Amendment to the Wellhead Protection Plan Part 2

City of Cloquet

Cloquet, Minnesota

SEH No. CLOQU 128421

September 2015

Public Water Supply Profile

Public Water Supply

Name: City of Cloquet
Contact: Caleb Peterson, Director of Public Works
Address: 1307 Cloquet Avenue
Cloquet, MN
Phone: (218) 879-6758
Email: cpeterson@cloquetmn.gov

Population Served: 12,156
PWS ID Number: 1090005

General Information

Well Name:	Unique Well Number
Well 1	229069
Well 6	229067
Well 8	400334
Well 11	400332
Spring Lake	269223

Consultant

Name: Short Elliott Hendrickson
Address: 3535 Vadnais Center Drive
St. Paul, MN 55110
Phone: (651) 490-2000
Email: swojtkiewicz@sehinc.com

Documentation List

Step	Date Performed
Scoping 2 Meeting (4720.53640, subp. 1)	September 11, 2013
Scoping 2 Decision Notice (4720.5340, subp. 2)	October 11, 2013
Remaining Portion of Plan Submitted to Local Government Units (4720.5350)	May 22, 2015
Review Received from Local Government Units (4720.5350, subp. 2)	July 21, 2015
Consider Comments from Local Government Units (4720.5350, subp. 3)	August 4, 2015
Public Hearing Conducted on Part I and Part II WHP Plan (4720.5350, subp. 4)	August 4, 2015
Part II WHP Plan Submitted to MDH (4720.5360, subp. 1)	October 6, 2015

List of Abbreviations and Glossary of Terms

CERCLA	COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT - see Superfund.
CERCLIS	COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY INFORMATION SYSTEM is a database maintained by the US Environmental Protection Agency. CERCLIS contains information such as the current status of cleanup efforts, cleanup milestones reached, and amounts of liquid and solid media treated at sites on the National Priorities List, which is a list of Superfund Sites with high priority for remediation activity.
CWI	COUNTY WELL INDEX is a database maintained by MDH with location and summary information for wells and boreholes in Minnesota.
DWSMA	DRINKING WATER SUPPLY MANAGEMENT AREA is the area delineated using identifiable land marks that reflects the scientifically calculated wellhead protection area boundaries as closely as possible. The boundaries of the DWSMA can be 1) the center lines of highways, streets, roads, or railroad right-of ways; 2) section, half-section quarter-section, quarter-quarter section, or other fractional section lines of the United State public land survey; or 3) property lines.
GIS	GEOGRAPHIC INFORMATION SYSTEMS is a computerized mapping method utilized in the compilation of data for the Wellhead Protection Plan.
IWMZ	INNER WELLHEAD MANAGEMENT ZONE is the area within 200 feet of a public water supply well.
LGU	LOCAL GOVERNMENT UNIT is a statutory or home rule charter city, town, county, soil and water conservation district, water shed district, organization formed for the joint exercise of powers under Minnesota Statutes, section 471.59, local health board, or other special purpose district or authority with local jurisdiction in water and related land resources management.
MDA	MINNESOTA DEPARTMENT OF AGRICULTURE
MDH	MINNESOTA DEPARTMENT OF HEALTH
MN DNR	MINNESOTA DEPARTMENT OF NATURAL RESOURCES
MPCA	MINNESOTA POLLUTION CONTROL AGENCY

NRCS	NATURAL RESOURCES CONSERVATION SERVICE
PCSI	POTENTIAL CONTAMINANT SOURCE INVENTORY is a database being compiled as part of this Wellhead Protection Plan, including potential point sources of contamination of the public water supply.
SUPERFUND	THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT of 1980, known as Superfund, was enacted to address abandoned hazardous waste sites in the U.S.
SWCD	SOIL AND WATER CONSERVATION DISTRICT
SWUDS	STATE WATER USE DATA SYSTEM is a database maintained by the MN DNR that includes location and summary information on high capacity wells (greater than 10,000 gallons per day) and other water withdrawal permits in Minnesota.
USGS	UNITED STATES GEOLOGICAL SURVEY
VIC	VOLUNTARY INVESTIGATION AND CLEANUP The Voluntary Investigation and Cleanup (VIC) Program allows buyers, sellers, developers or local governments to voluntarily investigate and, if necessary, clean up contaminated land to facilitate its sale, financing or redevelopment. Voluntary parties that complete investigation and/or cleanup activities under MPCA oversight can receive liability assurances that protect them from future Superfund liability.
WHPA	WELLHEAD PROTECTION AREA is the surface and subsurface area surrounding a well or well field that supplies a public water system, through which contaminants are likely to move toward and reach the well or well field. This definition is the same for the federal Safe Drinking Water Act (40 Code of Federal Regulations, Section 1428) and the Minnesota Groundwater Protection Act (Minnesota Statute 103I).
WIMN	WHAT'S IN MY NEIGHBORHOOD refers to databases maintained by the MPCA and MDA that locate and provide summary information about potential contamination sources in Minnesota.

Executive Summary

This report is Part II of a Wellhead Protection Plan for the City of Cloquet, and includes the following:

- A review of the data elements.
- The results of the potential contaminant source inventory.
- A review of changes, issues, problems, and opportunities related to the public water supply and the identified potential contaminant sources.
- A detailed discussion of the potential contaminant source management strategies and corresponding goals, objectives, and action plans.
- A review of the wellhead/source water protection evaluation program
- An alternative water supply contingency strategy.

Part I of the plan was completed in 2013. In Part I of the plan, the Wellhead Protection Area (WHPA) and Drinking Water Supply Management Area (DWSMA) were delineated, and vulnerability assessments of the wells and corresponding DWSMA were amended based on updated data available on the source water aquifer used by the municipal wells. The source water aquifer within the North DWSMA for Well 11 was determined to be moderately vulnerable to contamination from the ground surface and the source water aquifer for the South DWSM ranges from high to moderately vulnerable. These ratings are based on well construction, geologic conditions, and water quality testing.

The information and data contained in Sections 1-4 of this plan provide support and a basis for the approaches taken in addressing and managing the identified potential contaminant sources. Section 5 of this plan is composed of actions that the City's Wellhead Protection Team intends to implement over the ten year life of this plan. The wellhead protection program is designed to optimize the use of resources to prevent contamination of the City's water supply.

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City of Cloquet

Prepared for City of Cloquet

1.0 Introduction and Background Information

The City of Cloquet has completed Part II of the Wellhead Protection (WHP) Plan update in accordance with Minnesota Rules Chapter 4720.5300 and the 1986 amendments to the federal Safe Drinking Water Act. Definitions of rule-specific terms used are provided in the List of Abbreviations and Glossary of Terms.

The previous WHP Plan was completed in 2003. The wells included in the WHP plan are listed in Table 1.

Table 1 - Water Supply Well Information

Local Well ID	Unique Number	Use/ Status[1]	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/ Reconstructed	Aquifer	Well Vulnerability
Well 1	229069	P	12	87	111	1942	QBAA	Vulnerable
Well 6	229067	P	12	48	68	1958	QBAA	Vulnerable
Well 8	400334	P	12	82	102	1982	QBAA	Vulnerable
Well 11	400332	P	12	93	120	1985	QBAA	Vulnerable
Spring Lake Well	269223	P	No casing – open bottomed reservoir	No casing – open bottomed reservoir	No casing – open bottomed reservoir	1907	QWTA	Vulnerable

Note: 1. Primary (P); Emergency (E)
2. QBAA = Buried glacial sand and gravel; QWTA = Surficial glacial sand and gravel

In 2013, the Minnesota Department of Health (MDH) amended Part I of the wellhead protection (WHP) plan. The work was performed in accordance with the Minnesota Wellhead Protection Rule, parts 4720.5100 to 4720.5590. The

Part I WHP plan (Appendix A) included delineations of the wellhead protection area (WHPA) and drinking water supply management area (DWSMA), and the vulnerability assessments for the public water supply wells and DWSMA. Figure 1 shows the boundaries for the WHPA and the DWSMA. Due to well locations, the City of Cloquet has two DWSMAs: the North DWSMA for Well 11 and the South DWSMA for the remaining wells.

