CITY OF BARNESVILLE
WELLHEAD PROTECTION PLAN
AMENDMENT - Part II

POTENTIAL CONTAMINANT SOURCE
Management Strategy

AUGUST 2015 - 2025

TABLE OF CONTENTS

PUBLIC WATER SUPPLY PROFILE

PUBLIC WATER SUPPLY	
NAME	City of Barnesville
ADDRESS	102 Front Street North
	Barnesville, MN 56514
TELEPHONE NUMBER	218-354-2292
E-MAIL	mrietz@bvillemn.net

WELLHEAD PROTECTION MANAGER	
NAME	Mike Rietz
ADDRESS	102 Front Street North
	Barnesville, MN 56514
TELEPHONE NUMBER	218-354-2292
E-MAIL	mrietz@bvillemn.net

CONSULTANT	
NAME	Marilyn Bayerl
	Bayerl Water Resources
ADDRESS	9083 State Hwy 114 SW
	Alexandria, MN 56308
TELEPHONE NUMBER	320-766-6126
E-MAIL	bayerl@runestone.net

GENERAL INFORMATION		
UNIQUE WELL NUMBERS	411249 (Well Number 8), 411250 (Well Number 9), 759855 (Well Number 10)	
POPULATION SERVED:	2613	
CONNECTIONS:	990 Residential	110 Commercial
COUNTY:	Clay	

DOCUMENTATION LIST

STEP	DATE PERFORMED
Scoping Meeting 2 Held (4720.5340, subp. 1)	May 6, 2014
Scoping 2 Letter Received (4720.5340, subp. 2)	June 4, 2014
Remaining Portion of Plan Submitted to Local Units of Government (LGUs) (4720.5350)	January 30, 2015
Review Received From Local Units of Government (4720.5350, subp. 2)	April 6, 2015
Review Comments Considered (4720.5350, subp. 3)	April 7, 2015
Public Hearing Conducted (4720.5350, subp.4)	April 13, 2015
Remaining Portion WHP Plan Submitted (4720.5360, subp. 1)	May 1, 2015
Final WHP Plan Review Received (4720.5360, subp. 4)	August 1, 2015

Members of the Wellhead Protection Team

NAME	REPRESENTING
Mike Rietz	City of Barnesville
Karen Lauer	Barnesville Economic Development Authority
Mike Kurkowski	Peopleservice, Inc.
Jon Evert	Clay County Commissioner
Bruce Albright	Buffalo-Red River Watershed District
Ed Gilbertson	Property Owner
Ryan Tonsfeldt	Property Owner
Don Goedtke	Barnesville City Council and Planning Advisory Commission
Rick Hamman	Barnesville Planning Advisory Commission
Darrel Thomas	Humboldt Township
Lynn Foss	Clay SWCD
Bruce Jaster	Clay County Environmental Services
Tim Magnusson	Clay County Planning and Zoning
Mike Strodtman	MN Rural Water Association
Jeni Marchand	MN Department of Health
Marilyn Bayerl	Bayerl Water Resources

Abbreviations

BEDA Barnesville Economic Development Authority
BRRWD Buffalo-Red River Watershed District
CES Clay County Environmental Services
CP&Z Clay County Planning and Zoning
DNR MN Department of Natural Resources
DWSMA Drinking Water Supply Management Area
EPA Environmental Protection Agency
GIS Geographic Information Systems
IWMZ Inner Wellhead Management Zone
JPB Joint Powers Board
LGU Local Government Unit
LUST Leaking Underground Storage Tanks
LWMP Local Water Management Plan
MDA MN Department of Agriculture
MDH MN Department of Health
Mg/Y Million Gallons per year
MN Minnesota
MNDOT MN Department of Transportation
MPCA MN Pollution Control Agency
MRWA MN Rural Water Association
NRCS Natural Resources Conservation Services
PCSI Potential Contaminant Source Inventory
PS Peopleservice
PWS Public Water Supply
RST Registered Storage Tank
SSTS Sub-surface Sewage Treatment Systems
SWCD Clay Soil & Water Conservation District
SWP Source Water Protection
ST Storage Tank
TMDL Total Maximum Daily Load
TOT Time-of-travel
UST Underground Storage Tank
WHP Wellhead Protection
WHPA Wellhead Protection Area
WHPP Wellhead Protection Plan

EXECUTIVE SUMMARY

The Part Two Amendment of the City of Barnesville's Wellhead Protection Plan speaks to sections 4720.5220 through 4720.5290 of MN Rules. This portion of the plan is based on the requirements outlined in the scoping document found in the ***Appendix*** of this plan. It addresses:

- Data elements and their assessments;
- Impacts of changes on the public water supply well;
- Issues, problems and opportunities;
- Wellhead protection goals, objectives and action plans;
- Program evaluation; and
- Alternative water supply/contingency strategy.

In Part One of the Plan amendment, the delineation of the Wellhead Protection Area (WHPA), the Drinking Water Supply Management Area (DWSMA), vulnerability of the wells, and vulnerability status of the aquifer in which the city's wells are located were completed and approved by the Minnesota Department of Health (MDH). This important information was utilized in the completion of this document.

The vulnerability of the aquifer that underlies the city's well fields was assessed based on geologic logs from wells in the area, surficial geologic and soils maps, and chemical and isotope data. ***Figure One*** maps the area of vulnerability for the city's wells. The DWSMA is located within the city limits of Barnesville and in Humboldt Township in Clay County. It is comprised of about 869 acres and is of moderate vulnerability. This plan will address the DWSMA area based on required potential contaminant considerations required.

The size of the DWSMA and the vulnerability level has been changed from the previous delineation. The overland flow influences were determined not to have an effect on the public drinking water supply. Whisky Creek, which runs through part of the DWSMA from northwest to southeast, has limited data regarding potential influence on the drinking water supply wells. Monitoring as recommended by the MDH will help to rule out this potential influence definitively.

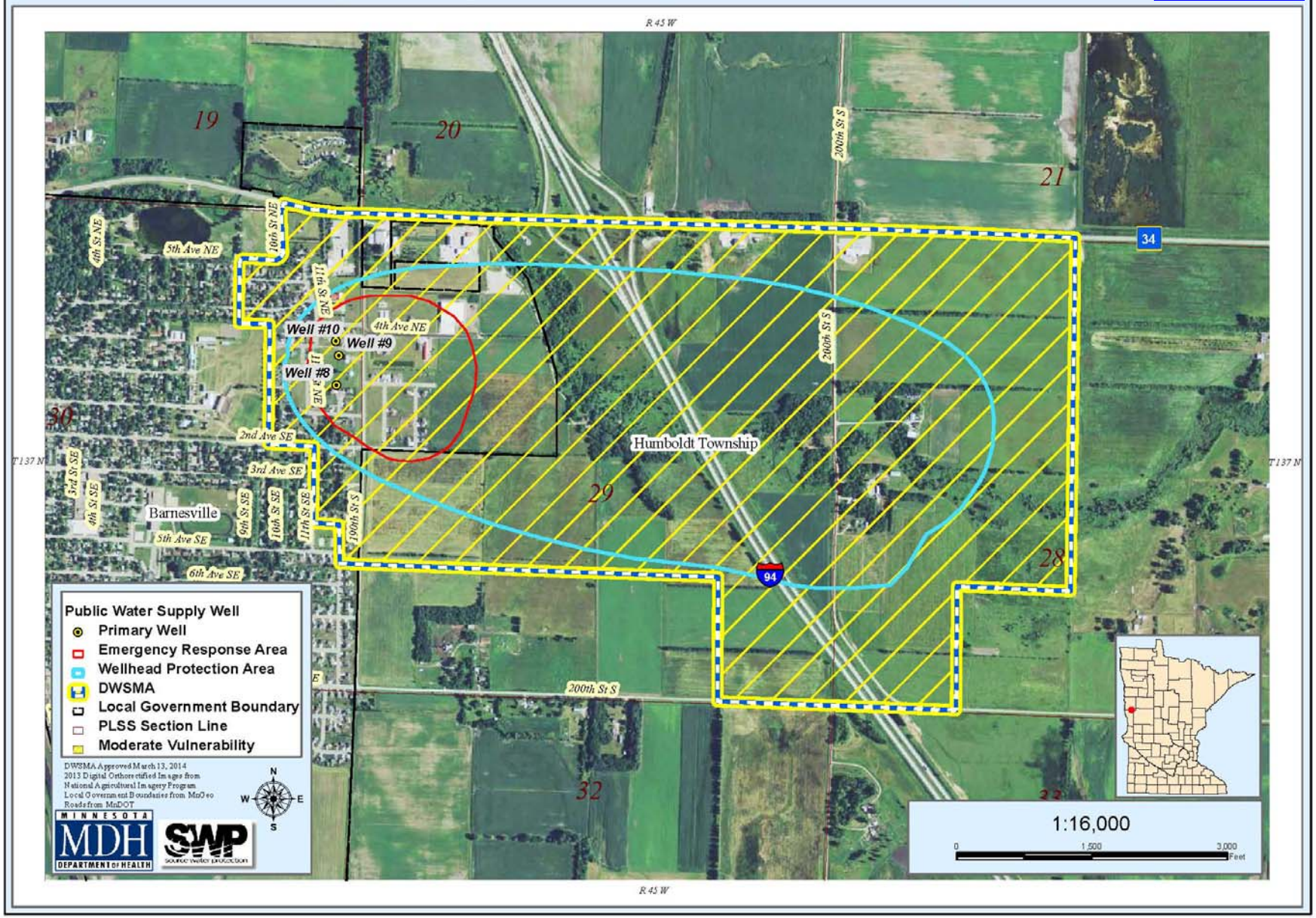
The Wellhead Protection Team intends to work with Clay County, the City of Barnesville, Humboldt Township and state and local agencies to continue to manage land use within the DWSMA to the extent available. It is the hope of the Wellhead Protection Team that through increased public awareness, habits will be established that will decrease the potential for future water problems and the community can continue to enjoy the current quality of water it has come to expect.

