City of Blaine Water Supply Plan

Water Supply System Description and Evaluation, Emergency Preparedness Procedures, and Water Conservation Plan

Prepared for

City of Blaine

March 2020

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4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435
Phone: 952.832.2600
Fax: 952.832.2601

Local Water Supply Plan Template
Third Generation for 2016-2018

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

INTRODUCTION TO WATER SUPPLY PLANS (WSP)

Who needs to complete a Water Supply Plan

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

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

Groundwater Management Areas (GWMA)

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

Benefits of completing a WSP

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

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

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

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

WSP Approval Process

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

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

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

Table 1. General information regarding this WSP

Requested Information	Description
DNR Water Appropriation Permit Number(s)	**766227**
Ownership	**Public**
Metropolitan Council Area	**Yes**, **Anoka County**
Street Address	**1801 101st Avenue, NE**
City, State, Zip	**Blaine, MN 55449**
Contact Person Name	**Jon Haukaas**
Title	**Director of Public Works**
Phone Number	**763-785-6167**
MDH Supplier Classification	**Municipal**

PART 1. WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION

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

A. Analysis of Water Demand

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

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

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

Water	used	for	non-essential	is	not	tracked.

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

Year	Pop. Served	Total Connections	Residential Water Delivered (MG)	C/I/I Water Delivered (MG)	Water used for Non-essential	Wholesale Deliveries (MG)	Total Water Delivered (MG)	Total Water Pumped (MG)	Water Supplier Services	Percent Unmetered/ Unaccounted	Average Daily Demand (MGD)	Max. Daily Demand (MGD)	Date of Max. Demand	Residential Per Capita Demand (GPCD)	Total per capita Demand (GPCD)
2005	49,860	16,024	1,458	759	N/A	6	2,223	2,225	N/A	0.095	6.10	10.208	8/30/05	80.09	122.3
2006	50,260	16,287	1,614	844	N/A	6	2,464	2,531	N/A	2.680	6.94	16.199	7/11/06	88.00	138.0
2007	50,945	16,559	1,677	845	N/A	8	2,530	2,543	N/A	0.506	6.97	17.944	7/25/07	90.20	136.7
2008	51,570	16,923	1,549	839	N/A	11	2,399	2,469	N/A	2.855	6.76	17.209	8/22/08	82.28	131.2
2009	53,328	17,124	1,651	874	N/A	7	2,532	2,675	N/A	5.331	7.33	17.218	6/2/09	84.83	137.4
2010	55,832	17,435	1,523	749	N/A	8	2,280	2,664	N/A	14.413	7.30	14.834	8/6/10	74.72	130.7
2011	57,805	17,792	1,483	740	N/A	5	2,229	2,573	N/A	13.374	7.05	11.184	7/29/11	70.30	121.9
2012	58,135	18,239	1,852	838	N/A	6	2,697	2,798	N/A	3.609	7.66	11.916	7/26/12	87.30	131.8
2013	60,000	18,385	1,655	797	N/A	7	2,459	2,511	N/A	2.047	6.88	18.944	8/29/13	75.58	114.6
2014	62,000	18,596	1,478	733	N/A	8	2,219	2,320	N/A	4.328	6.36	13.239	7/25/14	65.33	102.5
2015	63,180	19,194	1,512	759	N/A	6	2,277	2,335	N/A	2.490	6.40	13.305	7/10/15	65.23	100.7
Avg. 2010-2015	59,492	18,274	1,584	769	N/A	7	2,360	2,533.2	N/A	6.710	6.94	13.904	N/A	73	117.06

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 AVEDA CORP	Commercial	22,510,840	0.989%	Unknown
2 SANDPIPER BEND	Residential	17,108,890	0.751%	Unknown
3 PARK OF FOUR SEASONS	Residential	11,604,793	0.510%	Unknown
4 BLAINE INT'L VILLAGE	Residential	11,437,501	0.502%	Unknown
5 21ST CENTURY BANK	Commercial	10,879,345	0.478%	Unknown
6 CUSTOM MACHINING	Industrial	10,166,631	0.447%	Unknown
7 CLUB WEST PLAZA	Commercial	9,899,226	0.435%	Unknown
8 NORTHVIEW VILLA	Residential	9,296,097	0.408%	Unknown
9 NORTHTOWN MALL	Commercial	7,228,733	0.318%	Unknown
10 HOLIDAY #417	Commercial	6,632,609	0.291%	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 (gallons)	Disposal Process for Residuals	Do You Reclaim Filter Backwash Water?
Plant No. 1	2006	2,880,000	Filtronics Process and Air Stripper	Iron and Manganese removal and 1,2 Dichlor-oethane	35,000 gallons	Pumped to sanitary sewer	Yes

Treatment Site ID (Plant Name or Well ID)	Year Constructed	Treatment Capacity (GPD)	Treatment Method	Treatment Type	Annual Amount of Residuals (gallons)	Disposal Process for Residuals	Do You Reclaim Filter Backwash Water?
Plant No. 2	2006	7,920,000	Filtronics Process	Iron and Manganese removal	120,000 gallons	Pumped to sanitary sewer	Yes
Plant No. 3	2008	2,880,000	Filtronics Process	Iron and Manganese removal	52,000 gallons	Pumped to sanitary sewer	Yes
Total		13,680,000			207,000		

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)
WT #1	Elevated storage	1960	Steel top on steel base	1,000,000
WT #2	Elevated storage	1972	Steel top on steel base	1,000,000
WT #3	Elevated storage	1981	Steel top on steel base	1,000,000
WT #4	Elevated storage	2009	Steel top on concrete base	2,000,000
Ground Reservoir	Ground storage	1987	Concrete	5,000,000
Total	NA	NA	NA	10,000,000

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):

The current treatment capacity is 13.7 MGD and storage capacity is 10.0 MG. Average day demand is projected to increase to 8.37 MGD in 2025. The average day demand of 8.37 MGD plus 0.63 MGD for fire flow is within the system's storage and treatment capacity based on Ten State Standards recommendation 7.0.1 that total storage shall equal the average daily consumption plus fire flow.

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 #1	208629	1959	800	675	Seasonal	No
Groundwater	Well #2	208628	1960	800	665	Seasonal	No
Groundwater	Well #3	208646	1960	1000	681	Active Use	Yes
Groundwater	Well #4	208645	1964	1000	520	Active Use	Yes
Groundwater	Well #5	208615	1966	480	686	Seasonal	No
Groundwater	Well #6	208634	1968	1000	741	Active Use	Yes
Groundwater	Well #7	208616	1969	1000	487	Seasonal	No
Groundwater	Well #8	208630	1971	1000	500	Seasonal	No
Groundwater	Well #9	208618	1972	600	480	Seasonal	No
Groundwater	Well #10	208643	1971	1050	480	Active Use	No
Groundwater	Well #11	208633	1974	1000	735	Active Use	Yes
Groundwater	Well #12	224698	1976	2000	228	Active Use	Yes
Groundwater	Well #13	224699	1977	1000	685	Active Use	Yes
Groundwater	Well #14	233109	1978	1000	736	Seasonal	No
Groundwater	Well #16	151587	1986	1200 - 1500	505	Seasonal	No
Groundwater	Well #17	721815	2006	2000	244	Active Use	Yes
Groundwater	Well #18	809699	2016	1700	340	Stand-by	No
Interconnection	City of Coon Rapids - North of 126th Ave and University	N/A	N/A	6" unmetered	N/A	Emergency	No
Interconnection	City of Coon Rapids - 109th Ave and University Ave	N/A	N/A	6" metered	N/A	Emergency	No
Interconnection	City of Spring Lake Park - 85th Ave and Central Street	N/A	N/A	6" metered	N/A	Emergency	No
Interconnection	City of Mounds View - 85th Ave and Hastings Street	N/A	N/A	6" metered	N/A	Emergency	No
Interconnection	City of Circle Pines - Lexington Ave and Woodland Road	N/A	N/A	6" metered	N/A	Emergency	No

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)
Interconnection	City of Circle Pines - North Road and Pine Drive	N/A	N/A	6" metered	N/A	Emergency	No
Interconnection	City of Lino Lakes – Elm Street and Sunset Street	N/A	N/A	6" metered - 2 way metering	N/A	Emergency	No
Interconnection	City of Lexington	N/A	N/A	No Net Capacity - See explanation below.	N/A	Summer months	No

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 Blaine estimates that they can receive approximately 1 million gallons per day from Coon Rapids and Mounds View and significantly less from Lino Lakes and Spring Lake Park. The total volume available depends on the elevation of Blaine's and the adjoining communities' water towers.

The interconnection with the City of Coon Rapids located north of 126th Ave and University is only used for fire demand at Blaine High School and it is controlled by a pressure valve.

There are many interconnections with the city of Lexington, but there are no large meters to track water flow between the cities. The city of Lexington determines water usage in Lexington based on the flow registered in their customers' water meters. At the end of the year, Lexington notifies Blaine how much water was used and the following year, Blaine, which can control starting and stopping of the Lexington well, pumps that much volume from the Lexington well. Generally Lexington's well is only run during the summer months when more water is needed.

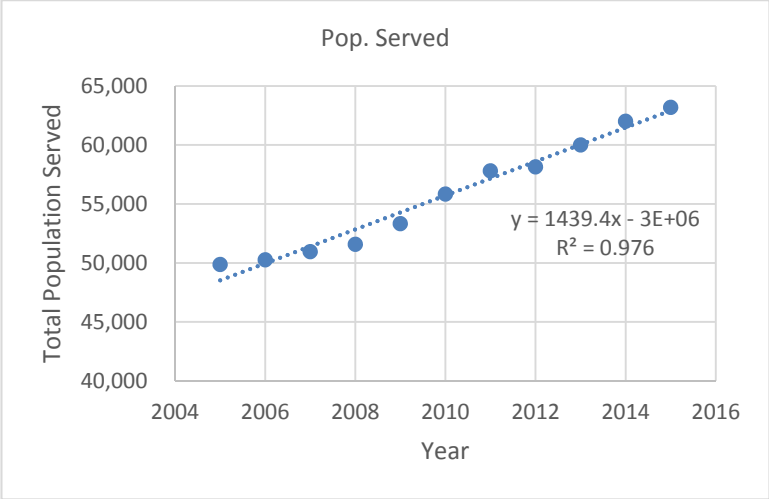
D. Future Demand Projections – *Key Metropolitan Council Benchmark*

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

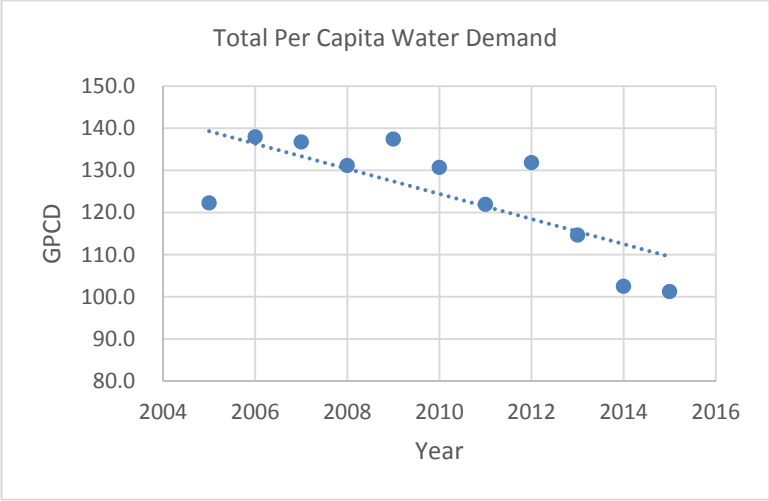
trends. For example, over the ten years has the average daily demand trended up or down? Why is this occurring?

1) Population Served



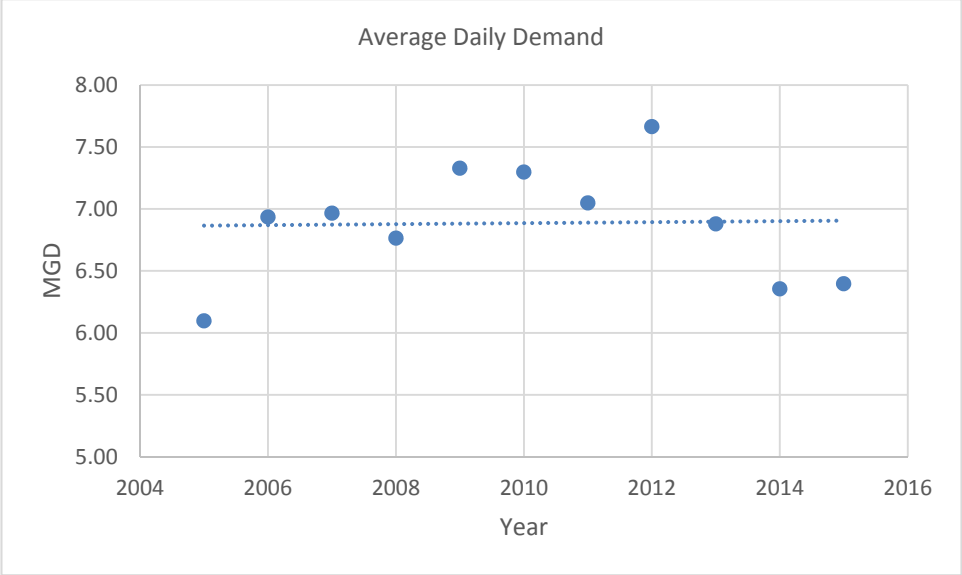
The population Served has increased at a very consistent rate since 2005. From 2005 to 2015, the population served increased on average by approximately 1,400 people per year.

2) Total Per Capita Water Demand



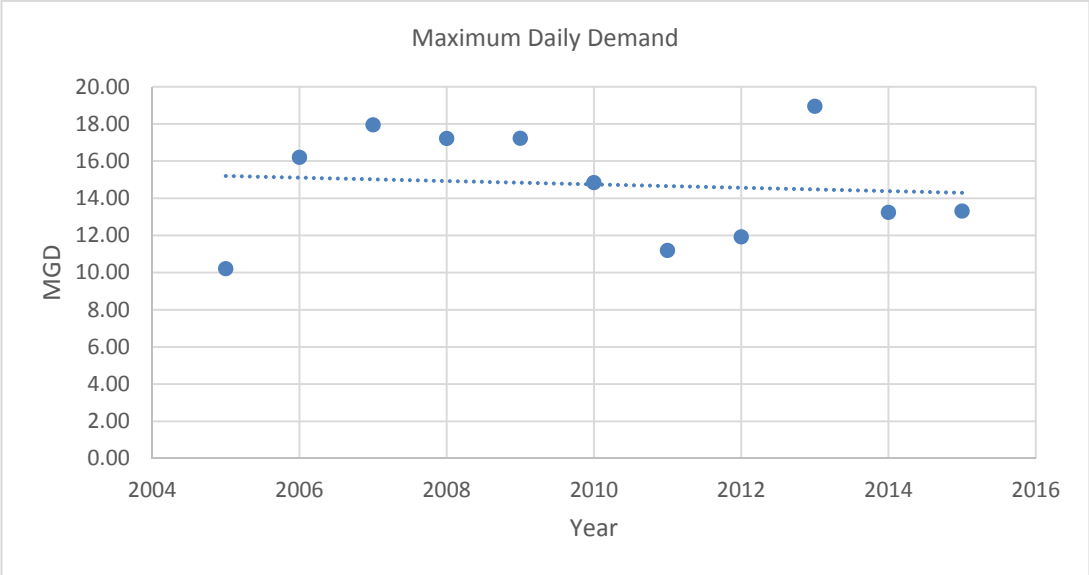
The Total per Capita Water Demand has followed an overall downward trend. Since 2005, the highest the Total Per Capita Demand reached was 138.0 GPCD in 2006 where 2015 was the lowest at 101.2 GPCD. This is likely due to stricter irrigation ordinances, more efficient plumbing fixtures, rain sensors on commercial/industrial irrigation systems, and the tiered billing structure.

3) Average Daily Demand



From 2005-2015, the Average Daily Demand was lowest in 2005 at 6.10 MGD. The Average Daily Demand peaked in 2012 at 7.66 MGD and has been decreasing since with 2014 and 2015 being 6.36 MGD and 6.40 MGD respectively.

4) Maximum Daily Demand



The overall Max Daily Demand trend has been fairly steady where the average maximum daily demand from 2005-2010 was 15.60 MGD and the average from 2010-2015 has decreased to 13.90 MGD. From 2005-2015, the highest Max Daily Demand occurred on August 29, 2013.

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	63,804	63,804	117	6.21	13.30
2017	64,428	64,428	117	7.54	16.15
2018	65,052	65,052	117	7.61	16.31
2019	65,676	65,676	117	7.68	16.47
2020	66,300	66,300	117	7.76	16.62
2021	67,340	67,340	117	7.88	16.88
2022	68,380	68,380	117	8.00	17.14
2023	69,420	69,420	117	8.12	17.40
2024	70,460	70,460	117	8.24	17.66
2025	71,500	71,500	117	8.37	17.93
2030	76,700	76,700	117	8.97	19.23
2040	87,300	87,300	117	10.21	21.89

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:

Populations were projected using linear interpolation of Metropolitan Council projections given in the 2015 System Statement for Blaine. The projected population served is assumed to be equivalent to the total population.

The average day demand was determined by multiplying the projected population served by 117 gallons per person per day (GPCD). The value 117 GPCD was the average total per capita demand for the last five years. The maximum daily demand was determined by multiplying the average daily demand by 2.14 which was the average max day peaking factor from 2005-2015.

E. Resource Sustainability

Monitoring – *Key DNR Benchmark*

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

Table 8. Information about source water quality monitoring

MN Unique Well # or Surface Water ID	Type of monitoring point	Monitoring program	Frequency of monitoring	Monitoring Method
208629 (Well 1)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
208628 (Well 2)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
208646 (Well 3)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
208645 (Well 4)	▣ production well ☐ observation well	☐Routine MDH sampling	☐continuous ☐hourly	▣ SCADA ☐ grab sampling

MN Unique Well # or Surface Water ID	Type of monitoring point	Monitoring program	Frequency of monitoring	Monitoring Method
	☐ source water intake ☐ source water reservoir	▣Routine water utility sampling ☐ other	☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	☐ steel tape ☐ stream gauge
208615 (Well 5)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
208634 (Well 6)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
208616 (Well 7)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	☐ SCADA ☐ grab sampling ▣ steel tape ☐ stream gauge
208630 (Well 8)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
208618 (Well 9)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
208643 (Well 10)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
208633 (Well 11)	▣ production well ☐ observation well ☐ source water	☐Routine MDH sampling ▣Routine water	☐continuous ☐hourly ☐ daily	▣ SCADA ☐ grab sampling ☐ steel tape

MN Unique Well # or Surface Water ID	Type of monitoring point	Monitoring program	Frequency of monitoring	Monitoring Method
	intake ☐ source water reservoir	utility sampling ☐ other	☐ weekly ▣ monthly ☐quarterly ☐annually	☐ stream gauge
224698 (Well 12)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
224699 (Well 13)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
233109 (Well 14)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
151587 (Well 16)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ monthly ☐quarterly ☐annually	▣ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
721815 (Well 17)	▣ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☐Routine MDH sampling ▣Routine water utility sampling ☐ other	☐continuous ☐hourly ☐ daily ☐ weekly ▣ 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
208629 (Well 1)	Franconia - Mt. Simon	The overall trend for Well 1 shows that water levels are rising. The lowest recorded water level reading occurred in September 2003 where water levels reached 170 feet below static level. The highest recorded water level reading occurred in January 2011 where water levels reached 60 feet below static level. May 2016 levels reached 70 feet below static level and the lowest recorded value for 2016 was 100 feet below static level which occurred in June.	☐ Falling ☐ Stable ☒ Rising	N/A
208628 (Well 2)	Franconia - Mt. Simon	The overall trend for Well 2 shows that water levels are rising. The lowest recorded water level reading occurred in August 2007 where water levels reached 175 feet below static level. The highest recorded water level reading occurred in May 2016 where water levels reached 75 feet below static level. The lowest recorded water level for 2016 was 111 feet below static level which occurred in June. The highest recorded water level reading occurred in May 2016 where water levels reached 75 feet below static level.	☐ Falling ☐ Stable ☒ Rising	N/A
208646 (Well 3)	Jordan - Mt. Simon	The overall trend for Well 3 shows that water levels are	☒ Falling ☐ Stable	N/A

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
		decreasing. The lowest recorded water level reading occurred in July 2013 where water levels reached 120 feet below static level. The highest recorded water level reading occurred in December 2008 where water levels reached 44 feet below static level. The lowest recorded water level for 2016 occurred in June where levels reached 97 feet below static level. The highest recorded water level for 2016 occurred in February where water levels reached 69 feet below static level.	☐ Rising	
208645 (Well 4)	Jordan - Eau Claire	The overall trend for Well 4 shows that water levels are stable. The lowest recorded water level reading occurred in September 2012 where water levels reached 142 feet below static level. The highest recorded water level reading occurred in December 2008 where water levels reached 54 feet below static level. The lowest recorded water level for 2016 occurred in June where levels reached 100 feet below static level. The highest recorded water level for 2016 occurred in January where water levels reached 69 feet below static level.	☐ Falling ☒ Stable ☐ Rising	N/A
208615 (Well 5)	Franconia - Mt. Simon	The overall trend for Well 5 shows that water levels are rising. The lowest recorded water level reading occurred in September 2003 where water levels reached 137 feet below static level. The highest recorded water level reading occurred in May 2014 where water levels reached 37 feet below static level. The recorded water level for June 2016 show water levels reached 104 feet below static	☐ Falling ☐ Stable ☒ Rising	N/A

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
		level.		
208634 (Well 6)	Franconia - Mt. Simon	The overall trend for Well 6 shows that water levels are falling slightly. The lowest recorded water level reading occurred in August 2011 where water levels reached 168 feet below static level. The highest recorded water level reading occurred in August 2003 where water levels reached 62 feet below static level. The lowest recorded water level for 2016 occurred in June where levels reached 115 feet below static level. The highest recorded water level for 2016 occurred in May where water levels reached 107 feet below static level.	☒ Falling ☐ Stable ☐ Rising	N/A
208616 (Well 7)	Franconia - Mt. Simon	The overall trend for Well 7 shows that water levels are rising. The lowest recorded water level reading occurred in July 2006 where water levels reached 133 feet below static level. The highest recorded water level reading occurred in January 2013 where water levels reached 36 feet below static level.	☐ Falling ☐ Stable ☒ Rising	N/A
208630 (Well 8)	Ironton - Galesville Wells	The overall trend for Well 8 shows that water levels are rising. The lowest recorded water level reading occurred in September 2003 where water levels reached 165 feet below static level. The highest recorded water level reading occurred in August 2014 where water levels reached 80 feet below static level. Water level reached 148 feet below static level in June 2016	☐ Falling ☐ Stable ☒ Rising	N/A
208618 (Well 9)	Ironton - Galesville Wells	The overall trend for Well 9 shows that water levels are rising. The lowest recorded water level reading occurred in	☐ Falling ☐ Stable ☒ Rising	N/A

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
		April 2005 where water levels reached 268 feet below static level. The highest recorded water level reading occurred in May 2015 where water levels reached 93 feet below static level. The lowest recorded water level for 2016 occurred in June where levels reached 233 feet below static level. The highest recorded water level for 2016 occurred in May where water levels reached 103 feet below static level.		
208643 (Well 10)	Franconia - Galesville Wells	The overall trend for Well 10 shows that water levels are rising. The lowest recorded water level reading occurred in August 2008 where water levels reached 285 feet below static level. The highest recorded water level reading occurred in May 2015 where water levels reached 68 feet below static level. The lowest recorded water level for 2016 occurred in June where levels reached 111 feet below static level. The highest recorded water level for 2016 occurred in May where water levels reached 76 feet below static level.	☐ Falling ☐ Stable ☒ Rising	N/A
208633 (Well 11)	Franconia - Mt. Simon	The overall trend for Well 11 shows that water levels are falling. The lowest recorded water level reading occurred in August 2013 where water levels reached 119 feet below static level. The highest recorded water level reading occurred in March 2011 where water levels reached 55 feet below static level. The lowest recorded water level for 2016 occurred in June where levels reached 108 feet below static level. The highest recorded water level for 2016	☒ Falling ☐ Stable ☐ Rising	N/A

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
		occurred in May where water levels reached 102 feet below static level.		
224698 (Well 12)	Drift Well	The overall trend for Well 12 shows that water levels are stable. The lowest recorded water level reading occurred in October 2010 where water levels reached 193 feet below static level. The highest recorded water level reading occurred in July 2013 where water levels reached 61 feet below static level. The lowest recorded water level for 2016 occurred in May where levels reached 140 feet below static level. The highest recorded water level for 2016 occurred in February where water levels reached 70 feet below static level.	☐ Falling ☒ Stable ☐ Rising	N/A
224699 (Well 13)	Franconia - Mt. Simon	The overall trend for Well 13 shows that water levels are rising. The lowest recorded water level reading occurred in July 2003 where water levels reached 291 feet below static level. The highest recorded water level reading occurred in July 2011 where water levels reached 25 feet below static level. The lowest recorded water level for 2016 occurred in May where levels reached 213 feet below static level. The highest recorded water level for 2016 occurred in March where water levels reached 167 feet below static level.	☐ Falling ☐ Stable ☒ Rising	N/A
233109 (Well 14)	Franconia - Mt. Simon	The overall trend for Well 14 shows that water levels are rising. The lowest recorded water level reading occurred in October 2003 where water levels reached 253 feet below static level. The highest recorded water level reading occurred in	☐ Falling ☐ Stable ☒ Rising	N/A

