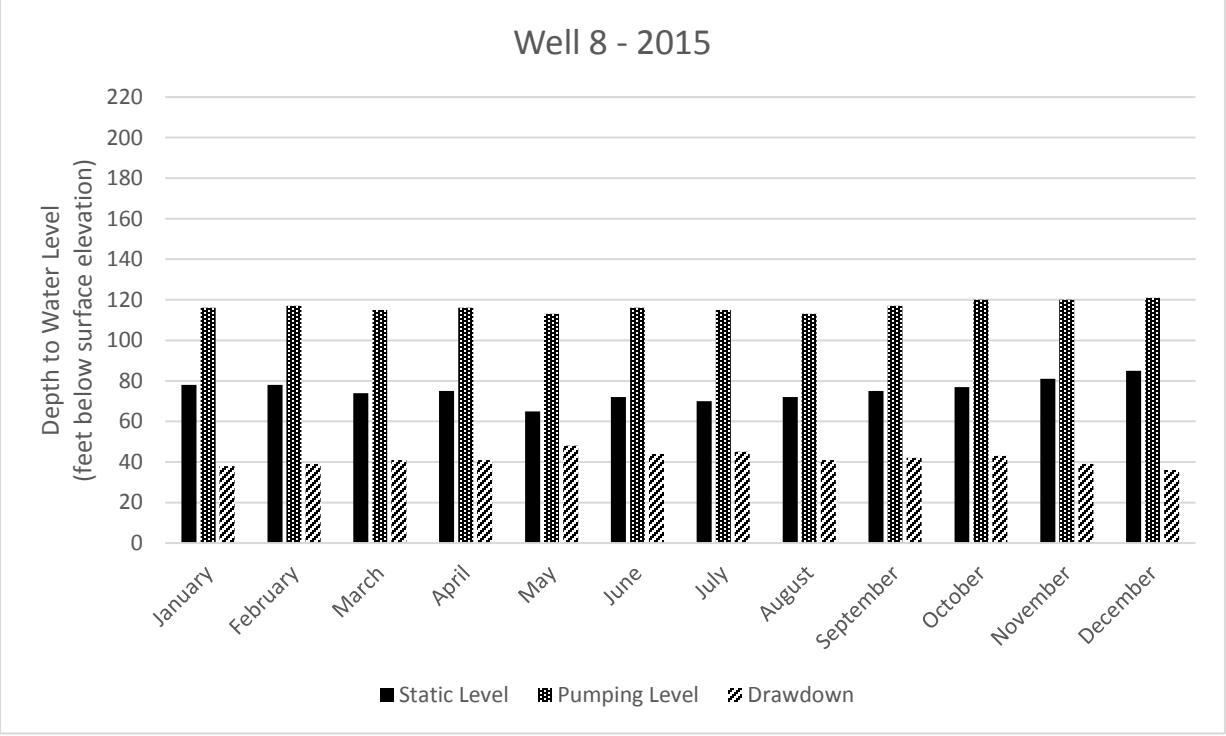
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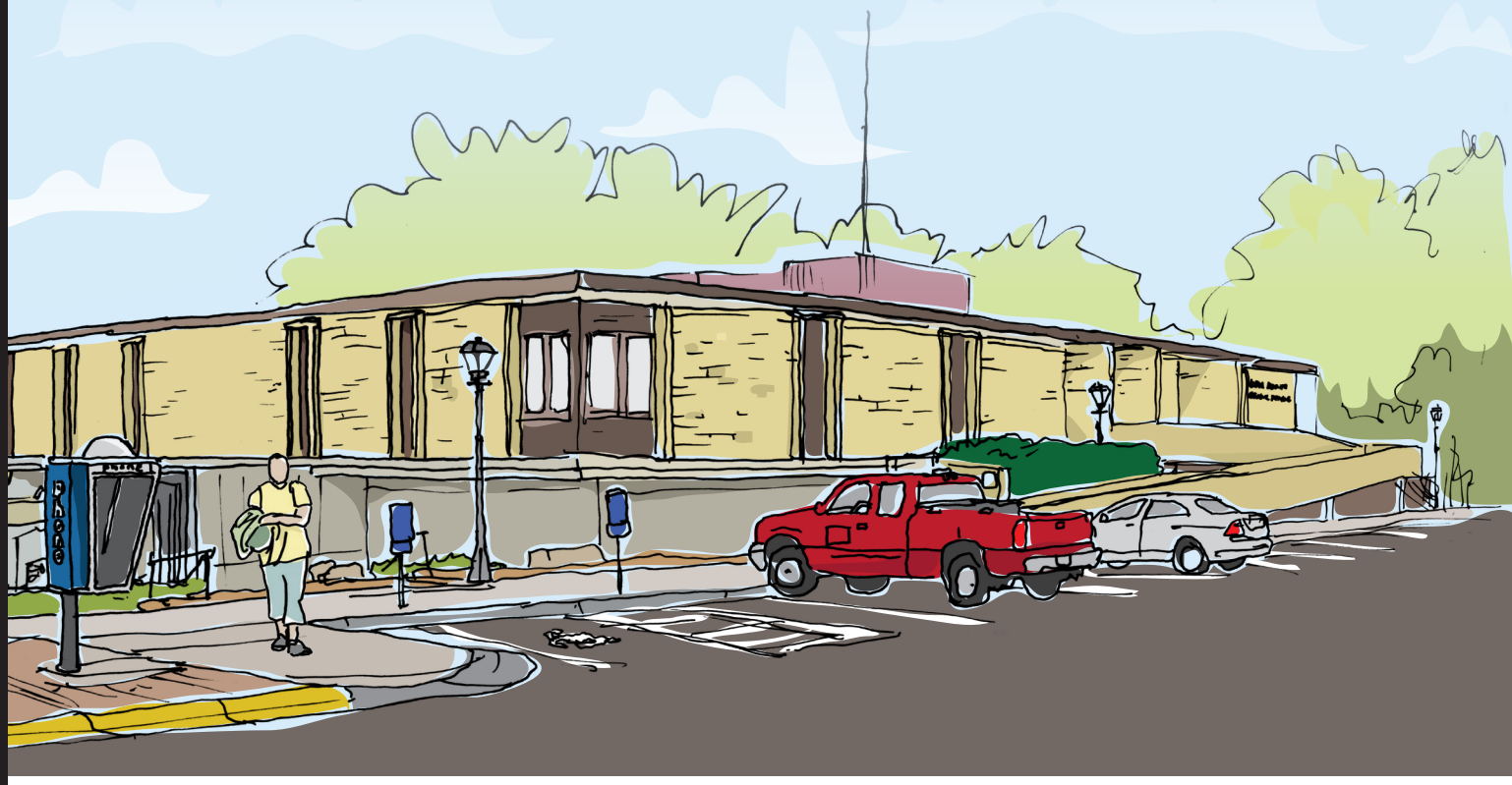
Appendix 4:

