



Wayne Wellhead Protection Plan

Wayne, NE



March 2013

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City of Wayne, Nebraska



Wellhead Protection Plan

Adopted: March 2013

Acknowledgements

Preparation of the City of Wayne Wellhead Protection Plan was made possible by funding assistance provided by the Nebraska Department of Environmental Quality Source Water Protection Program and the Lower Elkhorn Natural Resources District.



Prepared for: City of Wayne, Nebraska

Prepared by: JEO Consulting Group, Inc.

JEO Project Number: 100661

WELLHEAD PROTECTION PLAN STEERING COMMITTEE

Lowell Johnson ----- City Administrator
Don Nelson ----- Landowner
Doug Nelson ----- Landowner
Dave Fouss ----- Landowner
Dave Sievers ----- Landowner
Jeff Brady ----- Water and Wastewater Foreman
Brian Bruckner ----- Lower Elkhorn NRD
Ron Lundahl ----- Landowner
Casey Junck ----- City Water and Wastewater Operator
Brian Frevert ----- City Council Member
Joel Hansen ----- City Zoning Administrator
Garry Poutre ----- City Utilities & Public Works Superintendent
Mary Schroer ----- NDEQ
Ryan Chapman ----- NDEQ
Roger Protzman, PE ----- City Engineer
Adam Rupe ----- JEO Project Manager

This wellhead protection plan has been prepared to assist the City of Wayne to proactively protect and manage the aquifer that is the source of community drinking water. It has been written with guidance published by the Nebraska Department of Environmental Quality (NDEQ).

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CD-ROM (in front cover pocket)

Digital copy of the plan, appendices, and maps in PDF format.

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Nebraska's Wellhead Protection Program Summary

Nebraska's Wellhead Protection Program

The Nebraska Department of Environmental Quality (NDEQ) administers the Wellhead Protection Program, which began after the Nebraska Legislature passed LB 1161 in 1998 (Neb. Rev. Stat. §46-1501 – 46-1509), authorizing the Wellhead Protection Area Act. The intent of this program was to establish guidelines for communities and other public water suppliers to develop local wellhead protection plans. **The Act set up a process for public water supply systems to use, if they choose, to implement a local Wellhead Protection Plan.** A wellhead protection plan does not provide any new powers to a community; it serves as a guide to local decision makers to protect the community drinking water supply.

All community public water supplies have a delineated Wellhead Protection Area map as of October 1, 2004.

Wellhead Protection Program Activities

1. **Delineate the Wellhead Protection Area (WHPA)** - The NDEQ, and some Natural Resources Districts (NRDs), can provide a public water system with a WHPA map which shows the area that is critical to recharging a community's groundwater and drinking water supply.
2. **Perform a Contaminant Source Inventory (CSI)** - Conducting a CSI involves locating and documenting activities, structures, and locations which could affect the quality of the source of drinking water.
3. **Manage potential contaminants** - After identifying potential contaminant sources within the WHPA, the community can use management practices such as county and municipal zoning, local ordinances, working with landowners to implement best management practices (BMPs), or other options, such as education and information, to ensure a safe drinking water supply, which complies with The Safe Drinking Water Act.
4. **Develop emergency and contingency plans** - These plans will enable a community to react to events such as natural disasters, contamination, and drought. These and other issues, such as population growth, can be addressed through emergency/contingency plans, as well as by planning for new wells.
5. **Educate and involve the public** - Community awareness will help to provide citizens with the information they need to protect drinking water and increase their participation in the development of a wellhead protection plan.

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Section One: Introduction

Community Background

Wayne, the county seat of Wayne County, is located in northeast Nebraska on State Highways 15 and 35 (see Figure 1). The first settlers to this part of Nebraska arrived in the spring of 1869 from Lee County, IL. The prairie community of Wayne, however, didn't see its beginnings until 1881, when railroads extended a line through the county, linking Norfolk and Sioux City. This prompted Wayne to become the county seat in 1882. Early industries included a brickyard, flour mill, and incubator factory. The Nebraska Normal College opened in 1891 and marked the beginning of what is now Wayne State College. Today, Wayne has a healthy mix of industry, agriculture, and higher education supporting the community. Wayne's population, as seen in Table 1, was 5,660 in 2010.

Table 1: Wayne Population Since 1930

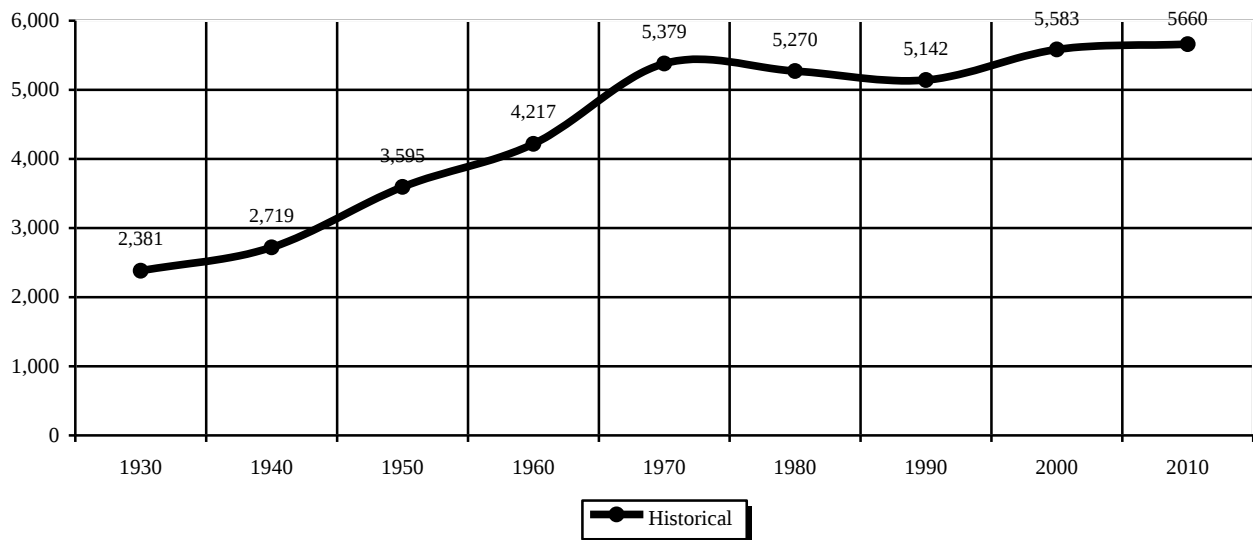
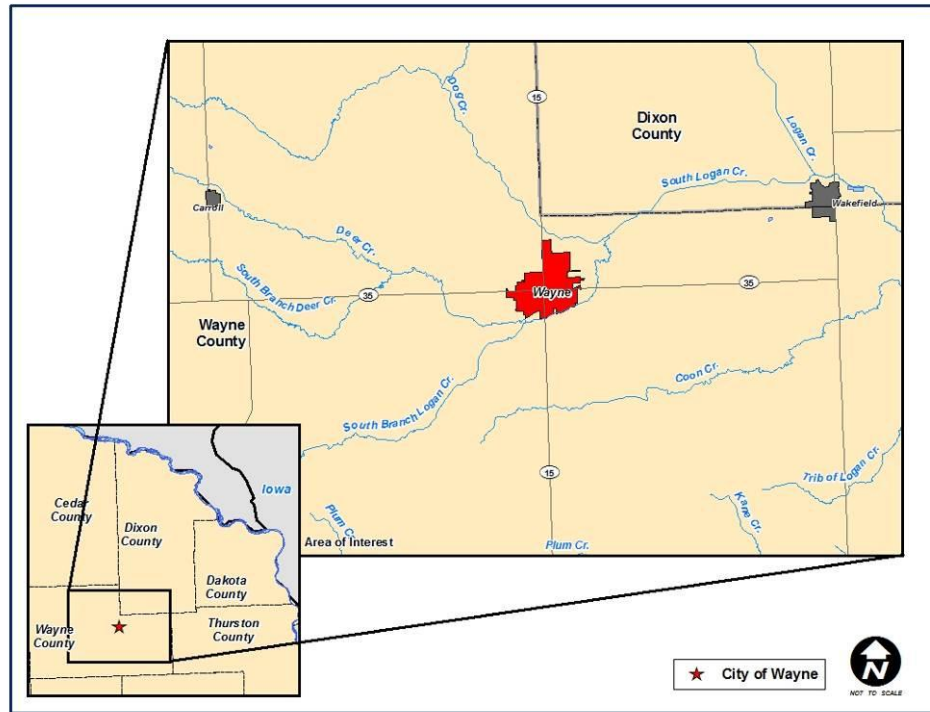


FIGURE 1: WAYNE, NE LOCATION

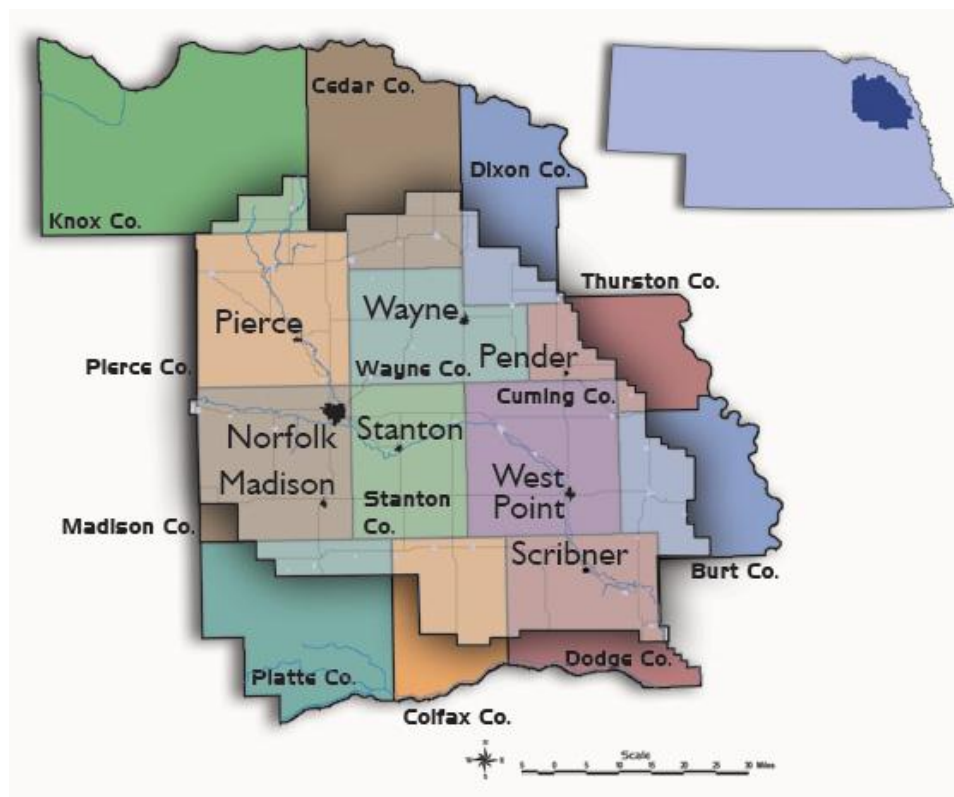


Lower Elkhorn Natural Resources District

Natural Resources Districts (NRDs) are local government entities with broad responsibilities to protect natural resources. Major Nebraska river basins form the boundaries, enabling districts to respond best to local needs. Elected boards of directors govern the district and much of their funding comes from local property taxes.

Natural Resources Districts were created to solve flood control, soil erosion, irrigation run-off, and groundwater quantity and quality issues. Nebraska's NRDs are involved in a wide variety of projects and programs to conserve and protect the state's natural resources. NRDs are charged under state law with 12 areas of responsibility including flood control, soil erosion, groundwater management and many others. Wayne is located in the Lower Elkhorn NRD, as shown in Figure 2, below.

