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Wellhead Protection Plan Amendment

Part I

Wellhead Protection Area Delineation
Drinking Water Supply Management Area Delineation
Well and Drinking Water Supply Management Area Vulnerability Assessments

For

City of Barnesville

April 2014

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City of Barnesville WHPP Part II - Appendix I

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Glossary of Terms

Data Element. A specific type of information required by the Minnesota Department of Health to prepare a wellhead protection plan.

Drinking Water Supply Management Area (DWSMA). The area delineated using identifiable land marks that reflects the scientifically calculated wellhead protection area boundaries as closely as possible (Minnesota Rules, part 4720.5100, subpart 13).

Drinking Water Supply Management Area Vulnerability. An assessment of the likelihood that the aquifer within the DWSMA is subject to impact from land and water uses within the wellhead protection area. It is based upon criteria that are specified under Minnesota Rules, part 4720.5210, subpart 3.

Emergency Response Area (ERA). The part of the wellhead protection area that is defined by a one-year time of travel within the aquifer that is used by the public water supply well (Minnesota Rules, part 4720.5250, subpart 3). It is used to set priorities for managing potential contamination sources within the DWSMA.

Inner Wellhead Management Zone (IWMZ). The land that is within 200 feet of a public water supply well (Minnesota Rules, part 4720.5100, subpart 19). The public water supplier must manage the IWMZ to help protect it from sources of pathogen or chemical contamination that may cause an acute health effect.

Wellhead Protection (WHP). A method of preventing well contamination by effectively managing potential contamination sources in all or a portion of the well's recharge area.

Wellhead Protection Area (WHPA). 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 (Minnesota Statutes, section 103I.005, subdivision 24).

Well Vulnerability. An assessment of the likelihood that a well is at risk to human-caused contamination, either due to its construction or indicated by criteria that are specified under Minnesota Rules, part 4720.5550, subpart 2.

Acronyms

CWI - County Well Index

DNR - Minnesota Department of Natural Resources

EPA - United States Environmental Protection Agency

FSA - Farm Security Administration

MDA - Minnesota Department of Agriculture

MDH - Minnesota Department of Health

MGS - Minnesota Geological Survey

MnDOT - Minnesota Department of Transportation

MnGEO - Minnesota Geospatial Information Office

MPCA - Minnesota Pollution Control Agency

NRCS - Natural Resource Conservation Service

SWCD - Soil and Water Conservation District

UMN - University of Minnesota

USDA - United States Department of Agriculture

USGS - United States Geological Survey

1. Introduction

The Minnesota Department of Health (MDH) amended Part I of the wellhead protection (WHP) plan at the request of the city of Barnesville (PWSID 1140001). The work was performed in accordance with the Minnesota Wellhead Protection Rule, parts 4720.5100 to 4720.5590.

This report presents amended 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 amended WHPA and the DWSMA. 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. Definitions of rule-specific terms that are used are provided in the "Glossary of Terms."

This report also documents the technical information that was required to prepare this portion of the WHP plan in accordance with the Minnesota Wellhead Protection Rule. Additional technical information is available from MDH.

The wells included in the WHP plan are listed in Table 1.

Table 1 - Water Supply Well Information

Local Well ID	Unique Number	Use	Case Diameter (inches)	Case Depth (feet)	Well Depth (feet)	Date Constructed	Aquifer	Well Vulnerability
Well 8	411249	Primary	8	45	77	1/11/1985	QWTA*	Vulnerable
Well 9	411250	Primary	12	56	86	10/31/1985	QWTA*	Vulnerable
Well 10	759855	Primary	10	55	80	6/17/2008	QWTA*	Vulnerable

* The aquifer exhibits both water table and confined conditions at the city wells and is primarily confined over most of its areal extent.

The re-evaluation of the WHPA and DWSMA was necessary because well #10 (759855), drilled in 2008, was not included in the previous delineation (Soule, 2003) and because the original plan will expire in 2015. The amended areas are compared with the originals in Figure 2.

The smaller WHPA and DWSMA resulted from development of additional information and the availability of additional assessment tools. The ten year groundwater capture area has been reduced largely through an improved assessment of the hydraulic conductivity data and calibration of the groundwater flow model to both head and discharge. The WHPA is also smaller because surface water run-off is not likely to be a significant part of the water pumped by the city based on the evaluation of unsaturated flow for local soils. Changes in the uncertainty assessment also led to a reduction of the WHPA. The model explicitly includes the variation of hydraulic conductivity in the vicinity of the city wells which eliminates the need for including lower hydraulic conductivity values that broaden the WHPA near and west of the city wells.

The original delineation identified the interaction between Whiskey Creek and the city wells as an important, but unknown, factor for wellhead protection. While some tests were completed over the

lifetime of the plan, their results were inconclusive. While this remains an open question that may be resolved with additional work, the groundwater model used for the amended delineation suggests that although up to half the water pumped by the wells may be from the creek, the travel time is approximately 10 years. As a result the watershed of the creek upstream from Barnesville is not included in the WHPA.

2. Assessment of the Data Elements

MDH staff met with representatives of the city of Barnesville on January 16, 2013 for a scoping meeting that identified the data elements required to prepare Part I of the WHP plan. Table 2 presents the assessment of these data elements relative to the present and future implications of planning items that are specified in Minnesota Rules, part 4720.5210.

Table 2 - Assessment of Data Elements

Data Element	Present and Future Implications				Data Source
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Precipitation*	M	H	H	H	State Climatology, USGS
Geology					
Maps and geologic descriptions	M	H	H	H	MGS, DNR, USGS, Consultant Reports
Subsurface data	M	H	H	H	MGS, MDH, MPCA, DNR, MDA
Borehole geophysics	M	H	H	H	MGS, Consultant Reports
Surface geophysics	L	L	L	L	DNR, MPCA, Consultant Reports
Maps and soil descriptions	M	H	H	H	NRCS
Eroding lands					
Water Resources					
Watershed units					
List of public waters					
Shoreland classifications					
Wetlands map					
Floodplain map					
Land Use					
Parcel boundaries map	L	H	L	L	Not Available
Political boundaries map	L	H	L	L	City of Barnesville
PLS map	L	H	L	L	USGS
Land use map and inventory					
Comprehensive land use map					
Zoning map					
Public Utility Services					
Transportation routes and corridors	L	M	M	M	MnDOT
Storm/sanitary sewers and PWS system map	H	M	H	M	City
Oil and gas pipelines map					

Data Element	Present and Future Implications				Data Source
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Public drainage systems map or list	M	H	M	M	USGS, DNR
Records of well construction, maintenance, and use	H	H	H	H	City, CWI, MDH
Surface Water Quantity					
Stream flow data	H	**H**	H	M	USGS
Ordinary high water mark data	M	L	M	M	Not available.
Permitted withdrawals	H	**H**	M	M	DNR
Protected levels/flows	H	**M**	M	L	DNR, none in area
Water use conflicts	H	M	M	L	City, DNR, none in area
Groundwater Quantity					
Permitted withdrawals	H	H	H	H	DNR
Groundwater use conflicts	H	H	H	H	DNR
Water levels	H	H	H	H	DNR, MPCA, MDA, MDH, City
Surface Water Quality					
Stream and lake water quality management classification					
Monitoring data summary	M	H	H	L	MDH
Groundwater Quality					
Monitoring data	H	H	H	H	MPCA, MDH, USGS
Isotopic data	H	H	H	H	MDH
Tracer studies	H	H	H	H	Not available.
Contamination site data	M	M	M	M	MPCA, MDA
Property audit data from contamination sites*	M	L	M	M	MPCA, MDA
MPCA and MDA spills/release reports	M	L	M	L	MPCA, MDA

Definitions Used for Assessing Data Elements:

High (H) - the data element has a direct impact

Moderate (M) - the data element has an indirect or marginal impact

Low (L) - the data element has little if any impact

Shaded - the data element was not required by MDH for preparing the WHP plan

Acronyms used in this report are listed on page ii, after the "Glossary of Terms." * Item identified after the scoping decision notice date.

3. General Descriptions

3.1 Description of the Water Supply System

The city of Barnesville obtains its drinking water supply from three primary wells. Table 1 summarizes the well information.

3.2 Description of the Hydrogeologic Setting

The description of the hydrogeologic setting for the aquifer used to supply drinking water is presented in Table 3. A detailed discussion of the hydrogeologic setting is available in the original part one report (Soule, 2003). For this delineation, additional detail was added for Whiskey Creek and for local recharge. Figure 3 shows the locations of cross-sections along the line of the creek (A-A', Figure 4) and across the center of an area where the upper confining materials are thinner to absent (B'B', Figure 4). Figure 3 also shows the thickness of the upper confining materials from local well logs, the unique numbers of the wells on the cross-sections and the surficial geology and landforms mapped by Harris (1995).

The depositional environments that resulted in the distribution of the sand and gravel serving as the aquifer for the city were complex and may not be fully understood. Winter (1976), suggested that similar deposits resulted from surficial melt water channeled into proglacial streams or within large cracks in glacial ice. Harris, West and Tipping (1996), proposed that the accumulation and discharge of sub-glacial water may be an equally important depositional process.

The local landforms and well logs indicate a significant sub-glacial discharge area about 2 miles east of the city wells (the "river eroded till" between "fluvial channel" lines on Figure 3). In cross-section, the sand and gravel bodies often have a diamond shape like the Buffalo Aquifer a few miles west of Barnesville (Wolf 1981). The cross-sections suggest these sand bodies are present in about two thirds of the wells (24 of 34), with remaining wells screened in another sand horizon about 100 feet below the ground surface. However, the upper and lower sands can be treated as a single aquifer because there are several points of contact and their heads are similar.

The values in the Table 3 also reflect modeling decisions and differ somewhat from those in the original delineation report. An aquifer thickness of 7.2 m was chosen as a conservative value that will tend to increase estimated groundwater velocities. The value was determined using geologic records from wells that fully penetrate the aquifer. The area of higher hydraulic conductivity in the original model was refined using seven concentric circular areas with values determined from the trends observed in local specific capacity tests. Areas of additional local recharge are larger in this version of the model and were defined by thinning of the upper confining layer rather than the relatively small areas in the original model that were defined by landforms. Whiskey Creek was modeled in greater hydrographic detail than in the original model. In addition, the hydraulic resistance to flow between the creek and the aquifer was added to this model.

Table 3 – Description of the Hydrogeologic Setting

Attribute	Descriptor	Data Source
Aquifer Material	Sand and Gravel	Local Well Logs (CWI)
Porosity Type and Value	Primary, 0.25	Freeze and Cherry (1979)
Aquifer Thickness	7.2 [m]	Local Well Logs (CWI)
Depth to Aquifer	10.6 [m]	Average of Well Logs (CWI) on cross-section
Hydraulic Confinement	Semi-Confined	Local Well Logs (CWI)
Global Aquifer Hydraulic Conductivity	Median 14.5, range 10.6 – 20.1 [m/d]	The range of values was derived using specific capacity data obtained from wells within the aquifer.
Local Hydraulic Conductivity	Spatially variable ranging from 50.7[m/d] at the city wells to 21.4 [m/d] 1500 m. from city wells.	A set of seven nested, approximately circular zones of radially decreasing hydraulic conductivity were used to address the local spatial variation of K while including global values fitting the calibration criteria.
Groundwater Flow Field	See Figure 2	Defined by using static water level elevations from well records in the CWI database.

4. Delineation of the Wellhead Protection Area

4.1 Delineation Criteria

The boundaries of the WHPA for the city of Barnesville are shown in Figure 1. Table 4 describes how the delineation criteria are specified under Minnesota Rules, part 4720.5510, were addressed.

Table 4 - Description of WHPA Delineation Criteria

Criterion	Descriptor	How the Criterion was Addressed
Flow Boundaries	Perennial Streams	Head specified lines were used to model most streams within and bounding the South Branch of the Buffalo River watershed. Whiskey Creek was modeled as a head and resistance specified line.
Flow Boundaries	Watershed Recharge	Recharge areas were used to address three different zones identified by Lorenz and Delin (2007) over the watershed.
Flow Boundaries	Local Recharge	Local recharge areas were used to address the thinning of the aquifer confining layer near the city wells.
Daily Volume of Water Pumped	See Table 5	Pumping information was obtained from the DNR, Groundwater Appropriations Permit No.1981-1088, and was converted to a daily volume pumped by a well.
Groundwater Flow Field	See Figure 2	The groundwater flow field was determined from local well data and used to calibrate the Split Model. The Oneka model used these data to evaluate the impact of the flow field uncertainty on the WHPA.
Local Transmissivity	365 [m^2/d]	Specific Capacity Tests on city wells 411249 & 759855. Aquifer test plan approved 12/3/13.
Time of Travel	10 years	The public water supplier selected a 10-year time of travel.

Information provided by the public water supplier was used to identify the maximum volume of water pumped annually by each well over the previous five-year period, as shown in Table 5. Also, the estimated pumping for the next five years is shown. Previous pumping values have been reported to the DNR, as required by the public water supply's Groundwater Appropriation Permit No. 1981-1088. The maximum daily volume of discharge used as an input parameter in the model was calculated by dividing the greatest annual pumping volume by 365 days.

Table 5 - Annual Volume of Water Discharged from Water Supply Well

Well Name	Unique No.	2008*	2009*	2010*	2011*	2012*	Maximum*	Model Discharge [m^3/d]
8	411249	24.8	**39.1**	25.6	26.1	26.6	39.1	405
9	411250	**39.6**	18.3	25.6	26.1	26.6	39.6	410
10	759855	14.3	**39.7**	25.6	26.1	26.6	39.7	411

*Expressed as millions of gallons, **bolding** indicates greatest annual volume.

4.2 Method Used to Delineate the Wellhead Protection Area

The WHPA for the city of Barnesville's wells was determined using a combination of two methods. The first method involved calculating the groundwater capture zones deterministically using representative aquifer parameters that were input into an analytical element modeling code called Split (Jankovic, 2000). An important objective of the Split model was to determine if the upstream watershed of Whiskey Creek should be included in the WHPA as a surface water contribution area. These results were not strong enough to require that the watershed be included in the WHPA at this time. However, this remains an important question that will need to be addressed by other methods. The second method used the stochastic analytical groundwater flow method Oneka (Barnes and Soule, 2003). The resulting WHPA boundaries are a composite of the capture zones calculated using these

two methods (Figure 1). The model results are shown on Figure 6. The input files for both models are available at MDH upon request.

The Split model was designed to allow for calibration to the available head and discharge information. The closest continuous gauging station to Barnesville is the South Branch of the Buffalo River at Sabin, MN. (USGS Site 05061000). The model included discharge features from adjacent watersheds as well as features representing the perennial streams within the watershed (Table 6). Features far from Barnesville were represented with little detail, while the features close to Barnesville were represented with a high degree of detail to capture local variations. The vertices of the lines correspond to those classified by the National Hydrologic Dataset (NHD) as perennial. Elevations were determined using the National Elevation Dataset (NHD) 30 meter grid. Although LiDAR was available in the area, discontinuity between panels indicated processing errors. Whisky Creek was modeled using head and resistance specified line elements, while the remaining features listed on Table 6 were modeled as head specified lines. The vertical resistance to flow for Whisky Creek was determined using the thicknesses of fine materials between the creek and the ground surface and the estimated hydraulic conductivity of the material. The thickness was estimated using well logs within 250 m of the creek which indicate an average thickness of 13.3 m upstream from Barnesville and 28.3 m downstream. The hydraulic conductivity of this material was determined as part of the calibration process.

Table 6 – Summary of Model Features

Discharge Features			
Adjacent Watershed		Within Watershed	
Buffalo River		S. Br. Buffalo River	
Otter Tail River		Deerhorn Creek	
Pelican River		Hay Creek	
Red River of the North		Stony Creek	
		Whiskey Creek	
Recharge Features: varied by model scenario (keeping ratios constant)			
Global Areas	Relative Ratio	Local Area	Relative Ratio
East	1	Internal Area	1
Central	.71	External Area	.5
West	.09		
Nested Circular Aquifer Inhomogeneities			
radius [m]	k [m/d]	radius [m]	k [m/d]
100	50.7	500	37.9
200	47.2	1000	30.9
300	43.9	1500	21.4
400	40.8		

Global recharge extended beyond the boundaries of the South Branch of the Buffalo River watershed to the discharge features of the adjacent watersheds. This decision allows for the possibility that the "groundwater shed" may not be the same as the surface watershed. Three areas of global recharge were defined based on the estimated recharge values of Lorenz and Delin (2007), the surficial geology and landforms. The eastern area includes the uplands associated with the Itasca and Alexandria moraines. The central area, which includes Barnesville, covers the westward sloping arm of the

moraines to the east as well as the subtle rise of the Big Stone moraine. The western area includes the Lake Agassiz lake planes and extends to the Red River of the North. The recharge values used in the model were varied with the global hydraulic conductivity to ensure acceptable head calibration.

Additional recharge was used to address a local area where the upper confining were less than half the average observed over the aquifer in the modeling domain. An interior portion of this area was defined where the thickness was one fifth of the average over the aquifer and was entirely missing in several locations. The upper limit of the recharge in this area was estimated to be three inches per year using the area weighted average from Lorenz and Delin (2007). The average thickness of the confining materials between the interior and exterior local recharge areas is twice that of the interior area so the recharge was reduced by half in this area.

The model included seven nested circular hydraulic conductivity inhomogeneities centered on the city wells. Specific capacity tests on local wells indicated that the city wells are located in an area of high hydraulic conductivity. While hydraulic conductivity estimates from specific capacity tests are "noisy", the geometric mean of 30 paired tests at increasing radial distance from the city wells indicate that hydraulic conductivity decreases to the aquifer median over a distance of about 1,500 meters from the city wells. The mildly exponential function that best fits the paired data was used to estimate the values shown on Table 6.

The travel time from Whiskey Creek to the aquifer was determined using the geometry of the sandy stream deposits, porosity, and the estimated thickness of the fine grained material between the creek and the aquifer. It was assumed that the water lost from the creek is infiltrated over the width of the permeable stream deposits and travels vertically to the aquifer below. The width of the stream deposits as mapped by Harris (1995) is approximately 250 m. The water loss was estimated from the Split model for 30 meter segments of the creek. The vertical specific discharge was estimated by dividing the flow by the area of the channel for each line segment. The vertical velocity was estimated by dividing the vertical specific discharge by the porosity (0.2). The vertical travel time was estimated by dividing the thickness of the resistive material by the velocity.

In order to assess whether it is likely that the Barnesville city wells capture water from Whiskey Creek within a ten-year time period, the vertical travel time calculated above is added to the horizontal travel time from the well to the creek. To estimate the average travel time of the creek water to the well, the estimates from the creek segments are weighted by flow. This ensures that the estimated average is representative of the quantity of water flowing to the well. The results shown in Table 7 indicate the average travel times for the three scenarios range from 8.7 to 11.7 years. While the travel time associated with some estimates is less than 10 years, these scenarios are intended to emphasize the hydraulic connection between the creek and the aquifer are probably overly conservative. As a result, a surface water contribution area is not included in the delineation of the WHPA.

A second code, using the analytical groundwater flow method named Oneka (Barnes and Soule, 2003), was used to assess the probability of impacts that local variations in hydrogeologic conditions may have on a well capture zone. While the Split model is intended to emphasize the potential influence of Whiskey Creek, the Oneka model is included to address the possibility that the variations and uncertainties of the local groundwater flow field are equally important. This model treats the aquifer properties and the available water level measurements as variable input parameters. The locations of wells, water levels, and the aquifer geometry were evaluated using information from the CWI database. For the solution, Oneka finds the flow field that best fits the network of water level elevations. The output from the model is a capture zone probability map for the specified time of travel (10 years). The 70% probability contour was combined with the split results to delineate the WHPA.

4.3 Results of Model Calibration and Sensitivity Analysis

Model calibration is a procedure that compares the results of a model based on estimated input values to measured or known values. This procedure can be used to define model validity over a range of input values, or helps determine the level of confidence with which model results may be used. As a matter of practice, groundwater elevation (head) and flow (flux) can both be used for calibration. A unique result can only be achieved by calibration to both head and flux because they are inherently correlated in a model. The calibration results for the three Split model scenarios used to delineate the WHPA are shown in Table 7.

The model was calibrated to flow using the available information for the South Branch of the Buffalo River and Whiskey Creek. The USGS has daily discharge records for the South Branch of the Buffalo River since 1945, and two years (1965-1966) of monthly averages for Whiskey Creek. It was assumed the flow during periods of time with continuous sub-freezing temperatures were representative of the average groundwater discharge of the modeled aquifer. This assumption may underestimate the total groundwater contribution as declining winter groundwater head would be expected to result in lower discharge. However, the assumption may also overestimate groundwater discharge of the modeled aquifer because it does not include flow from shallower aquifers.

The annual average winter discharge values for the South Branch of the Buffalo River indicated that there was a significant increase starting in about 1980. This change could not be linked to increased precipitation or temperature and is assumed to be due to changes in the watershed hydrography rather than recharge. The median annual winter discharge from 1945 to 1980 is 17.1 cfs, with a 95% confidence range of 15.7 to 18.7 cfs. The average discharge for Whiskey Creek from the five months of record where the temperature was below freezing is 0.99 cfs.

The model was calibrated in two phases. The first phase was conducted by determining the ratio of recharge to hydraulic conductivity that best fit the head calibration data set. Using the geometric mean (median) of the observed hydraulic conductivity values (14.6 m/d), the global recharge was adjusted to find the minimum head error while ensuring a reasonable value for the modeled discharge of the South Branch of the Buffalo River. The starting recharge values were determined using the area weighted estimates from Lorenz and Delin (2007). While the absolute recharge values were adjusted during calibration, their relative ratios were maintained.

The resistance values for Whiskey Creek and local recharge were adjusted in the second phase of calibration. The resistance was adjusted using the hydraulic conductivity of the resistive layer for comparison to representative hydraulic conductivity ranges for different materials. The local recharge rates were calibrated to the estimated discharge of Whiskey Creek at the gauging station location. Pumping by the city wells, which were not present when the flow of the creek was measured, was not included in the model during this part of the calibration.

These resistance hydraulic conductivity and local recharge values were calibrated iteratively. Increasing hydraulic conductivity of the resistance layer decreased the head error but also decreased the creek flow. Increasing the local recharge increased both the creek flow and the head error allowing for a decrease in the resistance hydraulic conductivity for a better fit to both head and flux. The best fit for both parameters was found using the maximum likely local recharge (3 in/y) and a resistance hydraulic conductivity of 0.052 m/d. This value is similar to the median (0.047 m/d) of in situ tests of sandy, northeast provenance tills in Wisconsin (Bradbury and Muldoon, 1990).

Table 7 - Delineation Scenarios and Calibration Results

Scenario	Global Aquifer	Domain Recharge			Head Calibration	Flow Calibration		Impacts of Whiskey Creek	
	K [m/d]	East [in/y]	West [in/y]	Mid [in/y]	RMSE (% Range)	S. Br. Buffalo R. (% Winter Flow)	Whiskey Cr.* [cfs]	Travel Time to Wells	Percent of Well Water
Low	10.6	0.03	0.31	0.22	6%	53%	0.8	8.7	57%
Average	14.6	0.04	0.42	0.30	5%	80%	0.9	9.6	49%
High	20.1	0.05	0.59	0.41	5%	105%	1.3	11.7	34%

*Discharge values estimated without pumping by city wells.

Model sensitivity is the amount of change in model results caused by the variation of a particular input parameter. The model sensitivity was reflected in the calibration process where changes in head or flux have a direct impact on the capture areas of the wells.

The modeled heads were most sensitive to the ratio of recharge to hydraulic conductivity. The modeled discharge of the South Branch of the Buffalo River was most sensitive to the global recharge rates. This discharge is somewhat less than the calibration target, but some difference would be expected due to the drainage of shallower flow systems.

