

# Zoning as a tool to protect groundwater

CLUE webinar

June 25, 2024

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Extension

UNIVERSITY OF WISCONSIN-MADISON



Center for Land Use Education

College of Natural Resources

**University of Wisconsin-Stevens Point**

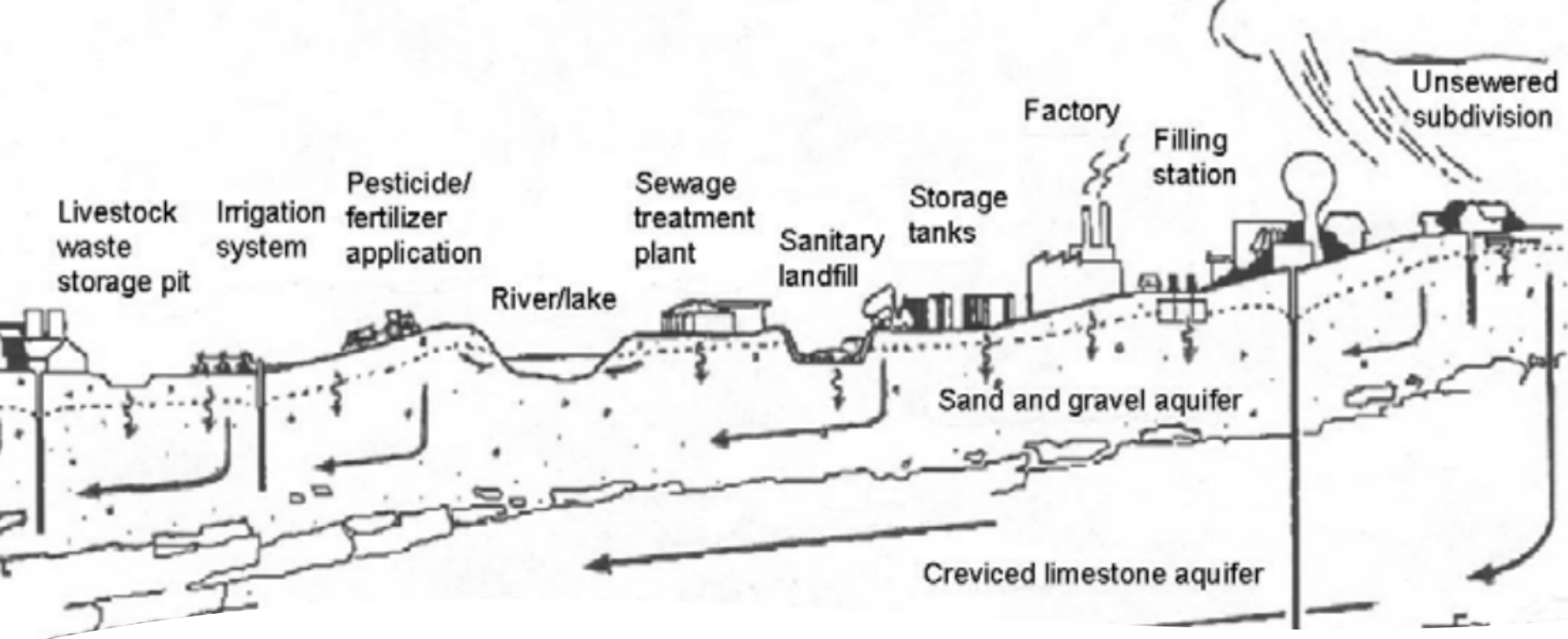


## What is your role? (select all that apply)

- Elected Official
- Planning and Zoning Staff
- Plan Commission
- Zoning Board of Adjustment or Appeals
- Clerk or Administrator
- Other

## How many people are watching from your site?

- 1, 2, 3, 4, 5, 6+



## Land use affects water quality

Everything is connected

Ways to reduce contaminants in groundwater

- Reduce sources of contaminants
- Geographically separate potential sources of contaminants and drinking water wells



# Key Takeaways



- Land use decisions affect groundwater quality
- Over 95% of Wisconsin's communities use groundwater for drinking water
- Plans, zoning and subdivision ordinances are tools to protect groundwater

## Weaknesses:

1. Zoning has limited ability to address existing problematic land uses
2. Zoning doesn't determine which crops are grown in ag districts, even though different crops have different amounts of nitrogen leaching to groundwater

## Strengths:

1. Zoning can address where new land uses are allowed/sited, and where they're not allowed
2. Wellhead protection zoning can protect community drinking water wells
3. Zoning can list land uses with potential to pollute groundwater as prohibited uses, or as conditional uses with measurable standards
4. Land uses that protect groundwater can be encouraged through zoning & incentives
5. Guide residential development to sewer areas or to lot sizes 2 acres or more



# OUTLINE

Why protect groundwater quality

Comprehensive planning

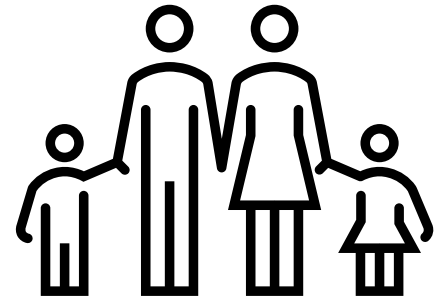
Wellhead protection zoning

General zoning options

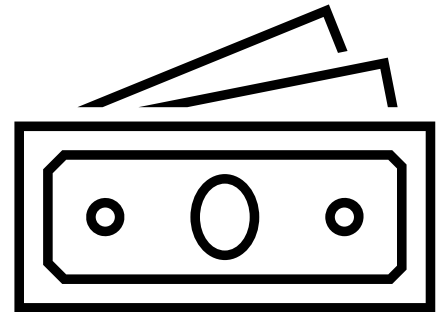
Subdivision ordinances

Wrap up

# Why protect groundwater quality?



Health



# Health effects of nitrate

Most common GW contaminant



WISCONSIN DEPARTMENT  
of HEALTH SERVICES

A central illustration of a diverse family consisting of a mother, father, two young boys, two young girls, and a dog. A speech bubble points to the family from the left.