The WHPA is defined by a 10-year time of travel. Figure 1 also shows the emergency response area (ERA), which is defined by a one-year time of travel. An inner wellhead management zone (IWMZ), defined as the areas within a 200-foot radius of each well, is not displayed in this report.

The 2003 and current South WHPAs are similar in size and the resulting DWSMAs are very similar. The only change is that the current DWSMA south boundary is slightly modified, with a few parcels removed from the DWSMA and the boundary now following property lines.

The North DWSMA is slightly larger than the 2003 version. This is due to a larger WHPA resulting from increased water usage from Well 11. The area of the North DWSMA is expanded primarily to the west and south.

This Part II of the Wellhead Protection Plan includes:

- Inventory of Potential Contaminant Sources
- Plan of Action to Manage Potential Contaminant Sources
- Alternate Water Supply & Contingency Strategy

2.0 Inventory of Potential Contaminant Sources

The Minnesota Department of Health (MDH) Scoping Decision Notice is found in Appendix B. It lists the data elements to be considered in developing Part II of the WHPP. A discussion of potential contaminant sources is provided in this section. Data for the potential contaminant source inventory (PCSI) and an assessment of all data required for the PCSI is found in Appendix C.

The management strategies selected and documented in Section 5 of this plan focus on land use activities and environmental conditions that have the highest potential to impact the aquifer the City is using for its drinking water supply. In general, land use and environmental conditions indicate that in managing the DWSMA for Cloquet consideration must be given to

- A portion of the South DWSMA receives surface water and runoff from Otter Creek and Fond du Lac Creeks watersheds. Storm water runoff is a concern because of the potential to impact the water supply.
- Geology in the South DWSMA that consists of glacial sediments that rest on top of a hummocky bedrock surface. Spring Lake draws water from the surficial sand aquifer and Wells 1, 6 and 8 draw water from deeper, buried aquifers. The interconnection between the surficial and buried aquifers is not known. This geologic setting dictates that all potential contaminant sources be considered in management strategies.
- The North DWSMA geology is clay-rich till at the surface, with a buried lens of sand and gravel resting on bedrock. This geologic setting affords some protection to the aquifer, requiring that only potential contamination sources penetrating through the till will be considered in WHPP management strategies.
- A variety of land uses within the DWSMA, including residential, parks and schools, and commercial and mixed use
- Municipal water and sewer utilities serve most properties within the South DWSMA and a storm water collections system is present. The North DWSMA properties all have private wells and private on-site wastewater systems.

Information and data pertaining to land uses and activities and environmental conditions were compiled from various state agency databases. The Potential Contaminant Source Inventory was refined based on local knowledge of land uses, with the Wellhead Protection Team providing several reviews of the PCSI.

The MPCA defines the methodology for locating sites within their GIS files. There are a variety of methods that the MPCA employs to locate sites. Those used for sites within the search area for this report include: address matching house number, digitized map tool, digitized DOQ, digitized DRG, interpolation unknown, and GPS. The MPCA considers the reliability of all of the methods listed as good to very good with the exception of “interpolation unknown”.

The addresses affiliated with potential contaminant sites have been cross-referenced with Parcel Identification Numbers where feasible to verify the locations of the potential contaminant sources. Those whose location could not be verified to date are identifiable in Appendix C as those that have not been assigned a Parcel Identification Number. In some cases, there may be more than one activity listed for a particular parcel.

2.1 Physical Environment Data Elements

2.1.1 Precipitation

The precipitation data element relates to the highly vulnerable areas of the Drinking Water Supply Management Area (DWSMA) due to the direct hydraulic connection, especially in the South DWSMA, between surface water and the aquifer which supplies Cloquet's drinking water.

Precipitation data has been collected and used in the delineation of the WHP area. The precipitation data is included in Table 2. A portion of the DWSMA receives surface water and run off from Otter and Fond du Lac Creeks watersheds. Figure 1 shows the boundaries of the South and North DWSMAs. Direct storm water runoff into Otter and Fond du Lac Creeks is a concern since storm water sewers and drainage ditches outlets discharge into these creeks. The plan's management strategies emphasize the importance of protecting these surface waters from impacted runoff.

Precipitation data in inches from the University of Minnesota Climatology Working Group (accessed at http://climate.umn.edu/hidenannual/HIDENannual.asp) was reviewed to find the most local precipitation gauging station with monthly records for the period 2010-2014. There is a National Weather Service station at Cloquet, located at the Carlton County Airport, in Section 29, Township 49 North, Range 17 West and the precipitation data recorded at the station is shown in the table below.

Table 2

Cloquet NWS Precipitation Data

	2010	2011	2012	2013	2014
January	1.02	1.15	0.53	1.12	0.87
February	0.30	0.18	1.11	0.87	2.00
March	0.82	0.85	1.40	2.12	1.94
April	0.77	3.44	3.47	4.53	3.83
May	2.23	2.59	7.02	5.14	5.56
June	4.38	3.42	12.64	6.25	5.59
July	4.98	4.85	3.84	1.95	2.66
August	7.12	5.07	3.50	2.31	5.36
September	3.94	1.11	1.16	2.65	1.98
October	5.38	1.27	1.92	0.16	2.16
November	2.06	0.55	1.65	1.19	1.20
December	1.91	0.53	1.09	3.00	1.87
Total	34.91	25.01	39.33	31.29	35.02

The data shows an annual average precipitation at Cloquet to be about 33 inches. For the five year period shown, June, August and May have the highest average rainfalls.

2.1.2 Geology

Consideration of geologic data is required for developing management strategies for both the South and North DWSMAs. However, according to the Scoping Decision Notice 2, submission of geologic data is not required for this Part II report. In addition, the City of Cloquet is not aware of any existing borehole geophysical studies or existing subsurface geophysical studies.

In the South DWSMA, the subsurface consists of a surface layer of outwash sand common to a wide area surrounding Cloquet and deeper glacial sediments that include clay and buried sand and gravel. The buried sand and gravel deposits may have some connection to the surface sand, which means that the DWSMA needs to be protected from contaminants infiltrating with surface water. In addition, the South DWSMA has a surface water component of Otter Creek and Fond du Lac Creek.

The North DWSMA geology is clay-rich till at the surface, with a buried lens of sand and gravel resting on bedrock. This geologic setting affords some protection to the aquifer, requiring that only potential contamination sources penetrating through the till will be considered in WHPP management strategies.

2.1.3 Soils

Soil types, infiltration characteristics and areas of erosion causing sedimentation are considered as they related to the South DWSMA. Soil data was obtained from Soil Survey Staff, Natural Resources Conservation Service of the United States Department of Agriculture. Web Soil Survey, available online at http://websoilsurvey.nrcs.usda.gov/ and from the Carlton County GIS Web Mapping Application (See Appendix C-1).

Soils in the South DWSMA are classified as

- Cloquet fine sandy loam
- Emmert gravelly fine sandy loam
- Cloquet-Emmert complex
- Omega loamy sand
- Ahmeek loam
- Loxley muck

Soils deposits in the South DWSMA are generally well drained sandy and gravelly soils that do not limit contaminate migration and infiltration. Soils within the South DWSMA are predominantly classified as having a high infiltration rate and low runoff potential. With regard to erosion, the soils have low potential for erosion. The WHP Team is unaware of any eroding lands causing sedimentation problems.

Management strategies related to the control and prevention of contaminant releases onto the ground surface are considered important due to the nature of soils in the South DWSMA.

2.1.4 Water Resources

Water resources data (watersheds, public waters, wetlands, floodplains) is to be considered in the management of the South DWSMA only. The South DWSMA is located in the Lower St. Louis Watershed Unit HUC 04010201170. Water drains from Cloquet's South DWSMA to Fond du Lac Creek (a tributary of the St. Louis River) or to a tributary of Otter Creek, which then connects to the St. Louis River at Scanlon. The Lower St. Louis Watershed is largely undeveloped. Outside of the City of Cloquet and cities of Brookston, Carlton and Scanlon, the watershed is nearly 70 percent forest and 16 percent wetlands. (MPCA, *St. Louis River Watershed Assessment,* March 2014).