The modeled flow in Whiskey Creek was most sensitive to the resistance hydraulic conductivity value and the local recharge rates as discussed in the calibration section above. The relatively high local recharge rates and hydraulic conductivity values used in the model may somewhat overestimate the impact of the creek on the well water. This evaluation is intended to provide a minimum estimate of the travel time of creek water to the city wells. The minimum RMSE was consistently associated with average absolute errors of approximately one meter. This may indicate a small, but systemic, bias in the model suggesting that one or more of the modeling assumptions are not quite correct. One possibility is that the relative recharge from the eastern area is too high for the modeled aquifer. Increased drainage by shallower flow systems in this area would result in lower recharge of deeper flow systems that could contribute water to the aquifer used by the city wells. The impact of higher modeled heads in the ten year capture area is not likely to significantly impact the capture areas because the modeled and observed hydraulic gradients are consistent.

4.4 Addressing Model Uncertainty

Using computer models to simulate groundwater flow necessarily involves representing a complicated natural system in a simplified manner. Local geologic conditions may vary within the capture area of the public water supply well, but the amount of existing information that is needed to accurately define this degree of variability is often not available for portions of the WHPA. In addition, the current capabilities of groundwater flow models may not be sufficient to represent the natural flow system exactly. However, the results are valid within a range defined by the reasonable variation of input parameters for this delineation setting.

The steps employed for this delineation to address model uncertainty were:

1) Pumping Rate - For each well, a maximum historical (five-year) pumping rate or an engineering estimate of future pumping, whichever is greater (Minnesota Rules, part 4720.5510, subpart 4).

2) The uncertainty of the overall model hydraulic conductivity was addressed using three model scenarios representing the 95% confidence interval of the estimates from local specific capacity tests.
3) The uncertainty of the boundaries of the area of locally high hydraulic conductivity was addressed using the set of nested inhomogeneities.
4) The uncertainty of the hydraulic connection between the aquifer and the Whiskey Creek was addressed in two ways. The values in the Split model were intended to emphasize the hydraulic connection and provide conservative travel times to the city wells. The hydraulic conductivity of the fine grained material between the creek and the aquifer used in the model, while consistent with a sandy till, is much higher than what might be expected from the local geologic materials. For example, it is 900 times higher than unweathered Des Moines till (Jones, 1993), and 6,000 times higher than Lake Agassiz clays (Baracos, 1960). The large difference between these and the modeled value may be due to the impacts of relatively small gaps in the confining materials. The locations of such gaps may become important should the water quality of Whiskey Creek adversely impact the city wells.
5) The Oneka model was used to address uncertainty of the hydraulic connection between the aquifer and Whiskey Creek, the uncertainty of the aquifer hydraulic conductivity and the uncertainty of the groundwater flow field.

    a) The Oneka model does not explicitly include the influence of Whiskey Creek on the groundwater flow field.
    b) The Oneka model used the frequency distribution of the geometric mean of the local specific capacity tests to evaluate the uncertainty of the aquifer hydraulic conductivity.
    c) The Oneka model was used to address the uncertainty of the local heads by including the uncertainty of the elevation estimate (1.44 [m]) and temporal variations (0.32 [m]) observed in DNR observation well 14045 (unique number 149506).

The Whiskey Creek watershed upstream of Barnesville was not included as a surface water contribution area for the following reasons:

1) There is insufficient water quality and isotopic information to conclude that a significant portion of the water pumped by the city wells originates from the creek.
2) The Split model results suggest that conditions favoring a connection between the creek and the city wells results in travel times of about ten years.
3) Most well logs in the area suggest that the aquifer is moderately vulnerable where it is crossed by the creek. While there are areas of high vulnerability, they are outside the WHPA.

5. Delineation of the Drinking Water Supply Management Area

The boundaries of the Drinking Water Supply Management Area (DWSMA) were defined by the city of Barnesville using the following features (Figure 1):

- Center-lines of highways, streets, or roads
- Parcel boundaries
- Public Land Survey coordinates

6. Vulnerability Assessments

The Part I wellhead protection plan includes the vulnerability assessments for the city of Barnesville's wells and DWSMA. These vulnerability assessments are used to help define potential contamination sources within the DWSMA and select appropriate measures for reducing the risk they present to the public water supply.

6.1 Assessment of Well Vulnerability

The vulnerability assessments for the wells used by the city of Barnesville are listed in Table 1 and are based upon the following conditions:

1) All the wells meet current State Well Code specifications (Minnesota Rules, part 4725), meaning that the construction of the wells should not provide a pathway for contaminants to enter the aquifer they use.
2) The geologic conditions at the well sites do not include a consistent cover of thick, clay-rich geologic materials over the aquifer.
3) Water samples analyzed for tritium, chloride and bromide indicate a component of young water (Alexander and Alexander, 1989, Mullaney et.al., 2009). These results are shown on Table 9.
4) The stable isotopes of oxygen and hydrogen from the city wells do not show an evaporative signature. However, the sample collected from Whiskey Creek also did not show an evaporative signature.

Table 8 - Water Quality Results

Well	Tritium (TU)-year	Chloride/Bromide ratio	Chloride (mg/L)	Bromide (mg/L)
Well #8 411249	5.7 - 2012	403	21.2	0.0525
Well #9 411250	5.3 - 2012 15.5 - 2000	433	21.6	0.0498
Well #10 759855	6.1 - 2012	264	12.4	0.0468

6.2 Assessment of Drinking Water Supply Management Area Vulnerability

The vulnerability of the DWSMA is shown in Figure 5 and is based upon the following information:

1) Isotopic and water chemistry data from wells located within the DWSMA indicate the aquifer contains water that has detectable levels of tritium and locally shows chloride/bromide ratios indicative of human-caused chloride contamination; and
2) Review of the geologic logs contained in the CWI database and geological maps and reports indicate the aquifer exhibits geologic sensitivity ratings that range from very high to very low. The high sensitivity zones may be associated with ridge lines that were more susceptible to erosion but are not sufficiently extensive to be mapped. Outside of these areas the aquifer used by the city wells is generally covered by varying thickness of till or lake clay;

7. Selected References

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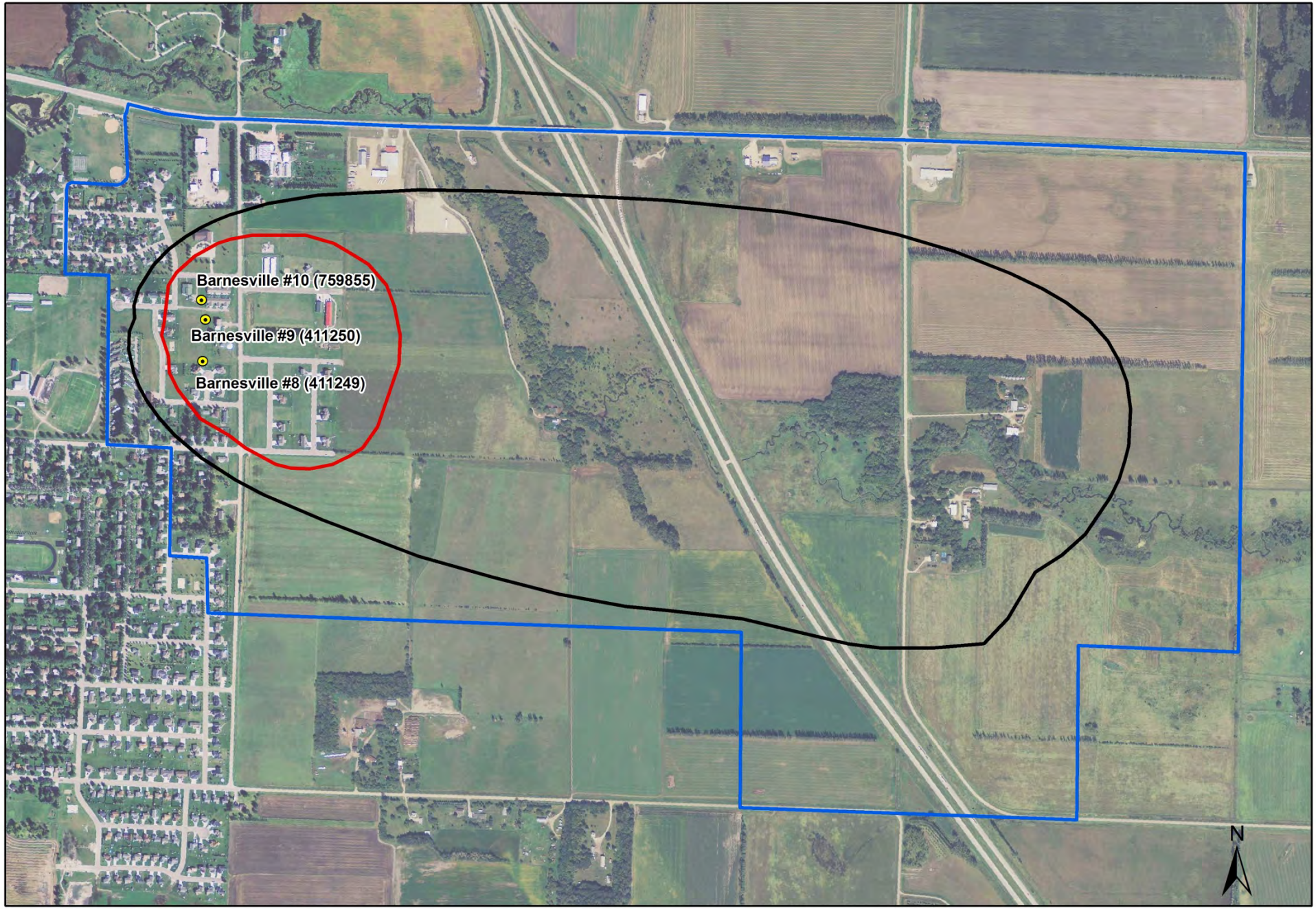
Figures



MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 1 Map of the Amended Wellhead Protection and Drinking Water Supply Management Areas

Barnesville City Wells | Amended ERA | Amended DWSMA | Amended WHPA

0 500 1,000 1,500
Feet

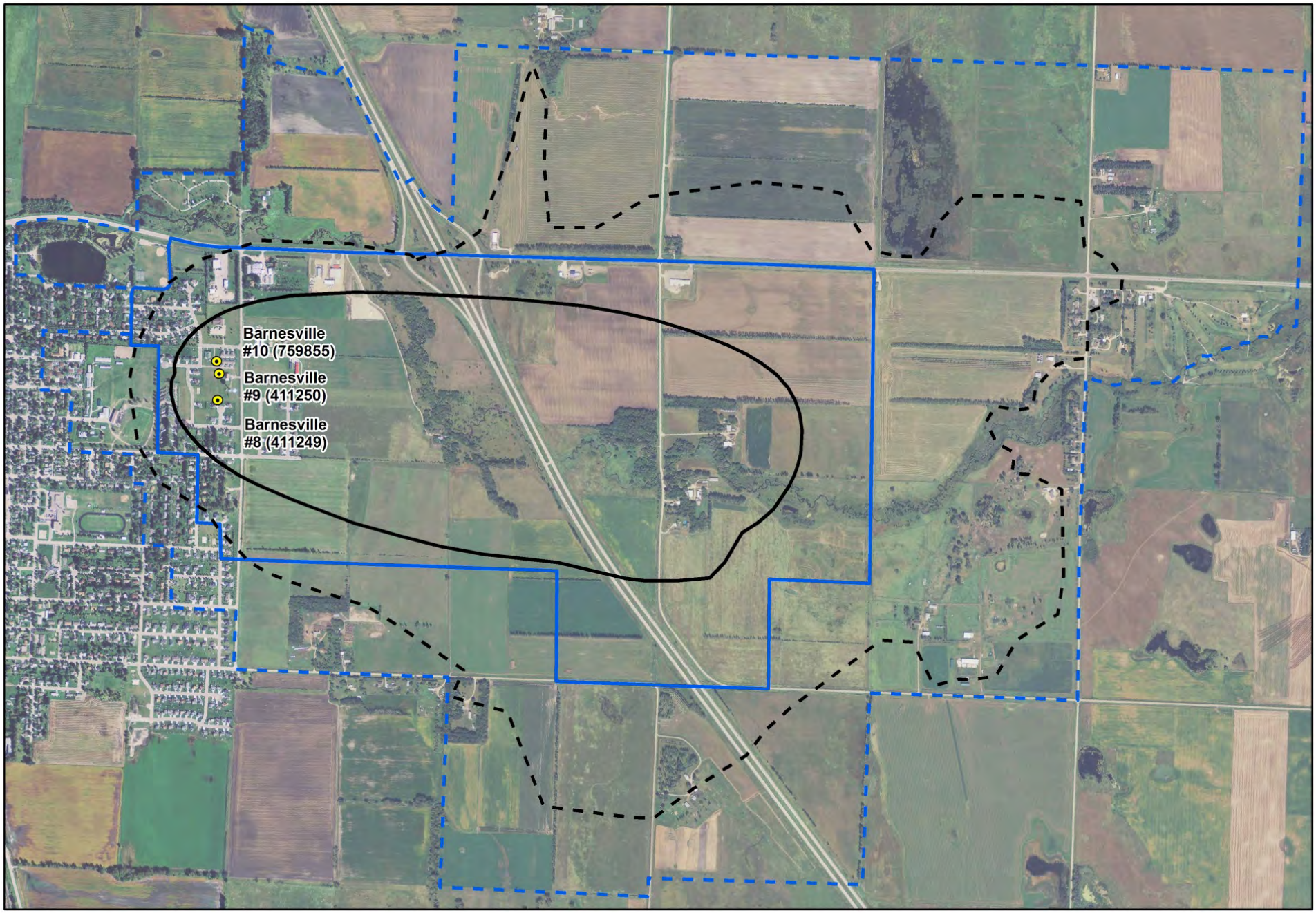
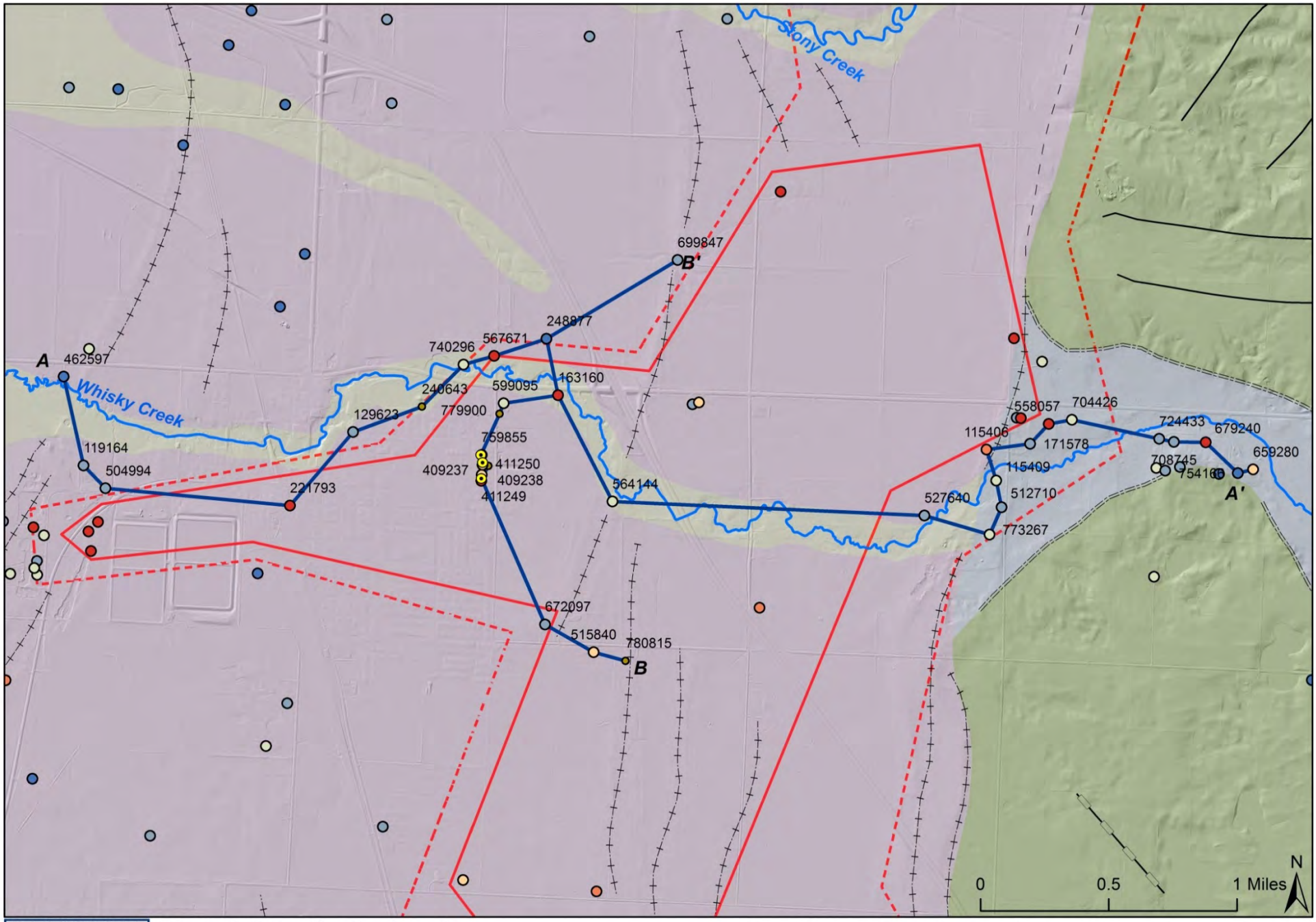


Figure 2 Amended and Previous Wellhead Protection and Drinking Water Supply Management Areas

Barnesville City Wells
Original WHPA
Amended WHPA
Original DWSMA
Amended DWSMA

0 0.1 0.2 0.3 0.4 0.5
Miles

N



MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 3 Cross Section Locations

Cross Section
411249 Unique Number
City Wells

Local Recharge Areas
Interior
Exterior

Confining Thickness (ft.)
< 10
10 - 20
20 - 30
30 - 50
50 - 100
>100

Surficial Geology and Landforms (from Harris, 1995)
Lake Shoreline(sand/silt)
Beach Ridge
Recent River Seds.
River Eroded Till
Fluvial Channel
Discontinuous Scarp
Glacial Till
Collapsed Till Over Gravel
Drumlin Axis

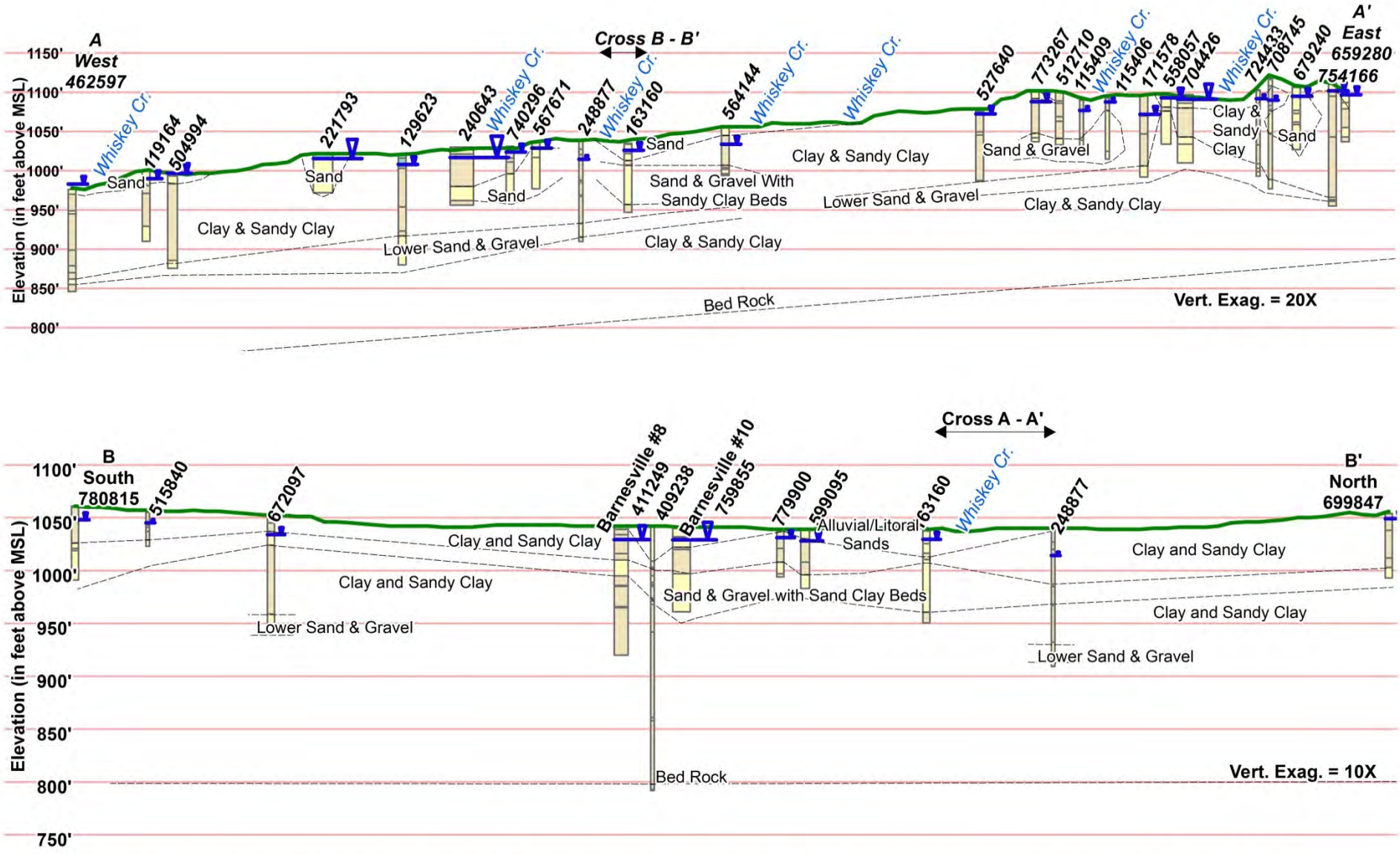


Figure 4 Geologic Cross Sections Along Whiskey Creek (A-A') and Across Local Recharge Area (B-B')