Nitrate can cause blue baby syndrome.  
This can affect infants less than 6 months old.

Nitrate may cause birth defects.  
This can affect women who are or may become pregnant.

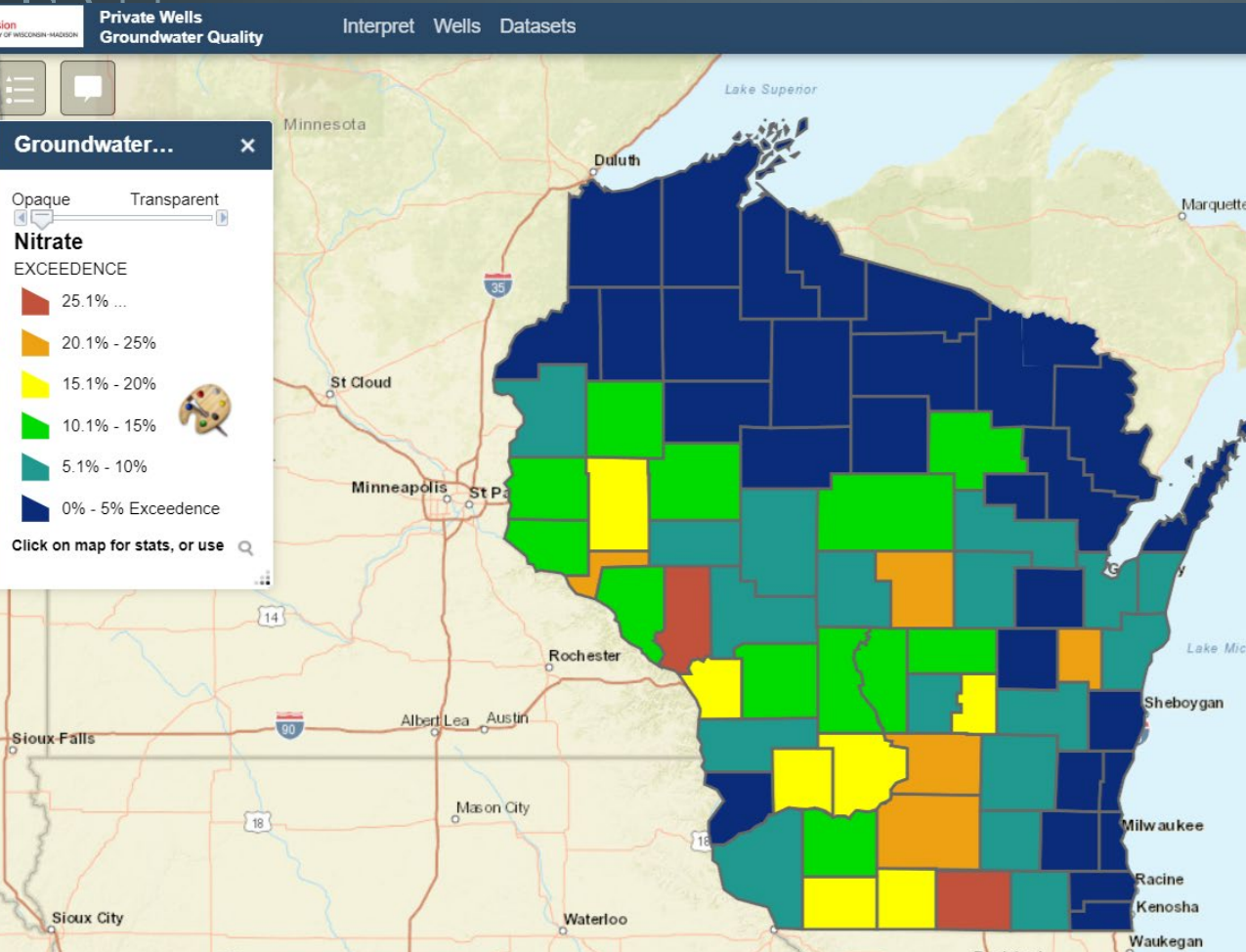
Levels of nitrate-nitrogen over **10 mg/L** can be harmful.

Nitrate may cause thyroid disease.  
This can affect everyone.

Nitrate may increase the risk for certain kinds of cancer.  
This can affect everyone.

- If nitrate level is high, water is more likely to contain pesticides

# Nitrate in private wells



In WI, applying fertilizer and manure on agricultural fields accounts for 90% of nitrate in groundwater

Drinking water is 3X more likely to exceed the nitrate standard in agricultural areas compared to forested areas

