VILLAGE OF NEW AUBURN
WELLHEAD PROTECTION PLAN
WELLS #1, & #2

July, 2014

Prepared for New Auburn Water Utility
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Sourcewater Protection Program
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Table of Contents

Figures

Appendices

BACKGROUND

The Village of New Auburn has prepared this wellhead protection plan for the purpose of minimizing the risk of contamination to the municipal water supply. The plan establishes wellhead protection areas around each municipal well which are designated for special protective measures intended to minimize the risk of the well becoming contaminated. The wellhead protection areas encompass the area determined by a hydrologic study to contribute groundwater to the well. Wellhead protection areas receive the most concerted protection efforts.

This plan is for New Auburn's existing well #1 and newly constructed Well #2. The water system serves the entire Village (population 594). The system has an average demand of around 24,000 gallons per day (gpd) which stays fairly consistent throughout the year. To meet average demand, one well is pumped for about two hours a day. The wells are alternately pumped on a weekly basis. Water storage is provided by one elevated tank with a capacity of 100,000 gallons. Well construction details are as follows:

Table 1

Well #	WI Unique Well ID	Total Depth (ft)	Casing Depth (ft)	Open Interval (ft)	Well Diameter (in)	Pump Capacity Max/Operational(gpm)
1	BF300	168	118	50	10	260/180
2	YJ237	164	156	10	10	200/150

Well #1 is located on the south side of County Hwy M, in the western part of the Village. The well was originally constructed in 1950 and rehabilitated most recently in 2007. Well #2 is equipped with a submersible pump. Auxiliary power for the well is provided by a portable diesel generator that can be used for either well.

Well #2 is a located 1,900 ft southeast of Well #1 in the eastern part of the Village park on the west side of East St. The well is a newly constructed well to help the Village meet future demand and provide the additional water system security that comes from having multiple sources of potable water. Well #2 is equipped with a submersible pump. The pump motor is controlled with a variable frequency drive which allows the well to be operated at a lower capacity. Auxiliary power for the well is provided by a portable diesel generator that can be used for either well.

Both wells pump groundwater from the aquifers that lies below the Village. Water from the wells is of good quality, meeting all state and federal drinking water quality criteria. Hardness measured as total calcium carbonate typically ranges from 40-70 mg/L, which is classified as soft to moderately hard (Kammerer, 1981). Treatment consists of sodium hydroxide for pH adjustment and corrosion control at both wells, and Well #2 is equipped for standby chlorine addition for disinfection if needed. Locations of the wells are shown in Figure 1 and lithologic logs and construction details for the wells are included in Appendix B. This plan was prepared in accordance with the Wisconsin Administrative Code, Chapter NR 811.12(6) for wellhead protection planning.

HYDROGEOLOGIC SETTING

New Auburn is located in northwest Chippewa County, an area characterized by gently rolling topography comprised of sandstone bedrock uplands dissected by sand and gravel lowlands of unconsolidated sand and gravel deposited by flowing glacial meltwater (Syverson, 2007). The surrounding uplands comprised of Cambrian age sandstone are desirable sources of industrial sand, therefore; there is a lot of industrial sand mining surrounding New Auburn. The area has been covered by glacial ice many times in the geologic past, which has left a thick layer of unconsolidated sand and gravel. The sand and gravel varies greatly in thickness due to the variability of the sandstone bedrock below. Well #1 is completed in 100ft of the Cambrian sandstone aquifer that lies below 70 feet of unconsolidated glacial material. Well #2 is constructed entirely in the unconsolidated glacial aquifer which is at least 200 feet deep at that location. Below the Cambrian sandstone lies Precambrian igneous granite that is effectively impermeable (Kammerer, 1998). Vertical relationships of the wells and aquifer in shown Figure 3, and the line on which the cross section is drawn is shown on the map in Figure 4.

The source of all groundwater is precipitation which infiltrates and recharges the aquifer. The rate of groundwater flow in an aquifer is determined by the hydraulic parameters of the aquifer. Important hydraulic parameters are described below and given in Table 2:

- Aquifer Thickness – Vertical thickness of water bearing porous medium.
- Effective Porosity – The ratio of void volume to the total volume of material.
- Hydraulic Gradient – The change in water table elevation (hydraulic head), divided by the change in distance in a given direction (calculation shown in Figure 2)
- Storage Coefficient – The volume of water that an aquifer releases from storage, per unit surface area of the aquifer, per unit change in head (From Schwartz & Zhang, 2003, page 73).
- Transmissivity – The rate at which water is transmitted through a unit width of the aquifer under a unit hydraulic gradient. It is estimated using pump test data, and the "T-Guess" computer solution (Bradbury and Rothschild, 1985).
- Hydraulic Conductivity – The ease with which flow takes place through a porous medium. It is calculated by dividing the transmissivity by the aquifer thickness.

Table 2

Aquifer Hydrologic Parameters	Well #1	Well #2
Aquifer Thickness (ft)	140	140
Effective Porosity	0.3	0.3
Hydraulic Gradient	0.004	0.004
Storage Coefficient	0.1	0.1
Transmissivity (ft2/sec)	0.058	0.047
Hydraulic Conductivity (ft/day)	35.79	29.01

The Aquifer hydraulic parameters are estimated using a pump test, which is conducted at the time of well construction, and can be found on the well construction report. A pump test provides an estimate of how much water an aquifer can yield, also known as the wells specific capacity. This is done by measuring drawdown, which is the difference between the static (pre-pumping) water levels and water levels after pumping the well at a given rate for a given period of time. The pumping test results are as follows:

Table 3

Pump Test	Well #1	Well #2
Pumping Rate (gpm)	285	230
Duration (hours)	24	24
Static Water Level (ft)	49	25
Pumping Water Level (ft)	74	129
Drawdown (ft)	25	104
Specific Capacity (gpm/ft)	11.4	2.2

GROUNDWATER FLOW DIRECTION

The direction of groundwater flow may be inferred from the regional topography and the slope of the water table. The water table is the upper limit of the aquifer and is measured in "head" or elevation above sea level. Wells provide measurement points of water table elevation. The water table is generally a subdued representation of the surface topography, where water moves from high points toward low areas where it discharges to lakes & rivers. The best available maps of groundwater elevations for the area were developed for Chippewa & Barron counties by the Wisconsin Gelogical and Natural History Suvey in 1988 & 1987 respectively. The water table is mapped in Figure 2 and is shown as contour lines of equal head with a 20 ft contour interval. Groundwater flows approximately at right angles to the contour lines, in the direction of decreasing head. Additionally in figure 2, surface watershed boundaries are shown. Surface water flow is controlled exclusively by topography. New Auburn sits at the intersection of three surface watersheds. Water to the north flows into Beaver Creek & Chetek Lake, water to the southeast flows into Duncan Creek, and water to the southwest flows into Sand Creek and the Red Cedar River. Surface watershed divides and groundwater divides are generally similar, but not always. Groundwater at New Auburn probably follows a similar flow regime to the surface water, but without detailed hydrogeologic study, we can't be sure. Groundwater recharging New Auburn's wells comes from infiltration of precipitation (recharge) in the area surrounding the wells; however it is not possible to determine the exact area contributing groundwater to New Auburn's Wells. Precipitation infiltrates downward into the ground until it reaches the water table where it starts to move in a horizontal direction. The general direction of groundwater flow is shown in figure 2. Arrows on the map show the general direction of groundwater flow. Currently, an in depth multi-year study of the groundwater in northwest Chippewa County is being conducted by the Wisconsin Geological and Natural History Survey. Once this study is complete, there will be a better understanding of groundwater flow near New Auburn.

ZONE OF INFLUENCE

The Theis equation is used to calculate the zone of influence (ZOI), which is a circle around each well that represents a cone of depression in the water table defined by a drawdown of 1 ft that would develop after 30 days of continuous pumping at full capacity, with no recharge to the groundwater. It assumes that the aquifer is homogeneous (the aquifer is equally permeable in all places and in all directions), the well fully penetrates the aquifer and drawdown is small compared to the saturated thickness. It simulates theoretical worst-case condition. Since the formula uses continuous pumping at full capacity and does not consider recharge to the aquifer, the calculation may be artificially large. When recharge is considered the ZOI becomes an elliptical shape extending farther upgradient and less downgradient. The ZOIs for each well are mapped in Figure 4.

Theis Equation:

$$W(\mu) = \frac{sT}{114.6*Q}$$

$$r^2 = \frac{Tt\mu}{1.87S}$$

Where:

$W(\mu)$ = Well Function
s = Drawdown (1 ft)
Q = Maximum Pumping CapaVillage
T = Transmissivity (gpd/ft)
S = Storativity
μ = From lookup table based on $W(\mu)$
t = 30 days continuous pumping
R = Radius of the cone of depression

Zone of Influence (ZOI) Calculations:

Well #1 $W(\mu)$= $\frac{1 \text{ X } 37468}{114.6 \text{ X } 260}$ W(μ)= 1.2575

r = $\sqrt{\left(\frac{37{,}468 \text{ X } 30 \text{ X } 0.19}{1.87 \text{ X } 0.1}\right)}$ μ = 0.19

ZOI radius= 1,069 feet

Well #2 $W(\mu)$= $\frac{1 \text{ X } 30{,}362}{114.6 \text{ X } 200}$ W(μ)= 1.3247

r = $\sqrt{\left(\frac{30{,}362 \text{ X } 30 \text{ X } 0.18}{1.87 \text{ X } 0.1}\right)}$ μ = 0.18

ZOI radius= 936 feet

ZONE OF CONTRIBUTION (RECHARGE AREA)

In order to protect the groundwater reaching New Auburn's municipal wells, it is important to determine where water pumped from the wells comes from. Groundwater captured by the wells is recharged by infiltration of precipitation in an area extending primarily up gradient from each well. The entire land area that contributes water to a well is known as the "zone of contribution" (ZOC) or recharge area. Several methods can be used to delineate the recharge area, ranging from a simple fixed radius to the use of complex computer models. As discussed earlier in the *Groundwater Flow Direction* section, New Auburn's location at the intersection of 3 separate watersheds, and the lack of detailed hydro geologic information for the area, makes determining the zone of contribution difficult. What is certain is that much of the recharge area for the village wells comes from fairly close to the wells. Due to the on complex hydrogeology and lack of detailed information, the calculated fixed radius method was used to estimate the ZOCs for New Auburn's wells. This method involves drawing a circle around the well that is equivalent to the area of the aquifer below the land surface that holds the amount of water that is withdrawn from the well in a given period of time. The period of time used is 5-years. The 5-year ZOC is particularly important because 5-years is generally determined to be an adequate amount of time needed for the geologic formation to degrade or dilute most contaminants, or contamination could be cleaned up before it reaches the pumping well. The calculated 5-year ZOCs are mapped in Figure 7 and calculations are shown below.