Barnesville
Clay County
Minnesota

Barnesville Drinking Water Supply Management Area (DWSMA) MN-00724 - Moderate Vulnerability

Minnesota Department of Health
Environmental Health
Source Water Protection Unit

Figure One



CHAPTER ONE

DATA ELEMENTS/ASSESSMENT

Minnesota Rules 4720.5200

I. REQUIRED DATA ELEMENTS

A. PHYSICAL ENVIRONMENT DATA ELEMENTS

1. Precipitation

Although not required to be included or assessed due to moderate vulnerability, precipitation is measured at multiple sites within Clay County through the Soil and Water Conservation District volunteers and other programs. Data from the sites are compiled and available on the State Climatology Website at: http://climate.umn.edu/doc/historical.htm.

2. Geology

Over twelve thousand years ago, the area surrounding Barnesville was the beach ridge area for Glacial Lake Agassiz. This area was formed by fluctuating levels of this glacial lake, and consists of sand beach ridges separated by silty depressions. The topography is gently rolling. Complete geologic information, vulnerability and delineations completed for the public water supply wells are found in the Part 1 amendment of the WHP Plan.

Geologic data elements pertinent to Wellhead Protection Area (WHPA) delineation and vulnerability status have been considered in the writing of this Plan. They are included in Part One of this Wellhead Protection Plan (WHPP) and are on file with the MDH and the City of Barnesville.

3. Soils

Due to the moderate vulnerability of the aquifer, soils are not required when determining potential contaminant sources.

4. Water Resources

The DWSMA is located entirely within the Buffalo-Red River Watershed. Water flows toward Whisky Creek which runs through the DWSMA in a south – southwesterly direction. Influence from Whisky Creek was not included in the Part I delineation. Analysis measures will be included in this plan to determine definitively the contribution this creek has to the drinking water supply wells. Creek flow documentation will also be considered during August through February.

B. Land Use Data Elements

1. Land Use

The City of Barnesville is located on the southern edge of Clay County, west of I-94. A parcel boundary map of the DWSMA is included in **Figure Five.** The city wells are located on the eastern boundary of the city limits. The total area of the WHPA (869 acres) is located mainly in Humboldt Township, and partly within the city limits of Barnesville. Political boundaries are shown in ***Figure One.*** Land cover within the DWSMA of Barnesville's aquifer is predominantly herbaceous / woody wetlands, as shown in ***Figure Two*** and ***Table 1*** below.

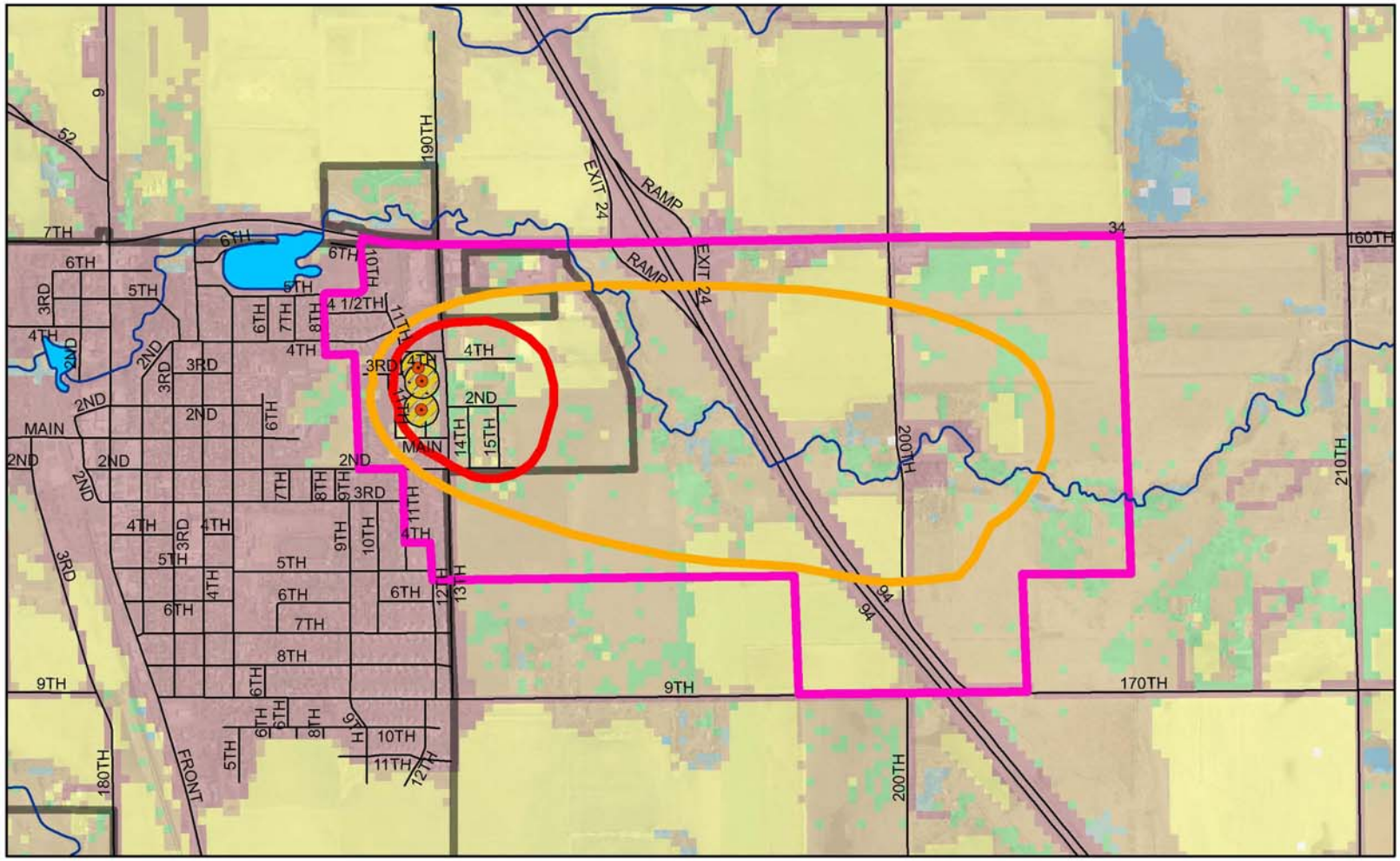
2012 Land Cover *Table 1*	**Acres**	**% of Total**
Cropland	166.4	19.2
Developed	153.0	17.6
Deciduous Forest	7.5	0.9
Evergreen Forest	0.2	0.0
Grassland/Pasture	82.6	9.5
Herbaceous/Woody Wetlands	459.0	52.8
Total	**868.7**	**100**

Official zoning within the DWSMA is shown in ***Table 2 and Figure Three.*** Agriculture and Agriculture Preservation account for almost eighty percent of the zoning within the DWSMA. Within the City of Barnesville, land use controls are administered locally, except for areas located within the Joint Powers Zoning area which is a Land Use Planning group made up of representatives from the City of Barnesville and Humboldt and Barnesville Townships. Clay County Environmental Services and Planning and Zoning are responsible for on-site septic system compliance and land use, respectively. Clay SWCD is responsible for administering the Wetland Conservation Act.