High nitrate levels are more common in sandy areas

*Well water quality viewer  
UW-Extension*



# Costs to replace wells or install nitrate removal equipment



## Municipal wells

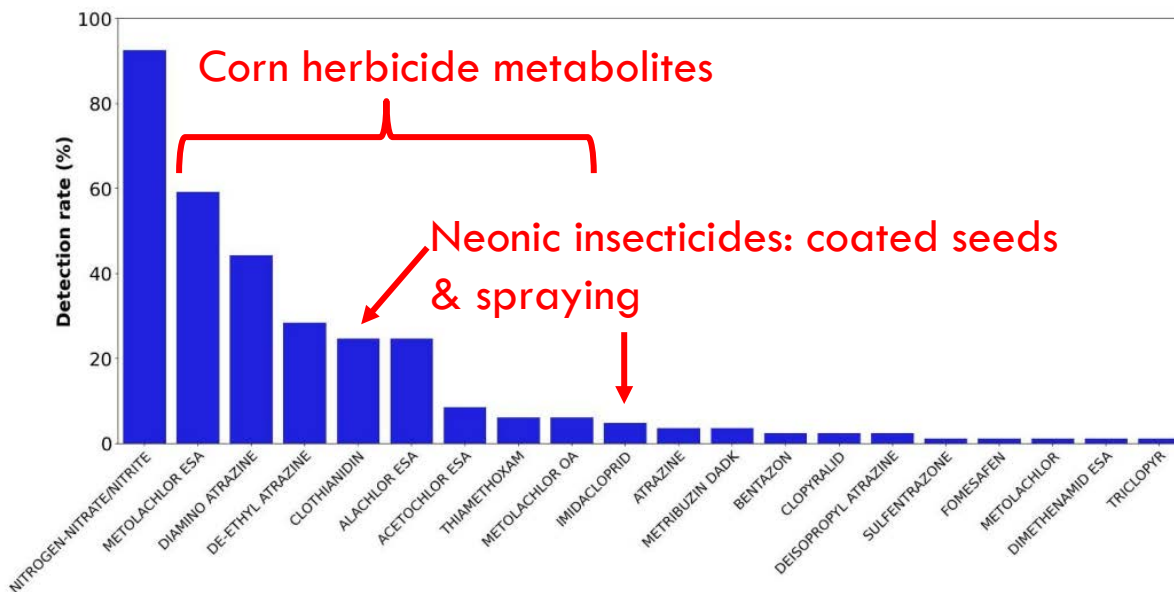
- Total: Over \$40 million
- Colby: \$769,000, 2019
- Junction City: \$1,128,000, 2018
- Fall Creek: \$1,074,000, 2018

## Private wells

- Over 42,000 wells exceed the health standard for nitrate
- ~\$9 million spent so far to replace wells
- \$446 million estimated to replace all private wells over the health standard for nitrate (estimates by county available)

# Other groundwater contaminants

Figure 2. Compounds detected through the 2022 Targeted Sampling Program and respective detection rates



**Precautionary Principle**  
 “if a product, an action or a policy has a suspected risk of causing harm to the public or to the environment, protective action should be taken even if some cause-and-effect relationships are not fully established scientifically”

Dept of Ag 2022  
 results from sampling  
 in 3 counties

## Other contaminants (WI has standards for 130 substances)

Benzene/gasoline

Arsenic

Chlorinated solvents (TCE/PCE)

Pharmaceuticals

PFAS

Bacteria & viruses

# Guiding Document – Comprehensive Plan



What does your comprehensive plan say about drinking water and policies to protect it?

## Regulatory Tools to Implement the Plan



Zoning Ordinance



Subdivision Ordinance

# PLANS THAT ADDRESS GROUNDWATER

## 5 STEPS FOR INTEGRATING GROUNDWATER INTO YOUR PLAN:

1. Review pre-planning actions
2. Inventory groundwater data and analyze trends
3. Develop groundwater goals, objectives and policies
4. Prioritize policies
5. Decide how to monitor progress

<https://wi.water.usgs.gov/gwcomp/integrate/index.html>

Provide specific recommendations about HOW to maintain or improve water quality

Update zoning ordinance, land division ordinance

Locate new homes/wells in areas with safe nitrate levels

Does the future land use map show groundwater flow?

Needed to strategically locate new development in safer GW areas

# PORTAGE COUNTY-PLANNING



## Portage County, Wisconsin Comprehensive Plan 2023-2043



Prepared by: North Central Wisconsin Regional Planning Commission  
210 McClellan St #210, Wausau, WI 5440

### Goals, Objectives, and Policies

#### Goals

1. Promote lifelong learning as an opportunity in the County.
2. Provide places and activities for the youth of the County.
3. Create and protect public green space and water resources Countywide.
4. Utilize design standards to enhance urban and rural character.
5. Provide criteria and direction for protecting and developing land.
6. Share services across County or municipal borders whenever possible.
7. Plan for the provision of infrastructure, utilities, and community facilities and services to efficiently meet community needs.

#### Objectives

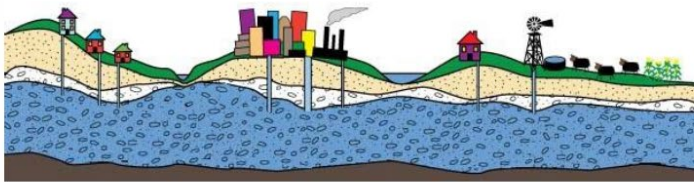
1. Direct more intensive development to areas where a full array of utilities, community facilities and public services are available.
2. Monitor and manage the effects of high-capacity wells, land use, private on-site waste disposal systems, and solid waste disposal on the quality and quantity of groundwater in the county.
3. Continue to provide law enforcement, ambulance, fire and first responder services to residents, whether by the County or by local units of government.
4. Support high quality educational and cultural opportunities for all residents.

#### Policies

1. Encourage clustering of urban and rural development so that community facilities and services can be provided in a cost-effective manner.
2. Utilize funding sources to maintain public and private infrastructure. For example, the Wisconsin Fund assists property owners in upgrading failing on-site disposal systems.
3. Meet public health and groundwater quality goals when permitting and monitoring private on-site wastewater and wells.
4. Encourage recycling by residents.
5. Ensure that schools, public safety, health care, and other community facilities are of the highest