The Wisconsin Geological and Natural History Survey is currently working on a detailed hydrogeologic study of the area. The study will yield much more accurate ZOC delineations for New Auburn. Once the study is complete, it is suggested that this wellhead protection plan be updated using the new information from the study (Estimated in Year 2016).

Assumptions used in the ZOC calculation include; pumping rates equal to each wells maximum capacity, a saturated aquifer thickness equal to each well's open/screened interval, effective porosity of 0.3.

Volumetric Flow Equation:

$$r = \sqrt{\left(\frac{Qt}{\pi n_e H}\right)}$$

Where:

Q = maximum pumping capacity (ft^3/day)

t = time of pumping (years)

n_e = effective porosity

H = Aquifer Thickness (ft)

Calculated Fixed Radius – Zone of Contribution Calculations:

Well #1 $r = \sqrt{\left(\frac{50044.8 \times 365 \times 5}{\pi \times 0.3 \times 140}\right)}$ Radius= 832 feet

Well #2 $r = \sqrt{\left(\frac{38496 \times 365 \times 5}{\pi \times 0.3 \times 140}\right)}$ Radius= 730 feet

POTENTIAL CONTAMINANT SOURCES

In order to design the most appropriate management strategy, it is necessary to know what possible sources of contaminants are present around each well. These are locations where human activity or land use has created the potential to release contaminates into the groundwater aquifer. Potential contaminant sources within ½ mile of well #1 & #2 were identified by records review and field reconnaissance.

A variety of contaminants can be released from the potential sources identified at New Auburn. Sewage contains both domestic and industrial wastewater. While industrial wastewater can have many types of pollutants, the contaminants of most concern in domestic wastewater include pathogens and nitrate. Pathogens (primarily bacteria and viruses) are filtered somewhat as they move through the ground and are viable for a limited time. Nitrate, on the other hand, travels very easily in groundwater with little attenuation. Nitrate is also present in fertilizers applied on agricultural land and lawns. Pesticides applied to lawns and fields are in a class of chemicals known as synthetic organic compounds (SOCs) which can be attenuated somewhat in topsoil and clays but would travel more easily through the sandstone & unconsolidated aquifers. Another class of chemicals, known as volatile organic compounds (VOCs) can be released from a variety of sources, including fuel tanks and auto repair shops. VOCs have mobility similar to that of SOCs. Chloride can be released from road salt, sewage, landfills, manure storage or spreading and septic system leachate and is also very mobile. Unused and improperly sealed wells are a significant threat to groundwater quality because they can act as a direct conduit for contaminants to move from the surface to the groundwater. Industrial sand processing plants are located less than ½ mile north/northwest & south/southwest of the wells. Little is known about the Acrylamides used as a flocculent during industrial sand processing, although Acrylamides are not known to be dangerous, it is important to note their presence. Additionally, petroleum products spills from fueling or malfunctioning of equipment used at processing plants could pose a threat. The shallow depth of the aquifer and the relatively short well casing make New Auburn's wells generally more susceptible to contamination.

<u>Well #1</u>

Well #1 is surrounded on all sides by residential neighborhoods, with some commercial and industrial to the north/northeast and some agriculture to the south and west. Residential land use is typically poses very little threat to groundwater, provided lawn chemicals & fertilizers are used properly, and household hazardous waste is disposed of properly. Several blocks to the northeast is the central business district of the Village, where there are several remediation sites, auto shops & the the plastics factory, all of which have potential to pollute groundwater. Steps should be taken to make sure these businesses are handling and disposing of chemicals properly. There is one known private well near the municipal wells. It is 400 ft northeast of Well #1. If constructed properly and in good repair, this should pose little threat. If any private wells are found that are unused or in disrepair, they should be properly abandoned.

Well #2

Well #2 is surrounded on all sides by the Village Park & residential neighborhoods, with some agriculture. The same things said about Well #1 and residential land use & the Village's central business district apply for Well #2. The biggest concern at Well #2 is nitrate. Preliminary test results show nitrate concentrations of 6.5 mg/L, results from the final well show concentrations of 5.5 mg/L. The likely source of Nitrate is agriculture. The village expects nitrate concentrations to continue to drop because of a large field immediately upgradient from the well was taken out of production. The land is now being used for a rail car staging area, with part of the land planted in native prairie grasses. Nitrate concentrations should be monitored carefully. If any increase is seen, further investigation should be conducted to determine the source of nitrate and attempts made to reduce nitrate concentrations.

Potential contaminant sources are mapped in Figure 6, and Appendix A contains a comprehensive inventory with distances from the nearest well. This inventory should be updated periodically by utility personnel in the space provided.

WELLHEAD PROTECTION AREA

This plan establishes wellhead protection areas (WHPAs) around each well (figure 7).
A wellhead protection area (WHPA) is defined by the federal Safe Drinking Water Act as 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 or well field". In practical terms, the ZOC is a technically-defined area based on groundwater hydraulics, while the WHPA is a legally-defined area including all or part of the ZOC and within which zoning practices or other land-use controls can be implemented to help protect groundwater from contamination (Kroheiski et. al., 2000)

The WHPAs are established to clearly define the area most critical for protecting the wells from contamination. They should be the primary focus of efforts to protect the Village water supply. The WHPAs include the full 5-year TOT capture zones. 5-years is used because it is generally an adequate amount of time for the geologic formation to degrade or dilute most contaminants, or contamination could be cleaned up before it reaches the pumping well. The DNR suggests the boundary of the WHPAs include, as a minimum, all the land within 1,200 ft of the wells. The calculated 5-year TOT capture zones for New Auburn's wells are less than 1,200 ft, so the boundary of the WHPAs have been extended out to a distance of 1,200 ft. Any parcel of land that which is partially included in the wellhead protection area is considered part of the wellhead protection area. The WHPAs are mapped in figure 7.

MANAGEMENT STRATEGY

Implementation of the wellhead protection plan happens by taking specific actions to protect the Village water supply. This includes addressing any specific issues and solutions identified in

the wellhead protection plan or by any steering committee. The steering committee has developed an implementation plan which lays out specific implementation activates along with the responsible party and a timeline for completion.

Blue-shaded blocks indicate activities already in place and ongoing

Activity	*Responsible Party*	*When Implemented*	*Comments*
SOURCE MANAGEMENT ACTIVITIES			
Wellhead Protection Ordinance Update	Village Board	Within 3 Months of WHP Plan Approval	New Auburn's existing wellhead protection ordinance will be reviewed and updated as needed to include the wellhead protection area for Well #2
Monitor Nitrate Levels in Well #2	Public Works	Ongoing	Nitrate levels in Well #2 will be monitored as prescribed by the DNR. Levels are expected to decrease due to agricultural land removed from production; however, if levels increase an investigation into the source will be conducted.
Wellhead Protection Plan Updated When County Completes Groundwater Flow Model	Public Works-With assistance from Wisconsin Rural Water Association	When Chippewa County Groundwater Model is Completed	Chippewa County and the Wisconsin Geological and Natural History Survey are developing a detailed groundwater model for the area. When the model is complete, New Auburn's WHPP will be updated using the model's advanced well capture zone delineations.
EDUCATION AND OUTREACH ACTIVITIES			
Educational Brochures	Village Clerk	Ongoing	Educational brochures about the importance of water conservation and protecting groundwater will be made available at Village hall.
WATER CONSERVATION ACTIVITIES			
Screen Water Bills	Public Works	Ongoing	Water bills are screened for anomalies that could indicate leaks or excessive water use
Leak Detection Surveys	Public Works	Ongoing	Leak detection surveys are conducted on an as-needed basis to decrease water loss

STEERING COMMITTEE

A steering committee has been formed to oversee implementation of this plan. The committee consists of the following individuals:

Jon Bohl, Public Works Superintendant, Village of New Auburn
Peggy Stanford, Clerk/Treasurer, Village of New Auburn
Andrew Aslesen, Source Water Specialist, Wisconsin Rural Water Association

Local governmental entities that have jurisdiction in the planning area are the Village of New Auburn and Chippewa County.

CONTINGENCY PLANNING

Contingency planning is done to minimize the disruption of water service in the event of emergencies. In the event that New Auburn's water supply becomes contaminated, the procedures laid out in the Emergency Response Plan (ERP), developed by New Auburn Utilities in 2009, and stored at village hall, will be followed. The ERP provides a regularly updated, comprehensive list of all necessary contacts for water system employees, emergency management agencies, contractors, and state agencies; as well as emergency procedures, including emergency alternate water sources and emergency disinfection procedures.