Capital Improvement Plan

CITY OF
NORTH MANKATO



Comprehensive Plan

February, 2015

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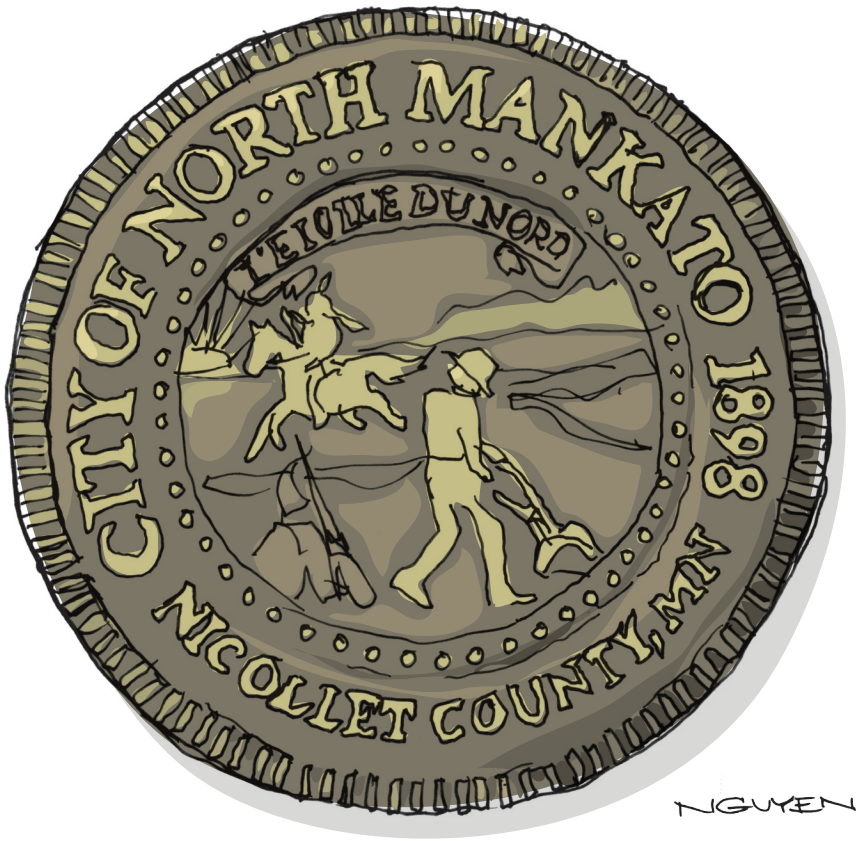
CHAPTER 7:

Public Utilities



Introduction

The City of North Mankato has a significant investment in its existing public utilities systems (water, wastewater and stormwater). The continued expansion and development within the growth areas identified in this Comprehensive Plan will require the extension of public utilities into those areas. In general, the existing infrastructure system is well-positioned and of adequate size to support the required expansion into the growth areas. However, coordination will be required between community development and the required expansion of the utility system. In some cases, the cost of providing utility service may dictate where and when future growth will occur and when.

The following sections provide a general description of the existing water system, wastewater system and storm drainage system within the City of North Mankato. Also included are schematic concepts demonstrating how the public utility systems may be expanded into most of the growth areas identified in this plan. This Chapter is not intended to be a detailed infrastructure master plan, but rather a source of information that will assist stakeholders (citizens, City staff, and potential developers) with the information about these systems and factors that may impact decision-making regarding development strategies.

Water System

Existing Systems

The City of North Mankato operates an extensive water treatment and supply system, serving residential, commercial and industrial users in two pressure zones: the upper system and the lower system.

Under normal circumstances, the two systems operate independently, each with their own supply, treatment, storage, and distribution systems. However, there is a connection between the two systems to facilitate the transfer of water between systems in the event of an emergency.

Water supply in the lower system is provided by two groundwater wells, Well No. 5 and Well No. 6, both located near Water Treatment Plant No. 1 at the intersection of Belgrade Avenue and Nicollet Avenue. The upper system is currently provided by two groundwater wells, Well No. 7 and Well No. 8. Well No. 7 is located near Water Treatment Plant No. 2 on Howard Drive. Well No. 8 is located in the Caswell Park complex, just east of Water Treatment Plant No. 2. A third well, Well No. 9, is currently in the design phase and will be constructed in 2014 and 2015. Table 7-A below shows a summary of the well characteristics:

Table 7-A: Well Data

Well No.	5-Lower	6-Lower	7-Upper	8-Upper	9-Upper (proposed)
Year Constructed	1950	1959	1975	1986	2014-2015
Well Depth (ft)	680	687	860	845	845
Casing Diameter (in)	16	24/20	24/20	30/24/18	30/24/18
Water Bearing Foundation	Ironton / Galesville / Mt. Simon	Ironton / Galesville / Mt. Simon	Franconia / Mt. Simon	Mt. Simon	Mt. Simon
Pump Type	Vertical Turbine	Vertical Turbine	Vertical Turbine	Vertical Turbine	Vertical Turbine
Capacity (gal/min)	1000	1440	1100	1100	1100

As mentioned previously, two water treatment plants treat the well water before it is pumped into the distribution system. Treated water for the lower system is provided by Water Treatment Plant No. 1, located at the intersection of Belgrade Avenue and Nicollet Avenue. This facility was initially constructed in 1959 with rehabilitation work completed most recently in 1994. The facility consists of a steel gravity filter which treats the raw water for iron and manganese and has a capacity of 1,500 gallons per minute (gpm). Treated water for the upper system is provided by Water Treatment Plant No. 2, located on Howard Drive just east of the Caswell Park athletic complex. This facility was constructed in 1975 and most recently rehabilitated in 2001, and expanded. The treatment capacity was increased to 2200 gpm in 2001.