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
		September 2011 where water levels reached 75 feet below static level. The lowest recorded water level for 2016 occurred in June where levels reached 214 feet below static level. The highest recorded water level for 2016 occurred in May where water levels reached 205 feet below static level.		
151587 (Well 16)	Franconia - Galesville Wells	The overall trend for Well 16 shows that water levels are rising. The lowest recorded water level reading occurred in August 2013 where water levels reached 142 feet below static level. The highest recorded water level reading occurred in January 2011 where water levels reached 64 feet below static level. The lowest recorded water level for 2016 occurred in June where levels reached 93 feet below static level. The highest recorded water level for 2016 occurred in May where water levels reached 80 feet below static level.	☐ Falling ☐ Stable ☒ Rising	N/A
721815 (Well 17)	Drift Well	The overall trend for Well 17 shows that water levels are falling. The lowest recorded water level reading occurred in September 2015 where water levels reached 143 feet below static level. The highest recorded water level reading occurred in September 2014 where water levels reached 60 feet below static level. The lowest recorded water level for 2016 occurred in June where levels reached 94 feet below static level. The highest recorded water level for 2016 occurred in May where water levels reached 91 feet below static level.	☒ Falling ☐ Stable ☐ Rising	N/A

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 **N/A** – Previous studies indicate that pumping from the aquifers does not affect surface waters.	Coon Creek	☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	
☐ Calcareous fen **N/A**		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing		☐ Revise permit ☐ Change groundwater pumping ☐ Increase	

Resource Type	Resource Name	Risk	Risk Assessed Through	Describe Resource Protection Threshold*	Mitigation Measure or Management Plan	Describe How Changes to Thresholds are Monitored
		☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ Other: ___		conservation ☐ Other	
☐ Lake **N/A** – Previous studies indicate that pumping from the aquifers does not affect surface waters.	Laddie Lake, numerous man-made lakes	☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ GIS analysis ☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	
▣ Wetland	Pioneer Park Wetland	▣ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ▣ Monitoring ☐ Aquifer testing ☐ Other: ___	Not established N/A	☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ▣ Other – The City installed a new monitoring well last year in Pioneer Park during their pumping tests for new wells 18-21.	Not established N/A
☐ Trout Stream		☐ Flow/water level decline ☐ Degrading	☐ GIS analysis ☐ Modeling ☐ Mapping		☐ Revise permit ☐ Change	

Resource Type	Resource Name	Risk	Risk Assessed Through	Describe Resource Protection Threshold*	Mitigation Measure or Management Plan	Describe How Changes to Thresholds are Monitored
N/A		water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ Monitoring ☐ Aquifer testing ☐ Other: ___		groundwater pumping ☐ Increase conservation ☐ Other	
▣ Aquifer	Multiple	▣ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ▣ Monitoring ☐ Aquifer testing ☐ Other: ___	City routinely measures the static and pumping water levels in the municipal wells, which are recorded by the SCADA system. The 10 observation wells are currently monitored manually on a monthly basis. Protection threshold not established. Two monitoring wells (OW-5 and OW-10) have been relocated at WTP4.	☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ▣ Other Protection threshold not established.	Not established N/A
☐ Endangered, threatened, or special concern species habitat, other Natural resource						

Resource Type	Resource Name	Risk	Risk Assessed Through	Describe Resource Protection Threshold*	Mitigation Measure or Management Plan	Describe How Changes to Thresholds are Monitored
impacts **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	Approved by MDH April 2018	April 2028 (Estimated)
SWP	☐ In Process ☐ Completed ▣ Not Applicable	N/A	N/A

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	2016-2017 2016-2020	Install Wells 18-21. Well Redevelopment
Water Storage Facilities	☐ No action planned - adequate ▣ Repair/replacement ☐ Expansion/addition	2015 and 2019 2016-2017	Tower 2 Exterior Cleaning Tower 1 Rehabilitation
Water Treatment Facilities	☐ No action planned - adequate ▣ Repair/replacement ▣Expansion/addition	2016 2016-2018	Replace Filter Media in WTP2 and WTP3 New WTP4
Distribution Systems (pipes, valves, etc.)	☐ No action planned - adequate ▣ Repair/replacement ▣ Expansion/addition	2015-2020 2017 2016 2017	Public Improvements – Trunk oversizing 105th Watermain 91st Ave and Hastings St Reconstruction Trunk Connection to Tower #4
Pressure Zones	▣ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		
Other:	☐ No action planned - adequate ▣ Repair/replacement ☐ Expansion/addition	2015-2016 2016-2020	SCADA System Replacement AMR Radio Replacement

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 Well #18	Near 125th Ave NE and Lexington Avenue N in Blaine	QBAA	1800 gpm	2016/2017	N/A
Groundwater Well #19	Near 125th Ave NE and Lexington Avenue N in Blaine	Tunnel City – Wonewoc	1400-1500 gpm	2016/2017	N/A
Groundwater Well #20	Near 125th Ave NE and Lexington Avenue N in Blaine	Quaternary	1800-2000 gpm	2016/2017	N/A
Groundwater Well #21	Near 125th Ave NE and Lexington Avenue N in Blaine	Tunnel City - Wonewoc	1400-1700 gpm	2016/2017	N/A

Water Source Alternatives - *Key Metropolitan Council Benchmark*

Do you anticipate the need for alternative water sources in the next 10 years? ☐ Yes ☒ 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

Alternative Source Considered	Source and/or Installation Location (approximate)	Estimated Amount of Future Demand (%)	Timeframe to Implement (YYYY)	Potential Partners	Benefits	Challenges
☐ 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 26, 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	ROBERT THERRES	763-785-6123	RTHERRES@CI.BLAINE.MN.US
Alternate Emergency Response Lead	GEORGE LINNGREN	763-785-6137	GLINNGREN@CI.BLAINE.MN.US

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.

The City of Blaine does not have a formal operational contingency plan but does have procedures that operations staff follow for mainline breaks and other common system failures.

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
COON RAPIDS	5.5 MGD	EMERGENCY	VALVE WRENCH, TRUCK, LABOR
LINO LAKES	UNKNOWN	EMERGENCY	VALVE WRENCH, TRUCK, LABOR
SPRING LAKE PARK	2.2 MGD	EMERGENCY	VALVE WRENCH, TRUCK, LABOR
MOUNDS VIEW	3.5 MGD	EMERGENCY	VALVE WRENCH, TRUCK, LABOR

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
NO SURFACE WATER SOURCES				

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

Reference the City WHPP Parts 1 and 2, prepared by Barr Engineering, for any additional emergency measures.

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	4,142,500	994,000
Commercial	5	2,079,500	666,500
Non-Essential	6	0	0
TOTAL	NA	6,222,000	1,660,500

GPD – Gallons per Day

Average Day Demands shown in Table 18 are based on water sold quantities in 2015. There aren't any second, third, or fourth priority water demands in the City of Blaine.

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 interconnections. ▣Enforce the critical water deficiency ordinance Sec. 86-186. - Reservation of right to restrict water use; use during fires. ▣Water allocation through tiered water allocation priorities. ▣Meet with large water users to discuss their contingency plan.	▣Supply augmentation through interconnections. ▣Enforce the critical water deficiency ordinance Sec. 86-186. - Reservation of right to restrict water use; use during fires. ▣Water allocation through tiered water allocation priorities. ▣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 ▣Social media (e.g. Twitter, Facebook) ▣Press release (TV, radio, newspaper),	▣Daily	▣Anoka County ▣The local media
▣Long-term Ongoing demand reduction declared	▣Website ▣Social media (e.g. Twitter, Facebook) ▣Direct customer mailing, ▣Other: Signs posted at key intersections	▣Monthly	▣Anoka County
▣Governor's Critical water deficiency declared	▣Website ▣Social media (e.g. Twitter, Facebook)	▣Monthly	▣Anoka County ▣The local media

Notification Trigger(s)	Methods (select all that apply)	Update Frequency	Partners
	▣Direct customer mailing, ▣Press release (TV, radio, newspaper), ▣Meeting with large water users (> 10% of total city use)		

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.

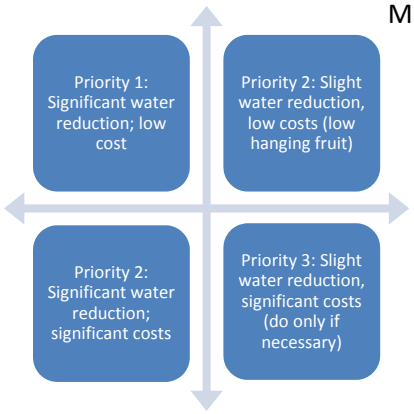
Irrespective of whether a critical water deficiency control is in place, does the public water supply utility, city manager, mayor, or emergency manager have standing authority to implement water restrictions? ▣ Yes ☐ No

If yes, cite the regulatory authority reference: Blaine, MN – Code of Ordinances - Chapter 86 Section 3.
https://www.municode.com/library/mn/blaine/codes/code_of_ordinances?nodeId=PTIICOOR_CH86UT_ARTIINGE_S86-7LASPRE

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

City Manager or designate.

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.

N/A

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 rates last changed 1/1/04
Water Supply System Improvements (e.g. leak repairs, valve replacements, etc.)	▣ Yes, water treatment plant media upgrades, leak repairs, and other maintenance as needed. ☐ No
Educational Efforts	▣Yes, an example was on the Blaine City Connect (2015), there was educational material about the increase in water usage during summer months with suggestions to reduce usage. ☐ No
New water conservation ordinances	▣ Yes, sprinkler ordinance was revised on 8/18/16. ☐ 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, however the City has a low interest loan program for remodeling. MN plumbing and energy codes would be required for the remodel.
Enforcement	▣ Yes, on July 20, 2007 the City Manager authorized Public Works Personnel and Utility Personnel to issue citations for sprinkler system violations. ☐ No
Describe Other	▣ Yes, Commercial and industrial properties are required to have rain sensors on their lawn irrigation systems. New developments are asked to use alternative water sources for irrigation (surface water if available). City has also participated in the sale of rain barrels. Blaine is a member of the Anoka County Wellhead Protection Group that provides ongoing educational information including a website called “know the flow”. City participates in a Green Expo every year to provide educational information to participants. ☐ No

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

The average residential per capita demand for 2010-2015 was 73 gpcd which decreased from the 2000-2005 average of 85 gpcd. There was also a decrease in the average total per capita demand for 2010-2015, which was 117 gpcd compared to 133 gpcd for 2000-2005. This is based on utility metering and billing records.

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 **N/A**		
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: When system storage does not meet fire demand.	▣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 the interconnections. ▣Water allocation through tiered water allocation priorities. ▣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 _____	▣Enforce the 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. ▣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	▣Per capita demand increasing ▣Total demand increase (higher population or more industry)Water level in well(s) below elevation of _____	▣Enforce the 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. ▣Meet with large water users to discuss user's contingency plan. ▣Enhanced monitoring and reporting: audits, meters, billing, etc.

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)

Blaine does not have a proactive leak detection monitoring program at this time. Before the City considers conducting regular leak detection surveys, they are first going to evaluate other projects to help reduce their unaccounted water.

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? Blaine does not do third party water audits but does prepare their annual DNR report on water usage.

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

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

NA – Water loss average was 6.7% for 2010-2015.

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)[1]	Average age/meter replacement schedule (years)[1]
Residential	17,965	17,965	17,965	N/A	10 / 20
Irrigation meters	N/A	N/A	N/A	N/A	___ / ___
Institutional	48	48	48	N/A	10 / 20
Commercial	1,229	1,229	1,229	N/A	10 / 20
Industrial	0	0	0	N/A	___ / ___
Public Facilities	N/A	N/A	N/A	N/A	___ / ___
Other	N/A	N/A	N/A	N/A	___ / ___
TOTALS	19,242	19,242	19,242	NA	10 / 20

[1]The City is in the process of upgrading their meters. If meters have more than 1.5 Million cumulative gallons or are older than 10 years, they are being included in the meter upgrade program.

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.

Blaine does not have any unmetered systems. They replaced the meters city wide for the residential area 10-11 years ago. Irrigation and public facility meters are accounted within the Commercial customer category.

Table 24. Water source meters

	Number of Meters	Meter testing schedule (years)[1]	Number of Automated Meter Readers	Average age/meter replacement schedule (years)[1]
Water Source (wells/intakes)	9	See note below.	0	10 / 20
Treatment Plant	7	See note below	0	10 / 20

[1]The City calibrates their compound meters every five years and their positive displacement meters every two years.

Note: The meters for wells at 5, 7, and 9 are tested on an annual basis. The remaining meters at the treatment plant are tested as needed.

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

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

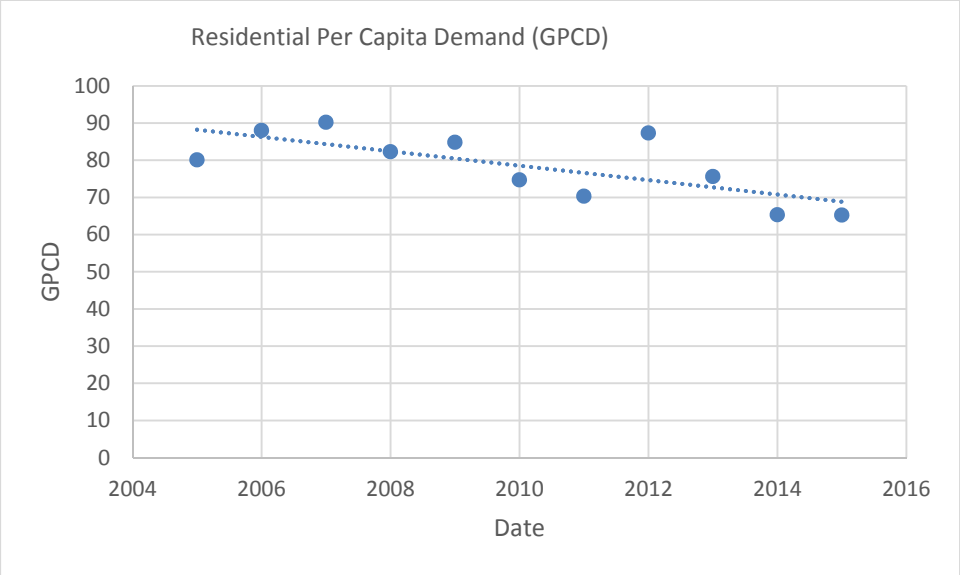
Is your average 2010-2015 residential per capita water demand in Table 2 more than 75? ☐ Yes ☒ No

What was your 2005 – 2014 ten-year average residential per capita water demand? 78.5 g/person/day

Describe the water use trend over that timeframe:

The residential per capita demand has an overall decreasing trend from 2005-2015 as shown in the following figure. The highest value was in 2007 with 90.2 GPCD where the lowest observed value was in 2015 with 65.2

GPCD. The decreasing trend is likely due to increased public awareness of conservation along with the Minnesota plumbing and energy code requirements. New developments are being built with more conservative fixtures and more advanced lawn irrigation systems.



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	Blaine encourages new developments to consider using storm water for irrigation. This is an ongoing strategy for helping to reduce the per capita demand.
☐ 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	The City has an ongoing maintenance program to upgrade wells, treatment plants, and hydrants. They have just started a water main replacement program if needed with street reconstruction projects.
☐ Offer free or reduced cost water use audits) for residential customers.	

Strategy to reduce residential per capita demand	Timeframe for completing work
☐ Implement a notification system to inform customers when water availability conditions change.	
▣Provide rebates or incentives for installing water efficient appliances and/or fixtures indoors (e.g., low flow toilets, high efficiency dish washers and washing machines, showerhead and faucet aerators, water softeners, etc.)	The City has a low interest loan program for remodel projects that would be required to meet current plumbing and energy code.
▣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.)	Blaine participates in the sale of rain barrels to area residents. They have helped residents with installation or rain gardens in the public right of way by replacing the concrete curb to provide an opening for storm water to enter the rain gardens.
☐ Identify supplemental Water Resources	
☐ Conduct audience-appropriate water conservation education and outreach.	
☐ Describe other plans	

Objective 3: Achieve at least a 1.5% per year water reduction for Institutional, Industrial, Commercial, and Agricultural GPCD over the next 10 years or a 15% reduction in ten years.
Complete Table 26 by checking which strategies you will used to continue reducing non-residential customer use demand and project a likely timeframe for completing each checked strategy (add rows for additional strategies).

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

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

Strategy to reduce total business, industry, agricultural demand	Timeframe for completing work
☐ Conduct a facility water use audit for both indoor and outdoor use, including system components	
▣Install enhanced meters capable of automated readings to detect spikes in consumption	Blaine's automatic meter reading system (AMR) can show high water use consumers. The City can then investigate each case as needed.
☐ 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)	Ongoing maintenance program. Also reviewing water main for replacement if

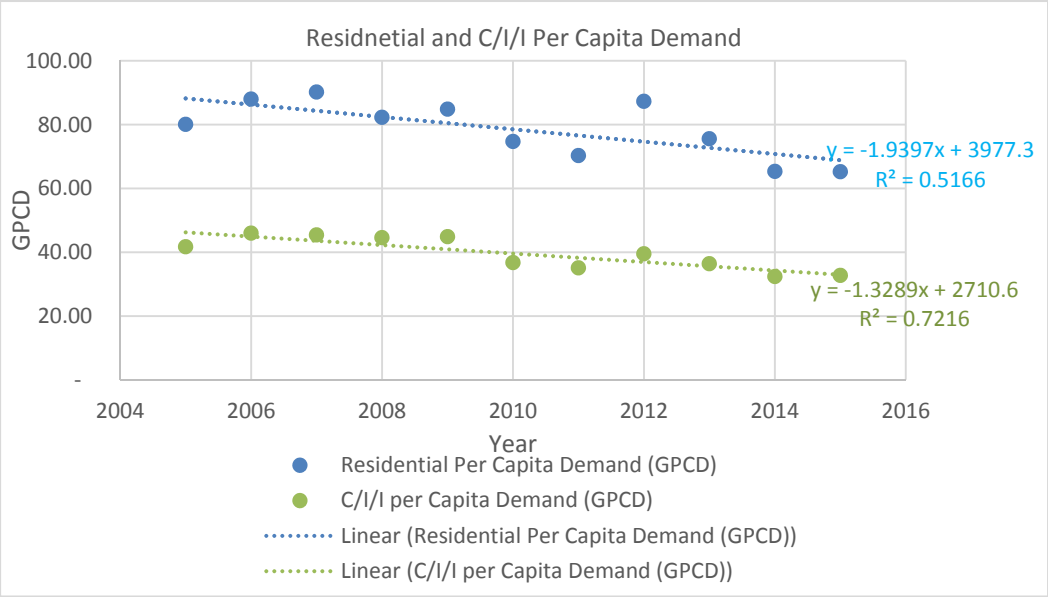
Strategy to reduce total business, industry, agricultural demand	Timeframe for completing work
	needed with street reconstruction projects.
☐ Investigate the reuse of reclaimed water (e.g., storm water, wastewater effluent, process wastewater, etc.)	
☐ Reduce outdoor water use (e.g., turf replacement/reduction, 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.	This is already part of the City Ordinance. They will implement as needed.
☐ [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.

The trends for residential per capita demand along with C/I/I per capita demand both decreased between 2005 and 2015. The overall decreasing trend is likely due to increased public awareness of conservation along with the Minnesota plumbing and energy code requirements. New developments are being built with more conservative fixtures and more advanced lawn irrigation systems.



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, Max day peaking factor is 2.14.

Calculate a ten year average (2005 – 2014) of the ratio of maximum day demand to average day demand: 2.14

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: 1,000 gallons or ____ cubic feet ___ other

Frequency of billing: ☒ Monthly for Industrial and Commercial ☐ Bimonthly ☒ Quarterly for Residential ☐ Other: _____

Water Rate Evaluation Frequency: ☒ every year with the City Council ☐ every ___ years ☐ no schedule

Date of last rate change: 1/1/04

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:

NA

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). ***This strategy is already in place for Blaine.***
☐	Adopt a Water Use Restriction Ordinance (lawn irrigation, car washing, pools, etc.)
▣	Adopt an Outdoor Lawn Irrigation Ordinance. ***The lawn irrigation ordinance has recently been revised by Blaine.***
☐	Adopt a Private well Ordinance (private wells in a city must comply with water restrictions)
▣	Implement a Stormwater Management Program. ***This strategy is already in place for Blaine.***
▣	Adopt Non-Zoning Wetlands Ordinance (can further protect wetlands beyond state/federal laws-

	for vernal pools, buffer areas, restrictions on filling or alterations). ***This strategy is already in place for Blaine.***
☐	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: ***Blaine has the existing low interest loan program in place and is currently in the process of doing approximately 300 acres of wetland restoration under a conservation easement on City open space land.***

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

The City of Blaine will measure success based on utility billing records through the next ten years.

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

1. 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.
2. 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.
3. 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.
4. 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.
5. If appropriate, they will cooperatively develop a simple work plan for the next few years, targeting a couple areas where the city might focus efforts.

A. Regulation

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

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

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

Regulations Utilized	When is it applied (in effect)?
☐ Rainfall sensors required on landscape irrigation systems *Rainfall sensors are not required by they are recommended: "Rain sensors connected to irrigation controllers are vital to conserving water. There's no need for an automatic sprinkler system to be used when it's raining." Item #4 on Blaine City Connect on 7/27/16 <* [*http://www.ci.blaine.mn.us/index.cfm?id=904188#.V5kg4oMrJhE*](http://www.ci.blaine.mn.us/index.cfm?id=904188#.V5kg4oMrJhE)*>.*	☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
▣ Water efficient plumbing fixtures required	☐ New Development

Regulations Utilized	When is it applied (in effect)?
	☐ Replacement ☐ Rebate Programs ▣ Low interest loan program for remodeling which requires current MN plumbing and energy codes be met as part of the remodel.
▣ Critical/Emergency Water Deficiency ordinance	▣ Only during declared Emergencies – *The City Manager has authority to implement water emergency responses.*
▣ Watering restriction requirements (time of day, allowable days, etc.)	▣ Odd/Even – *Now enforced throughout the year. No watering from 10 am to 6 pm during summer months.* ☐ 2 days/week ☐ Only during declared Emergencies
☐ Water waste prohibited (for example, having a fine for irrigators spraying on the street) **N/A**	☐ -Ongoing ☐ Seasonal ☐ Only during declared Emergencies
☐ Limitations on turf areas (requiring lots to have 10% - 25% of the space in natural areas) **N/A**	☐ New Development ☐ Shoreland/zoning ☐ Other
▣ Soil preparation requirement s (after construction, requiring topsoil to be applied to promote good root growth) http://www.ci.blaine.mn.us/index.cfm?id=50138#.V5knHIMrJhE	▣ New Development - *4" of black dirt required for lawns. Cannot contain more than 35% sand.* ☐ Construction Projects ☐ Other
▣ Tree ratios (requiring a certain number of trees per square foot of lawn) *Planting Location: A minimum of two front yard trees is required for most Zoning Districts. One of the two front yard trees is required to be planted in the boulevard.Ornamental trees do not meet landscaping requirements. From Blaine City Connect on 7/27/16* *http://www.ci.blaine.mn.us/index.cfm?id=50139#.V5kncYMrJhE*	▣New development ☐ Shoreland/zoning ☐ Other
☐ Permit to fill swimming pool and/or requiring pools to be covered (to prevent evaporation) **N/A**	☐ 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: *City Code of Ordinances does allow appropriation of water from storm water ponds with City approval. Ordinance Sec 34-522*

B. Retrofitting Programs

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

conservation goals, such as electric or gas suppliers, to develop cooperative rebate and retrofit programs.

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

Retrofitting Programs

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

Table 30. Retrofitting programs (Select all that apply)

Water Use Targets	Outreach Methods	Partners
☐ low flush toilets, ☐ toilet leak tablets, ☐ low flow showerheads, ☐ faucet aerators; ☒ Achieve MN plumbing and energy codes	☐ Education about ☐ free distribution of ☐ rebate for ☒ Low interest loan program for remodeling which requires current MN plumbing and energy codes be met as part of the remodel.	☐ Gas company ☐ Electric company ☐ Watershed organization
☐ water conserving washing machines, ☐ dish washers, ☐ water softeners; ☒ Achieve MN plumbing and energy codes	☐ Education about ☐ free distribution of ☐ rebate for ☒ Low interest loan program for remodeling which requires current MN plumbing and energy codes be met as part of the remodel.	☐ Gas company ☐ Electric company ☐ Watershed organization
☒ rain gardens, ☐ rain barrels, ☒ Native/drought tolerant landscaping, etc. Source: City of Blaine Ordinance No. 10-2205 http://www.ci.blaine.mn.us/_Docs/_CityClerk/Ordinances/ORD10-2205.pdf	☐ Education about ☐ free distribution of ☐ rebate for ☒ other: Storm water management plan shall be required of all new development, redevelopment and land disturbance projects greater than one (1) acre in parcel size or part of a greater plan of development	The Minnesota Stormwater Manual (Stormwater Steering Committee, MN Pollution Control Agency), the Minnesota Urban Small Sites BMP Manual (Metropolitan Council), Local Watershed Districts, Local Road Research

Water Use Targets	Outreach Methods	Partners
	Source: City of Blaine Ordinance No. 10-2205 http://www.ci.blaine.mn.us/_Docs/_CityClerk/Ordinances/ORD10-2205.pdf	Board BMP Maintenance Guide, and Protecting Water Quality in Urban Areas (MPCA) are resources that provide guidance in achieving these goals. Source: City of Blaine Ordinance No. 10-2205 http://www.ci.blaine.mn.us/_Docs/_CityClerk/Ordinances/ORD10-2205.pdf

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

Success will be measured through utility billing records.