MINNESOTA MDH DEPARTMENT OF HEALTH

Inferred Geologic Contacts
Static Water Levels
Ground Surface

Stratigraphy
Sandy Materials
Clayey Materials

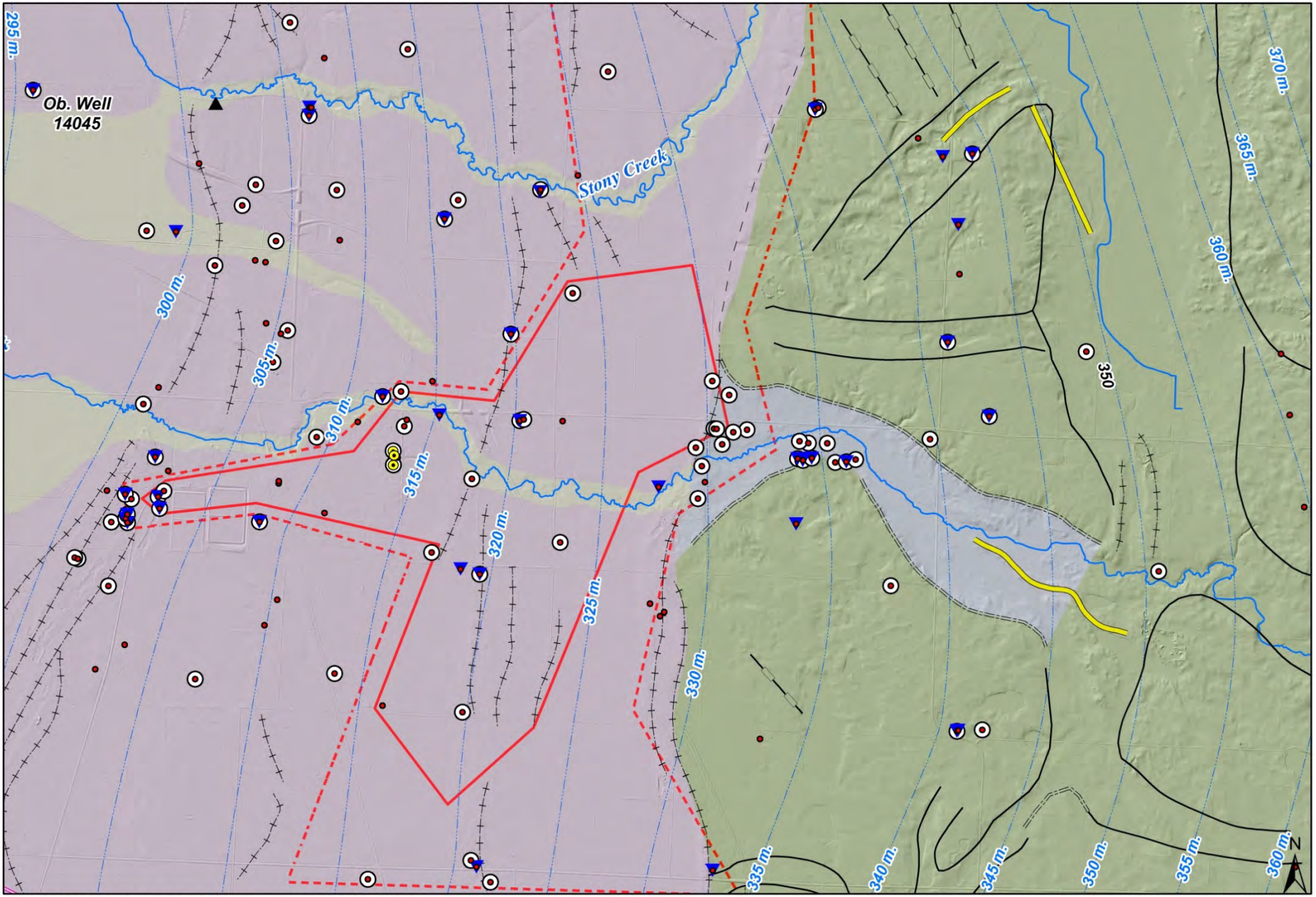
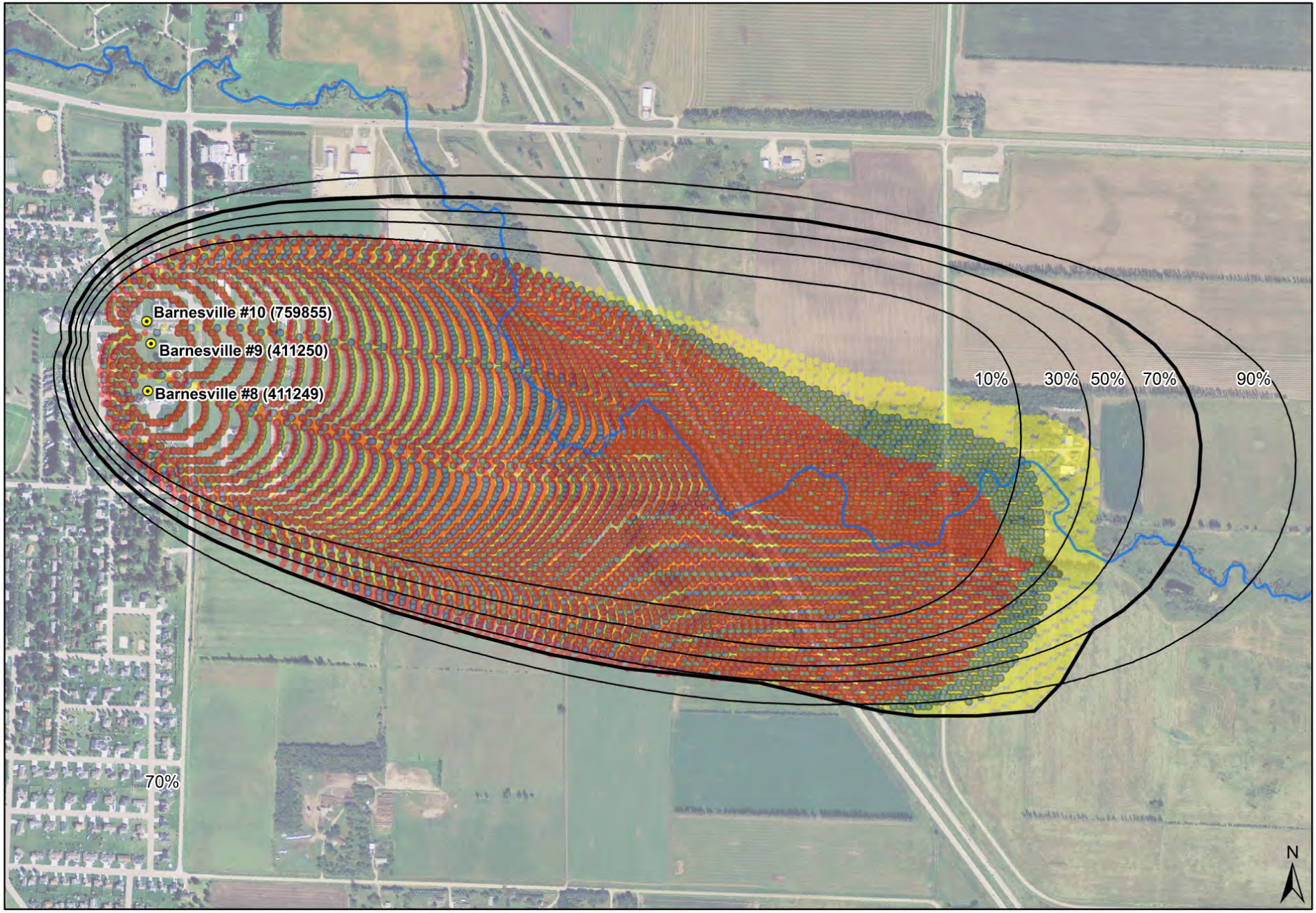


Figure 5 Groundwater Flow Field and Data Base Map



MINNESOTA DEPARTMENT OF HEALTH MDH

Figure 6 Model Results

Barnesville City Wells

Whiskey Creek

Split Result
- Low Scenario
- Average Scenario
- High Scenario

Oneka Result

70% - Captures 70% of pathlines

Amended WHPA

0 500 Feet 1,000 1,500

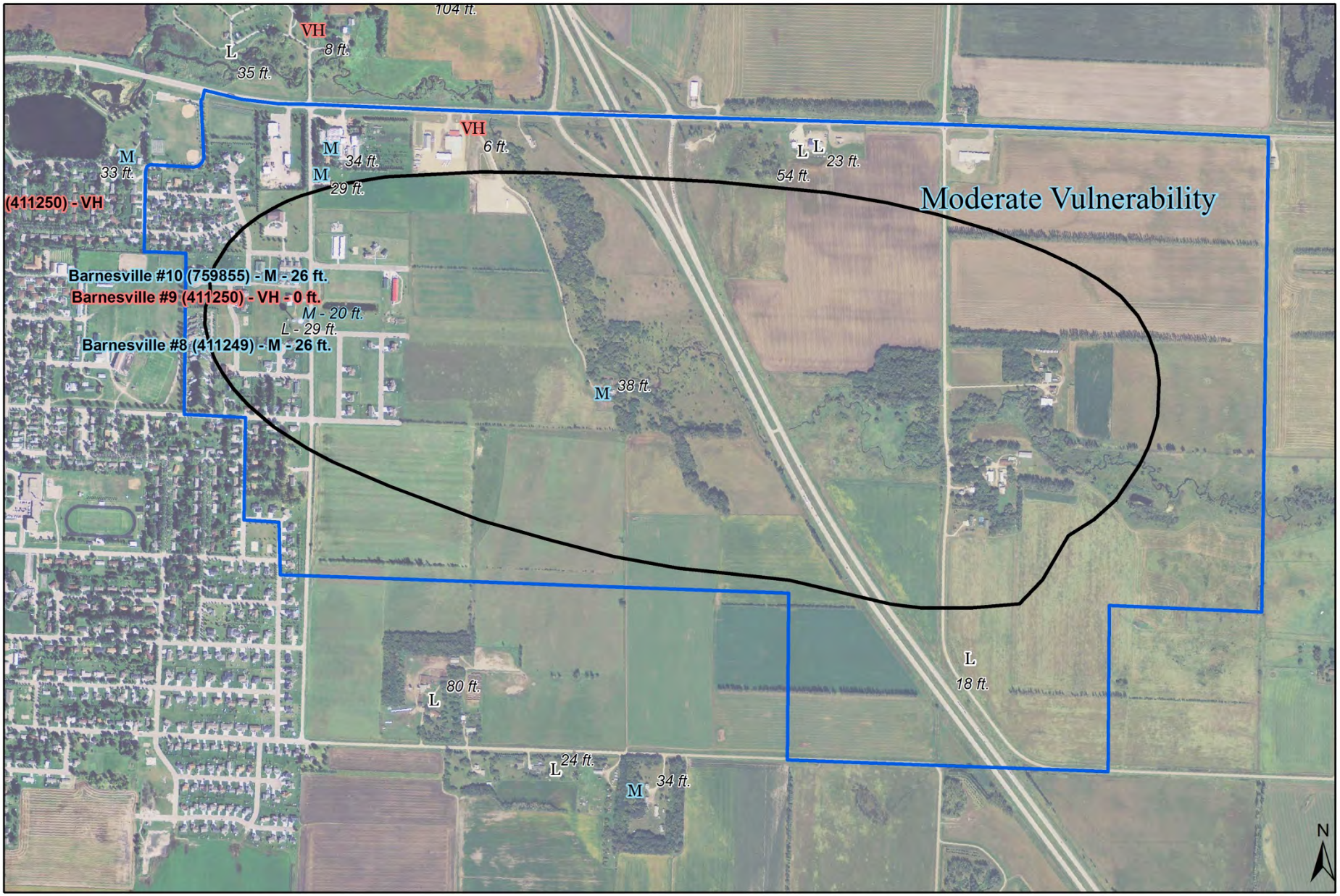


Figure 7 DWSMA Vulnerability

MINNESOTA MDH DEPARTMENT OF HEALTH

Amended DWSMA

Amended WHPA

Local Well Vulnerability

VH Very High *25 ft - Thickness of Clayey Materials*

M Moderate

L Low

0 500 1,000 1,500 Feet

MINNESOTA MDH DEPARTMENT OF HEALTH

Protecting, maintaining and improving the health of all Minnesotans

February 15, 2013

FEB 25 2013

Mr. Michael Rietz
City Clerk - City of Barnesville
P. O. Box 550
Barnesville, Minnesota 56514

Dear Mr. Michael Reiz:

Subject: Scoping Decision Notice No. 1 for the City of Barnesville, PWSID 1140001, for Amending the Wellhead Protection Plan

This letter provides notice of the results of the Scoping 1 meeting that George Minerich and I (Minnesota Department of Health) held with you and Karen Lauer , Dan Lubbesmeyer, and Terry Yestenes (People's Service) on January 17, 2013, regarding amending your Wellhead Protection Plan. The city of Barnesville is amending the Wellhead Protection Plan because eight years have expired since the approval of its last Wellhead Protection Plan (Minnesota Rules, part 4720.5570, item C). During the meeting, we discussed the preparation of Part I of a Wellhead Protection Plan that will document the 1) delineation of a wellhead protection area, 2) delineation of a drinking water supply management area, and 3) assessments of well and aquifer vulnerability related to these areas for the primary water supply wells used by City of Barnesville.

According to the state wellhead protection rule, the city will have until December 16, 2014, to amend its entire Wellhead Protection Plan, Part I and Part II. As we discussed, the rule describes the criteria used for determining the time period for completion of the Wellhead Protection Plan (Minnesota Rules, part 4720.5130). The Minnesota Department of Health (MDH) highly recommends that half of the time allotted be dedicated to completing Part II of the plan.

It is our understanding that MDH will assist the city with the preparation of its Part I report. There will be no cost to the city for any involvement by MDH staff with this work. It will be the city's responsibility to assist with the data collection to aid in the delineation and vulnerability assessments.

At our meeting, we discussed rule requirements and the types of information needed to amend the Part I report. The Wellhead Protection Plan must be prepared in accordance with Minnesota Rules, parts 4720.5100 to 4720.5590. General wellhead protection requirements and criteria for delineating the wellhead protection area and data reporting are presented in Minnesota Rules, parts 4720.5500 to 4720.5510.

The enclosed Scoping Decision Notice No. 1 formally identifies the information that the city must provide to MDH to meet rule requirements for preparing Part I of the Wellhead Protection Plan. The wellhead rule refers to the existing information required for wellhead planning as data elements. Much of this information is available in the public domain, as described in the Scoping Decision Notice No. 1 form. You only need to provide the information that is not in the public domain and, therefore,

not available to MDH. The Scoping Decision Notice No. 1 form also 1) lists the Minnesota unique well number and well construction for each well that will be included in the Wellhead Protection Plan [Table 1] and 2) lists the pumping volumes for each well [Table 2]. A summary of the information that the city needs to provide is included at the end of the Scoping Decision Notice No. 1 form.

After the delineation has been completed, we would like to meet with you to discuss the wellhead area delineation and the boundaries of the drinking water supply management area. The boundaries of the drinking water supply management area use streets, roads, section lines, or other features that the public can easily understand for referencing the areas that will be included in the city's Wellhead Protection Plan.

Finally, it is our understanding that you will serve officially as the wellhead protection manager on behalf of the city. You are responsible for providing written notice to local units of government of the city's intent to amend the Wellhead Protection Plan, as required by the wellhead protection rule (part 4720.5300, subpart 3). A copy of this notice should be forwarded to MDH and must include a list of the city wells, identified by unique number, and contact information for you as wellhead protection manager. George Minerich, your Source Water Protection Unit Planner, can provide you with some examples of the notification of intent that other communities have used, if you do not have a copy of your original notice of intent. Please contact George Minerich at 320/223-7314.

In closing, we look forward to working with you on amending your Wellhead Protection Plan. If you have any questions regarding our comments, please contact me at 651/201-4676.

Sincerely,

Richard G. Soule, Hydrologist
Source Water Protection Unit
Environmental Health Division
P.O. Box 64975
St. Paul, Minnesota 55164-0975

RGS:dcc
Enclosures: Scoping Decision Notice No. 1, Summary of Data Requested, Table 1 - Public Water Supply Well Information, Table 2 - Annual Volume of Water Pumped From City of Barnesville wells
cc: George Minerich, Planner, Source Water Protection Unit, St. Cloud District Office
Byron Adams, Water Monitoring Section, Minnesota Pollution Control Agency
Joe Richter, Division of Waters, Minnesota Department of Natural Resources
Brian Williams, Pesticide & Fertilizer Mgmt. Division, Minnesota Department of Agriculture
Eric Mohring, Hydrologist, Board of Water and Soil Resources
Karen Lauer, Peoples Service
Dan Lubbesmeyer, Peoples Service
Terry Yestenes, People Service

SCOPING DECISION NOTICE No. 1
(Vulnerable Setting)

The purpose for the first Scoping Meeting, as required by Minnesota Rules, part 4720.5310, is to discuss the information necessary for preparing the Part I Report of a Wellhead Protection Plan. The Part I Report identifies the area that provides the source of drinking water for the public water supply (PWS) so that the PWS can develop land use or management practices to protect their groundwater resource from contamination. Specifically, the Part I Report documents the delineation of the wellhead protection area (WHPA), the delineation of the drinking water supply management area (DWSMA), and assesses the vulnerability of the PWS wells and DWSMA.

The wellhead rule (Minnesota Rules, part 4720.5310) refers to the information required for wellhead planning as data elements. This form lists the data elements that are stated in Minnesota Rules, part 4750.5400. The Minnesota Department of Health (MDH) uses this form to designate which data elements are needed to prepare the Part I Report, based on the hydrogeological setting, vulnerability of the wells, and aquifer information known at the time of the Scoping 1 Meeting.

Name of Public Water Supply		**Date**
Barnesville (PWSID = 1140001)		February 15, 2013
Name of the Wellhead Protection Manager		**Scoping Date**
Mr. Michael Reiz, City Clerk		January 17, 2013
Address	**City**	**Zip**
P. O. Box 550	Barnesville	56514
Unique Well Numbers		**Phone**
411249 (Well 8) 411250 (Well 9) 759855 (Well 10)		218/354-2292

Instructions for Completing the Scoping No. 1 Form

N	D	V	S	
X				**N** = If this box is checked with an "X," this data element is **NOT** necessary for the **Part I Report** of your Wellhead Protection Plan. This data element may be identified later at the Scoping 2 Meeting and used for the Part 2 Report. Please go to the next data element.

N	D	V	S	
	X			**D** = If this box is checked with an "X," the preparer of the Part I Report is **required** to use this information for the **DELINEATION** of the WHPA or the DWSMA. If there is no check in the "S" box, this information is available in the public domain or is on-file at MDH.

N	D	V	S	
		X		**V** = If this box is checked with an "X," the preparer of the Part I Report is **required** to use this information for the **VULNERABILITY** assessment of the PWS well(s) or the DWSMA. If there is no check in the "S" box, this information is available in the public domain or is on-file at MDH.

N	D	V	S	
			X	**S** = If this box is checked with an "X," the PWS **must SUBMIT** the information to the MDH.

DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT

A. PRECIPITATION

N	D	V	S	
X				A.1: An existing map or list of local precipitation gauging stations.

Technical Assistance Comments

N	D	V	S	
X				A.2: An existing table showing the average monthly and annual precipitation, in inches, for the preceding five years.

Technical Assistance Comments:

B. GEOLOGY

N	D	V	S	
	X	X		B.1: An existing geologic map and a description of the geology, including aquifers, confining layers, recharge areas, discharge areas, sensitive areas as defined in Minnesota Statutes, section 103H.005, subdivision 13, and groundwater flow characteristics.

Technical Assistance Comments: Information of this type is required to characterize the geologic and hydrogeologic setting of the PWS well field. This information is used to define aquifer geometry, location and magnitude of the recharge and discharge areas, and groundwater flow information. Aquifer tests or alternatives listed in MN Rules, part 4720.5510, subpart 6, can be used to help characterize flow in the aquifer. Reference all information used to develop the conceptual model of the geologic setting and submit to MDH only the information that is not available in the public domain.

N	D	V	S	
	X	X		B.2: Existing records of the geologic materials penetrated by wells, borings, exploration test holes, or excavations, including those submitted to the department.

Technical Assistance Comments: Information of this type may be useful to refine the understanding of the geologic and hydrogeologic setting on a local basis. Submit only if the PWS or city has information of test drilling or site investigations conducted by the city that is not available in the public domain.

N	D	V	S	
	X	X		B.3: Existing borehole geophysical records from wells, borings, and exploration test holes.

Technical Assistance Comments: Information from geophysical records may provide additional information about aquifer thickness, well construction, and water level information at a local scale. Submit only if the information is not available in the public domain.

N	D	V	S	
	X	X		B.4: Existing surface geophysical studies.

Technical Assistance Comments: Information from geophysical studies may be useful to refine the understanding of the geology on a local basis. Submit only if the information is not available in the public domain.

C. SOILS

N	D	V	S	
	X	X		C.1: Existing maps of the soils and a description of soil infiltration characteristics.

Technical Assistance Comments: This information is in the public domain and can be used to delineate the WHPA and assess the vulnerability of the DWSMA because it indicates the underlying geology.

N	D	V	S	
X				C.2: A description or an existing map of known eroding lands that are causing sedimentation problems.

Technical Assistance Comments:

D. WATER RESOURCES				
N	D	V	S	D.1: An existing map of the boundaries and flow directions of major watershed units and minor watershed units.
	X			
Technical Assistance Comments: This information is in the public domain and may be used to delineate the surface water contribution area of the WHPA.				
N	D	V	S	D.2: An existing map and a list of public waters as defined in Minnesota Statutes, section 103G.005, subdivision 15, and public drainage ditches.
X				
Technical Assistance Comments:				
N	D	V	S	D.3: The shoreland classifications of the public waters listed under sub-item (2), pursuant to part 6120.3000 and Minnesota Statutes, sections 103F.201 to 103F.221.
X				
Technical Assistance Comments:				
N	D	V	S	D.4: An existing map of wetlands regulated under Chapter 8420 and Minnesota Statutes, section 103G.221 to 103G.2373.
X				
Technical Assistance Comments:				
N	D	V	S	D.5: An existing map showing those areas delineated as floodplain by existing local ordinances.
X				
Technical Assistance Comments:				

DATA ELEMENTS ABOUT THE LAND USE

E. LAND USE				
N	D	V	S	E.1: An existing map of parcel boundaries.
	X			
Technical Assistance Comments: This information may be helpful in delineating the DWSMA, if available. If this information is provided, identification numbers must be provided for each parcel. An electronic format for the map is preferable.				
N	D	V	S	E.2: An existing map of political boundaries.
	X			
Technical Assistance Comments: Please provide this information if the boundaries have been updated/changed. This information may be helpful in delineating the DWSMA. An electronic format for the map is preferable.				
N	D	V	S	E.3: An existing map of public land surveys, including township, range, and section.
	X			
Technical Assistance Comments: This information is available in the public domain and may be helpful in delineating the DWSMA.				
N	D	V	S	E.4: A map and an inventory of the current and historical agricultural, residential, commercial, industrial, recreational, and institutional land uses and potential contaminant sources.
X				
Technical Assistance Comments:				

N	D	V	S	E.5: An existing, comprehensive land-use map.
X				

Technical Assistance Comments:

N	D	V	S	E.6: Existing zoning map.
X				

Technical Assistance Comments:

F. PUBLIC UTILITY SERVICES

N	D	V	S	F.1: An existing map of transportation routes or corridors.
	X			

Technical Assistance Comments: This information is available in the public domain and may be helpful in delineating the DWSMA.

N	D	V	S	F.2: An existing map of storm sewers, sanitary sewers, and the public water supply systems.
	X		X	

Technical Assistance Comments: Do not submit a map of the storm sewers and sanitary sewers.

N	D	V	S	F.3: An existing map of gas and oil pipelines used by gas and oil suppliers.
X				

Technical Assistance Comments:

N	D	V	S	F.4: An existing map or list of public drainage systems.
	X	X		

Technical Assistance Comments: This information is available in the public domain and may be helpful in delineating the DWSMA.

N	D	V	S	F.5: An existing record of construction, maintenance, and use of the public water supply well(s) and other wells within the DWSMA.
	X	X		

Technical Assistance Comments: If the information is different than that on-file with MDH, please provide 1) the pumping rates for the current and previous years, and the projected annual pumping rates for the next five years for each well in the PWS; and 2) well record(s) for the PWS well(s). Information about the PWS well(s) may affect the vulnerability assessment due to rehabilitation/reconstruction of a well or changes in pumping rates.

DATA ELEMENTS ABOUT WATER QUANTITY

G. SURFACE WATER QUANTITY

N	D	V	S	
	X	X		**G.1:** G.1: An existing description of high, mean, and low flows on streams.

Technical Assistance Comments: This information is available in the public domain and may be used to determine hydraulic connections between surface water bodies and the aquifer(s) of concern.

N	D	V	S	
	X			G.2: An existing list of lakes where the state has established ordinary high water marks.

Technical Assistance Comments: This information is available in the public domain. The information may be used to determine the WHPA.

N	D	V	S	
	X	X		G.3: An existing list of permitted withdrawals from lakes and streams, including source, use, and amounts withdrawn.

Technical Assistance Comments: Only required if different from the DNR database. Surface water bodies may be in direct hydraulic connection with the aquifer(s) of concern and withdrawals may affect water levels in both the surface water and adjacent groundwater systems.

N	D	V	S	
	X			G.4: An existing list of lakes and streams for which state protected levels or flows have been established.

Technical Assistance Comments: This information is available in the public domain and may be used to determine hydraulic connections between surface water bodies and the aquifer(s) of concern.

N	D	V	S	
	X	X	X	G.5: An existing description of known water-use conflicts, including those caused by groundwater pumping.

Technical Assistance Comments: Please notify MDH of surface water/well interference problems of which the PWS is aware. Conflicts between use of groundwater resources and surface water bodies would indicate a hydrologic boundary that would need to be considered in delineating the WHPA.