# Portage County

## Groundwater Management Plan 2017



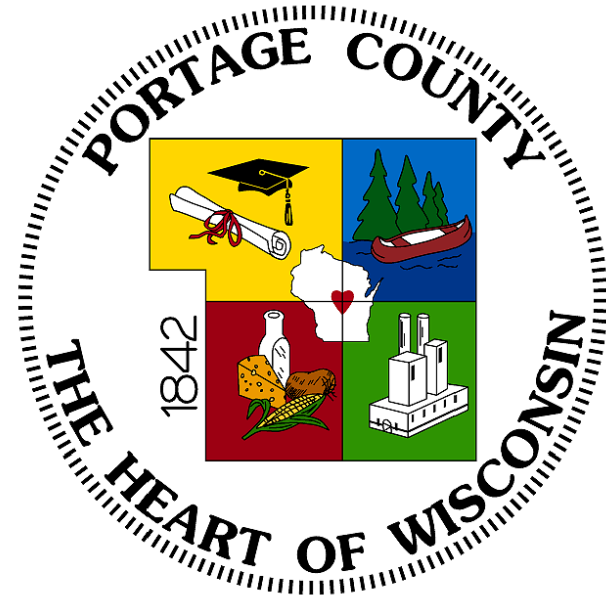
**Prepared By:**

Portage County Groundwater  
Citizen Advisory Committee

Portage County Planning and  
Zoning Department Staff

Recommended by Portage County  
Planning and Zoning, Agriculture and  
Extension Education, and Land and  
Water Conservation Committees:  
June 26, 2017

Adopted by Portage County Board:  
July 18, 2017



# Land and Water Resource Management Plan

Plan Prepared By: Portage County Planning and Zoning Department  
Land and Water Conservation Division  
December 2019

<https://www.co.portage.wi.gov/DocumentCenter/View/1711/2017-Groundwater-Management-Plan-PDF?bidId=>

<https://www.co.portage.wi.gov/DocumentCenter/View/1632/Portage-County-Land-and-Water-Resource-Management-Plan-PDF?bidId=>

Every County has a Land and Water Resource Management Plan!

**Goal 2:** Maintain and improve groundwater quality in Portage County to support the daily living needs of all Portage County residents, a thriving commercial, agricultural, and industrial economy, the quality of life in rural communities, recreational opportunities, tourism, and the health of groundwater dependent surface water and their ecosystems.

**Objective 2.1:** Develop a monitoring strategy for drinking water quality in Portage County to establish a consistent baseline of information that can be used for future management decisions.

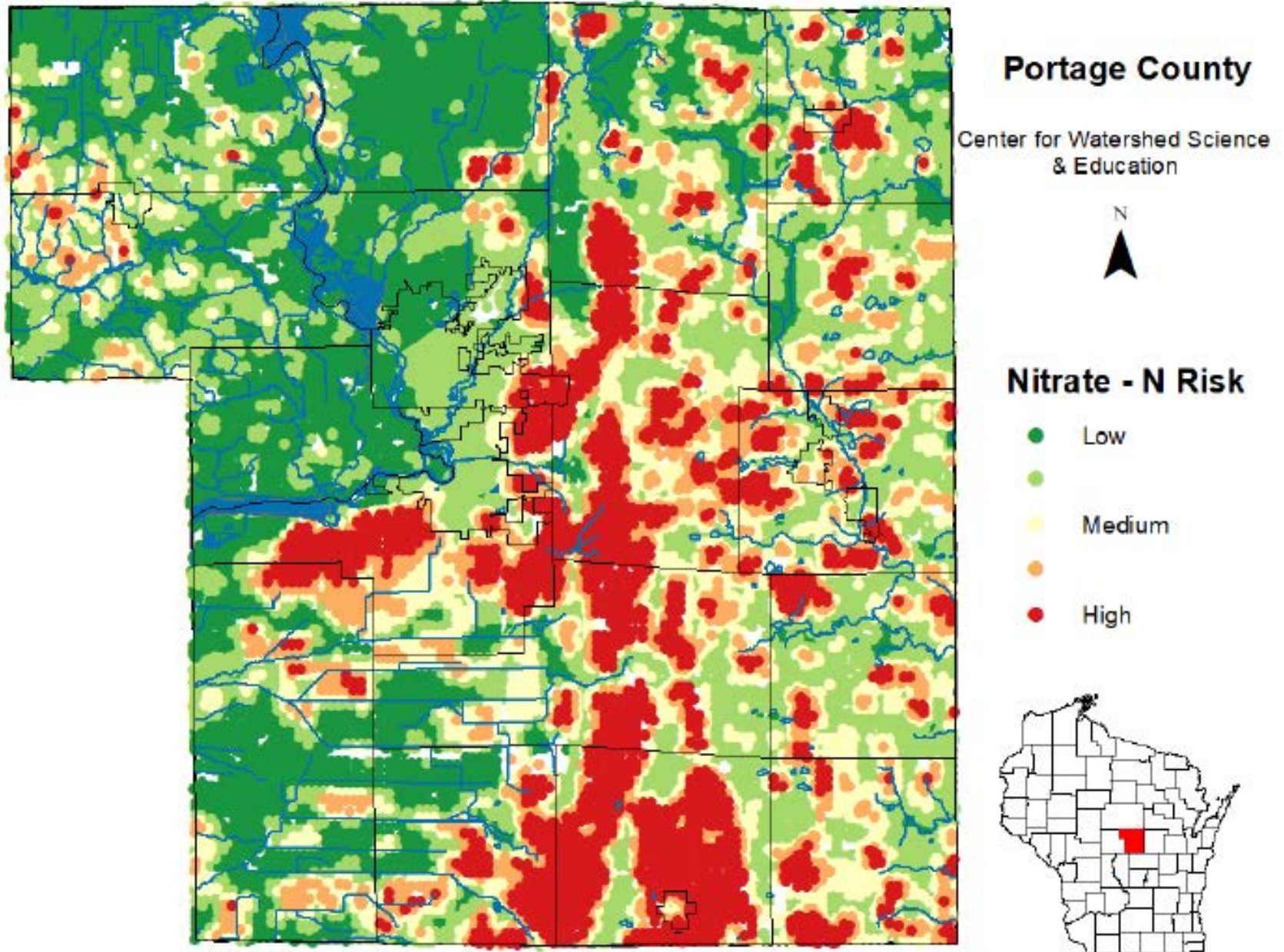
Action	Potential Partners	Timeline	Evaluation Tools	Potential Funding/Resources
Establish a long-term groundwater quality monitoring strategy that includes where monitoring will take place, how monitoring will occur, what is monitored etc.	Po Co Planning and Zoning Dept, Po Co County Board, GCAC	Ongoing	An established monitoring plan	N/A
Establish a network of water quality sampling wells	Po Co Water Resources Specialist, GCAC,	2018	Establish a network and protocol for water quality sampling	WIDNR
Establish a private residence water quality sampling program throughout different parts of the County	Po Co Water Resources Specialist, GCAC,	2017	Establish a program for sampling private residences throughout Portage County	Health Dept.
Include the results of water quality sampling program as an addendum to the groundwater management plan.	Po Co Water Resources Specialist, GCAC,	2017	An addendum with sampling program results is added to the management plan	N/A
Follow up testing of private wells within the atrazine prohibition areas	Po Co Water Resources Specialist, GCAC, DATCP, UWSP	2018	Establish program of follow up sampling in Atrazine prohibition area	DATCP
Encourage owners to have comprehensive water testing done	Po Co Water Resources Specialist, GCAC, UW-Extension	Ongoing	Promotional materials developed and shared	Health and Human Services
Examine water quality data in detail to establish trends spatially and over time for water quality parameters	Po Co Water Resources Specialist, GCAC, WIDNR, UW-Extension,	2016	Identified trends in Groundwater quality parameters	N/A
Establish a plan for data management	Po Co Water Resource Specialist, USGS, UWSP data analytics major and UWSP GIS Dept.	Ongoing	A data management plan	N/A