C. Education and Information Programs

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

Proposed Education Programs

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

Table 31. Current and Proposed Education Programs

Education Methods	General summary of topics	#/Year	Frequency
Billing inserts or tips printed on the actual bill		Ongoing, throughout year	▣ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Consumer Confidence Reports	City newsletter is used annually to provide information on the City's Consumer Confidence Drinking Water Report	1/year	▣ Annually ☐ 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)		Ongoing, throughout year	▣ 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	City's storm water Manager presents to various groups each year and participates in the annual Green Expo with Educational Materials.	Ongoing, throughout year	▣ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Staff training	Continuing education training for staff		▣ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Facility tours			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Displays and exhibits	Green Expo educational materials. Ongoing information at City Hall Engineering counter on testing well water and information on rain gardens. Participate in annual grant program for voluntary private well		▣ Annually ▣ Ongoing ☐ Seasonal ☐ Only during declared Emergencies

Education Methods	General summary of topics	#/Year	Frequency
	abandonment.		
Marketing rebate programs (e.g., indoor fixtures & appliances and outdoor practices)			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Community news letters	Current issues that are going on (Hydrant flushing, odd/even watering schedule).		▣ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Direct mailings (water audit/retrofit kits, showerheads, brochures)			☐ Ongoing ☐ Seasonal ▣ Only during declared Emergencies
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)	Residential rain gardens in right of way.		▣ 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 throughout partnership with Anoka County Wellhead Protection Implementation Group.		▣ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Website (include address: **www.ci.blaine.mn.us**)		Rolling out new web site in	☐ Ongoing ▣ Seasonal ☐ Only during

Education Methods	General summary of topics	#/Year	Frequency
		February with new information on usage and water news	declared Emergencies
Targeted efforts (large volume users, users with large increases)	Automatic meter reading review of high water use.		▣ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Notices of ordinances	Through public hearing notices as changes are made.		▣ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Emergency conservation notices			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
Other:			☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies

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

The City newsletter will provide information on the City's Consumer Confidence Drinking Water report on an annual basis. The Stormwater Manager will continue to present to various groups each year. The City will participate in the annual Green Expo and provide educational material. The City will continue to provide educational material at City Hall for testing well water and installing rain gardens.

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 On June 4, 2014 Blaine joined the Anoka County Municipal Wellhead Protection Group to combine their protection efforts with other cities. *Source*: Know the Flow. Anoka County Municipal Wellhead Protection Group Receives Governor's Award. Visited 9.16.2016. http://www.knowtheflow.us/2013/06/municipal-wellhead-protection-group-receives-governors-award/

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: Blaine participates in the Anoka County Wellhead Protection Group. No storm water infiltration allowed in DWSMA per the City's Local Surface Water Management Plan.		

Technical assistance

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

- ☐ Coordination of state, regional and local water supply planning roles
- ☐ Regional water use goals

- ☐ Water use reporting standards
- ☐ Regional and sub-regional partnership opportunities
- ☐ Identifying and prioritizing data gaps and input for regional and sub-regional analyses
- ☐ Others: _____

GLOSSARY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Acronyms and Initialisms

AWWA – American Water Works Association

C/I/I – Commercial/Institutional/Industrial

CIP – Capital Improvement Plan

GIS – Geographic Information System

GPCD – Gallons per capita per day

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

MDH – Minnesota Department of Health

MGD – Million gallons per day

MG – Million gallons

MGL – Maximum Contaminant Level

MnTAP – Minnesota Technical Assistance Program (University of Minnesota)

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

MRWA – Minnesota Rural Waters Association

SWP – Source Water Protection

WHP – Wellhead Protection

APPENDICES TO BE SUBMITTED BY THE WATER SUPPLIER

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

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

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

Appendix 4: Capital Improvement Plan - see Part 1E

Appendix 5: Emergency Telephone List – see Part 2C

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

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

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

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

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

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

APPENDICES

Appendix 1: Well Records and Maintenance Summaries

Well Maintenance Summary:

Blaine monitors the pumping for all of their wells. When their numbers start to decrease, indicating a problem, Blaine will rehabilitate the well. Blaine conducts motor inspections and maintenance on exposed motors in their water plants and will rebuild the motors as needed.

Blaine has records that the following maintenance was conducted between 2005 and 2015:

Well #2 had a maintenance inspection on May 22, 2009.

Well #2 had a submersible turbine pump inspection on May 25, 2000 and May 18, 2001.

Well #13 inspected on April 4, 2003.

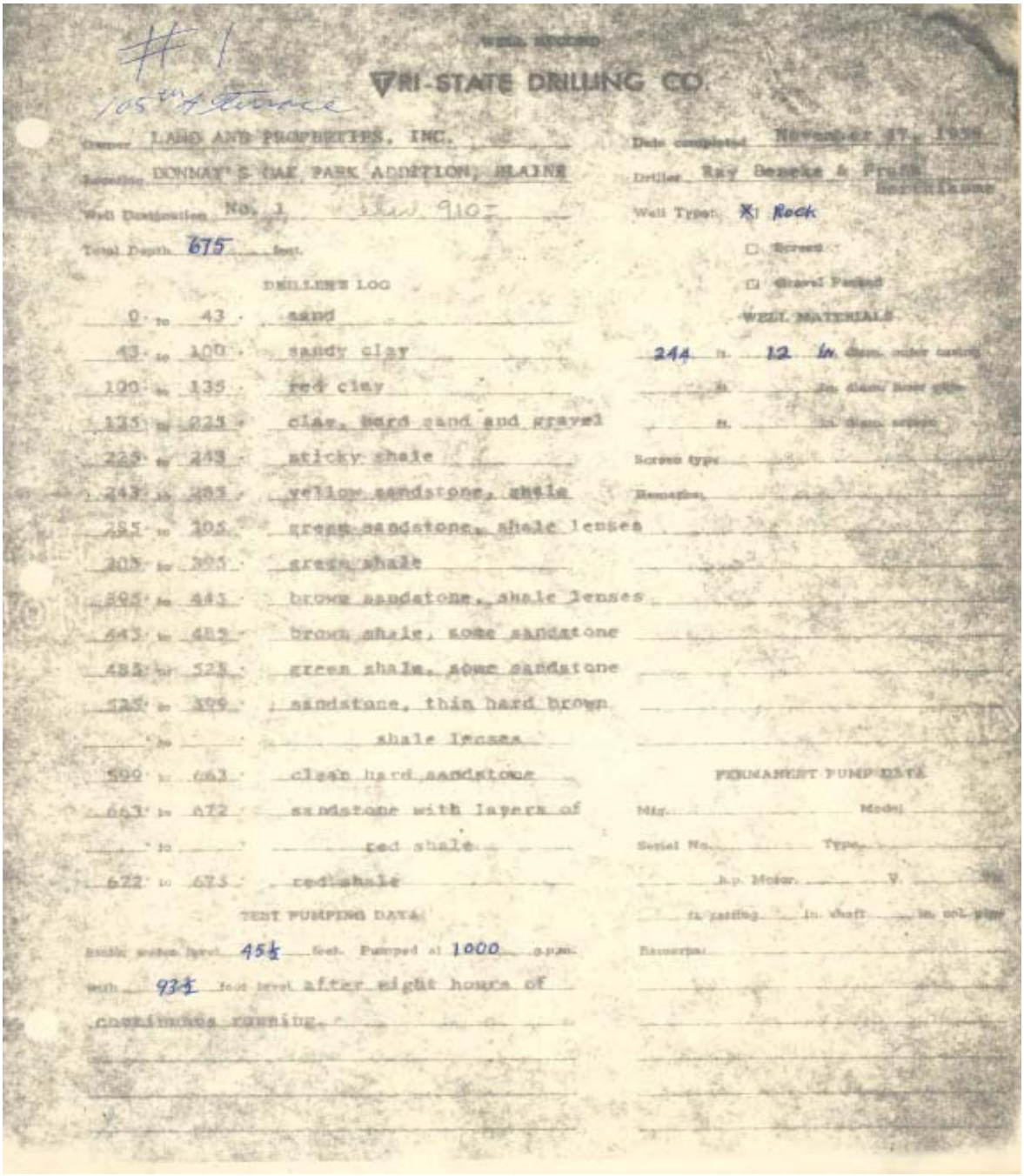
Well #9 had maintenance conducted by E.H. Renner & Sons on June 12, 2009.

Wellhouse 11 and 14 Rehabilitation began in 2018

Wellhouse 1, 2, and 9 Rehabiliation began in 2019.

Well Records:

Figure 1 - Well 1 Record



#1
105th & Florence

WELL RECORD

TRI-STATE DRILLING CO.

Owner LAND AND PROPERTIES, INC.
Date completed November 27, 1978
Subdivision DONNAY'S OAK PARK ADDITION, BLAINE
Driller Ray Deweese & Frank Berchtenbreiter
Well Designation No. 1 SW 9107
Well Type: [X] Rock [ ] Screen [ ] Gravel Packed
Total Depth 675 feet.

DRILLER'S LOG

0	43	sand
43	100	sandy clay
100	135	red clay
135	225	clay, hard sand and gravel
225	243	sticky shale
243	285	yellow sandstone, shale
285	305	green sandstone, shale lenses
305	395	green shale
395	443	brown sandstone, shale lenses
443	483	brown shale, some sandstone
483	525	green shale, some sandstone
525	599	sandstone, thin hard brown shale lenses
599	663	clean hard sandstone
663	672	sandstone with layers of red shale
672	675	red shale

WELL MATERIALS

244 ft. 12 in. diam. under casing
ft. in. diam. liner pipe
ft. in. diam. screen
Screen type
Remarks

PERMANENT PUMP DATA

Mfg. Model
Serial No. Type
h.p. Motor V.
ft. casing in. shaft in. col. pipe
Remarks

TEST PUMPING DATA

Static water level 45½ feet. Pumped at 1000 g.p.m.
with 93½ feet level after eight hours of continuous running.

Figure 2 - Well 2 Record

126th & Jefferson

WELL RECORD

TRI-STATE DRILLING CO.

Owner: LAND AND PROPERTIES, INC.

Location: DONNAY'S OAK PARK ADDITION, BLAINE

Well Designation: No. 2

Total Depth: 665 feet.

Date completed: June 29, 1960

Driller: Ray Beneke

Well Type: ☒ Rock ☐ Screen ☐ Gravel Packed

DRILLER'S LOG

From	To	Material
0'	37'	sand
37'	80'	grey clay
80'	110'	red sand
110'	138'	red clay and gravel
138'	225'	Jordan sandstone (soft)
225'	280'	green sandstone and shale
280'	291'	brown sandstone
291'	390'	alternate layers of green shale and sandstone
390'	439'	sandstone
439'	465'	sandstone with shale layers
465'	484'	brown shale with seams of sandstone
484'	513'	green silty shale
513'	615'	sandstone with thin ledges of shale
615'	661'	clean white sandstone
661	665	red shale

WELL MATERIALS

229 ft. 12 in. diam. outer casing

___ ft. ___ in. diam. liner pipe

___ ft. ___ in. diam. screen

Screen type: ___

Remarks: Well was developed with dynamite and air.

TEST PUMPING DATA

Static water level 45 feet. Pumped at 1050 g.p.m. with 113 foot level

PERMANENT PUMP DATA

Mfg. Fairbanks-Morse Model 12"MC

Serial No. ___ Type line shaft

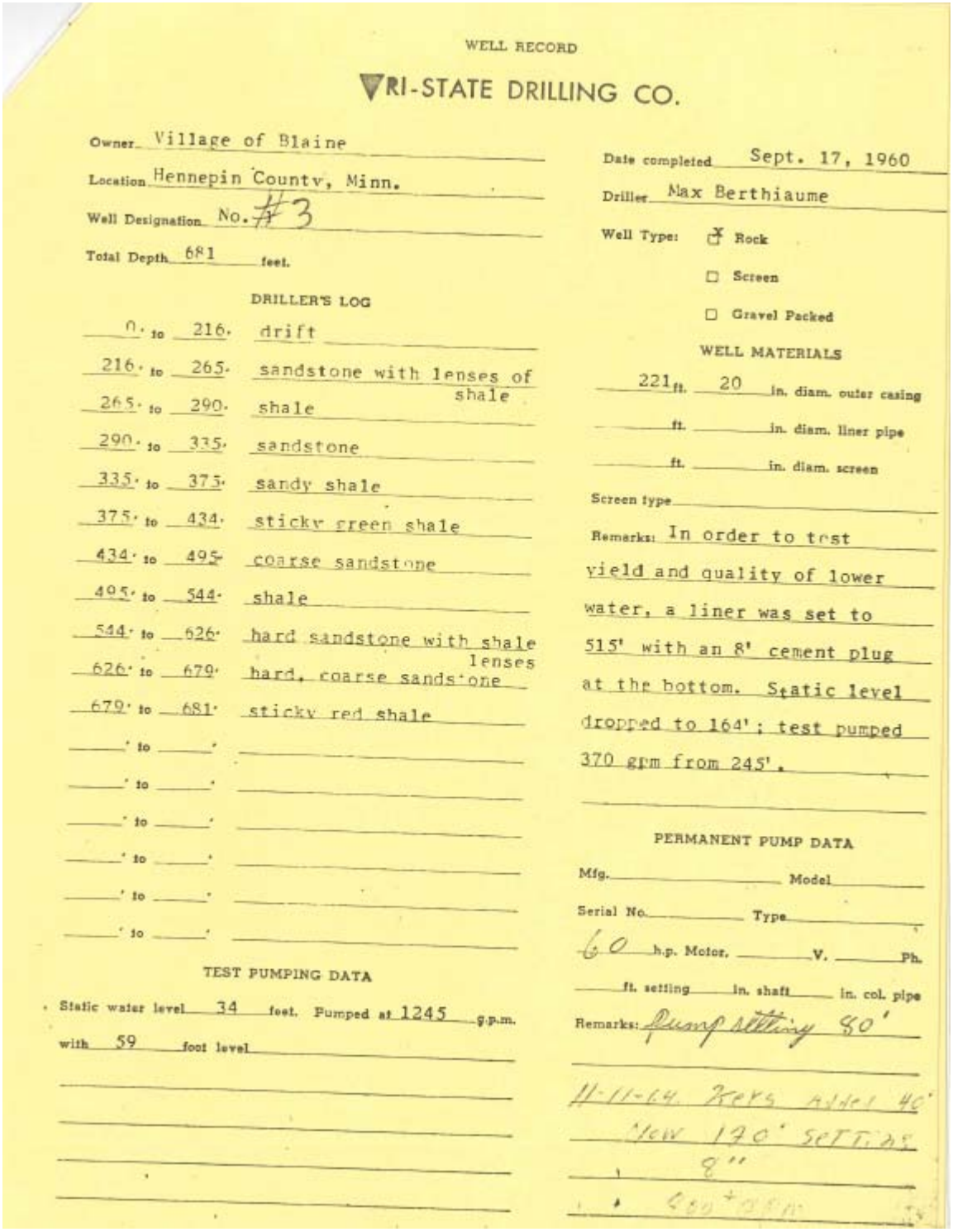
60 h.p. Motor, 220 V. 3 Ph.

120 ft. setting 8 in. shaft 1 7/16" col. pipe

Remarks: ~~30 ft more was added 8-5-64 now it has a 150 ft setting~~

1-19-65 - Keys removed 20' Now 130' setting

Figure 3 - Well 3 Record



WELL RECORD

TRI-STATE DRILLING CO.

Owner Village of Blaine

Location Hennepin County, Minn.

Well Designation No. #3

Total Depth 681 feet.

Date completed Sept. 17, 1960

Driller Max Berthiaume

Well Type: ☒ Rock ☐ Screen ☐ Gravel Packed

DRILLER'S LOG

0.	216.	drift
216.	265.	sandstone with lenses of shale
265.	290.	shale
290.	335.	sandstone
335.	375.	sandy shale
375.	434.	sticky green shale
434.	495.	coarse sandstone
495.	544.	shale
544.	626.	hard sandstone with shale lenses
626.	679.	hard, coarse sandstone
679.	681.	sticky red shale

TEST PUMPING DATA

Static water level 34 feet. Pumped at 1245 g.p.m. with 59 foot level

WELL MATERIALS

221 ft. 20 in. diam. outer casing

ft. in. diam. liner pipe

ft. in. diam. screen

Screen type

Remarks: In order to test yield and quality of lower water, a liner was set to 515' with an 8' cement plug at the bottom. Static level dropped to 164'; test pumped 370 gpm from 245'.

PERMANENT PUMP DATA

Mfg. Model

Serial No. Type

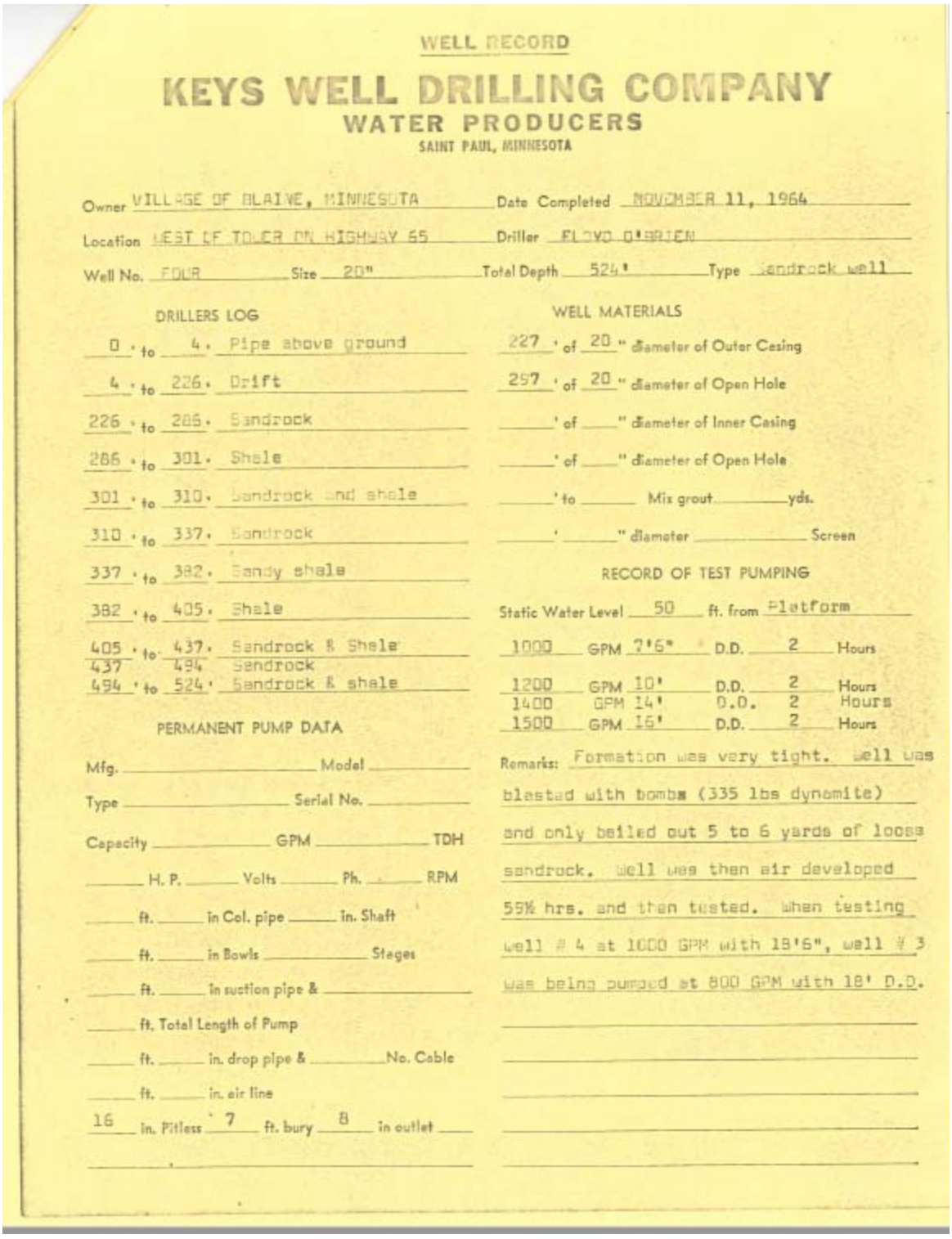
60 h.p. Motor, V. Ph.

ft. setting in. shaft in. col. pipe

Remarks: Pump setting 90'

11-11-64 Reset added 40' new 130' setting 8" 600+GPM

Figure 4 - Well 4 Record



WELL RECORD

KEYS WELL DRILLING COMPANY
WATER PRODUCERS
SAINT PAUL, MINNESOTA

Owner VILLAGE OF BLAINE, MINNESOTA Date Completed NOVEMBER 11, 1964

Location WEST OF TOWER ON HIGHWAY 65 Driller FLOYD O'BRIEN

Well No. FOUR Size 20" Total Depth 524' Type Sandrock well

DRILLERS LOG

0 ' to 4 ' Pipe above ground
4 ' to 226 ' Drift
226 ' to 286 ' Sandrock
286 ' to 301 ' Shale
301 ' to 310 ' Sandrock and shale
310 ' to 337 ' Sandrock
337 ' to 382 ' Sandy shale
382 ' to 405 ' Shale
405 ' to 437 ' Sandrock & Shale
437 494 Sandrock
494 ' to 524 ' Sandrock & shale

PERMANENT PUMP DATA

Mfg. _____ Model _____
Type _____ Serial No. _____
Capacity _____ GPM _____ TDH
_____ H. P. _____ Volts _____ Ph. _____ RPM
_____ ft. _____ in Col. pipe _____ in. Shaft
_____ ft. _____ in Bowls _____ Stages
_____ ft. _____ in suction pipe & _____
_____ ft. Total Length of Pump
_____ ft. _____ in. drop pipe & _____ No. Cable
_____ ft. _____ in. air line
16 in. Pitless 7 ft. bury 8 in outlet _____

WELL MATERIALS

227 ' of 20 " diameter of Outer Casing
257 ' of 20 " diameter of Open Hole
_____ ' of _____ " diameter of Inner Casing
_____ ' of _____ " diameter of Open Hole
_____ ' to _____ Mix grout _____ yds.
_____ ' _____ " diameter _____ Screen

RECORD OF TEST PUMPING

Static Water Level 50 ft. from Platform

1000 GPM 7'6" D.D. 2 Hours
1200 GPM 10' D.D. 2 Hours
1400 GPM 14' D.D. 2 Hours
1500 GPM 16' D.D. 2 Hours

Remarks: Formation was very tight. Well was blasted with bombs (335 lbs dynamite) and only bailed out 5 to 6 yards of loose sandrock. Well was then air developed 59½ hrs. and then tested. When testing well # 4 at 1000 GPM with 18'6", well # 3 was being pumped at 800 GPM with 18' D.D.

Figure 5 - Well 6 Record

(Rev. 1-68)

DIVISION OF WATERS

WELL LOG STATEMENT

Approp. No. _____

Well No. 6

Mail Report Promptly To Director, Division Of Waters, Centennial Office Bldg., St. Paul 1, Minn.

Location of Well (address) 103 Lane NE & Lever

Locate Well on Plat of Section

Sec. _____

Twp. _____

Range _____

Anoka (County) Blaine, MN (City or Town)

Describe Further by Lot, Block, Nearest Highway.

Drilled for: Village of Blaine

Driller Layne Minnesota Company

Address Blaine, Minnesota

Address 3147 California St, NE

Minneapolis, MN 55418

Date of Completion April 10, 1968

REPORT OF FINAL PUMPING TEST

Type of well Driven (Dug, Driven, Bored, Drilled) Depth 741

Duration of Test 8 Hrs. 0 Min. Date 3/29/68

Casing diameter 24 inch, from 0 to 255

Rate of Pumping up to 2400 GPM

16 inch, from 0 to 300

Static Water Level 30 Ft. Below land surface

_____ inch, from _____ to _____

Water Level While Pumping 117 1/2 Ft. @ 2400

Screen: Length _____ Diameter _____ Slot size _____

Use: Domestic ☐ Industrial ☐ Irrigation ☐

Pump: Type _____ Horsepower _____

Public supply ☒ Commercial ☐ Stock ☐

WELL LOG

Geologic Formations Kind, Color, Hard or Soft	Depth in Feet From	To	Geologic Formations Kind, Color, Hard or Soft	Depth in Feet From	To
Sand	0	30	Sandstone	430	487
Grey clay	30	60	Shale	487	555
Red sand	60	90	Sandstone & shale	555	714
Sand & gravel	90	120	Sandstone	714	741
Rocks & clay	120	135			
Sand & gravel	135	240			
Boulders	240	244			
Clay	244	256			
Shale w/trace of sand	256	337			
Shale	337	430			
			We also have Blasting Log & pumping test from 1968		

Figure 6 - Well 7 Record

Well # 7

[illegible] BROS. WELL CO., INC.

Municipal and Industrial Water Conditioning Equipment and Service

WELL LOG AND CONSTRUCTION RECORD

Date May 19 19 69

TO City of Blaine

ADDRESS

CITY Blaine STATE Minnesota

LOG OF FORMATIONS

to 35	Gray Sand	244 to 260	Sandrock
to 70	Gray Clay	260 to 370	Sandrock & Shale
to 105	Fine Sand	370 to 435	Sandrock
to 170	Red Clay	435 to 487	Green Shale
to 195	Brown Clay & Gravel	to	
to 210	Brown Clay & Rocks	to	
to 220	Bray Clay and Rocks	to	
to 244	Gray Clay	to	

WELL DEPTH

measured from None

SCREEN DATA

of Screen

Dia. in. Length ft. Slot Size

Position in Well to , Screen Material

Fittings: Top

Bottom

Screen Data

CASING RECORD

0 to 213.5

23 1/4 ID 24

Wt. 94.62 lbs. per ft.

Thrd.& Cpld.

Welded Yes

Drive Shoe Yes

Cemented Yes

0 to 287

15 1/4 ID 16

Wt. 62.58 lbs. per ft.