City of Barnesville, Humboldt & Barnesville Twp. Joint Powers Area and Clay County/Barnesville Zoning *Table 2*	**Acres**	**% of Total**
Joint Powers Area		
Highway Commercial	72.3	8.3
Agriculture Preservation	35.8	4.1
Commercial	46.7	5.4
City of Barnesville Zoning		
Municipality – Residential, Urban Residential, Multi-family Residential, Mobile Home, Commercial Park, Light Industrial and Highway Industrial	64.0	7.4
Clay County Zoning		
General Agriculture – All area outside Joint Powers and City limits	649.7	74.8
Total	**868.5**	**100**

Landcover

Figure Two



Legend

- Public Water Supply
- Rivers
- Lakes
- Inner Wellhead Management Area
- Emergency Response Area
- Wellhead Protection Area
- Drinking Water Supply Management Zone
- Barnesville City
- Roads
- Crop
- Deciduous Forest
- Developed
- Grass/Pasture
- Herbaceous/Woody Wetlands
- Open Water

N W E S

CLAY COUNTY

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0 0.1 0.2 0.4 0.6 0.8 Miles

Barnesville DWSMA Map

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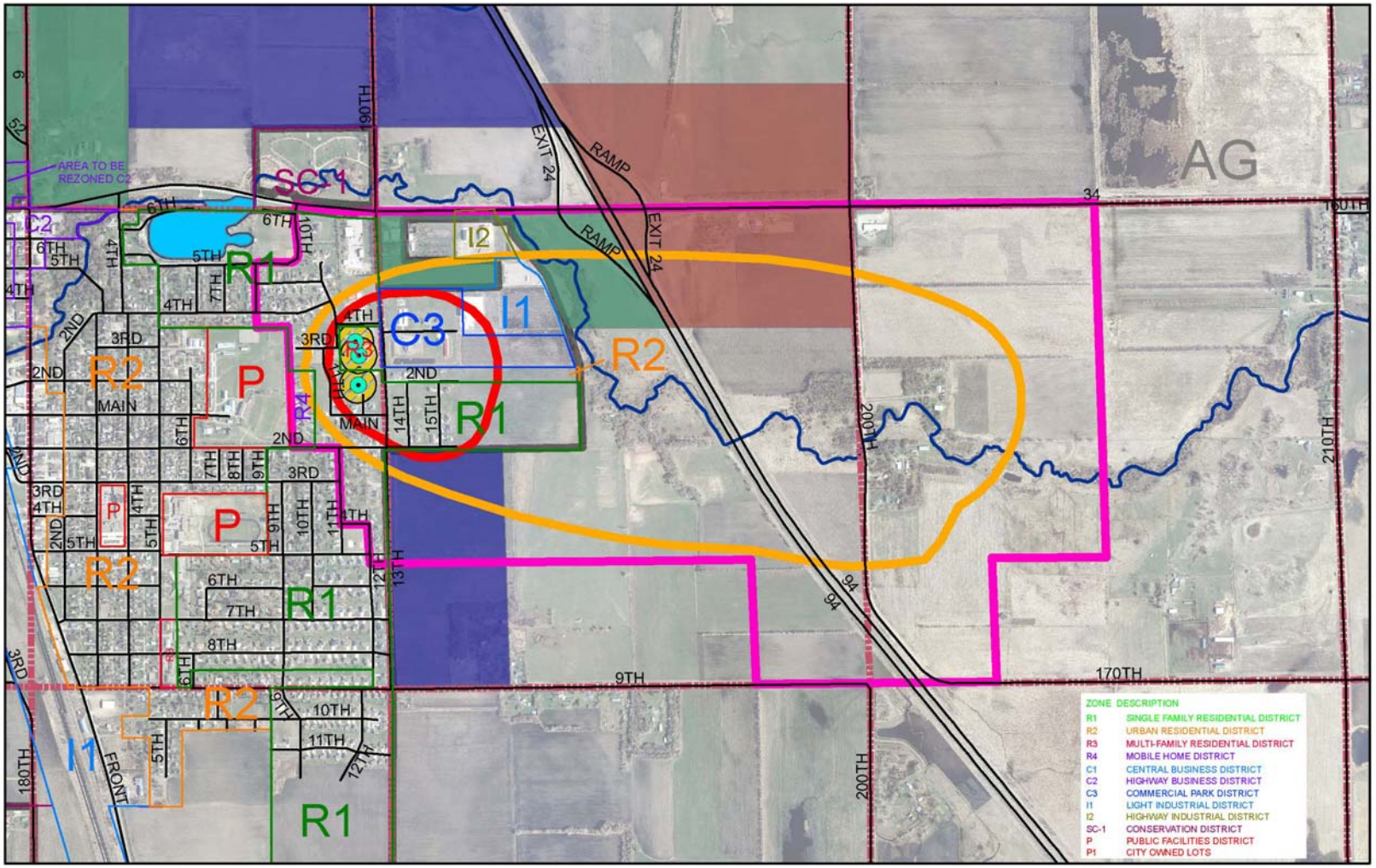
Zoning and Joint Powers Area

Figure Three



Legend

- Public Water Supply
- Drinking Water Supply Management Zone
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Area

Joint Powers Area

- Agrigultural Preservation
- Commercial
- Highway Commercial

N W E S

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0 500 1,000 2,000 3,000 4,000 Feet

Barnesville DWSMA Map

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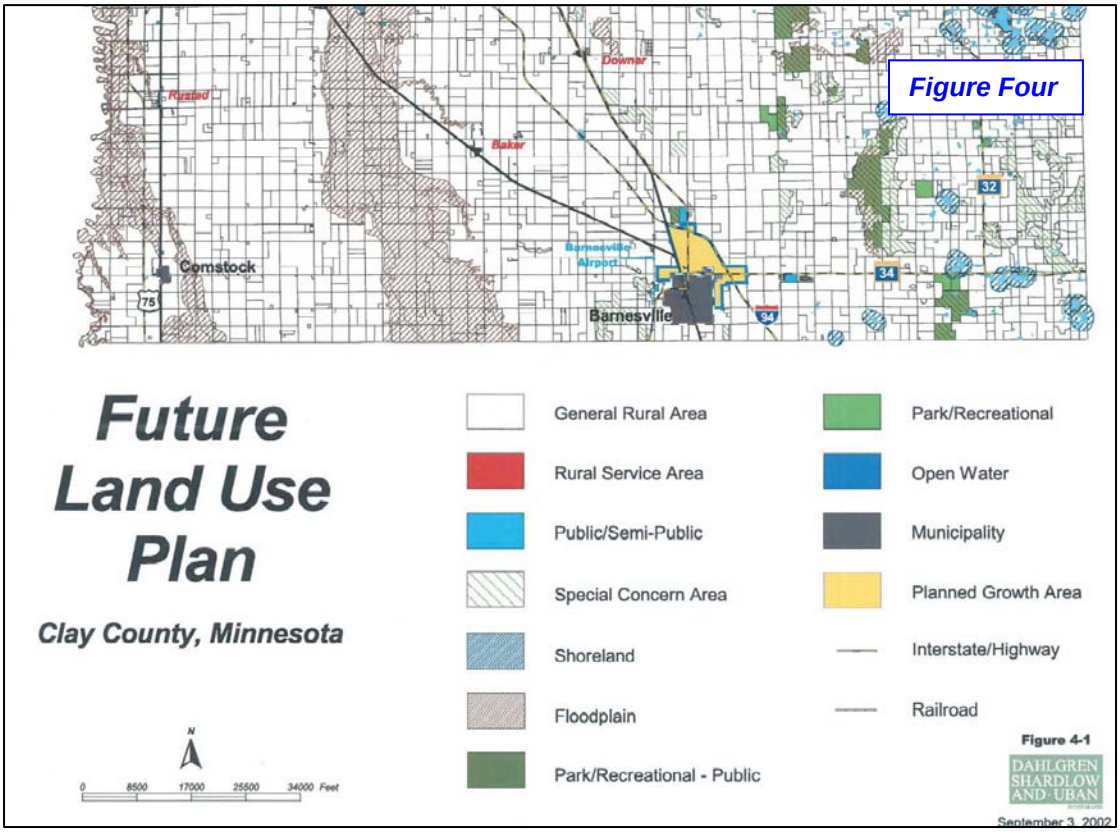
According to the Clay County Comprehensive Plan, the areas located to the north and east of Barnesville city limits were determined to be future expansion areas. The map from the Plan – ***Figure Four*** – shows this area.



Potential contaminant sources and assigned risk

Existing land uses and potential sources of contamination located within the DWSMA was reviewed by the WHP Team. The Potential Contaminant Source Inventory (PCSI), utilizing State databases combined with local knowledge, was used to identify most of the contaminant sources. ***Table 3 and Figure Five*** show the location of identified Potential Contaminant Sources. Numbers identifying property owners of each individual contaminant source are listed in the Appendix. A list of all property owners in the DWSMA, addresses, parcel identification numbers, and current use classification is also shown in the ***Appendix***.