H. GROUNDWATER QUANTITY

N	D	V	S	
	X	X		H.1: An existing list of wells covered by state appropriation permits, including amounts of water appropriated, type of use, and aquifer source.

Technical Assistance Comments: Please submit this information for wells that are not permitted by the DNR because this information may be useful in identifying the hydrologic boundary conditions that could affect the size and shape of the WHPA boundaries.

N	D	V	S	
	X	X	X	H.2: An existing description of known well interference problems and water-use conflicts.

Technical Assistance Comments: Please notify MDH of well interference problems of which the PWS is aware. Interference problems with other wells, if present, likely indicate a hydrologic boundary that would need to be considered in making the WHPA delineation.

N	D	V	S	
	X	X		H.3: An existing list of state environmental boreholes, including unique well number, aquifer measured, years of record, and average monthly levels.

Technical Assistance Comments: Only submit monthly water level measurements (with unique well numbers and dates) that are not in the public domain.

DATA ELEMENTS ABOUT WATER QUALITY

I. SURFACE WATER QUALITY

N	D	V	S	
X				I.1: An existing map or list of the state water quality management classification for each stream and lake.

Technical Assistance Comments:

N	D	V	S	
		X	X	I.2: An existing summary of lake and stream water quality monitoring data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; 3. organic chemicals; 4. sedimentation; 5. dissolved oxygen; and 6. excessive growth or deficiency of aquatic plants.

Technical Assistance Comments: This information can be used to evaluate surface water/groundwater interactions and aquifer water quality. Submit if the PWS has information that is not available in the public domain.

J. GROUNDWATER QUALITY

N	D	V	S	
	X	X	X	J.1: An existing summary of water quality data, including: 1) bacteriological contamination indicators; 2) inorganic chemicals; and 3) organic chemicals.

Technical Assistance Comments: Submit if the PWS has information that is not available in the public domain because the information may help explain groundwater flow paths.

N	D	V	S	
	X	X	X	J.2: An existing list of water chemistry and isotopic data from wells, springs, or other groundwater sampling points.

Technical Assistance Comments: Submit if the PWS has information that is not available in the public domain because the information may help explain groundwater flow paths.

N	D	V	S	
	X	X		J.3: An existing report of groundwater tracer studies.

Technical Assistance Comments: Submit if the PWS has information that is not available in the public domain because the information may help explain groundwater flow paths.

N	D	V	S	
		X	X	J.4: An existing site study and well water analysis of known areas of groundwater contamination.

Technical Assistance Comments: Submit if the PWS has information on contaminant sources not available in the public domain because these reports may contain additional geologic or hydrogeologic information.

N	D	V	S	
X				J.5: An existing property audit identifying contamination.

Technical Assistance Comments:

N	D	V	S	
	X	X		J.6: An existing report to the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency of contaminant spills and releases.

Technical Assistance Comments: Notify MDH of reports on spills or contaminant releases that are on-file with the PWS or city but are not in the public domain. These reports do not need to be submitted but MDH staff would like to review reports.

Summary of Data Request

Specific Data to be Provided to MDH by PWS

The above table identifies the kinds of information that could facilitate the delineation and assessment of the vulnerability of your wellhead protection areas. Most of this information is available in the public domain and will be summarized by MDH for you. However, the city may have access to important information that is not easily accessible to MDH and may be needed during this process. At the scoping meeting we identified two items that would be immediately helpful:

1) The Volume of water pumped by each well in 2011 and 2012, and
2) Any pumping test information from the wells. This will look like a two-column list of time (usually minutes) and water level measurements and should also not the pumping rate of the well.

Table 1
Public Water Supply Well Information
City of Barnesville, Minnesota

Local Well ID	Unique Number	Use / Status	Case Diameter (inches)	Case Depth (feet)	Well Depth (feet)	Date Constructed / Reconstructed	Aquifer	Well Vulnerability
8	411249	Primary	8	45	77	01/11/1985	QWTA*	Vulnerable
9	411250	Primary	12	56	86	10/31/1985	QWTA*	Vulnerable
10	759855	Primary	10	55	80	06/17/2008	QWTA*	Vulnerable

*Quaternary Water Table Aquifer

Table 2
Annual Volume of Water Pumped from City of Barnesville Wells

SWUDS Permit ID	Well Name	Unique No.	2006	2007	2008	2009	2010	2011	2012	Daily Volume
811088	8	411249	**66.507**	46.487	24.800	39.087	25.642			
811088	9	411250	28.180	35.069	**39.607**	18.293	25.642			
1981-1088	10	759855	0	0	14.277	**39.687**	25.609			

(Expressed as millions of gallons. **Bolding** indicates greatest annual pumping volume.)

MINNESOTA MDH DEPARTMENT OF HEALTH

Protecting, maintaining and improving the health of all Minnesotans

May 30, 2014

Mr. Michael Rietz, Administrator
City of Barnesville
P.O. Box 550
Barnesville, Minnesota 56514-0550

Dear Mr. Rietz:

Subject: **Scoping 2 Decision Notice and Meeting Summary – City of Barnesville– PWSID 1140001**

This letter provides notice of the results of the second scoping meeting I held with you, Dan Lubbesmeyer, and Karen Lauer (city of Barnesville), Marilyn Bayerl (Consultant), and Mike Strodtman (Minnesota Rural Water Association (MRWA) on May 6, 2014, at Barnesville City Hall regarding Part II of your wellhead protection (WHP) plan. During the meeting, we discussed data elements that must be included and used to prepare the part of the WHP plan related to the management of potential contaminants in the approved drinking water supply management area. The enclosed Scoping 2 Decision Notice lists the data elements that were discussed at the meeting. We also discussed a summary of planning issues that were identified during the Part I WHP Plan development process which should be considered for inclusion in your Part II WHP Plan.

The city of Barnesville has met the requirements to distribute copies of the first part of the WHP plan to local units of government and hold an informational meeting for the public. The city of Barnesville will have until December 16, 2014, to complete its WHP plan.

If a data element is marked on the enclosed notice as a data element that must be used and it does not exist, it is helpful if your plan notes this. MDH understand Bayerl Water Resources will be working with you to develop a draft of the remainder of the WHP plan. I will be contacting you to review the progress of the development of Part II of your plan. If you have any questions regarding the enclosed notice, contact me by email at george.minerich@state.mn.us or by phone at 320/223-7314.

Sincerely,

George Minerich, Planner
Source Water Protection Unit
Environmental Health Division
3333 West Division Street - Suite 212
St. Cloud, Minnesota 56301

GEM:ds-b
Enclosures
cc: Marilyn Bayerl, Bayerl Water Resources
Mike Strodtman, Minnesota Rural Water Association
Steven Pederson, MDH Engineer, Fergus Falls District Office
Ron Struss, Minnesota Department of Agriculture

SCOPING 2 DECISION NOTICE
Moderately Vulnerable DWSMA

Remainder of the Wellhead Protection Plan

Name of Public Water Supply:		**Date:**
City of Barnesville **PWSID 1140001**		May 30, 2014
Name of the Wellhead Protection Manager:		
Michael Rietz, Administrator		
Address:	**City:**	**Zip:**
P.O. Box 550	Barnesville	56514-0550
Unique Well Numbers:		**Phone:**
41129 (Well 8), 411250 (Well 9). 759855 (Well 10)		(218) 354-2292

Instructions for Completing the Scoping 2 Form

N	R	S	
X			**N = Not required.** If this box is checked, this data element is **NOT** necessary for your wellhead protection plan because it is not needed or it has been included in the first scoping decision notice. **Please go to the next data element.**

N	R	S	
	X		**R = Required for the remainder of the plan.** If this box is checked, this data **MUST** be used for the **"remainder of the plan."**

N	R	S	
		X	**S = Submit to MDH.** If this box is checked, this data element **MUST** be included in your **wellhead protection plan and submitted to MDH.** If there is **NO** check mark in the **"S"** box but there is an **"X"** in the **"R"** box, this data element **MUST** be included in your plan, but should **NOT be submitted to MDH**. This box will only be checked if MDH does not have access to this data element. This will help to reduce the cost by reducing the amount of paper and time to reproduce the data element.

Note: Any data elements required in the first scoping decision notice must also be used to complete the remainder of the wellhead protection plan.

DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT

PRECIPITATION

N	R	S	
X			An existing map or list of local precipitation gauging stations.

Technical Assistance Comments:

N	R	S	
X			An existing table showing the average monthly and annual precipitation in inches for the preceding five years.

Technical Assistance Comments:

GEOLOGY

N	R	S	
	X		An existing geologic map and a description of the geology, including aquifers, confining layers, recharge areas, discharge areas, sensitive areas as defined in Minnesota Statutes, section 103H.005, subdivision 13, and groundwater flow characteristics.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.

N	R	S	
	X		Existing records of the geologic materials penetrated by wells, borings, exploration test holes, or excavations, including those submitted to the department.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.

N	R	S	
	X		Existing borehole geophysical records from wells, borings, and exploration test holes.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect the geology of the area(s).

N	R	S	
	X		Existing surface geophysical studies.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect the geology of the area(s).

SOILS

N	R	S	
X			Existing maps of the soils and a description of soil infiltration characteristics.

Technical Assistance Comments:

N	R	S	
X			A description or an existing map of known eroding lands that are causing sedimentation problems.

Technical Assistance Comments:

WATER RESOURCES			
N	R	S	An existing map of the boundaries and flow directions of major watershed units and minor watershed units.
X			
Technical Assistance Comments:			
N	R	S	An existing map and a list of public waters as defined in Minnesota Statutes, section 103G.005, subdivision 15, and public drainage ditches.
X			
Technical Assistance Comments:			
N	R	S	The shoreland classifications of the public waters listed under subitem (2), pursuant to part 6120.3000 and Minnesota Statutes, sections 103F.201 to 103F.221.
X			
Technical Assistance Comments:			
N	R	S	An existing map of wetlands regulated under Chapter 8420 and Minnesota Statutes, section 103G.221 to 103G.2373.
X			
Technical Assistance Comments:			
N	R	S	An existing map showing those areas delineated as floodplain by existing local ordinances.
X			
Technical Assistance Comments:			

DATA ELEMENTS ABOUT THE LAND USE

LAND USE			
N	R	S	An existing map of parcel boundaries.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing map of political boundaries.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing map of public land surveys including township, range, and section.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	
	X	X	A map and an inventory of the current and historical agricultural, residential, commercial, industrial, recreational, and institutional land uses and potential contaminant sources.

Technical Assistance Comments: The inventory, mapping and management of land uses and potential sources of contamination for all the Drinking Water Supply Management Areas(s) must reflect what is known about these data elements, as follows:

Moderate Vulnerability:

1) all potential contaminant sources and facility designations as listed on the attachment
2) a land use/land cover map and table,
3) an inventory of the Inner Wellhead Management Zone (IWMZ)

In the Emergency Response Area (only) Inventory the following potential contaminant sources in addition to the items normally included in a Moderate Vulnerability PCSI:

- stormwater Infiltration ponds and stormwater outfalls
- manure land application sites
- sewage sludge land application sites
- sewer lines
- subsurface sewage treatment systems (septic systems)

As a starting point, MDH will provide a 2006 land cover map and table from federal data bases. This data set must be used unless an alternative electronic data set that is more current and detailed is available.

Management strategies must be developed for all land uses and potential sources of contamination.

N	R	S	
	X	X	An existing comprehensive land-use map.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X	X	Existing zoning map.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

PUBLIC UTILITY SERVICES

N	R	S	
	X		An existing map of transportation routes or corridors.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X	X	An existing map of storm sewers, sanitary sewers, and public water supply systems.

Technical Assistance Comments: It is not necessary to include a map of your public water supply system in your plan if you feel it would pose a threat to the security of your system. An existing map of the storm sewers and sanitary sewers in the Drinking Water Supply Management Area(s) must be included in the wellhead protection plan and must also be submitted to MDH as part of the approval.

N	R	S	
	X	X	An existing map of the gas and oil pipelines used by gas and oil suppliers.
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	
	X		An existing map or list of public drainage systems.
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	
	X		An existing record of construction, maintenance, and use of the public water supply well and other wells within the drinking water supply management area.
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			

DATA ELEMENTS ABOUT WATER QUANTITY

SURFACE WATER QUANTITY			
N	R	S	
X			An existing description of high, mean, and low flows on streams.
Technical Assistance Comments:			
N	R	S	
X			An existing list of lakes where the state has established ordinary high water marks.
Technical Assistance Comments:			
N	R	S	
X			An existing list of permitted withdrawals from lakes and streams, including source, use, and amounts withdrawn.
Technical Assistance Comments:			
N	R	S	
X			An existing list of lakes and streams for which state protected levels or flows have been established.
Technical Assistance Comments:			
N	R	S	
X			An existing description of known water-use conflicts, including those caused by groundwater pumping.
Technical Assistance Comments:			

GROUNDWATER QUANTITY			
N	R	S	An existing list of wells covered by state appropriation permits, including amounts of water appropriated, type of use, and aquifer source.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing description of known well interference problems and water use conflicts.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing list of state environmental bore holes, including unique well number, aquifer measured, years of record, and average monthly levels.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

DATA ELEMENTS ABOUT WATER QUALITY

SURFACE WATER QUALITY			
N	R	S	An existing map or list of the state water quality management classification for each stream and lake.
X			
Technical Assistance Comments:			
N	R	S	An existing summary of lake and stream water quality monitoring data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; 3. organic chemicals; 4. sedimentation; 5. dissolved oxygen; and 6. excessive growth or deficiency of aquatic plants.
X			
Technical Assistance Comments:			

GROUNDWATER QUALITY			
N	R	S	An existing summary of water quality data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; and 3. organic chemicals.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing list of water chemistry and isotopic data from wells, springs, or other groundwater sampling points.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing report of groundwater tracer studies.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	
	X		An existing site study and well water analysis of known areas of groundwater contamination.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.

N	R	S	
	X		An existing property audit identifying contamination.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X		An existing report to the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency of contaminant spills and releases.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

Barnesville Scoping 2 Meeting
Wellhead Protection (WHP) Planning Issues Summary

Drinking Water Protection Issues Identified to Date:

- The clay-rich geologic materials covering the aquifer are thin, discontinuous, or leaky.

Water Quality Detections and Implications:

- The detection of tritium indicates captures young (post-1953) recharge indicating the aquifer is dominated by young recharge. Wells 8 & 10 are moderate while Well 9 exhibits high vulnerability.
- Chloride is elevated (see Table 8 in Part I Plan). The chloride/bromide ratio suggests the elevated chloride is likely due to man-made impacts but too low for road salt (Mullaney et. al., 2009).
- Low levels of nitrate and naturally occurring arsenic below health standards detected.

Old Municipal Well Information:

- The Minnesota Department of Health has compiled historical information for use in the planning process.

Sanborn Maps:

XX Sanborn Maps are available for this area

☐ Sanborn Maps are not available for this area.

Recommended WHP Measures:

MDH Hydro Barnesville Part 2 Recommendations:

There are two uncertain exposure pathways that could be eliminated with some additional information. First, there wasn't sufficient information to determine if contaminants from Whisky Creek could be captured by the city wells. Second, the geologic information from the logs of the city wells suggest that a protective layer above the aquifer typically found in the DWSMA may be missing near the wells.

Whisky Creek and the city wells should be sampled and analyzed for pesticides, nitrate, stable isotopes of water, bromide and chloride. Field parameters (pH, temperature, conductivity, dissolved oxygen and oxidation-reduction potential) should be measured at each location. The modeling for the amendment suggests that the travel time from the creek to the city wells is approximately 11 years. Past results suggest that stable isotopes may not provide an effective evaluation of creek water intercepted by the wells because the creek water may not have sufficient residence time to show an evaporative signature. This suggests that long term sampling may be necessary to identify a component of creek water on the city wells or to infer that there is some physical process removing contaminants before they get to the wells. One sample should be collected from both the wells and the creek in August, at least two days after any precipitation and preferably after a dry, hot period when

evaporation and pumping at are their peak. A second sample should be collected from the city wells approximately six months later (February). To save on costs associated with possible non-detection of pesticides, the creek and well samples should be submitted for nitrate analysis first. If nitrate is detected at the creek and not the wells, an assimilative capacity boundary can be invoked and no additional sampling is needed. If no nitrate is detected in the creek, then the pesticide sample from the creek should be submitted for analysis. If no pesticides are detected, the well samples can be discarded. If the creek samples are positive, then the well samples should also be submitted for pesticide analysis.

Better estimates of the flow in Whisky Creek would improve the quality of the model by reducing the uncertainty of this parameter. As noted in the delineation report, flow in the creek was measured monthly in 1965 and 1966 where the creek passes through a culvert between Barnesville and I94. Additional measurements excluding March through July would be very helpful.

The aquifer vulnerability at the city wells could be evaluated using down-hole gamma and resistivity logging when the wells have had their pumps removed for service. In particular, the log for Well #9 (411250, see tag on the well) shows little, if any fine grained material above the aquifer, which is not consistent with the two adjacent city wells. Logging would be necessary on well #9 and one of the other adjacent wells for comparison.

Other:

Scoping 2 Document amended to include:

In the Emergency Response Area (only) Inventory the following potential contaminate sources in addition to the items normally included in a Moderate Vulnerability PCSI:

- stormwater Infiltration ponds and stormwater outfalls
- manure land application sites
- sewage sludge land application sites
- sewer lines
- subsurface sewage treatment systems (septic systems)

*This document is intended to be a summary of issues identified to date and is **not intended to replace the required data elements identified in the Scoping 2 Decision Notice** nor is it intended to be an exhaustive list of all potential drinking water issues.*

Potential Contaminants Located within the City of Barnesville DWSMA

MAP LOCATION	PCS MATERIAL CODE	FACILITY CODE	PARCEL ID	MPCA_ID	OWNERS NAME	PROPERTY ADDRESS	ACTIVITY	STATUS	ZONING
16	SPL	2116	50.900.0244	15137	Deans Bulk Service	I 94 & Highway 34	Leak Site - Spilled Lube Oil (Closed in 2008)	Inactive	Highway Industrial
17	AST-F000	2116	50.900.0240	50963	Deans Bulk Service Inc	1677 7th Avenue NE	Above Ground Storage Tanks >1,100 Gallons - 28	Active	Highway Industrial
18	UST-F000	2116	50.900.0240		Deans Bulk Service Inc	1677 7th Avenue NE	Underground Storage Tanks - 3	Active	Highway Industrial
19		4000			MNDOT	I 94 & Highway 34	Transportation Corridor		
ERA	SWB	4000	50.053.0080		City of Barnesville	1301 4th Avenue NE	Stormwater Basin - 2		Commercial Park
ERA	SROUT	4000	50.235.0070 50.053.0080		City of Barnesville	1407 2nd Avenue NE 1301 4th Avenue NE	Stormwater Outfall - 3		Commercial Park
ERA	Sewer Lines	4000	multiple				Sewer Lines		
				UNIQUE WELL NO			**DEPTH FT_____USE**		
1	WEL	4000	50.835.0020	411249	Barnesville City Well #8	201 13th Street NE	77 City Well	Active	Multi-Family Residential
2	WEL	4000	50.835.0020	411250	Barnesville City Well #9	201 13th Street NE	86 City Well	Active	Multi-Family Residential
3	WEL	4000	50.835.0020	759855	Barnesville City Well #10	201 13th Street NE	80 City Well	Active	Multi-Family Residential
4	WEL	1100-01	16.028.2000	Unknown	Janet Holt	16408 200th St South	Unk Domestic	Active	General Agriculture
5	WEL	2000	16.028.2202	262418	Galaxie Supper Club, Sports Bar & Lanes	20063 Hwy 34 South	Unk Public	Active	Highway Commercial
6	WEL	1100-01	16.028.3000	Unknown	Edward &Marlys Mulcahy	16532 200th St South	Unk Domestic	Active	General Agriculture
7	WEL	1100-01	16.028.3201	Unknown	David & Diane Barnard	16564 200th St South	Unk Domestic	Active	General Agriculture
8	WEL	1100-01	16.028.3202	628893	Pat Mulcahy	16600 200th St South	40 Domestic	Active	General Agriculture
9	WEL	1100-01	16.029.0261	779900	Brad Hammer	502 190th Street NE	42 Domestic	Active	Commercial
10	WEL	2110	16.029.1101	Unknown	Thomas Kennedy	19809 Hwy 34 South	Unk Domestic	Active	Highway Commercial
11	WEL	2114	16.029.1102	611050	Kenneth Lemke	21075 Hwy 34 South	73 Domestic	Active	Highway Commercial
12	WEL	2000	16.029.1103	757448	Renee's Drive Inn	19765 Hwy 34 South	75 Public	Active	Highway Commercial
13	WEL	9000	16.029.2201	599095	Darrel Thomas	602 190th Street NE	53 Irrigation	Active	Commercial
14	WEL	1100-01	16.029.2401	564144	Neil Josephson	19251 Hwy 34	61 Domestic	Active	General Agriculture
15	WEL	2116	50.900.0240	163160	Deans Bulk Service Inc	1677 7th Avenue NE	77 Domestic	Active	Highway Industrial

City of Barnesville WHPP Part II - Appendix III

Minnesota Unique Well No.
409237

County Clay
Quad Barnesville
Quad ID 240B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes Chapter 103I

Entry Date 02/08/1989
Update Date 02/14/2014
Received Date

Well Name BARNESVILLE OB-2
Township Range Dir Section Subsections Elevation 1042 **ft.**
137 45 W 30 ADADBC **Elevation Method** 7.5 minute topographic map (+/- 5 feet)

Well Depth	Depth Completed	Date Well Completed
82 **ft.**	73 **ft.**	11/19/1984

Drilling Method Non-specified Rotary

Well Address
BARNESVILLE MN

Geological Material	Color	Hardness	From	To
GRAVEL & CLAY MIXED	VARIED		0	9
GRAVEL & CLAY MIXED	VARIED		9	14
SANDY CLAY & GRAVEL	BLUE		14	21
SAND & GRAVEL	VARIED		21	27
SANDY CLAY	BLUE		27	30
SAND & GRAVEL	VARIED		30	38
SAND & GRAVEL W/CLAY LENSES	VARIED		38	40
SAND & GRAVEL	VARIED		40	48
SAND & GRAVEL, LITTLE FINER	VARIED		48	59
SAND & GRAVEL	VARIED		59	61
SAND & GRAVEL, FINE			61	75
SANDY CLAY			75	82

Drilling Fluid --

Well Hydrofractured? ☐ Yes ☐ No
From Ft. to Ft.

Use Observation well

Casing Type Steel (black or low carbon) **Joint** Threaded **Drive Shoe?** ☐ Yes ☑ No **Above/Below** 2 **ft.**

Casing Diameter	Weight	Hole Diameter
2 in. to 55 ft.	3.65 lbs./ft.	6.25 in. to 73 ft.

Open Hole from ft. to ft.

Screen YES **Make** JOHNSON **Type** stainless steel

Diameter	Slot/Gauze	Length	Set Between
2	25	20	53 ft. and 73 ft.

Static Water Level
12.6 ft. from Land surface Date Measured 11/20/1984

PUMPING LEVEL (below land surface)
ft. after hrs. pumping g.p.m.

Well Head Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☑ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

REMARKS
OBSERVATION WELL #2, TEST HOLE #4.

Grouting Information Well Grouted? ☑ Yes ☐ No

Grout Material: Bentonite from to ft.

Located by:

Method: Digitization (Screen) - Map (1:24,000)

Unique Number Verification: Information from owner

Input Date: 07/12/2010

System: *UTM - Nad83, Zone15, Meters*

X: 239426 **Y:** 5172399

Nearest Known Source of Contamination
_feet _direction _type
Well disinfected upon completion? ☑ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name Model number HP Volts
Length of drop Pipe ft. Capacity g.p.m Type Material

Abandoned Wells Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Well Contractor Certification

Ltp Enterprises	91353	WIEDERHOLT, D
License Business Name	Lic. Or Reg. No.	Name of Driller

First Bedrock
Last Strat clay+sand
Aquifer Quat. Buried Artes. Aquifer
Depth to Bedrock ft.