Thrd. & Cpld.

Welded Yes

Drive Shoe Yes

Cemented Yes

ID

Wt. lbs. per

Thrd. & Cpld.

Welded

Drive Shoe

Cemented

Borehole 16 diam. to 487 ft.

TEST PUMP DATA

85 gpm. Static Water Level 25' Pumping Water Level 97'

hours of pumping (Drawdown 78/72, ft.)

PUMP DATA

Type

Serial No.

Drop Pipe Size Ft. Length

Head

Volts Phase Cycles

Seal

Test Pump Data: Bearings

Figure 7 – Well 7 Record Continued

Well # 7

WELL LOG AND CONSTRUCTION RECORD

Date May 19, 19 69

TO City of Blaine

ADDRESS

CITY Blaine STATE Minnesota

0	to 35	Gray Sand	244	to 260	Sandrock
35	to 70	Gray Clay	260	to 370	Sandrock & Shale
70	to 105	Fine Sand	370	to 435	Sandrock
105	to 170	Red Clay	435	to 487	Green Shale
170	to 195	Brown Clay & Gravel			
195	to 210	Brown Clay & Rocks			
210	to 220	Bray Clay and Rocks			
220	to 244	Gray Clay			

Depth measured from None

0 to 213.5

23 1/4 OD 24

Wt. 94.62 lbs. per ft.

Welded Yes

Drive Shoe Yes

Grouted Yes

Open borehole 16 from 487

0 to 287

15 1/4 to 16

Wt. 62.58

2015 gpm. Static Water Level 25' Pumping Level 97'

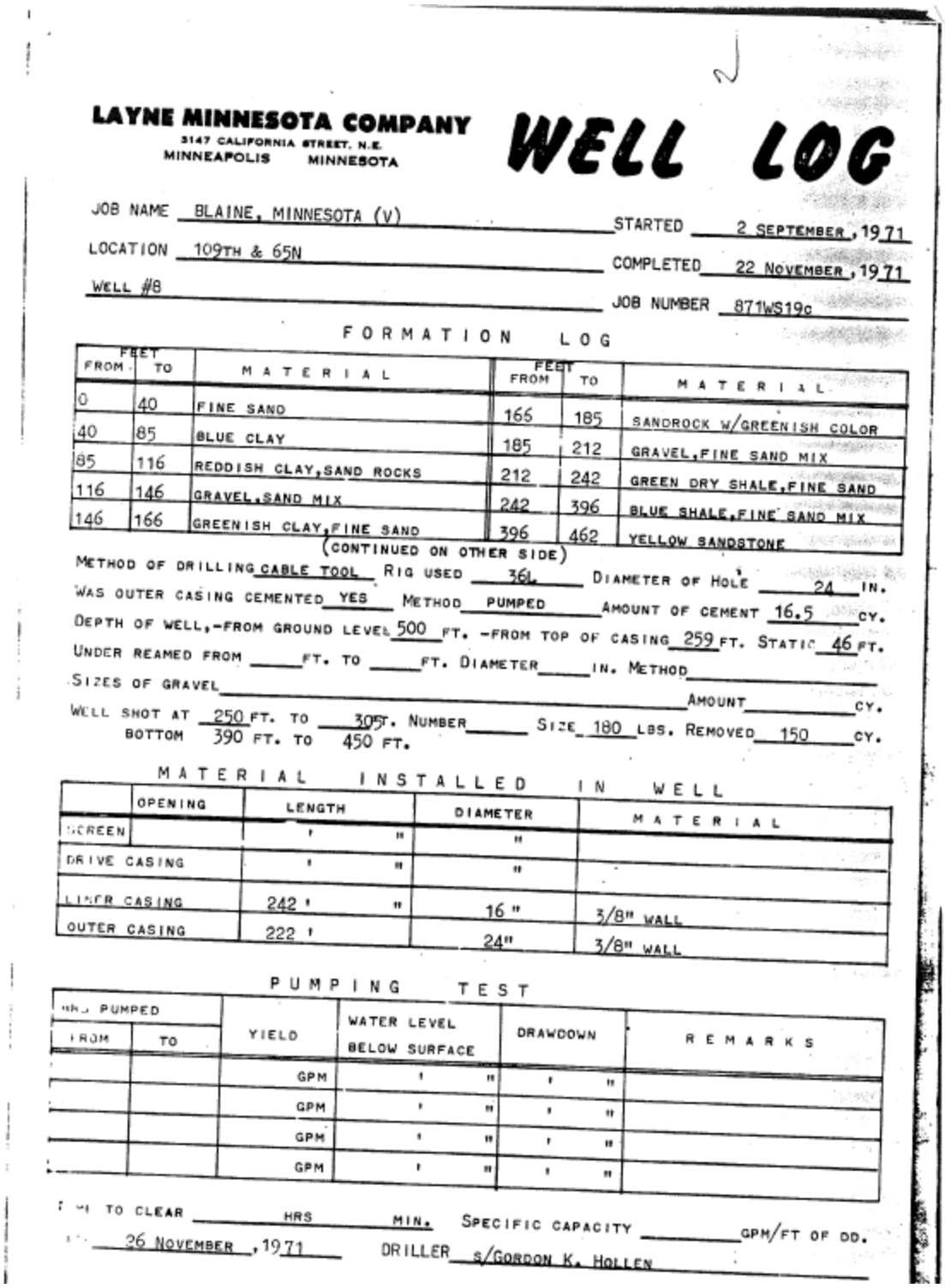
hours of pumping 7/8/72

Welded Yes

Drive Shoe Yes

Grouted Yes

Figure 8 - Well 8 Record



LAYNE MINNESOTA COMPANY
3147 CALIFORNIA STREET, N.E.
MINNEAPOLIS MINNESOTA

WELL LOG

JOB NAME BLAINE, MINNESOTA (V) STARTED 2 SEPTEMBER, 1971
LOCATION 109TH & 65N COMPLETED 22 NOVEMBER, 1971
WELL #8 JOB NUMBER 871WS19c

FORMATION LOG

FEET FROM	FEET TO	MATERIAL	FEET FROM	FEET TO	MATERIAL
0	40	FINE SAND	166	185	SANDROCK W/GREENISH COLOR
40	85	BLUE CLAY	185	212	GRAVEL, FINE SAND MIX
85	116	REDDISH CLAY, SAND ROCKS	212	242	GREEN DRY SHALE, FINE SAND
116	146	GRAVEL, SAND MIX	242	396	BLUE SHALE, FINE SAND MIX
146	166	GREENISH CLAY, FINE SAND	396	462	YELLOW SANDSTONE

(CONTINUED ON OTHER SIDE)

METHOD OF DRILLING CABLE TOOL RIG USED 36L DIAMETER OF HOLE 24 IN.
WAS OUTER CASING CEMENTED YES METHOD PUMPED AMOUNT OF CEMENT 16.5 CY.
DEPTH OF WELL, -FROM GROUND LEVEL 500 FT. -FROM TOP OF CASING 259 FT. STATIC 46 FT.
UNDER REAMED FROM ____ FT. TO ____ FT. DIAMETER ____ IN. METHOD ____
SIZES OF GRAVEL ____ AMOUNT ____ CY.
WELL SHOT AT 250 FT. TO 305 FT. NUMBER ____ SIZE 180 LBS. REMOVED 150 CY.
BOTTOM 390 FT. TO 450 FT.

MATERIAL INSTALLED IN WELL

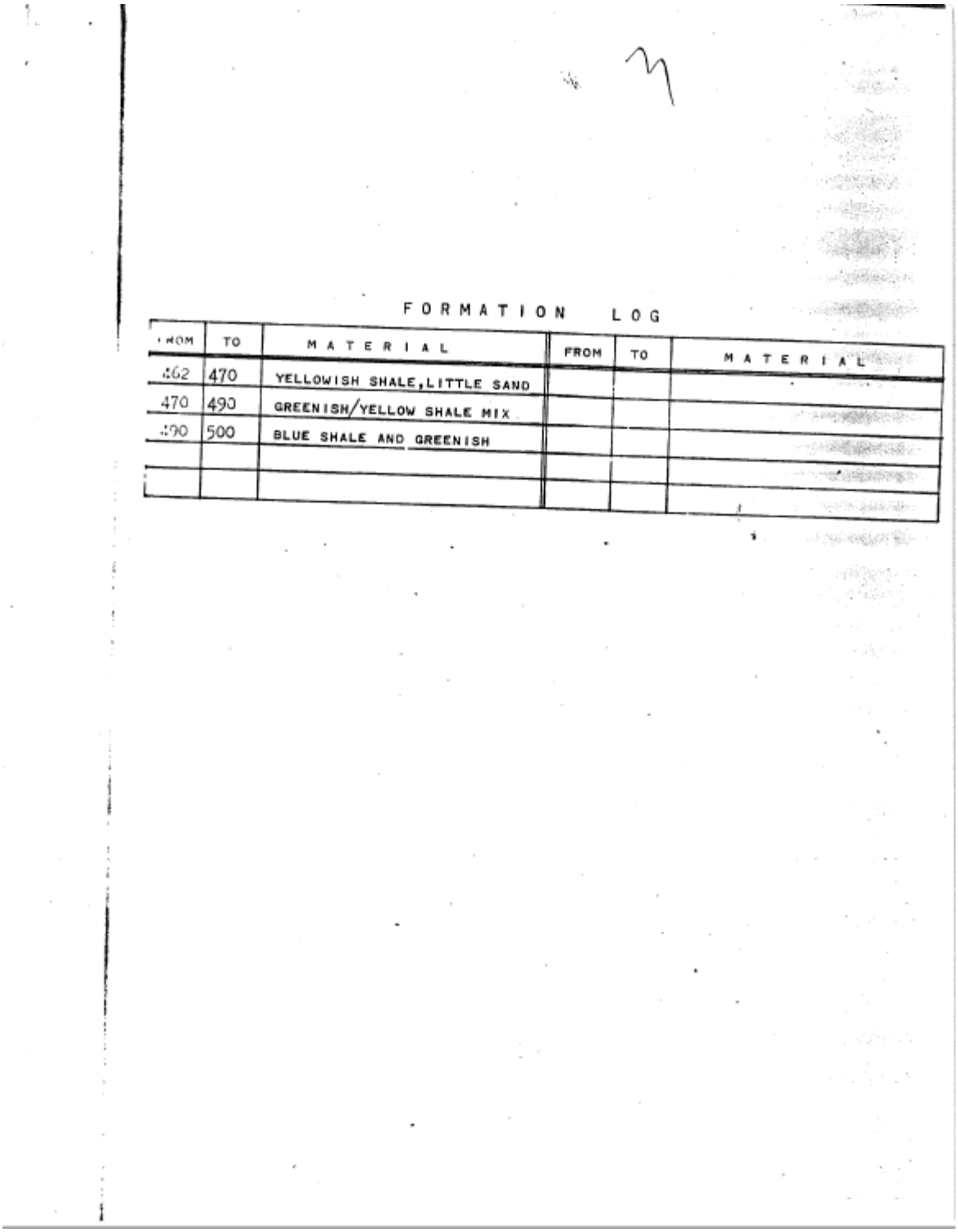
	OPENING	LENGTH	DIAMETER	MATERIAL
SCREEN		' "	"	
DRIVE CASING		' "	"	
LINER CASING	242 '	"	16 "	3/8" WALL
OUTER CASING	222 '		24"	3/8" WALL

PUMPING TEST

HRS. PUMPED FROM	HRS. PUMPED TO	YIELD	WATER LEVEL BELOW SURFACE	DRAWDOWN	REMARKS
		GPM	' "	' "	
		GPM	' "	' "	
		GPM	' "	' "	
		GPM	' "	' "	

TIME TO CLEAR ____ HRS ____ MIN. SPECIFIC CAPACITY ____ GPM/FT OF DD.
DATE 26 NOVEMBER, 1971 DRILLER S/GORDON K. HOLLEN

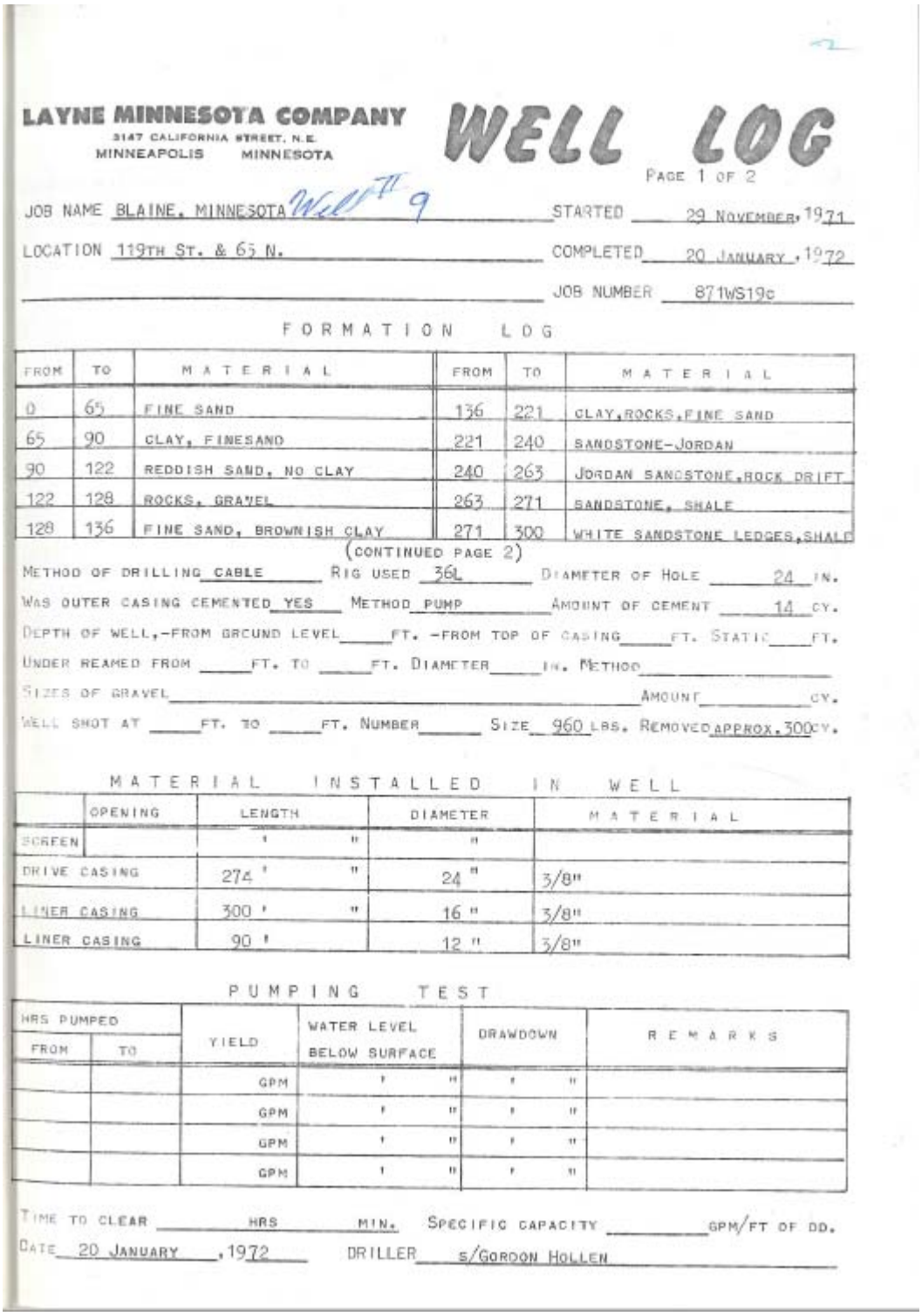
Figure 9 – Well 8 Record Continued



FORMATION LOG

FROM	TO	MATERIAL	FROM	TO	MATERIAL
462	470	YELLOWISH SHALE, LITTLE SAND			
470	490	GREENISH/YELLOW SHALE MIX			
490	500	BLUE SHALE AND GREENISH			

Figure 10 - Well 9 Record



LAYNE MINNESOTA COMPANY
3147 CALIFORNIA STREET, N.E.
MINNEAPOLIS MINNESOTA

WELL LOG

PAGE 1 OF 2

JOB NAME BLAINE, MINNESOTA Well #9 STARTED 29 NOVEMBER, 1971
LOCATION 119TH ST. & 65 N. COMPLETED 20 JANUARY, 1972
JOB NUMBER 871WS19c

FORMATION LOG

FROM	TO	MATERIAL	FROM	TO	MATERIAL
0	65	FINE SAND	136	221	CLAY, ROCKS, FINE SAND
65	90	CLAY, FINESAND	221	240	SANDSTONE-JORDAN
90	122	REDDISH SAND, NO CLAY	240	263	JORDAN SANDSTONE, ROCK DRIFT
122	128	ROCKS, GRAVEL	263	271	SANDSTONE, SHALE
128	136	FINE SAND, BROWNISH CLAY	271	300	WHITE SANDSTONE LEDGES, SHALE

(CONTINUED PAGE 2)

METHOD OF DRILLING CABLE RIG USED 36L DIAMETER OF HOLE 24 IN.
WAS OUTER CASING CEMENTED YES METHOD PUMP AMOUNT OF CEMENT 14 CY.
DEPTH OF WELL, -FROM GROUND LEVEL ____ FT. -FROM TOP OF CASING ____ FT. STATIC ____ FT.
UNDER REAMED FROM ____ FT. TO ____ FT. DIAMETER ____ IN. METHOD ____
SIZES OF GRAVEL ____ AMOUNT ____ CY.
WELL SHOT AT ____ FT. TO ____ FT. NUMBER ____ SIZE 960 LBS. REMOVED APPROX. 300 CY.

MATERIAL INSTALLED IN WELL

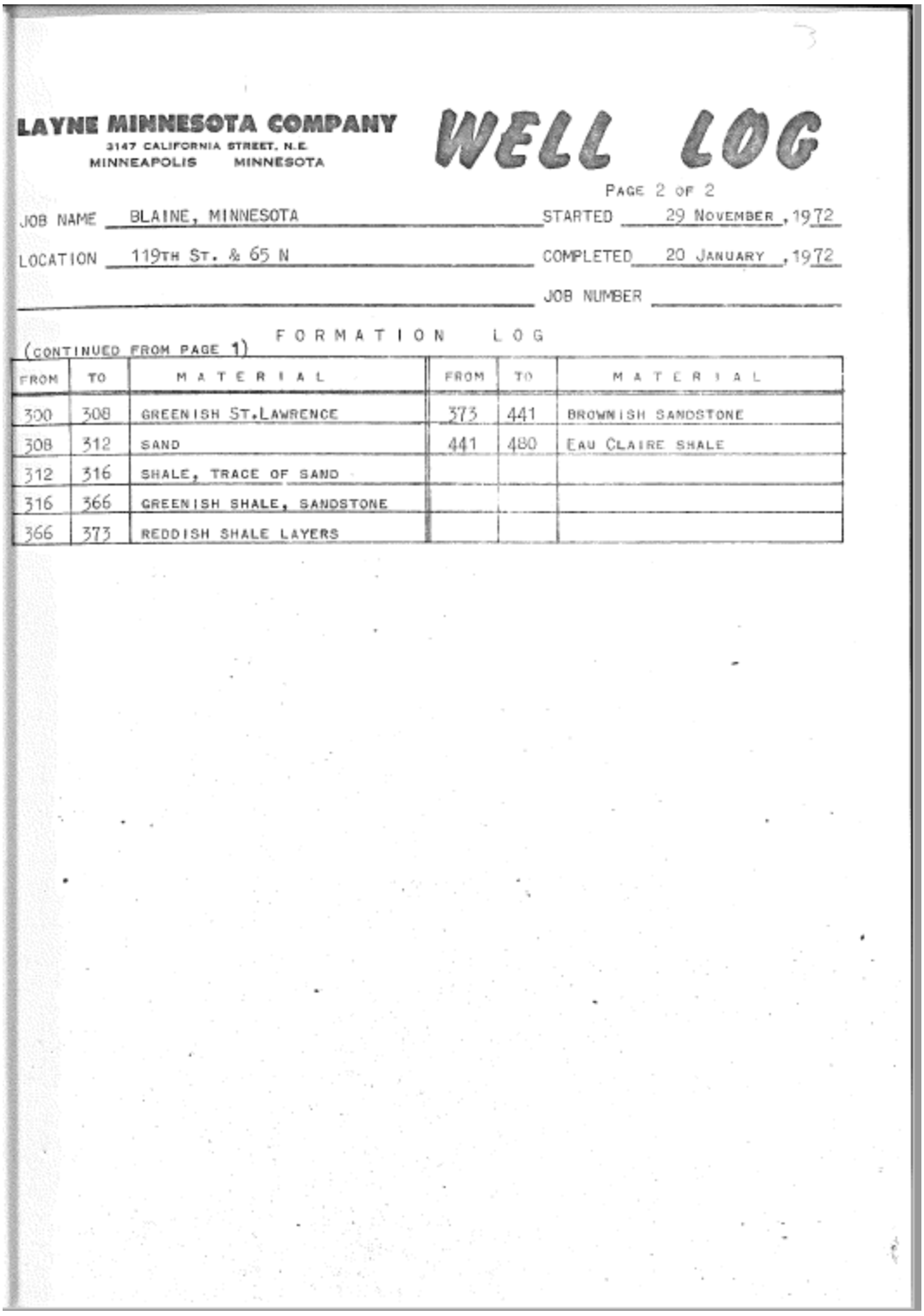
	OPENING	LENGTH	DIAMETER	MATERIAL
SCREEN		' "	"	
DRIVE CASING		274 ' "	24 "	3/8"
LINER CASING		300 ' "	16 "	3/8"
LINER CASING		90 '	12 "	3/8"

PUMPING TEST

HRS PUMPED FROM	HRS PUMPED TO	YIELD	WATER LEVEL BELOW SURFACE	DRAWDOWN	REMARKS
		GPM	' "	' "	
		GPM	' "	' "	
		GPM	' "	' "	
		GPM	' "	' "	

TIME TO CLEAR ____ HRS ____ MIN. SPECIFIC CAPACITY ____ GPM/FT OF DD.
DATE 20 JANUARY, 1972 DRILLER S/GORDON HOLLEN

Figure 11 – Well 9 Record Continued



LAYNE MINNESOTA COMPANY
3147 CALIFORNIA STREET, N.E.
MINNEAPOLIS MINNESOTA

WELL LOG

PAGE 2 OF 2

JOB NAME BLAINE, MINNESOTA STARTED 29 NOVEMBER, 1972

LOCATION 119TH ST. & 65 N COMPLETED 20 JANUARY, 1972

JOB NUMBER

FORMATION LOG

(CONTINUED FROM PAGE 1)

FROM	TO	MATERIAL	FROM	TO	MATERIAL
300	308	GREENISH ST.LAWRENCE	373	441	BROWNISH SANDSTONE
308	312	SAND	441	480	EAU CLAIRE SHALE
312	316	SHALE, TRACE OF SAND			
316	366	GREENISH SHALE, SANDSTONE			
366	373	REDDISH SHALE LAYERS			

Figure 12 - Well 10 Record

WELL RECORD

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

Owner City of Blaine, Minnesota — Date Completed 1971

Location — Driller

Well No. 10 — Size 16" — Total Depth 515 — Type Sandstone

DRILLERS LOG

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

____' to ____' ____

PERMANENT PUMP DATA

Mfg. Peerless Type Turbine Serial No. 338643

Capacity 1400 GPM 273' TDH

Motor Make Fairbanks/Morse Type VHS (KIZKV)

125 H. P. 480 Volts 3 Ph. 1800 RPM

150 ft. 10 in Col. pipe 1½ in. Shaft

5 ft. 14 in Bowls 3 Stages LC Type

10 ft. 10 in suction pipe & strainer

195 ft. Total Length of Pump

____ ft. ____ in. drop pipe & ____ No. Cable

____ ft. ____ in. air line

____ in. Pitless ____ ft. bury ____ in outlet ____

WELL MATERIALS

280 ' of 16 " diameter of Outer Casing

235 ' of 15 " diameter of Open Hole

____ ' of ____ " diameter of Inner Casing

____ ' of ____ " diameter of Open Hole

____ ' to ____ Mix grout ____ (yds.) (Sacks)

____ ' ____ " diameter ____ Screen

RECORD OF TEST PUMPING

Static Water Level 30 ft. from top of pipe

1600 GPM 40' D.D. ____ Hours

____ GPM ____ D.D. ____ Hours

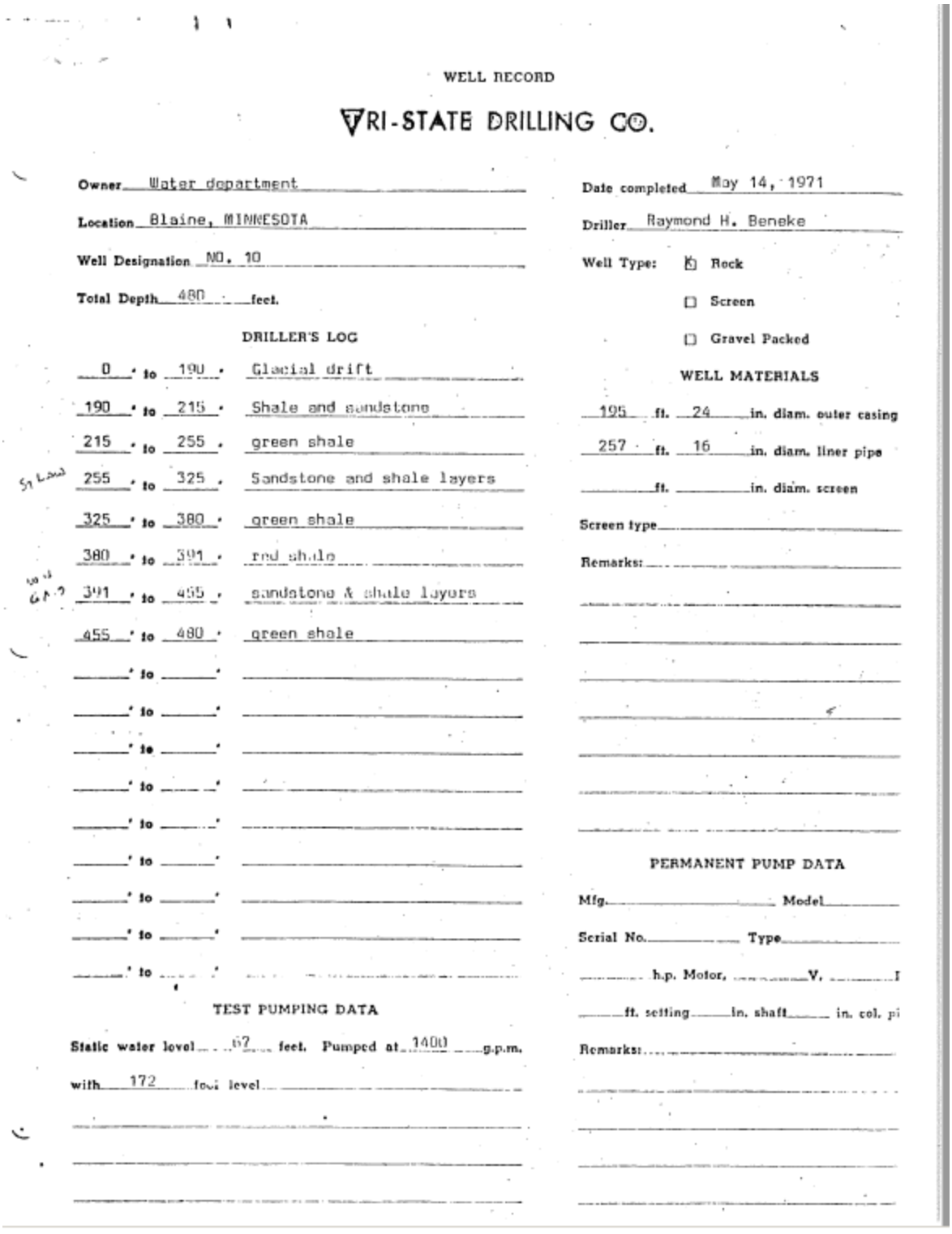
____ GPM ____ D.D. ____ Hours

____ GPM ____ D.D. ____ Hours

____ GPM ____ D.D. ____ Hours

Remarks:

Figure 13 – Well 10 Record Continued



WELL RECORD

TRI-STATE DRILLING CO.