No mapped drainage ditches are located within the South DWSMA.

Generally, wetlands are located in the northwest and southeast parts of the South DWSMA.

2.2 Land Use Data Elements

Historic and future land use data, including potential contaminant source identification, is important in helping decision makers look at potential impacts to the drinking water supply management area and plan source water protection measures.

2.2.1 Land Use

The following land use maps were reviewed and are found in Appendix C-2:

- Parcel and political boundaries map
- Comprehensive land use map
- Existing zoning map
- 2006 land cover map and data

Both the North and South DWSMAs are within the City of Cloquet. The western half of the City of Cloquet lies within the Fond du Lac Reservation. The Reservation guides and controls tribal and allotment land. The development pattern in this area is predominantly rural open space with scattered rural residential uses. Part of the South DWSMA lies within the Fond du Lac Reservation, so coordination with the FDL will be beneficial to both parties.

Zoning in the North DWSMA is Farm Residential with a small area of Mixed Residential/Commercial along Highway 33. In the South DWSMA, zoning is predominantly Farm Residential and Suburban Residential. There is some Public/Institutional zoning, Sewered Single Family Residential, One and Two Family Residential (also Sewered) and General Commercial along the Highway 33 corridor.

2.2.2 Potential Contamination Sources

Potential contamination sources, such as underground storage tanks or hazardous waste generators were initially identified from state and federal databases, with the WHP Team providing local knowledge and review of the data. Potential contaminant sources are shown on Figures 2 and 3 of the report are listed in Appendix C-3.

Table 3 – Summary of Potential Contaminant Sources

Activity Type and Status	South DWSMA	North DWSMA
Leaking Underground Storage Tanks (LUST)	7	0
Underground Storage Tanks (UST)	10	0
Hazardous Waste Generators (HWG)	5	Not applicable
Wells[1] (WEL)	68	12
Individual Sewage Treatment Systems	25	Not applicable

[1] Wells data shown on Figure 2 and 2S includes municipal wells for City of Cloquet

Potential contamination sites identified include hazardous waste generators, leaking underground storage tank, and underground storage tank sites. No differentiation is made between inactive and active sites because inactive sites, due to the nature of site closure regulations, may still have the potential to act as a source of contamination.

2.2.3 Public Utility Services

2.2.3.1 Transportation Routes and Corridors

Management of the DWSMAs must reflect what is known about transportation routes and corridors. The City of Cloquet is served by a network of highways and streets consisting of principal and minor arterials, collectors and local streets. Within the South DWSMA, the major road corridor is Highway 33, which runs north-south and connects to Interstate 35.

While railroad corridors also pass through the City of Cloquet, there are no railroad corridors within the DWSMAs.

2.2.3.2 Public Water System, Sanitary Sewer, and Storm Sewers

The City of Cloquet owns and operates municipal water, sanitary sewer and storm water systems. The city operates and maintains these systems as a public service through associated use and access fees. Figure 4 shows Cloquet's public utilities along with pipelines.

The City of Cloquet municipal water system currently has four wells in operation along with Spring Lake Reservoir. One well is currently used on an emergency basis only. The water distribution system consists of a network of water mains. There is no water distribution system within the North DWSMA. The north and east portions of the South DWSMA are served by the municipal water system. The remainder of the DWSMA, which is lightly developed, is served by private wells.

Cloquet operates a municipal wastewater collection system. Wastewater is conveyed to the Western Lake Superior Sanitary District (WLSSD) treatment plant in Duluth where it is treated and discharged into Lake Superior. There is no wastewater collection system within the North DWSMA. The north and east portions of the South DWSMA are served by the municipal sanitary sewer system. The remainder of the DWSMA, which is lightly developed, is served by private subsurface sewage treatment systems (SSTSs).

City of Cloquet regulations (January of 2009) prohibit any major subdivisions with lots less than 5 acres in size unless City water or sewer service is available. And the regulations are currently being updated (summer 2015) to require City water and sewer for lots less than 5 acres.

As of February 2007, the City of Cloquet became obligated to supplement its existing storm water management activities and specifically addresses the permit requirements for Minnesota's Phase II Storm water Permit for Municipal Separate Storm Sewer Systems (MS4s). There is no storm water collection system within the North DWSMA. Similarly to water and sanitary sewer, storm sewer facilities in the South DWSMA are limited to the far north and east portions of the area.

There are no public drainage systems within either DWSMA.

2.2.3.3 Pipelines

According to the National Piping Mapping System, there is a gas transmission pipeline passing through the west end of the South DWSMA. Another hazardous liquid pipeline is located at the far southeast corner of the South DWSMA.

2.3 Water Quantity Data Elements

2.3.1 Surface Water Quantity

The City of Cloquet is not aware of any water-use conflicts related to surface waters (Otter Creek or Fond du Lac Creek) within either DWSMA.

2.3.2 Groundwater Quantity

Cloquet's water system has a capacity of 2.5 million gallons per day (MDG). Typically, the City's water usage is 1.1 to 1.2 MGD. The City has not observed any well interference problems or water use conflicts, and there are no other water appropriations permits within either DWSMA.

The City of Cloquet has agreed to provide up to 600,000 gallons per day to USG, a local manufacturer of ceiling tiles, as a back-up water source to the industry's primary use of surface water from the St. Louis River.

Under Minnesota law, the Department of Natural Resources may limit consumptive appropriations of surface water under certain low flow conditions: USG uses water from the St. Louis River for its production of ceiling tiles. If flow on the St. Louis River drops below 638 cubic feet per second (cfs) at station 04024000, then USG's water withdrawal may be subject to suspension by DNR. The City of Cloquet has agreed to provide water to USG, if needed, but has conditioned its supply of water to USG. The City of Cloquet's conditions are aimed to protect the City's water supply from over pumping of the aquifer. But it would be useful to the City of Cloquet to further investigate the impact on its water system of supplying up to 600,000 gallons of water per day to USG.

2.4 Water Quality Data Elements

2.4.1 Surface Water Quality

According to MPCA, Fond du Lac Creek (68LS039 on AUID 04010201-879) failed to meet the MPCA's fish and invertebrate threshold for cold water streams. MDNR surveys conducted in the late 1960s indicated that brook trout were captured at the MPCA's monitoring station downstream of County Road 114 (Jarvi Road) and one MDNR station 0.4 miles upstream of the Fond du Lac Creek confluence with the St. Louis River. However, MPCA has recently reported that much of the stream is influenced by beaver impoundments which tend to warm water temperatures, modify habitat, and alter the water chemistry in ways that make sustaining reproducing populations of cold water fish and invertebrates difficult. MPCA has recommended that additional monitoring should be conducted to determine if Fond du Lac Creek is suitable to sustain viable cold water communities.

Otter Creek is a designated trout stream. Water quality data for a station downstream of the South DWSMA is collected by MPCA and indicates that Otter Creek is considered impaired for aquatic life.

2.4.2 Groundwater Quality

The quality of the groundwater in the Cloquet DWSMAs is generally good. Results of routine chemical monitoring of the Cloquet wells conducted by the MDH over the period 1993 – 2000 showed indications of well vulnerability, but no violations of any parameters monitored under the Safe Drinking Water Act. Chloride and nitrate-nitrogen are commonly used indicators of human-caused impacts on water quality. The chloride concentration in water samples taken at the same time as the tritium samples show values elevated above background, with particularly high levels seen at Wells 6 and 8 (21.3 and 95.0 mg/l, respectively).No additional water chemistry and isotopic data from wells, springs or other groundwater sampling points was available for consideration.