County Well Index Online Report

409237

Printed 6/3/2014
HE-01205-07

City of Barnesville WHPP Part II - Appendix III

Minnesota Unique Well No.

409238

County Clay
Quad Barnesville
Quad ID 240B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 103I

Entry Date 02/08/1989
Update Date 07/12/2010
Received Date

Well Name BARNESVILLE OB-1

Township Range Dir Section Subsections Elevation 1042 **ft.**

137 45 W 30 ADAACD **Elevation Method** 7.5 minute topographic map (+/- 5 feet)

Well Depth	Depth Completed	Date Well Completed
250 **ft.**	74 **ft.**	11/13/1984

Drilling Method Non-specified Rotary

Drilling Fluid --

Well Hydrofractured? ☐ Yes ☐ No From Ft. to Ft.

Use Observation well

Casing Type Steel (black or low carbon) **Joint** Threaded **Drive Shoe?** ☐ Yes ☑ No **Above/Below** 2.5 **ft.**

Casing Diameter	Weight	Hole Diameter
2 in. to 61.5 ft.	3.65 lbs./ft.	6.25 in. to 74 ft.

Open Hole from ft. to ft.

Screen YES **Make** JOHNSON **Type** stainless steel

Diameter	Slot/Gauze	Length	Set Between
2	12	15	59 ft. and 74 ft.
2	18	15	59 ft. and 74 ft.

Static Water Level
ft. from Date Measured

PUMPING LEVEL (below land surface)
ft. after hrs. pumping g.p.m.

Well Head Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☑ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Geological Material	Color	Hardness	From	To
SAND & GRAVEL, COARSE	VARIED		0	33
SAND & GRAVEL W/CLAY LENSES	VARIED		33	39
SAND & GRAVEL	VARIED		39	41
SANDY CLAY	BLUE		41	47
SAND	BLUE		47	53
SAND W/LENSES OF CLAY	BLUE		53	55
SANDY CLAY	BLUE		55	57
SANDY CLAY W/LENSES OF SAND	BLUE		57	68
SAND & GRAVEL	VARIED		68	70
SANDY CLAY	BLUE		70	71
SAND & GRAVEL	VARIED		71	74
SANDY CLAY (ROCKY)	BLUE	HARD	74	100
SANDY CLAY, ROCKY	BLUE		100	181
SAND W/LENSES OF CLAY	BLUE		181	184
SANDY CLAY, ROCKY	BLUE		184	244
DECOMPOSED	GREEN		244	249
DECOMPOSED, VERY ROCKY	GREEN		249	250

REMARKS
OBSERVATION WELL #1

Grouting Information Well Grouted? ☑ Yes ☐ No

Grout Material: Bentonite from to ft.

Located by:

Method: Digitization (Screen) - Map (1:24,000)

Unique Number Verification: Information from owner

Input Date: 07/12/2010

System: *UTM - Nad83, Zone15, Meters*

X: 239468 **Y:** 5172455

Nearest Known Source of Contamination
__feet __direction __type

Well disinfected upon completion? ☑ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name Model number __ HP _ Volts
Length of drop Pipe _ ft. Capacity _ g.p.m Type Material

Abandoned Wells Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Well Contractor Certification

Ltp Enterprises	91353	WIEDERHOLT, D
License Business Name	Lic. Or Reg. No.	Name of Driller

First Bedrock weathering residuum unc.age

Last Strat weathering residuum unc.age

Aquifer Quat. Buried Artes. Aquifer

Depth to Bedrock 244 **ft.**

County Well Index Online Report

409238

Printed 6/3/2014
HE-01205-07

REPAIR ORDER

LTP Enterprises Inc. Leonard T. Pulkrabek
P. O. BOX 2131 FARGO, N. DAK. 58102 PHONE 232-8928

PA - 6/30/88

Job No. 11226 C.B Commitment Date A.S.A.P. Sold by L.T.P.

Owner Name Renter City of Barnesville Phone Dave Pederson 354-2292 city 354-7251 home Date 4/5/88

City Barnesville, mn. Location

Stop in to see Dave & he'll show you.

CUSTOMER INFORMATION

Size of well Depth of well Age Did we drill Screen Size and type

Screen Changed last Pressure system Type of pump Did we install

Pit Pitless House Drop pipe Rod Windmill

Promises and commitments Pull 2" Obs. Wells

JOB INFORMATION

Size of well Depth of well Static level Screen Size and type

Type of pump 6 Make Model Serial No.

Size of motor Voltage Pump installed by

Length of drop pipe Size and type material of drop pipe Total pump setting

Pump Rod Length Rod Size Cylinder Size Air Charging System

Type of tank Size Pit Frost Proof House

Pitless Make Size Type Bury Depth

Additional information pertaining to pump and system

Job Completed yes Date 6/28/88 Signed A. Pulkrabek

LABOR AND EXPLANATION OF WORK

Number of men 2 Equipment 73 Job hours 1 1/2 Travel hours 1/2 Shop hours 1/2 Total hours 2 1/2

	J	T	S
6/28/88			
Al & Mike G loaded & drove out. Pulled 2 2" obs. wells. Tore down & drove in. The city man said they would fill in the open holes.	1 1/2	1/2	1/2

PARCELS LOCATED WITHIN THE CITY OF BARNESVILLE DWSMA

Parcel_ID	TAX_NAME	ADDRESS	CITY	ST	ZIP	CLASS
50.227.0120	LIEN DOUGLAS L & VIRGINIA M	502 12TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.227.0110	STETZ MICHAEL & SARA	410 12TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.227.0100	JERGER RONALD W & DEBRA J	PO BOX 61	BARNESVILLE	MN	56514	100 Res 1 unit
50.227.0090	SCHMITZ DAVID & CHRISTINE	406 12TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.227.0080	HANSON JEFFREY A & SUSAN E	404 12TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.227.0060	YOKOM WILLIAM J & CATHERINE L	1102 4TH AVE SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.227.0070	SOGN DAVID V & CYNTHIA B	1104 4TH AVE SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0240	FANKHANEL GAY	PO BOX 435	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0130	HERFINDAHL CRAIG J & SHARON J	306 11TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0120	HERFINDAHL CRAIG J & SHARON J	306 11TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0230	FANKHANEL GAY	PO BOX 435	BARNESVILLE	MN	56514	100 Res 1 unit
16.028.3202	MULCAHY PATRICK E & SARAH M	16600 200TH ST S	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0140	BROWN DAVID W SR & LINDA	304 11TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0110	BROWN DAVID W SR & LINDA	304 11TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0220	FANKHANEL GAY	PO BOX 435	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0100	SWENSON NATHAN R	302 11TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
16.028.3201	BARNARD DAVID & DIANE	16564 200TH ST S	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0160	PEPPEL KELLY & CHRISTINE	206 11TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0210	FANKHANEL GAY	PO BOX 435	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0090	PEPPEL KELLY & CHRISTINE	206 11TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0170	WALTERS DANIEL & KARI	204 11TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0180	HENG STANLEY & MARLYS	202 11TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0070	COOPER ROGER D & RUTH A	PO BOX 111	BARNESVILLE	MN	56514	100 Res 1 unit
50.300.0190	PEARSON MICHAEL J	1202 2ND AVE SE	BARNESVILLE	MN	56514	100 Res 1 unit
16.029.0260	GILBERTSON EDWARD & PATRICIA	1514 9 AVE SE	BARNESVILLE	MN	56514	200 Agricultural
16.029.3800	GILBERTSON EDWARD & PATRICIA	1514 9 AVE SE	BARNESVILLE	MN	56514	200 Agricultural
50.900.0252	GILBERTSON EDWARD & PATRICIA	1514 9 AVE SE	BARNESVILLE	MN	56514	200 Agricultural
16.028.3000	MULCAHY EDWARD & MARLYS	16532 200TH ST S	BARNESVILLE	MN	56514	200 Agricultural 211 Rural Vacant Land
50.235.0180	HAJ GEORGE & TAVA	1518 17TH ST S	MOORHEAD	MN	56560	140 Res V Land
50.235.0240	OLSON CHRISTOPHER & STACY	112 14TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0250	SEEFELDT PHILLIP & JOVONE	111 15TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0360	HENRICKSON TODD & LORI A	812 4 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0060	JUVE DAVID L & MONA L	201 11TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0050	SWENSON TIMOTHY D & KELLY	1101 2ND AVE SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0040	RASMUSSEN JEFF & SUZANNE	1103 2ND AVE SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0030	GARCIA FELIX & KAY TEMANSON	1105 2ND AVE SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0020	SYTSMA MATTHEW R & STACIA	1201 2ND AVE SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0010	BELLEFEUILLE DAVID & MICHELLE	1203 2ND AVE SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0170	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0230	ROSENTHAL JERRY L & BREANN L	110 14TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0260	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0350	PETERSON KIRK C & BETHANY M	PO BOX 296	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0070	WALSETH LISA	1102 MAIN AVE E	BARNESVILLE	MN	56514	100 Res 1 unit
50.900.0480	BROWN DENNIS J	1017 2ND AVE SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0080	SWENSON TIMOTHY D & KELLY	1101 2ND AVE SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0090	AMUNDSON ROSS E & BRENDA J	1106 E MAIN	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0100	GRAY ANGELA R	1108 MAIN AVE E	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0110	THOMPSON STEVEN F	13619 100TH ST S	BARNESVILLE	MN	56514	100 Res 1 unit
50.850.0120	ERNST EUGENE R & TAMARA L	1204 MAIN AVE E	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0160	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0220	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0270	MOREY DUANE & ROBYN	107 15TH ST SE	BARNESVILLE	MN	56514	140 Res V Land

PARCELS LOCATED WITHIN THE CITY OF BARNESVILLE DWSMA

Parcel_ID	TAX_NAME	ADDRESS	CITY	ST	ZIP	CLASS
50.235.0340	BOLGREAN JASON & RONDA	108 15TH ST SE	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0140	PELOUBET FRANCIS & CAROLYN	PO BOX 639	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0150	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0210	O'LEARY COREY S	106 14TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0280	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.745.0190	BAUER SCOTT & MEGAN	1101 MAIN AVE E	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0330	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.745.0200	BOEN CALVIN & MILDRED	101 12TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0130	BARNESVILLE ECON DEVELOP AUTH	PO BOX 550	BARNESVILLE	MN	56514	956 Muni Srvc Ent
16.029.2401	JOSEPHSON NEIL	19251 HWY 34	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0180	BAUER SCOTT & MEGAN	1101 MAIN AVE E	BARNESVILLE	MN	56514	140 Res V Land
50.745.0210	STEGER PETER	2871 COUNTY RD E	BERLIN	WI	54923	952 State Property
50.745.0250	ANDERSON THOMAS H & DELOYCE	1608 1ST AVE N	MOORHEAD	MN	56560	100 Res 1 unit
50.235.0140	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0200	FIELD BRIAN W & MICHELLE M	PO BOX 115	BARNESVILLE	MN	56514	140 Res V Land
50.235.0290	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0320	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.745.0120	BARNESVILLE ECON DEVELOP AUTH	PO BOX 550	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.745.0170	SYVERSON BRETT & TABITHA	106 11TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0220	NEWELL ERIC C & REBECCA K	105 12 ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0230	SALVATORE JAMES G	106 12TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0130	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0190	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0300	BLAKEMAN RICHARD & BARBARA	101 15TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0310	BREDMAN DARIN & AMY J	102 15 ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0110	BARNESVILLE ECON DEVELOP AUTH	PO BOX 550	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.745.0100	BARNESVILLE ECON DEVELOP AUTH	PO BOX 550	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.745.0260	BARNESVILLE CITY OF	PO BOX 550	BARNESVILLE	MN	56514	958 Muni Srvc Other
50.235.0010	KOPP KATHLEEN M	1301 2ND AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0020	SHELLITO SCOTT J & LORAINE R	1303 2ND AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0030	ANDERSON DEVELOPMENT & C/O SCOTT D J ANDERSON	3303 190TH ST N	HAWLEY	MN	56549	100 Res 1 unit
50.235.0040	OLSON GEORGE THOMAS & IVADEL	1401 2ND AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0050	BACHMANN MONTE E	1403 2ND AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0060	LAMB DAVID A & EVA	1405 2ND AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.235.0070	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0080	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0090	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0100	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.235.0110	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.745.0090	STEGER PETER	2871 COUNTY RD E	BERLIN	WI	54923	952 State Property
50.745.0160	HERR KEVIN & KATHY	204 11TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0070	OLSON ERIC & MELISSA	4210 51ST AVE S	FARGO	ND	58104	952 State Property
50.745.0080	GROSS DAVID & ANNA	1006 3RD AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0150	RUFF CARTER & TERI	206 11TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.053.0080	BARNESVILLE CITY OF	PO BOX 550	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.053.0090	BUFFALO-RED RIVER WATERSHED	PO BOX 341	BARNESVILLE	MN	56514	959 Sp Tax District
50.053.0100	BUFFALO-RED RIVER WATERSHED	PO BOX 341	BARNESVILLE	MN	56514	959 Sp Tax District
50.053.0110	BUFFALO RED RIVER WATERSHED	PO BOX 341	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.053.0120	BARNESVILLE ECON DEVELOP AUTH	PO BOX 550	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.053.0140	RICK JASON & KRISTAL	1005 8TH AVE SE	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.053.0150	PETERSON JARED & MARI	PO BOX 301	BARNESVILLE	MN	56514	300 Commercial

PARCELS LOCATED WITHIN THE CITY OF BARNESVILLE DWSMA

Parcel_ID	TAX_NAME	ADDRESS	CITY	ST	ZIP	CLASS
50.835.0010	KASKA PROPERTIES	920 SE 4TH ST	LITTLE FALLS	MN	56345	110 Apt 4+ units
50.835.0020	BARNESVILLE CITY OF	PO BOX 550	BARNESVILLE	MN	56514	958 Muni Srvc Other
50.835.0030	E & F RENTAL	1104 4TH AVE NE #6 P O BOX 340	WALKER	MN	56484	110 Apt 4+ units
16.029.4001	GILBERTSON EDWARD & PATRICIA	1514 9 AVE SE	BARNESVILLE	MN	56514	211 Rural Vacant Land 200 Agricultural
50.745.0040	LOEKS BRETT A & KRISTY D	1003 3RD AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0030	BAKER JEFFREY & LEAH	1005 3RD AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0020	FRONNING BRADLEY & NADIA	1007 3RD AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.745.0010	VOLRATH KEVIN & KARLA	1101 3RD AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0140	FEIGUM JEROME J & JANE	816 4 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0100	HOUGHT CALVIN & ALEXIA	810 4TH AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0110	EBERT DAVID F & JENNIFER L	812 4TH AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0120	LENOUE NICK J & KELLEE D	814 4TH AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.053.0020	BORTNEM FAMILY PARTNERSHIP	55 3RD ST N	FARGO	ND	58102	300 Commercial
50.105.0130	FEIGUM JEROME J & JANE	816 4 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0120	RAMBOW MARK A & TAMMY	402 8TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0110	LOESLIE G SCOTT & REBECCA	803 4TH AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0100	ANDRES JOSHUA A & REBECCA L	805 4TH AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0090	ADRIAN ROGER A & SHIRLEY	807 4TH AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0090	BREDMAN DION A & ANGELA R	809 4TH AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0080	THOENNES RALPH N & JOYCE B	PO BOX 460	BARNESVILLE	MN	56514	100 Res 1 unit
50.106.0030	PACKER BONNIE R	401 11TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0050	BERNIER CLARK & JEAN	802 4 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0060	HOLEN MICHAEL L & JULIE A	804 4TH 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0070	SLININGER JONATHAN P & CORINNE	806 4TH 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0080	SOSSA GREGORY & MELISSA	808 4 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0040	TSCHUMPERLIN GARY & TARA	810 4TH 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0050	POWER ROBERT & BOBBI	812 4 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.106.0010	EENHUIS TERRY & DAWN	813 4TH AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.106.0020	BOOM CHAD & JULIE	403 11TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.740.0010	FOLLINGSTAD MARGARET F	406 11TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0040	SZWEDVIK DONOVAN L & LORETTA	PO BOX 352	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0010	VOTAVA AMBER A	809 4TH 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0010	BEATTIE RYAN & KARA	801 4 1/2 AVE N	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0020	DURENSKY STEVEN K & SHIRLEY	805 4TH 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.100.0030	DURENSKY STEVEN K & SHIRLEY	805 4TH 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0020	HOLTE JON S & JAN M	811 4 1/2 AVE NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.105.0030	SAMUELSON CRAIG J & JODI L	813 4TH 1/2 AVE NE BOX 133	BARNESVILLE	MN	56514	100 Res 1 unit
16.029.0261	HAMMER BRAD A	502 13TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.060.0030	VANWECHEL SCOTT B & CHRISTY A	501 11TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.060.0060	CARR KENWOOD C & PAMELA J	408 11TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.060.0040	HUESMAN MARK A	503 11TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.060.0050	KNUTSON MURIEL	PO BOX 518	BARNESVILLE	MN	56514	100 Res 1 unit
16.029.2802	T3 TOWER 2 LLC	4017 WASHINGTON RD	MCMURRAY	PA	15317	300 Commercial
16.029.2201	THOMAS DARREL L & RUTH A	602 13TH ST NE	BARNESVILLE	MN	56514	300 Commercial 100 Res 1 unit
50.900.0230	THOMAS DARREL L & RUTH A	602 13TH ST NE	BARNESVILLE	MN	56514	300 Commercial
16.030.1100	MINNESOTA STATE OF	50 SHERBURNE AVE #309	ST PAUL	MN	55155	952 State Property

PARCELS LOCATED WITHIN THE CITY OF BARNESVILLE DWSMA

Parcel_ID	TAX_NAME	ADDRESS	CITY	ST	ZIP	CLASS
16.029.1201	TRIPLE L ENTERPRISES & C/O LARRY DAVIS SR	PO BOX 478	BARNESVILLE	MN	56514	300 Commercial
50.053.0130						
16.029.1103	NICKLAY RENEE M	701 7TH AVE SE	BARNESVILLE	MN	56514	300 Commercial
16.029.1102	LEMKE KENNETH & MICHAEL	21075 HWY 34 S	BARNESVILLE	MN	56514	300 Commercial
16.029.1101	KENNEDY THOMAS D	201 E PRAIRIEWOOD DR	FARGO	ND	58103	300 Commercial
16.028.2201	SJK CORP C/O SUPPER CLUBS & LANES	20063 HWY 34 S	BARNESVILLE	MN	56514	300 Commercial
50.060.0020	HINSVERK JOANN M	15756 RIDGEVIEW LN	DETROIT LAKES	MN	56501	100 Res 1 unit
16.028.2202	SJK CORP C/O SUPPER CLUBS & LANES	20063 HWY 34 S	BARNESVILLE	MN	56514	300 Commercial
16.028.2000	HOLT JANET	16408 200TH ST S	BARNESVILLE	MN	56514	200 Agricultural
50.900.0249	BARNESVILLE CITY OF	PO BOX 550	BARNESVILLE	MN	56514	958 Muni Srvc Other
50.740.0020	ST JOHNS EVANGELICAL & LUTHERAN CHURCH	1103 4TH AVE NE	BARNESVILLE	MN	56514	915 Church
16.029.4003	KOST DAVID	2237 FLICKERTAIL DR	FARGO	ND	58103	200 Agricultural
16.029.4002	GILBERTSON BRUCE	1104 4TH AVE NE #2	BARNESVILLE	MN	56514	211 Rural Vacant
16.029.4000	KOST DAVID	2237 FLICKERTAIL DR	FARGO	ND	58103	200 Agricultural
16.029.0263	THOMAS DARREL L & RUTH A	602 13TH ST NE	BARNESVILLE	MN	56514	140 Res V Land
50.900.0244	DEANS BULK SERVICE INC	P O BOX 249	BARNESVILLE	MN	56514	300 Commercial
50.900.0240	DMT PROPERTIES	PO BOX 249	BARNESVILLE	MN	56514	305 Industrial
50.235.0120	DEL ACRES	PO BOX 429	BARNESVILLE	MN	56514	140 Res V Land
50.053.0010	BARNESVILLE ECON DEVELOP AUTH	PO BOX 550	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.054.0040	BARNESVILLE ECON DEVELOP AUTH	PO BOX 550	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.054.0030	BARNESVILLE CITY OF	PO BOX 550	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.054.0010	BARNESVILLE CITY OF	PO BOX 550	BARNESVILLE	MN	56514	956 Muni Srvc Ent
50.054.0020	LANGHALS ENTERPRISES LLC	PO BOX 279	DELPHOS	OH	45833	300 Commercial
50.053.0160	J & J BRATON PROPERTIES	1044 300TH AVE	BARNESVILLE	MN	56514	300 Commercial
50.053.0170	J & J BRATON PROPERTIES	1044 300TH AVE	BARNESVILLE	MN	56514	300 Commercial
50.053.0030	BARNESVILLE HOMES INC	PO BOX 340	BARNESVILLE	MN	56514	300 Commercial
16.029.2800	GILBERTSON EDWARD & PATRICIA	1514 9 AVE SE	BARNESVILLE	MN	56514	200 Agricultural
50.900.0247	GILBERTSON EDWARD & PATRICIA	1514 9 AVE SE	BARNESVILLE	MN	56514	200 Agricultural
50.745.0230	SALVATORE JAMES G	106 12TH ST NE	BARNESVILLE	MN	56514	100 Res 1 unit
50.053.0140	RICK JASON & KRISTAL	1005 8TH AVE SE	BARNESVILLE	MN	56514	956 Muni Srvc Ent

Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

City of Barnesville WHPP Part II - Appendix IV

INNER WELLHEAD MANAGEMENT ZONE (IWMZ) - POTENTIAL CONTAMINANT SOURCE INVENTORY (PCSI) REPORT

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1140001 **COMMUNITY**
NAME	Barnesville
ADDRESS	Barnesville Water Superintendent, People Service Inc., P.O. Box 684, Barnesville, MN 56514

FACILITY (WELL) INFORMATION

NAME	Well #8
FACILITY ID	S04
UNIQUE WELL NO.	411249
COUNTY	Clay

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ **YES** (Please attach a copy)
☐ **NO** ☐ **UNDETERMINED**

PWS ID / FACILITY ID	1140001 S04	**UNIQUE WELL NO.**	411249

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
Agricultural Related							
*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well[2] (Class V well - illegal[3])	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		
SSTS Related							
AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well)[2]	50/300/150[4]	50/300/150[4]	100/600/300[4]	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S04	UNIQUE WELL NO.	411249

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		Y	100	Y
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		Y	140	Y
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		Y	71	N
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		N		
UUW	Unused, unsealed well or boring	50	50		Y	73	
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S04	UNIQUE WELL NO.	411249

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
	none found within 200' of this well.						