Owner Water department

Location Blaine, MINNESOTA

Well Designation NO. 10

Total Depth 480 feet.

Date completed May 14, 1971

Driller Raymond H. Beneke

Well Type: ☒ Rock ☐ Screen ☐ Gravel Packed

DRILLER'S LOG

0 ' to 190 '	Glacial drift
190 ' to 215 '	Shale and sandstone
215 ' to 255 '	green shale
255 ' to 325 '	Sandstone and shale layers
325 ' to 380 '	green shale
380 ' to 391 '	red shale
391 ' to 455 '	sandstone & shale layers
455 ' to 480 '	green shale

WELL MATERIALS

195 ft. 24 in. diam. outer casing

257 ft. 16 in. diam. liner pipe

ft. in. diam. screen

Screen type

Remarks:

PERMANENT PUMP DATA

Mfg. Model

Serial No. Type

h.p. Motor, V.

ft. setting in. shaft in. col. pi

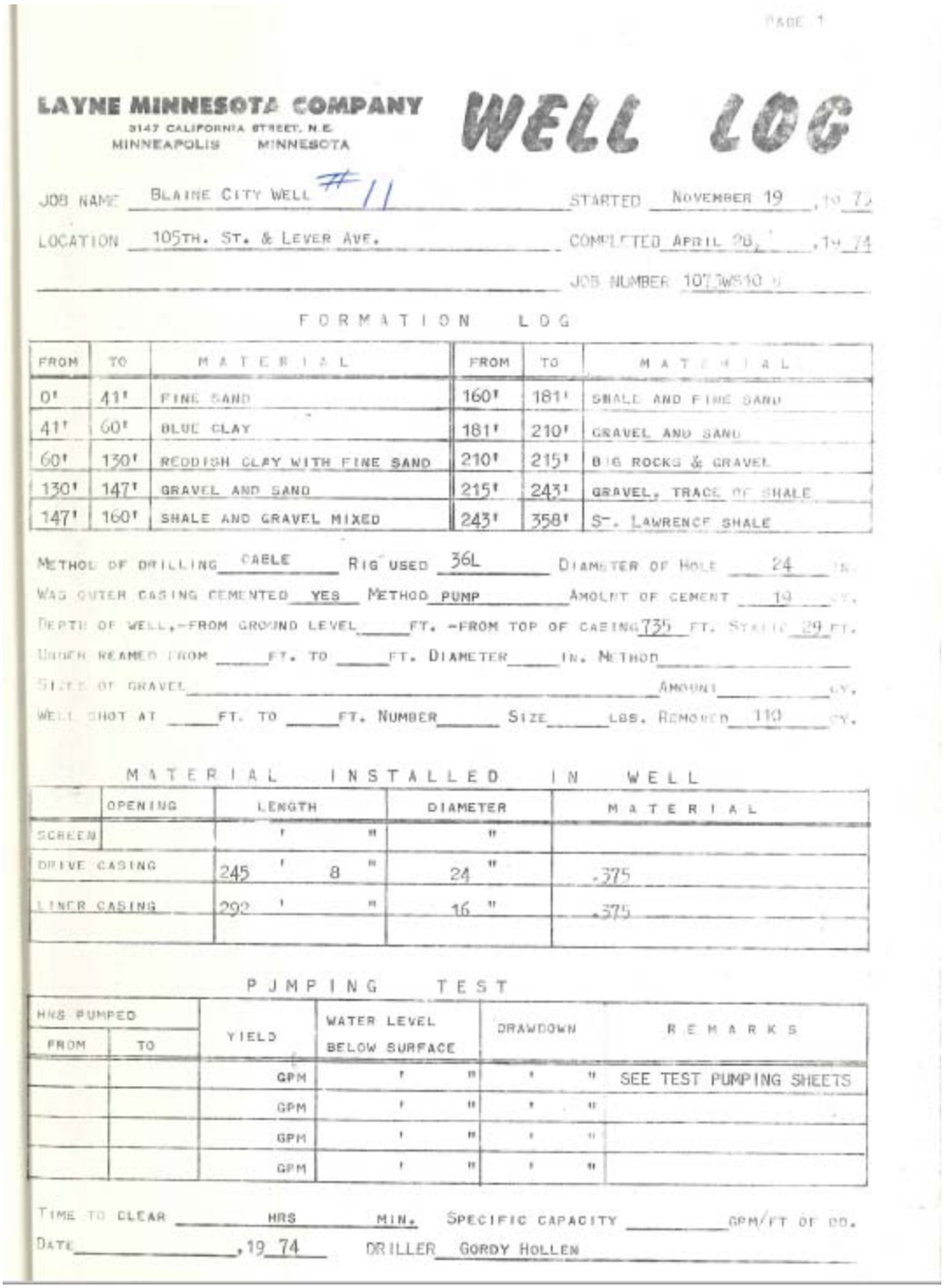
Remarks:

TEST PUMPING DATA

Static water level 67 feet. Pumped at 1400 g.p.m.

with 172 foot level

Figure 14 - Well 11 Record



PAGE 1

LAYNE MINNESOTA COMPANY
3147 CALIFORNIA STREET, N.E.
MINNEAPOLIS MINNESOTA

WELL LOG

JOB NAME BLAINE CITY WELL #11 STARTED NOVEMBER 19, 19 73
LOCATION 105TH. ST. & LEVER AVE. COMPLETED APRIL 28, 19 74
JOB NUMBER 107W510

FORMATION LOG

FROM	TO	MATERIAL	FROM	TO	MATERIAL
0'	41'	FINE SAND	160'	181'	SHALE AND FINE SAND
41'	60'	BLUE CLAY	181'	210'	GRAVEL AND SAND
60'	130'	REDDISH CLAY WITH FINE SAND	210'	215'	BIG ROCKS & GRAVEL
130'	147'	GRAVEL AND SAND	215'	243'	GRAVEL, TRACE OF SHALE
147'	160'	SHALE AND GRAVEL MIXED	243'	358'	ST. LAWRENCE SHALE

METHOD OF DRILLING CABLE RIG USED 36L DIAMETER OF HOLE 24 IN.
WAS OUTER CASING CEMENTED YES METHOD PUMP AMOUNT OF CEMENT 19 CY.
DEPTH OF WELL, -FROM GROUND LEVEL ____ FT. -FROM TOP OF CASING 735 FT. STICK UP 29 FT.
UNDER REAMED FROM ____ FT. TO ____ FT. DIAMETER ____ IN. METHOD ____
SIZE OF GRAVEL ____ AMOUNT ____ CY.
WELL SHOT AT ____ FT. TO ____ FT. NUMBER ____ SIZE ____ LBS. REMOVED 110 CY.

MATERIAL INSTALLED IN WELL

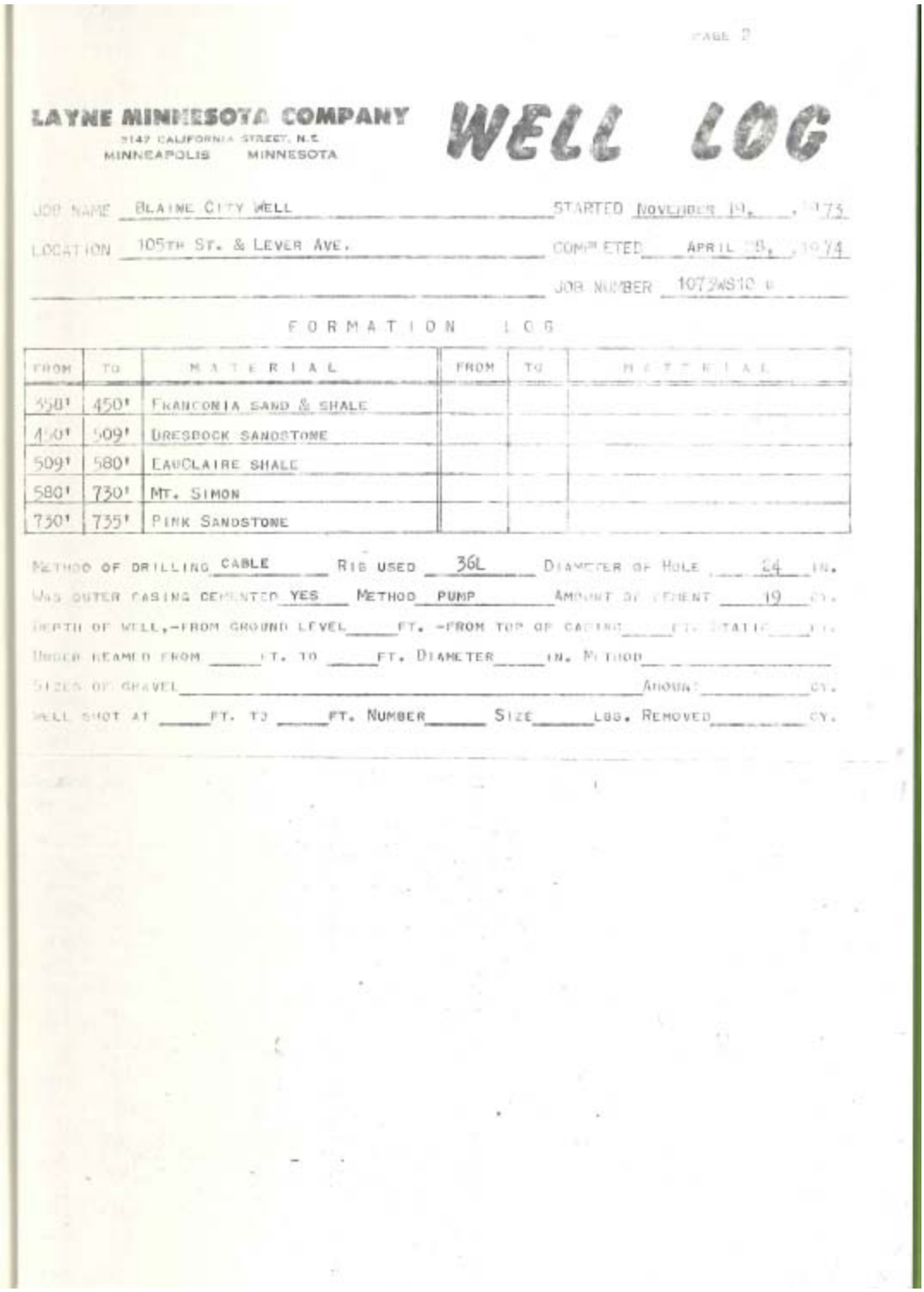
	OPENING	LENGTH	DIAMETER	MATERIAL
SCREEN		' "	"	
DRIVE CASING		245 ' 8 "	24 "	.375
LINER CASING		292 ' "	16 "	.375

PUMPING TEST

HRS PUMPED FROM	HRS PUMPED TO	YIELD	WATER LEVEL BELOW SURFACE	DRAWDOWN	REMARKS
		GPM	' "	' "	SEE TEST PUMPING SHEETS
		GPM	' "	' "	
		GPM	' "	' "	
		GPM	' "	' "	

TIME TO CLEAR ____ HRS ____ MIN. SPECIFIC CAPACITY ____ GPM/FT OF DD.
DATE ____, 19 74 DRILLER GORDY HOLLEN

Figure 15 – Well 11 Record Continued



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LAYNE MINNESOTA COMPANY
5149 CALIFORNIA STREET, N.E.
MINNEAPOLIS MINNESOTA

WELL LOG

JOB NAME Blaine City Well STARTED November 19, 1973

LOCATION 105th St. & Lever Ave. COMPLETED April 28, 1974

JOB NUMBER 1073WS10 0

FORMATION LOG

FROM	TO	MATERIAL	FROM	TO	MATERIAL
358'	450'	Franconia sand & shale			
450'	509'	Dresbock sandstone			
509'	580'	EauClaire shale			
580'	730'	Mt. Simon			
730'	735'	Pink Sandstone			

METHOD OF DRILLING CABLE RIG USED 36L DIAMETER OF HOLE 24 IN.

WAS OUTER CASING CEMENTED YES METHOD PUMP AMOUNT OF CEMENT 19 CY.

DEPTH OF WELL,-FROM GROUND LEVEL ____ FT. -FROM TOP OF CASING ____ FT. STATIC ____ FT.

UNDER REAMED FROM ____ FT. TO ____ FT. DIAMETER ____ IN. METHOD ____

SIZES OF GRAVEL ____ AMOUNT ____ CY.

WELL SHOT AT ____ FT. TO ____ FT. NUMBER ____ SIZE ____ LBS. REMOVED ____ CY.

Figure 16 - Well 12 Record

WELL RECORD

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

Owner Blaine, Minnesota — Date Completed August 6, 1976

Location Oak Park Blvd. - Highway No. 242 — Driller S. E. Unertl

Well No. 12 A — Size 24" x 20" — Total Depth 228' — Type Screen

DRILLERS LOG

0	65	Sand
65	93	Sand and Clay
93	119	Clay and Sand
119	126	Gravel
126	143	Clay and Gravel
143	228	Sand and Gravel
228	251	Clay/Gravel
251	296	Clay
296	305	Gravel
305	312	Gravel and Sandrock
312	320	Shale/St. Lawrence
____	____	
____	____	
____	____	

PERMANENT PUMP DATA (Later)

Mfg. _____ Type _____ Serial No. _____

Capacity _____ GPM _____ TDH

Motor Make _____ Type _____

_____ H. P. _____ Volts _____ Ph. _____ RPM

_____ ft. _____ in Col. pipe _____ in. Shaft

_____ ft. _____ in Bowls _____ Stages _____ Type

_____ ft. _____ in suction pipe & _____

_____ ft. Total Length of Pump

_____ ft. _____ in. drop pipe & _____ No. Cable

_____ ft. _____ in. air line

_____ in. Pitless _____ ft. bury _____ in outlet _____

WELL MATERIALS

150 ' of 24 " diameter of Outer Casing

____ ' of ____ " diameter of Open Hole

188 ' of 20 " diameter of Inner Casing

____ ' of ____ " diameter of Open Hole

0 ' to 150' Mix grout 160 (XXX Wet) (Sacks)

40 ' ____ " diameter 16" Screen

RECORD OF TEST PUMPING

Static Water Level 43' 6" ft. from top of pipe.

1,000	GPM	26' 6"	D.D. 4	Hours
1,400	GPM	41' 9"	D.D. 3	Hours
1,600	GPM	51'11"	D.D. 3	Hours
2,000	GPM	62' 4"	D.D. 4	Hours
2,400	GPM	76' 6"	D.D. 4	Hours

Remarks: Set 8" x 20' Test Screen from 208' to 228' and tested at 508-GPM, with 79' 2" D.D. Air-Developed Well - 41 Hours.

FILE: 76 - 3

Figure 17 - Well 13 Record

WELL RECORD

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

Owner City of Blaine, Minnesota — Date Completed June, 1977

Location Oak Park Boulevard - 20' West of Well No. 12 — Driller Floyd C. O'Brien

Well No. 12B Well 13 — Size 30" x 24" x 16" — Total Depth 685' — Type Rock

DRILLERS LOG

0	308	Sand and Gravel
308	392	Shale
392	431	Shale and Sandrock
431	462	Sandrock
462	474	Sandrock and Shale
474	510	Shale
510	538	Sandrock and Shale
538	576	Shale
576	668	Sandrock
668	685	Shale
____	____	
____	____	
____	____	
____	____	

PERMANENT PUMP DATA

Mfg. Johnston Type Turbine Serial No. ____

Capacity 1600 GPM 350' TDH

Motor Make Gen. Electric Type VHS - PW

200 H. P. 460 Volts 3 Ph. 1800 RPM

250 ft. 10 in Col. pipe 1-11/16 in. Shaft

6 ft. 12 in Bowls 7 Stages EC Type

10 ft. 10 in suction pipe & Strainer

266 ft. Total Length of Pump

____ ft. ____ in. drop pipe & ____ No. Cable

____ ft. ____ in. air line

____ in. Pitless ____ ft. bury ____ in outlet

WELL MATERIALS

142 ' of 30 " diameter of Outer Casing

166 ' of 29 " diameter of Open Hole

308 ' of 24 " diameter of Inner Casing

47 ' of 24 " diameter of Open Hole

0 ' to 308') Mix grout 600 [Sacks]

0 ' to 355') diameter ____ Screen

RECORD OF TEST PUMPING

Static Water Level 123 ft. from top of pipe.

2,000	GPM	108' 6"	D.D.	19 Hours
2,100	GPM	103' 9"	D.D.	14 Hours
1,200	GPM	69' 8"	D.D.	9 Hours
____	GPM	____	D.D.	____ Hours
____	GPM	____	D.D.	____ Hours

Remarks:

355' of 16" Liner.

330' of 15" Open Hole.

Well was blasted with 540 Lbs. of dynamite below the 16" liner. We bailed out 398 yds. Well was then air developed for 100-1/2 hours.

Figure 18 - Well 14 Record

WELL RECORD

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

Owner Blaine, Minnesota — Date Completed August 16, 1978

Location Flowerfield Road - 2 Blocks West of Lexington — Driller Floyd C. O'Brien

Well No. 14 — Size 30 x 24 x 16 — Total Depth 736' — Type Sandrock

DRILLERS LOG

0	44	Sand	
44	68	Clay and Gravel	
68	130	Sand	
130	329	Hardpan and Gravel	
329	372	Hardpan	
372	388	Gravel and Clay	
388	414	Sand	
414	451	Shale	
451	470	Sandrock and Shale	
470	515	Sandrock	
515	532	Shale	
532	575	Sandrock and Shale	
575	736	Sandrock	

PERMANENT PUMP DATA (Later)

Mfg. _____ Type _____ Serial No. _____

Capacity _____ GPM _____ TDH

Motor Make _____ Type _____

_____ H. P. _____ Volts _____ Ph. _____ RPM

_____ ft. _____ in Col. pipe _____ in. Shaft

_____ ft. _____ in Bowls _____ Stages _____ Type

_____ ft. _____ in suction pipe & _____

_____ ft. Total Length of Pump

_____ ft. _____ in. drop pipe & _____ No. _____ Cable

_____ ft. _____ in. air line

_____ in. Pitless _____ ft. bury _____ in outlet

WELL MATERIALS

80'	30	" diameter of Outer Casing	
220'	24	"	Cased Hole
414'	20	" diameter of ~~Open Hole~~	~~Cased Hole~~
47'	19"		Open Hole
248'	16"	" diameter of Inner Casing	
275'	16"	" diameter of Open Hole	

0 to 461' Mix grout 675 ~~XXXX~~ (Sacks)

_____ ' _____ " diameter _____ Screen

RECORD OF TEST PUMPING

Static Water Level 151 ft. from top of pipe.

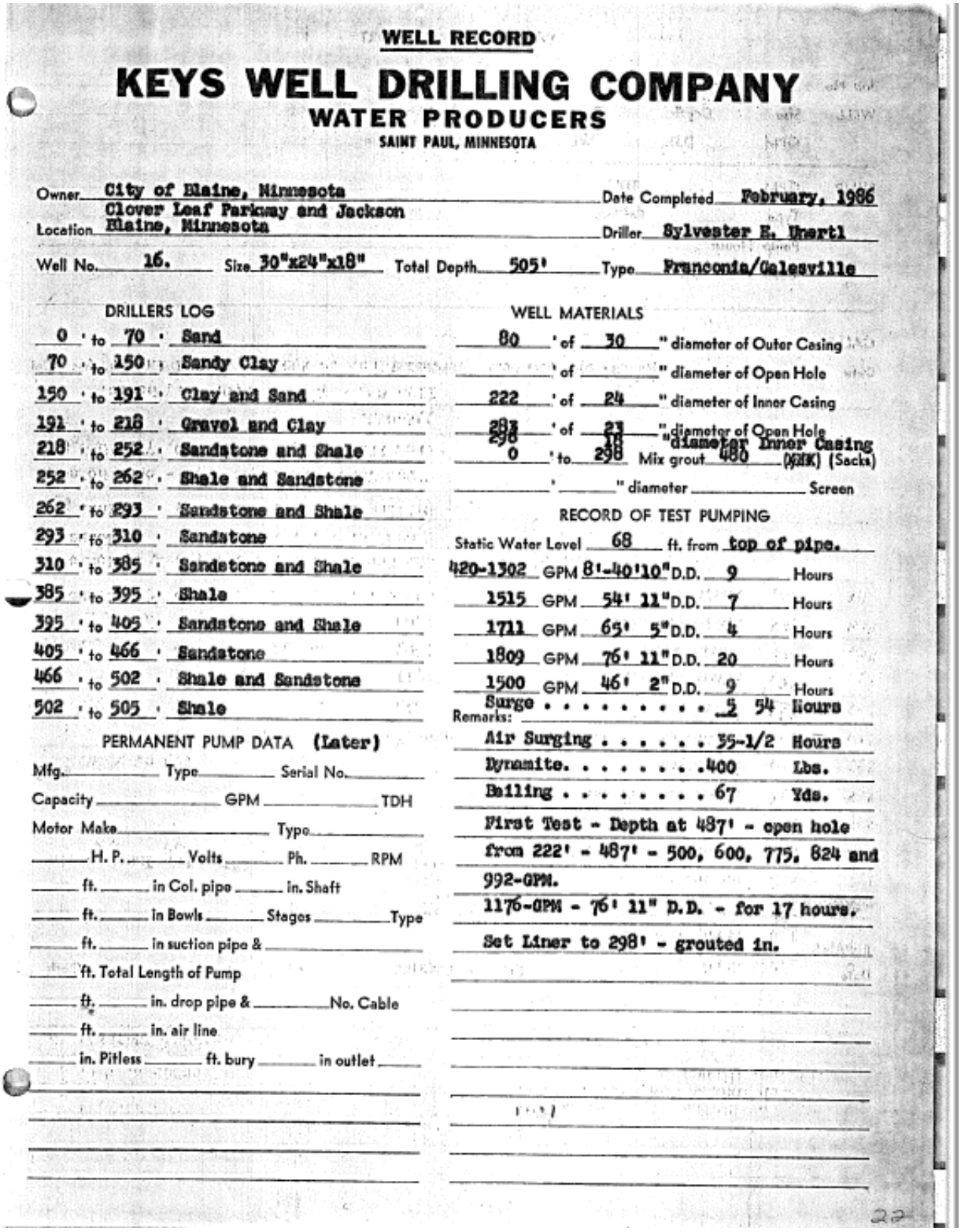
2,013	GPM	77'	D.D. 8	Hours
1,500	GPM	63'	D.D. 15	Hours
1,800	GPM	68'	D.D. 7	Hours
	GPM		D.D.	Hours
	GPM		D.D.	Hours

Remarks: Hole was blasted with 668 Lbs. of Dynamite - Yards Bailed out - 1,100.

Hole was reduced to 12" and a screen was set at 234' - Tested at 1,000-GPM - 33' Drawdown - Water quality was not acceptable.

Hole was retested at 294' at 1,000-GPM - 26' Drawdown - with screen in place - Water quality not acceptable.