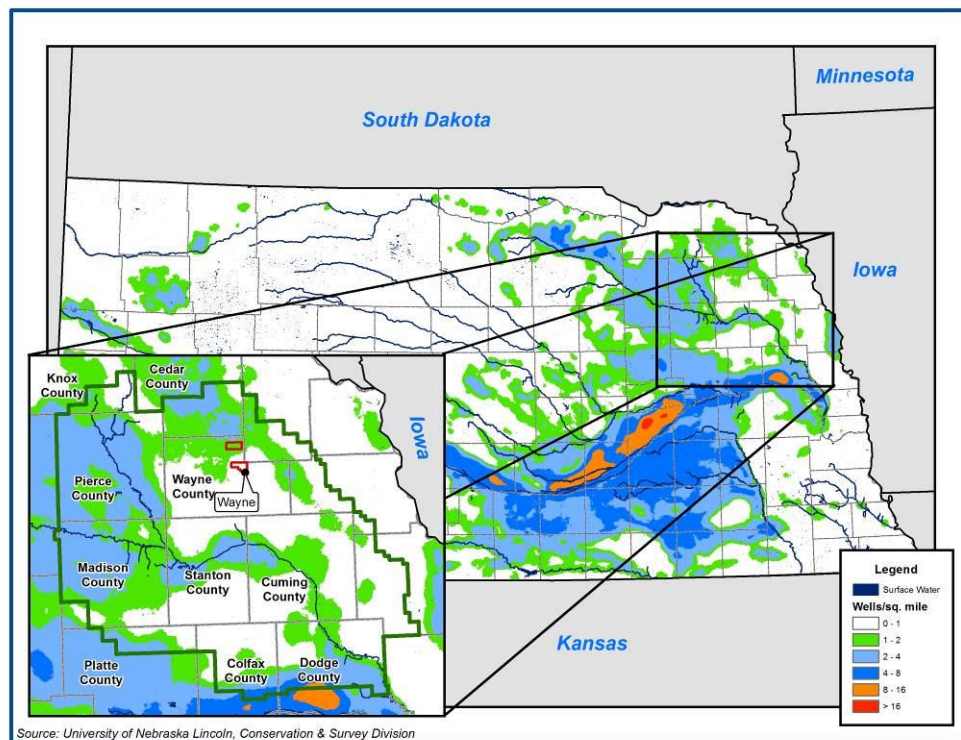
FIGURE 2: LOWER ELKHORN NATURAL RESOURCES DISTRICT



Nebraska Groundwater

The State of Nebraska is blessed with a great supply of groundwater, which makes it one of Nebraska's most important natural resources. Groundwater is used for irrigation, water supply for humans and animals, and commercial and industrial uses. Nebraska receives nearly 85% percent of its public drinking water and nearly 100% of its private water supply from ground water sources. Agriculture (the state's largest industry) is dependent on this resource as well. In fact, as of October 2010, the Nebraska Department of Natural Resources (DNR) listed over 92,000 active irrigation wells and nearly 23,900 domestic wells registered in the state. Figure 3, below, displays the density of registered irrigation wells across the state.

FIGURE 3: DENSITY OF ACTIVE REGISTERED IRRIGATION WELLS – JANUARY 2011



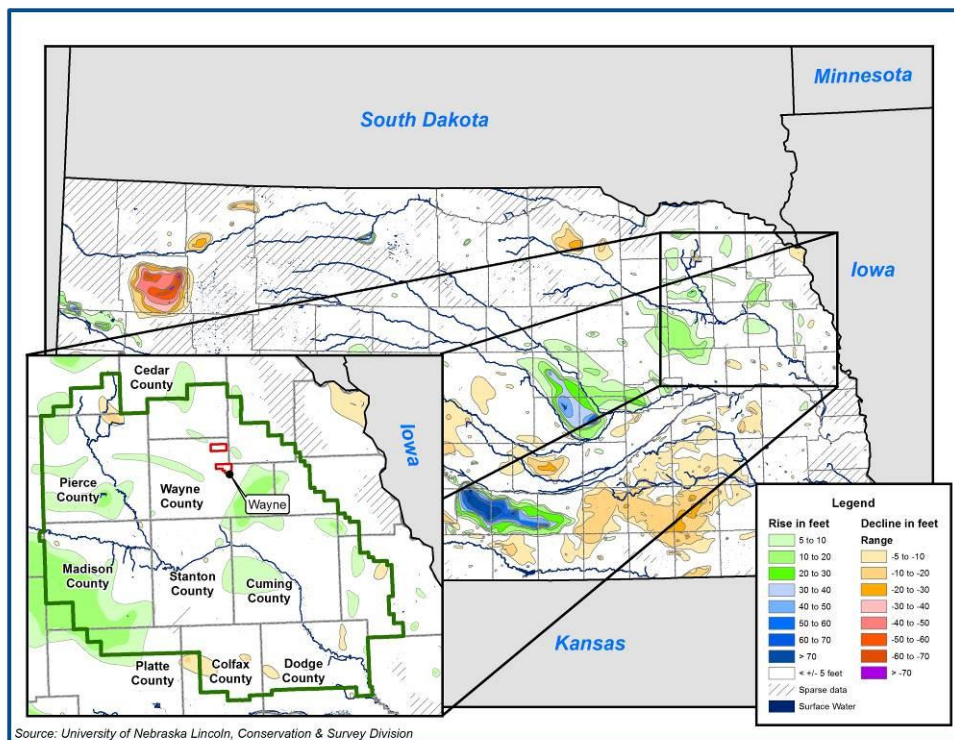
Due to the importance of groundwater to the state a massive effort is made in monitoring the quality of the resource. Several entities are involved:

- Natural Resource Districts (23)
- Nebraska Department of Agriculture
- Nebraska Department of Environmental Quality
- Nebraska Department of Health and Human Services
- University of Nebraska-Lincoln
- United State Geologic Survey

The results of these monitoring efforts is combined in the Quality-Assessed Agrichemical Contaminant Database for Nebraska Groundwater (Database) The Database brings together groundwater data from many different sources and provides public access to this data. The dates of this data represent the majority of sample results available and range from mid-1974 to the present. Most monitoring takes place from irrigation or domestic supply wells; however, in recent years, dedicated groundwater monitoring wells have been installed in increasing numbers.

The network of monitored wells provides data from a wide range of geologic conditions and water that is sampled for a wide variety of compounds used in agriculture production. Because of the widespread utilization of groundwater, it's "abundance" or change in availability is also closely watched. Figure 4, below, displays the change in depth to groundwater from pre-development to the spring of 2010.

FIGURE 4: GROUNDWATER-LEVEL CHANGES IN NEBRASKA – PREDEVELOPMENT TO SPRING 2010



While groundwater is typically abundant in the state, the southeast, northeast and northwest corners have difficulty providing adequate yields. Good quality ground water is available for most areas of the state; however, in some areas, non-point sources of contamination, such as nitrates and other agricultural contaminants, have impacted ground water sources. Point sources of contamination have impacted localized areas. These sources can include leaking underground storage tanks, livestock lagoons, landfills, illegal or improperly constructed wells, hazardous waste, grain fumigants, munitions sites, or septic systems.

The cost of contamination is a major concern. Communities have been forced to abandon wells and/or construct expensive treatment systems. These costs can have a significant financial impact on communities. Both point and nonpoint source contamination cause increased costs to the public - in the form of treatment, new wells, or long term management programs.

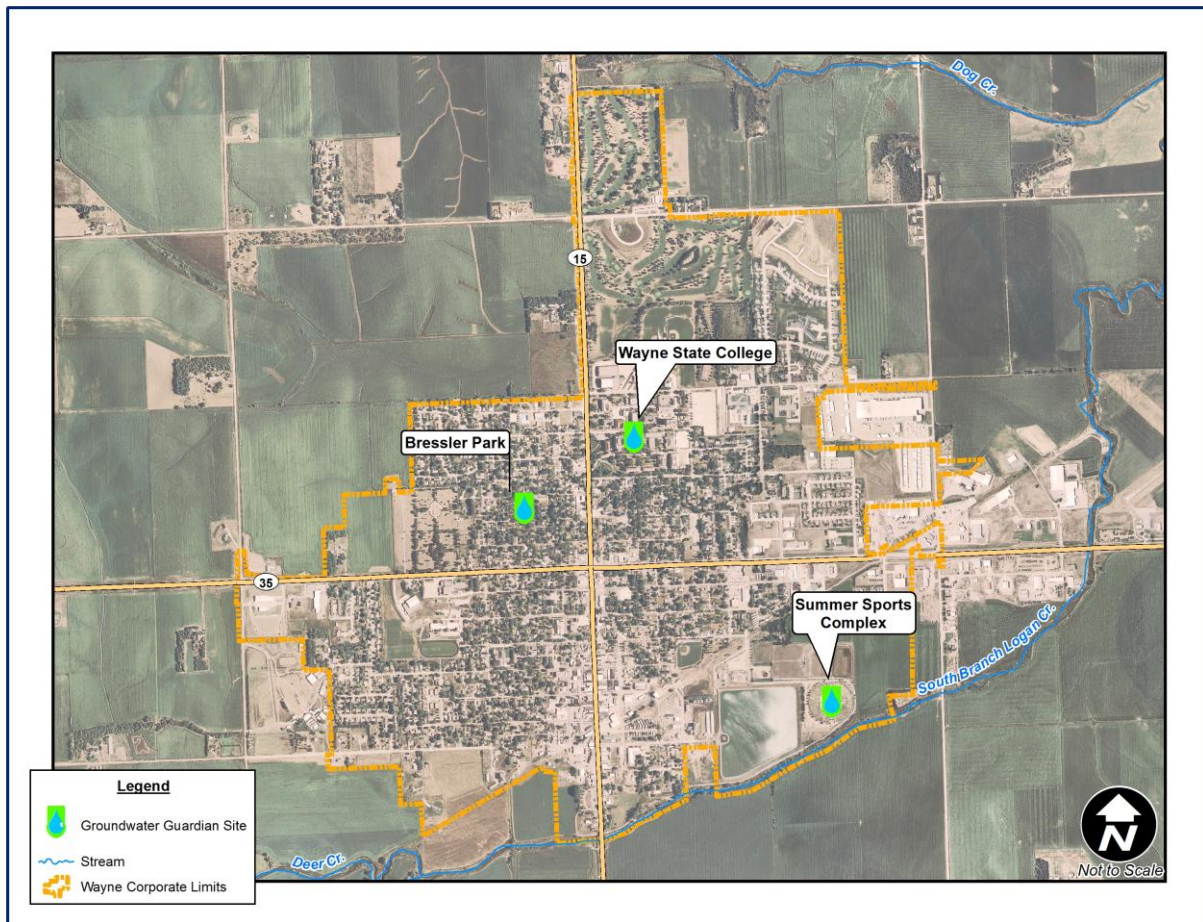
Previous Efforts to Protect Groundwater

In recent years, the City of Wayne has become more proactive in source water protection and education. In 2009, the City installed seven rain sensors on city properties such as ball fields, city hall, community activity center, and the fire hall. Each month a newsletter is distributed and features water conservation tips for citizens and property owners. The City also participates in the annual 'Green Expo' held each spring as an opportunity to meet with citizens and deliver information on water conservation techniques. The City has installed nearly four acres of stormwater retention facilities in an effort to limit runoff to local streams and recharge local aquifers.

In 2010, the City of Wayne partnered with the Groundwater Foundation to become one of the first *Let's Keep It Clean!* communities and worked together to put together the following events and actions:

- A two-day educational library event was hosted, with over 100 youth attending
- A Groundwater education event was held at a Kiwanis meeting
- The Groundwater Foundation booth was at the Wayne Chicken Show, where visitors made water cycle bracelets and took their turn using the water flow model
- Established three Groundwater Guardian Green Sites, as shown in Figure 5
- Formed a Groundwater Guardian team

FIGURE 5: WAYNE GROUNDWATER GUARDIAN GREEN SITES



Wayne Wellhead Protection Contacts

In Table 2 below is contact information for the primary agencies which were included in the establishment of the wellhead protection plan, or could provide technical assistance with wellhead protection activities in the future.