Elevated chloride is commonly seen in groundwater that is influenced by road salt, although other sources are possible. In addition, nitrate-nitrogen has been present in low levels (0.36 – 2.4 mg/l) with the higher values coming from Wells Nos. 6 and 8. These values are well below the drinking water standard of 10.0 mg/l, but likely indicate human impacts on aquifer water quality. The pesticide 2,4-D has been detected in low levels at Wells 6 and 11, and the gasoline additive MTBE has been detected at a low level at Well 8.

A summary of water quality sampling from 2011 is shown in the table below.

Table 4 - Water Quality Results

Name	Chloride (mg/l)	Bromide (mg/l)	Nitrate (mg/l)	Tritium (TU)
Well 1 (229069)	18	0.0171	0.77	6.0
Well 6 (229067)	65	0.0282	1.9	7.4
Well 8 (400334)	253	0.068	1.2	6.8
Well 11(757533)	7.05	0.0281	<0.05	4.7
Spring Lake Reservoir (269223)	75.6	0.0136	1.5	6.9

The following groundwater quality data sources were reviewed but do not have information applicable for Cloquet: Nitrate Probability Mapping Study, ground water tracer studies, existing property audits identifying contamination, or existing report to MDA or MPCA of contaminant spills and releases.

3.0 Impact of Changes on Public Water Supply Wells

Considering and anticipating changes in the physical environment, land use, administrative capacity, and regulations is an important part of the wellhead protection process. The Wellhead Protection Team reviewed potential changes and how they might impact the City of Cloquet water supply.

3.1 Changes in Physical Environment

No significant changes in the physical environment are anticipated within the Wellhead Protection Area or Drinking Water Supply Management Area (DWSMA).

3.2 Changes in Land Use

Some changes in land use are anticipated in the next ten years.

South DWSMA

- Within the South DWSMA, there is potential for low-density residential growth, with a minimum five-acre lot required where municipal water and sewer service are not present.
- Commercial growth is anticipated to occur along Highway 35

North DWSMA

- Commercial development along Highway 33 is possible
- Low density and very-low density residential development may occur due to the lack of municipal utilities and a five-acre minimum lot size requirement

3.3 Changes in Surface Water

The following possible changes in surface water were identified:

- A possible change in the Big Otter Creek and Fond du Lac Creek watersheds is increasing runoff that could influence the South DWSMA.
- Changes to water use appropriations from the St. Louis River may occur, impacting users supplied by surface water.

3.4 Changes in Groundwater

The City of Cloquet is considering the addition of another municipal well, which may cause a change in the location of groundwater withdrawal.

3.5 Changes in Existing Water and Land Government Programs & Regulation

The City of Cloquet provides water to residents of Cloquet and to the City of Scanlon. No changes in water service are anticipated. No changes in the City's water and land use policies are anticipated.

A portion of the South DWSMA is located within the city limits and within the Fond du Lac Reservation. The county, city and Fond du Lac Reservation planning department work closely together to make sure that drinking water protection is done in a manner that will result in a workable community.

3.6 Administrative, Technical and Financial Considerations

Administration and implementation of the WHP Plan is the responsibility of the City of Cloquet. The City of Cloquet has developed a budget for the wellhead protection program as part of the City's water budget. Any capital or operating expenses needed for wellhead protection plan implementation will be taken from that portion of the budget.

Additionally, funds from other programs and cooperating agencies may be pursued to implement the plan. MDH currently administers a grant program for implementation of wellhead protection plans in the Minnesota. This grant program is funded through the Clean Water, Land, and Legacy Amendment to the State Constitution, and funding is expected to continue into the future.

4.0 Issues, Problems and Opportunities

Identifying issues, problems and opportunities as they relate to the aquifer, wells, water and DWSMA and through comments raised during the review process helps to determine goals and management activities to be employed in wellhead protection.

4.1 The Aquifer Serving the Public Water Supply Wells

The City of Cloquet wells draw water from a relatively shallow sand and gravel aquifer. The aquifer, within the South DWSMA, primarily has areas of very high and high vulnerability, indicating that the aquifer could be adversely impacted by surface activities, placement of additional high capacity wells or changes in groundwater appropriation to existing wells. The aquifer within the North DWSMA is believed to have a greater degree of protection from surface influence, due to the presence of a layer of clay above the aquifer.

Sites around the city's wells (Inner Wellhead Management Zones) should be protected and managed to prevent acute contamination of the City of Cloquet's aquifer.

4.2 Wells

Siting a New Well

The City is currently investigating locations for a new well or wells that would serve as a replacement for Well 8 due to elevated chloride and manganese levels and a detectable level of nitrate.

New High Capacity Wells

Construction of a new high capacity well within the immediate area of the City of Cloquet's wells is a concern, due to reliance on a shallow sand and gravel aquifer. The City will need to work with MDH and MDNR regarding possible new high capacity wells. At this time, the City of Cloquet is not aware of plans for high capacity wells to be installed by other parties.

Industrial Water Use

The City of Cloquet has agreed to provide up to 600,000 gallons of water per day to USG, in the event that USG is no longer able to utilize water from the St. Louis River. The impact of this additional groundwater withdrawal is an issue that should be explored in management strategies.

4.3 The Well Water

Water Quality

The primary issue with water quality is the presence of chloride, nitrate and tritium that indicate surface or anthropogenic influences on the groundwater. Continued management of the South DWSMA is warranted.

Surface Water Influence

There is potential for surface infiltration to occur within the South DWSMA, due to the geologic setting of aquifer and presence of surface water. In the South DWSMA, the subsurface consists of a surface layer of outwash sand common to a wide area surrounding Cloquet and deeper glacial sediments that include clay and buried sand and gravel. The buried sand and gravel deposits may have some connection to the surface sand, which means that the DWSMA needs to be protected from contaminants infiltrating with surface water. In addition, the South DWSMA has a surface water component of Otter Creek and Fond du Lac Creek.

4.4 The Drinking Water Supply Management Area

Potential Contaminant Source Inventory Findings

Potential contaminant sources identified in the PCSI could impact the drinking water supply and the City will attempt to reduce risks that these land uses may pose. Two major issues with potential contaminant sources are noted:

1. The City currently has no controls regarding private wells and wishes to determine what language may be added to existing ordinances or what new ordinance is needed.

2. There remains a possibility for the construction of new high capacity wells in and around the DWSMA that may have the capacity to influence the city's wells and DWSMA.

4.5 Problems and Opportunities Disclosed at Public Meetings and in Written Comment

A draft of the WHPP was submitted, per Minnesota Rule 4720.5350, to

- Local government units within the DWSMA
- The regional development commission
- Watershed districts and watershed management organizations within the DWSMA.

In addition, the WHPP was presented at a public meeting. However, no comments were disclosed.

5.0 Wellhead Protection Goals

A number of factors must be considered when WHP measures are selected and prioritized (part 4720.5250, subpart 3). These factors can include:

- Contamination of the public water supply wells by substances that exceed federal drinking water standards
- Quantifiable levels of contamination resulting from human activity
- The location of potential contaminant sources relative to the wells
- The number of each potential contaminant source identified and the nature of the potential contaminant associated with each source
- The capability of the geologic material to absorb a contaminant
- The effectiveness of existing controls
- The time required to get cooperation from other agencies and cooperators
- Administrative, legal, technical, and financial resources needed.

The City of Cloquet has established the following goals:

1. **Support ongoing data collection efforts to enhance future WHP activities.**

   Additional data collection will improve the understanding of the surface-groundwater interaction between the City of Cloquet wells and area surface water features, help to gain an understanding of the source of potential contaminants, assist with planning for replacement of municipal wells in a less susceptible hydrogeological setting, and aid in identifying new high capacity wells in the Cloquet area and their potential impact on the DWSMA. Overall, these data collection measures will help improve the general understanding of existing impacts to the public wells by land use activities and serve to better plan for the long-term protection of the city's drinking water supply.

2. **Increase awareness among public officials, land owners and the general public about the importance of WHP in protecting the City of Cloquet drinking water supply.**

   Promoting the importance of wellhead protection will improve the effectiveness of the City of Cloquet's efforts by encouraging all citizens to participate and be aware of how their actions can impact their drinking water supply.