Figure 19 - Well 16 Record



WELL RECORD

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

Owner City of Blaine, Minnesota — Date Completed February, 1986

Location Clover Leaf Parkway and Jackson Blaine, Minnesota — Driller Sylvester E. Uhertl

Well No. 16. Size 30"x24"x18" Total Depth 505' Type Franconia/Galesville

DRILLERS LOG

0	to 70	Sand
70	to 150	Sandy Clay
150	to 191	Clay and Sand
191	to 218	Gravel and Clay
218	to 252	Sandstone and Shale
252	to 262	Shale and Sandstone
262	to 293	Sandstone and Shale
293	to 310	Sandstone
310	to 385	Sandstone and Shale
385	to 395	Shale
395	to 405	Sandstone and Shale
405	to 466	Sandstone
466	to 502	Shale and Sandstone
502	to 505	Shale

PERMANENT PUMP DATA (Later)

Mfg. _____ Type _____ Serial No. _____

Capacity _____ GPM _____ TDH

Motor Make _____ Type _____

_____ H. P. _____ Volts _____ Ph. _____ RPM

_____ ft. _____ in Col. pipe _____ in. Shaft

_____ ft. _____ in Bowls _____ Stages _____ Type

_____ ft. _____ in suction pipe & _____

_____ ft. Total Length of Pump

_____ ft. _____ in. drop pipe & _____ No. Cable

_____ ft. _____ in. air line

_____ in. Pitless _____ ft. bury _____ in outlet

WELL MATERIALS

80 ' of 30 " diameter of Outer Casing

' of " diameter of Open Hole

222 ' of 24 " diameter of Inner Casing

283 ' of 23 " diameter of Open Hole

298 18 "diameter Inner Casing

0 ' to 298 Mix grout 480 (XXX) (Sacks)

' " diameter _____ Screen

RECORD OF TEST PUMPING

Static Water Level 68 ft. from top of pipe.

420-1302 GPM 8'-40'10" D.D. 9 Hours

1515 GPM 54' 11" D.D. 7 Hours

1711 GPM 65' 5" D.D. 4 Hours

1809 GPM 76' 11" D.D. 20 Hours

1500 GPM 46' 2" D.D. 9 Hours

Surge . . . . . 5 54 Hours

Remarks:

Air Surging . . . . . 35-1/2 Hours

Dynamite. . . . . .400 Lbs.

Bailing . . . . . 67 Yds.

First Test - Depth at 487' - open hole from 222' - 487' - 500, 600, 775, 824 and 992-GPM.

1176-GPM - 76' 11" D.D. - for 17 hours.

Set Liner to 298' - grouted in.

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Appendix 2: Water Level Monitoring Plan

Water Level Monitoring Plan for the City of Blaine

1. Purpose of Water Level Monitoring Plan

   The purpose of the Water Level Monitoring Plan is to document the water level for all supply wells to track the seasonal variation in water levels and the long-term trends for each well.

2. Data Collection Method

   The water level is measured by recording the depth to water from the static level for each well. The depth to water for each well is measured with a SCADA transducer for all wells with the exception of well 7 which is measured with a metal tape.

3. Measurement Frequency and Timing

   The water level for all supply wells will need to be recorded on a monthly basis. Measurements are recorded during the first week of the month.

Table 1 - Well Locations and Schedule for Water Level Readings

Permittee Well Number:	MDH Unique Well Number:	Measurement Frequency
Well 1	208629	Monthly
Well 2	208628	Monthly
Well 3	208646	Monthly
Well 4	208645	Monthly
Well 5	208615	Monthly
Well 6	208634	Monthly
Well 7	208616	Monthly
Well 8	208630	Monthly
Well 9	208618	Monthly
Well 10	208643	Monthly
Well 11	208633	Monthly
Well 12	224698	Monthly
Well 13	224699	Monthly
Well 14	233109	Monthly
Well 16	151587	Monthly
Well 17	721815	Monthly