<b>Objective 2.4 cont.: Improve communication and information about groundwater quality in Portage County</b>				
Provide reports of programming and information to GCAC, Planning & Zoning Committee, Land & Water Conservation Committee, and annual report to the County	Po Co Water Resource Specialist, GCAC	Ongoing	Regular reports provided to committees	N/A

<b>Objective 2.5: Continue to administer and as needed revise County ordinances that protect groundwater quality in Portage County</b>				
<b>Action</b>	<b>Potential Partners</b>	<b>Timeline</b>	<b>Evaluation Tools</b>	<b>Potential Funding/Resources</b>
Continue to administer the wellhead protection ordinance in unincorporated areas of Portage County	Po Co Water Resource Specialist, GCAC, Po Co Planning & Zoning, Portage County Municipalities	Ongoing	A continued wellhead protection ordinance that protects municipal drinking water supplies in unincorporated areas	N/A
Continue to administer the County subdivision ordinance with regard to the water testing requirement	Po Co Water Resource Specialist, GCAC, Po Co Planning & Zoning	Ongoing	A subdivision ordinance that provides clear instructions on sampling requirements for lot subdivision	N/A
Support other County ordinances that protect water quality in Portage County	Po Co Water Resource Specialist, GCAC, Po Co Planning & Zoning, Po Co Land and Water Conservation	Ongoing	Work cooperatively to support other County ordinances that affect groundwater	N/A
Explore drafting a public health and groundwater protection ordinance for Portage County				
Explore revising the Portage County manure management and storage ordinance				



Figure 11. Model of nitrate risk produced using multiple linear regression model. Map displays nitrate risk for each parcel in Portage County.



# ZONING

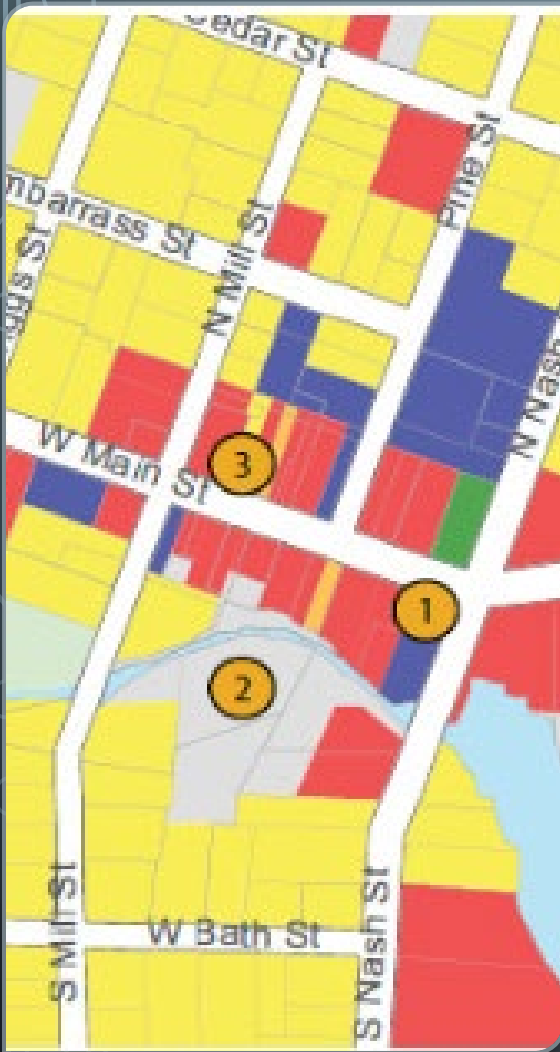
Regulates the location, size and intensity of different types of development within a community

Must be consistent with your comp plan

A proactive way to determine your community's future

General zoning covers entire local government area

Wellhead protection zoning is an overlay (additional layer) that covers land that contributes water to community wells