2015 Comprehensive Plan

City of North Mankato

Figure 7.1 Existing Water System

January, 2015

Water Pump 2

Well 9 (Proposed)

Well 8

Water Tower 2
(500, 000 Gal)

Hillside Reservoirs
(190,000 Gal &
60,000 Gal)

Ground Storage
Reaervoir
(500,000 Gal)

Well 6

Water Plant 1

Well 5

Water Tower 1
(500, 000 Gal)

Hiniker
Pond

Spring
Lake
Park

Minnesota River

City of
Mankato

City of
Mankato

CH 77

CH 13

CH 41 ROCKFORD RD.

512TH ST.

415TH AVE.

409TH AVE.

KERNS DR.

LOR RAY DR.

LEE BLVD.

LOOKOUT DR.

LAKE ST.

US 14

US 169

US 169 MN 60

COUNTY 71 ROAD

14

169

41

13

6

Legend

- Existing Wells
- Existing Resevoir
- Existing Tower
- Existing Watermain
- City Limits
- Parcels

0 2,000 Feet

Source: Nicollet County, MnDNR, ESRI

Map Document: \\arcserver1\gis\NMAN_Basemap\ESRI\Maps\2015\Comprehensive_Plan\Nman-Comp Plan Water Towers-11x17.mxd
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The existing treated water storage for the City of North Mankato consists of five reservoirs. Three ground-level storage reservoirs provide a total of 750,000 gallons of water storage for the lower system. One of the ground storage reservoirs (500,000 gallons) is located at Water Treatment Plant No. 1. The other two reservoirs for the lower system with a combined capacity of 250,000 gallons are located in the hillside bluff overlooking the lower North Mankato area and thus act as elevated reservoirs for the lower system. The upper system is served by two 500,000 gallon elevated water towers, one located on Tower Drive, constructed in 2011 and one located on Carlson Drive, constructed in 1993. In addition, a 750,000 gallon ground storage reservoir is located adjacent to Water Treatment Plant No. 2.

High service pumps are utilized to pump water from the two ground storage reservoirs located at the water treatment plants. Two high service pumps at Water Treatment Plant No. 1 are capable of pumping 1,200 gpm each and approximately 2,000 gpm when operating together. In addition, the pumps at this plant are capable of transferring water from the lower system to the upper system at a rate of approximately 1,000 gpm. High service fixed speed pumps at Water Treatment Plant No. 2 are capable of delivering 2,200 gpm from the ground storage reservoir ar Water Treatment Plant No. 2. A variable speed pump at this location is capable of delivering up to 1,100 gpm to the distribution system.

The existing water distribution system consists of 4-inch diameter through 16-inch diameter mains. The oldest watermains are in the lower area. Those that have not been replaced with ductile iron or polyvinyl chloride (PVC) pipe within the past 20 to 25 years are cast iron pipe. Most of the upper system is ductile iron or PVC pipe. Dead end mains have, in general, been minimized, which provides for adequate circulation and very few areas of stagnant water throughout the lower and upper systems. The City's water department staff flushes the system on a regular basis in order to clean sediment and rust from the system. Numerous reconstruction projects over the past 25 to 30 years, primarily in the lower system, have greatly improved the water supply and pressure, and have increased the reliability of the system. The existing water system in North Mankato is shown on **Figure 7.1.**

Future Improvements

The following table shows the current and projected water usage demands for the City of North Mankato:

Table 7-B: Water Usage

Year	Lower System		Upper System		Overall System	
	Annual Water Use (mg)	**Peak Day Water Use (gpm)**	**Annual Water Use (mg)**	**Peak Day Water Use (gpm)**	**Annual Water Use (mg)**	**Peak Day Water Use (gpm)**
Current	140	700	403	1,967	840	2,667
2020	140	700	417	2,025	840	2,725
2025	140	700	429	2,085	840	2,785
2035	140	700	452	2,200	840	2,900

With the proposed construction of new Well No. 9 in the upper system, the well capacity is adequate to meet the projected water demands throughout the planning period. Firm peak day capacity, calculated over 24 hours with the largest well in each system out of service is 1,000 gallons per minute (gpm) in the lower system and 2,200 gpm in the upper system. The City will continue to implement an on-going well maintenance program in order to maximize the useful lives of the well casings, pumps, piping and equipment. Periodic repairs and replacements will be performed as required.

The capacity of the water treatment plants and high service pumping should equal the maximum day demands for the planning period. The projected future peak day demands for the planning period are 1.2 mgd in the lower system and 2.5 mgd in the upper system. Treatment capacity of Plant No. 1 is 1.8 mgd and Plant No. 2 is 2.6 mgd. Since the capacity of each treatment plant exceeds the projected peak day demand for each facility, the treatment capacity is adequate for the planning period. However, Water Treatment Plant No. 1 is 55 years old and was most recently rehabilitated 20 years ago. Water Treatment Plant No. 2 is 39 years old and was most recently rehabilitated 13 years ago. Therefore it is likely that both water treatment facilities will need to be rehabilitated or reconstructed within the planning period. At such time that significant rehabilitation is required at one or both of the facilities, consideration should be given to the cost-effectiveness of maintaining two separate water treatment facilities as compared to the option of expanding Water Treatment Plant No. 2 and decommissioning Water Treatment Plant No. 1.