Class V injection wells are typically shallow disposal systems that are used to place a variety of fluids below the land surface. Examples of Class V injection wells include: motor vehicle waste disposal wells, large capacity cesspools, storm water drainage wells, aquifer remediation wells and large capacity septic systems.

Class V wells are a concern because, in some situations, they may pose a risk to underground sources of drinking water. The risk a Class V well may present depends on factors such as: the type of fluid(s) it receives, its location in relation to water supply sources, its construction, maintenance and local geology. There are no known Class V wells located in the DWSMA.

Identification of Class V injection wells will be addressed further in the management strategies found in Chapter Five.

The above ground tanks all contain lube oil. Tanks and wells will be addressed in the strategies through education and incentive opportunities.

Transportation corridors that run through moderate vulnerability areas can pose a threat if spills occur. Strategies to address Interstate 94 and Trunk Hwy 34 will be addressed by a letter to MNDOT identifying the area of concern. The City of Barnesville will procure spill response equipment and training if feasible.

Wells will be managed through education and incentives for sealing. The two ob-wells located within the Inner Wellhead Management Zone (IWMZ) have been removed in 1988 by removing the casing and backfilling. This does not meet the sealing requirements of the MDH, therefore, the City will pursue MDH funding and work with the MDH well management section to locate and properly seal these wells if feasible.

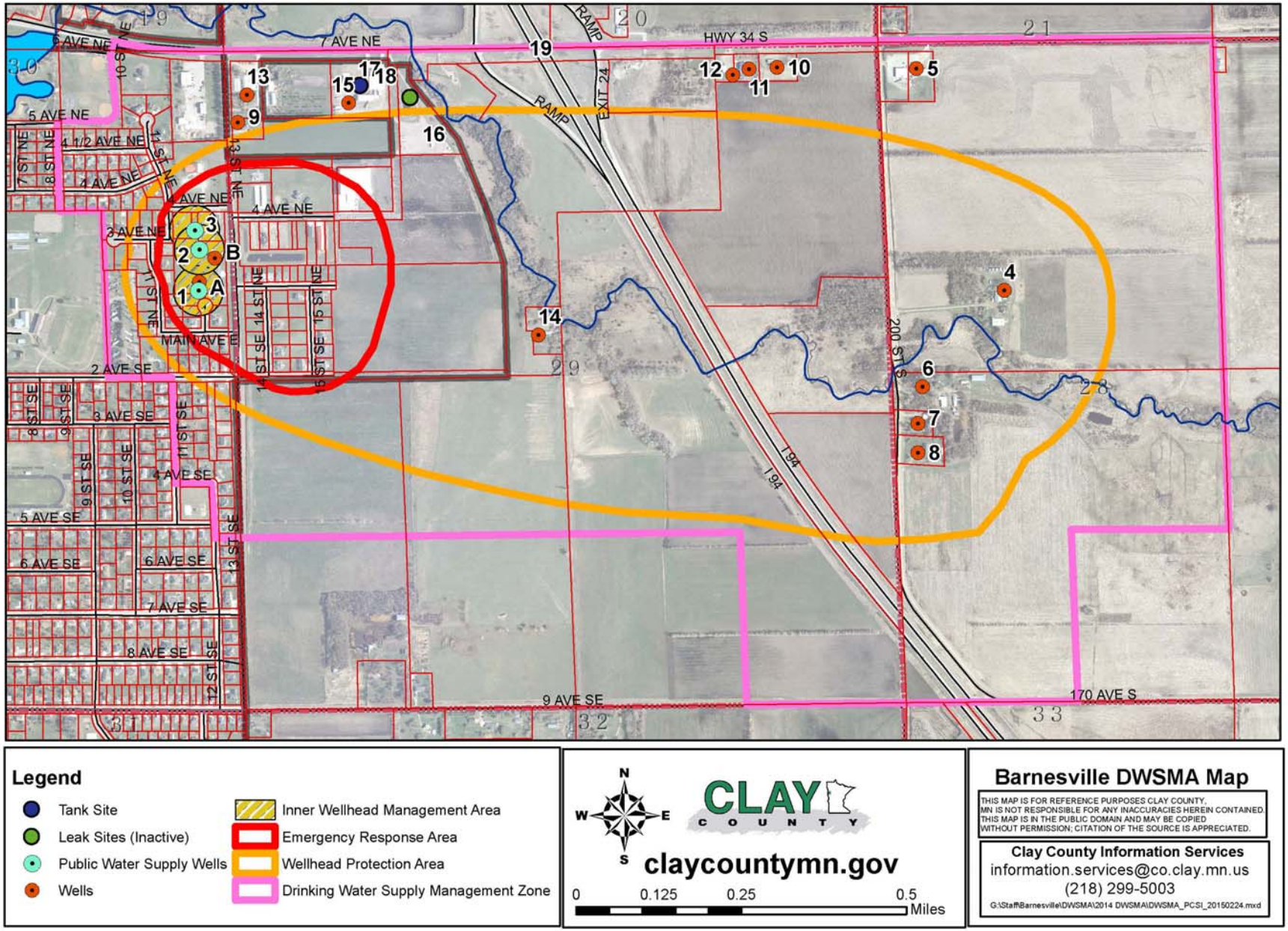
Potential Source Type	Status		***Table 3***
	Active	**Inactive**	**Level of Risk**
Above Ground Storage Tanks greater than 1100 Gal.	28		MEDIUM
Underground Storage Tanks	3		HIGH
Petroleum Release (Closed 2008)		1	LOW
Transportation – I-94 / Hwy 34	X		MEDIUM
Public Water Supply Wells	3		LOW
Domestic Wells	9		MEDIUM
Ob-wells		2	MEDIUM
Irrigation Wells	1		MEDIUM
Public Wells	2		MEDIUM
Class V Wells	0		LOW
ERA PCSI – Stormwater Ponds with lines / outfall	2		LOW
ERA PCSI – Sewer Lines	X		MEDIUM

Special attention is required in the ERA (Emergency Response Area) in regards to existing stormwater ponds. These two ponds are detention ponds with liners per specifications listed in the ***Appendix*** of this plan. With the exception of 164 feet in the SW corner of the ERA installed in about 1979, sewer lines were constructed within the last 20 years and are of PVC material. The City will consider the financial feasibility of monitoring these lines via televised inspection. Strategies to manage this area will be considered in ***Table 8***.

Existing land uses, management and local land use controls within the Inner Well Management Zone (IWMZ or 200' radius around the public water supply wells) and the immediate one year time of travel area is shown in ***Table 4*** and was reviewed and considered by the WHP team during the development of this plan. This is done to identify land use issues and related potential contaminants that may have the most immediate impact upon the PWS wells.

Potential Contamination Source Inventory

Figure Five



Legend

- Tank Site
- Leak Sites (Inactive)
- Public Water Supply Wells
- Wells
- Inner Wellhead Management Area
- Emergency Response Area
- Wellhead Protection Area
- Drinking Water Supply Management Zone

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0 0.125 0.25 0.5 Miles

Barnesville DWSMA Map

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Potential Contamination Sources and Assigned Risk for the IWMZ

Table 4 Source Type	Well 8	Well 9	Well 10	Assigned Risk
WEL - Operating Well	0	1	1	L
WEL – Ob-Well	1	1		M
SB1 – Buried Sewer Residential	2			L
SB2 – Buried Sewer Municipal	1	1	1	L
SD1 – Stormwater Drain >8" diameter		1	1	L
CR1 – Cistern or reservoir		1		L

A copy of the IWMZ forms and measures that have been identified are included in the ***Appendix*** of this plan. There is a reservoir located under the water treatment plant that holds drinking water prior to its movement to the tower. The WHP team discussed the importance of on-going monitoring for land use changes and potential contaminants near the public water supply wells and awareness of State Well Code isolation distances and need to maintain these setback requirements.

IWMZ strategies will include replacement of any sewer lines observed to be leaking, cracked or deteriorated and manage the storm sewer line that runs through the well #9 zone for optimal performance.

Existing land uses, potential contaminants and future land use changes were also considered within the one year time of travel. Based on the land uses and potential contaminants identified in the IWMZ and one year time of travel area described, the City will consider the potential contaminants and land uses a high priority during the implementation of management strategies found in Chapter Five of this plan.