## ZONING DISTRICTS

12.19-1

ESTABLISHMENT (3/1)  
For the purpose of this  
twenty-nine (29) basic

A-1

A-2

Agricultural

General Agricultural

Agricultural Related Manu

Agricultural Land Holding District

District

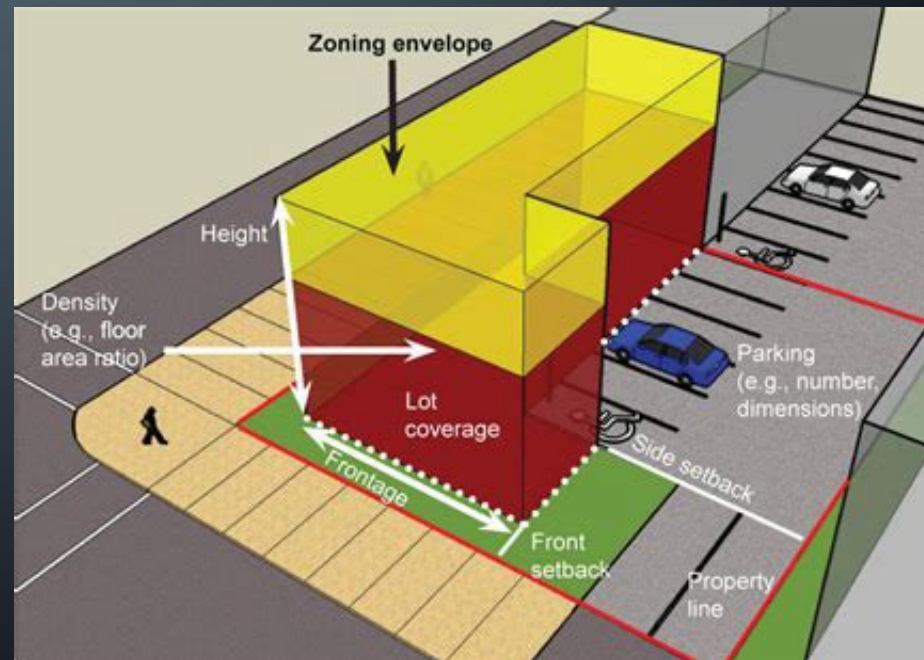
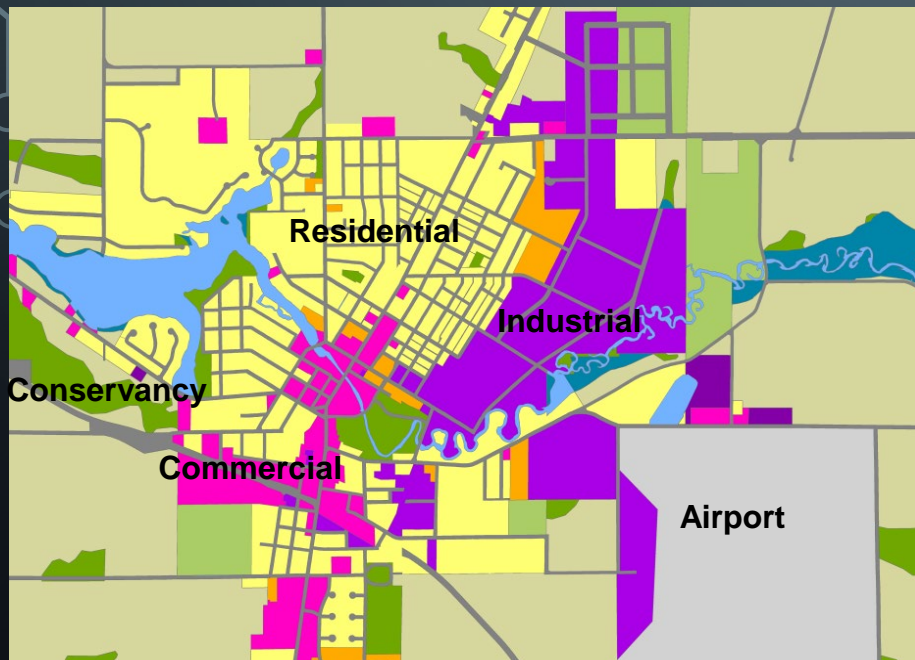
Residential District

District

General zoning is decided **locally**  
Each community is different

Map – Divides the community into zoning districts

Text – Describes regulations that apply community wide or within each district



# Uses for each zoning district:

## Permitted Use

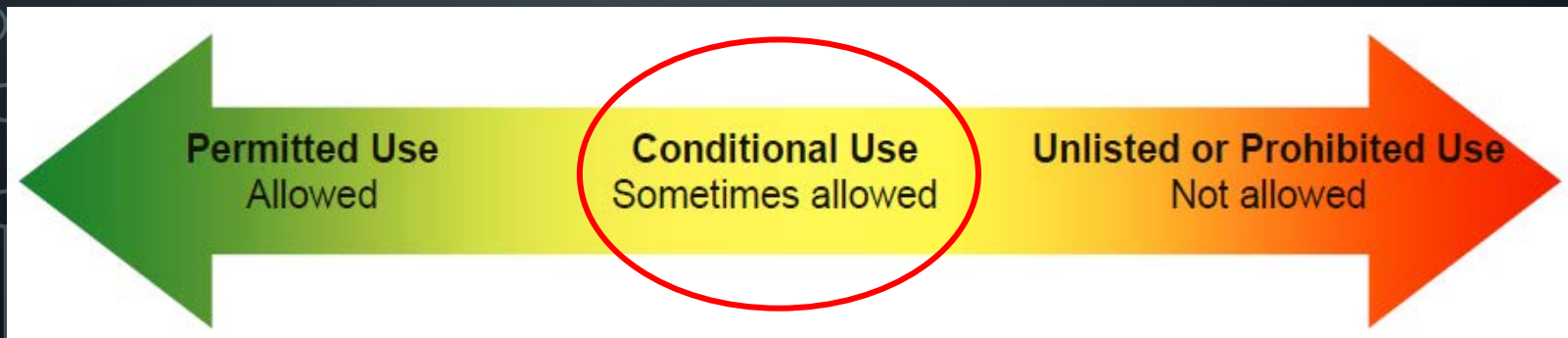
Use is listed and allowed by right in all parts of the zoning district

## Conditional Use

Use is listed for the district  
2017 law: If the applicant meets or agrees to meet all requirements and conditions specified in the ordinance or imposed by the local government, the local government shall grant the conditional use permit