Appendix 3: Water Level Graphs for each Water Supply Well

Figure 1 – Water Level Monitoring Data for Well 1

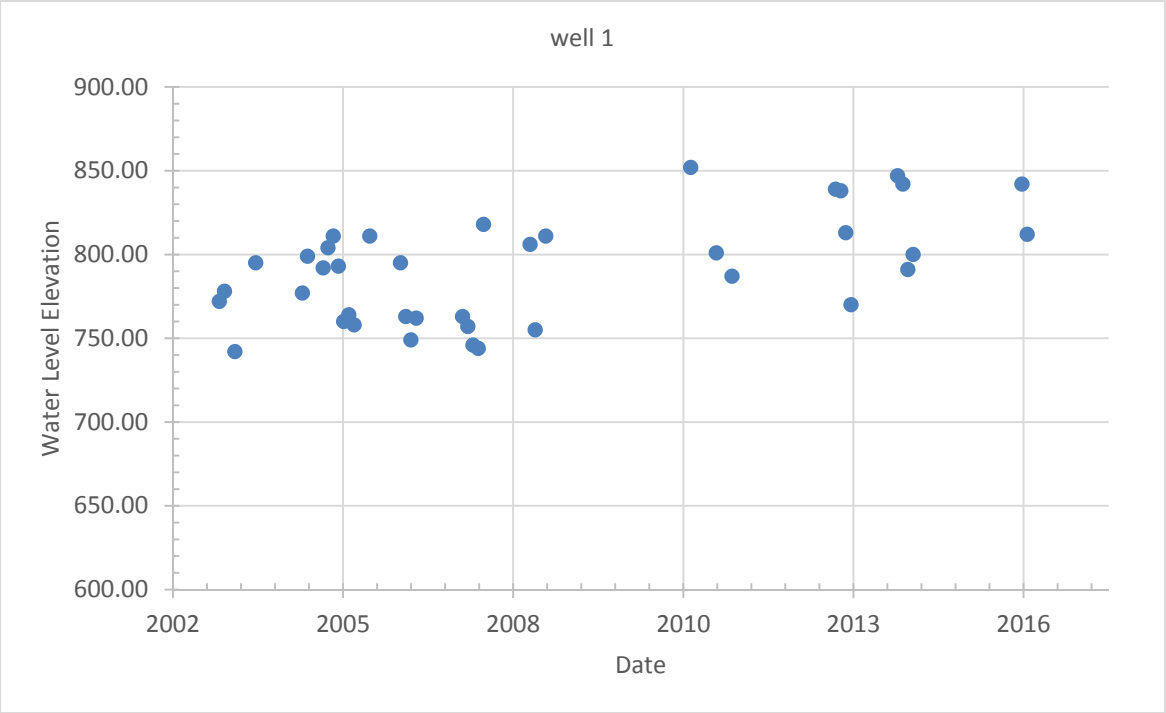


Figure 2 – Water Level Monitoring Data for Well 2

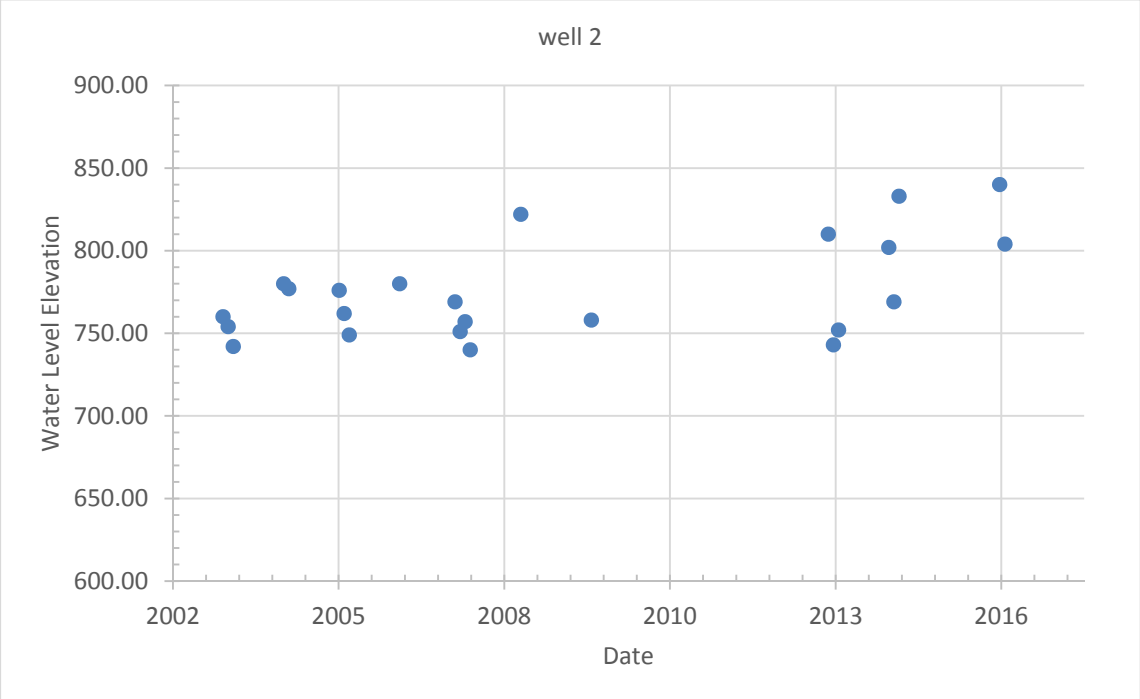


Figure 3 – Water Level Monitoring Data for Well 3

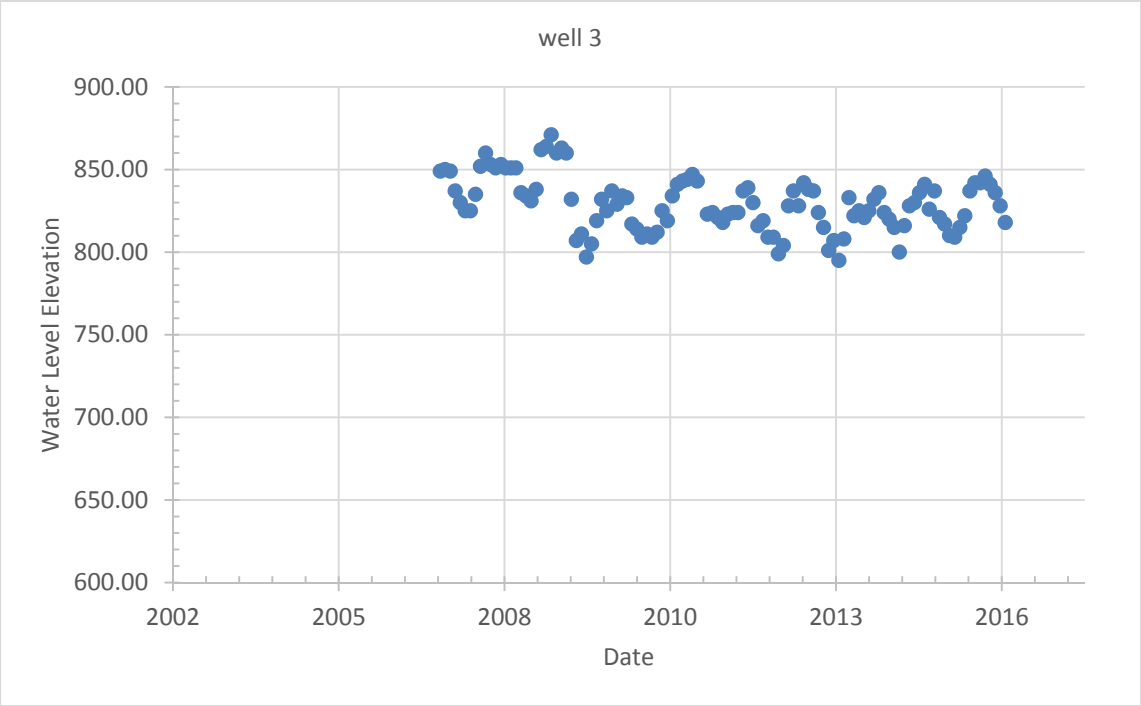


Figure 4 – Water Level Monitoring Data for Well 4

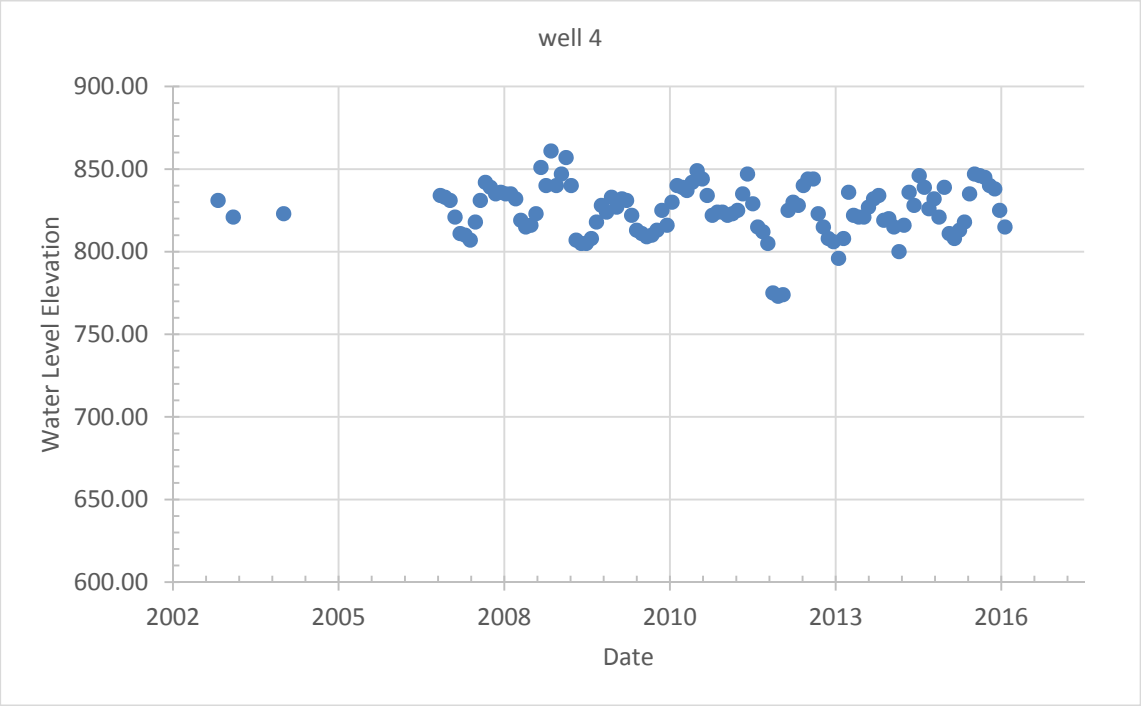


Figure 5 – Water Level Monitoring Data for Well 5

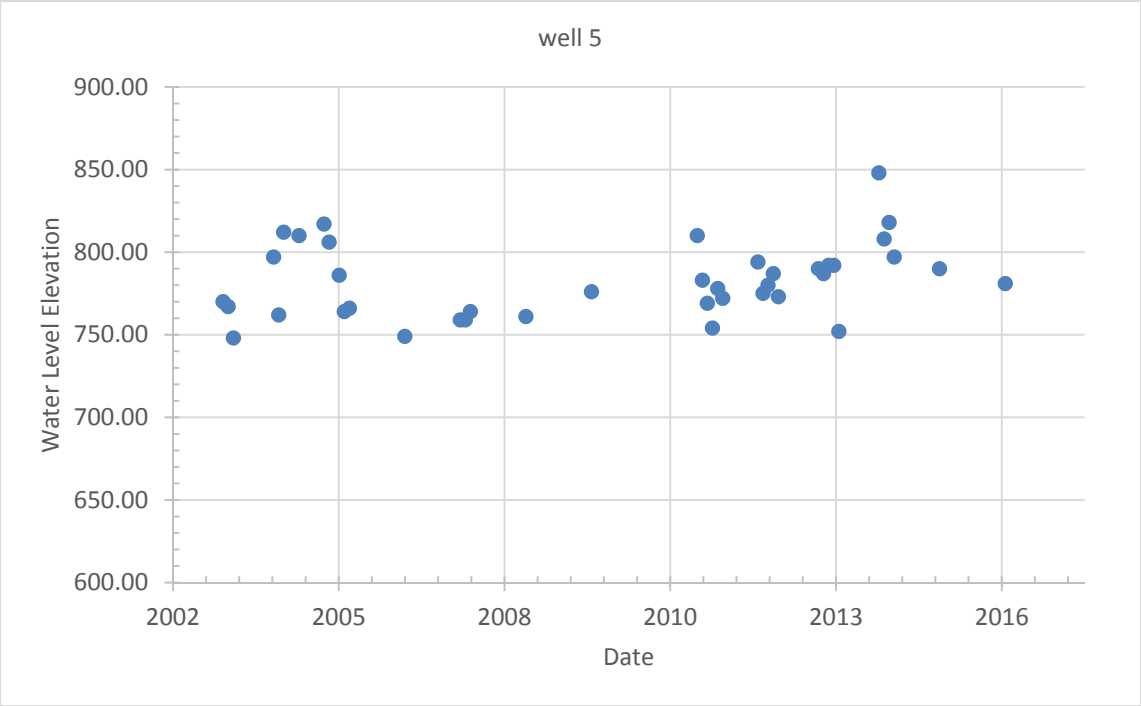


Figure 6 – Water Level Monitoring Data for Well 6

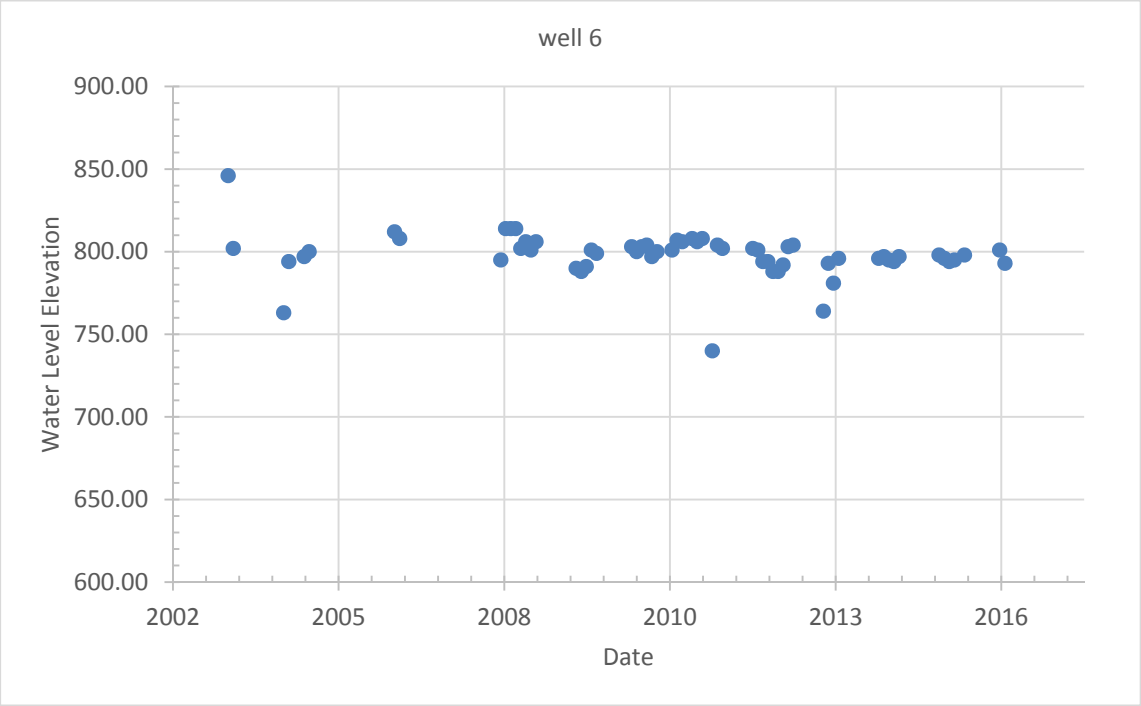


Figure 7 – Water Level Monitoring Data for Well 7

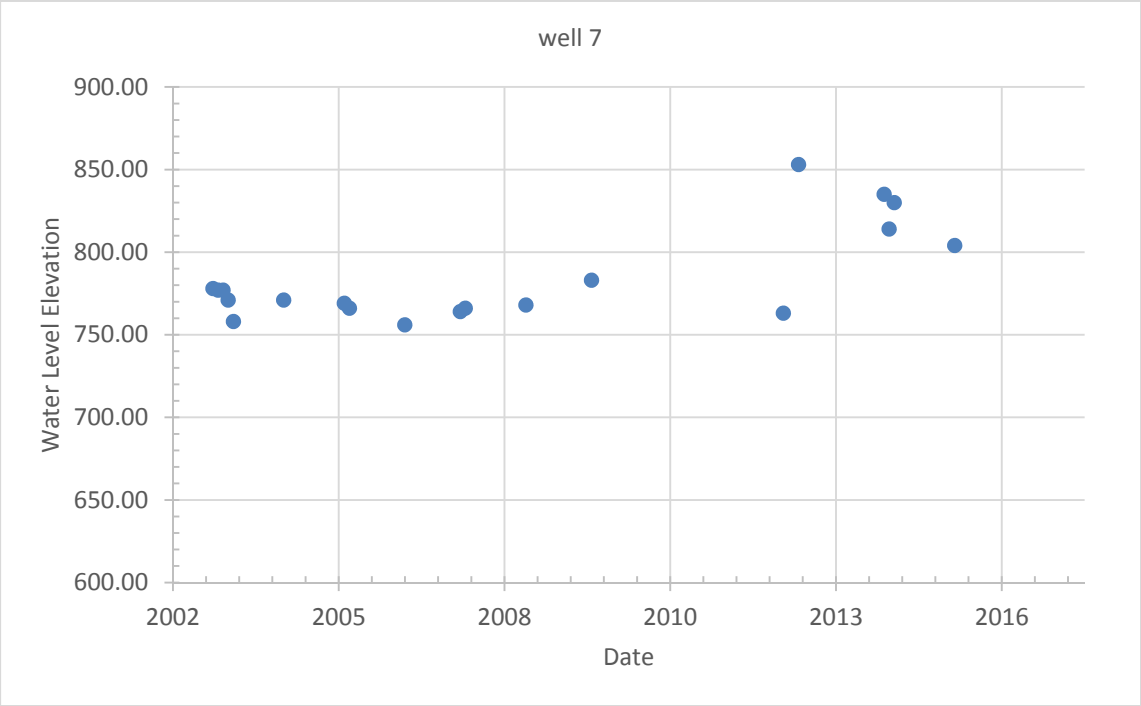


Figure 8 – Water Level Monitoring Data for Well 8

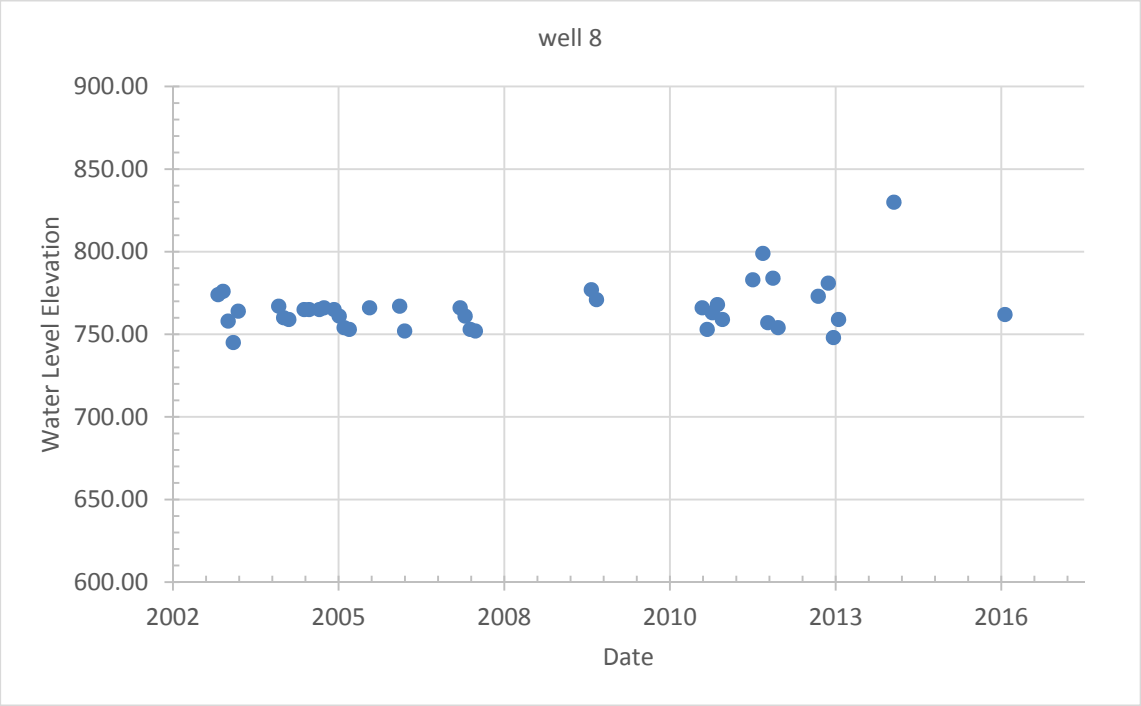


Figure 9 – Water Level Monitoring Data for Well 9

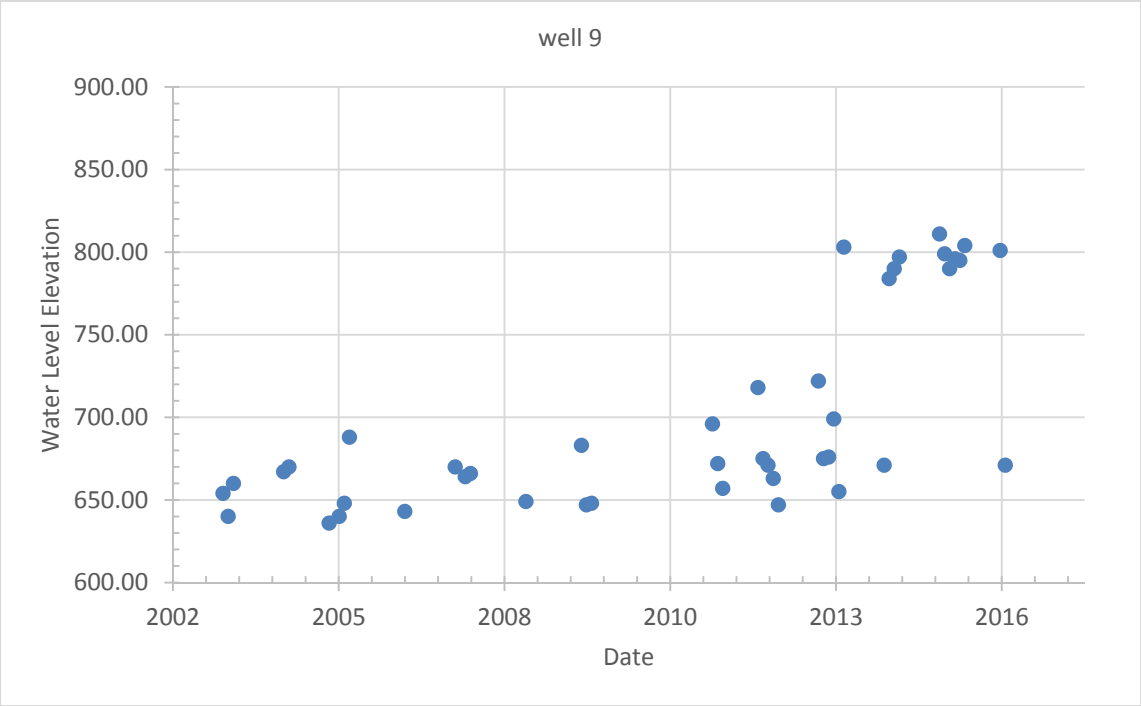


Figure 10 – Water Level Monitoring Data for Well 10

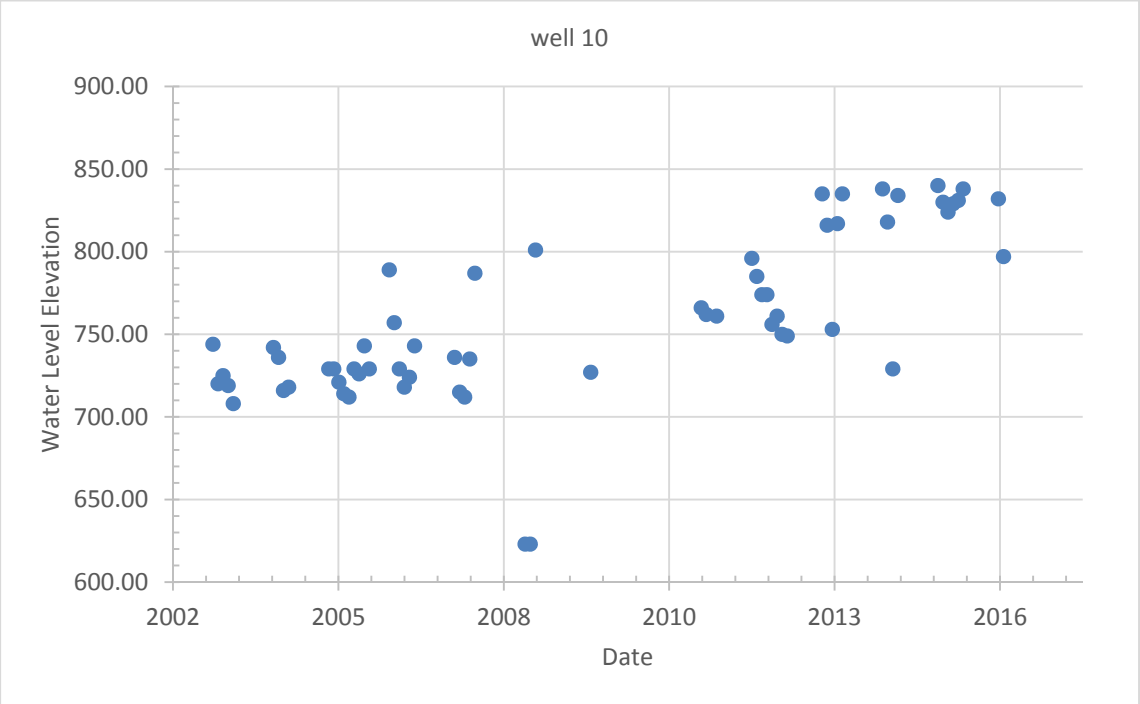


Figure 11 – Water Level Monitoring Data for Well 11

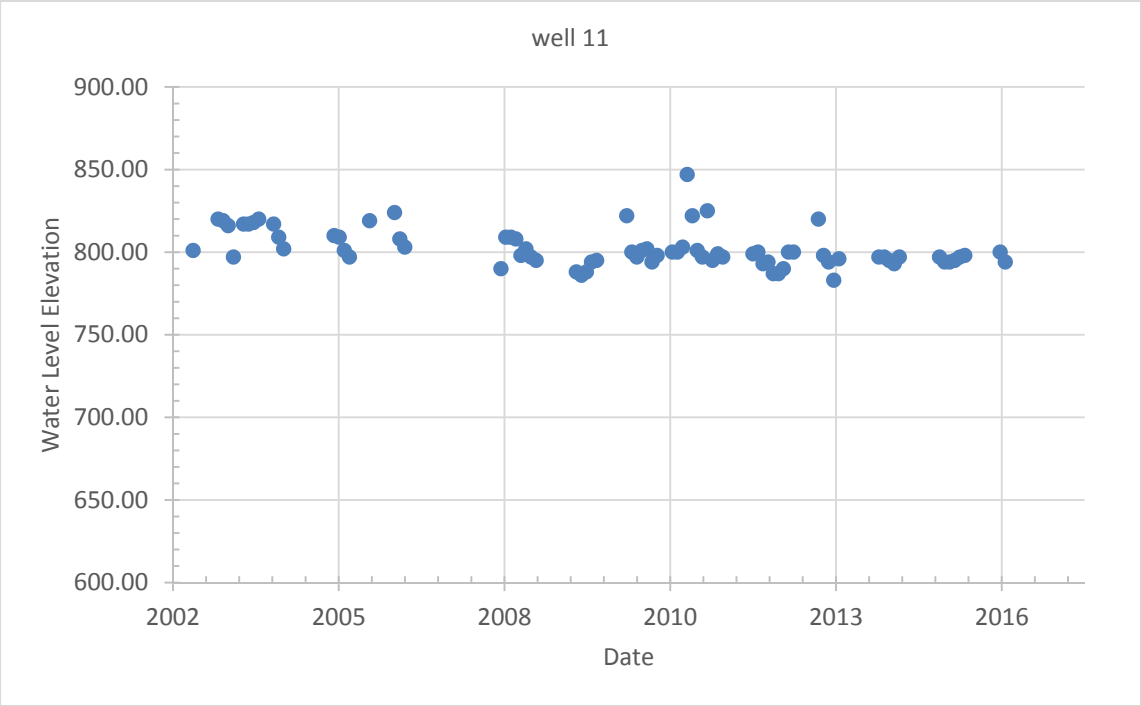


Figure 12 – Water Level Monitoring Data for Well 12

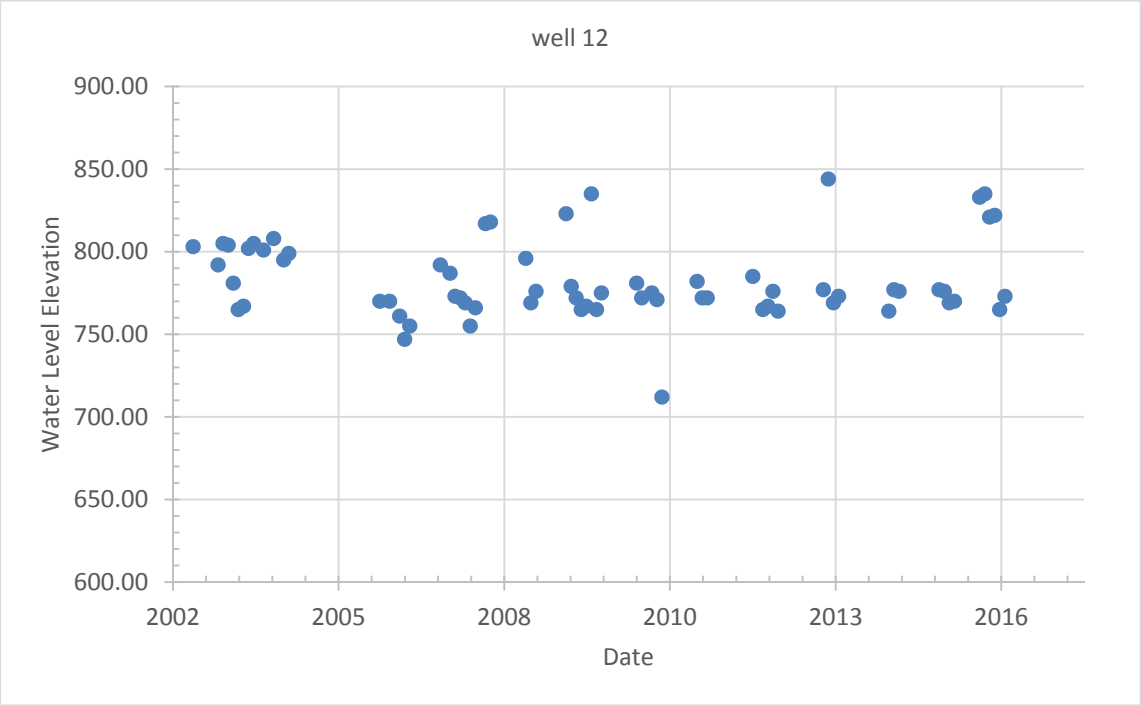


Figure 13 – Water Level Monitoring Data for Well 13

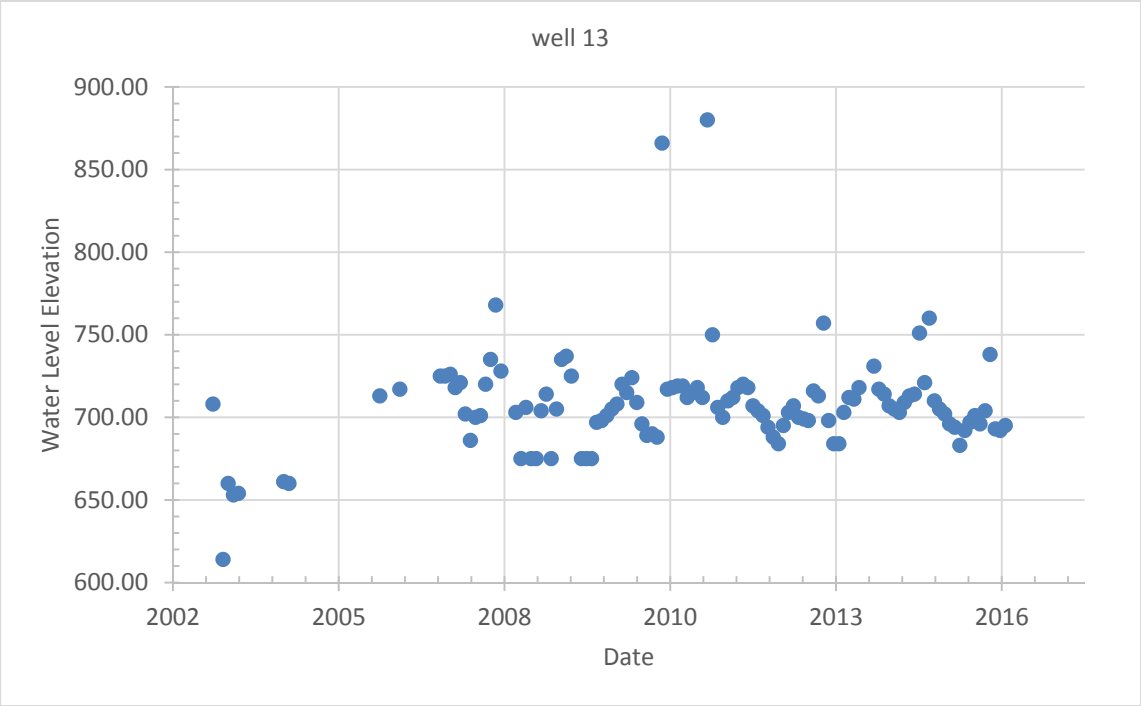


Figure 14 – Water Level Monitoring Data for Well 14

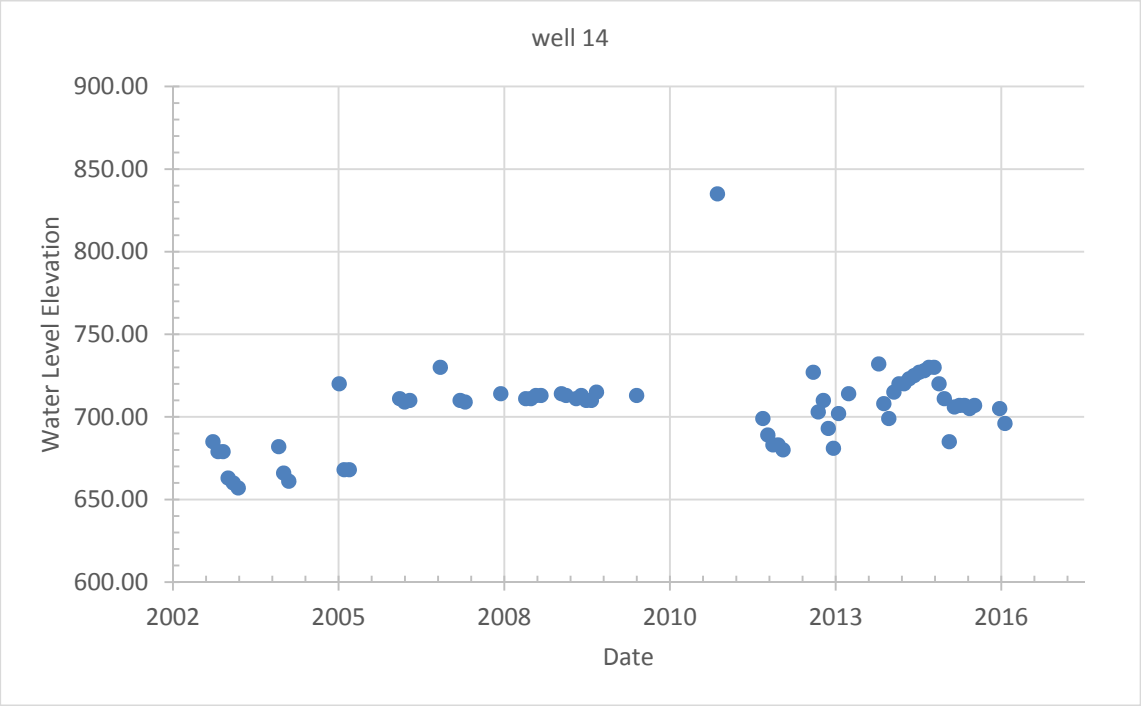


Figure 15 – Water Level Monitoring Data for Well 16

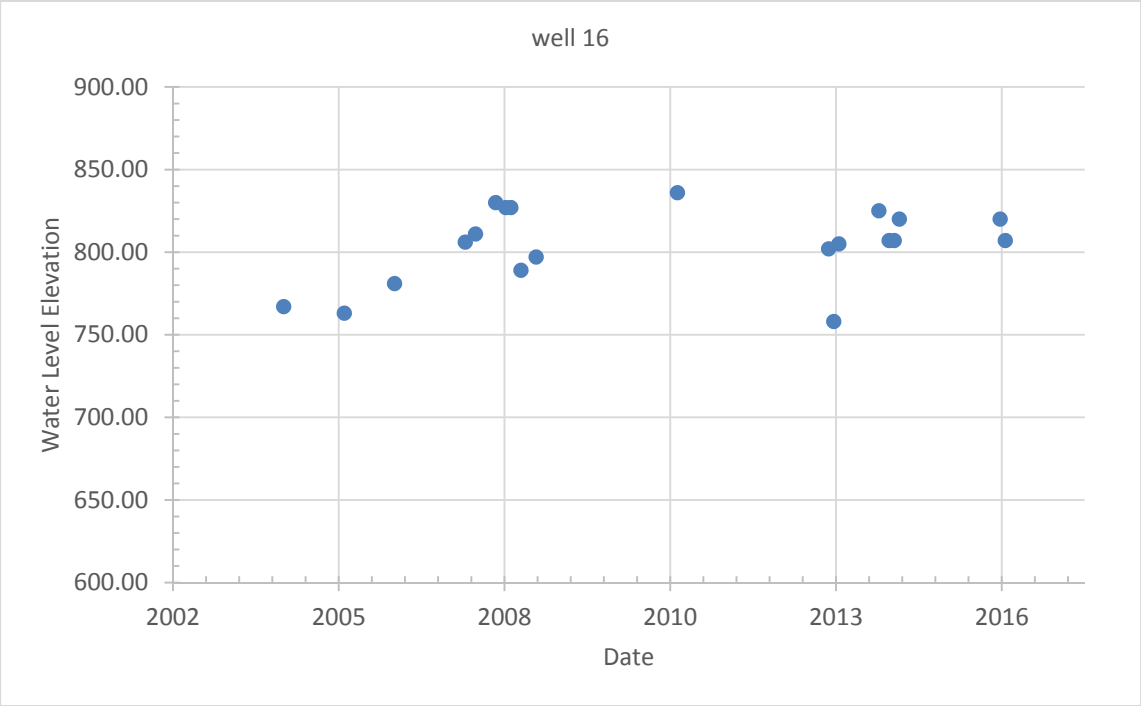
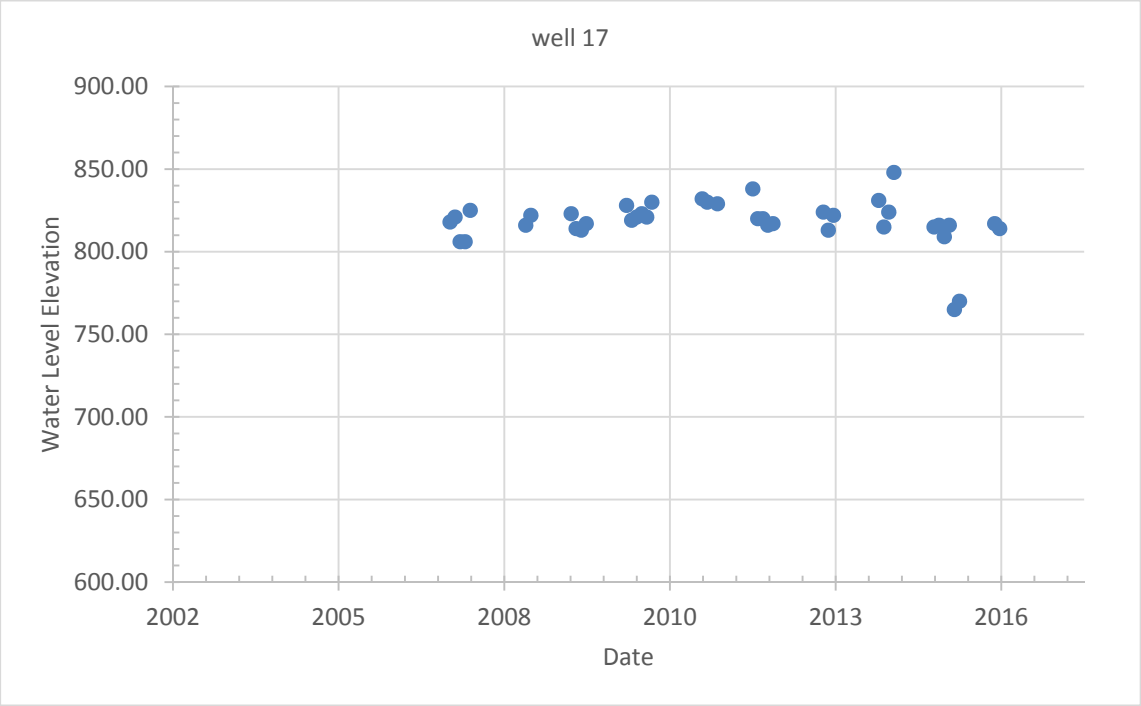


Figure 16 – Water Level Monitoring Data for Well 17



Appendix 4: Capital Improvement Plan

City of Blaine 2016-2020 Capital Improvement Plan

SUPPLEMENTAL INFORMATION
2018 CAPITAL BUDGET
WATER UTILITY FUND - 601

	2015 Actual	2016 Actual	2017 Actual	2018 Actual	2019 Budget	2019 Projected	2020 Preliminary Budget	2021	2022	2023	2024	2025	2026
EXPENDITURES													
Capital Equipment	$ 71,628	$ 29,209	$ 210,214	$ 85,671	$ 148,800	$ 159,800	$ 775,000	$ -	$ 177,000	$ 130,000	$ 130,000	$ 85,000	
A770 Bobcat Upgrade					16,000	16,000							
Mobile Home Park Meter					59,000	70,000							
Humidifier Replacement					10,500	10,500							
Gate Valve maint Trailer					63,300	63,300							
Ford F350 with Plow/Lift gate (x 2)							130,000			130,000	130,000	$ 35,000	
CAT 316F excavator							260,000						
Lowboy trailer							40,000						
Single axle plow truck							240,000						
WTP 1-3 air compressors (3)							45,000						
Commercial meters (3" Aveda; 4" Aerocryogenics							60,000						
Toro 60" mower									27,000				
Backhoe loader									150,000				
100kw Generator @ Tower 1												50,000	
Capital Projects	663,267			26,570									
HVAC Improvements at WTP1-3					141,500	141,500	80,000						
Air Compressor Replacments WTP1-3							45,000						
Electrical Improvements WTP1-3							75,000						
Paint interior and piping @ WTP 1,2,3							450,000						
Watermain additions to NE Well Field		728	19,391	1,264,329									
Filter Media at treatment plants 2 & 3		202,782											
New Wells 18-21		786,251	1,368,057	73,809	-								
Wellhead Protection Plan Update		31,724		1,455									
Glenn Meadows/Section 23 WM		305,422											
Parkside North 2nd Addition		472,662											
Facility security improvements - Proj #					50,000	50,000							
Well Redevelopment Proj 17-18 (Wells 3&4)				43,182	68,000	68,000							
Well 3 Emergency Repair						-							
Well 4 Repair						-							
						-							
AMR Radio & Meter replacement						-							
Recycling of old radios & batteries				2,717,098	20,000	916,000							
						-							
Wellhouse rehabilitation - 16-22						-							
Wellhouse 11 & 14 - Proj 16-22				478,956	977,400	1,100,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000		
Wellhouses 1 & 2					1,000,000								
Wellhouses 5 & 7						-							
Wellhouse 8						-							
Wellhouse 9													
Wellhouse 10													
Wellhouse 16							-						
						-							
Lexington Metering					425,000	425,000							
						-							
Water Treatment Plant #4						-							
Design - Barr/BMI		1,116	46,986	914,559		-							
Construction Admin - Barr/BMI					999,000	1,160,000	500,000						

Construction					19,000,000	9,261,000	15,407,000						
						-							
SCADA system improvements		70,130	76,098	225,509		-							
Design - Barr Eng													
Software Integration - Automatic Systems													
Hardware Installation & Commissioning					2,830,000	1,744,750	900,000						
						-							
Water Tower Improvements						-							
Tower #2 - Cleaning & Inspection					1,000,000	-				1,400,000			
Tower #4 - Cleaning & Inspection						-	150,000						40,000
Tower #3 - Cleaning & Inspection					40,000	-	150,000					40,000	
Reservoir - Cleaning & Inspection					50,000	50,000							
Tower #1 - Cleaning & Inspection		223,102	1,512,015	8,320		-			40,000				
						-							
Public Improvements-Trunk Oversizing				60,987		-							
Lever St					100,000	100,000				-			
Wagamon Ranch 3rd, 132nd						-	150,000						
Zest Ext, 131st						-		250,000					
131st - Lexington to Lever						-			150,000				
						-							
Watermain Replacement w/ Street Projects					350,000		400,000	400,000	400,000	450,000	450,000	450,000	450,000
						-							
Debt Service		591,695	571,216	761,845	548,200	1,869,653	1,840,230	2,451,530	2,448,660	2,444,380	2,410,680	2,407,481	2,410,430
TOTAL EXPENDITURES	$ 734,895	$ 2,714,821	$ 3,803,977	$ 5,900,445	$ 27,747,900	$ 17,045,703	$ 21,922,230	$ 4,101,530	$ 4,215,660	$ 5,424,380	$ 3,990,680	$ 2,982,481	$ 2,900,430
Net Funding Sources Added (Used)													

Appendix 5: Emergency Telephone List

Blaine Emergency Telephone List

Emergency Response Team	Name	Work Telephone	Alternate
Emergency Response Lead	Robert Therres	763-785-6123	763-785-6167
Alternate Emergency	George Linngren	763-785-6137	612-799-2904
Water Operator	Chris Imdieke	763-286-3541	763-245-3135
Alternate Water Operator	Kent Backes	763-286-6580	612-366-1737
Public Communications	Roark Haver	763-785-6192	

State and Local Emergency	Name	Work Telephone	Alternate
State Incident Duty Officer	Minnesota Duty Officer	651-649-5451 Metro	
County Emergency Director	Terry Stoltzman	911	
National Guard	Minnesota Duty Officer	651-649-5451 Metro	
Mayor/Board Chair	Tom Ryan	763-785-6121	
Fire Chief	Charlie Smith	763-786-4436	
Sheriff	James Stuart	911	
Police Chief	Chris Olson	911	
Ambulance	Allina	911	
Hospital	Unity Hospital	763-236-5000	
Doctor or Medical Facility	Blaine Medical Center	763-785-4200	

State and Local Agencies	Name	Work Telephone	Alternate Telephone
MDH District Engineer	Robert Dehler	651-201-3710	
MDH	Drinking Water Protection	651-201-4700	
State Testing Laboratory	Minnesota Duty Officer	651-649-5451 Metro	
MPCA	Minnesota Duty Officer	651-649-5451 Metro	
DNR Area Hydrologist	Kate Drewry	651-259-5753	
County Water Planner	Bart Biernat	763-422-6985	

Utilities	Name	Work Telephone	Alternate Telephone
Electric Company	Connexus Energy & Xcel Energy	911	
Gas Company	Centerpoint Energy & Xcel	911	
Telephone Company	Century Link	911	
Gopher State One Call	Utility Locations	800-252-1166	651-454-0002
Highway Department	MNDOT	911	

Mutual Aid Agreements	Name	Work Telephone	Alternate Telephone
Emergency Water Connections			
Coon Rapids	Kory Jorgensen - Utilities Supervisor	763-767-6576	
Lino Lakes	Tim Hillesheim – Utilities Supervisor	651-982-2452	
Spring Lake Park	Terry Randall - PW Director	763-784-6491	

Technical/Contracted	Name	Work Telephone	Alternate Telephone
MRWA Technical Services	MN Rural Water Association	800-367-6792	
Well Driller/Repair	Bergerson Caswell- Tim Berquam	612-369-3652	
Pump Repair	Bergerson Caswell- Tim Berquam repair	612-369-3652	
Electrician	Phasor electric	763-780-3401	
Plumber	On Call Employee	763-286-2771	
Backhoe	On Call Employee	763-286-2771	
Chemical Feed	DPC	651-437-1333	
Meter Repair	On Call Employee	763-286-2771	
Generator	Ziegler power	952-445-4292	
Valves	On Call Employee	763-286-2771	
Pipe & Fittings	Ferguson Water Works	763-560-5200	
Water Storage	George Linngren	763-477-2199	612-799-2904
Laboratory	Interpoll Testing	763-786-6020	

Communications	Name	Work Telephone	Alternate Telephone
News Paper	Star Tribune	612-673-4000	
News Paper	Blaine Spring Lake Park Life	763-421-4444	
Radio Station	KQRS	612-676-8292	
Radio Station	WCCO	612-339-4444	

Appendix 6: Cooperative Agreements for Emergency Services

Cooperative Agreement for Emergency Services between Blaine and Circle Pines

UTILITY AGREEMENT WITH CIRCLE PINES

Circle Pines: Water Agreement dated 2/17/77 -- Installation and operation of a water system interconnection between Blaine and Circles Pines for emergency use, the meter has been inactive since 1996. ***Recommend:*** Rate information should be amended to read that any water used should be billed at the users lowest rate.