Table 2: Wayne Wellhead Protection Contacts

Agency/Role	Name	Title	Phone/Email
City of Wayne	Garry Poutre	Utilities & Public Works Superintendent	402.375.2896 eldist@cityofwayne.org
Lower Elkhorn NRD	Brian Bruckner	Groundwater Management Area Specialist	402.371.7313 bbruckner@lenrd.org
NDEQ	Ryan Chapman	WHP Coordinator	402-471-2186 ryan.chapman@nebraska.gov
JEO Consulting Group	Adam Rupe	Natural Resources Specialist	402.435.3080 arupe@jeo.com
JEO Consulting Group, Inc.	Roger Protzman, PE	Engineer	402.371.6416 rprotzman@jeo.com
Nebraska Rural Water Association	Mike Lucas	Source Water Specialist	402.443.5216 lucas@nerwa.org
DHHS – Public Health	Richard Koenig	Water Supply Specialist	402.370.3114 Rich.Koenig@nebraska.gov

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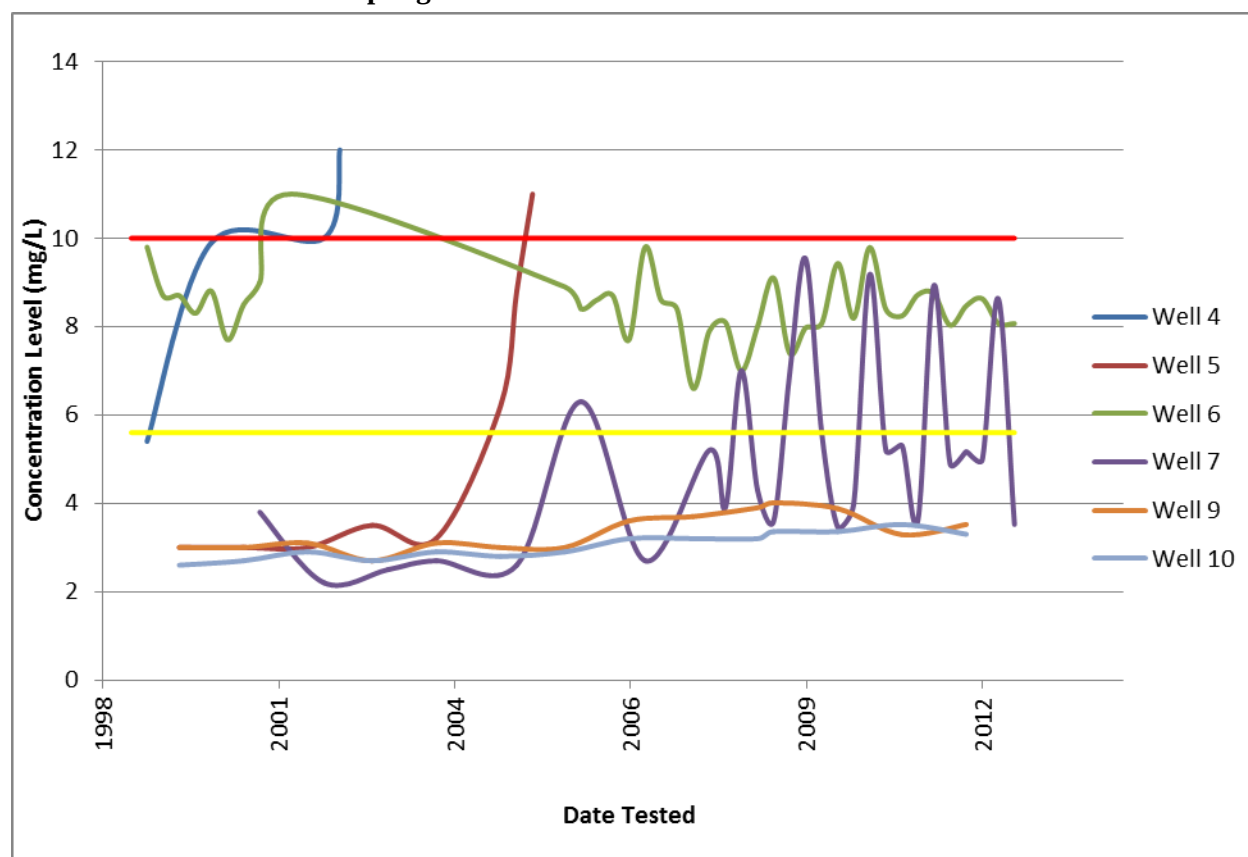
Section Two: Wayne Water System

Water System Information

The community water supply system in Wayne includes seven water wells, as shown in Figure 6, including two emergency wells, five active production wells (Well Number 11 was just recently constructed in 2011), one stand pipe, one elevated storage tank, a new water pressure booster station, and numerous mains. The City has made available a number of “monitoring wells” for future use, if needed. However, their use for source water sampling is limited as they are all within 1000 feet of wells 9, 10, 11. They were originally constructed for drawdown testing. Wayne receives all of its drinking water from groundwater, with the bulk of the City’s water supplied by the three wells located six miles north of the community. This well field was developed in the 1980’s because the City’s existing wells located in and around the community were experiencing elevated nitrate levels.

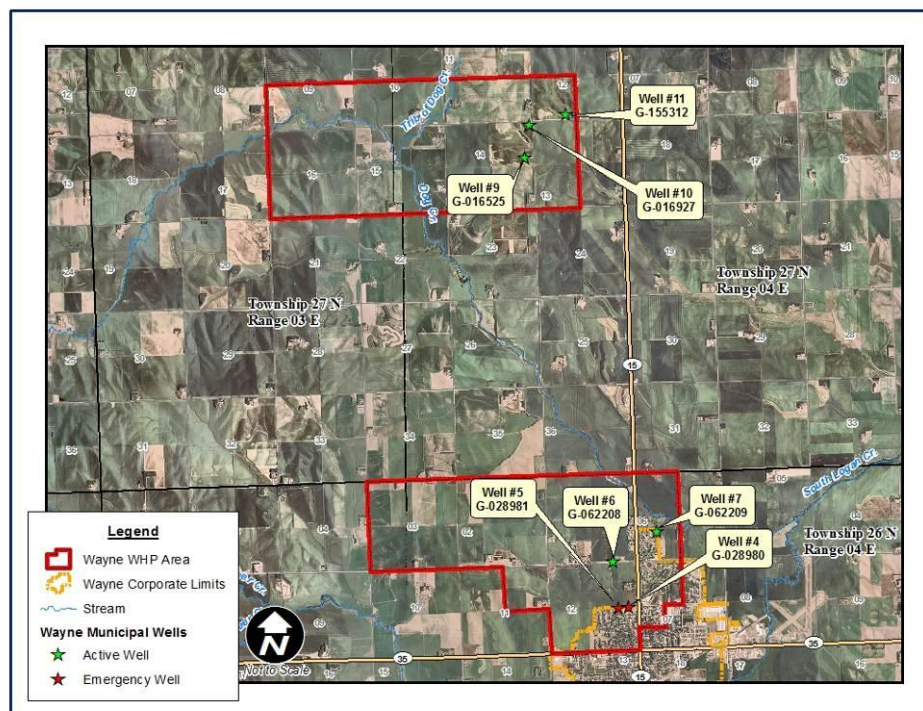
The Nebraska Department of Health and Human Services maintains historical drinking water well sampling information. This is accessible through the “Drinking Water Watch” located on their website: http://dhhs.ne.gov/publichealth/Pages/enh_pwsindex.aspx. The “Drinking Water Watch” was searched for nitrate-nitrite (code 1038) sampling results from 1999 thru 2012. The available results are displayed below in Table 3. The chart also displays the EPA regulated Maximum Contaminant Level (MCL) at 10 parts per million (PPM or mg/L) as a red line and 5.6ppm as a yellow line, which is a level that triggers additional monitoring by the system operator. Currently, wells 9, 10, and 11 are sampled on a yearly basis and wells 6 and 7 are sample on a quarterly basis.

Table 3: Nitrate-Nitrite Sampling Data



Well Numbers 4 and 5 have exceeded the Maximum Contaminant Level (MCL) of 10 parts per million (PPM) for nitrate and are no longer used. They are now classified as emergency wells. Well Number 6 has documented evidence of nitrate levels exceeding MCL levels, but has recently dropped below the MCL. At times when the levels were elevated the City mixed water from Well Number 6 with Wells 9 and 10 to blend the water and reduce the nitrate level prior to introduction into the system. The desire to avoid past troubles has been the impetus for the City to install Well Number 11 and to begin to engage in more proactive source water protection efforts. Sample results were not available for Well Number 11, at the time this plan was prepared.

FIGURE 6: WAYNE MUNICIPAL WELL LOCATIONS



The tables below display the general system summary for Wayne’s water system, according to the Sanitary Survey. Wayne’s most recently completed (2011) Sanitary Survey and Annual Water Quality Report (2011) are included in Appendix D. The documents are also available from the Utility and Public Works Office.

Table 4: Wayne General Water System Information

General System Information			
Water System Number: NE3118104			
Population Served	5,289	Water Storage Capacity	1,250,000 gallons
Meters Connected	99%	Maximum Daily (24-hour) Production Capability	4,600,000 gallons/day
Total # of Service Connections	2,118	Total Production for past 12 months	285,400,000 gallons
Residential	1,850	Highest Daily Production	2,000,000 gallons/day
Commercial	268	Average Daily Production	782,000 gallons/day

Source: Public Water Supply Routine Sanitary Survey (2008)

Table 5: System Contact Information

System Contact Information	
Mailing Address: PO Box 8	Physical Address: 306 N. Pearl St.
City / State / Zip: Wayne / Nebraska / 68787	
System Phone Number: 402.375.5250	System Fax Number: 402.375.7904
System E-Mail: jbrady@cityofwayne.org	
Water System Owned By: City of Wayne	Operated By: City of Wayne
Governing Body: Mayor & City Council	
Administrative Contact Person	
Lowell Johnson, City Administrator	Phone: 402.375.1733
Financial Contact Person	
Betty McGuire, Clerk	Phone: 402.375.1733
Legal Contact Person	
Pieper & Miller; Attorney	Phone: 402.375.5385
Operational Contact Person Information	
Operator in Responsible Charge: Jeff Brady	Title: Water Operator
Home Phone Number: 402.375.1794	Cell Phone Number: 402.375.9129

Table 6: Wayne Public Water Supply Well Information

Well Common Name	Well ID #	DNR Registration #	Status	Total Well Depth (feet)
Well #4	90104541	G-028980	Emergency	135
Well #5	90104651	G-028981	Emergency	125
Well #6	90104701	G-062208	Active	185
Well #7	90104702	G-062209	Active	103
Well #9	90104881	G-016525	Active	244
Well #10	90104901	G-016927	Active	266
Well #11	90104091	G-155312	Active	259

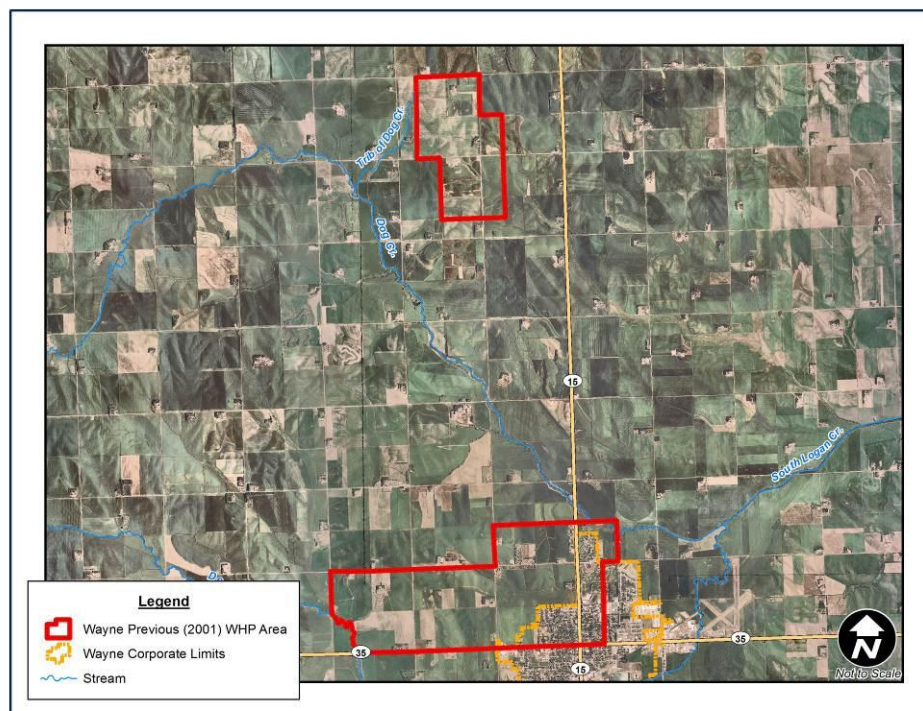
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Section Three: Wayne Wellhead Protection Area

UPDATED WELLHEAD PROTECTION AREA SUMMARY

Wayne's previous wellhead protection area (WHPA) map was provided by the NDEQ in September 2001. The previous WHPA covered two areas: 2,528 acres immediately to the west of Wayne (including a portion of the City) and 949 acres approximately 5 miles north; totaling 3,477 acres (see Figure 7). The 2011 WHPA was updated in June 2011 by NDEQ using newer modeling software and information. NDEQ used the modeling software "Wellhead Analytic Element Model (WhAEM) 2000", created by the US Environmental Protection Agency. WhAEM was initially designed to facilitate capture zone delineation and protection area mapping in support of the State's WHP programs. WhAEM uses geohydrologic modeling for steady pumping wells, including the influence of hydrological boundaries, annual recharge estimation, and no-flow boundaries, such as the local geological formations of bedrock.