Water storage for the City of North Mankato is located in both the upper and lower distribution zones. Storage adequacy can be assessed in several ways. The recommended water storage volume is based on fire demand, emergency reserve and equalization. Based on average day demand, a worst case fire event, and equalization volume equal to 20 percent of the average daily flow, an analysis indicates that the water storage provided in the upper area by the ground storage/high service pumps and the two elevated water towers is adequate to meet the projected storage requirements through the planning period. A similar analysis indicates that the lower system is currently deficient in storage by approximately 200,000 gallons. Since water demand in the lower system is not expected to increase significantly during the planning period, the lower system will be approximately 200,000 deficient in storage at the end of the planning period. However, water from the upper system can be diverted to the lower system without limiting services in the upper system, so the need to add storage in the lower system is not anticipated. However, the hillside ground storage reservoirs in the lower system are over 50 years and the rehabilitation or replacement of these reservoirs will likely be required at some point during the planning period. It is recommended that the reservoirs be drained, inspected and maintained every 3 to 5 years.

In general the water distribution system for the City of North Mankato is well maintained and well managed. Although much of the old cast iron watermain system has been replaced through numerous reconstruction projects in the lower system in recent years, portions of the old system still remain. These segments should be replaced and, where required, increased in size as street construction projects are implemented. As previously noted, most of the upper system is much newer (relatively speaking) than the lower system and consists primarily of ductile iron and cast iron pipe. As with the lower area, the existing watermain system in the upper system should be evaluating for improvement and/or replacement when the City is contemplating street reconstruction projects.

Most of the water system improvements in the upper area will be driven by residential, commercial and/or industrial development in the undeveloped areas within the City limits and the projected growth areas beyond the City limits. A system of trunk watermains ranging in size from 10 to 16 inches in diameter will be extended into these growth areas as they develop. The approximate configuration of the trunk watermain systems within the projected growth areas is shown in **Figures 7.2, 7.3, and 7.4**.

2015 Comprehensive Plan

City of North Mankato

Figure 7.2 Future Water System Improvements

January, 2015

Legend

- Study Boundary
- 10"-16" Watermain
- Existing Hydrants
- Existing Valves
- Existing Resevoir
- Existing Tower
- Existing Wells
- Existing Watermain
- Existing Fire Service
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\arcserver1\gis\NMAN_Basemap\ESRIMaps\2015\Comprehensive_Plan\Nman-Comp Plan Water System 1-11x17.mxd
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Figure 7.3 Future Water System Improvements

January, 2015

Legend

- Study Boundary
- 10"-16" Watermain
- Existing Hydrants
- Existing Valves
- Existing Resevoir
- Existing Tower
- Existing Wells
- Existing Watermain
- Existing Fire Service
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

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2015 Comprehensive Plan

City of North Mankato

Figure 7.4 Future Water System Improvements

January, 2015

Legend

- Study Boundary
- 10"-16" Watermain
- Existing Hydrants
- Existing Valves
- Existing Resevoir
- Existing Tower
- Existing Wells
- Existing Watermain
- Existing Fire Service
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\arcserver1gis\NMAN_Basemap\ESRIMaps\2015\Comprehensive_Plan\Nman-Comp Plan Water System 3-11x17.mxd
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Water System Goals, Objectives, and Policies

The following section outlines the primary goals for the water system followed by a series of objectives and policies intended to influence future development efforts that align with the community visions in this plan.

GOAL 1: Expand existing water system infrastructure to meet the demands generated by continued development.

Objective 1.1: Expand the trunk watermain system into future growth areas.

Policy 1.1.1: Implement the expansion of the trunk watermain system as areas outside the limits of the existing water distribution system are developed.

Policy 1.1.2: The trunk watermain system within the future growth areas should generally follow the configuration as shown in Figures 7.2, 7.3 and 7.4. Final trunk watermain sizes and locations should be based on the type, location and sequence of development within the projected growth areas.

Policy 1.1.3.: Develop a financing strategy for funding the expansion of the trunk watermain system.

GOAL 2: Monitor, evaluate and improve the condition of the City's existing water system infrastructure

Objective 2.1: Replace aging water distribution system infrastructure.

Policy 2.1.1: Prepare a study to document the condition of deficient watermains based on age, materials and history of breaks, leaks, freezing and other deficiencies.

Policy 2.1.2: Utilize the information from the watermain condition study, in conjunction with the condition information for other infrastructure elements, to develop, expand and prioritize projects to be included in the capital improvements.

Objective 2.2: Monitor the condition of existing water supply, treatment, and storage infrastructure and replace as required.

Policy 2.2.1: Monitor changes in drinking water quality standards and identify possible changes to the treatment processes currently utilized by the City's two water treatment facilities.

Policy 2.2.2: Monitor the condition of Water Treatment Plant No. 2 and continue with regular maintenance and miscellaneous equipment replacement as required.

Policy 2.2.3: Prepare a study to evaluate the condition of Water Treatment Plant No. 1, to determine the estimated remaining useful life of the existing equipment, to develop alternatives for upgrades or replacement, and to develop alternatives for financing any required improvements.

Policy 2.2.4: Monitor the condition of the existing wells and related equipment and continue with regular inspections, maintenance and miscellaneous equipment replacement as required.

Policy 2.2.5: Monitor the condition of the water storage facilities and related equipment and continue with regular inspections, maintenance and miscellaneous equipment replacement as required.

Appendix 5:

Emergency Telephone List

Emergency Contact List

Duane Rader, Water Superintendent	507-380-2106
Rudy Kleist, Water Foreman	507-420-7971
North Mankato City Hall	507-625-4141
North Mankato Police Station	507-625-2305 ext 700
North Mankato Fire Department	507-625-5561 ext 434
Nicollet County Dispatch	507-931-1570
Ron McCabe, Minnesota Pipe Company	507-381-2554
Travis Lakeberg, Hawkins Chemical	763-482-1182

Appendix 6:

Cooperative Agreements for Emergency Services

An informal agreement exists between the City of North Mankato and the City of Mankato as well as between the City of North Mankato and Wis-Pak Bottling. The infrastructure exists to transfer water to the City of North Mankato in the case of an emergency from either or both of these sources.