With one well out of service, the remaining well could easily meet the average daily pumpage of around 24,000 gallons. The Village has one reservoir capable of holding 100,000 gallons that could provide approximately three days worth of water. Additionally, emergency water use restrictions could be implemented to conserve water.

The following is an abbreviated list of emergency contacts.

EMERGENCY CONTACT		PHONE NUMBERS
Local:	New Auburn Water Dept.-Jon Bohl	715-933-1091
	New Auburn Village Hall	715-237-2223
	Fire Department	911 or 715-237-2103
	Police Department	911 or 715-237-3200
	Ambulance (EMS)-Bloomer	911 or 715-568-5554
	Ambulance (EMS)-Chetek	911 or 715-924-4211
	DNR Representative-Brad Henderson	715-839-1636
County and Regional:		
	Chippewa County Sheriff	911 or 715-726-7701
	Chippewa County Emergency Management	715-726-7728
	Chippewa County Health Department	715-726-7900
	Barron County Sheriff	911 or 715-537-3106
	Barron County Emergency Management	715-537-6595
	Barron County Health Department	715-537-5691
	DNR-Regional Spill Coordinator	715-839-1604
State:	DNR-State Spill Response	800-943-0003
	State Lab of Hygiene	608-263-3280

Figure 1 – Municipal Divisions and Village of New Auburn Well Locations

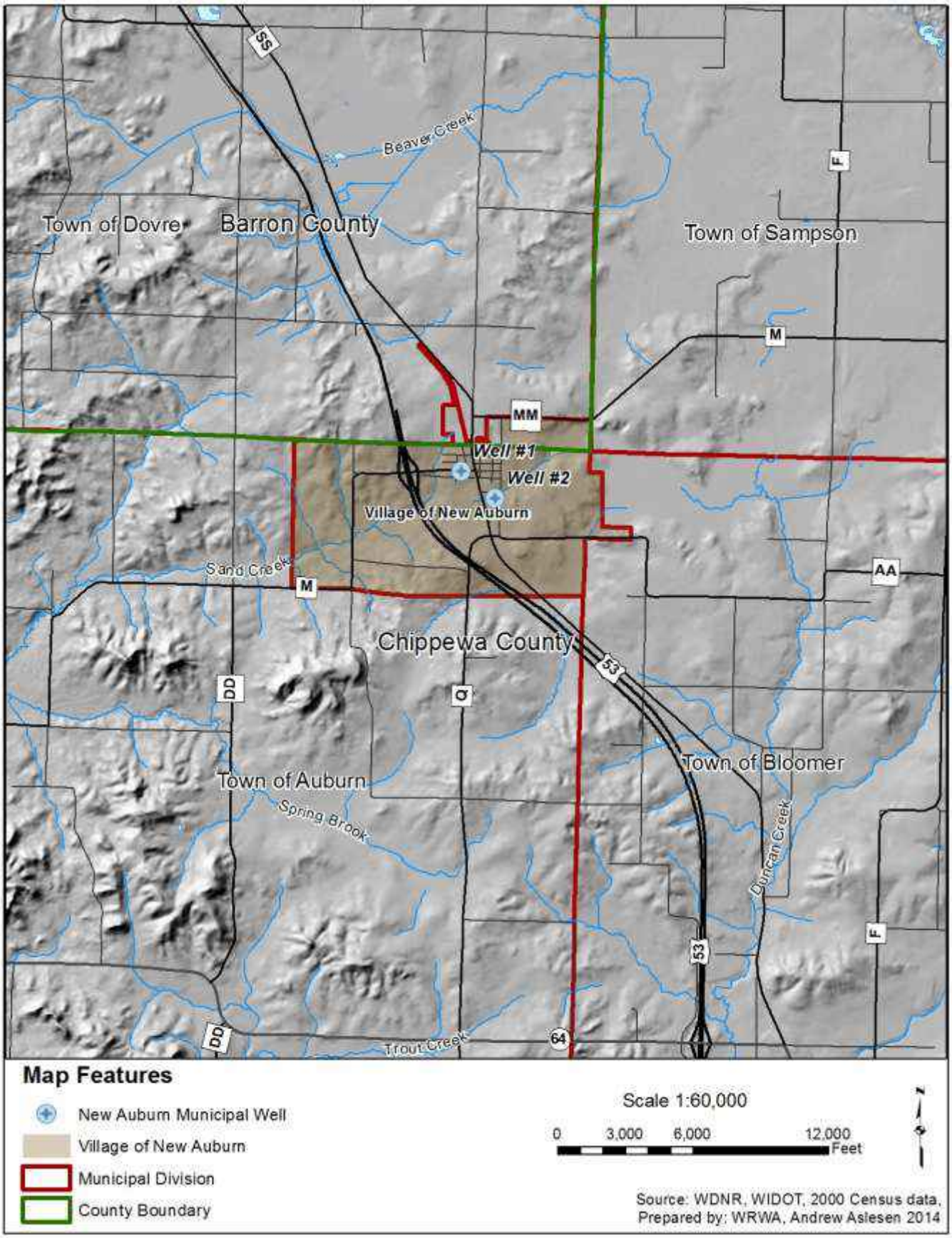


Figure 2 –Groundwater Flow Direction

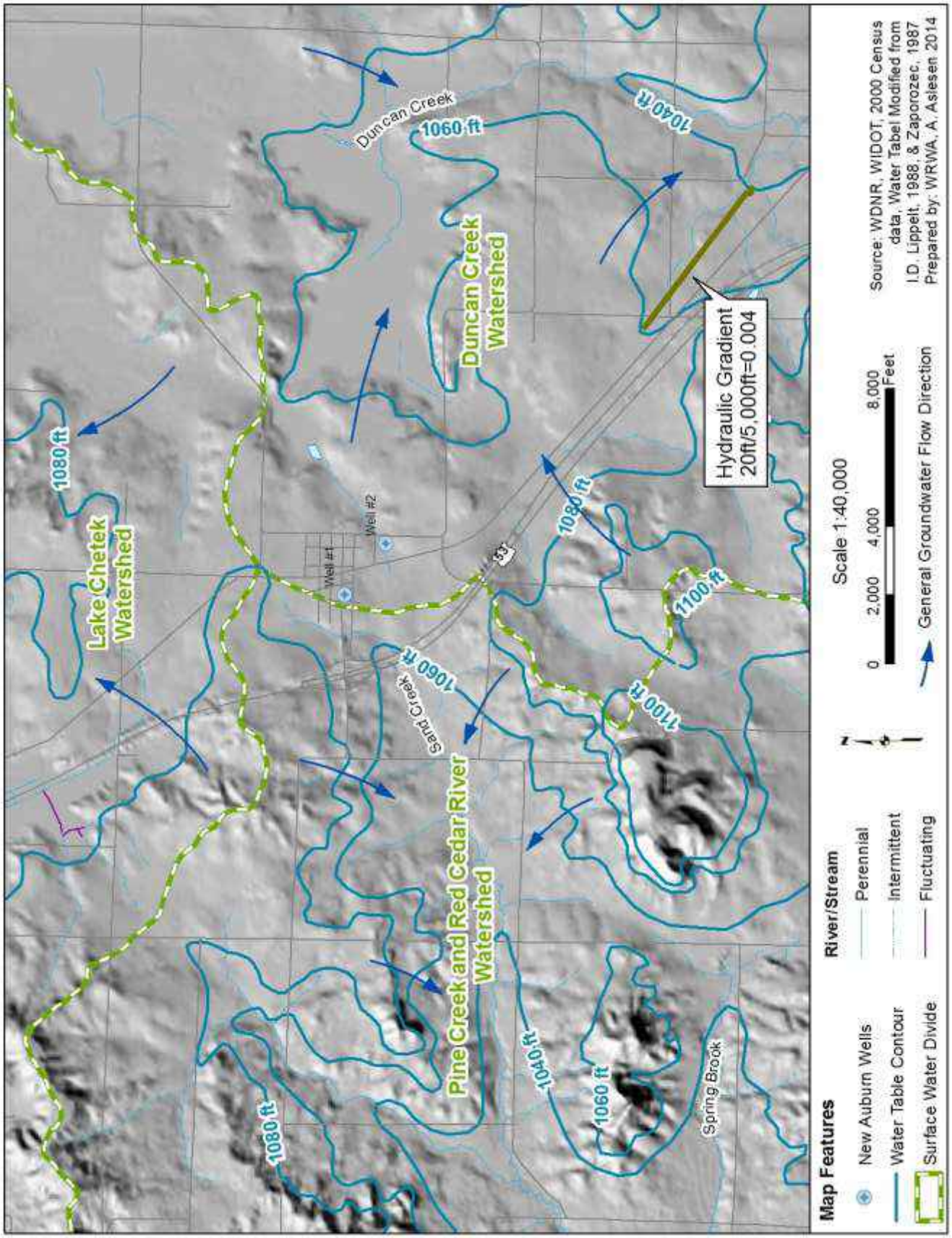


Figure 3 – Vertical Relationships

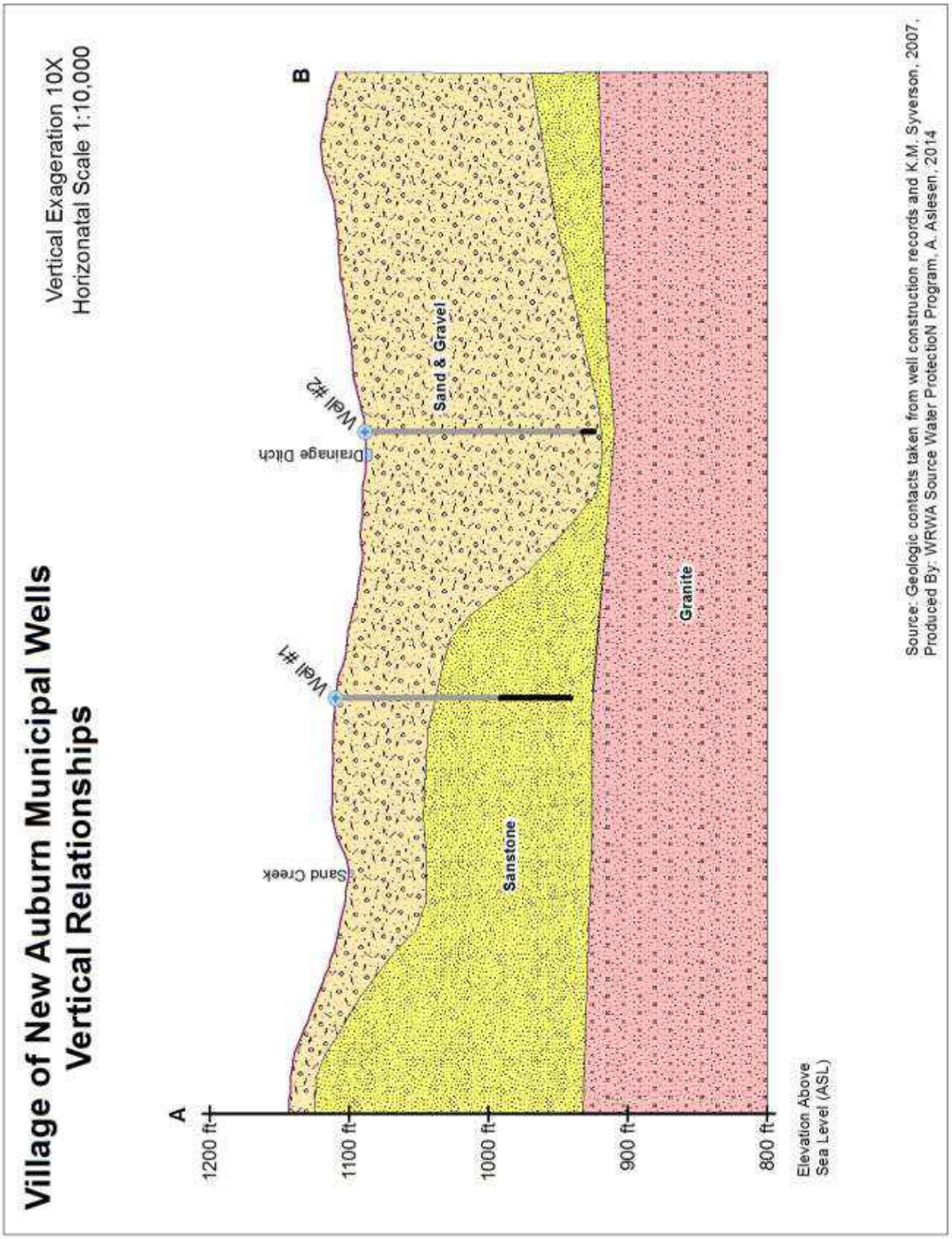


Figure 4- Zones of Influence

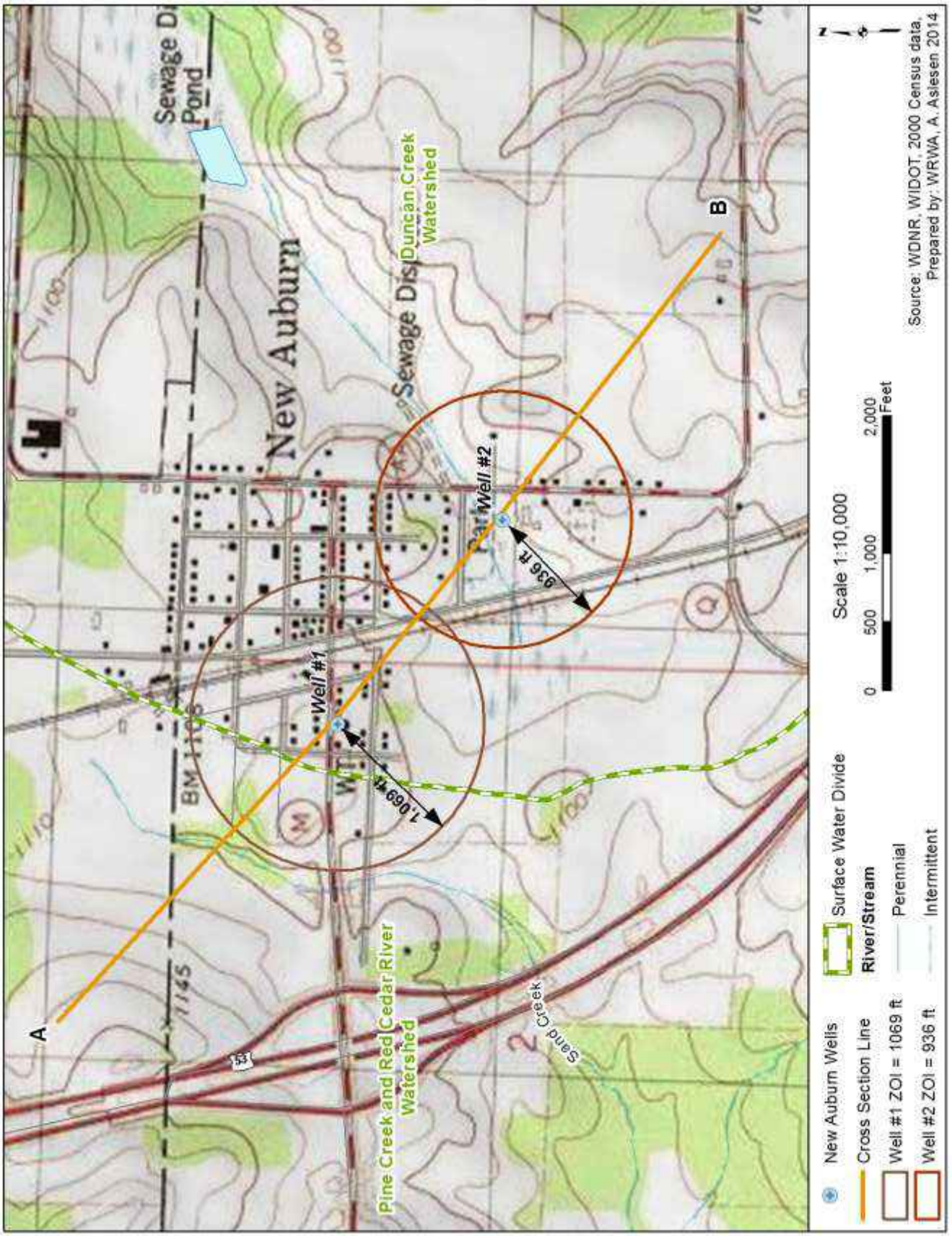


Figure 5- Zones of Contribution (5-year Time of Travel)