FIGURE 7: 2001 WAYNE WELLHEAD PROTECTION AREA BOUNDARY



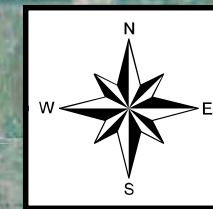
One set of time-of-travel path lines are delineated for each active well: one, two, 10, and 20-year. The 20-year time-of-travel is what generally determines the water system wellhead protection area. The wellhead protection area is statutorily recognized as a boundary in which a community can manage potential contaminant sources through a wellhead protection program. The WHPA is delineated around the 20-year time-of-travel along visible or recognizable features such as roads, rivers, and sections lines.

The updated WHPA expanded and the limits moved, due to updates to the modeling software and an improved knowledge of the aquifer. The 2011 WHPA covers two areas: 3,282 acres immediately to the west and north of Wayne (including a portion of the City) and 3,337 acres approximately 5 miles north; totaling 6,619 acres (see Figure 8). The City of Wayne officially recognized the updated WHPA on January 17th, 2012. The ordinance can be found in Appendix C.

As part of the updated WHPA mapping process, The City of Wayne requested that the NDEQ delineate a 50-year time-of-travel in order to facilitate general long-range planning. Since variability and uncertainty significantly increases as the temporal time frame increases, the NDEQ will not officially recognize the 50 year boundary.

NE3118104

R 2 E R 3 E



G-155312
2009-1
Well #11

A-016927
90-1
Well #10

A-016525
88-1
Well #9

WAYNE

WAYNE COUNTY

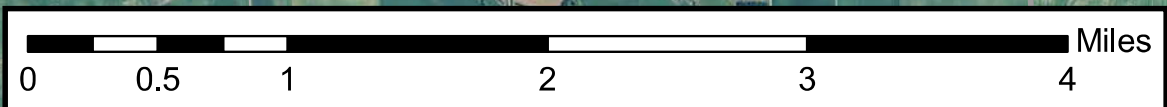
Drawn by Nebraska Department of
Environmental Quality, Wellhead
Protection Program, June 2011

Time of Travel

- 0-1 Year
- 1-2 Year
- 2-10 Year
- 10-20 Year
- 20-50 Year

Time-of-Travel lines are created using the U.S. EPA's Wellhead Analytic Element Model, WhAEM2000, 3.2.1 which assumes steady-state flow and average groundwater travel times. This model is a representation of reality based on the best known geologic, water level, and pumping information available. NDEQ will continue to update and revise wellhead protection areas as new information becomes available.

The wellhead protection boundary was deliberately drawn slightly larger than time-of-travel lines shown on the map to allow for seasonal changes and some natural variability in the aquifer. The wellhead protection boundary is also drawn to conform to property boundaries, section lines, and water bodies to allow for easier land management and identification.



- Generalized 50 Year Wellhead Protection Area Boundary
- State Recognized Wellhead Protection Area Boundary

Wellhead Protection Area Boundary

Dixon County T 27 N
Wayne County T 26 N

G-062209
70-2
Well #7

G-062208
70-1
Well #6

G-028981
65-1
Well #5

G-028980
54-1
Well #4

Wayne

R 3 E R 4 E

WELLHEAD PROTECTION AREA LAND COVER

Land cover in the Wayne WHPA was determined by GIS analysis of the 2010 USDA-NRCS's Cropland Data Layer (CDL), which is available at the GeoSpatial Data Gateway. The CDL is a complete, geographically referenced classification of all satellite ortho-imagery data within a state by crop or land cover. By using imagery from multiple times of the year, the CDL is able to classify pastures, trees, and other permanent vegetation separately from annual crops. The CDL is spot-checked for accuracy during the potential contaminant source inventory. Table 7, below, displays the land cover in the Wayne WHPAs. The percentages of land cover are approximate. An inventory of land cover allows Wayne to adopt specific management strategies to reduce potential contamination. Land cover types included in the summary are as follows:

- **Developed, Open Space** - Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, gravel roads and ditches, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes
- **Developed, Low Intensity** - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.
- **Developed, Medium Intensity** - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.
- **Developed, High Intensity** - Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.
- **Deciduous Forest** - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.
- **Grassland/Herbaceous** - Areas dominated by herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
- **Pasture/Hay** - Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.
- **Cultivated (Row) Crops** - Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.
- **Woody Wetlands** - Areas where forest or shrubland vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Table 7: Wayne 2010 WHPA Land Cover Breakdown

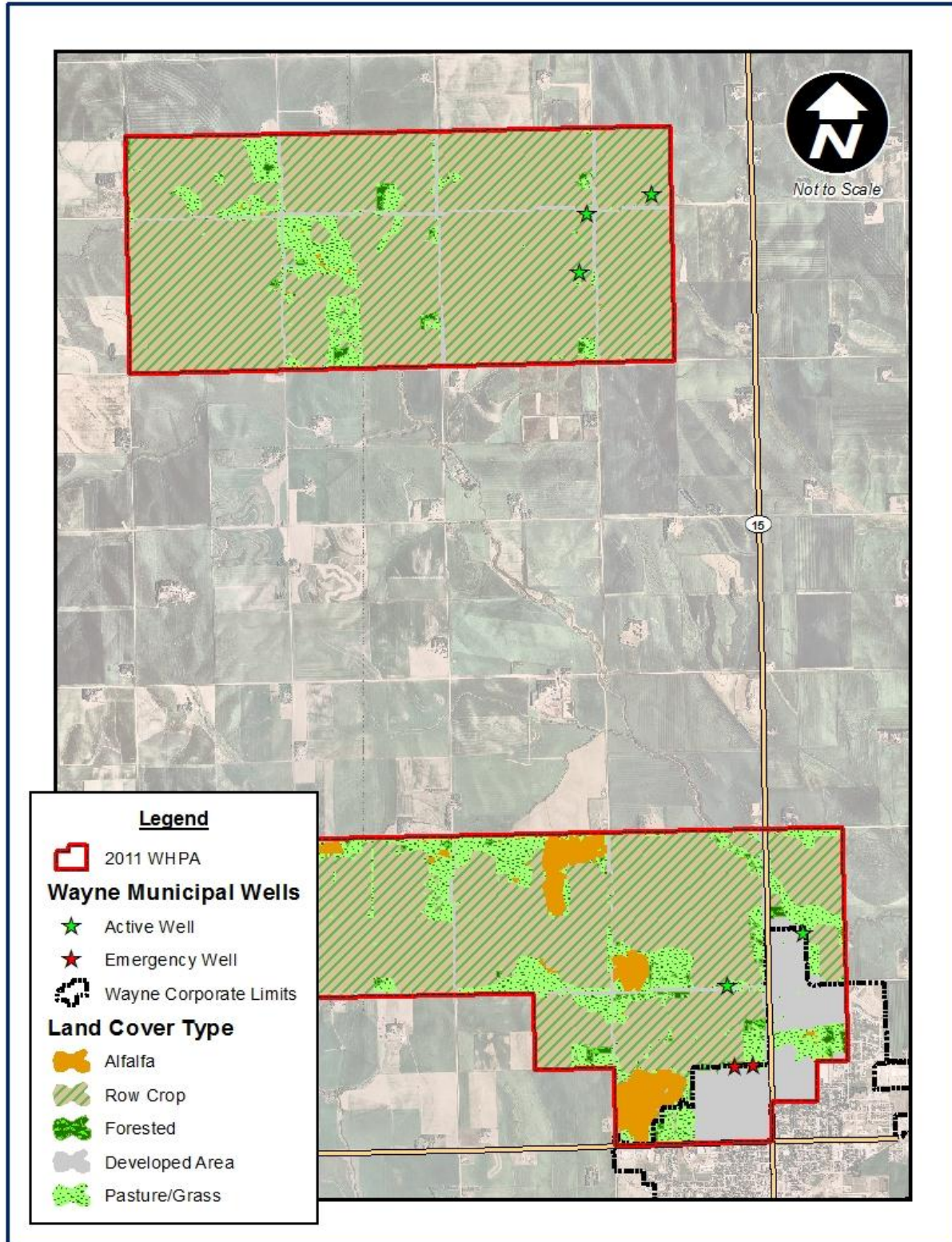
Land Cover type	North WHPA		South WHPA		Combined WHPA	
	Acres	% of Total	Acres	% of Total	Total Acres in both WHPAs	% of Total in both WHPAs
Alfalfa	3	0%	208	6%	211	3%
Corn	1,483	44%	830	25%	2,313	35%
Deciduous Forest	20	1%	43	1%	63	1%
Developed/High Intensity	0	0%	5	0%	5	0%
Developed/Low Intensity	6	0%	185	6%	191	3%
Developed/Medium Intensity	0	0%	27	1%	27	0%
Developed/Open Space	103	3%	280	9%	383	6%
Fallow/Idle Cropland	0	0%	3	0%	3	0%
Grassland Herbaceous	274	8%	555	17%	829	13%
Oats	<1	0%	1	0%	0	0%
Pasture Hay	3	0%	1	0%	4	0%
Sorghum	1	0%	<0	0%	0	0%
Soybeans	1,455	43%	1,115	34%	2,570	39%
Winter Wheat	0	0%	8	0%	8	0%
Woody Wetlands	<1	0%	2	0%	0	0%
Total	3,348	100%	3,263	100%	6,611	100%
Summary						
Row Crop (Corn, Soybeans, etc)	2,939	88%	1,954	60%	4,891	74%
Developed (Roads, Town, Farmsteads)	109	3%	497	15%	606	9%
Non-Farmed or Developed	300	9%	812	25%	1,110	17%

Source: 2010 Cropland Data Layer, provided by USDA-NRCS GeoSpatialDataGateway

The majority of Wayne's WHPAs are row crop agriculture with an approximate 74 percent of the total area, or about 4,891 acres; however, the North and South WHPAs differ greatly in their respected land uses. While, the North WHPA is dominated (88%) by row crop production, the South WHPA has only a slight majority in row crop production (60%). The South WHPA has nearly half (40%) of its land use in developed areas (15%) and in uses other than row crop agriculture and development (25%) such as grasslands, forest, and alfalfa.

As the majority land use, row crop agricultural practices have the potential to affect the underlying groundwater through runoff, which can potentially contribute to nitrates and other contaminants infiltrating through the soil and into groundwater aquifers. Several management strategies are discussed to limit non-point and point source pollution from agricultural practices in Section 6: Management Strategies. Strategies to limit source water pollution may vary greatly between the two WHPAs because of their varying land uses. See Figure 9 for a map of the land cover, as of 2010.

FIGURE 9: WAYNE WHPA 2010 LAND COVER



Section Four: Potential Contaminant Source Inventory

The purpose of a potential contaminant source inventory (CSI) is to identify potential drinking water contaminants or sources that contaminants may originate from. Understanding what potential contaminant sources exist within the WHPA, allows a community to make informed decisions to safely manage their drinking water supply. The inventory is compiled from existing databases and on-the-ground observations. Even if identified in the CSI, a feature may not be contributing to contamination presently.

It is important to note that this inventory only represents a snapshot in the history of the area. There may be features which have already contributed to groundwater contamination, but there is no record of their occurrence. Just as likely, is that, features recorded may not be actively be operating, but have in the past. Due to the long period of time it can take for an aquifer to respond to changes in the land surface, historical land use and activities that have occurred there are important to record.

The inventory typically consists of:

Agricultural	Commercial and Light Industrial	Industry	Other
• Fuel Storage • Grain Storage • Water Wells • Chemigation • Livestock	• Auto Repair • Dry Cleaners • Fuel Stations • Machine Shops • Rail Yards • Large Parking Lots	• Manufacturing Plants • Gas/Oil Wells • Junk Yards • Landfills • Sewage Treatment Facilities	• Cemetery • Golf Course • Highway/Road Maintenance Yard • Transportation Corridors

Wayne's potential contaminant source inventory (CSI) is a compilation of multiple sources:

- Nebraska Department of Environmental Quality provided:
 - NDEQ Regulated Facilities Database
 - Above & Below Ground Storage Tank Database (maintained by State Fire Marshall)
 - Gas and Oil Wells Database (maintained by Nebraska Oil and Gas Conservation Commission)
 - Agriculture Chemical Storage & Manufacturer Database (maintained by Nebraska Department of Agriculture)
- Nebraska Department of Natural Resources (DNR) provided:
 - Registered Wells Database
- JEO Consulting Group, Inc. conducted:
 - On-the-ground field inventory completed January 4th, 2011
 - On-the-ground field inventory completed June 2nd, 2011

The field inventory was completed using a tablet PC with Geographic Information System (GIS) software and aerial photography. JEO prepared a CSI geodatabase to collect data on potential contaminant sources identified in the field. The CSI is a major step in establishing a wellhead protection plan and includes recording locations and information on potential contaminant sources such as fuel storage, onsite wastewater systems, illegal wells, and many others.