Appendix 7:

Municipal Critical Water Deficiency Ordinance

Phase Requirements

Phase 1 In the event of a short term water supply shortage the city will issue a press release via the newspaper, television, and radio urging all customers to conserve water. Large customers would be contacted directly by the water utility requesting that they voluntary cut back on their usage.

Phase 2 The city is divided into two different water zones. We would initiate an alternate day sprinkling ban. The lower system would be allowed to sprinkle on even days, and the upper system would be allowed to sprinkle on odd days.

Phase 3 The city would initiate a complete ban on priority six water use. This would include washing cars, sprinkling, and any recreational use.

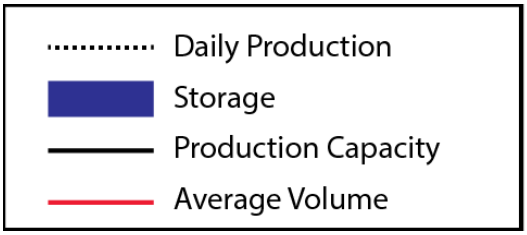
Phase 4 At this phase, the city would implement a complete ban on all nonessential priority six uses. Likewise, all priority three, four, and five users would have water supplies reduced by 40 percent by the water utility. Priority One and Two would have water supplies reduced by 10 percent at this time.

Phase 5 At this phase, the city would implement a complete ban on all nonessential Priority Six uses. The city would restrict water supply to priority One by 20 percent. Priority Two through Five would be restricted and decreased at the discretion of the City.

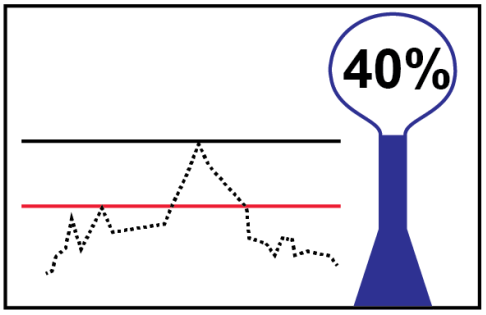
Throughout all of these phases, public water service announcements urging water conservation would continue to be broadcast via television, radio and newspaper. In a Phase Two or higher emergency, city utility personnel and the police department would include looking for water use violations as a part of their normal job duties. In addition, residential water users would be urged to use water only for essential purposes such as drinking, cooking and sanitation.

Emergency Conservation Plan Continued

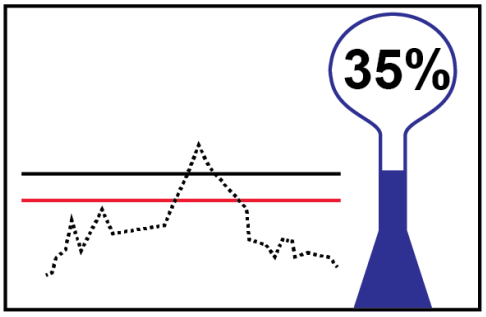
Phase Implementation Triggers



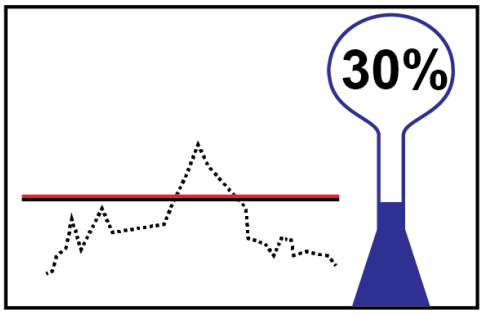
1. Production capacity drops to a daily volume equal to the daily peak volume for that month, or the previous days pumping lowered our total storage to 40 percent at any one time, and the demand is expected to continue. Under this situation, Phase One would be implemented.



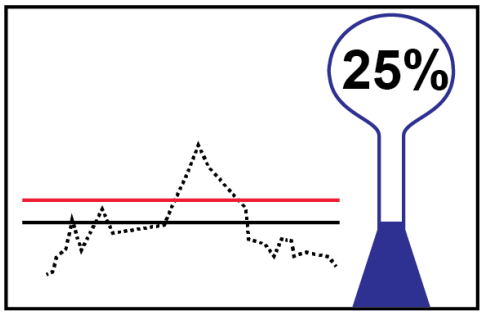
2. Production capacity drops to a daily volume below the daily peak volume for that month, or the previous days pumping lowered our total storage to 35 percent at any one time, and the demand is expected to continue. Under this situation, Phase Two would be implemented



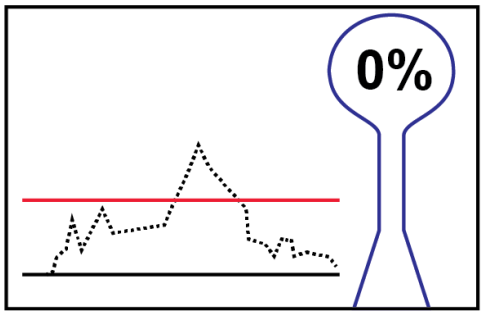
3. Production capacity drops to a daily volume equal to the daily average volume for that month, or the previous days pumping lowered our total storage to 30 percent at any one time, and the demand is expected to continue. Under this situation, Phase Three would be implemented.



4. Production capacity drops to a daily volume below the daily average volume for that month, or the previous days pumping lowered our total storage to 25 percent at any one time, and the demand is expected to continue. Under this situation, Phase Four would be implemented.



5. Upper or Lower system failure. When the remaining system is incapable of providing the daily peak volumes of both systems for that time of year. Under this situation, Phase Five would be implemented.



Enforcement

The City Council **will** address an ordinance and the enforcement procedures the next time the city updates the city ordinances. At this time they will address disconnects, fines, and anything else pertinent to compliance enforcement.