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

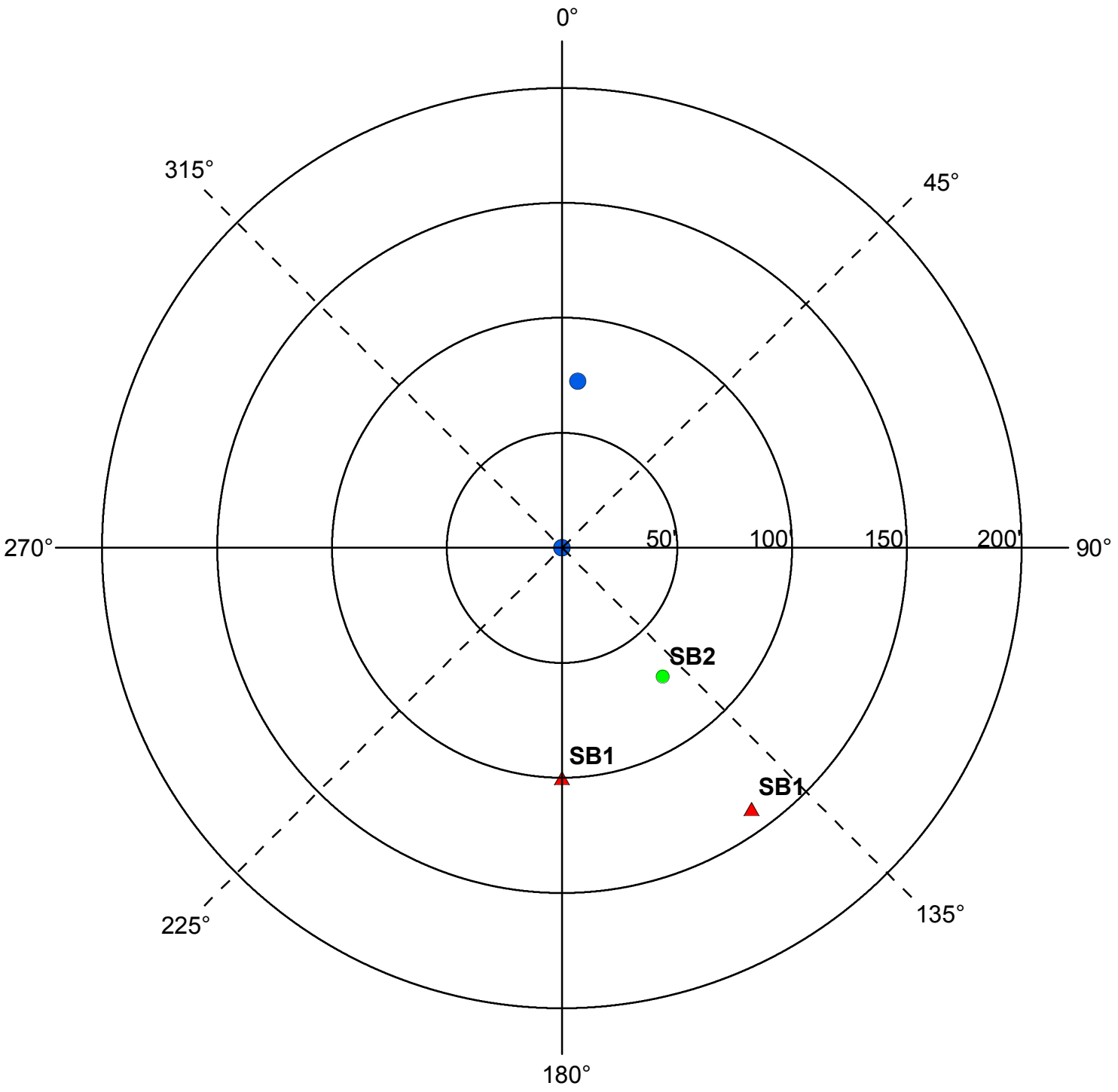
This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S04	UNIQUE WELL NO.	411249

SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.

Record the distance and approximate compass bearing of each potential contaminant source from the well, and identify the source using the "Source Code". Unlabeled points on the map are unsealed wells.



	Y	N	N/A
Were the isolation distances maintained for the new sources of contamination?			
Is the system monitoring existing nonconforming sources of contamination?			

Reminder Question: Were the wellhead protection measure(s) implemented?

INSPECTOR	Strodtman, Mike	DATE	3 - 19 - 2015

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S04	UNIQUE WELL NO.	411249

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Any sewer lines that are observed to be leaking, cracked, or deteriorated, should be replaced.		
The unused, unsealed well located on the property should be sealed in accordance with Minn. Rules 4725.3850 and 4725.3875 by a properly licensed well contractor. Unused wells that have not been properly sealed can provide a direct pathway for contaminants to enter the drinking water source.		

COMMENTS

9/7/2003 - Location for PCSI Type BLD (bearing = 0, distance = 0 , inventory date: 12/15/1998) could not be determined.
9/7/2003 - Location for PCSI Type BPO (bearing = 0, distance = 0 , inventory date: 12/15/1998) could not be determined.
Well # 409237 is also known as observation well #2. Location and distance are unkown.

For further information, please contact:

Minnesota Department of Health
Drinking Water Protection Section
Source Water Protection Unit
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Section Receptionist: 651-201-4700
Division TDD: 651-201-5797 or MN Relay Service @ 1-800-627-3529 and ask for 651-201-5000

Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

City of Barnesville WHPP Part II - Appendix IV

INNER WELLHEAD MANAGEMENT ZONE (IWMZ) - POTENTIAL CONTAMINANT SOURCE INVENTORY (PCSI) REPORT

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1140001 **COMMUNITY**
NAME	Barnesville
ADDRESS	Barnesville Water Superintendent, People Service Inc., P.O. Box 684, Barnesville, MN 56514

FACILITY (WELL) INFORMATION

NAME	Well #9
FACILITY ID	S05
UNIQUE WELL NO.	411250
COUNTY	Clay

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ **YES** (Please attach a copy)
☐ **NO** ☐ **UNDETERMINED**

PWS ID / FACILITY ID	1140001 S05	**UNIQUE WELL NO.**	411250

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
Agricultural Related							
*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well[2] (Class V well - illegal[3])	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		
SSTS Related							
AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well)[2]	50/300/150[4]	50/300/150[4]	100/600/300[4]	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S05	UNIQUE WELL NO.	411250

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		Y	75	Y
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	98	N**
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	158	
UUW	Unused, unsealed well or boring	50	50		Y	140	
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		Y	105	N
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S05	UNIQUE WELL NO.	411250

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
	none found within 200' of this well.						

* New potential contaminant source.

** This number is the estimated distance that this potential source is from this well even though it was identified during an inventory for an adjacent well.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

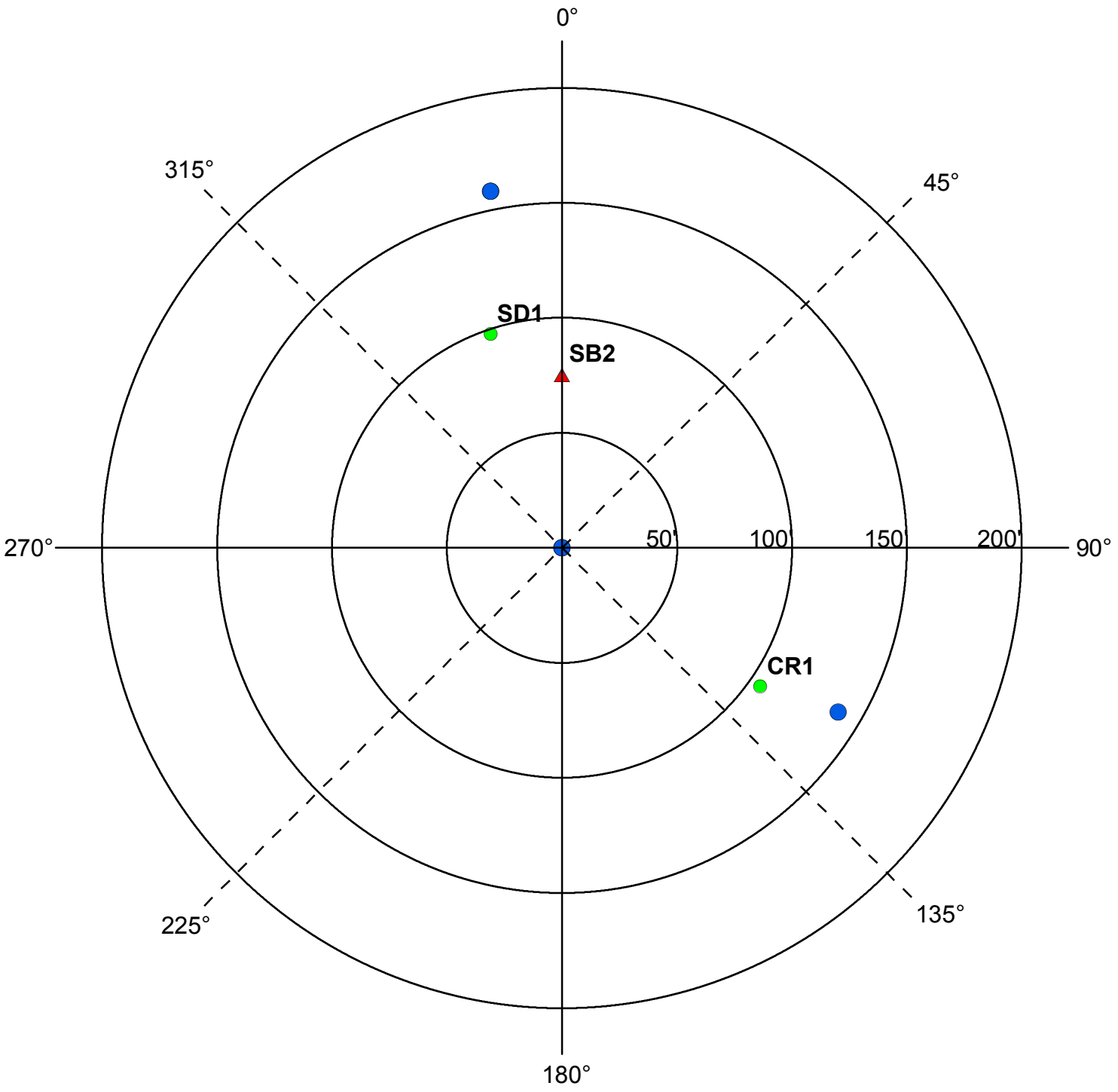
This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S05	UNIQUE WELL NO.	411250

SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.

Record the distance and approximate compass bearing of each potential contaminant source from the well, and identify the source using the "Source Code". Unlabeled points on the map are unsealed wells.



	Y	N	N/A
Were the isolation distances maintained for the new sources of contamination?			
Is the system monitoring existing nonconforming sources of contamination?			

Reminder Question: Were the wellhead protection measure(s) implemented?

INSPECTOR	Strodtman, Mike	DATE	3 - 19 - 2015

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S05	UNIQUE WELL NO.	411250

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Any sewer lines that are observed to be leaking, cracked, or deteriorated, should be replaced.		
The stormwater pond/pipe (choose) should be managed to insure optimal performance. Information on stormwater management can be found on the Minnesota Pollution Control Agency website.		
The unused, unsealed well located on the property should be sealed in accordance with Minn. Rules 4725.3850 and 4725.3875 by a properly licensed well contractor. Unused wells that have not been properly sealed can provide a direct pathway for contaminants to enter the drinking water source.		

COMMENTS

Well # 408238 is also known as observation well #1. The exact location is unknown.

For further information, please contact:

Minnesota Department of Health
Drinking Water Protection Section
Source Water Protection Unit
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Section Receptionist: 651-201-4700
Division TDD: 651-201-5797 or MN Relay Service @ 1-800-627-3529 and ask for 651-201-5000

Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

City of Barnesville WHPP Part II - Appendix IV

INNER WELLHEAD MANAGEMENT ZONE (IWMZ) - POTENTIAL CONTAMINANT SOURCE INVENTORY (PCSI) REPORT

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1140001 **COMMUNITY**
NAME	Barnesville
ADDRESS	Barnesville Water Superintendent, People Service Inc., P.O. Box 684, Barnesville, MN 56514

FACILITY (WELL) INFORMATION

NAME	Well #10
FACILITY ID	S06
UNIQUE WELL NO.	759855
COUNTY	Clay

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ **YES** (Please attach a copy)
☐ **NO** ☐ **UNDETERMINED**

PWS ID / FACILITY ID	1140001 S06	**UNIQUE WELL NO.**	759855

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
Agricultural Related							
*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well[2] (Class V well - illegal[3])	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		
SSTS Related							
AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well)[2]	50/300/150[4]	50/300/150[4]	100/600/300[4]	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S06	UNIQUE WELL NO.	759855

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		Y	86	Y**
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	62	N
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	158	
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S06	UNIQUE WELL NO.	759855

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
	none found within 200' of this well.						

* New potential contaminant source.

** This number is the estimated distance that this potential source is from this well even though it was identified during an inventory for an adjacent well.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

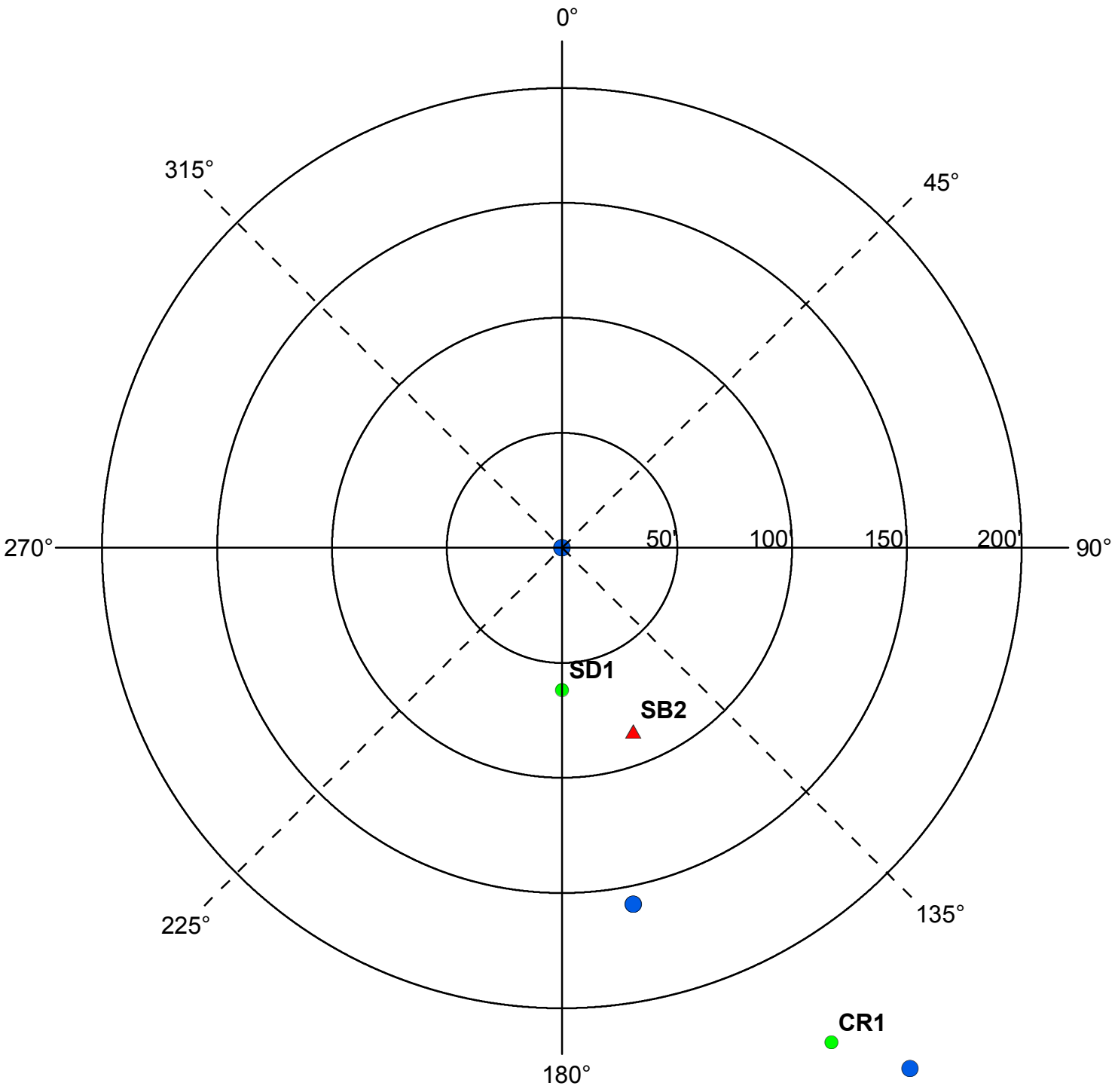
This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S06	UNIQUE WELL NO.	759855

SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.

Record the distance and approximate compass bearing of each potential contaminant source from the well, and identify the source using the "Source Code". Unlabeled points on the map are unsealed wells.



	Y	N	N/A
Were the isolation distances maintained for the new sources of contamination?			
Is the system monitoring existing nonconforming sources of contamination?			

Reminder Question: Were the wellhead protection measure(s) implemented?

INSPECTOR	Strodtman, Mike	DATE	7 - 24 - 2014

City of Barnesville WHPP Part II - Appendix IV

PWS ID / FACILITY ID	1140001 S06	UNIQUE WELL NO.	759855

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED

COMMENTS

City operator is unaware of location of sewer service lines for structure within 200 ft of well.

For further information, please contact:

Minnesota Department of Health
Drinking Water Protection Section
Source Water Protection Unit
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Section Receptionist: 651-201-4700
Division TDD: 651-201-5797 or MN Relay Service @ 1-800-627-3529 and ask for 651-201-5000

City of Barnesville WHPP Part II - Appendix V

Minnesota Unique Well No.
411249

County Clay
Quad Barnesville
Quad ID 240B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes Chapter 103I

Entry Date 07/23/1992
Update Date 03/10/2014
Received Date

Well Name BARNESVILLE 8
Township Range Dir Section Subsections Elevation 1042 **ft.**
137 45 W 30 **Elevation Method** Calc from NED (Natl.Elev.Dataset-30m)

Well Depth	Depth Completed	Date Well Completed
122 **ft.**	77 **ft.**	01/11/1985

Drilling Method Non-specified Rotary

Well Address
BARNESVILLE MN 56514

Geological Material	Color	Hardness	From	To
TOP SOIL	BLACK		0	3
CLAY	BROWN		3	8
SANDY CLAY	GRAY		8	26
SAND & CLAY	GRAY		26	32
SAND & GRAVEL	VARIED		32	47
SANDY CLAY	GRAY		47	56
SAND	GRAY		56	57
SANDY CLAY, LENSES OF SAND &GRAVEL	VARIED		57	76
SAND	VARIED		76	77
CLAY	GRAY		77	122

Drilling Fluid --
Well Hydrofractured? ☐ Yes ☐ No
From Ft. to Ft.

Use Community Supply **PWS ID** 1140001 **Source** S04

Casing Type Steel (black or low carbon) **Joint** Welded **Drive Shoe?** ☐ Yes ☑ No **Above/Below** 2 **ft.**

Casing Diameter	Weight	Hole Diameter
8 in. to 45 ft.	28.55 lbs./ft.	12.25 in. to 45 ft.

Open Hole from ft. to ft.

Screen YES **Make** JOHNSON **Type** other

Diameter	Slot/Gauze	Length	Set Between
6	60	36	45 ft. and 77 ft.

Static Water Level
12.7 ft. from Land surface Date Measured 01/10/1985

PUMPING LEVEL (below land surface)
33.96 ft. after 72 hrs. pumping 500 g.p.m.

Well Head Completion
Pitless adapter manufacturer MONITOR Model
☐ Casing Protection ☑ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

NO REMARKS

Grouting Information Well Grouted? ☑ Yes ☐ No
Grout Material: Neat Cement from 10 to 45 ft. 0.75 yrds.

Located by: Minnesota Department of Health **Method:** Digitization (Screen) - Map (1:12,000)
Unique Number Verification: Tag on well **Input Date:** 11/06/2012
System: *UTM - Nad83, Zone15, Meters* **X:** 239424 **Y:** 5172377

Nearest Known Source of Contamination
_feet _direction _type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 06/13/1986
Manufacturer's name BERKELEY Model number 652AH-2 HP 7.5 Volts 230
Length of drop Pipe 32 ft. Capacity 250 g.p.m Type Submersible Material

Abandoned Wells Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Well Contractor Certification

License Business Name	Lic. Or Reg. No.	Name of Driller
Ltp Enterprises	91353	HEIRASS, R.

First Bedrock
Last Strat clay-gray
Aquifer Quat. Buried Artes. Aquifer
Depth to Bedrock ft.

County Well Index Online Report **411249** Printed 6/3/2014
HE-01205-07

City of Barnesville WHPP Part II - Appendix V

Minnesota Unique Well No.
411250

County Clay
Quad Barnesville
Quad ID 240B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes Chapter 103I

Entry Date 07/23/1992
Update Date 03/10/2014
Received Date

Well Name BARNESVILLE 9
Township Range Dir Section Subsections Elevation 1042 **ft.**
137 45 W 30 **Elevation Method** Calc from NED (Natl.Elev.Dataset-30m)

Well Depth	Depth Completed	Date Well Completed
96 **ft.**	86 **ft.**	10/31/1985

Drilling Method Non-specified Rotary

Well Address
BARNESVILLE MN 56514

Geological Material	Color	Hardness	From	To
TOP SOIL	BLACK		0	1
SAND & GRAVEL	GRAY		1	42
SAND (#10, #12)	BLK/WHT		42	46
SAND (#8)	VARIED		46	82
SAND WITH LENSES OF CLAY	GRAY		82	90
SANDY CLAY	GRAY		90	96

Drilling Fluid --
Well Hydrofractured? ☐ Yes ☐ No From Ft. to Ft.

Use Community Supply **PWS ID** 1140001 **Source** S05

Casing Type Steel (black or low carbon) **Joint** Welded **Drive Shoe?** ☐ Yes ☑ No **Above/Below** 2 **ft.**

Casing Diameter	Weight	Hole Diameter
12 in. to 56 ft.	49.56 lbs./ft.	18 in. to 56 ft.

Open Hole from ft. to ft.

Screen YES **Make** JOHNSON **Type** stainless steel

Diameter	Slot/Gauze	Length	Set Between
10	20	32	54 ft. and 86 ft.

Static Water Level
ft. from Date Measured

PUMPING LEVEL (below land surface)
ft. after hrs. pumping g.p.m.

Well Head Completion
Pitless adapter manufacturer MONITOR Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

NO REMARKS

Grouting Information Well Grouted? ☑ Yes ☐ No

Grout Material: Neat Cement from 10 to 56 ft. 1.75 yrds.

Located by: Minnesota Department of Health **Method:** Digitization (Screen) - Map (1:12,000)
Unique Number Verification: Tag on well **Input Date:** 11/06/2012
System: *UTM - Nad83, Zone15, Meters* **X:** 239431 **Y:** 5172477

Nearest Known Source of Contamination
_feet _direction _type
Well disinfected upon completion? ☑ Yes ☐ No

Pump ☐ Not Installed Date Installed 06/11/1986
Manufacturer's name BERKLEY Model number 753M-2 HP 15 Volts 230
Length of drop Pipe 50 ft. Capacity 500 g.p.m Type Submersible Material

Abandoned Wells Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Well Contractor Certification

License Business Name	Lic. Or Reg. No.	Name of Driller
Ltp Enterprises	91353	HEIRASS, R.

First Bedrock
Last Strat clay+sand-gray
Aquifer Quat. Water Table Aquifer
Depth to Bedrock ft.

County Well Index Online Report **411250** Printed 6/3/2014 HE-01205-07

City of Barnesville WHPP Part II - Appendix V

Minnesota Unique Well No.
759855

County Clay
Quad Barnesville
Quad ID 240B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes Chapter 103I

Entry Date 10/29/2008
Update Date 03/10/2014
Received Date 10/07/2008

Well Name CITY OF BARNESVILLE
Township Range Dir Section Subsections Elevation 1041 **ft.**
137 45 W 30 ADAABC **Elevation Method** 7.5 minute topographic map (+/- 5 feet)

Well Depth	Depth Completed	Date Well Completed
80 **ft.**	80 **ft.**	06/17/2008

Drilling Method Non-specified Rotary

Well Address
13TH ST NE
BARNESVILLE MN 56514

Drilling Fluid --

Well Hydrofractured? ☐ Yes ☐ No
From Ft. to Ft.

Use Community Supply **PWS ID** **Source**

Geological Material	Color	Hardness	From	To
TOPSOIL	BLACK		0	1
ROCKY GRAVEL			1	9
HARD CLAY	GRAY		9	10
GRAVEL W/ SOME SAND			10	19
VERY SILTY CLAY			19	21
LAYER ROCK SILTY CLAY C GRAVEL			21	44
F SAND SOME COARSE SAND MIXED IN			44	80

Casing Type Steel (black or low carbon) **Joint** No Information **Drive Shoe?** ☐ Yes ☐ No **Above/Below** **ft.**

Casing Diameter	Weight	Hole Diameter
10 in. to 55 ft.	40.48 lbs./ft.	