Due to the use of a laptop computer with GIS, field data sheets were not used to collect data on potential contaminant sources. Information collected in the field was entered directly into a database as seen in the CSI database tables below. A CSI allows Wayne to plan for and manage potential contaminant sources

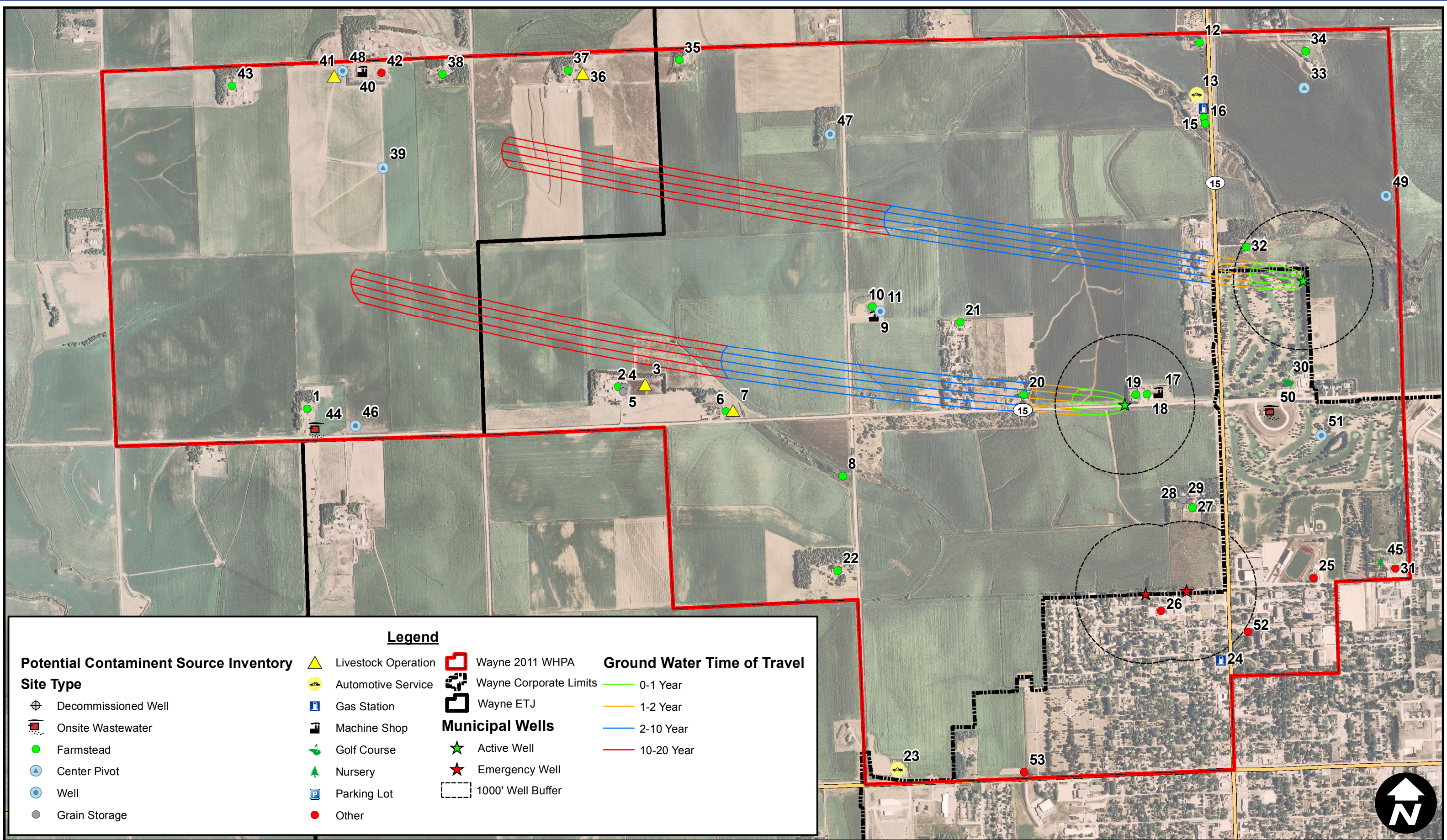
and decide where to focus educational and management efforts to minimize the likelihood of source water contamination. Table 8 displays a summary count of potential contaminant sources found in the Wayne WHPA. A full map of Wayne's CSI is found below in Figures 10 and 11, where each potential contaminant is numbered on the map and then included in a database (Table 8), with information on each potential contaminant.

Table 8: Wayne Potential Contaminant Sources by Count

Potential Contaminant Source Site Type	North Wellfield	South Wellfield	Total
Farmstead	11	21	32
Grain Storage	11	4	15
Center Pivot	15	2	17
Livestock Operation	1	4	5
Machine Shop	1	3	4
Well	2	6	8
Decommissioned Well	2	0	2
Gas Station	0	2	2
Automotive Service	0	2	2
Golf Course	0	1	1
Nursery	0	1	1
Other	0	6	6
Onsite Wastewater/Septic System	10	23	33
Total	53	75	128

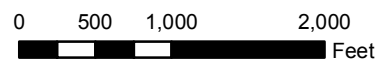
The steering committee reviewed and discussed the potential contaminant source inventory to ensure local accuracy, to add any historical items that may not be recorded in state-maintained databases, and to ensure nothing was missed in the field inventory.

All rural residences were assumed to have both a private well and septic system, which puts a potentially large number of both in the WHPAs (33 total). The CSI identified seven potentially abandoned well sites, of which more are assumed to exist and will be located. Abandoned wells are being targeted for decommissioning as part of Wayne's wellhead protection strategies and an ongoing program with Lower Elkhorn NRD. Solvents, mostly at assumed farm and acreage locations, total 39. Another common potential contaminant was above ground fuel storage, with 22 identified tanks in the WHPAs.



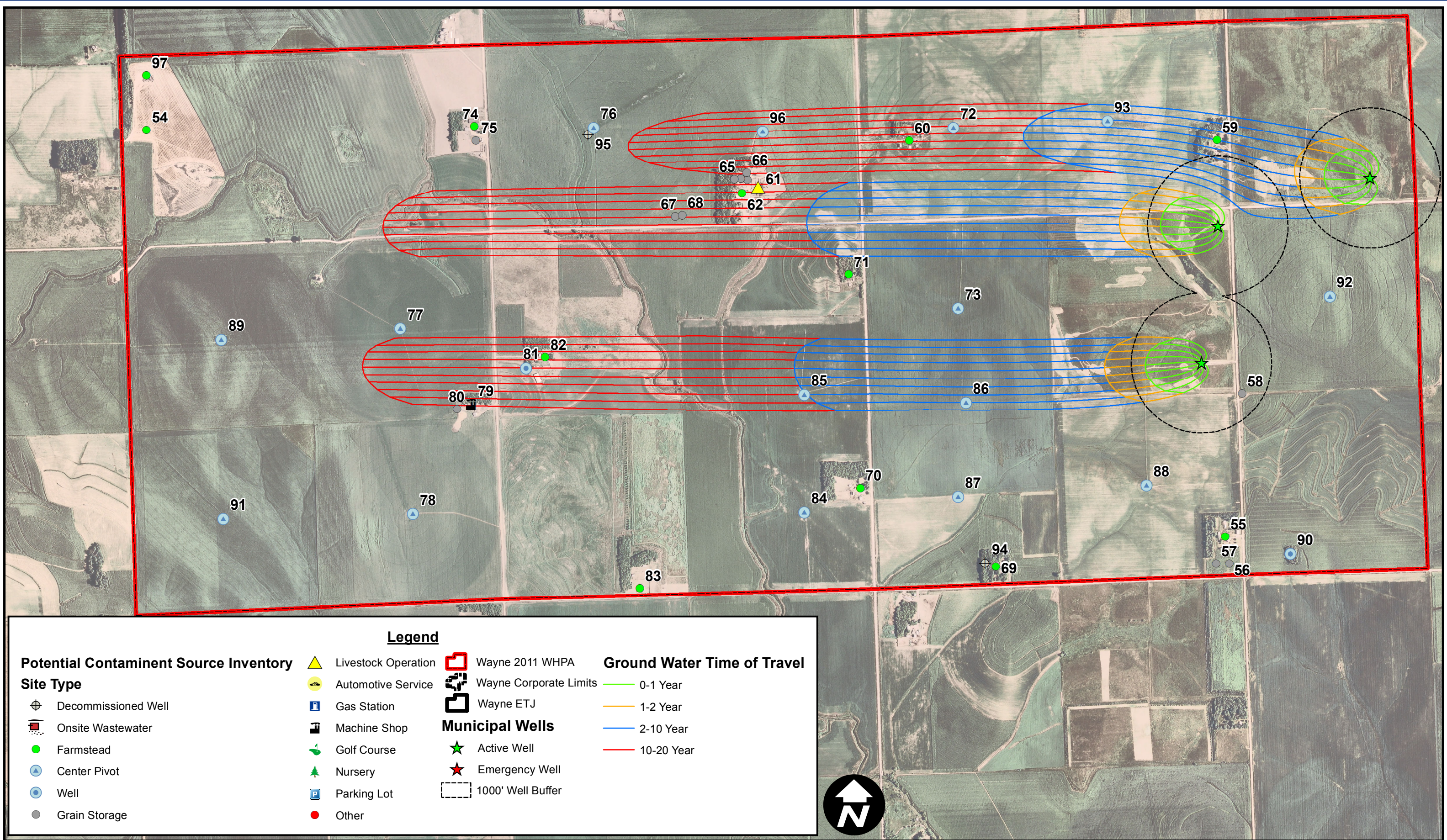
Potential Contaminant Source Inventory was conducted through a windshield survey conducted on January 4, 2011 and June 2, 2011. Data was also obtained through Nebraska Department of Natural Resources and Nebraska Department of Environmental Quality

See attached table identifying each Record #



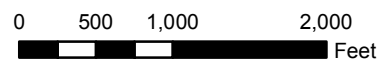
City of Wayne
- Source Water Protection Project -
Figure 10: Potential Contaminant Sources Inventory Map
South Well Field





Potential Contaminant Source Inventory was conducted through a windshield survey conducted on January 4, 2011 and June 2, 2011. Data was also obtained through Nebraska Department of Natural Resources and Nebraska Department of Environmental Quality

See attached table identifying each Record #



City of Wayne
- Source Water Protection Project -
Figure11: Potential Contaminant Sources Inventory Map
North Well Field