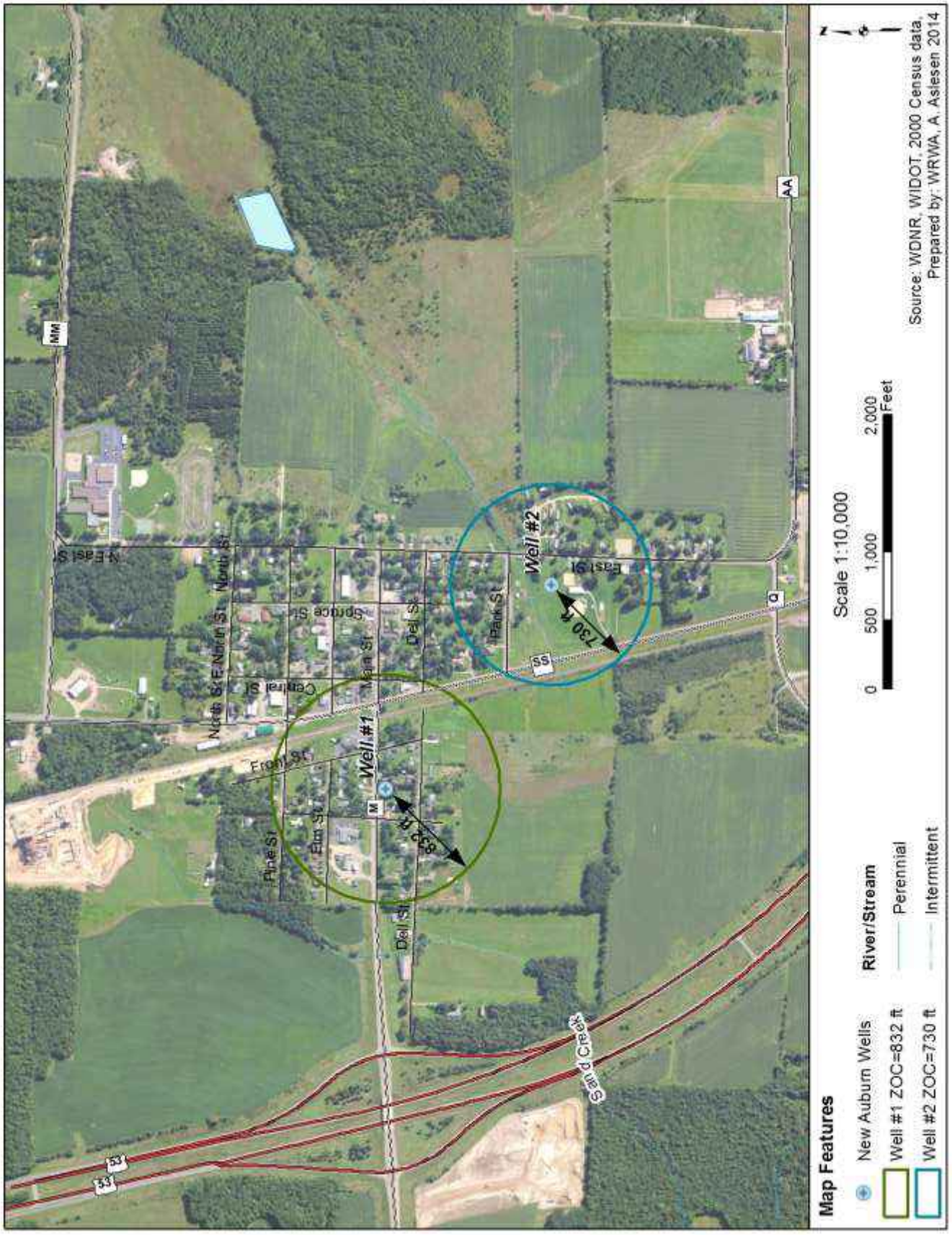


Figure 6 – Potential Contaminant Sources

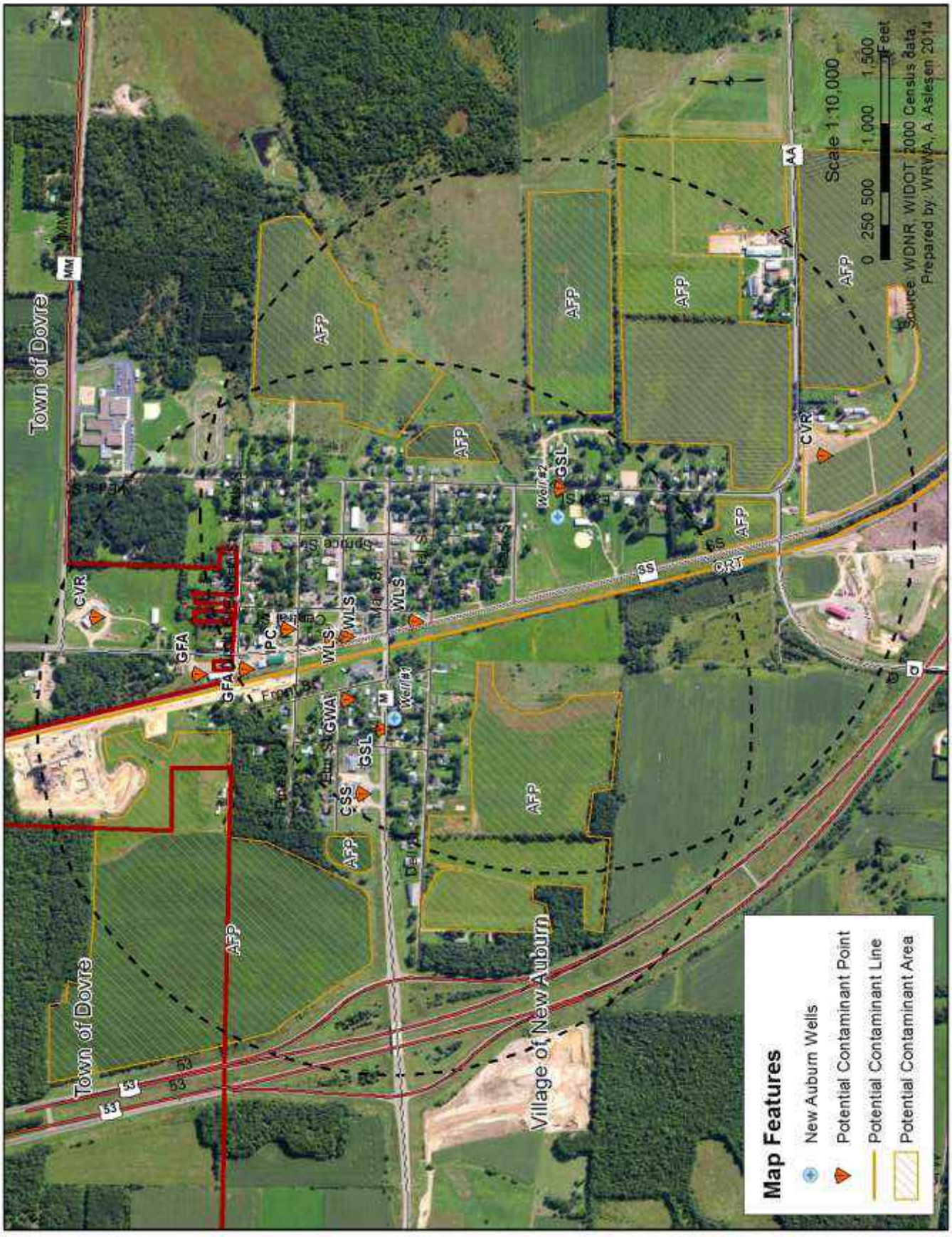
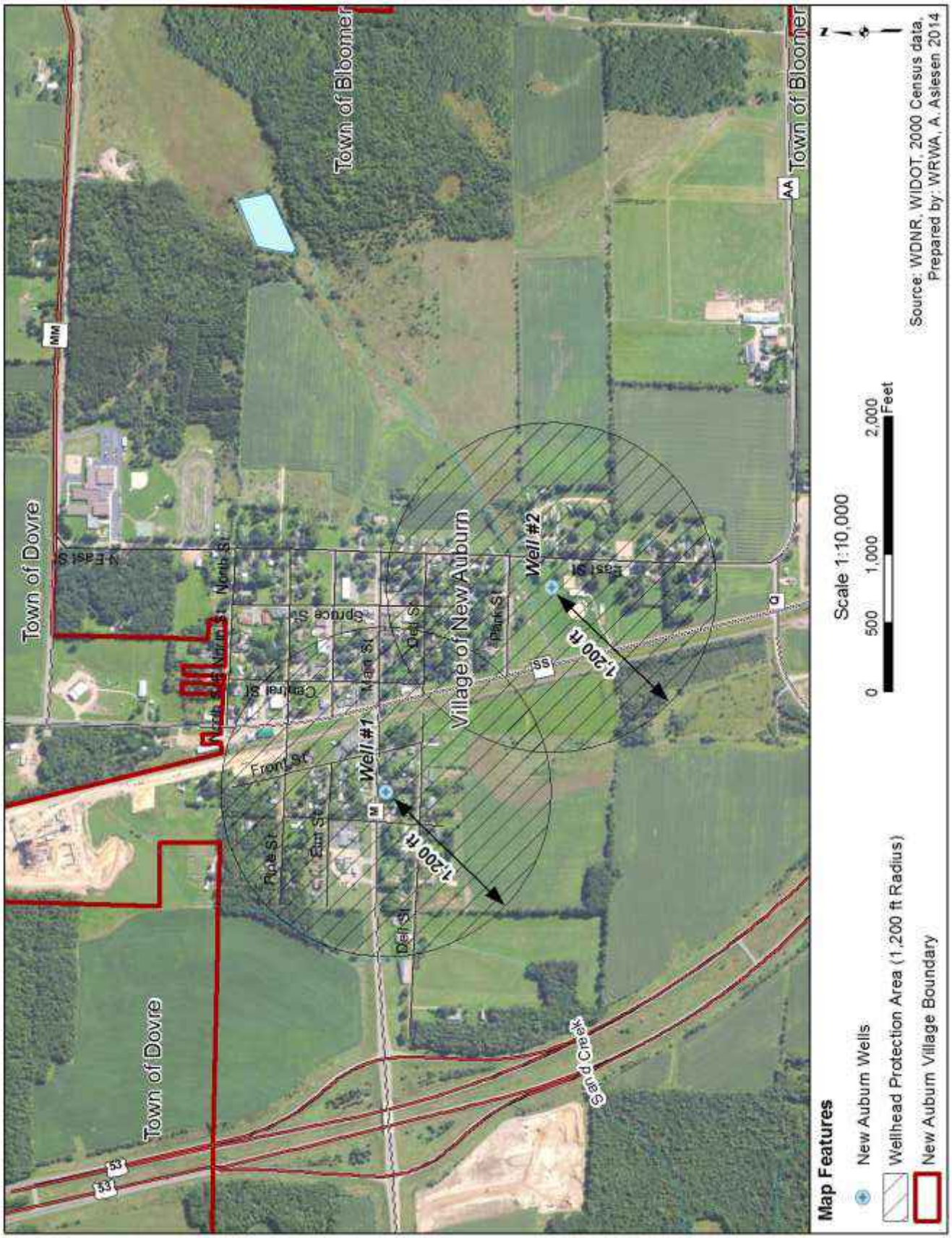


Figure 7 – Wellhead Protection Areas



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Appendix A – Potential Contaminant Source Inventory, Setbacks & List of Abbreviations

Potential Contaminant Sources Within ½ Mile of Well #1

See Figure 6

	Code	Potential Contaminant Sources	Distance (ft)	Direction	Name/Owner	
1	GSL	Sewer Line	100	N	Village of New Auburn	
2	GWA	Water Well - Active	400	N	Dan Hanson, 209 W Elm St.	
3	CRT	Railroad	510	E	Canadian & Northwestern leased to Progressive Rail	
4	AFP	Agricultural Farming	600	S,W,NW	Multiple	
5	CSS	Gas Service Station	600	W/NW	Bridge Stop LLC, 330 W Main St.	
6	IPC	Plastics Manufacturer/Molder	1,050	NE	Triad Plastics, 106 W. Pine St.	
7	GFA	Fuel Storage Tank-Above Ground	1,200	N	Patrick Young, 327 Old Hwy 53 St.	
8	GFA	Fuel Storage Tank-Above Ground	1,500	N	Martin Maidment, 415 Cth SS	
9	CVR	Motor Vehicle Repair Shop	2,350	N/NW	Hometown Repair, 19 Cty Rd SS	
	WLS	Leaking underground storage tank	Dist (ft)	Direction	BRRTS ID #	Status
1		Fix All Silo Co., 120 N Old 53 St.	700	E/NE	309000419	Closed
2		B&B Motors, 126 S Old 53 St.	720	E/SE	309001350	Open
3		LaRose Property, 208 N Old 53 St.	740	E/NE	309001479	Closed

Updates to Well #1 potential contaminant source list.