3. **Protect the aquifer from which the city draws its drinking water**

   Establishing a goal of protecting the aquifer substantiates management of potential contaminant sources within the DWSMAs.

4. **Promote public health, economic development, and community infrastructure by ensuring a potable drinking water supply at reasonable costs for all residents of the community.**

   The objectives of this goal are to complete regular evaluations of the WHPP and plan for disruptions to the drinking water system.

6.0 Objectives and Plan of Action

6.1 Data Collection

Goal: Support ongoing data collection efforts to enhance future WHP activities.

Objective 1: Locate any missing or unknown wells and manage proposed high capacity well construction or appropriations permits modifications as the city's authority allows.

WHP Measure 1A: The City conducted a survey of existing wells during initial development of necessary data for this WHP Plan. Some wells may have been unidentified due to lack of well logs and/or other information. The City will attempt to locate other wells within the DWSMA that could possibly threaten the City's water supply.

Source of Action: City of Cloquet

Cooperator(s): Landowners

Time Frame: 2017, 2022

Estimated Cost: Staff time

WHP Measure 1B: City staff and members of the WHP Team will request that the County formally identify the City's WHPA/DWSMA in GIS mapping so that current and future land owners will be aware of issues.

Source of Action: City of Cloquet

Cooperators: Carlton County

Time Frame: 2016

Estimated Cost: Staff time to share shapefiles with Carlton County

WHP Measure 1C: The City of Cloquet will request a meeting to review current St. Louis River stream levels and ask DNR and USG to forecast the likelihood of curtailment of USG's surface water supply.

Source of Action: City of Cloquet

Cooperators: USG, DNR

Time Frame: 2016

Estimated Cost: Staff time

WHP Measure 1D: The City of Cloquet will assist MDH with the collection of samples for state-required suite of groundwater sampling parameters.

Source of Action: MDH

Cooperators: City of Cloquet

Time Frame: 2023

Estimated Cost: Staff time (Sample analysis by MDH)

6.2 Aquifer Protection

Goal: Protect the aquifer from which the city draws its drinking water

Objective 2: Address the need for an additional well or well field.

WHP Measure 2A: Provide for the long term protection of Cloquet's public water supply by conducting a well siting study as the first step in adding a new well source to the City of Cloquet system. MDH hydrologists may be available to assist with identification of potential well sites.

Source of Action: City of Cloquet

Cooperators: City staff, engineering firm, MDH staff

Time Frame: 2018

Estimated Cost: $15,000

WHP Measure 2B: If a new well site is identified, provide for the long term protection of Cloquet's public water supply by obtaining access to the site (through agreement with property owner, option to purchase, purchase of site or other means), constructing a test well and completing test pumping and water quality testing.

Source of Action: City of Cloquet

Cooperators: City staff, engineering firm, MDH staff

Time Frame: 2020

Estimated Cost: $20,000 - $150,000

Objective 3: Seal unused or abandoned wells.

WHP Measure 3A: The City will communicate the need to seal unused or abandoned wells within and near the DWSMAs to property owners.

Source of Action: Cloquet WHP Team.

Cooperator(s): Landowners

Time Frame: 2018

Estimated Cost: Staff time

WHP Measure 3B: If unused or abandoned wells are identified within the DWSMA, the City will inventory them and seek outside funding to assist the landowner with sealing.

Source of Action: Landowners.

Cooperator(s): City staff

Time Frame: 2016 - 2025

Estimated Cost: Staff time

Objective 4: Manage the Inner Wellhead Management Zone to prevent contamination of the aquifer near the public supply wells.

WHP Measure 4: Measure: Review and update the IWMZ survey form for all wells in the system every 6 years.

Source of Action: Cloquet WHP Team.

Cooperator(s): Landowners, MDH

Time Frame: 2022

Estimated Cost: Staff time

Objective 5: Properly inventory and manage potential contaminant sources to protect the drinking water supply.

Note that this objective is also addressed by WHP Measures 1A, 3 and 6A.

WHP Measure 5A: Conduct a review of activity as reported in the MPCA What's in my Neighborhood database for the sites shown on Figure 3 appearing in the South DWSMA. This will require a search of 11 current sites within the South DWSMA. A review of the MPCA mapping application will also be conducted to identify new sites. The WHP Team will also look for and document new contaminant sources identified in the Scoping 2 Notice as they become known.

Source of Action: Cloquet WHP Team.

Cooperator(s): Landowners, MDH, MPCA, MDNR

Time Frame: 2020

Estimated Cost: Staff time

WHP Measure 5B: The City of Cloquet currently participates in a regional stormwater management consortium. The City will continue to participate in this consortium and with a major highway in the DWSMA, chlorides resulting from surface water runoff impacting groundwater quality are a concern. As part of participation in the regional storm water management consortium, the City of Cloquet will renew training for staff members who have received road salt application training.

Source of Action: Cloquet WHP Team.

Cooperator(s): MPCA

Time Frame: 2020

Estimated Cost: Staff time

6.3 Public Awareness

Goal: Increase awareness among public officials, land owners and the general public about the importance of WHP in protecting the City of Cloquet drinking water supply.

Objective 6: Continue to improve public awareness of the importance of WHP.

WHP Measure 6A: The City of Cloquet will add a requirement that new construction of dwellings or other buildings served by private wells submit a copy of the well construction report to the City as part of the building permit process.

Source of Action: City of Cloquet

Cooperators: City staff, landowners.

Time Frame: 2017

Estimated Cost: Staff time

WHP Measure 6B: Create new content on City of Cloquet website that provides information and links to outside sources (for example, MDH, Minnesota Rural Water) on wellhead protection and resources for managing potential contaminant sources such as leaking underground storage tanks or hazardous waste generators. The website may also include links to information about storm water runoff and how it impacts groundwater quality.

Source of Action: City of Cloquet

Cooperators: City staff, MDH, MRWA

Time Frame: 2016

Estimated Cost: City staff time, estimated at $1,500.

WHP Measure 6C: Update website content pertaining to wellhead protection every 3 years.

Source of Action: City of Cloquet

Cooperators: City staff, MDH, MRWA

Time Frame: 2019, 2022, 2025

Estimated Cost: City staff time, estimated at $4,500.

WHP Measure 6D: Provide notice to property owners within the DWSMA that promotes WHP efforts and provides web address for City's WHPP page. The notice will be directed to both City residents and non-residents with property in the DWSMA.

Source of Action: City of Cloquet

Cooperators: City staff, MDH, MRWA

Time Frame: 2017, 2020, 2023

Estimated Cost: City staff time, expenses estimated at $2,500

WHP Measure 6E: Obtain information that can be distributed to private well owners and septic system owners explaining standards for managing private wells and waste systems, such as inspections and testing requirements.

Source of Action: City of Cloquet

Cooperators: Minnesota Department of Health, County Water Plan, SWCD, Fond du Lac Reservation

Time Frame: 2021

Estimated Cost: $200

WHP Measure 6F: Provide information to property owners with identified potential contamination sources other than wells as listed in PCSI, which may include hazardous waste generators, underground storage tank owners or remediation sites. The information will provide a reminder of the importance of wellhead protection.

Source of Action: City of Cloquet

Cooperators: City staff, MDH, MRWA

Time Frame: 2021

Estimated Cost: City staff time, website update, copying and mailing expenses estimated at $2,500

6.4 Drinking Water Reliability

Goal: Promote public health, economic development, and community infrastructure by ensuring a potable drinking water supply at reasonable costs for all residents of the community.

Objective 7: Effectively track and report the implementation efforts and WHPP progress to applicable governing authorities.

This objective is addressed in Section 7.0

Objective 8: Prepare the City of Cloquet for disruptions to the water distribution system.

This objective is addressed in Section 8.0.

6.5 The Drinking Water Supply Management Area

Goal: Potential contaminant sources identified in the PCSI could impact the drinking water supply and the City will attempt to reduce risks that these land uses may pose.

Objective 9: Address private well issues as identified in the DWSMAs.