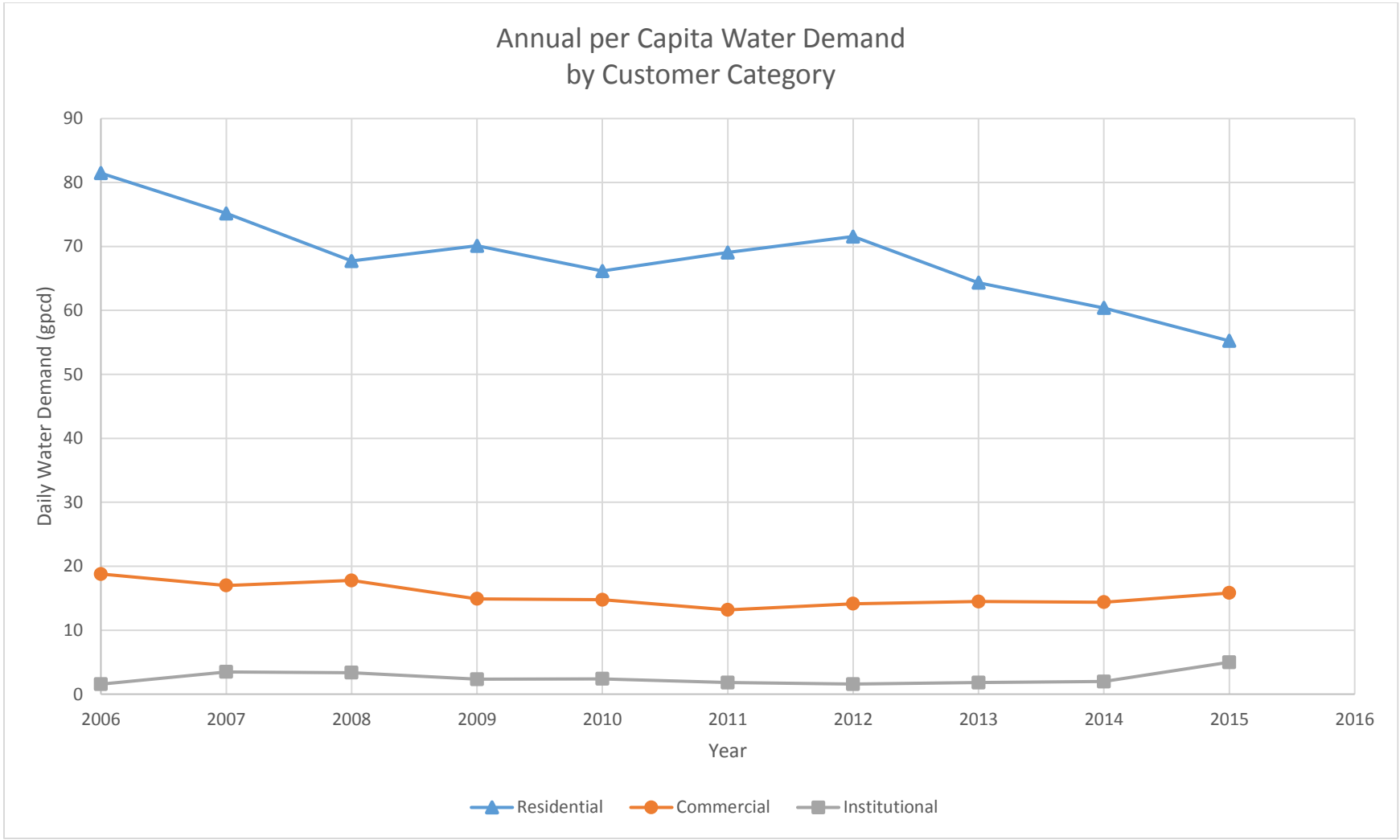
§ 52.07 RESTRICTED HOURS FOR SPRINKLING.

Whenever the city shall determine that a shortage of water threatens the city, it may limit the times and hours during which water may be used from the city water system for lawn and garden sprinkling, irrigation, car washing, air conditioning, and other uses, or either or any of them. It is unlawful for any water consumer to cause or permit water to be used in violation of such determination after public announcement thereof has been made through the news media specifically indicating the restrictions thereof.

(1975 Code, § 3.70, Subd. 6) Penalty, see § 10.99

Appendix 8:

Annual per Capita Water Demand Graphs


Annual per Capita Water Demand
by Customer Category
Daily Water Demand (gpcd)
90
80
70
60
50
40
30
20
10
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
Residential
Commercial
Institutional

Appendix 9:

Water Rate Structure

GENERAL BILLING INFORMATION

Utility bills are mailed before the last working day of each month for water, sewer, garbage and recycling. Payment is due on or before the due date specified on the bill. (Due date is usually the 10th of each month.) You will have the full day of the due date to get your bill payment to our office or in the drop box. Delinquent payments and meter readings will be subject to penalties.

PAYMENT

Automatic Bank Payment is available. Authorization forms can be found online at **www.northmankato.com** and at City Hall. Once signed up, your payment will be withdrawn from your account on the due date.

Credit Card Payment is available. Convenience fees apply.

You will still need to submit meter readings each month and you can do so through the City of North Mankato web page (www.northmankato.com) or by mail or drop off.

WATER CHARGES

All customers are sent a utility bill and charged for water according to their usage. In order for water usage to be calculated and charged, water meter readings are needed. The City of North Mankato does not provide meter readers. It is the responsibility of the customer to send in accurate meter readings. Do not estimate or round numbers, enter the actual reading.

SEWER CHARGES

All customers pay a sewer charge based on actual water consumption, plus a surcharge for any excessive strength sewage. Installation of a second water meter for outdoor use is permitted. Water that is metered through a second meter will be based on actual consumption and will not be subject to a sewer charge.

PENALTIES

A 10% penalty will be charged to the account when a payment is not received by the due date. When a meter reading is not received by the due date the account will be charged a $3 penalty. Three (3) consecutive months of no readings will result in an additional $20 charge.

SHUT OFF

All customers will be subject to their services being shut off for non-payment and/or failure to report monthly meter readings.