Circle Pines: Water & Sewer Agreement dated 2/15/88 -- **Agreement okay** – Connection of 4 Blaine properties (Golden Lake Estate 2nd Addition) to Circle Pines water and sewer, Circle Pines bills these customers for their services.

Circle Pines: Water & Sewer Agreement dated 12/14/88 – **Agreement okay** – Connection of homes in Hidden Lake Estates to Circle Pines water and sewer, Circle Pines bills these customers for their services.

Cooperative Agreement for Emergency Services between Blaine and Coon Rapids

UTILITY AGREEMENT WITH COON RAPIDS

Coon Rapids: Water for Fire Protection only is provided to Blaine High School – **no agreement.**

Coon Rapids: 11024 University Ave, Believer's Bible Chapel (Coon Rapids) is connected to Blaine water supply and they are billed by the City of Blaine for their services – **no agreement**.

Coon Rapids: There is an Interconnect at 109th & University that is to be used in emergencies only, as of April 2004 the line is closed. -- There is no agreement. ***Recommend:*** Send a letter of mutual understanding between the cities.

Cooperative Agreement for Emergency Services between Blaine and Lexington

UTILITY AGREEMENT WITH LEXINGTON

Lexington: Water Agreement dated 10/6/77 – Blaine and Lexington water services south of Edgewood Road are interconnected, water is pumped back and forth as needed. Blaine's computer controls the pumping of Lexington's well. Per a 1992 memo, it was determined that Blaine would pump from Lexington's well an amount equal to Lexington's usage. Blaine was to keep records of the gallons being pumped from the Lexington well and Lexington was to supply Blaine with documentation of their usage. In the event that the pumping of Lexington's well were over or under the actual usage, the difference in what was pumped from the well and the usage would be paid by the appropriate City. If Blaine pumped more water out of Lexington's well than Lexington used, Blaine would pay Lexington for the additional gallons pumped, if Blaine pumped less water out of Lexington's well than Lexington used, Lexington would pay Blaine for those additional gallons that were pumped from Blaine's system. The rate agreed to be paid was ($.30) per 1,000 gallon. In a 1996 memo it was mentioned that the City over the past few years was not pumping Lexington's well enough to cover Lexington's usage and that Blaine would be increasing the pumping of Lexington's well to try to make up the difference. It doesn't look like any money has ever been exchanged for the differences in the pumping and usage. The max amount that Blaine strives to pump out of Lexington's well is 68 million gallons of water per year (unable to determine what established that amount, maybe an estimate of Lexington's usage). Because of the dry summer in 2003, Blaine pumped more than the 68 million gallons. Suggestion: - Start as of January 2004, to keep a spreadsheet of readings, consumptions and the amount of water Lexington bills their residents. Keep the current rate of ($.30) per 1,000 gallons of water. This would cover Blaine in the event we need to purchase water from them. We do not feel Lexington would want to pay Blaine for water, instead would prefer Blaine to pump more from the Lexington well. The system seems to be working, for both cities. Blaine pumps Blaine's well throughout the winter months and pumps Lexington's well in the summer when more water is needed. The goal would be to have better documentation of what is being pumped out of Lexington's well and what they are actually using.

Lexington: Sewer Disposal Contracts 9/7/67 & 3/2/72 – Agreement was made prior to construction of Lexington's municipal sanitary sewer system and construction of Blaine's main sanitary sewer to allow Blaine to discharge sewage into Lexington then to be conveyed to Lexington's outlet to the North Suburban Sewer District. Blaine to pay Lexington the portion of the total cost of jointly used facilities in excess of the cost of the same facilities constructed to service only Lexington boundaries, constructed to the minimum standards. Blaine to reimburse Lexington for operation and maintenance services in an amount equal to the charge made to the residents of the City, per quarter, per residential equivalent connection for administrative expenses, subject to an annual adjustment at such time each year as an audit of Lexington is completed, said expenses to be determined by audit and filed with both Lexington and Blaine. This Contract was recently reviewed.

Lexington: Water & Sewer Agreement dated 8/17/67--- Blaine properties abutting Lexington boundary streets to connect to Lexington water & sewer. Owner will pay Lexington an amount equal to the charge that the City would impose on equivalent properties in Blaine. Also, the owner will pay Lexington the connection charges imposed by North Suburban Sanitary Sewer District. In addition, the user of the water and sewer will pay the quarterly user charges imposed by Lexington. ***Recap:*** Lexington provides some Blaine properties with water and/or sewer and Lexington bills those customers for their services. Blaine provides some Lexington properties with water and/or sewer and Blaine bills those customers for their services.

Cooperative Agreement for Emergency Services between Blaine and Lino Lakes

UTILITY AGREEMENT WITH LINO LAKES

Lino Lakes: Water & Sewer Agreement dated 11/16/89 – Properties in Lino Lakes connecting to Blaine water & sewer system in Sunset Avenue. A base fee established to be indexed by ENR each year. Blaine to provide Lino Lakes a list of customers connected to the system. Blaine will provide Lino Lakes with a quarterly statement of the water & sewer usage upon which payment will be due. **Agreement is fine.**

Lino Lakes: There is an interconnect at Sunset Ave & Elm Street which is new. As of April 2004 the line is closed and is to be used for emergencies only – no known agreement. ***Recommend:*** Send a letter of mutual understanding between the cities that would address how to bill if it is ever used.

Cooperative Agreement for Emergency Services between Blaine and Mounds View

UTILITY AGREEMENT WITH MOUNDS VIEW

Mounds View: Water & Sewer Agreement dated 3/8/71 – Properties in Mounds View connecting to Blaine water & sewer system. Lateral charges were established in the agreement. Mounds View to pay the City of Blaine within 30 days of connection. Usage rates were established in the agreement. Blaine to bill the affected Mounds View properties quarterly and the City give those properties a 90 day notification of any change in the rates. Agreement covers City of Mounds View Golf Course Club House and Maintenance Building and 3024 85th Avenue NE. The City of Blaine bills the customers for their services. ***Recommend :*** Should be amended to read that we will bill them at our current rates.

Mounds View: Water Agreement dated 2/28/89 – Sysco property, in Mounds View, connecting to Blaine water for fire protection services only and to be used in emergencies only. The owner to pay all water charges for water used at the same rate charged to similar users in Blaine. **Agreement is fine**

Mounds View: Water Agreement dated 6/26/89 – The 2/28/89 agreement was amended to change the number days needed, from 30 to 180, for Blaine to give written notice to the City of Mounds View notifying them of the discontinuance of water service to the property and termination of the 2/28/89 agreement. **Agreement is fine**

Mounds View: There is an Interconnect at 85th & Hastings, as of April 2004 the line is closed and is to be used for emergencies only – no known agreement. ***Recommend:*** Send a letter of mutual understanding between the cities.

Cooperative Agreement for Emergency Services between Blaine and Shoreview

UTILITY AGREEMENT WITH CITY OF SHOREVIEW

Shoreview: Water & Sewer Agreement dated 11/16/87 – Agreement makes water and sewer service available to two Shoreview properties, 1600 County Road J (Brookside Mobile Home Park) and 1586 County Road J, and includes an interconnection agreement at Co Rd J and Lexington Ave. Since this agreement was made in 1987 Shoreview has expanded their water and sewer services to this area. As of April 2004 there is not an interconnection, there is an 8" water service that is turned off and not connected to anything. There is no sewer connection between Shoreview and Blaine, and no known future plans to connect.

Cooperative Agreement for Emergency Services between Blaine and Spring Lake Park

UTILITY AGREEMENT WITH CITY OF SPRING LAKE PARK

Spring Lake Park: Water Agreements dated 3/1/63-12/17/70-3/5/79-11/1/90-5/1/97 -- Blaine provides certain properties in SLP for water & sewer service. SLP bills their customers (at their rates) for our services and reports water consumptions to us so we can bill SLP for the services (at our rates) except for 8501 Polk St NE, Blaine bills that address for water & sewer. The quarterly water consumptions are then reported to Kyle @ MCES, he deducts this flow from Blaine's total sewer flow and adds them to SLP total sewer flow. ***Recommend:*** In 2001 SLP proposed a new agreement that covered B, C & D (see map) which would supercede all previous agreements. It continues to use the previously mentioned cumbersome billing system for C & D. We would like to propose, in a new agreement, that Blaine will bill these customers directly for water & sewer. The cumbersome billing system would be eliminated if we billed directly. After speaking with Kyle @ MCES he agrees this would be a more efficient way of handling this area.

Spring Lake Park: Water & Storm Water Agreement dated 8/29/88 – SLP provides sanitary sewer flow and storm water drainage for the North Court Commons, which is east of Jefferson Street and does not include Northtown Shopping Center or other various properties west of University Avenue, South of County Road 10 and North of 85th Avenue. ***Recommend:*** In 2001 SLP proposed a new agreement that covered areas B, C & D (see map), this agreement was never approved. We would like to propose an agreement to include that, even though Northtown and the Northtown Commons areas are in Blaine and connected to Blaine water & sewer, the sewage flows through SLP on its way to the Metro Sewer Line. This flow is subtracted from SLP's sewer totals by the MCES accounting using information provided from Blaine's Utility Billing records. Because we realize we have increased SLP's maintenance with our flow, we would agree to compensate them at their recommended $420.00 annually for sewer line maintenance. In addition, our agreement with SLP should address areas I & H (see map) for future clarification. Area H (see map) is in Blaine and serviced, and billed, by the City of Coon Rapids for water & sewer and in no way interconnected with either Blaine or SLP. Area I (see map) is located in Coon Rapids and in no way interconnected with Blaine or SLP.

Spring Lake Park: There is a cross connection at Highway 65 and 85th Avenue that is to be used for emergencies only, as of April 2004 it is off – there is no agreement. ***Recommend:*** Send a letter of mutual understanding between the cities.

Appendix 7: Municipal Critical Water Deficiency Ordinance

Municipal Critical Water Deficiency Ordinance for the City of Blaine –

The City of Blaine plans to adopt a critical water deficiency ordinance within 6 months of approval of this Water Supply Plan.

Appendix 8: Graph Showing Annual Per Capita Water Demand for each Customer Category during the Last Ten-years

Graphs showing annual per capita water demand for each customer category during the last ten years and projection for the next ten years.

Figure 1 –Annual Per Capita Water Demand for Each Customer Category during the Last Ten Years

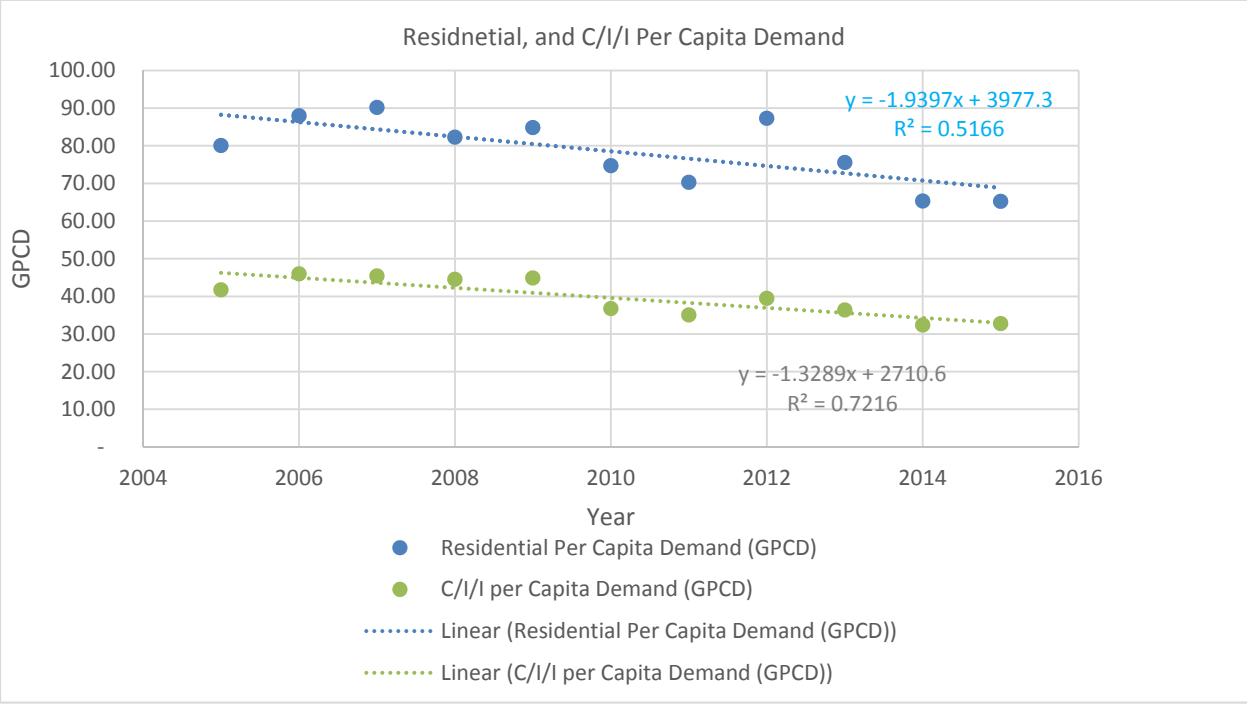
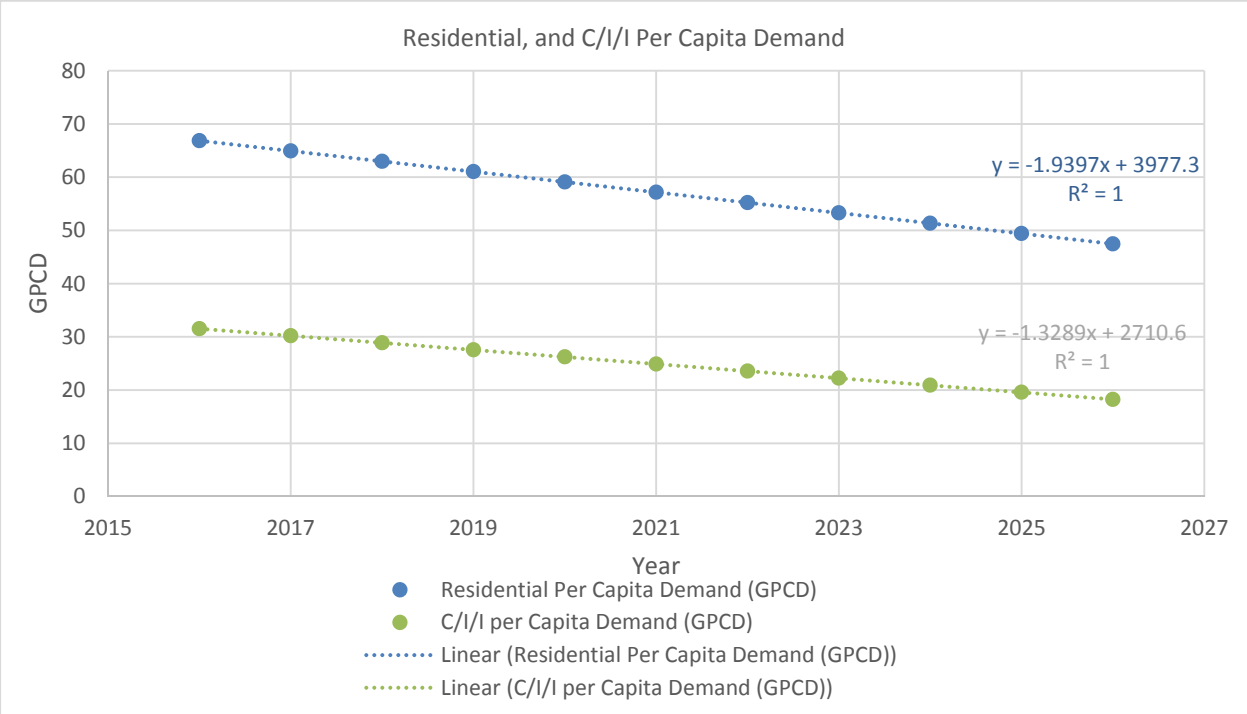


Figure 2 –Annual Per Capita Water Demand for Each Customer Category during the Next Ten Years



Appendix 9: Water Rate Structure

Water Rate Structure for the City of Blaine –

Residential Customers will be billed a quarterly service charge of $5.50, plus a charge per each 1,000 gallons of fraction thereof for all water consumed as outlined below.

Commercial Customers will be billed a monthly service charge of $5.50, plus a charge per each 1,000 gallons of fraction thereof for all water consumed as outlined below.

	Current Rate Schedule
$1.06/1,000 gallons	*For usage up to 24,000 gallons/quarter or 8,000 gallons per month*
$1.43/1,000 gallons	*For usage over 24,000 gallons/quarter or 8,000 gallons per month*
$2.10/1,000 gallons	*For usage over 150,000 gallons/quarter or 50,000 gallons per month*

Source: Blaine Rate Schedule, from website on September 16, 2016, http://www.ci.blaine.mn.us/index.cfm?id=50126#.V9wJT_krJhE

Appendix 10: Adopted or Proposed Regulations to Reduce Demand or Improve Water Efficiency

Adopted or Proposed Regulations to Reduce Demand or Improve Water Efficiency

Note: Listed in the table below are current regulations that are already in place.

Adopted and Proposed Regulations to Reduce Demand or Improve Water Efficiency	
▣ Water efficient plumbing fixtures required	☐ New Development ☐ Replacement ☐ Rebate Programs ▣ Low interest loan program for remodeling which requires current MN plumbing and energy codes be met as part of the remodel.
▣ Critical/Emergency Water Deficiency ordinance	▣ Only during declared Emergencies – *The City Manager has authority to implement water emergency responses.*
▣ Watering restriction requirements (time of day, allowable days, etc.)	▣ Odd/Even – *Now enforced throughout the year. No watering from 10 am to 6 pm during summer months. Sprinkler ordinance was revised on 8/18/16.* ☐ 2 days/week ☐ Only during declared Emergencies
▣ Soil preparation requirement s (after construction, requiring topsoil to be applied to promote good root growth) http://www.ci.blaine.mn.us/index.cfm?id=50138#.V5knHIMrJhE	▣ New Development - *4" of black dirt required for lawns. Cannot contain more than 35% sand.* ☐ Construction Projects ☐ Other
▣ Tree ratios (requiring a certain number of trees per square foot of lawn) *Planting Location: A minimum of two front yard trees is required for most Zoning Districts. One of the two front yard trees is required to be planted in the boulevard.Ornamental trees do not meet landscaping requirements. From Blaine City Connect on 7/27/16* *http://www.ci.blaine.mn.us/index.cfm?id=50139#.V5kncYMrJhE*	▣New development ☐ Shoreland/zoning ☐ Other
▣ Ordinances that permit stormwater irrigation, reuse of water, or other alternative water use (Note: be sure to check current plumbing codes for updates)	▣ Describe: *City Code of Ordinances does allow appropriation of water from storm water ponds with City approval. Ordinance Sec 34-522*

Appendix 11: Implementation Checklist – Summary of All the Actions that a Community is doing, or Proposes to do, Including Estimated Implementation Dates

Implementation Checklist – Summary of All the Actions that a Community is doing, or Proposes to do, Including Estimated Implementation Dates

Continued/Proposed Actions	**Implementation Date**
City has low interest loan program for remodeling which requires current MN plumbing and energy codes be met as part of the remodel.	Ongoing
Continue to enforce the revised lawn irrigation ordinance that is now enforced throughout the year where no watering is allowed from 10 am to 6 pm.	Ongoing
Continue to make water supply system improvements as needed. (The City has an ongoing maintenance program to upgrade wells, treatment plants, and hydrants. They have just started a water main replacement program if needed with street reconstruction projects.)	Ongoing
Continue to require commercial and industrial properties to utilize rain sensors on their lawn irrigation systems.	Ongoing
Continue to provide ongoing educational information and participate in "know the flow".	Ongoing
Continue to participate in a Green Expo every year to provide educational information to participants.	Ongoing
Adopt a critical water deficiency ordinance within 6 months of approval of this Water Supply Plan	Within 6 months of approval of this plan

Appendix 12: Response to Local Government Unit Comments

Response to Local Government Unit Comments

Prior to submittal of this plan, a draft copy was sent out to all local government units (public works directors, watershed district managers, and county soil and water conservation manager) for review and comment. Comments on the draft water supply plan were received from Coon Creek Watershed District. A summary of the response to each comment is presented below. A copy of the comment request letter sent to the local government units is included after the comment response summary.

Has the City looked into the Water Stewards program?

> The City is aware of the program, and will take potential benefits of collaboration into consideration.

Table 10 – endangered, threatened and special concern species should be checked for the Pioneer Park and developments in the area of the park.

> The City has installed a new monitoring well to monitor wetland levels in Pioneer Park and ensure they are not changing significantly. The increased monitoring will help to prevent any impacts to endangered, threatened and special concerns species due to changes in water levels and/or availability. The monitoring well was installed as part of the City's recent water supply project. As a result of that work it was determined that City supply wells are installed below a clay layer that effectively separates the water table in Pioneer Park from the City's source aquifer. As a result, it was determined that pumping of city wells does not negatively impact water levels in Pioneer Park.

Table 30 – Water Use Targets – the city should include cooperation with the water shed districts

> Table 30 has been updated to include cooperation with local watershed districts.

Table 25 and 26 – City should look at encouraging low to no maintenance landscaping so no irrigation is needed.

> Comment is noted. The City will take the input under advisement, and consider the Watershed District's suggestion within the confines of current and future City ordinances and zoning.
>
> The City is open to using education materials or resources the Watershed District is willing to provide that can help inform our citizens about the use of low impact landscaping.

Also, add cooperation with the Watershed Districts to the sections about changing plumbing code.

> The City will consult the Watershed District about plumbing code updates as required. However, most of the currently planned updates are purely municipal in nature.

WSP LETTER TO LGUs

City of Blaine

10801 Town Square Drive
Blaine, MN 55449-8
www.ci.blaine.mn

WATER SUPPLY PLAN LETTER TO LGUs

Date: November 29, 2016

To: Tim Himmer, City of Coon Rapids
Rick DeGardner, City of Lino Lakes
Terry Randall, City of Spring Lake Park
Brian Erickson, City of Mounds View
Mark Maloney, City of Shoreview
Rich Lavell, City of Circle Pines
Jim Fischer and Travis Schmid, City of Lexington
Chris Lord, Anoka Conservation District
Tim Kelly, Coon Creek Watershed District
Phil Belfiori, Rice Creek Watershed District

Re: Draft DNR Water Supply Plan - City of Blaine

The City of Blaine is in the process of revising their Minnesota Department of Natural Resources (DNR) Water Supply Plan. This plan includes information pertaining to the City's:

1. Water supply system description and evaluation,
2. Emergency preparedness procedures, and
3. Water conservation plan

Enclosed please find the draft plan for your review and comment. Please respond back to me with any comments on the plan by December 14, 2016.

Thank you,

Jean M. Keely
City Engineer
City of Blaine, Minnesota

cc: Katie Duncan, Barr Engineering Co.
Kate Drewry, Minnesota DNR