WHP Measure 9A: The City of Cloquet currently has no controls regarding private wells and wishes to determine what language may be added to existing ordinances or what new ordinance is needed. Discussion of amending or modifying current ordinances to address this issue with the City Council is planned..

Source of Action: City of Cloquet

Cooperators: City staff,

Time Frame: 2021

Estimated Cost: City staff time

WHP Measure 9B: The Wellhead Protection Team and City staff will cooperate with MDH and DNR to identify potential high capacity well development within 1 mile of the existing DWSMAs, due to a possibility for the construction of new high capacity wells to influence the city's wells and DWSMA.

Source of Action: City of Cloquet

Cooperators: City staff,

Time Frame: 2023

7.0 Evaluation

The success of the Cloquet Wellhead Protection program must be routinely evaluated in order to determine whether the plan is actually accomplishing the intentions of the City. Wellhead protection plan evaluation must be completed a minimum of every 2.5 years as described in *Minnesota Rules* Chapter 4720.5270, subpart 4.

Some of the goals of evaluations are to:

- Track the implementation of the management strategies identified in Section 5.0 of this plan
- Evaluate the effectiveness of specific management strategies regarding the protection of the public water supply
- Identify possible changes to these strategies which may improve their effectiveness
- Determine the adequacy of financial resources and staff availability to carry out the management strategies planned for the coming year

In order to meet these evaluation goals, the following activities will be implemented:

- 1. Require the Wellhead Protection Team to meet on an as-needed basis, with a minimum of one meeting per year, to review the results of each strategy implemented during the previous plan year. The Wellhead Protection Team will document observations of management measures for reference during the next plan amendment.

- 2. The Wellhead Protection Manager will make an annual written report to the Wellhead Protection Team regarding progress in implementing the wellhead protection management objectives of this plan. The annual reports will be compiled and used to review the overall progress in implementing management strategies when the Wellhead Protection Plan is updated in 10 years. Copies of the annual report will be sent to the MDH Source Water Protection Unit in St. Paul (to satisfy minimum 2.5 year evaluation), will be placed in the City's wellhead and source

water protection file and provided to the City Council. A template for the evaluation report is provided in Appendix D.

8.0 Alternative Water Supply and Contingency Strategy

The City of Cloquet has a *Water Supply Plan* that was submitted and approved by the MN DNR. This approved plan contains the required elements of the Minnesota Wellhead Protection Rule and is accepted as an equivalent to an Alternative Water Supply/Contingency Plan as defined in MN Rules 4720.5280. Implementation of the plan has begun with the aid and assistance of local emergency management agencies. A copy of the plan is available from the City of Cloquet. The MN DNR approval letter is provided in Appendix E.

Appendix A

Amendment to the Wellhead Protection Plan Part I

Appendix B

Scoping No. 2 Decision Notice

Appendix C

Data Elements and Assessment

Data Elements and Assessment

This section identifies the required data elements as listed in the Minnesota Department of Health (MDH) Scoping Decision Notice dated October 11, 2013 (Appendix B) and provides an assessment of present and future implications of data elements.

Physical Environment Data Elements

Precipitation

The precipitation data element relates to the highly vulnerable areas of the Drinking Water Supply Management Area (DWSMA) due to the direct hydraulic connection, especially in the South DWSMA, between surface water and the aquifer which supplies Cloquet's drinking water.

Precipitation data in inches from the University of Minnesota Climatology Working Group (accessed at http://climate.umn.edu/hidenannual/HIDENannual.asp) was reviewed to find the most local precipitation gauging station with monthly records for the period 2010-2014. The two closest gauging stations are listed below

Agency	Township	Range	Section
National Weather Service	49N	17W	29
Department of Natural Resources	49N	17W	26

Precipitation data for the past five years at the NWS gaging station located at the Carlton County Airport is shown in the table below.

Cloquet NWS Precipitation Data

	2010	2011	2012	2013	2014
January	1.02	1.15	0.53	1.12	0.87
February	0.30	0.18	1.11	0.87	2.00
March	0.82	0.85	1.40	2.12	1.94
April	0.77	3.44	3.47	4.53	3.83
May	2.23	2.59	7.02	5.14	5.56
June	4.38	3.42	12.64	6.25	5.59
July	4.98	4.85	3.84	1.95	2.66
August	7.12	5.07	3.50	2.31	5.36
September	3.94	1.11	1.16	2.65	1.98
October	5.38	1.27	1.92	0.16	2.16
November	2.06	0.55	1.65	1.19	1.20
December	1.91	0.53	1.09	3.00	1.87
Total	34.91	25.01	39.33	31.29	35.02

The data shows an annual average precipitation at Cloquet to be about 33 inches. For the five year period shown, June, August and May have the highest average rainfalls. Precipitation data, as applied to DWSMA management, indicates that most precipitation occurs during summer months, which is when there is the most potential for surface water run off to occur and for contaminants to be carried overland towards the wells' recharge areas.

A portion of the South DWSMA receives surface water and run off from Otter and Fond du Lac Creeks watersheds. Direct storm water runoff, resulting from precipitation, to Otter and Fond du Lac Creeks is a concern since storm water sewers and drainage ditches outlets discharge into these creeks. The plan's management strategies emphasize the importance of protecting these surface waters from impacted runoff.

Geology

Consideration of geologic data is required for developing management strategies for both the South and North DWSMAs. However, according to the Scoping Decision Notice 2, submission of geologic data is not required for this Part II report. In addition, the City of Cloquet is not aware of any existing borehole geophysical studies or existing surface geophysical studies.

In the South DWSMA, the subsurface consists of a surface layer of outwash sand common to a wide area surrounding Cloquet and deeper glacial sediments that include clay and buried sand and gravel. The buried sand and gravel deposits may have some connection to the surface sand, which means that the DWSMA needs to be protected from contaminants infiltrating with surface water. In addition, the South DWSMA has a surface water component of Otter Creek and Fond du Lac Creek.

The North DWSMA geology is clay-rich till at the surface, with a buried lens of sand and gravel resting on bedrock. This geologic setting affords some protection to the aquifer, requiring that only potential contamination sources penetrating through the till will be considered in WHPP management strategies.

Soils

Soil types, infiltration characteristics and areas of erosion causing sedimentation are considered as they relate to the South DWSMA. Soil data was obtained from Soil Survey Staff, Natural Resources Conservation Service of the United States Department of Agriculture. Web Soil Survey, available online at http://websoilsurvey.nrcs.usda.gov/ and from the Carlton County GIS Web Mapping Application (See Appendix C-1).

Soils in the South DWSMA are classified as

- Cloquet fine sandy loam
- Emmert gravelly fine sandy loam
- Cloquet-Emmert complex
- Omega loamy sand
- Ahmeek loam
- Loxley muck

Soils deposits in the South DWSMA are generally well drained sandy and gravely soils that do not limit contaminate migration and infiltration. Soils within the South DWSMA are predominantly classified as

having a high infiltration rate and low runoff potential. With regard to erosion, the soils have low potential for erosion. The WHP Team is unaware of any eroding lands causing sedimentation problems.

Management strategies related to the control and prevention of contaminant releases onto the ground surface are considered important due to the nature of soils in the South DWSMA which allow drainage of water (and contaminants) from the surface into the groundwater.

Water Resources

Water resources data (watersheds, public waters, wetlands, floodplains) is to be considered in the management of highly vulnerable parts of the DWSMA. In this case, for the South DWSMA only.

Watersheds: The South DWSMA is located in the Lower St. Louis Watershed Unit HUC 04010201170. Water drains from Cloquet's South DWSMA to Fond du Lac Creek (a tributary of the St. Louis River) or to a tributary of Otter Creek, which then connects to the St. Louis River at Scanlon. The Lower St. Louis Watershed is largely undeveloped. Outside of the City of Cloquet and cities of Brookston, Carlton and Scanlon, the watershed is nearly 70 percent forest and 16 percent wetlands. (MPCA, *St. Louis River Watershed Assessment,* March 2014).