MONTHLY UTILITY RATES

WATER

Meter Size	Monthly Charge
1-1/4" or smaller	$ 5.00
1-1/2" to 6"	38.26

Consumption –Cost per 1,000 Gal	Billing Rate
Indoor Usage	$3.43
Outdoor Usage	4.35

Fire Connections	Monthly Charge
6" or smaller	$ 10.30
8"	18.90
10"	34.70
12"	53.55
16"	118.10

SEWER

Water Consumption	Billing Rate
0 Gal to 2,250 Gal	$11.40
2,251 Gal or more	$6.35/1,000 Gal

Excessive strength sewage is billed a surcharge

GARBAGE

Account	Billing Rate
35 Gallon	$ 9.00
65 Gallon	14.00
95 Gallon	19.00

Senior Discount (65+) - $1.25 off any size garbage

Solid Waste Mgmt Tax.....	(State Mandated 9.75%)
Curbside Recycling	6.00
Extra Bag Tag	3.50
Valet Service/per Cart	9.00

STORM WATER

(This charge is to pay for improvements and upkeep of the storm water system.)

Account	Billing Rate
Single-family Residential	$ 3.25
All Other (Based on lot size)	
0 to 10,000 sq ft	$ 3.25
10,001 sq. ft or more	$0.325/1,000 sq. ft

STATE FEES and CHARGES

Sales tax, solid waste management fees and water surcharges, which are set by the State of Minnesota, may be added to your billing in addition to the above charges which are set by the City.

RURAL MONTHLY UTILITY RATES

WATER

Meter Size	Monthly Charge
1-1/4" or smaller	$ 10.00
1-1/2" to 3"	43.26

Consumption –Cost per 1,000 Gal	Billing Rate
1-1/4" or smaller	$4.43
1-1/2" to 3"	6.12

SEWER

Water Consumption	Billing Rate
0 Gal to 2,250 Gal	$ 11.40
2,251 Gal or more	$7.45/1,000 Gals

A service charge of $40.00 will be charged to your utility bill each time water is shut off at the curb box whether it be upon the request of the resident or due to non-payment of the utility bill.

When a water user moves, the billing department must be notified in advance, and the user must supply a final meter reading.

City of North Mankato
1001 Belgrade Avenue
507-625-4141

Missed Garbage/Recycle Collections
West Central Sanitation
1-800-246-7630

Riverbend Recycling Center
600 Webster Avenue
507-625-8632

Find all of this information and more at:
www.northmankato.com

Appendix 10:

Water Efficiency Improvements

The City of North Mankato has begun checking 100% of their distribution system for leaks on a yearly basis, this should reduce the amount of unaccounted water. City code requires that low flush toilets be installed during retrofits. Below are water conservation tips, distributed to citizens, to help reduce water demand.

Water Conservation Tips for Consumers

Bathroom

Toilets:

- If you happen to live in an older home with original fixtures, you may be flushing at a rate of 5 to 7 gallons per flush. You can save water per flush by installing a toilet dam. (Toilet dams displace water in the tank so that the toilet uses less water each time it's flushed.)
- Your toilet is not a wastebasket - don't use it to flush away cigarette butts, Kleenex, baby wipes, hearing aid batteries, etc.
- Most new toilets presently available on the market are engineered for low volume use.
- Put a few drops of food coloring in your tank. If colored water shows in the bowl without flushing, there's a leak and repairs are needed.

Bathing:

Bathing usually consumes the second greatest quantity of water in the home.

- A shower generally uses less water than a bath.
- Do your showering and hair washing in one step.
- Fill the tub only 1/4 full. This is enough to cover an adult's body or float a child's toy.
- Most showers can be fitted with a flow restrictor or low-volume head to conserve water.
- Don't turn the shower on until you're ready to step in.

Sink:

- Don't leave water running while washing your face, shaving or brushing your teeth.
- An electric razor uses less energy than it takes to heat up the water for razor shaving.

Kitchen and Laundry

Twenty-five percent of the daily household water use occurs in the kitchen and laundry with much of this water being wasted.

Cooking:

- Remove frozen food from freezer before you're ready to use them so you won't have to use running water to hasten thawing.
- Always use lids on pots and pans.
- Use the smallest amount of water possible in cooking to save both water and nutrients. Most frozen vegetables require about 1/2 to 1 cup of water, not half a saucepan.
- Rather than letting the water run while peeling vegetables, rinse them briefly at the beginning and end of the chore.
- Don't let the faucet run for a cold drink. Keep a jug of water cooling in the refrigerator.

Washing Dishes:

- When washing dishes by hand, use a stopper in the sink and don't rinse with running water.
- Use low-sudsing detergents - they require less rinsing.
- Adding 1/4 to 1/2 cup of vinegar to your wash water cuts grease more readily than hot water alone.
- Run your dishwater only when you have a full load.
- Use the prewash, rinse-hold and scrub cycles of your dishwasher only when necessary.

Laundry:

- If your washer has a variable load control, always adjust water levels to fit the size of the load. This saves both water and the energy needed to heat the extra hot water.
- Run your washer when you have a full load.
- Remember that in soft water clothes get cleaner and require less detergent and less rinse water.
- When buying a new washing machine, look for models with water or energy-saving controls.

All Around the House

- Check every faucet for leaks. Just a slow drip can waste 15 to 20 gallons a day.
- Use a broom, not the hose, to clean the garage, sidewalks, and driveway. Wash the car from a bucket. Use the hose only to rinse it off afterwards.
- Insulate the hot water heater, pay special attention to the insulation qualities of the shell. Avoid buying a larger tank than is necessary for your needs.