Open Hole from ft. to ft.

Screen YES **Make** JOHNSON **Type** stainless steel

Diameter	Slot/Gauze	Length	Set Between
10	30	25	55 ft. and 80 ft.

Static Water Level
12 ft. from Land surface Date Measured 0

PUMPING LEVEL (below land surface)
43 ft. after 24 hrs. pumping 500 g.p.m.

Well Head Completion
Pitless adapter manufacturer BAKER Model SEE REMARK
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

REMARKS
WHEN EXISTING WELL PUMPED WATER LEVEL WOULD DROP TO 48 FT.
WELL LOCATION: BARNESVILLE WATER TREATMENT FACILITY.
WELLHEAD: MODEL=8PS1012WBWE06F6E.

Grouting Information Well Grouted? ☑ Yes ☐ No

Grout Material: Neat Cement from 8 to 45 ft. 3.75 yrds.

Located by: Minnesota Department of Health **Method:** GPS SA Off (averaged)
Unique Number Verification: Info/GPS from data source **Input Date:** 01/18/2013
System: *UTM - Nad83, Zone15, Meters* **X:** 239422 **Y:** 5172524

Nearest Known Source of Contamination
200 feet N direction Sewer type
Well disinfected upon completion? ☑ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name Model number 8FP450D151B6 HP 15 Volts 240
Length of drop Pipe 45 ft. Capacity 500 g.p.m Type Submersible Material

Abandoned Wells Does property have any not in use and not sealed well(s)? ☐ Yes ☑ No

Variance Was a variance granted from the MDH for this well? ☐ Yes ☑ No

Well Contractor Certification

License Business Name	Lic. Or Reg. No.	Name of Driller
Lako Drilling, Inc.	1644	LAKO, A.

First Bedrock
Last Strat sand
Aquifer Quat. Buried Artes. Aquifer
Depth to Bedrock **ft.**

County Well Index Online Report **759855** Printed 6/3/2014
HE-01205-07

City of Barnesville WHPP Part II - Appendix V

Minnesota Department of Health
Environmental Health in Minnesota

MDH Public Water Supply Sources Report

PWSID: **1140001**
PWS Name: **Barnesville**
PWS Type: **Community**
PWS Status: **Active**

Public Water Supply Sources: Information from MNDWIS and CWI (sorted by Sample Point ID)
Source Type Codes: **GW** = Ground water; **SW** = Surface water; **GUI** = Ground water under influence
Location Source: **MGS** = digitized by the MN Geological Survey; * indicates imcomplete records
O* = duplicate in Unverified Well Data; **R*** = duplicate in MNDWIS PWS Sources Removed from Flow; **S*** = duplicate in MNDWIS PWS Sources in Flow;

MNDWIS PWS SOURCES IN FLOW

Source Info							MNDWIS Data				CWI Data			
Sample Point ID	Name	Type	Availability	Status	Well No. (link to Well Log(s))	Location Info (link to Map)	Drill Year	Depth (in feet)	Case Depth (in feet)	Case Diam. (in inches)	Drill Date	Depth Completed (in feet)	Case Depth (in feet)	Case Diam. (in inches)
S04	**Well #8**	GW	Primary	Active	411249	11/06/2012 (M. Strodtman)	1985	77	45	8	01-11-1985	77.00	45.00	8.00
S05	**Well #9**	GW	Primary	Active	411250	11/06/2012 (M. Strodtman)	1985	86	56	12	10-31-1985	86.00	56.00	12.00
S06	**Well #10**	GW	Primary	Active	759855	01/18/2013 (R. Soule)	2008	80	55	10	06-17-2008	80.00	55.00	10.00

MNDWIS PWS SOURCES REMOVED FROM FLOW

Source Info							MNDWIS Data				CWI Data			
Sample Point ID	Name	Type	Availability	Status	Well No. (link to Well Log(s))	Location Info (link to Map)	Drill Year	Depth (in feet)	Case Depth (in feet)	Case Diam. (in inches)	Drill Date	Depth Completed (in feet)	Case Depth (in feet)	Case Diam. (in inches)
S02	**Well #6**	GW	Sealed	Inactive	240642 O*	08/17/1999 (M. Howe)	0	0	0	0				
S03	**Well #7**	GW	Sealed	Inactive	240643 O*	01/09/2004 (M. Howe)	1969	72	56	**6**	09-18-1969	72.00	56.00	**12.00**

MNDWIS and CWI data value discrepancies in preceding tables are shown in **RED** (0 or null values excepted).

Unverified Wells

The following tables show information on wells whose existence (or previous existence) has not yet been confirmed.

UNVERIFIED Well Data

Reference in Record	Name(s)	Unique Well Number	Drilled Depth (ft.)	Completed Depth (ft.)	Depth Cased (ft.)	Casing Diameter (in.)	Year Constructed	Construction Type	Year Out of Service	Sealing Record?	Year Sealed	Location Info	Comments
A	Well No. 1		63.0	63.0	63.0	8.0	Before 1919	Rotary/Drilled	1921			N side, basement of pump station.	Ref.: 1919 MDH San. Rpt.
B	Well No. 2	240460	134.0	134.0	134.0	8.0	1920	Cable Tool/Bored				E side, basement of pump station w/Well No. 1	Ref.: 1921 MDH San. Rpt.

City of Barnesville WHPP Part II - Appendix V

UNVERIFIED Well Data

Reference in Record	Name(s)	Unique Well Number	Drilled Depth (ft.)	Completed Depth (ft.)	Depth Cased (ft.)	Casing Diameter (in.)	Year Constructed	Construction Type	Year Out of Service	Sealing Record?	Year Sealed	Location Info	Comments
C	Well No. 3; H146690		73.0	73.0		12.0	Before 1927	Cable Tool/Bored		Y	1998	In pit, below pump room in SE part of city. Old 6th St. (now 5th St.) & Front.	Ref.: 1927 MDH San. Rpt. 1929 Sanborn map. Sealing Rec'd. general location and depth match Well No. 3. Can city confirm?
D	Creamery Well						Before 1930					Barnesville Co-op Creamery Assn.	Ref.: 1930 MDH San. Rpt. Inter-connection w/city.
E	Well No. 4; H78137		73.0	73.0	58.0	10.0	1942	Cable Tool/Bored		Y	1991	240 ft. from Well No. 3. On Block 38.	Ref.: 1943 MDH San. Rpt. H78137. Can city confirm sealing record is for this well?
F	Well No. 5; Filter Plant Well	240461	72.0	72.0	49.0	12.0	Before 1944	Cable Tool/Bored				Lots 13-18, Blk. 5, Orig. Townsite, in iron rem'l. plant. See map in 1Suite docs.	Ref.: 1969 MDH San. Rpt.: 20-in csg. No Well Rec. avail. 1Suite info.
G	Well No. 6; H267501	240642 R*				6.0	1949			Y	2008	137-45-30 CACDBA	Ref.: 1971 MDH San. Rpt. H267501. Diff. T-R-S than 221793. 1Suite info: 6-in. csg. & date drilled.
H	Well No. 7	240643 R*	70.0	70.0	57.0	12.0	1969					137-45-30 ABBDAC	Ref. 1971 MDH San. Rpt.
I		H146690	74.0	74.0	74.0	10.0				Y	1998	Hwy. 52 - 4th Ave SE.	Ref.: Wells database. H146690. Sealed by LPT(drlr). 18" csg. to 30. Could be Well No 3. Can city assist?

City of Barnesville WHPP Part II - Appendix V

UNVERIFIED Well Data

Reference in Record	Name(s)	Unique Well Number	Drilled Depth (ft.)	Completed Depth (ft.)	Depth Cased (ft.)	Casing Diameter (in.)	Year Constructed	Construction Type	Year Out of Service	Sealing Record?	Year Sealed	Location Info	Comments
J		H267514	80.0	80.0	80.0	12.0				Y	2008	137-45-30, "NE of NE fo SE 1/4" (questionable loc'n). "405-5th St. SE"	Ref.: MDH Wells database. See map in Well Sealing Rec'd, H267514. Near Well No. 6.
K		H246640	70.0	70.0		8.0				Y	1992	119-3rd Ave. SE.	Ref.: MDH Wells database. H246640, sealed with Uniq. ID no.
L		H42402	120.0	120.0	120.0	8.0				Y	1993	119-3rd Ave. (SE).	Ref.: MDH Wells database. H42402.
M	Former Great Northern RR Well; H33586	221793								Y	1993		Ref.: MDH Wells database. Remark on well record suggests this same as 240642 (G). Unlikely. Appears to have been sealed. H33586. Can city confirm identity?

Databases Searched	Remarks
County Well Index (1-mile radius); MDH DWP Microfiche; MDH 1Suite; Lakesnwoods.com; Biennial Report of the MN State Dairy and Food Commissioner-1907; Minnesota Geological Survey City Well File Folders; MDH DWP MNDWIS; Past and Present MN Railroad Stations; Sanborn Fire Insurance Maps; MDH WELLS	This Unverified Municipal Well Inventory is as complete and thorough as possible, given available documentation. However, MDH Planners and Hydrologists, as well as City representatives, should feel free to add or subtract from this report as necessary. BARNESVILLE, in Clay Co., was incorporated in 1881, received its charter as a city in 1889, and the village was platted in 1882. No breweries are reported to have operated here. The MGS Bulletins do not cover Clay Co. The MGS City Well file includes a map an which are located several private water wells. The 1894 Sanborn map showed a well for the GNRR. The 1929 Sanborn shows the older street names and reveals that the creamery moved locations. Documents appear to show two different locations for (G & M) Well No. 6 (see map). It also appears that the former RR well was named Well No. 6 for a period of time. See Comments about individual wells on this report. Several clarifications are necessary.

Unverified Well Data Compiled By: **Geoffery Nash** Compiled Date: **7/1/2013 10:38:25 AM**

Source: MN Dep't. of Health - 7/2/2013

City of Barnesville WHPP Part II - Appendix V

Use of MDH Public Water Supply Sources Report

The report you have received shows three classes of Public Water Supply wells:

- In Use (actively used)
- Removed From Flow (for back-up or emergency use; may be disconnected from PWS)
- **Unverified Wells (unused wells with no documented location, unique ID number, and/or well sealing record)**

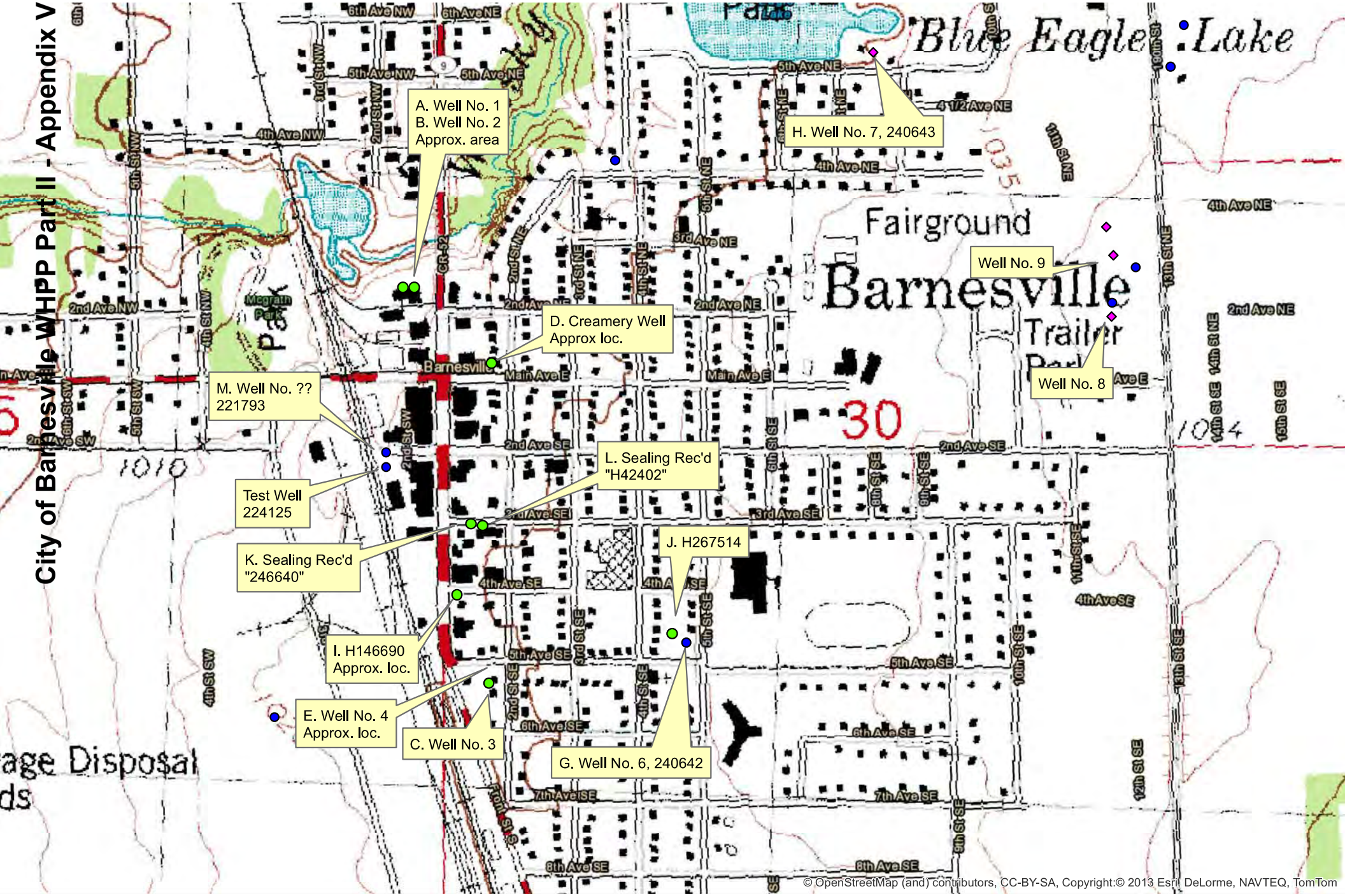
Unverified wells are unsealed, abandoned wells. These wells pose a risk of contamination to existing wells and aquifers. According to State Well Code and under the terms of your Wellhead Protection Plan, your PWS may need to identify, locate, and properly seal Unverified Wells within your Drinking Water Supply Management Area, to current MDH standards. While historical records may indicate that some of these wells were "capped", "abandoned", or "sealed" in the past, unless it can be shown that the sealing was performed to current standards, they may need to be located, cleaned out, and sealed properly with a well sealing record issued.

The report lists database references that were searched to compile the report. Under "Remarks" are notes and questions to help you with this process. State grant funding is available to help fund sealing of these old public water supply wells.

If you have questions, please talk to your MDH Planner or Hydrologist to address your PWS's specific issues. This report is not intended to be the "last word" on the status of unverified wells and your input will be critical in successfully finding and sealing these potential sources of contamination.

Restart

City of Barnesville WHPP Part II - Appendix V



City of Barnesville WHPP Part II - Appendix V

y of Barnesville; Clay County; PWS ID 1140001 (completed on 2/23/05 - by kaw)

Well Sequence # (in record)	Well Name	Unique #	Casing Diameter	Well Depth	Depth Cased	Year Constructed	Well Type	Year Out of Service	Sealing Record	Location
1	Well Number (No.) 1		8 inch	63 feet (1921) 65 feet (1923)		Pre-1919	Drilled	Stanby 1921		* North well in the basement of the Powerhouse
2	Well No.2	240640	8 inch	134 feet (1921) 95 feet (1923)		1920	Drilled	Stanby 1946	(possibly) H0042402- sealed in 1993	*South well in the basement of the Powerhouse
3	Well No. 3		12 inch	73 feet (1926) 79 feet (1943)	0-53 feet (1926) 0-57 feet (1943)	1926	Drilled	Not in use as of 1946		*Southeast portion of the villiage of Barnesville
4	Creamery Well (Barnesville Cooperation Creamery Association									
5	Well No. 4		10 inch	73 feet	0-58 feet	1942	Drilled	Emergency Well		*Southeast portion of the village of Barnesville (Block 38) * 240 feet apart from Well No. 3
6	Well No. 5 Filter Plant Well	240641	20 inch (1946) 12 inch (1974)	72 feet (1946) 69 feet (1974)	0-49 feet (1974)	1944	Drilled			*Lots 13-18 on Block 5 of the original Barnesville townsite
7	Well No. 6 Old Great Northern Railroad Well							Emergency/standby as of 1971	00240642- sealed in 1993	*Township 137, Range 46, Section 25

City of Barnesville WHPP Part II - Appendix V

Old Municipal Well Worksheet

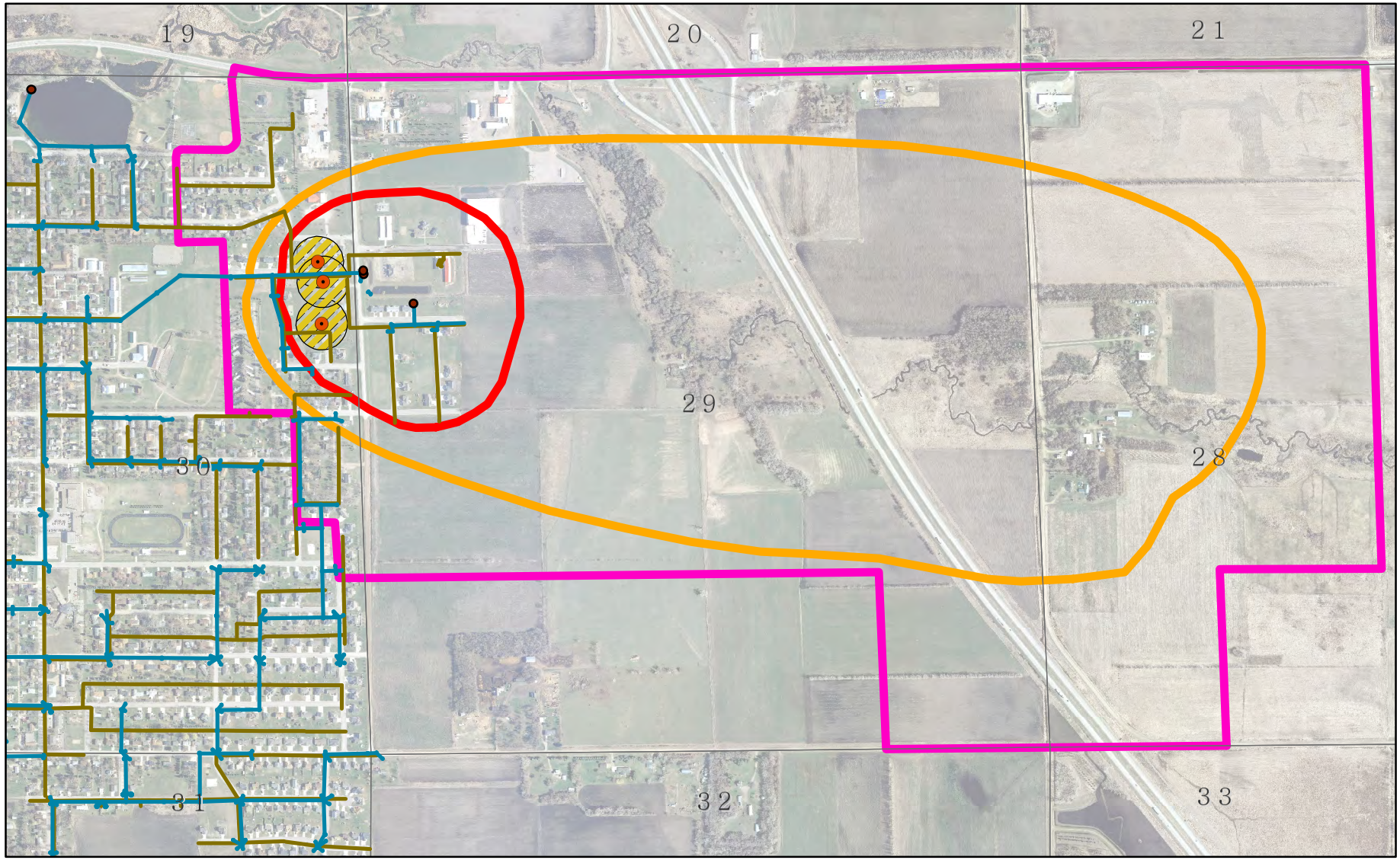
City of Barnesville, Clay Co. PWS ID 1140001

Sequential number	Well Name/ #	Casing Diameter	Well Depth	Depth Cased	Year Const.	Well Type	Yr. Out Of Service	Sealing Record	Location
1	Well No 1. (Power Plant well)	8 inch	63ft ("21) 65ft ("23)		Pre-1919	drilled	Standby 1921		at the pumping station * north well * basement of powerhouse
2 reconstructed in 1951	Well No. 2 240640	8 inch	134ft ("28) 95ft ("23)		1920		Standby as of 1946		at the pumping station * South well * basement of powerhouse
3	Well No. 3	12 inch	73ft 194ft ("43)	0-53ft 0-59ft	1926		not in use 1946		SE portion of the village
4	Creamery Well (Barnesville Cooperative Creamery Association)								
5	Well No. 4	10 inch	73ft	0-58ft	1942	drilled	emergency well		SE portion of the city * Block 38 * 240 ft apart from well No. 3
6	Well No. 5 240461 (Filter Plant Well)	20 inch	72ft		1946				lots 13-18 of Block 5 of the original townsite
7 sealed	Well No. 6 240462 (old Great Northern Railway well)						emergency/ Standby (1971)	Sealed 00240642 1993	137-46-25
8 Current well	Well No. 7 240463	12 inch	70ft	0-56ft	1969				* 50ft NW of well No. 5
9 Current well	Well No. 8 411249	8 inch	77ft	0-45ft	1985				

Old Municipal Well Worksheet

Sequential number	Well Name/ #	Casing Diameter	Well Depth	Depth Cased	Year Const.	Well Type	Yr. Out Of Service	Sealing Record	Location
10 current well	Well No. 9 411250	12 inch	88ft	0-56ft	1985				
City of Barnesville sealed wells				H0042402		D=120ft	1993		

Storm Sewers



Legend

- Public Water Supply Wells
- Storm Sewer Outfalls
- Storm Sewer
- Sanitary Sewer
- Inner Wellhead Management Area
- Emergency Response Area
- Wellhead Protection Area
- Drinking Water Supply Management Zone

N W E S

CLAY COUNTY

www.co.clay.mn.us

0 0.050.1 0.2 0.3 0.4 Miles

Barnesville DWSMA Map

Clay County Information Services
information.services@co.clay.mn.us
(218) 299-5003

G:\Staff\Barnesville\DWSMA\DWSMA_StormSewersl05102014.mxd

2) **Fertilizer**

Fertilizer shall be included in the lump sum turf establishment for an application rate of one hundred (100) pounds per acre.

E. Machine Time (Special Provisions)

Whenever directed by the Engineer to determine the location of unknown items, the contractor shall make all exploration and excavation for such purposes. Extra compensation shall be allowed as provided in the Special Provisions.

Payment for verification of existing utilities shall be per hour to include the following items but only if authorized in advance by the Engineer:

2123.501	Foreman (1), Common Laborer (2)
0123.601	2.5 C.Y. Backhoe

Payment shall be for subsurface exploration by the crew hour to include the above labor and equipment. Soil recompaction shall be incidental.

43. Retention Basin

The retention basins shall be constructed as shown on the plans and shall include all items for a complete basin including excavation, embankment, wood fiber blanket around the retention basin, dewatering, temporary erosion control, turf establishment, filter fabric, riprap, topsoil, and all items necessary for a complete retention basin.

Excess embankment materials shall be disposed of onsite at a location as directed by the Engineer.

A twelve (12) inch clay liner in the retention pond shall be installed on the pond bottom and the dike inslope to the elevations shown on the plans. The liner shall be installed in six (6) inch lifts in the following manner:

Initial Lift (six [6] inch)	East – West direction
Second Lift (six [6] inch)	North – South direction

Prior to installing the clay liner, the subgrade shall be prepared and compacted to a minimum of ninety-five (95) percent Standard Proctor density. The contractor shall scarify the soils as necessary to reduce the moisture content to within three (3) percent of optimum in the upper twelve (12) inches of the subgrade.