Well Field	Record Number	SiteType	Above Ground Fuel Storage	Below Ground Fuel Storage	Automotive Chemicals	Solvents	Fertilizer Storage	Chemical Storage	Septic System	Private Well	Stock Well	Abandoned Well	Chemigation Site	Grain Fumigants	Structure Fumigant	Site Description	Materials Description	Facility Name	Facility Address	Facility Owner	Above Ground Tank Size	Below Ground Tank Size
South	1	Farmstead	Yes	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No	20 Head of Cattle and Possible Onsite Wastewater Lagoon						
South	2	Farmstead	Yes	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
South	3	Livestock Operation	No	No	No	No	No	No	No	No	No	No	No	No	No							
South	4	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
South	5	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
South	6	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No	Abandoned						
South	7	Livestock Operation	No	No	No	No	No	No	No	No	No	No	No	No	No							
South	8	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	No	No	Old Farmstead	Possible Abandoned Well					
South	9	Machine Shop	No	No	Yes	Yes	No	No	Yes	No	No	No	No	No	No							
South	10	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
South	11	Well	No	No	No	No	No	No	No	No	No	No	No	No	No	windmill						
South	12	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
South	13	Automotive Service	No	No	Yes	Yes	No	No	Yes	No	No	No	No	No	No		SARA Title III					
South	14	Gas Station	No	Yes	Yes	No	No	No	No	No	No	No	No	No	No		Sara Title III	Fredrickson Oil Company			8 Verticle @ 2000 Gallons	5 below ground tanks
South	15	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
South	16	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
South	17	Machine Shop	No	No	Yes	Yes	No	No	No	No	No	No	No	No	No		NPDES Permit	Red Carr Implement Inc				
South	18	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No		Possible Sewer and Water?					
South	19	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No		Possible Sewer and Water?					
South	20	Farmstead	Yes	No	No	Yes	No	No	Yes	No	Yes	No	Yes	No	No		Horses					
South	21	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
South	22	Farmstead	Yes	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
South	23	Automotive Service	No	No	Yes	Yes	No	No	No	No	No	No	No	No	No							
South	24	Gas Station	No	Yes	Yes	No	No	No	No	No	No	No	No	No	No			G's Quick Shop			2 tanks	
South	25	Other	No	No	No	No	No	No	No	No	No	No	No	No	No	Power Plant						
South	26	Other	No	No	No	No	No	No	No	No	No	No	No	No	No	City Pool						
South	27	Farmstead	Yes	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No		50 Head of Cattle					
South	28	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
South	29	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
South	30	Golf Course	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No	Golf Course	Fertilizer and Pesticide Storage and Application	Wayne Country Club				
South	31	Other	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	No	No			WSC Campus Services			300 Gallons	
South	32	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
South	33	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
South	34	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
South	35	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
South	36	Livestock Operation	No	No	No	No	No	No	No	No	No	No	No	No	No		200 Head of Cattle					
South	37	Farmstead	Yes	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No						300 Gallons	
South	38	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No		Donkeys on site					
South	39	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
South	40	Machine Shop	No	No	Yes	Yes	No	No	No	No	No	No	No	No	No							
South	41	Livestock Operation	No	No	No	No	No	No	No	No	No	No	No	No	No		Large Dairy Operation ~ 200 head					
South	42	Other	No	No	No	No	No	No	No	No	No	No	No	No	No	Large Storage Tank	Liquid Livestock Feed				3000 Gallons	
South	43	Farmstead	Yes	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No						300 Gallons	
South	44	Onsite Wastewater	No	No	No	No	No	No	No	No	No	No	No	No	No	Possible Onsite Wastewater Lagoon						
South	45	Nursery	No	No	No	No	Yes	Yes	No	No	No	No	No	No	No	WSC Greenhouse						
South	46	Well	No	No	No	No	No	No	No	No	No	No	No	No	No							
South	47	Well	No	No	No	No	No	No	No	No	No	No	No	No	No							
South	48	Well	No	No	No	No	No	No	No	No	Yes	No	No	No	No							
South	49	Well	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
South	50	Onsite Wastewater	No	No	No	No	No	No	No	No	No	No	No	No	No							
South	51	Well	No	No	No	No	No	No	No	No	No	No	No	No	No	Irrigation Well		Wayne Country Club				
South	52	Other	No	Yes	No	No	No	No	No	No	No	No	No	No	No	Onsite Wastewater and HAZMAT spill - from NDEQ database search		Wayne State College			3 tank	
South	53	Other	No	No	No	No	No	No	No	No	No	No	No	No	No	Approximate SE corner of farm Brownfield						
South	54	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	No	No	Old Farmstead	May have abandoned well					
North	55	Farmstead	Yes	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No						250 Gallons	
North	56	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
North	57	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
North	58	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							

Table 9: Wayne Potential Contaminant Source Inventory

Well Field	Record Number	SiteType	Above Ground Fuel Storage	Below Ground Fuel Storage	Automotive Chemicals	Solvents	Fertilizer Storage	Chemical Storage	Septic System	Private Well	Stock Well	Abandoned Well	Chemigation Site	Grain Fumigants	Structure Fumigant	Site Description	Materials Description	Facility Name	Facility Address	Facility Owner	Above Ground Tank Size	Below Ground Tank Size
North	59	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No	Old barns possibly used to be a farm site						
North	60	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	No	No	Possible Abandoned Windmill						
North	61	Livestock Operation	No	No	No	No	Yes	No	No	No	No	No	No	No	No	200 Head of Cattle						
North	62	Farmstead	Yes	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No						1 @ 2000 Gal; 4 @ 500 Gal	
North	63	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
North	64	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
North	65	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
North	66	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
North	67	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
North	68	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
North	69	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	No	No	Cleared Farmstead						
North	70	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No	Abandoned Farmstead						
North	71	Farmstead	No	No	No	Yes	No	No	No	Yes	No	Yes	No	No	No							
North	72	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	73	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	74	Farmstead	Yes	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No						2 @ 500 Gallons	
North	75	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
North	76	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	Yes	No	No							
North	77	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	78	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	79	Machine Shop	No	No	Yes	Yes	No	No	No	No	No	No	No	No	No							
North	80	Grain Storage	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes							
North	81	Well	No	No	No	No	No	No	No	No	No	No	No	No	No	Old Windmill						
North	82	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
North	83	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No							
North	84	Center Pivot	No	No	No	No	No	No	No	No	No	No	No	No	No							
North	85	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	86	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	87	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	88	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	89	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	90	Well	No	No	No	No	No	No	No	No	No	No	No	No	No							
North	91	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	92	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	93	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	94	Decomissioned Well	No	No	No	No	No	No	No	No	No	No	No	No	No							
North	95	Decomissioned Well	No	No	No	No	No	No	No	No	No	No	No	No	No							
North	96	Center Pivot	No	No	No	No	No	No	No	Yes	No	No	No	No	No							
North	97	Farmstead	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	No	No	Old Farmstead	May have abandoned well					

Table 9: Wayne Potential Contaminant Source Inventory

Section Five: Management Strategies

Wayne will establish a comprehensive management strategy to layout the framework for on-the-ground actions to protect their drinking water source over the next 10 to 20 years. The ultimate goal of the management practice recommendations is to provide the community with the best possible management strategies, which are both implementable and protective of the water supply for the community. It is important to note that the management strategies outlined below, while endorsed by the NDEQ, were developed based on the potential pollution sources identified through the potential contaminant source inventory, land use evaluation, and comments gathered through the community planning process.

Educational activities and voluntary approaches should be considered the core of the recommended management strategies for Wayne's Wellhead Protection Plan because these can be implemented now. Furthermore, even though the City is owner and operator of the community water system, it does not have jurisdiction over all of the land identified in the wellhead protection areas. Consequently, educational activities and voluntary approaches offer the greatest potential for more immediate and successful plan implementation.

Management strategies outlined below are general in nature. Specific strategies should be developed on a case-by-case basis through working with the wellhead protection steering committee, the community, and the landowners.

Public Education – Wayne has provided education opportunities in the past and will continue to provide opportunities to educate all ages of citizens and property owners, in and around the wellhead protection area, about the importance of source water protection.

Public education efforts may include, but are not limited to:

- Focus groups
- Community workshops
- Press releases
- “Test Your Well” nights
- Distributing brochures
- School poster contests
- News/information articles
- Utility bill stuffers
- Others

Education could be on a variety of topics such as:

- Proper animal waste handling
- Aquifer and Groundwater Basics
- Private Well and Lagoon Management
- Urban and Rural BMP practices
- Others

Decommission Abandoned Wells – Abandoned wells can directly channel contaminants into ground water, and so pose a considerable risk to water supplies. Abandoned wells must be decommissioned (filled, sealed, and plugged) according to state regulations or they are deemed “illegal”. The 2010 Source Water Protection Grant, which funded completion of this plan, provided for additional cost-share assistance in decommissioning abandoned wells. Wayne will continue to expand efforts to locate and decommission abandoned wells in and around the WHPA, in cooperation with NDEQ and the Lower Elkhorn Natural Resources District.

Wellhead Protection Area Signage – By approving the WHP plan, Wayne can post WHPA signs in the affected areas to alert property owners to the issues. These signs can be supplemented with information regarding the existing land use regulations and directing property owners to contact the City of Wayne.

Security – In recent years, the City has focused on working to increase the level of security at its well houses through installing new doors and “Best Locks” on all well houses in the last 5 years. Wayne will continue to increase all levels of security at water production and infrastructure facilities.

Deep Soil Sampling Cost Share– Deep soil sampling (36 inches in depth) enables producers to better manage fertilizer application by knowing what exists in the full crop root zone. The Lower Elkhorn NRD currently has a 75 percent cost-share program for performing a deep soil sample. The 2010 Source Water Protection Grant, which funded completion of this plan, provides for additional 25% cost-share to be provided as incentive to producers to complete soil sampling in the WHPA from the City of Wayne. Wayne will continue to encourage producers to perform deep soil sampling. If the results are used to inform management decisions, this will ultimately reduce nitrate introduction into the source aquifer.

Groundwater Sampling – Groundwater monitoring wells help with evaluation of whether or not management practices implemented in the wellhead protection area are effective. Groundwater sampling can help the City monitor the current nitrate concentrations in the WHPA. The Lower Elkhorn NRD has an irrigation well sampling program and monitoring wells throughout the district.

Vadose Zone Soil Sampling - In order to better understand the potential for future nitrate contamination, the City could conduct vadose testing of nitrate levels in the wellhead protection areas. The vadose zone is the area of soil between the surface and the water table, which is unsaturated. This would help to determine future areas of concern for nitrate contamination in the groundwater and would help establish management strategies as part of the source water plan.

Easements and Contracts – Some areas within the WHPA may provide opportunities to work with willing landowners. Conservation easements, cost share assistance, land purchasing/managed leasing or contracting with land owners for land use restrictions may be viable options to protect areas outside the City’s zoning power.

Conservation Reserve Program (CRP) – Agricultural producers with farmed land in a WHPA are eligible for increased payment amounts for enrolling land in the CRP program when located in a wellhead protection area. The local NRD and NRCS office will assist in this.

Best Management Practices (BMPs) – BMPs offer an effective prevention strategy or solution to a potential water quality challenge. Selection of the most appropriate BMP or combination of BMPs under a voluntary approach is each individual’s decision.

Agricultural BMP Incentives BMPs focus on management of agricultural inputs to provide for economic, environmental, and agronomic efficiency in agriculture. Implementation of BMPs will reduce the potential of contamination of the source water aquifer. The Lower Elkhorn NRD and others utilize incentives for agricultural producers and residents in the WHPA to implement BMPs such as:

- Vegetative and tillage practices
- Increase the amount of soil sampling
- Encourage no-till or low-till agriculture
- Irrigation Management
- Pesticide Management
- Livestock Waste Management
- Windbreak Management
- Nitrogen Management
- Use of Nitrogen Inhibitors
- Buffer, Filter Strips, or Strip Cropping

- Establish permanent cover on marginal crop ground

Urban BMP Incentives – The City of Wayne, Lower Elkhorn NRD, and others could encourage residents to utilize incentives to adopt best management practices in the urban setting such as:

- Use of native plants in lawns and landscapes
- Recycling
- Soil Sampling of lawns
- Mulching Lawn Clippings
- Rain Barrels/Rain Gardens
- Household hazardous waste collection
- Others

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Section Six: Regulatory Authority

JEO makes NO judgment or guarantee as to the legality or effectiveness of any approach and recommends consulting with legal counsel before enacting any ordinances, regulations, or entering into any legally binding agreement.

City of Wayne

As part of the 2010 Source Water Protection Grant, which funded completion of this plan, Wayne is in the process of assessing their current municipal code and zoning. Due to the different threats and limits of jurisdiction the in each well field, it is important that any current or future ordinances and/or zoning districts are flexible, enforceable, and developed with citizen/landowner input.

WAYNE MUNICIPAL CODE

Ordinances are part of the police power authority of a community, which is simply the power of the state to regulate, in order to protect public health, safety, and welfare. Currently, several sections of the City's municipal code provide protection of the community's drinking water, within the City's extraterritorial jurisdiction. A summary of applicable codes follows, however the actual text of the Municipal Code can be found in Appendix C.

At adoption of this plan, well setback distances are established in the latest version of Nebraska Title 179 – *Public Water Systems*, Chapter 7 (Effective date April 4, 2010). Wayne municipal code section 82-204 codifies these set back distances, which are modified automatically in accordance with updates to Title 179 Chapter 7.