Emergency Response Area (ERA)

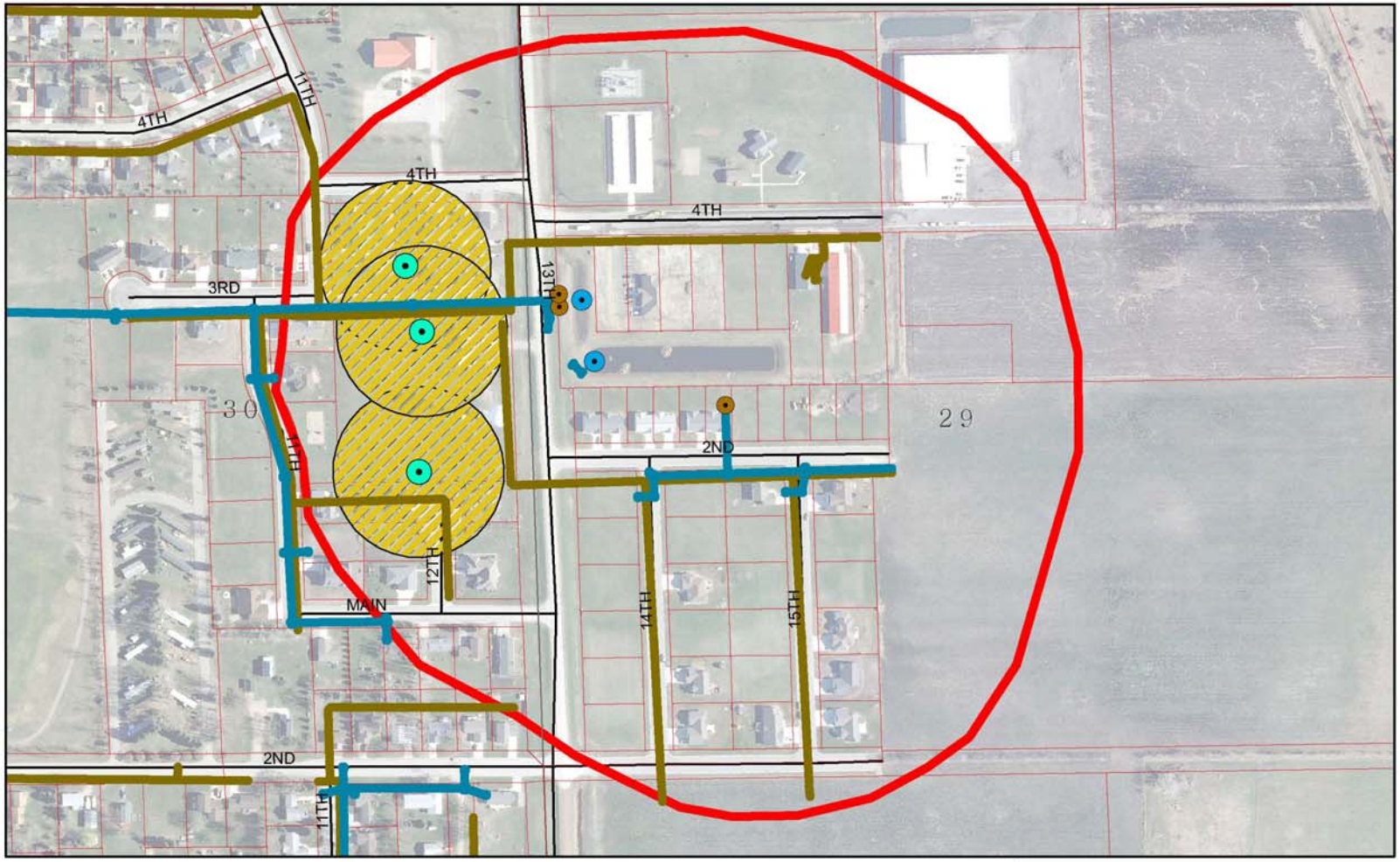
The City of Barnesville will need to take into special consideration the ERA, which is the area within the one-year time-of-travel of the city wells. The MDH outlined in the Scoping 2 document a list of special considerations within this area which include:

- Stormwater Infiltration ponds and stormwater outfalls,
- Manure land application sites,
- Sewage sludge land application sites,
- Sewer lines, and
- Subsurface sewage treatments systems (septic systems).

This area requires careful land use planning, as the potential impacts to the city wells are more immediate. A map depicting the location of existing potential contaminant sources within the ERA is shown in ***Figure Six.*** This area contains two regional stormwater retention ponds with storm sewer and stormwater outfalls. The two ponds are detention ponds with liners per specifications listed in the ***Appendix*** of this plan. Strategies to manage this area will be considered in ***Table 8.*** Newer PVC sanitary sewer lines run through the area – there are no Sub-surface sewage treatment systems or infiltration ponds within this priority area. There are no known manure or sewage sludge land application sites within the ERA.

Potential Contaminants in the Emergency Response Area

Figure Six



Legend

- Public Water Supply
- Storm Outfalls
- Barnesville Regional Pond
- Storm Sewer
- Sanitary Sewer
- Inner Wellhead Management Area
- Emergency Response Area

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0 480 960 Feet

Barnesville DWSMA Map

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Public Utility Services

Public Utilities and infrastructure that may impact groundwater quality in the DWSMA were considered in the development of this plan. Ground transportation corridors provide a potential source of contamination due to accidental spills and discharges. Interstate 94 transects the DWSMA from southeast to northwest and crosses Whisky Creek at one point. State Highway 34 intersects I-94 and travels east to west. A Public Utilities Map is on file at Barnesville City Hall and is included in the ***Appendix*** of this Plan. Most of the utilities are located outside the DWSMA. There are legal no drainage systems or pipelines located with the Barnesville DWSMA

Logs of the city's wells are located in the ***Appendix***. There are no other known high-capacity wells located with the DWSMA of the City of Barnesville. Unused municipal or other high-capacity wells have been identified, along with well sealing logs and are located in the ***Appendix*** of this document. The WHP reviewed the old municipal well report and determined the location of the wells were all outside of the DWSMA. The city will work with MDH to try to locate the wells and if the opportunity arises, apply for a grant to have them sealed.

C. WATER QUANTITY DATA ELEMENTS

1. Surface Water Quantity

According to Part One of the WHPP, there was unsubstantiated surface water contribution from Whisky Creek to the city's wells. Part One recommendations include water quality monitoring to verify and confirm this assessment. This will be considered in the management strategies of Chapter Five.

No known surface water use conflicts exist.

2. Groundwater Quantity

Adequacy of volume during drought periods has been addressed in Part One of the Plan. To date, there are no known well interference problems or water use conflicts. There are no known environmental bore holes in the DWSMA. Environmental bore holes are used to measure static water levels and can be used for monitoring other parameters as well. Static water levels are monitored semi-annually in all three PWS wells.

D. WATER QUALITY DATA ELEMENTS

1. Surface Water Quality

Surface water quality is not a consideration in the completion of this plan due to the moderate vulnerability rating.

2. Groundwater Quality

Tritium analysis was conducted on the PWS wells number eight, nine and ten in 2012. Tritium is a radioactive isotope of hydrogen that was released into the atmosphere during testing of hydrogen bombs. When Tritium is found in groundwater in amounts greater than one tritium unit, it is an indicator that recharge due to rainfall has occurred in the United States.

Results of the Tritium testing at 5.7, 5.3 and 6.1 tritium units, respectively, shows water in the aquifer is "young", meaning it has leached from the surface since 1953. Tritium analysis was conducted in 2000 on city well number nine. Results of 15.5 tritium units were detected at that time.

Nitrate levels in all wells are within MDH standards. The ***Appendix*** contains the 2013 Consumer Confidence report. The City of Barnesville will work to maintain their good water quality the community has come to expect.

II. ASSESSMENT OF DATA ELEMENTS

A. USE OF THE WELL

The City of Barnesville utilizes three wells ranging in depth from 77 to 80 feet, as shown in ***Table 5.*** An average of 82 million gallons per year has been pumped from these wells between 2008 and 2012. Usage has varied between a low of 76.8 million gallons in 2010 and 97.1 million gallons in 2009.

Well Number	Unique well #	Casing Depth (ft)	Depth (ft)	***Table 5*** Average pumped (Mg/Y)
8	411249	45	77	28.4
9	411250	56	86	27.2
10	759855	55	80	26.5

The city pumps an average of 250,000 gallons per day and has one elevated storage tank with a total capacity of 400,000 gallons plus one 100,000 gallon clear well reservoir. The city water system provides drinking water to 1100 metered service connections through appurtenant distribution mains, lines and services. Historic water usage over the past five years has averaged approximately 82 million gallons annually. Water use is expected to increase slightly by 2024. A State licensed operator currently manages the water system.

B. WELLHEAD PROTECTION AREA DELINEATION CRITERIA

The following data inputs were used in determination of the boundaries of the wellhead protection area.