Date	Updated By	Code	Potential Contaminant Source /Name/Owner	Distance (ft)	Direction

Potential Contaminant Sources Within ½ Mile of Well #2

See Figure 6

	Code	Potential Contaminant Sources	Distance (ft)	Direction	Name/Owner	
1	GSL	Sewer Line	200	E	Village of New Auburn	
2	AFP	Agricultural Farming	600	E,S,W	Multiple	
3	CRT	Railroad	630	W	Canadian & Northwestern, leased to Progressive Rail	
4	CVR	Motor Vehicle Repair Shop	2,000	S	Badger State Recovery, 305 County Highway AA.	
5	GWA	Water Well - Active	2,050	NW	Dan Hanson, 209 W Elm St.	
6	IPC	Plastics Manufacturer/Molder	2,160	N/NW	Triad Plastics, 106 W. Pine St.	
7	CSS	Gas Service Station	2,500	NW	Bridge Stop LLC, 330 W Main St.	
8	GFA	Fuel Storage Tank-Above Ground	2,570	N/NW	Patrick Young, 327 Old Hwy 53.	
	WLS	Leaking underground storage tank	Dist (ft)	Direction	BRRTS ID #	Status
1		B&B Motors, 126 S Old 53 St.	1,300	NW	309001350	Open
2		Fix All Silo Co, 120 N Old 53 St.	1,800	NW	309000419	Closed
3		LaRose Property, 208 N Old 53 St.	1,880	NW	309001479	Closed

Updates to Well #2 potential contaminant source list.

Date	Updated By	Code	Potential Contaminant Source /Name/Owner	Distance (ft)	Direction

CONT CODE	CONTAMINANT SOURCE	DESCRIPTION	SPECIFIC CONTAMINANTS
AAH	Animal housing		Livestock sewage wastes, nitrates, phosphates, chloride, chemical sprays and dips for controlling insect, bacterial, viral , and fungal pests, coliform bacteria, viruses
AFA	Animal Feedlot		Livestock sewage wastes, nitrates, phosphates, chloride, chemical sprays and dips for controlling insect, bacterial, viral , and fungal pests, coliform bacteria, viruses
AFP	Agricultural farming	Active farming operations	Pesticides, fertilizers
AIA	Irrigation system	Agricultural irrigation	Pesticides, fertilizers
AMH	Agriculture milkhouse		Livestock sewage wastes, nitrates, phosphates, chloride, chemical sprays and dips for controlling insect, bacterial, viral , and fungal pests, coliform bacteria, viruses, acids
AMS	Manure storage	Lined and unlined manure storage facilities	Livestock sewage wastes, nitrates, phosphates, chloride, chemical sprays and dips for controlling insect, bacterial, viral , and fungal pests, coliform bacteria, viruses
BCT	Chemical storage	500 gallon or more	Specific to chemical product stored at site
BFS	Fertilizer storage/mixing	Feed mill, agricultural co-op	Nitrates
BFT	Petroleum storage	500 gallon or more	Specific to petroleum product stored at site
BGS	Grain storage site		Fungicides
BPS	Pesticide storage / mixing / load	Feed mill, agricultural co-op	Herbicides, insecticides, rodenticides, fungicides, avicides
BSS	Road salt storage	Bulk storage sites	Sodium chloride, calcium chloride, waste oil
CAI	Airport		Jet fuels, deicers, batteries, diesel fuel, chlorinated solvents, automobile wastes, heating oil, building wastes
CBS	Auto body shop		Paints, solvents
CBY	Boat yard		Diesel fuels, batteries, oils, septage from boat waste disposal areas, wood preservatives, paints, waxes, varnishes, automotive wastes
CCE	Cemetery		Leachate (formaldehyde), lawn and maintenance chemicals
CCW	Car wash	Car washes in unsewered areas	Soaps, detergents, waxes, miscellaneous chemicals
CDC	Dry cleaning		Solvents (tetrachloroethylene, petroleum solvents, freon), spotting chemicals (trichloroethane, ammonia, rust removers)
CLD	Laundromat	Laundromats in unsewered areas	Detergents, bleaches, fabric dyes
CMP	Plating facility	Jewelry and metal plating	Cyanide, heavy metals
CMW	Machine / metal working shop		Solvents, metals, organics, sludges, cutting oils, degreasers
CPH	Photo processing	Only include processing facilities, don't include photo drop off sites	Cyanides, biosludges, silver sludges
CPR	Printing		Solvents, inks, dyes, oils, organics, chemicals
CPS	Paint shop		Paint, paint thinner, solvents
CRT	Railroad track		Spills
CRY	Rail yard		Spills
CSP	Seed production plant		Fumigants
CSS	Gas service station		Gasoline, oils, solvents, miscellaneous wastes
CSY	Scrap/junkyard		Oil, gasoline, antifreeze, PCB contaminated soils, lead acids batteries
CVR	Motor vehicle repair shop		Waste oils, solvents, acids, paints, automotive wastes,
GFA	Fuel storage tank - above ground	Non-service station tanks	Gasoline, diesel fuel, other petroleum products
GFB	Fuel storage tank - underground	Non-service station tanks	Gasoline, diesel fuel, other petroleum products
GSA	Sewage absorption area	Drainfields, mounds, dry wells	"
GSL	Sewer line (municipal)	Municipal sewer lines	Septage, coliform bacteria, viruses, nitrates
GSN	Sewer line (non-municipal)	Non-municipal sewer lines	"
GST	Sewage tank	Holding tanks, septic tanks, sumps	Septage, coliform bacteria, viruses, nitrates, heavy metals, synthetic detergents, cooking and motor oil, bleach, pesticides, paints, paint thinner, photographic chemicals, septic tank cleaner chemicals, chlorides, sulfate, calcium, magnesium, potassium, phosphate
GWA	Water well (active production)		Potential conduit
GWI	Water well (unused or improperly abandoned)		Potential conduit
IAS	Asphalt plant		Petroleum derivatives
ICM	Chemical production	Industrial chemical production facilities	Chemicals
IEE	Electrical and electronic products		Cyanides, metal sludges, caustics, solvents, oils, acids, alkalis,

	manufacturing		paints, methylene chloride, tetrachloroethylene, trichloroethane, acetone, toluene, PCBs
IES	Electroplating / metal finishing facility		Acids, alkaline solutions, cyanide, metallic salts, solvents, cyanide, heavy metal contaminated wastewater
IFM	Furniture or wood manufacturing / refinishing / stripping		Paints, solvents (toluene, methylene chloride), degreasing sludges
IFW	Foundry / smelting plant		Cyanides, sulfides
IGS	Gravel and Sand pits		Spills, miscellaneous chemicals, bacteria
IMQ	Mining / Mine waste		Cyanide, sulfides, metals, acids drainage
IPC	Plastics manufacturer / molder		Solvents, oils, organics and inorganics, paint wastes, cyanides, acids, alkalis, sludges, esters, surfactants, glycols, phenols, formaldehyde, peroxides
IPM	Paper mill		Metals, acids, minerals, sulfides, chemicals, sludges, chlorine, hypochlorite, chlorine dioxide, hydrogen peroxide
IPP	Pipeline (petro./chem.)		Petroleum, chemicals
ISQ	Stone quarries		Spills, miscellaneous chemicals, potential conduit, bacteria
ITP	Textile / polyester manufacturer		Chemicals
IWT	Wood preserving facility		Treated wood residue, preservatives (pentachlorophenol, chromate, copper arsenate,), tanner gas, paint sludges, solvents, creosote, coating wastes
MFT	Fire training facility		Chemicals
MGC	Golf course		Fertilizers, herbicides, pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests., automotive wastes
MGP	Manufactured gas plant / gasification plant		Petroleum VOCs, Benzo(a)pyrene, PAHs, cyanide
MLA	Laboratory (college, medical, school, private, etc.)		Biological wastes, disinfectants, acids, formaldehyde, miscellaneous chemicals
MMI	Military installation		
MMP	Medical Installation (e.g. Hospital)		X-ray developers and fixers, infectious wastes, radiological wastes, biological wastes, disinfectants, asbestos, beryllium, acids, formaldehyde, miscellaneous chemicals
MOT	Other (specify) _____		
WDR	Class V injection well	Any well, drilled or dug hole, used to inject fluids into the subsoil	Chlorides, pathogens, petroleum products, pesticides
WHS	Hazardous waste generator (SARA Title III) / RCRA authority clean-ups	Any facility listed on the SARA Title III list thought to pose a threat to the well / RCRA clean-ups	Hazardous waste
WIN	Incinerator (municipal)		Metals, combustion by-products
WLA	Landfill	Solid and hazardous waste sites listed in the DNR "Registry of Waste Disposal Sites in Wisconsin"	Leachate
WLS	Leaking underground storage tank (LUST)	LUST Sites included in the DNR "Leaking Underground Storage Tank List"	Gasoline, diesel fuel, other petroleum products
WRF	Recycling facility		Petroleum products, chemicals
WRP	ERRP Site	Sites on the DNR "Emergency and Remedial Response" list	Spills
WSI	Wastewater Spray Irrigation		Coliform bacteria, nitrate, chloride, pathogens, viruses
WSS	Sludge spreading	Municipal wastewater sludge, paper mill sludge	Viruses, coliform bacteria, heavy metals, dioxins
WSW	Storm water retention pond		Metals, petroleum products
WTS	Solid waste transfer station		Miscellaneous chemicals
WUC	Superfund site	Sites listed in the DNR "Superfund Sites in Wisconsin"	Miscellaneous contaminants
WWL	Wastewater lagoon	Treatment and/or storage lagoons	Coliform bacteria, viruses
WWO	Wastewater discharge to surface water	Surface water outfall	Coliform bacteria, viruses
WWP	Wastewater treatment plant		
WWS	Wastewater discharge to groundwater	Absorption and seepage cells, spray irrigation, subsurface systems, etc.	Coliform bacteria, viruses