- Section 82-186: Recognizes the importance of groundwater to the City of Wayne and requires the registration of all wells within the zoning jurisdiction of the city.
- Section 82-187: defines the terms well construction, groundwater, illegal well, pollution of groundwater, and well
- Section 82-188: sets usage preference for water users
- Section 82-189: declares any well which pollutes the groundwater within city limits unlawful
- Section 82-190: requires all wells within the zoning jurisdiction of the city to be registered on a form furnished by the city clerk
- Section 82-191: requires persons to apply for permit to drill a well
- Section 82-193: requires the city engineer to investigate a proposed well to determine the potential for the well to pollute or injure the city's water supply
- Section 82-198: Defines a water emergency and steps and phases to be taken in the event it is declared
- Section 82-200: defines a wellhead protection area and designates the boundaries as drawn on a separate map
- Section 82-201: declares drilling and operation of wells and other underground facilities or contaminating facilities without obtaining a permit
- Section 82-203: defines the procedures to obtain a permit
- Section 82-204: declares setback distances for drilling or installation of certain items from the city's municipal water wells
- Section 82-212: defines pollution
- Section 82-214 thru 82-218: establishes and defines a backflow program
- Section 82-275: addresses private sewage disposal

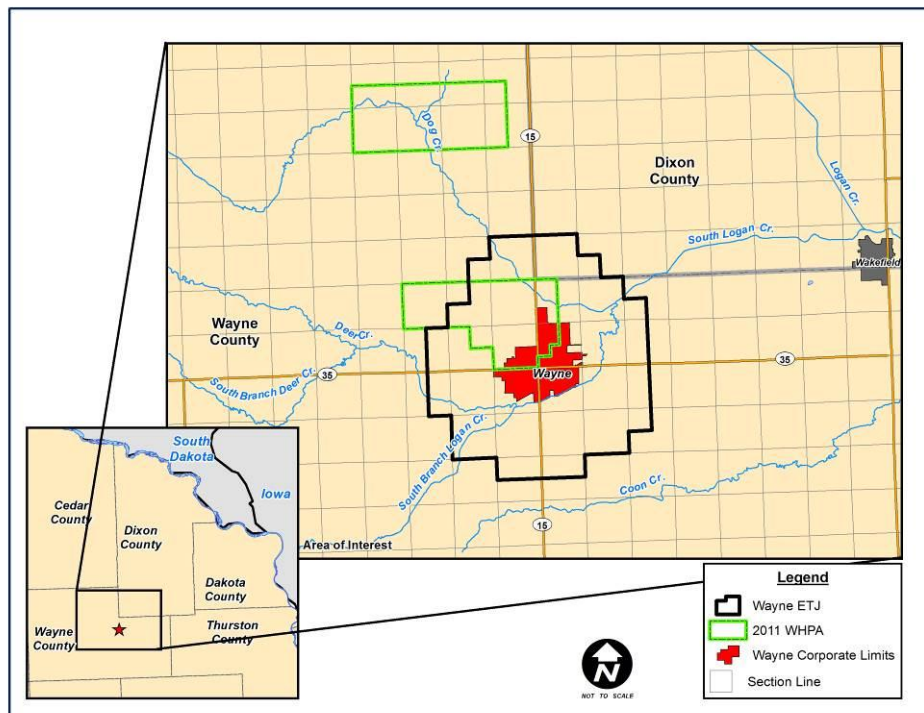
- Section 82-277: addresses use of stormwater sewers and defines illegal discharges into the sewers
- Section 82-279: defines the power and authorities of inspectors to enter onto properties
- Section 82-280: defines and sets penalties for violations of city codes

ZONING CONTROLS

The City of Wayne adopted a comprehensive plan, zoning, and subdivision regulations for the community in 1992, and updated in 2006. Through this effort, Wayne gained land use control up to two miles beyond the corporate limits, through its extraterritorial jurisdiction (ETJ). Figure 12 shows the location of the ETJ in relation with the 2011 WHPA.

Zoning and municipal codes may only be applied to areas within the City's ETJ. As shown in Figure 12, below, the north WHPA does not fall into the City's ETJ.

FIGURE 12: WAYNE ETJ AND 2011 WHPA



Wellhead Protection Zoning – Wayne could enact a wellhead protection overlay zone or adjust current zoning to allow for oversight of activities in the portions of the City's ETJ. The city is unable to utilize Nebraska Revised Statute 17-536 (the 15-mile statute), to protect sources of drinking water outside the community's ETJ, because it only applies to villages and second class cities.

Wayne County has adopted a Comprehensive Plan, according to the Nebraska Association of County Officials, which gives them the authority to enact zoning; however, they have not adopted zoning regulations and are not in the process of developing zoning regulations. The City would need to work with Wayne County to enact a wellhead protection overlay zone in areas outside of Wayne's ETJ. This would most likely be a long-term endeavor.

Lower Elkhorn Natural Resources District

Natural Resource Districts may require best management practices (BMPs) or regulate practices in ground water management areas (GWMAs) to protect groundwater quality.

GROUNDWATER MANAGEMENT PLAN SUMMARY

The Lower Elkhorn NRD's overall mission regarding groundwater quality management is to:

“Provide an adequate supply of acceptable quality groundwater to forever fulfill the reasonable groundwater demands within the NRD for domestic, municipal, agricultural, industrial, wildlife, and other uses deemed beneficial by the NRD Board”

The Lower Elkhorn NRD established a groundwater management plan in 1986 (last updated in 1996). The plan was authorized by Nebraska Revised Statute Chapter 46, Article 6, Section 73.01. The groundwater management plan is used in conjunction with other Lower Elkhorn NRD plans to manage the groundwater resources of the district and serves as a foundation for decision-making – not to dictate groundwater management rules and regulations.

The plan states that generally, an abundance of groundwater is available in most of the Lower Elkhorn NRD; however, the eastern part of the district has areas of poor quality, quantity, or both. The geologic variability of the district creates challenges in management of both water quantity and quality. The many and complex layers of the aquifer resulting from glacial drift cause difficulty in finding an adequate quantity of water within areas of the district. Coarse textured soils combined with irrigation development have caused non-point source nitrate contamination in Pierce and Madison Counties. Heavy concentrations of livestock also can increase the risk for both non-point and point source contamination in parts of the district where these activities are present.

The district's groundwater quality monitoring program consist of maintaining a network of 82 irrigation wells and 92 nested monitoring wells for district-wide groundwater quality monitoring that are on a monthly or annual sampling cycle and follows state and federal protocols. In a 1983 report by the UNL Conservation and Survey Division, sampling, primarily in Pierce County, showed elevated nitrate-nitrogen in half the samples – a rise since 1970. The report concluded that the source of the elevated nitrate-nitrogen levels was probably under-utilized commercial fertilizer. Pierce County has subsequently been designated a Phase 2 – Groundwater Management Area due to the prevalence of nitrate in groundwater. Land within this area is subject to specific requirements that should, over time, improve groundwater quality issues.

Wayne County is located in the Glacial Drift Region of the Lower Elkhorn NRD. Groundwater quality in this region is generally fit for most uses, but chemical parameters are higher than in the Sandhills and Disected Plains Regions. Some areas of Wayne and Stanton Counties have elevated concentrations of total dissolved solids, sulfates, and calcium. High nitrate concentrations have been reported in some locations in the Glacial Drift region. Wayne County is rated as “High Pesticide Use, Low Vulnerability”. Because of the variability of the geology in the region, site specific research and management is necessary to prevent degradation of groundwater resources. Future geologic research will be necessary in Wayne County to help the district delineate aquifers and subaquifers within the county. This information is necessary as some areas of Wayne County are subject to in-season static water level declines that could cause harm to both irrigators and residents with domestic water wells.

Nebraska NRD's are authorized to form special areas called “groundwater management areas,” to protect groundwater quantity and/or quality. Within these areas, NRDs can encourage, require, or control actions

that have an impact on groundwater. Groundwater management areas are divided into subareas called “phases” based on the presence of contaminants or potential to be contaminated. Each phase has varying levels of control for management practices to improve groundwater quality. Phases, and their controls, are outlined in the Lower Elkhorn NRD Groundwater Management Plan:

Phase 1 Area

Areas that are not designated as either Phase 2 or Phase 3.

Phase 2 Area

Areas that have from 50% to 90% of the Maximum Contaminant Level for a contaminant (5 to 9 ppm of nitrate-nitrogen), or are vulnerable to groundwater contamination, or have vadose zone contamination that indicates a potential for groundwater contamination, or are in the recharge areas for public supply wells, or are areas with similar soil and land use conditions as an existing Phase 2 or 3 area. Phase 2 areas must be a minimum of 10 square miles in size.

Phase 3 Area

Areas with greater than 90% of the Maximum Contaminant Level for a contaminant (9 ppm of nitrate-nitrogen), or are vulnerable to groundwater contamination, or have vadose zone contamination that indicates a potential for groundwater contamination, or are in the recharge areas for public supply wells, or are areas with similar soil and land use conditions as an existing Phase 3 area. Phase 3 areas must be a minimum of 10 square miles in size.

Phase 1 Controls

- Persons installing new or replacement wells with a capacity greater than 50 gallons per minute must obtain a permit from the NRD.
- The district will encourage operators to attend certification classes for fertilizer and irrigation water management, to perform deep soil testing for residual nutrients, to test irrigation water for nutrients and to submit an annual report of fertilizer application to the district.
- The district will also encourage operators to use nitrification inhibitors or split application of nitrogen fertilizers and to not apply nitrogen fertilizer in the fall or winter.

Phase 2 Controls

- All Phase 1 requirements
- All operators using commercial or organic fertilizers must be certified by the district.
- Irrigation water must be tested for nitrate-nitrogen (Once every four years)
- Soil must be tested for residual nitrogen content to a 2 foot depth each year in which a non-legume, annual row crop will be planted for at least the second consecutive year (for example, a corn-on-corn rotation).
- All operators applying fertilizer must submit a report to the district every year (due March 31st).

Phase 3 Controls

- All Phase 1 & 2 requirements
- Operators are required to meter volume of irrigation wells.
- Irrigation scheduling is required.

The district Board of Directors, at its discretion, may also designate an area as, or include an area in, either phase 2 or Phase 3, even when the triggers are not met, under various circumstances - including areas that are within Public Water Supply Wellhead Protection Areas.

Currently the area around Wayne, including both WHPAs, is designated as a Phase 1 Groundwater Management Area. Correspondence with the NRD has indicated there are no plans to change the phase in the near future.

A complete copy of the Lower Elkhorn NRD Groundwater Management Plan was not included in this document due to size. For a complete copy of the Plan and related rules or information, contact the NRD at 402.371.7313.

ABANDONED WELL PROGRAM

Lower Elkhorn NRD can provide cost-share to properly close and seal illegal wells. Abandonment must be completed by a licensed well driller.

The procedure is as follows:

1. Pick up application forms from the Lower Elkhorn NRD, or the county NRCS Office.
2. Landowners should apply for the program by submitting NRD 100a form with a completed well sealer's price quote form to the county NRCS Office only.
3. The work may not be done until after the NRD has approved the application.
4. After the well is sealed, the landowner will submit the contractor's bill to the local NRCS office to be certified to the NRD.
5. Upon receiving certification from NRCS, the Lower Elkhorn NRD will reimburse the well owner 75% of the approved costs of sealing the well - up to a limit of \$500 for drilled wells or \$700 for dug wells.

Landowners are required to report the abandonment of a registered well to the Nebraska Department of Natural Resources.

DEEP SOIL SAMPLING COST SHARE

Deep soil sampling (36 inches in depth) enables producers to better manage fertilizer application by knowing what exists in the full crop root zone. Lower Elkhorn NRD currently has a 75 percent cost-share program for performing a deep soil sample. The 2010 Source Water Protection Grant, which funded completion of this plan, provides for additional 25% cost-share to be provided as incentive to producers to complete soil sampling in the WHPA from the City of Wayne. Wayne will continue to encourage producers to perform deep soil sampling. If the results are used to inform management decisions, this will ultimately reduce nitrate introduction into the source aquifer.

State of Nebraska

Below is a listing of Nebraska's legislature statutes that allow local jurisdictions to protect public health and safety. NDEQ administers the wellhead protection program and provides technical assistance to any controlling entity designating a wellhead protection area and adopting controls to limit potential threats to the public water supply. The Nebraska Rural Water Association also can assist with wellhead protection in Nebraska. State statutes and laws are summarized below.

WELLHEAD PROTECTION STATUTES

Sections 46-1501 to 46-1509 shall be known and may be cited as the Wellhead Protection Area Act.

46-1502 - Terms defined

For purposes of the Wellhead Protection Area Act:

- (1) Controlling entity means a city, a village, a natural resources district, a rural water district, any other entity, including, but not limited to, a privately owned public water supply system, or any combination thereof operating under an agreement pursuant to the Interlocal Cooperation Act or the Joint Public Agency Act that operates a public water supply system;*
- (2) Department means the Department of Environmental Quality;*
- (3) Director means the Director of Environmental Quality; and*
- (4) Wellhead protection area means the surface and subsurface area surrounding a water well or well field, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field.*

46-1503 - Wellhead protection area; designation

Any controlling entity may designate a wellhead protection area and adopt controls pursuant to the Wellhead Protection Area Act for the purpose of protecting the public water supply system. The department shall provide technical assistance to any controlling entity designating a wellhead protection area and adopting controls pursuant to the act.