The clay liner for the retention pond shall be approved clays and shall be compacted to a minimum of ninety-five (95) percent of the Standard Proctor density and moisture content shall be at or above optimum (ASTM D698-91). The moisture content shall be limited to four (4) percent above optimum.

No rocks over four (4) inches in diameter shall be used in the liner material.

Select clay for the retention pond clay liner shall be obtained for the pond. The Engineer shall have a geotechnical consultant on site to evaluate the select clay and the constructed liner. Various tests will be performed by the geotechnical consultant, including moisture content and density. The contractor shall maintain the specified moisture content until the topsoil is placed over the clay liner. The necessary water shall be added to the clay in accordance with MnDOT Specification 2130 to obtain

the specified moisture content. Compaction shall continue until the specified density is obtained. Any liner areas that do not meet the specified density requirements shall be immediately repaired by the contractor at the contractor's expense.

Clay material for the liner construction shall meet the above-described classification. The permeability of the clay liner material shall not exceed 1.1×10^{-7} cm/sec for the stormwater retention basin at the specified moisture content and density. Permeability tests may be conducted by the Engineer.

The finished liner elevation shall be within 0.20 feet in either vertical direction and shall average the design elevation. The Engineer will complete a pond bottom survey to ascertain the contractor's compliance with this requirement as required by the Minnesota Pollution Control Agency before permission is granted to prefill the pond for testing.

The clay liner on the dikes shall be covered with six (6) inches of an earth fill (as detailed on the plans).

The liner cover material shall be select granular material from the excavation process and shall not contain roots, sod, plants or other organic matter, or objectionable materials. Material, which takes on excess moisture in the opinion of the Engineer, shall not be placed as liner cover.

MnDOT Specification 2105 shall apply to the clay liner installation.

Payment shall be by the lump sum at the contract price and shall be full compensation for all materials and costs for constructing the retention basin as shown on the plans.

44. Decorative Aerating Fountain

Contractor will furnish and install a decorative aerating fountain in the stormwater pond in the location as shown on the plans.

A. Submittals

1) Submit shop drawings and manufacturer's installation recommendations.

2) Submit operation and maintenance manuals

B. Payment

Furnish and install decorative aerating fountain on site shall be paid at the lump sum price including all labor, materials, electrical requirements and equipment necessary to make a complete and operational system.

C. Design Requirements

The decorative aerating fountain shall be capable of pumping at a rate of 400 gpm with a five (5) HP motor. The required spray heights and diameters will be as follows:

	Inside	Outside
Spray Height (ft)	18	10
Spray Diameter (ft)	3	34

Larson-Peterson
Ulteig engineers
Get the job done right

1115 West River Road
PO Box 150
Detroit Lakes, MN 56502-0150
Phone: 218.847.5607
Fax: 218.847.2791

July 19, 2004

Ms. Kathy Holland-Hanson
Water Quality Engineer
Minnesota Pollution Control Agency
714 Lake Avenue #220
Detroit Lakes, Minnesota 56501

RE: Storm Water Retention Facility
Commercial Park
Barnesville, Minnesota

Dear Ms. Holland-Hanson:

The City of Barnesville wishes to make drainage improvements to the I-94 Commercial Acres Addition plat which is located between the East City Limits Road and Willow Creek and between TH 34 and Second Avenue Southeast in the City of Barnesville. The I-94 Commercial Acres Addition consists of a 16.7 acre area that is platted for commercial and/or industrial development.

As part of the drainage improvement project, the City wishes to install a stormwater detention basin in order to satisfy the permanent stormwater requirements of the NPDES General Stormwater Permit for the entire I-94 Commercial Acres plat. The pond would collect runoff from the entire 16.7 acres and provide treatment before it is discharged into the City's storm sewer system.

Originally, the pond was to be a wet sedimentation basin with three (3) feet of dead storage. Due to the fact that the pond site is within the City's Drinking Water Supply Management Area (DWSMA) and that this area of the DWSMA is considered to be highly vulnerable to contamination, the Minnesota Department of Health (MnDOH) has suggested that the basin be a dry sedimentation pond in order to minimize infiltration. A letter from the MnDOH regarding this issue is enclosed.

Enclosed, please find preliminary construction plans for the drainage improvements, a Stormwater Pollution Prevention Plan (SWPPP), a map of the

drainage area to be served by the pond, and a HydroCAD model of the drainage area and pond. Please review the enclosed documents and provide correspondence regarding concerns or comments on the proposed improvements.

If you have any questions, please contact me.

Sincerely,

Robert C. Schlieman

Robert C. Schlieman, E.I.T.

RCS:jle

Enclosure

cc: Karen Lauer, City of Barnesville
Gary L. Nansen, Larson-Peterson/Ulteig Engineers
John Green, Larson-Peterson/Ulteig Engineers

MINNESOTA MDH DEPARTMENT OF HEALTH

Protecting, maintaining and improving the health of all Minnesotans

July 16, 2004

Mr. Gary Nansen, P.E.
Larson-Peterson/Ulteig Engineers
1115 West River Road
P.O. Box 150
Detroit Lakes, Minnesota 56502

Dear Mr. Nansen:

The city of Barnesville has a wellhead protection plan that has identified the proposed location of a storm water pond intended to serve the I-94 Commercial Acres Addition within their drinking water supply management area (DWSMA). This area of the DWSMA has been identified by the Minnesota Department of Health as being highly vulnerable to contamination. The groundwater travel time to the city wells from this location is estimated to be less than one year. This suggests that chemical or potentially biological contaminants infiltrating from the storm water pond will enter the city's drinking water supply. As a result, we recommend that any storm water pond constructed at this location be designed as a dry pond without dead storage in order to minimize infiltration.

If you have any questions, please contact me at richard.soule@state.mn.us or (651) 215-0974.

Sincerely,

Rich G. Soule, Hydrogeologist
Environmental Health Division
P.O. Box 64975
St. Paul, Minnesota 55164-0975

RGS:tvw

CONSUMER CONFIDENCE REPORT

PWSID: 1140001

City of Barnesville
2013 Drinking Water Report

The City of Barnesville is issuing the results of monitoring done on its drinking water for the period from January 1 to December 31, 2013. The purpose of this report is to advance consumers' understanding of drinking water and heighten awareness of the need to protect precious water resources.

Source of Water

The City of Barnesville provides drinking water to its residents from a groundwater source: three wells ranging from 77 to 86 feet deep, that draw water from the Quaternary Buried Artesian and Quaternary Water Table aquifers.

The water provided to customers may meet drinking water standards, but the Minnesota Department of Health has also made a determination as to how vulnerable the source of water may be to future contamination incidents. If you wish to obtain the entire source water assessment regarding your drinking water, please call 651-201-4700 or 1-800-818-9318 (and press 5) during normal business hours. Also, you can view it on line at www.health.state.mn.us/divs/eh/water/swp/swa.

Call Dan Lubbesmeyer 701.893.8825 if you have questions about the City of Barnesville drinking water or would like information about opportunities for public participation in decisions that may affect the quality of the water.

Results of Monitoring

No contaminants were detected at levels that violated federal drinking water standards. However, some contaminants were detected in trace amounts that were below legal limits. The table that follows shows the contaminants that were detected in trace amounts last year. (Some contaminants are sampled less frequently than once a year; as a result, not all contaminants were sampled for in 2013. If any of these contaminants were detected the last time they were sampled for, they are included in the table along with the date that the detection occurred.)

Key to abbreviations:
MCLG—Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MCL—Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MRDL—Maximum Residual Disinfectant Level.

MRDLG—Maximum Residual Disinfectant Level Goal.

AL—Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirement which a water system must follow.

90th Percentile Level—This is the value obtained after disregarding 10 percent of the samples taken that had the highest levels. (For example, in a situation in which 10 samples were taken, the 90th percentile level is determined by disregarding the highest result, which represents 10 percent of the samples.) Note: In

situations in which only 5 samples are taken, the average of the two with the highest levels is taken to determine the 90th percentile level.

ppm—Parts per million, which can also be expressed as milligrams per liter (mg/l).

ppb—Parts per billion, which can also be expressed as micrograms per liter (µg/l).

nd—No Detection.

N/A—Not Applicable (does not apply).

Contaminant (units)	MCLG	MCL	Level Found		Typical Source of Contaminant
			Range (2013)	Average /Result*	
Fluoride (ppm)	4	4	.51-.65	.59	State of Minnesota requires all municipal water systems to add fluoride to the drinking water to promote strong teeth; Erosion of natural deposits; Discharge from fertilizer and aluminum factories.
Haloacetic Acids (HAA5) (ppb)	0	60	nd-8.1	8.1	By-product of drinking water disinfection.
Nitrate (as Nitrogen) (ppm)	10.4	10.4	N/A	.46	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
TTHM (Total trihalomethanes) (ppb)	0	80	4.8-19.6	19.6	By-product of drinking water disinfection.

*This is the value used to determine compliance with federal standards. It sometimes is the highest value detected and sometimes is an average of all the detected values. If it is an average, it may contain sampling results from the previous year.

Contaminant (units)	MRDLG	MRDL	****	*****	Typical Source of Contaminant
Chlorine (ppm)	4	4	.04-1.21	.37	Water additive used to control microbes.

****Highest and Lowest Monthly Average.
*****Highest Quarterly Average.

Contaminant (units)	MCLG	AL	90% Level	# sites over AL	Typical Source of Contaminant
Copper (ppm) (08/20/2012)	1.3	1.3	.47	0 out of 10	Corrosion of household plumbing systems; Erosion of natural deposits.
Lead (ppb) (08/20/2012)	0	15	5.8	0 out of 10	Corrosion of household plumbing systems; Erosion of natural deposits.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. City of Barnesville is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for

several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Monitoring may have been done for additional contaminants that do not have MCLs established for them and are not required to be monitored under the Safe Drinking Water Act. Results may be available by calling 651-201-4700 or 1-800-818-9318 during normal business hours.

Compliance with National Primary Drinking Water Regulations

During the year, we failed to take a sample and/or submit information on Total Coliform Bacteria during the required testing period(s) of August 1, 2013 to August 31, 2013. Because we did not monitor or failed to monitor completely during the compliance period(s), we did not know whether Total Coliform Bacteria were present in your drinking water, and we are unable to tell you whether your health was at risk during that time.

During the year, we failed to take a sample and/or submit information on Chlorine during the required testing period(s) of August 1, 2013 to August 31, 2013. Because we did not monitor or failed to monitor completely during the compliance period(s), we did not know whether Chlorine were present in your drinking water, and we are unable to tell you whether your health was at risk during that time.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the U. S. Environmental Protection Agency (EPA) prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791.

CONSUMER CONFIDENCE REPORT

PWSID: 1140001

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at 1-800-426-4791.

ALTERNATIVE WATER SUPPLY / CONTINGENCY STRATEGY

Minnesota Rules 4720.5280

I. PURPOSE

The purpose of this Contingency Plan is to establish, provide and keep updated, certain emergency response procedures and information for the City of Barnesville which may become vital in the event of a partial or total loss of public water supply services as a result of natural disaster, chemical contamination, or civil disorder of human-caused disruptions.

II. PUBLIC WATER SUPPLY CHARACTERISTICS

A. CURRENT SUPPLY SOURCE

The City of Barnesville water utility supplies water to the residents within their city limits. The system uses three primary wells finished into the Quaternary Water Table Aquifer. Below is a table with particular characteristics of each well.

	Well Number 8	Well Number 9	Well Number 10
Unique Well Number	**411249**	**411250**	**759855**
Well Depth (ft.)	77	86	80
Well Diameter (in.)	8	12	10

B. TREATMENT

The City of Barnesville utilizes chlorine and fluoride treatment and also incorporates iron and manganese removal through a gravity bed filter system.

C. STORAGE AND DISTRIBUTION

The City operates one tower with 400,000 gallon capacity located within the city limits of Barnesville. The water system contains 1,096-metered connections.

D. MAPS/PLANS

Complete distribution plans and maps are located at the Barnesville city hall, the Barnesville water utility and on file with the City Engineer.

III. PRIORITY OF WATER USERS DURING WATER SUPPLY EMERGENCY

Water Use Category	Maximum daily use (gpd)	Minimum daily use (gpd)
Residential	418,310	113,568
Institutional/Other	23250	12,620
Commercial/Industrial	23000	10,000

IV. ALTERNATIVE WATER SUPPLY OPTIONS

A. SURFACE WATER SOURCES AND TREATMENT NEEDS

Blue Eagle Lake is the closest surface water supply. The Minnesota National Guard has the ability to provide emergency treatment of surface waters for human consumption. The following procedure is recommended:

1. Contact the County Sheriff (218) 299-5151 to request assistance from the Minnesota National Guard.
2. Sheriff contacts the Minnesota National Guard, Division of Emergency Management, the State Duty Officer at (800) 422-0798, and the Community Support Group at (651) 282-4013 to request assistance for the Utility.
3. The Minnesota National Guard has the ability to provide Reverse Osmosis Water Purification Units capable of supplying up to 1,500 gallons-per-hour, or 25 gallons-per-minute of potable water.

B. BOTTLED WATER SUPPLIES, DELIVERY AND DISTRIBUTION

1. Wells number 8, 9, and 10 have the capability of being operated with a portable generator if necessary.
2. There is a Wal-Mart Supercenter in Dilworth that can provide bottled water in emergency circumstances. Contact information:

   415 34th St N
   Dilworth, MN 56529
   (218) 233-9822

C. SYSTEM INTERCONNECTS WITH OTHER WATER SUPPLIES

There is no opportunity for interconnects with other water suppliers at this time.

D. NEW WELL

No new wells are planned at this time.

E. EMERGENCY OR BACKUP WELLS

There are no emergency or backup wells, although each well can be run independently.

F. SOURCE MANAGEMENT (BLENDING)

Typically all wells are run at the same time and blending is utilized. Each well could be run independently if necessary.

V. INVENTORY OF AVAILABLE EMERGENCY EQUIPMENT AND MATERIALS

Description	Owner	Telephone	Location
Well Repair	Thein Well	320-796-2114	Spicer, MN
Pump Repair	Thein Well	320-796-2114	Spicer, MN
Electrician	Anderson Elect.	701-371-4890	Barnesville
Electrician	Magnum Elect.	218-236-8753	Moorhead
Main Break	City Of Barnesville	218-354-2292	Barnesville
Plumbing	J & J Plumbing	218-329-9392	Hawley, MN
Chemical Feed	Hawkins Chemical	701-281-8673	Fargo, ND

VI. NOTIFICATION PROCEDURES

A. LEAD COORDINATING AGENCY

Water System Personnel	Name	Cell Phone	Work Phone
Mayor	Eugene Prim	701-412-3198	218-354-2606
Council Members	Larry Davis, Jr.	218-790-9375	218-493-4464
Council Members	Betty Strom	701-371-5885	
Council Members	Don Goedtke	701-238-4934	
Council Members	Richard Sylvester	701-371-9541	
Council Members	Cathy Enstad	218-354-7764	
Council Members	Jason Rick	701-238-5757	
Council Members			
State Incident Duty Officer			800-422-0798
County Emergency Director	Brian Green		218-299-7357
Fire Chief	Michael Stetz	218-329-2338	
Police Chief	Dean Ernst	701-219-0170	218-354-2281
School Superintendent	Scott Loeslie		218-354-2217
Ambulance	Scott Nelson	701-219-0178	218-354-2299
Hospital	N/A		
Electric Company	Guy Swenson	701-219-0169	218-354-2292
Highway Department	Dave Overbo		218-299-5099
Telephone Company	Guy Swenson	701-219-0169	218-354-2292
Neighboring Water System			
MRWA Technical Services	Mike Roers	320-760-5886	
MDH Public Water Supply	Steve Peterson	218-736-7788	218-770-0482
MDH SWP Planner	Jeni Marchand		218-308-2153

B. INCIDENT ASSESSMENT TEAM

Responsible Party	Name	Cell Phone	Work Phone
Mayor	Eugene Prim	701-412-3198	218-354-2606
Council Members	Larry Davis, Jr.	218-790-9375	218-493-4464
Council Members	Betty Strom	701-371-5885	
Council Members	Don Goedtke	701-238-4934	
Council Members	Richard Sylvester	701-371-9541	
Council Members	Cathy Enstad	218-354-7764	
Council Members	Jason Rick	701-238-5757	
Council Members			
Fire Chief	Michael Stetz	218-329-2338	
Police Chief	Dean Ernst	701-219-0170	218-354-2281
County Emergency Director	Brian Green		218-299-7357
Hazardous Materials Response	Barnesville Fire Dept	911	
Public Works	Trevor Moen	701-219-5791	

C. Public Information Plan

1. **Primary spokesperson for the media and/or public comment in the event of an emergency or contamination incident.**

Name: **Eugene Prim**
Title: **Mayor, City of Barnesville**
Address: **Barnesville City Hall**
102 Front Street North

Cell Phone: **701-412-3198**
Work Phone: **218-354-2606**

Public Information Center Location during Emergency: Barnesville City Hall, back-up at Barnesville Police Department

Times Available: Continuous during emergency

2. **Information checklist to be conveyed to the public media:**

Name of water system: _____
Contaminant of concern and date: _____
Source of contamination: _____
Public health hazard: _____
Steps the public can take: _____
Steps the water system is taking: _____
Other information: _____

3. **Media Contacts**

Media	Name	Telephone
Newspaper	Record Review	218-354-2606
TV	WDAY	701-237-6500

VII. MITIGATION AND CONSERVATION

A. MITIGATION

1. **Infrastructure maintenance/upgrades/maps:**
City of Barnesville or PeopleService, Inc.

2. **Regular inspection of tower, well, pump house:**
PeopleService, Inc.

3. **Staff emergency training:**
PeopleService and City of Barnesville Public Works

4. **Site new backup well:**
No plans currently to provide one.

5. **System valving to isolate problems:**
City feels we have appropriate valving in place

6. **Sanitation procedures for construction/repairs:**
Follow all pertinent MDH guidelines.

B. CONSERVATION

1. **Water Meters**
   All buildings are metered and read monthly.

2. **Public Education**
   A Consumer Confidence Report is provided annually to residents.

City of Barnesville WHPP Part II - Appendix IX

CITY OF BARNESVILLE - WHP IMPLEMENTATION SCHEDULE

NOTE: 1) For a complete description of each strategy, refer to the WHP Plan, Chapter 5.

2) Year 1 starts 60 days after final plan approval is received from MDH.

STRATEGIES	on-going or as needed	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	COMPLETION DATE
MONITORING, DATA COLLECTION, AND ASSESSMENT:												
1 - Contact MDH Hydro for monitoring of City wells and Whisky Creek		X	X									
2 - Utilize flow data from USGS site for Whisky Creek		X	X	X								
3 - MDH to evaluate impacts of monitoring data			X	X								
4 - Down-hole testing on PWS wells (#411250)	X	**If/when well maintenance occurs**										
5 - Update PCSI						X						
6 - Work with MDH on Old Municipal Wells					X	X						
WELL AND CONTAMINANT SOURCE MANAGEMENT:												
7 - Apply for grant funding to seal unused/unsealed wells							X					
8 - Work with MDH on ob-wells in IWMZ				X	X							
9 - MDH grant application to locate ob-wells if feasible					X	X						
10 - MDH grant application to seal wells if located						X	X					
11 - Update Inner Wellhead Management Zone						X						
12 - Monitor setbacks for new IWMZ uses	X											
13 - IWMZ measures - replace sewer lines as needed	X											
14 - Map/Letter to Fire Dept, MNDOT, City		X				X						
15 - Assess security - apply for MDH grant if needed				X								
16 - Educate landowners on well management/sealing		X										
17 - Apply for MDH grant to seal unused/unsealed wells						X						
18 - Identify Class V Wells	X											
19 - Work with MDH Hydro if new high-capacity wells are identified	X											
20 - Information to storage tank owners (UST and AST)			X									
21 - Apply for MDH grant - storage tank corrective measures					X							
22 - Manage stormwater ponds if grant funds available	X											
23 - Apply for funding for additional stormwater detention needs.	X											
24 - Investigate purchase vs. contracting televising equipment for sewer lines if funding is available.			X									
25 - Apply for MDH grant to replace any leaking or cracked sewer lines in ERA.				X								
EDUCATION AND OUTREACH:												
26 - Apply for MDH grant - WHP brochures		X			X			X				
27 - Post WHP information on City website	X											
28 - Provide MRWA water week info to grade 4 teachers		X	X	X	X	X	X	X	X	X	X	
29 - WHP Display at Clay County Fair		X					X					
30 - Apply for MDH grant for groundwater Model		X										
31 - Support attendance at River Keepers water fest		X	X	X	X	X	X	X	X	X	X	
32 - Meet with Barnesville School Administrator		X				X						
LAND USE AND PLANNING:												
33 - Require PWS used on city-owned properties	X											
34 - Update Water Contingency information (Chapter 7)						X						
35 - Mailing to LGUs - priority request in comp plan		X										
36 - Letter to County - request notification of land use permits or zoning changes.		X										
WHP COORDINATION, REPORTING, AND EVALUATION:												
37 - Every 2.5 years review of wellhead measures				X			X			X		
38 - Maintain WHP folder		X	X	X	X	X	X	X	X	X	X	
39 - Evaluation report every 2.5 years (Send to MDH)				X			X			X		
40 - Unforeseen issues	X											

Glossary of Terms

Data Element. A specific type of information required by the Minnesota Department of Health to prepare a wellhead protection plan.

Drinking Water Supply Management Area (DWSMA). The surface and subsurface areas surrounding a public water supply well, including the wellhead protection area, that must be managed by the entity identified in the wellhead protection plan. (Minnesota Rules, part 4720.5100, subpart 13). This area is delineated using identifiable landmarks that reflect the scientifically calculated wellhead protection area boundaries as closely as possible.

Emergency Response Area (ERA). The part of the wellhead protection area that is defined by a one-year time of travel within the aquifer that is used by the public water supply well (Minnesota Rules part 4720.5250, subpart 3). It is used to set priorities for managing potential contamination sources within the DWSMA.

Emergency Standby Well. A well that is pumped by a public water supply system only during emergencies, such as when an adequate water supply cannot be achieved because one or more primary or seasonal water supply wells cannot be used.

Inner Wellhead Management Zone (IWMZ). The land that is within 200 feet of a public water supply well (Minnesota Rules, part 4720.5100, subpart 19). The public water supplier must manage the IWMZ to help protect it from sources of pathogen or chemical contamination that may cause an acute health effect.

Nonpoint Source Contamination. Refers to contamination of the drinking water aquifer that is caused by polluted runoff or pollution sources that cannot be attributed to a specifically defined origin, e.g., runoff from agricultural fields, feedlots, or urban areas.

Point Source Contamination. Refers to contamination of the drinking water aquifer that is attributed to pollution arising from a specifically defined origin, such as discharge from a leaking fuel tank, a solid waste disposal site, or an improperly constructed or sealed well.

Primary Water Supply Well. A well that is regularly pumped by a public water supply system to provide drinking water.

Seasonal Water Supply Well. A well that is only used to provide drinking water during certain times of the year, either when pumping demand cannot be met by the primary water supply well(s) or for a facility, such as a resort, that is closed to the public on a seasonal basis.

Vulnerability. Refers to the likelihood that one or more contaminants of human origin may enter either 1) a water supply well that is used by the public water supplier or 2) an aquifer that is a source of public drinking water.

WHP Area (WHPA). 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 (Minnesota Statutes, part 103I.005, subdivision 24).

WHP Plan Goal. An overall outcome of implementing the WHP plan, e.g., providing for a safe and adequate drinking water supply.

WHP Measure. A method adopted and implemented by a public water supplier to prevent contamination of a public water supply, and approved by the Minnesota Department of Health under Minnesota Rules, parts 4720.5110 to 4720.5590.

WHP Plan Objective. A capability needed to achieve one or more WHP goals, e.g., implementing WHP measures to address high priority potential contamination sources within 5 years.