Public Waters: The only public water within the South DWSMA is the tributary to Otter Creek. However, there are also several mapped wetlands on the Public Waters Inventory. No shoreland zoning classification is indicated by Carlton County for this stream.

Wetlands & Floodplains: Wetlands within the highly vulnerable area of the South DWSMA are identified on the Public Waters Inventory as Second Lake and Third Lake (located south of County Highway 7) and First Lake, located north of the highway. There are no floodplain areas within the South DWSMA.

In management of the DWSMA, water resources are an important consideration because of the possible connection between surface water and the aquifer. All water resources described above are within the high vulnerability area of the South DWSMA.

Land Use Data Elements

Historic and future land use data, including potential contaminant source identification, is important in helping decision makers look at potential impacts to the drinking water supply management area and plan source water protection measures.

Land Use

The following land use maps were reviewed and are found in Appendix C-2:

- Existing zoning map (Figure A)
- Parcel and political boundaries map (Figure B)
- Comprehensive land use map (Figure C)
- 2006 land cover map and data

Both the North and South DWSMAs are within the City of Cloquet. The western half of the City of Cloquet lies within the Fond du Lac Reservation. The Reservation guides and controls tribal and allotment land. The development pattern in this area is predominantly rural open space with scattered rural residential uses. Part of the South DWSMA lies within the Fond du Lac Reservation, so coordination with the FDL will be beneficial to both parties.

Zoning in the North DWSMA is Farm Residential with a small area of Mixed Residential/Commercial along Highway 33. In the South DWSMA, zoning is predominantly Farm Residential and Suburban Residential. There is some Public/Institutional zoning, Sewered Single Family Residential, One and Two Family Residential (also Sewered) and General Commercial along the Highway 33 corridor.

Potential contaminant sources as identified from state and federal databases and shown in Figures 2 and 3 of the report are listed in Appendix C-3. The WHP Team provided local knowledge and review of the data, including assistance with locating potential contaminant sources not found in the databases. Potential contamination sites identified include hazardous waste generators, leaking underground storage tank, and underground storage tank sites. No differentiation is made between inactive and active sites because inactive sites, due to the nature of site closure regulations, may still have the potential to act as a source of contamination.

The table below shows specific potential contaminant sources, inventory requirement based on DWSM vulnerability and whether at least one is present in the DWSMA where it is required to be inventoried.

Potential Contaminant Source	Material Code	Moderate Vulnerability	High Vulnerability	Present in DWSMA?[3]
Above-Ground Storage Tank	AST	X	X	yes
Chemicals	C000	X	X	
Fertilizers	A050	X	X	
Fuels, gases, and oils	F000	X	X	
Hazardous substances	C001	X	X	
Solvents and coatings	S000	X	X	
Waste	W000	X	X	
Agricultural Drainage Well (potential Class V)	ADW	X	X	no
Animal Burial Site	ABS		X	no
Animal Feedlot	AFL		X	no
Ash Disposal Site	ASHD		X	no
Disposal Well (potential Class V)	DISWLL	X	X	no
Grave(s)	GRV		X	yes
Hazardous Waste Generator	HWG		X	yes
Hazardous Waste Handler	HWH		X	no
Individual Sewage Treatment System	ISTS		X	yes
Industrial Drainage Well (potential Class V)	INDW	X	X	no
Large Capacity Cesspool (potential Class V)	CVLCC	X	X	no
Large Capacity Waste Water Disposal Site (potential Class V)	CVWWD	X	X	no

Leaking Underground Storage Tank	LUST	X	X	yes
Misc. Injection Well (potential Class V)	INJWLL	X	X	no
Motor Vehicle Waste Disposal Well (potential Class V)	CVMVW	X	X	no
Nuclear Reactor	NR		X	no
Pipeline Facility	PLFAC	X	X	yes
Pit (aggregate)	PIT		X	no
Potential Contamination Site[1]	PCS	X	X	no
Recharge Well (potential Class V)	RWLL	X	X	no
Reinjection Well (potential Class V)	RIWLL	X	X	no
Sludge Disposal Site	SLDG		X	no
Solid Waste Management Site	SWMS	X	X	no
Special Drainage Well (potential Class V)	SPDW	X	X	no
Spills	SPL	X	X	no
Storage or Preparation Area	STOR		X	no
Agricultural chemicals	C010		X	
Chemicals (include RMP facilities here)	C000	X	X	
Fertilizers	A050	X	X	
Fuels, gases, and oils	F000	X	X	
Hazardous substances (include TRIS facilities here)	C001	X	X	
Road salt	C020		X	
Solvents and coatings	S000	X	X	
Pressure-treated wood	C220		X	
Waste (used unless one of the materials below apply)	W000	X	X	
Solid waste	W100		X	
Animal manure	W520		X	
Waste oils	W700		X	
Motor vehicle waste	W710		X	
Tires	W120		X	
Stormwater Basin	SWB		X	no
Stormwater Injection Well (potential Class V)	SWI	X	X	no
Stormwater Outlet	SROUT		X	no
Suspected Contaminant of Concern	SCC	X	X	no
Chemical	C000	X	X	
Food, agricultural, and consumer products	A000	X	X	
Fuels, gases, and oils	F000	X	X	
Materials and minerals	M000	X	X	
Pathogens	P000	X	X	

Solvents and coatings	S000	X	X	
Waste	W000	X	X	
Underground Storage Tank	UST	X	X	yes
Chemicals	C000	X	X	
Fertilizers	A050	X	X	
Fuels, gases, and oils	F000	X	X	
Hazardous substances	C001	X	X	
Solvents and coatings	S000	X	X	
Waste	W000	X	X	
Waste - Metro Area	IWS	N/A	N/A	
Wastewater Disposal Site[2]	WWDS		X	no
Wastewater Stabilization Pond	WSP		X	no
Wastewater Treatment Pond	WWTD		X	no
Wells	WEL	X	X	yes
Notes				
1 - PCS include Brownfields, Delisted State Superfund, Federal Superfund, Hazardous Waste Investigative/cleanup, No further remedial action required, State Superfund, Suspected Hazardous Waste Site, Voluntary Investigative Cleanup, State Assessment Site				
2 - WWDS include National Pollutant Elimination System, State Disposal System Permit				
3 - This column in intended to assist in PCSI interpretation. "Yes" indicates that one or more of this type of PCS is present within either DWSMA				
3 - This column in intended to assist in PCSI interpretation. "Yes" indicates that one or more of this type of PCS is present within either DWSMA				

In addition, an inventory of the Inner Wellhead Management Zone (IWMZ) for each well is found in Appendix C-3. There are no non-conforming or non-complying potential contaminant sources within the IWMZ areas. All sources met setback distances identified in the MN Well Code. In management of the DWSMA, potential contaminant sources must be considered so that appropriate monitoring of water quality can be performed and so that land uses are managed prudently to protect groundwater.

Public Utility Services

Transportation Routes and Corridors: Management of the DWSMAs must reflect what is known about transportation routes and corridors. The City of Cloquet is served by a network of highways and streets consisting of principal and minor arterials, collectors and local streets. Within the South DWSMA, the major road corridor is Highway 33, which runs north-south and connects to Interstate 35.

While railroad corridors also pass through the City of Cloquet, there are no railroad corridors within the DWSMAs.

Public Water System, Sanitary Sewer and Storm Sewers: The City of Cloquet owns and operates municipal water, sanitary sewer and storm water systems. The city operates and maintains these systems

as a public service through associated use and access fees. Figure 4 shows Cloquet's public utilities along with pipelines.

The City of Cloquet municipal water system currently has four wells in operation along with Spring Lake Reservoir. One well is currently used on an emergency basis only. The water distribution system consists of a network of water mains. There is no water distribution system within the North DWSMA. The north and east portions of the South DWSMA are served by the municipal water system. The remainder of the DWSMA, which is lightly developed, is served by private wells.