## Prohibited Use

Use is not listed for the district or is expressly prohibited



# Comparing Land-use Impacts



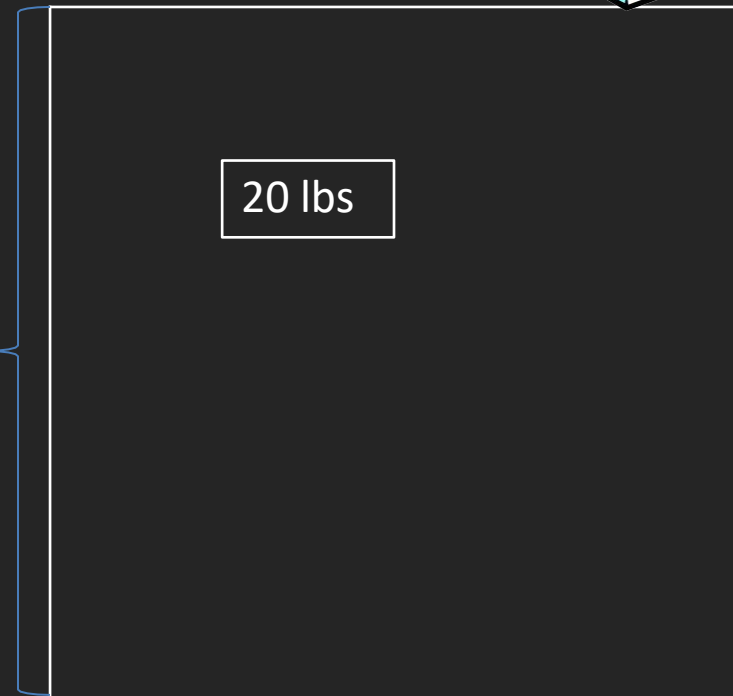
20 acres

36 lbs	36 lbs	36 lbs	36 lbs
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$36 \text{ lbs/ac} \times 20 \text{ acres} = 720 \text{ lbs}$

**16 mg/L**

20 acres



$20 \text{ lbs/septic system} \times 1 \text{ septic systems} = 20 \text{ lbs}$

1/36<sup>th</sup> the impact on water quality

**0.44 mg/L**

Assuming 10 inches of recharge -

# How does your zoning ordinance classify land uses with high potential for groundwater contamination? Permitted, conditional or prohibited?

	Adams	Juneau	Marquette	Portage	Waushara	Wood
Are land uses with high potential to contaminate drinking water prohibited or restricted in areas with drinking water wells?	<p><b>Conditional uses:</b> Fertilizer plants, feedlots, gas stations. Require a public hearing to decide whether to grant or deny depending on if standards are met, including impacts on adjacent properties.</p> <p><b>Permitted uses:</b> Ag uses, golf courses and cemeteries. Allowed.</p> <p><b>Comment:</b> Portage Co has GW flow maps, depth to GW, irrigated fields, water quality viewer, locations of wells and septics.</p>					

- State law says if a landowner meets or agrees to meet standards for a conditional use permit, it must be granted
- Review the permitted, conditional, and unlisted/prohibited uses listed for each zoning district in your ordinance
- Compare zoning maps with groundwater susceptibility/soil maps
- Are potentially polluting uses being allowed in areas with high GW susceptibility? Do maps and/or zoning text need to be updated to protect groundwater quality?

# Zoning land use classification is **key**

**P** Permitted    **C** Conditional    **■** Prohibited

Zoning District	A1 Intense Agriculture	A2 Light Agriculture	RR Rural Residential	R1 Single Family	R2 Multi Family	C1 Commercial
Livestock facility	P	C	■	■	■	■
Fertilizer plant	C	■	■	■	■	■
Dry cleaners	■	■	■	■	■	C
Gas station	P	P	C	■	■	C
Electric vehicle charger – Level 2	P	P	P	P	P	P

# Be prepared for new land uses

Planning ahead is the only option for local government:

- List each potential land use as a permitted use, conditional use, or prohibited use
- Use strong language and measurable standards

Don't assume that new land uses won't come to your community  
e.g. nuclear waste site, pesticide manufacturer, CAFO, digester, PFAS source

When a developer applies for a project, it's too late to change your ordinance to include that use, or strengthen standards for that use

ENVIRONMENT INVESTIGATES

## Ford megasite atop 'recharge zone' for underregulated Memphis Sands aquifer

An area that provides drinking water for more than a million people depends on company and state for protection

BY ASHLI BLOW - JANUARY 3, 2022 5:01 AM



Satellite image of a portion of the Megasite of West Tennessee. (Tennessee Department of General Services.)

Ford Motor Co. promises a green future at its Blue Oval campus, where it will produce zero-emissions





# Example: Fertilizer or pesticide storage facility



More work, time, stress,  
cost, and possible  
health effects

## Proactive

- List in zoning ordinance with strong language
  - Prohibited? Very clear & simple
    - No monitoring or data needed
  - Allowed as conditional use only in strategic areas with defined conditions to minimize spills/leaks; conditions transfer to future owners
    - Regular monitoring for spills
    - If contaminant moves offsite, clear funding and procedures for immediate clean up to prevent further spread