Lawn and Yard

- Morning is the best time to water most lawns. Before 10:00 am is best because rising heat later on tends to steal a lot of water by evaporation. Another benefit is that grass and leaves have a chance to dry off quickly. Evening or night-time watering leaves the grass wet and can allow lawn diseases to develop.
- A lush green lawn requires 1 to 1 1/2 inches of water a week. Keep in mind the amount of rainfall that might fall on your yard and adjust your watering schedule accordingly.
- If you let your grass grow to about 1 1/2 to 2 inches in the summer, water loss will be reduced because the blades will provide shade for the roots.
- Avoid watering when windy or in the heat of the day.
- Don't allow sprinklers to run unattended. Use a timer as a reminder when it's time to move or turn off the sprinkler.
- Lawns that are frequently aerated absorb water better.
- High nitrogen fertilizers stimulate lawn growth and increase water requirements.
- Thatch build-up in a lawn can create a rapid run-off situation. Every spring the lawn should be raked and dead grass removed.
- Sprinklers throwing large drops in a flat pattern are more effective than those with fine, high sprays.
- Forget about watering streets, walks and driveways. They don't grow a thing.
- Mulch shrubs and other plantings so the soil holds moisture longer.
- When possible, flood irrigate vegetables and flower gardens rather than using sprinklers. Irrigation allows deeper soaking with less water. Sprinklers result in high evaporation loss of water.

Water Use Habits

	TYPICAL USAGE	GOOD, WATER-SAVING HABITS
Showering	20-40 gallons (5 gallons per minute)	5 gallons (wet down, soap up, rinse off)
Tub Bathing	36 gallons (full)	10-15 gallons (low-level)
Toilet Flushing	6 gallons	1.6 gallon with new standard toilet
Teeth Brushing	2 gallons (tap running)	1 pint (wet, brush, rinse briefly)
Hand Washing	2 gallons (tap running)	1 gallon (fill basin, rinse briefly)
Shaving	3-5 gallons (tap running)	1 gallon (fill basin, rinse briefly)
Dish Washing	20 gallons (tap running)	5 gallons (wash, rinse, in pan or sink)
Automatic Dishwasher	15 gallons (full cycle)	DO ONLY FULL LOADS
Clothes Washer	36-60 gallons (full cycle)	DO ONLY FULL LOADS
Outdoor Watering	5-10 gallons per minute	Be sensible

Do you think you have High Water Usage???

Culprits of unexplained high consumption

- ❖A running/leaky toilet
- ❖Water softener
- ❖Outdoor watering

Don't let your toilet waste water.

A silent leak in your toilet can waste several thousand gallons of high quality water each year and place unnecessary demands on your sewer system or septic tank.

Follow these easy steps to discover if your toilet leaks.

1. Lift off the lid from your toilet tank.
2. Place 3 or 4 drops of ordinary food coloring into the toilet tank (note- do not use dye – it could stain).
3. Do not flush the toilet for 2 hours or longer.
4. If the color shows up in the bowl, you have a leak.

You can check for leaks by watching your water meter.

This can be done either overnight or during the day when you know there will be no water being used.

1. Read your meter before going to bed or before leaving for the day.
2. Read it again when you first get up or get home.
3. There should be NO change. If there is, you have a leak.

You may need to contact a plumber.

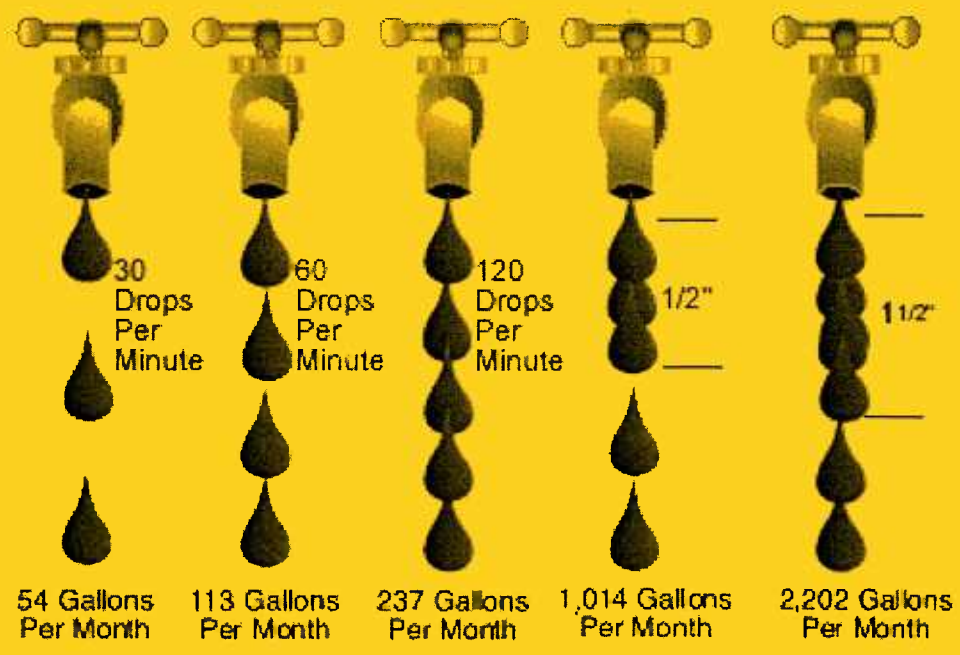
Leakage Can Be Costly

Leak This Size	Water Loss in Gallons		Annual Loss in Dollars @ $5.00 per 1,000 Gal. Rate
	Per Day	Per Month	
•	185	5,550	333
•	735	22,050	1,323
•	1,655	49,650	2,979
•	2,945	88,350	5,301
•	6,620	198,600	11,916
•	11,770	353,100	21,186
•	18,395	551,850	33,111
•	26,485	794,550	47,673
•	36,050	1,081,500	64,890
•	47,090	1,412,700	84,762

Leakage estimates based on 50psi pressure

Source: Drapar Aden Associates

Faucet Leaks



Appendix 11:

Summary of Actions

- Monthly well monitoring
- Annual leak detection
- Developing a Wellhead Protection Plan
- Wells, water storage, treatment facilities, and distribution system will be rehabilitated or replaced as needed
- Conservation tips are given to new residents and provided as water bill inserts
- Annual distribution of Consumer Confidence Report
- Two Community Newsletters released per year
- Continued staff training
- Code requires retrofits with low flush toilets
- Comprehensive Plan for City Parks
- Stormwater Management Program – MS4