46-1504 - Wellhead protection area designation; controlling entity; duties

Any controlling entity proposing to designate a wellhead protection area and adopt controls shall:

- (1) Designate the boundaries of the wellhead protection area following the procedure in section 46-1505. The wellhead protection area shall be based on all reasonably available hydrogeologic information on ground water flow, recharge, and discharge and other related information necessary to adequately determine the wellhead protection area for the purposes stated in this section;*
- (2) Identify within each proposed wellhead protection area all potential sources of contaminants which may have any adverse effect on the health of persons;*
- (3) Describe a program that contains, as appropriate, technical assistance, financial assistance, implementation of controls, education, training, and demonstration projects to protect the water supply within the wellhead protection area from such contaminants;*
- (4) Include contingency plans for the location and provision of alternate drinking water supplies for each affected public water supply system in the event of water well or well field contamination by such contaminants; and*
- (5) Propose the controls necessary to provide protection from contaminants which may have any adverse effect on the health of persons served by the public water supply system of each participating controlling entity.*

46-1505 - Proposed wellhead protection area; public notice and comment

The controlling entity shall publicize proposed boundaries for the wellhead protection area and the proposed controls and shall provide time for public comment at one or more regularly scheduled public meetings of the governing board of the controlling entity. Notice of the time for public comment shall be published in conjunction with notice of such regularly scheduled meeting. A description of the proposed boundaries and the text of the proposed controls shall be available at the office of the controlling entity for thirty days before such meeting. Persons shall be given the opportunity to speak on the proposed designation and the proposed controls or to submit written testimony for consideration by the controlling entity.

46-1506 - Boundaries of wellhead protection area; designation; procedure

Within sixty days after the last time for public comment under section 46-1505, the controlling entity shall make a final designation of the boundaries of the wellhead protection area and the controls necessary to protect the water in the wellhead protection area and shall submit them to the director for approval or disapproval. Such approval shall be based on whether the boundaries of the wellhead protection area are reasonably defined, the controls are reasonably related to the purpose of ground water protection in the area, and such approval is in the public interest.

The director shall act on the proposed designation of boundaries and proposed controls within ninety days after the date the proposals are received by him or her.

If the director approves the proposed boundaries and controls, he or she shall so notify the controlling entity, but the boundaries and controls shall not be deemed effective until the controlling entity has adopted such boundaries and controls by ordinance or resolution. If the director disapproves either or both of the proposals, he or she shall return the proposals to the controlling entity with an explanation of the reasons for such disapproval. The controlling entity may revise such proposed designation of boundaries and proposed controls and, after notice and hearing as provided for in the original proposed designation of boundaries and proposed controls, submit the revised proposed designation of boundaries and proposed controls to the director for approval or disapproval.

If the director does not act on either the original or revised proposed designation of boundaries and proposed controls within ninety days after submission by the controlling entity, the proposed designation of boundaries and proposed controls shall be deemed approved by the director.

46-1507 - Existing wellhead protection areas; effect of act

Any wellhead protection area established before July 15, 1998, by resolution or ordinance of the controlling entity need not be reestablished under the Wellhead Protection Area Act unless controls are proposed. If such controls are proposed, the controls and the boundaries of the wellhead protection area are subject to the requirements of sections 46-1504 to 46-1506. Any wellhead protection area purported to have been established before July 15, 1998, other than by official action of a controlling entity shall be null and void beginning nine calendar months after July 15, 1998, unless reestablished by resolution or ordinance of the controlling entity.

46-1508 - Designated wellhead protection area; boundary area changes

A designated wellhead protection area may be amended as to boundaries and controls as provided for in the initial designation of a wellhead protection area in the Wellhead Protection Area Act.

46-1509 - Environmental Quality Council; rules and regulations

The Environmental Quality Council shall adopt and promulgate rules and regulations to carry out the Wellhead Protection Area Act.

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Section Seven: Emergency and Contingency Plans

Wayne Emergency Plan

Wayne's Public Water System Emergency Response Plan is located in Appendix E. The emergency plan was last updated on February 11, 2011. The City of Wayne is not currently a member of the Nebraska Water/Wastewater Agency Response Network (NEWARN) but is working to obtain membership at the time of the planning period.

NEWARN is a statewide Water/Wastewater Agency Response Network (WARN) of "utilities helping utilities" to:

- Prepare for the next natural or human-caused emergency.
- Organize response according to established requirements
- Share personnel and other resources statewide, by agreement.

NEWARN provides water and wastewater utilities with:

- A Mutual Aid Agreement and process for sharing emergency resources among water and wastewater agencies statewide.
- A mutual assistance program consistent with other statewide mutual aid and assistance programs and the National Incident Management System.
- The resources to respond and recover more quickly from a natural or human caused disaster.
- A forum for developing and maintaining emergency contacts and relationships.

Wayne Contingency Plan

Wayne's Public Water System Emergency Response Plan (copy located in Appendix E) contains emergency water supply contact information, contingency plans, and emergency contact information to deal with the following emergencies/contingencies:

- | | |
|--|--|
| • Power Outage | • Chemical Incident |
| • Prolonged Water Outage | • Drought, Flooding, or other Severe Weather |
| • Transmission and/or Distribution System Failure | • Fire at Supply System Facility |
| • Treatment Equipment Failure | • Hazardous Material (HAZMAT) Release |
| • Source Pump Failure | • Terrorism or Vandalism |
| • Loss of SCADA/Automated Controls | |
| • Contamination of Supply (including MCL violations) | |

Wayne New Well Planning

Wayne completed a water system master plan in November 2000 that included a phased implementation plan for water system improvements through 2020. One of the recommendations involved increasing well capacity, which the City just recently implemented through construction of Well #11. The new well, and increased system capacity and resiliency it provides, should serve Wayne well into the foreseeable future.

Going forward, the City will begin to explore areas for locating a new well. The City will need to ensure siting criteria (Title 179, NHHS-R&L) are met. Identifying a new well or well field will be a long term process outside the scope of this plan; however, a few considerations have been identified during the development of this plan:

- Wayne could utilize the Lower Elkhorn NRD's groundwater monitoring and sampling program and Groundwater Management Plan to aid in preliminarily identifying future well locations.
- The City could consider staying in the same area as the existing well field to utilize the infrastructure
- An evaluation of existing capacity of the infrastructure will need to be explored
- The City should obtain an option or purchase a property for the new well once the site is identified.
- The City should obtain a provisional wellhead protection area from NDEQ in order to identify potential contaminant sources before the future well site is chosen. The provisional WHPA will ensure that groundwater is protected until it is needed.

Section Eight: Public Education and Notification

Opportunity for Public Input

In order for a plan to be approved by the NDEQ, there must be proper documentation of public involvement. The Wayne Wellhead Protection Plan adoption format has followed the guidance of NDEQ to ensure proper opportunity for public input. The following steps below are the basic minimum requirements that must be documented. Due to efforts to satisfy all public comments and concerns, Wayne WHPP project went through multiple public meetings and the documentation materials for each of the opportunities (copy of newspaper notices, affidavit of publication, and minutes) is located in Appendix A.

1. Prepare a Wellhead Protection Plan
2. The WHP Plan is made available for public review at least 30 days prior to the meeting where public comment will be taken on the Plan.
3. Public comment is taken at a regularly scheduled meeting of the “controlling entity” (meaning the village board, city council, Rural Water District board, etc)

Wayne Wellhead Protection Plan Steering Committee

A 16-member steering committee was established at the initiation of the project. As shown in Table 9, below, members include the City staff, Lower Elkhorn NRD, City Council, NDEQ, and JEO. The steering committee was responsible for planning public workshops and open houses, plan review, and serving as local contacts to residents to provide information during the planning period.

Table 10: Wayne Wellhead Protection Steering Committee Members

NAME	TITLE	ASSOCIATION
Don Nelson	Landowner	North Well Field
Doug Nelson	Landowner	North Well Field
Dave Fouss	Landowner	North Well Field
Dave Sievers	Landowner	South Well Field
Ron Lundahl	Landowner	South Well Field
Lowell Johnson	City Administrator	City of Wayne
Casey Junck	Water & Wastewater Operator	City of Wayne
Brian Frevert	City Council Member	City of Wayne
Joel Hansen	Zoning Administrator	City of Wayne
Garry Poutre	Utilities & Public Works Superintendent	City of Wayne
Jeff Brady	Water/Wastewater Foreman	City of Wayne
Brian Bruckner	Groundwater Management Area Specialist	Lower Elkhorn NRD
Ryan Chapman	Wellhead Protection Coordinator	NDEQ
Mary Schroer	Source Water Coordinator	NDEQ
Roger Protzman	City Engineer	JEO Consulting Group, Inc.
Adam Rupe	Natural Resources Specialist	JEO Consulting Group, Inc.

Meeting Summary

During the establishment of the wellhead protection plan, Wayne offered a series of community meetings/workshops, established a wellhead protection committee, and held public open meeting to offer residents and property owners an opportunity to voice their opinion or ask any questions about wellhead protection and the plan. The following is a summary of the types and dates of meetings. Sign-in sheets, meeting minutes, and public notification materials are located in Appendix A.

Public Education Workshop – June 2, 2011

The University of Nebraska – Lincoln Extension, provided the City of Wayne an educational opportunity to learn about water quality with a focus on best management practices, homeowner education related to onsite wastewater systems, drinking water quality, pollution prevention, and source water security. A total of 15 residents, property owners, and WHP Committee members attended. The workshop lasted just over one hour and was considered a great success by those in attendance.

Notification: The workshop was advertised through the local newspaper, radio station, and flyers.

WHP Committee Meeting #1 – June 2, 2011

The first WHP Committee meeting was held on June 2, 2011; prior to the Education Workshop. The committee discussed their responsibilities, plan progress and schedule, the new WHPA map, the contaminant source inventory process, soil sampling, issues and ideas about the development of the plan, and potential timing of the next WHP Committee meeting and Public Open House.

Notification: Committee members were invited to the meeting by phone calls, letters, and word to mouth.

WHP Committee Meeting #2 – July 25, 2011

A second WHP Committee meeting was held on July 25, 2011, to discuss progress of the first draft of the wellhead protection plan, review the draft CSI, and answer specific questions. The committee also served as a focus group to provide input to the plan development process.

Notification: Committee members were notified of the meeting by phone calls, letters, and word to mouth.

WHP Committee Meeting #3 – September 13, 2011

A third WHP Committee meeting was held on September 13th, 2011, prior to the public open house. The Committee reviewed the project goals and status. The draft plan and draft ordinance was reviewed in detail. A solid direction for updates to municipal code and zoning was established at this meeting.

Notification: Committee members were notified of the meeting by phone calls, letters, and word to mouth.

Public Open House – September 13, 2011

A second educational opportunity was held for the public to learn about the wellhead protection plan and to offer the chance for comments, questions, and input on the draft plan and wellhead protection planning in general. The open house was held on the nationally recognized “Protect Your Groundwater Day” in order to help gather interest in the plan. A blank “Input and Comment” form is located in Appendix A – no forms were received back from the public.

Notification: The open house was advertised through the local newspaper, radio station, and flyers.

Test Your Well Night – May 17, 2012

A Test-Your-Well Night was held for Wayne and the surrounding community. Individuals whom obtain their drinking water from private wells were invited to bring a sample of the water to be tested for Nitrates. Volunteers from the Wayne County 4-H assisted at the event. The event was considered very successful with 46 individuals bringing in over 50 samples for testing. While well owners waited for their testing results information was available on the wellhead protection plan, well maintenance, and common groundwater contaminant issues. For those individuals testing over the MCL of 10 ppm, information on treatment options and laboratory testing was made available.

Notification: The event was advertised through the local newspaper, radio station, and flyers.

Public Hearing – June 5, 2012

A public hearing, prior to the City Council voting to adopt the plan was held. Many residents and landowners were on hand to speak. Due to the large volume of potential concerns with the plan, the adoption of the plan was tabled. It was agreed that additional meetings with landowners were needed to ensure the plan was accurate.

Notification: The hearing was advertised through the local newspaper, radio station, and flyers.

Landowner Meetings

Following the Public Hearing on June 5, 2012, a series of meeting was held to gather more input into the wellhead protection plan. Minor modifications and clarifications were made to the plan to prepare it for adoption by the City. Meetings were held on the following dates:

- July 2, 2012
- August 2, 2012
- December 20, 2012

Notification: Invites to the meeting were made through direct letters, phone calls, and word of mouth.

Public Hearing – February 19, 2013

A public hearing, prior to the City Council voting to adopt the plan was held. Many residents and landowners were on hand to speak. Following testimonies, a decision to table the vote for two weeks was made due to many members of the City Council being newly elected. This would give them adequate time to gather any additional information.

Notification: The hearing was advertised through the local newspaper, radio station, and flyers.

Plan Adoption – March 5, 2013

At the regular City Council meeting, the Council voted unanimously to adopt the Wayne Wellhead Protection Plan, by resolution.

Notification: The regularly scheduled meeting was advertised through the local newspaper.