1. **Time of Travel - 10 year**
2. **Flow Boundaries**
3. **Daily Volume**
4. **Ground Water Flow Field**
5. **Aquifer Transmissivity**

A detailed discussion of the delineation is found in Part One of the Plan. Part One Amendment of City of Barnesville's plan was completed by Richard Soule, Hydrologist, Minnesota Department of Health. Part One is located in the ***Appendix*** of this plan.

C. QUALITY AND QUANTITY OF WATER SUPPLYING THE PUBLIC WATER SUPPLY WELL

The City of Barnesville's wells pump about 82 million gallons per year. Results of routine sampling conducted by the MDH in 2013 discovered no violations of any parameters monitored under the Federal Safe Drinking Water Act. A copy of the 2013 Consumer Confidence Report is located in the ***Appendix*** of this plan.

D. THE LAND AND GROUNDWATER USES IN THE DRINKING WATER SUPPLY MANAGEMENT AREA

The area of the DWSMA located within the City limits of Barnesville consist mainly of general agricultural, residential, with an area of commercial to the north and residential to the west. Education of landowners about the importance of proper management of tanks and wells are issues of concern and will be the focus of management strategies.

The intent of this WHPP is to heighten awareness regarding the impact of land use activities on groundwater quality. Through awareness, it is hoped that citizens will voluntarily take the necessary steps, which will maintain the quality of groundwater and drinking water produced by the City.

CHAPTER TWO

IMPACT OF CHANGES ON PUBLIC WATER SUPPLY WELL

Minnesota Rules 4720.5220

I. CHANGES IDENTIFIED IN:

A. PHYSICAL ENVIRONMENT

No physical changes in the environment are anticipated within the next ten years.

B. LAND USE

The City has potential to annex the Agricultural Preservation area to the south of the city limits and the Commercial area on the north and east. These areas can be seen in ***Figure Three.***

The City Commercial Park is approximately 50% built out. The City is recruiting and expects expansion in this area. Consideration of the WHPA will be utilized when applicants come into the DWSMA. Conditions may be applied to permits to protect the drinking water supply. If there is a need for additional storm water retention basins, the city will work with MDH to assess any possible implication to the drinking water supply.

C. Surface Water

Whisky Creek is part of the Buffalo River Watershed TMDL. It will be included in the Watershed Restoration and Protection plan being completed by the BRRWD. Through this effort there is expectation that water quality in the creek will show improvement in the next ten years.

D. Groundwater

No changes in the groundwater appropriations are anticipated.

II. IMPACT OF CHANGES

A. Expected Changes in Water Use

There are no expected changes in the water use within the DWSMA. No new irrigation wells are expected in the area.

B. Influence of Existing Water and Land Government Programs and Regulation

The Clay County Local Water Management Plan has identified priorities supportive of groundwater protection in its current plan. An update has been postponed due to the TMDL and Watershed Restoration and Protection Planning process. This will be incorporated into the LWMP when completed.

The Barnesville DWSMA is located within the Buffalo-Red River Watershed and is part of the Red River Basin. More information about the Red River Basin can be found at the following website: http://www.redriverbasincommission.org/ and the Buffalo-Red Watershed at: http://www.brrwd.org/.

The following ***Table 6*** shows the departments or programs within Clay County that may be able to assist the city with issues relating to potential contamination sources that 1) have been inventoried or 2) may result from changes in land and water use within the DWSMA.

Table 6

Government Unit	Name of Control/Program	Program Description
City of Barnesville	Comprehensive Land Use Plan	Land Use Permitting
Joint Powers Agreement		Land Use Permitting
Clay County	Planning and Zoning	Zoning and Land Use Ordinance
Clay County SWCD	Wetland Conservation Act Local Water Management Plan	Well Sealing Cost-Share
Buffalo-Red River Watershed District	Watershed Management Plan Land Use Regulations	Regulation of flood control and alteration of drainage

The following ***Table 7*** indicates the state and federal agencies and programs available to implement this WHP plan.

Government Unit	Type of Program	***Table 7*** **Program Description**
MDH	State Well Code (Minnesota Rules, Chapter 4725)	MDH has authority over the construction of new wells and the sealing of wells. MDH staff in the Well Management Program offer technical assistance for enforcing well construction codes, maintaining setback distances for certain contamination sources, and well sealing.
MDH	WHP	MDH has staff that will help the city identify technical or financial support that other governmental agencies can provide to assist with managing potential contamination sources. MDH can assist with implementation through MDH and SWP Implementation Grants.
DNR	Water appropriation permitting (Minnesota Rules, Chapter 6115)	DNR can require that anyone requesting an increase in existing permitted appropriations, or to pump groundwater, must address concerns regarding the impacts to drinking water if these concerns are included in a WHP plan.
EPA	Class V Wells	The EPA has authority over Class V wells. Owners are required to notify the EPA.

C. ADMINISTRATIVE, TECHNICAL, AND FINANCIAL CONSIDERATIONS

The City of Barnesville, Clay SWCD and Clay County Planning and Zoning Office have been supportive of Wellhead Protection efforts. A wellhead team had been formed and has been actively involved in the planning process. A budget has been established for implementation of priority strategies identified in this Plan.

The WHP Manager will be responsible for implementation of this Plan. The WHP team will continue to meet at least every 2.5 years to review and discuss implementation programs.

The City will work with the Clay SWCD providing groundwater education opportunities as they arise. Clay County Local Water Management, SWCD, BRRWD and County Planning and Zoning have provided and will continue to provide technical assistance for this plan.

CHAPTER THREE

ISSUES, PROBLEMS, AND OPPORTUNITES

Minnesota Rules 4720.5230

I. LAND USE ISSUES, PROBLEMS, AND OPPORTUNITIES RELATED TO:

A. THE AQUIFER

The aquifer providing Barnesville's Public Water Supply has been determined to be influenced by land use based on the geologic setting and Tritium dating of the water. The amount of recharge provided to the aquifer from Whisky Creek is largely unknown as described in Part I of the WHPP and may serve as a conduit for the movement of contaminants into the groundwater. Since the majority of the DWSMA is located outside the city limits, the City of Barnesville will work in partnership with the Buffalo-Red River Watershed District, the Joint Powers Board, Humboldt Township and Clay County when land use changes are proposed within the DWSMA. Further monitoring of creek flow and parameters identified in Part I will be included in the strategies.

Other opportunities presented include: The city, in partnership with MDH, has the opportunity for monitoring Whisky Creek to determine if there is any influence on the drinking water supply wells, data logging on well #9 and an adjacent well during routine maintenance, transportation corridors – spill abatement education and equipment are all high priority. Identification of unsealed, unused wells – funding for well sealing as needed, location of above ground tanks greater than 1,100 gallons, underground storage tanks, and new wells placed in the DWSMA. The City will apply for well location and sealing funds if the need presents. Public education programs addressing potential contamination of the DWSMA will be initiated.

B. THE WELL WATER

The City of Barnesville has adequate water for the projected use in the next ten years. Adding any high capacity well by the City may affect the WHPA and DWSMA and would require a new delineation. The City will work with the MDH and DNR to assist with location and construction of any proposed new high capacity wells. Education is one of the main strategies in protection of drinking water supply management area.

The City of Barnesville has multiple opportunities to contribute to educational programs within the community such as: River Keepers Water Festival held annually for area 4th grade students, the MRWA coloring contest for area 4th grade students, science fair in local grade schools, Clay County Fair and the River Watch program. The City has the opportunity to apply for grant funding to purchase a groundwater flow model to provide education at these venues.

C. THE DRINKING WATER SUPPLY MANAGEMENT AREA

Land use within the DWSMA of this aquifer has been relatively stable for years. The City of Barnesville may have a need for security cameras for the water tower and plant. An MDH Sourcewater Protection Implementation grant will be applied for if security levels are determined to be inadequate.

II. IDENTIFICATION OF:

A. PROBLEMS AND OPPORTUNITIES DISCLOSED AT PUBLIC MEETING AND IN WRITTEN COMMENT

No public comments were presented at any of the public meetings held in conjunction with this plan.

B. DATA ELEMENTS

The State's Wellhead Protection Rule requires that existing information be utilized in developing the amended Wellhead Protection Plan. Much of the data collected and utilized to delineate the City of Barnesville's WHPA and DWSMA and to determine vulnerability of the aquifer to possible contamination comes from regional sources on a large scale. While much regional information and data is being used as supplied by MDH, the City has verified all of the contaminant sites to further protect public drinking water supplies.

The City will continue to compile data collected by all entities regarding groundwater and surface water to track potential changes in the quality of water. This plan will be updated on ten-year intervals as required by the State of Minnesota. Updated data will be utilized at that time.