Cloquet operates a municipal wastewater collection system. Wastewater is conveyed to the Western Lake Superior Sanitary District (WLSSD) treatment plant in Duluth where it is treated and discharged into Lake Superior. There is no wastewater collection system within the North DWSMA. The north and east portions of the South DWSMA are served by the municipal sanitary sewer system. The remainder of the DWSMA, which is lightly developed, is served by private subsurface sewage treatment systems (SSTSs).

City of Cloquet regulations (January of 2009) prohibit any major subdivisions with lots less than 5 acres in size unless City water or sewer service is available. And the regulations are currently being updated (summer 2015) to require City water and sewer for lots less than 5 acres.

As of February 2007, the City of Cloquet became obligated to supplement its existing storm water management activities and specifically addresses the permit requirements for Minnesota's Phase II Storm water Permit for Municipal Separate Storm Sewer Systems (MS4s). There is no storm water collection system within the North DWSMA. Similarly to water and sanitary sewer, storm sewer facilities in the South DWSMA are limited to the far north and east portions of the area.

Oil and Gas Pipelines: According to the National Piping Mapping System, there is a gas transmission pipeline passing through the west end of the South DWSMA. Another hazardous liquid pipeline is located at the far southeast corner of the South DWSMA.

Public Drainage Systems: There are no public drainage systems within either DWSMA; therefore, no map is provided.

Water Quantity Data Elements

Surface Water Quantity

This data element applies to the South DWSMA only. The only surface water stream located with the South DWSMA is an unnamed tributary to Otter Creek. No flow data is available for this tributary. The only surface water bodies within the South DWSMA are labeled as First, Second and Third Lake, but are classified as wetlands by Carlton County zoning records.

Within the South DWSMA, there are no:

- Lakes where the state has established ordinary high watery marks
- Permitted withdrawals from lakes or streams
- State protected lake levels or flows

The City of Cloquet is not aware of any water-use conflicts related to surface waters within the South DWSMA, including those caused by groundwater pumping.

Groundwater Quantity

Cloquet's water system has a capacity of 2.5 million gallons per day (MDG). Typically, the City's water usage is 1.1 to 1.2 MGD. The City has not observed any well interference problems or water use conflicts, and there are no other water appropriations permits within either DWSMA.

The City of Cloquet has agreed to provide up to 600,000 gallons per day to USG, a local manufacturer of ceiling tiles, as a back-up water source to the industry's primary use of surface water from the St. Louis River.

Under Minnesota law, the Department of Natural Resources may limit consumptive appropriations of surface water under certain low flow conditions: USG uses water from the St. Louis River for its production of ceiling tiles. If flow on the St. Louis River drops below 638 cubic feet per second (cfs) at station 04024000, then USG's water withdrawal may be subject to suspension by DNR. The City of Cloquet has agreed to provide water to USG, if needed, but has conditioned its supply of water to USG. The City of Cloquet's conditions are aimed to protect the City's water supply from over pumping of the aquifer. But it would be useful to the City of Cloquet to further investigate the impact on its water system of supplying up to 600,000 gallons of water per day to USG.

The issue of water quantity does not have a significant role in DWSMA management at this time.

Water Quality Data Elements

Surface Water Quality

According to MPCA, Fond du Lac Creek (68LS039 on AUID 04010201-879) failed to meet the MPCA's fish and invertebrate threshold for cold water streams. MDNR surveys conducted in the late 1960s indicated that brook trout were captured at the MPCA's monitoring station downstream of County Road 114 (Jarvi Road) and one MDNR station 0.4 miles upstream of the Fond du Lac Creek confluence with the St. Louis River. However, MPCA has recently reported that much of the stream is influenced by beaver impoundments which tend to warm water temperatures, modify habitat, and alter the water chemistry in ways that make sustaining reproducing populations of cold water fish and invertebrates difficult. MPCA has recommended that additional monitoring should be conducted to determine if Fond du Lac Creek is suitable to sustain viable cold water communities.

Otter Creek is a designated trout stream. Water quality data for a station downstream of the South DWSMA is collected by MPCA and indicates that Otter Creek is considered impaired for aquatic life.

Groundwater Quality

The quality of the groundwater in the Cloquet DWSMAs is generally good. Results of routine chemical monitoring of the Cloquet wells conducted by the MDH over the period 1993 – 2000 showed indications of well vulnerability, but no violations of any parameters monitored under the Safe Drinking Water Act. Chloride and nitrate-nitrogen are commonly used indicators of human-caused impacts on water quality. The chloride concentration in water samples taken at the same time as the tritium samples show values elevated above background, with particularly high levels seen at Wells 6 and 8 (21.3 and 95.0 mg/l, respectively).

Elevated chloride is commonly seen in groundwater that is influenced by road salt, although other sources are possible. In addition, nitrate-nitrogen has been present in low levels (0.36 – 2.4 mg/l) with the higher values coming from Wells Nos. 6 and 8. These values are well below the drinking water standard of 10.0 mg/l, but likely indicate human impacts on aquifer water quality. The pesticide 2,4-D has been detected in low levels at Wells 6 and 11, and the gasoline additive MTBE has been detected at a low level at Well 8.

A summary of water quality sampling from 2011 is shown in Table 4 in the main body of the report.

C-1 Soils Map

C-2 Land Use Maps and Data

SOUTH DWSMA LAND COVER							
DWS_ID	LCOV_C	LAND_COVER	ORIG_SQM	ADJ_SQM	ACRES	PERCENT	YEAR
666	11	Open Water	203400.000	203067.751	50.18	2.35	2006
666	21	Developed, Open Space	1495800.000	1493356.649	369.02	17.30	2006
666	22	Developed, Low Intensity	1053900.000	1052178.481	260.00	12.19	2006
666	23	Developed, Medium Intensity	428400.000	427700.220	105.69	4.95	2006
666	24	Developed, High Intensity	326700.000	326166.344	80.60	3.78	2006
666	41	Deciduous Forest	923400.000	921891.650	227.80	10.68	2006
666	42	Evergreen Forest	1069200.000	1067453.489	263.77	12.37	2006
666	43	Mixed Forest	680400.000	679288.584	167.86	7.87	2006
666	52	Shrub/Scrub	189900.000	189589.803	46.85	2.20	2006
666	71	Grassland/Herbaceous	49500.000	49419.143	12.21	0.57	2006
666	81	Pasture/Hay	259200.000	258776.603	63.95	3.00	2006
666	82	Cultivated Crops	2700.000	2695.590	0.67	0.03	2006
666	90	Woody Wetlands	1719000.000	1716192.057	424.08	19.88	2006
666	95	Emergent Herbaceous Wetlands	244800.000	244400.125	60.39	2.83	2006
666	99	Total	8646300.000	8632176.489	2133.06	100.00	2006

NORTH DWSMA LAND COVER

DWS_ID	LCOV_C	LAND_COVER	ORIG_SQM	ADJ_SQM	ACRES	PERCENT	YEAR
667	11	Open Water	75600.000	75448.917	18.64	2.36	2006
667	21	Developed, Open Space	170100.000	169760.062	41.95	5.32	2006
667	22	Developed, Low Intensity	31500.000	31437.049	7.77	0.98	2006
667	23	Developed, Medium Intensity	8100.000	8083.812	2.00	0.25	2006
667	41	Deciduous Forest	323100.000	322454.299	79.68	10.10	2006
667	42	Evergreen Forest	154800.000	154490.639	38.18	4.84	2006
667	43	Mixed Forest	31500.000	31437.049	7.77	0.98	2006
667	52	Shrub/Scrub	135900.000	135628.410	33.51	4.25	2006
667	71	Grassland/Herbaceous	32400.000	32335.250	7.99	1.01	2006
667	81	Pasture/Hay	738900.000	737423.340	182.22	23.09	2006
667	90	Woody Wetlands	947700.000	945806.062	233.71	29.62	2006
667	95	Emergent Herbaceous Wetlands	549900.000	548801.049	135.61	17.19	2006
667	99	Total	3199500.000	3193105.937	789.03	100.00	2006

C -3 Potential Contaminant Source Inventory

Appendix D

Evaluation Form

Appendix E

DNR