NR 811.12(5) Required Setback Distances From Community Water Supply Wells and Potential Sources of Contamination

Potential Contaminant Source	Minimum Setback Distance (ft)
Emergency Power System Operated by The Same Facility Operating Well And Has a Double Wall Above Ground Storage Tank With Continuous Electronic Interstitial Leak Monitoring	10
Storm Sewer Main or Sanitary Sewer Main Constructed of Water Main Class Material	50
Sanitary Sewer Main Not Constructed of Water Main Class Materials	200
Lift Station	
One or Two Family Residential Fuel Oil UST[1] or AST[2]	
POWTS Treatment Tank or Holding Tank	
Any farm UST[1] system or other UST[1] system with double wall and with electronic interstitial monitoring for the system, any farm AST[2] with double wall, or single wall tank with other secondary containment and under a canopy; other AST[2] system with double wall, or single wall tank with secondary containment and under a canopy and with electronic interstitial monitoring for a double wall tank or electronic leakage monitoring for a single wall tank secondary containment structure*	300 [3]
Septic Tank (<12,000 gpd)	400
Cemetery	
Storm Water Retention or Detention Pond	
Farm UST[1] system or other UST[1] system with double wall and with electronic interstitial monitoring for the system, any farm AST[2] with double wall, or single wall tank with other secondary containment and under a canopy or other AST[2] system with double wall, or single wall tank with secondary containment and under a canopy; and with electronic interstitial monitoring for a double wall tank or electronic leakage monitoring for a single wall tank secondary containment structure*	600 [6]
Land Application of Municipal, Commercial, or Industrial Waste	1,000
The Boundary of a Land Spreading Facility for Spreading of Petroleum-Sontaminated Sol Regulated Under ch. NR 718 While Facility is in Operation	
Industrial, Commercial, or Municipal Wastewater Treatment Plant Treatment Units, Lagoons, or Storage Structures	
Manure Stacks or Storage Structures	
Septic Tank (>12,000 gpd)	
Solid Waste Storage, Transportation, Transfer, Incineration, Air Curtain Destructor, Processing, Wood Burning, One Time Disposal or Small Demolition Facility	1,200
Sanitary Landfill	
Any Property With Residual Groundwater Contamination That Exceeds CH. NR140 Enforecement	
Coal Storage Area	
Salt or Deicing Material Storage Area	
Single Wall Farm UST or Single Wall Farm AST or Other Single Wall UST or AST That Has or Has Not Received Written Approval From The Department of Commerce or Its Designated Local Program Operator*	
Bulk Fuel Storage Facilities	
Bulk Pesticide or Fertilizer Handling or Storage Facilities	

Footnotes On Page 2

*These requirements apply to tanks containing gasoline, diesel, bio-diesel, ethanol, orther alternative fuel, fuel oil, petroleum product, motor fuel, burner fuel, lubricant, waste oil, or hazardous substance

[1] UST-Underground Storage Tank

[2] AST-Above Ground Storage Tank

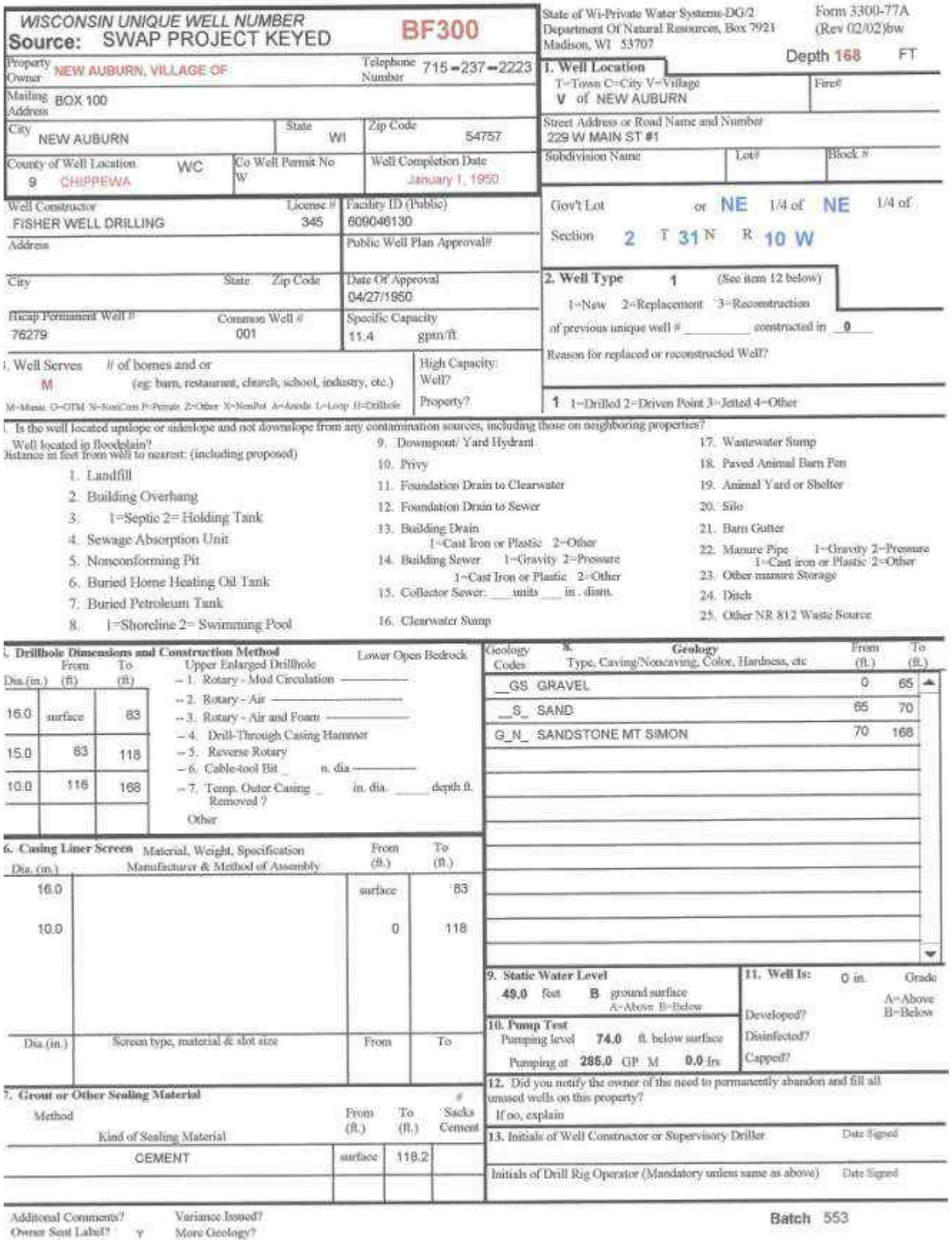
[3] These installations shall meet the most restrictive installation requirements of s. Comm 10.260 and receive written approval from the department of commerce or its designated Local Program Operator under s. Comm 10.110

[4] For USTs s. Comm 10.260 states the 600ft setback distance may be reduced by 50% if all of the following features are provided and maintained in addition to the features in the tank–type column: tank system construction of corrosion–resistant material, such as fiber–reinforced plastic, or steel with a fiber–reinforced plastic wrap or jacket; non–discriminating sump sensors; testable secondary containment spill bucket; continuous electronic liquid–filled, pressure, or vacuum interstitial monitoring with automatic system shut–down; audible and visual high–level alarm at 90% full, and automatic shut–off at 95%; all fueling area protected by canopy; and downspouts for drainage of rainwater do not discharge into a fueling area.

[5] For ASTs s. Comm 10.260 states the 600ft setback distance may be reduced by 50% if all of the following features are provided and maintained in addition to the features in the tank–type column: either continuous non–discriminating electronic interstitial monitoring for double wall, or continuous non–discriminating electronic sensor for other secondary containment; audible and visual high–level alarm at 90% full, and either automatic shut–off at 95% or no latch–open device is used with any manual–shutoff nozzle; all dispensing by suction pump fuel transfer; all motor vehicle fueling limited to private or fleet use; all fueling area protected by canopy; and downspouts for drainage of rainwater do not discharge into a fueling area.