C. STATUS AND ADEQUACY OF OFFICIAL CONTROLS, PLANS, AND OTHER LOCAL, STATE, AND FEDERAL PROGRAMS ON WATER USE AND LAND USE

The WHP team feels adequate protection of the DWSMA is available through existing land use ordinances in the City of Barnesville, Clay County, the Joint Powers Area, the Watershed District, Humboldt Township and state well and groundwater appropriation permits. The City of Barnesville regulates most of the land within in the 1-year time-of-travel of the City wells.

Education programs promoting Best Management Practices and working with local landowners on issues is the approach proposed by the City.

The MDH and Minnesota Rural Water Association (MRWA) will continue to provide technical assistance towards the successful implementation of this Plan. Other State agencies including the DNR, MDA, MPCA, and BWSR are available to provide assistance as needed.

CHAPTER FOUR

WELLHEAD PROTECTION GOALS

Minnesota Rules 4720.5240

Goals define the overall purpose for the WHP plan, as well as the end points for implementing objectives and their corresponding actions. The WHP team identified the following goals after considering the impacts that 1) changing land and water uses have presented to drinking water quality over time and 2) future changes that need to be addressed to protect the community's drinking water:

- Maintain a safe and adequate drinking water supply for community residents;
- Prevent contaminants from reaching levels that present a risk to people's health; and
- Create public awareness and general knowledge about the importance of WHP for maintaining an adequate and safe drinking water supply.

CHAPTER FIVE

OBJECTIVES AND PLANS OF ACTION

Minnesota Rules 4720.5252

Objectives provide the focus for ensuring that the goals of the WHP plan are met and that priority is given to specific actions that support multiple outcomes of plan implementation.

Both the objectives and the wellhead protection measures (actions) that support them are based on assessing 1) the data elements, 2) the potential contaminant source inventory, 3) the impacts that changes in land and water use present and 4) issues, problems, and opportunities referenced to administrative, financial, and technical considerations.

OBJECTIVES

The following objectives have been identified to support the goals of the WHP plan for the City of Barnesville:

A. Provide land owners with educational materials and other resources to assist them with drinking water protection issues such as tanks, private well use, maintenance and sealing assistance and Class V wells.

B. Increase the knowledge base regarding quantity of water available – maintain adequate drinking water supply.

C. Gather new information on potential contaminants.

D. Manage potential contaminants.

E. Ensure emergency preparedness of local agencies.

F. Create awareness among LGUs about the importance of protection of the drinking water supply aquifer.

G. Maintain communications with the MDH and other agencies able to assist with implementation of this plan.

H. Collect additional data to substantiate information contained within this Plan, and to provide more detail for future Plan amendments.

I. Conduct regular evaluations of Plan implementation and effectiveness.

WHP MEASURES AND ACTION PLAN

Based upon this information, the WHP team has identified WHP measures that will be implemented by the City over the 10-year period that its WHP plan is in effect. The objective that each measure supports is noted as well as 1) the lead party and any cooperators, 2) the anticipated cost for implementing the measure and 3) the year or years in which it will be implemented.

The following categories are used to further clarify the focus that each WHP measure provides, in addition to helping organize the measures listed in the action plan:

- Data Collection
- IWMZ Management
- Land Use Management
- Potential Contamination Source Management
- Public Education and Outreach
- Reporting and Evaluation
- Water Use and Contingency Strategy

ESTABLISHING PRIORITIES

WHP measures reflect the administrative, financial, and technical requirements needed to address the risk to water quality or quantity presented by each type of potential contamination source. Not all of these measures can be implemented at the same time, so the WHP team assigned a priority to each. A number of factors must be considered when WHP action items are selected and prioritized (part 4720.5250, subpart 3):

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

The City of Barnesville defines a priority for implementing a WHP measure as maintaining the quantity and high quality drinking water they have come to expect. The following ***Table 8*** lists each measure that will be implemented over the 10-year period that the City's WHP plan is in effect, including the priority assigned to each measure. It is difficult to foresee and plan for the future. The City will be the primary responsible party to all strategies listed in Table 8. The City will use its planning and management capabilities within this plan to respond to any new/unknown source water protection issues that may impact the quality or quantity of its drinking water in the future.

Table 8 - WHP Plan of Action

MONITORING, DATA COLLECTION, AND ASSESSMENT:

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Groundwater Quality & Quantity Monitoring **WHP Measure #1:** Contact the MDH Hydrologist to initiate sampling of the City wells and Whisky Creek. Parameters and sample dates are outlined in the Scoping 2 Document. If available, apply for grant funding to cover the costs of monitoring.	**H**	**H**	Barnesville MDH BRRWD MRWA	MDH will cover lab fees			X	X						
WHP Measure #2: Work with MDH hydrologist to assess the possibility of collecting flow data on Whisky Creek during the months of August through April.	**H**	**H**	Barnesville BRRWD MDH MRWA	Staff Time			X	X	X	X	X			
WHP Measure #3: Collaborate with the MDH regarding the impacts of the groundwater monitoring results on DWSMA management, if any.	**H**	**H**	Barnesville MDH MRWA	TBD						X	X			
2. Aquifer Testing **WHP Measure #4:** Conduct an aquifer test with down-hole gamma and resistivity logging on well #9 (411250) and either well #8 (411249) or well # 10 (759855) if feasible – particularly well #411250. Contact MDH Hydrologist prior to a PWS well pump being pulled for maintenance.	**B**	**M**	Barnesville MDH	Staff Time	←---------- If/when well maintenance occurs ----------→									
3. Inventory and Prioritization **WHP Measure #5:** Update the PCSI during year five. Review status of existing potential contaminants and add any new ones identified within the DWSMA.	**C**	**H**	Barnesville MPCA MDH	Staff Time					X					

MONITORING, DATA COLLECTION, AND ASSESSMENT (CONT):

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WHP Measure #6: As no old municipal wells are located within the DWSMA, work with MDH to review old municipal well and boring information to help locate and determine efforts needed to address former City wells outside of the DWSMA. Obtain well records from well driller and submit to MDH.	**C**	**H**	Barnesville MDH MRWA Local Well Drillers	Staff Time				X	X					

WELL AND CONTAMINANT SOURCE MANAGEMENT:

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Municipal Well Management Practices **WHP Measure #7:** If old municipal wells are located and property owner agrees to seal, apply for MDH grant funding to seal identified unused unsealed wells.	**D**	**H**	Barnesville MDH Property Owners	$6,000 to $10,000 per well						X				
WHP Measure #8: Work with MDH well management to determine feasibility and financial cost of locating ob-wells #409237 and 409238.	**C/D/G**	**H**	Barnesville MDH well unit MRWA	Staff Time			X	X						
WHP Measure #9: Apply for MDH grant funding to locate ob-wells if determined to be feasible by MDH.	**D**	**H**	Barnesville MDH	TBD				X	X					
WHP Measure #10: Apply for MDH grant funding to seal ob-wells #409237 and 409238 if located and sealing is feasible.	**D**	**H**	Barnesville MDH	TBD					X	X				

WELL AND CONTAMINANT SOURCE MANAGEMENT (CONT):

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WHP Measure #11: Review and update the IWMZ survey form for all wells in the system every 5 years working in coordination with the MDH.	**C**	**H**	Barnesville MDH, MRWA	Staff Time					X					
WHP Measure #12: Monitor setbacks for all new potential contaminant sources within the IWMZ.	**D**	**H**	Barnesville MDH	Staff Time	←----------On-Going----------→									
WHP Measure #13: Implement WHP measures identified on the IWMZ Inventory forms.	**D**	**H**	Barnesville MDH	Staff Time	←----------As Needed----------→									
WHP Measure #14: Provide a map of the DWSMA to the local Fire Department, City Street Department, and MNDOT. Request their awareness and prompt response to accidents, spills and clean-up efforts near the PWS wells.	**E**	**H**	Barnesville MNDOT	$250	X				X					
2. Municipal Well Security Issues **WHP Measure #15:** Assess the need for security devices to protect the City wells. Apply for MDH Sourcewater Protection grant if need is determined	**D**	**H**	Barnesville MDH MRWA	TBD			X							
3. Private Well Management **WHP Measure #16:** Provide information on the proper management and sealing of wells to landowners located in the DWSMA that have a well and why this is important.	**A**	**H**	Barnesville MDH	$250	X									
WHP Measure #17: Apply for a MDH SWP Grant to seal any unused unsealed wells identified in the DWSMA.	**D**	**H**	Barnesville MDH	$600-$1,000 per well					X					
4. Class V Wells **WHP Measure #18:** Update and identify any new known potential Class V Wells in the DWSMA. Environmental Protection Agency factsheet will be available at city hall.	**C**	**M**	Barnesville MDH EPA	Staff Time	←----------As Needed----------→									