[6] These installations shall meet the standard double wall tank or single wall tank secondary containment installation requirements of s. Comm 10.260 and receive written approval from the department of commerce or its designated Local Program Operator under s. Comm 10.110

Appendix B – Lithologic Logs and Well Construction Details



WISCONSIN UNIQUE WELL NUMBER Source: SWAP PROJECT KEYED — BF300

State of Wi-Private Water Systems-DG/2, Department Of Natural Resources, Box 7921, Madison, WI 53707 — Form 3300-77A (Rev 02/02)bw

Depth 168 FT

Property Owner: NEW AUBURN, VILLAGE OF — Telephone Number: 715-237-2223

Mailing Address: BOX 100

City: NEW AUBURN — State: WI — Zip Code: 54757

County of Well Location: 9 CHIPPEWA — WC — Co Well Permit No: W — Well Completion Date: January 1, 1950

1. Well Location — T=Town C=City V=Village: V of NEW AUBURN — Fire#

Street Address or Road Name and Number: 229 W MAIN ST #1

Subdivision Name — Lot# — Block #

Well Constructor: FISHER WELL DRILLING — License #: 345 — Facility ID (Public): 609046130

Address — Public Well Plan Approval#

City — State — Zip Code — Date Of Approval: 04/27/1950

Gov't Lot — or NE 1/4 of NE 1/4 of Section 2 T 31 N R 10 W

Recap Permanent Well #: 76279 — Common Well #: 001 — Specific Capacity: 11.4 gpm/ft

2. Well Type: 1 (See item 12 below) — 1=New 2=Replacement 3=Reconstruction — of previous unique well # _____ constructed in 0

Reason for replaced or reconstructed Well?

Well Serves: M — # of homes and or (eg: barn, restaurant, church, school, industry, etc.) — High Capacity Well? — Property?

M-Munic. G=GTM N=NonCom P=Private 2=Other X=NonPot A=Anode L=Loop H=Drillhole

1 1=Drilled 2=Driven Point 3=Jetted 4=Other

Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties?

Well located in floodplain?

Distance in feet from well to nearest: (including proposed)

1. Landfill
2. Building Overhang
3. 1=Septic 2=Holding Tank
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. 1=Shoreline 2=Swimming Pool
9. Downspout/ Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain 1=Cast Iron or Plastic 2=Other
14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other
15. Collector Sewer: ___ units ___ in. diam.
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other
23. Other manure Storage
24. Ditch
25. Other NR 812 Waste Source

5. Drillhole Dimensions and Construction Method — Upper Enlarged Drillhole — Lower Open Bedrock

Dia.(in.)	From (ft)	To (ft)
16.0	surface	83
15.0	83	118
10.0	118	168

1. Rotary - Mud Circulation
2. Rotary - Air
3. Rotary - Air and Foam
4. Drill-Through Casing Hammer
5. Reverse Rotary
6. Cable-tool Bit ___ in. dia
7. Temp. Outer Casing ___ in. dia. ___ depth ft. Removed ?

Other

Geology Codes	Geology Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
GS	GRAVEL	0	65
S	SAND	65	70
G_N	SANDSTONE MT SIMON	70	168

6. Casing Liner Screen — Material, Weight, Specification, Manufacturer & Method of Assembly

Dia. (in.)	From (ft.)	To (ft.)
16.0	surface	83
10.0	0	118

Dia.(in.)	Screen type, material & slot size	From	To

9. Static Water Level: 49.0 feet B ground surface (A=Above B=Below)

10. Pump Test: Pumping level 74.0 ft. below surface — Pumping at 285.0 GP M 0.0 hrs

11. Well Is: 0 in. Grade (A=Above B=Below) — Developed? — Disinfected? — Capped?

7. Grout or Other Sealing Material

Method / Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
CEMENT	surface	118.2	

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property? If no, explain

13. Initials of Well Constructor or Supervisory Driller — Date Signed

Initials of Drill Rig Operator (Mandatory unless same as above) — Date Signed

Additional Comments? — Variance Issued? — Owner Sent Label? Y — More Geology?

Batch 553

Well Construction Report — WISCONSIN UNIQUE WELL NUMBER **YJ237**

State of WI · Private Water Systems DG/5 · Department of Natural Resources, Box 7921 · Madison, WI 53707 — Form 3300-077A (R 7/10)

Property Owner: New Auburn, Village of	Telephone Number: (715) 237-2223
Mailing Address: 130 East Elm Street/PO Box 100	
City: New Auburn	State: WI — Zip Code: 54757-
County of Well Location: CHIPPEWA	Co. Well Permit No.: W
Well Completion Date (mm-dd-yyyy): 02 - 28 - 2014	

1. Well Location

☐ Town ☐ City ☒ Village of New Auburn — Fire # (If avail.)

Street Address or Road Name and Number: 401 S. East Street

Subdivision Name — Lot # — Block #

Gov't Lot # ___ or SW 1/4 of NW 1/4 of Section 1, T 31 N, R 10 ☐ E ☒ W

Latitude Deg 45 Min. 0.2005

Longitude Deg 91 Min. 0.5585

Well Constructor (Business Name): Municipal Well and Pump	License #: 13
Address: 1212 Storbeck Drive	Facility ID Number (Public Wells):
City: Waupun — State: WI — Zip Code: 53963-	Well Plan Approval #: 2013-0388
Dnr Permanent Well #	Common Well #: 2
	Date of Approval (mm/dd/yyyy): 08/27/2013
	Specific Capacity: 2.2 gpm/ft

2. Well Type ☒ New ☐ Replacement ☐ Reconstruction (see item 12 below) — Lat/Long Method: GPS006

of previous unique well # ___ constructed in ___

Reason for replaced or reconstructed well?

☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other ___

3. Well serves ___ # of Village ___ (For example: home, barn, restaurant, church, school, industry, etc.)

High Capacity: Well? ☒ Yes ☐ No — Property? ☒ Yes ☐ No

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties? ☒ Yes ☐ No (If no, explain on back side.)

Well located within 1,200 feet of a quarry? ☐ Yes ☒ No If yes, distance in feet from quarry: ___

Well located in floodplain? ☐ Yes ☒ No

Distance in feet from well to nearest: (include proposed)

___ 1. Landfill
___ 2. Building Overhang
___ 3. Septic ☐ Holding Tank ☐
___ 4. Sewage Absorption Unit
___ 5. Nonconforming Pit
___ 6. Buried Home Heating Oil Tank
___ 7. Buried Petroleum Tank
___ 8. Shoreline ☐ Swimming Pool ☐
___ 9. Downspout/Yard Hydrant
___ 10. Privy
___ 11. Foundation Drain to Clearwater
___ 12. Foundation Drain to Sewer
___ 13. Building Drain ☐ Cast Iron or Plastic ☐ Other
___ 14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
___ 15. Collector Sewer: ☐ sanitary ___ units ___ in. diam ☐ storm ☐ ≤ 6" ☐ > 6"
___ 16. Clearwater Sump
___ 17. Wastewater Sump
___ 18. Paved Animal Barn Pen
___ 19. Animal Yard or Shelter
___ 20. Silo
___ 21. Barn Gutter
___ 22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
___ 23. Other Manure Storage ___
___ 24. Ditch
___ 25. Other NR 812 Waste Source ___

5. Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft.)	To (ft.)	Lower Open Bedrock
16	surface	8	
10		164	

Upper Enlarged Drillhole
☐ 1. Rotary - Mud Circulation
☐ 2. Rotary - Air
☐ 3. Rotary - Air and Foam
☐ 4. Drill-Through Casing Hammer
☒ 5. Reverse Rotary
☐ 6. Cable-tool Bit ___ in. dia.
☒ 7. Temp. Outer Casing 16 in. dia. Removed? 164 depth ft. ☒ Yes ☐ No - If no, explain on back side.
☐ 8. Dual Rotary

6. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification, Manufacturer & Method of Assembly	From (ft.)	To (ft.)
16	ASTM A53/.375 wall	surface	8
10	ASTM A53B/.365 Wall		156
	RE/BEV/Welded		
Dia. (in.) 10	Screen type, material & slot size: Johnson 304SS 45 slot, pipe siz	From 156	To 164

7. Grout or Other Sealing Material

Method: Tremie Pipe - Pumped

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
eat Cement	surface	164	180
(mud pack if applicable)			

8. Geology

Geology Codes	Type, Caving/Noncaving, Color, Hardness, etc.	From (ft.)	To (ft.)
- - S M	Sand, Silty	0	15
- - S G	Sand, w/Gravel/Cobbles/Boulders/Stones	15	85
- N S M	Fine, Sand, Silty	85	151
- M S G	Medium, Sand, w/Gravel/Cobbles/Boulders/S	151	164

9. Static Water Level

___ ft. above ground surface

25 ft. below ground surface

10. Pump Test

Pumping level 129 ft. below surface

Pumping at 230 GPM for 24 Hrs.

11. Well Is:

24 in. ☒ Above Grade ☐ Below

Developed? ☒ Yes ☐ No

Disinfected? ☒ Yes ☐ No

Capped? ☒ Yes ☐ No

12. Did you permanently abandon and fill all unused, noncomplying or unsafe wells on this property?

☒ Yes ☐ No If no, explain on reverse.

13. Signature of Well Constructor or Supervisory Driller: TG — Date Signed: 03/31/2014

Print Name of Drill Rig Operator (Mandatory unless same as above): BS — Date: 03/31/2014

Make additional comments on reverse side about geology, additional screens, water quality, etc. Comments on reverse side ___ (CHECK √, IF YES) Variance Issued ☐ Yes ☐ No

Notification #

DNR