WELL AND CONTAMINANT SOURCE MANAGEMENT (CONT):

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
5. High Capacity Well Management **WHP Measure #19:** Collaborate with the MDH Source Water Protection Unit in the identification of new high-capacity wells that are proposed for construction with the DWSMA or within one mile of the DWSMA.	**G**	**M**	Barnesville MDH DNR	Staff Time	←----------As Needed----------→									
6. Tank Management **WHP Measure #20:** Provide a brochure to property owners with storage tanks describing what WHP is. Provide information regarding proper containment areas for above and below ground tanks and spill response and clean-up.	**D**	**H**	Barnesville MDH MRWA MPCA	$250		X								
WHP Measure #21: Contact the owners of the storage tanks identified in the PCSI to determine the status of their tanks. If any corrective measures are needed, assist them by applying for a grant via MDH to perform any corrective actions, including but not limited to removal of unused tanks.	**D**	**H**	Barnesville MDH	TBD				X	X	X				
7. Stormwater Management **WHP Measure #22:** If grant funds available, manage the stormwater ponds and pipe in ERA to insure optimal performance per MPCA guidelines.	**D**	**H**	Barnesville	$10,000	←----------As Available----------→									
WHP Measure #23: If there is a need for additional storm water retention basins, construct stormwater projects that will protect the drinking water resource outside of the ERA. If this is not an available option, the city will work with MDH to assess any possible implication to the drinking water supply. If the opportunity presents and funding is available, construct an additional storm water retention pond in accordance with MDH recommendations	**D**	**L**	Barnesville	Based on Bids	←----------As Required----------→									

WELL AND CONTAMINANT SOURCE MANAGEMENT (CONT):

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
8. Sewer Lines located in the ERA **WHP Measure #24:** If funding is available investigate purchasing vs. contracting televising equipment to monitor sewer lines in the ERA and IWMZ.	**D**	**H**	Barnesville	$10,000		X								
WHP Measure #25: Apply for grant funding to replace any leaking or cracked sewer lines identified in the ERA.	**D**	**H**	Barnesville	$10,000			X							

EDUCATION AND OUTREACH:

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Wellhead Protection **WHP Measure #26:** Select wellhead protection education items from the MN Rural Water Association source water protection website to use to educate the public about WHP and unsealed wells. Place brochures at City Hall and the public library. Apply for MDH SWP funds for printing costs.	**A**	**H**	Barnesville MRWA	$750	X			X			X			
WHP Measure #27: Post and highlight WHP education information on the City website.	**A**	**M**	Barnesville MDH	$500	←----------On-Going----------→									
WHP Measure #28: Assess interest and annually provide the MRWA Water Week educational materials to the local 4th grade school teacher if willing to participate.	**A**	**M**	Barnesville MRWA MDH	Staff Time	X	X	X	X	X	X	X	X	X	X
WHP Measure #29: Display WHP information at the Clay County Fair. Highlight practices or activities that citizens can do to support WHP efforts.	**A/F**	**M**	Barnesville SWCD	Staff Time	X					X				

EDUCATION AND OUTREACH (CONT.):

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WHP Measure #30: Work with county SWCD on providing groundwater information to local youth outreach programs such as water festivals or envirothon. Apply for MDH grant funds for a groundwater flow model to assist in education.	**A/F**	**H**	Barnesville SWCD	$2,500	X									
WHP Measure #31: Support the attendance of the River Keepers children's water festival held in Moorhead based on school needs.	**A**	**M**	Barnesville SWCD River Keepers Local Schools	$500	X	X	X	X	X	X	X	X	X	X
WHP Measure #32: Set up a meeting with the Barnesville School Administrator to discuss the identified cooperative education efforts (measures 28 and 29).	**A**	**M**	Barnesville Local Schools	Staff Time	X				X					

LAND USE AND PLANNING:

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Water Use Management **WHP Measure #33:** Require that only the public water supply be used by businesses that locate on commercial properties within the City limits that lie within the DWSMA.	**D**	**H**	Barnesville	Staff Time	←----------As Needed----------→									

LAND USE AND PLANNING (CONT.):

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WHP Measure #34: Review and update the Emergency / Contingency Strategy Plan portion of the Barnesville WHP plan every five years or earlier if required to ensure that it reflects current personnel information and any changes in the water supply system.	**E**	**H**	Barnesville	Staff Time					X					
2. General Land Use & Water Resource Planning **WHP Measure #35:** Send letter to the JPB, BRRWD, Clay County, and the SWCD requesting that they incorporate a map of the DWSMA and identify local wellhead issues and activities during plan updates.	**F**	**H**	Barnesville JPB BRRWD Clay County SWCD	Staff Time	X									
WHP Measure #36: Request notification of land use permits or proposed zoning changes in the DWSMA.	**F**	**M**	Barnesville JPB BRRWD Clay County	Staff Time	X									

WHP COORDINATION, REPORTING, AND EVALUATION:

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. WHP Coordination **WHP Measure #37:** Coordinate a meeting with the WHP team every 2.5 years. Discuss funding needs and pursuit of SWP Grant funds to help implement activities identified in the WHP Plan.	**F/I**	**H**	Barnesville WHP Team MRWA	Staff Time			X			X			X	

WHP COORDINATION, REPORTING, AND EVALUATION (CONT):

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2. Implementation Tracking and Reporting Activities **WHP Measure # 38:** Maintain a "WHP folder" that contains documentation of WHP activities you have completed and a date that it was done. Identify each activity with the number of the measure contained in this table.	**I**	**H**	Barnesville	Staff Time	X	X	X	X	X	X	X	X	X	X
3. WHP Program Evaluation Plan Reporting **WHP Measure #39:** Complete an Evaluation Report every 2.5 years that evaluates the "progress of plan of action and the impact of any contaminant release on the aquifer supplying the public water supply well" MN WHP Rule 4720.5270. Submit copy to MDH.	**I**	**H**	Barnesville MDH	Staff Time			X			X			X	
WHP Measure #40: It is difficult to foresee or plan for the future. The City will use its planning and management capabilities within this plan to respond to any new/unknown source water protection issues that may impact the quality or quantity of its drinking water in the future.	**D**	**L**	Barnesville MDH	$5,000	←----------As Needed----------→									

CHAPTER SIX

EVALUATION PROGRAM

Minnesota Rules 4720.5270

The success of the Potential Contaminant Source Management Strategy must be measured regularly to ensure the Plan is meeting the community needs on Wellhead understanding and compliance.

The City of Barnesville's WHPA has been designated as having moderate vulnerability to contamination. The designation of moderate vulnerability requires monitoring of the following potential contaminant sources within the DWSMA:

a. Above Ground Storage Tanks greater than 1,100 gallons
b. Potential Class V Wells
c. Leaking Underground Storage Tanks
d. Potential Contamination Sites
e. Solid Waste Management Sites
f. Spills
g. Storage or Preparation Areas (Chemicals, Fertilizers, Fuels, Gasses, Oils, Hazardous substances, Solvents and Coatings and Waste
h. Suspected Contaminants of Concern
i. Underground Storage Tanks
j. Wells

In addition to the moderate vulnerability identified above, the hydrologist completing the Part One plan amendment requested an additional inventory in the Emergency Response Area for the following potential contaminants:

k. Stormwater Infiltration ponds and stormwater outfalls
l. Manure land application sites
m. Sewer lines
n. Subsurface sewage treatment systems (septic systems)

Of these elements, there are no stormwater infiltration ponds, two stormwater retention ponds, three stormwater outfalls, and various sewer lines located within the ERA.

A program to ensure this is completed has been documented in Chapters One through Five. In addition to this, to ensure compliance, the City will:

- Track the implementation efforts completed;
- determine the effectiveness of these efforts; and
- identify any implementation changes needed to accomplish the goal of the plan.

To accomplish the above, the following activities will be completed:

1. Changes in land use and other development within the DWSMA will be monitored.
2. It is recommended that the WHP team meets annually, although at a minimum they will meet every two-and-one-half years and develop a report which assesses the status of plan implementation and to identify issues that impact the implementation of action steps throughout the DWSMA.
3. A written report will be completed every 2.5 years and presented to the Barnesville City Council stating progress in implementation of objectives. This report will be sent to the MDH, Source Water Protection Planner; MRWA, Wellhead Liaison; The County Local Water Manager; and be placed on file at the Barnesville City offices.

CHAPTER SEVEN

ALTERNATIVE WATER SUPPLY / CONTINGENCY STRATEGY

Minnesota Rules 4720.5280

PURPOSE

The Alternative Water Supply and Contingency Strategy can be found in the ***Appendix*** of this Plan. The purpose of this Contingency Strategy 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.