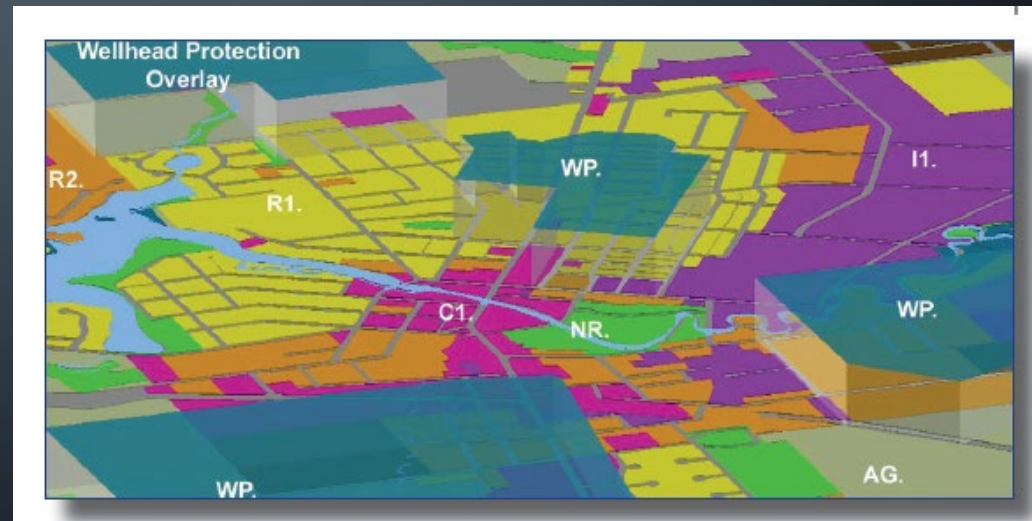
## Reactive

- Not listed or listed in zoning ordinance or general/weak language
- If leaks/spills occur and contamination travels offsite:
  - Discussions with company throughout process
  - Does company continue to spill/contaminate?
  - Need data to prove source. Who can do a study? How much data is enough? Who pays for study that includes sampling plan, monitoring wells, sampling, data analysis and interpretation?
  - How do neighbors know if their water/air/soil is safe? If it's not, who provides safe drinking water while study is happening?
  - Local government or residents must decide what to do after study is completed
  - Enforcement?
  - Lawsuits?
  - Finding funding for clean up
  - Clean up and monitoring – could take decades

# Overlay zoning

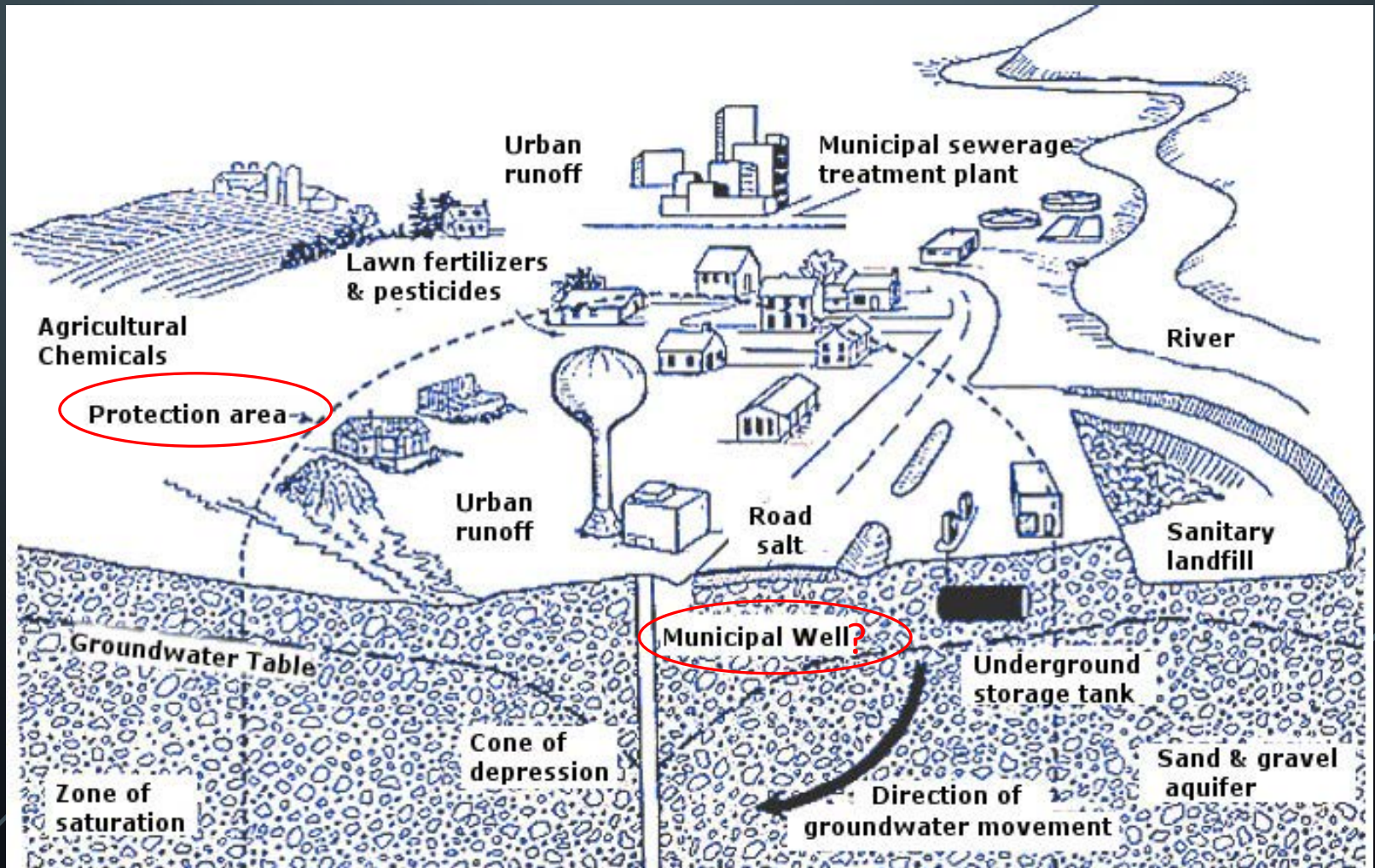
- A special zoning district, placed over the general zoning layer which creates special provisions in addition to those in the underlying base zone to protect a specific resource

- Examples
  - Wellhead protection
  - Shoreland zoning
  - Floodplain zoning



# Wellhead protection zoning

Key tool for groundwater protection



# EXAMPLE WELLHEAD PROTECTION ORDINANCES

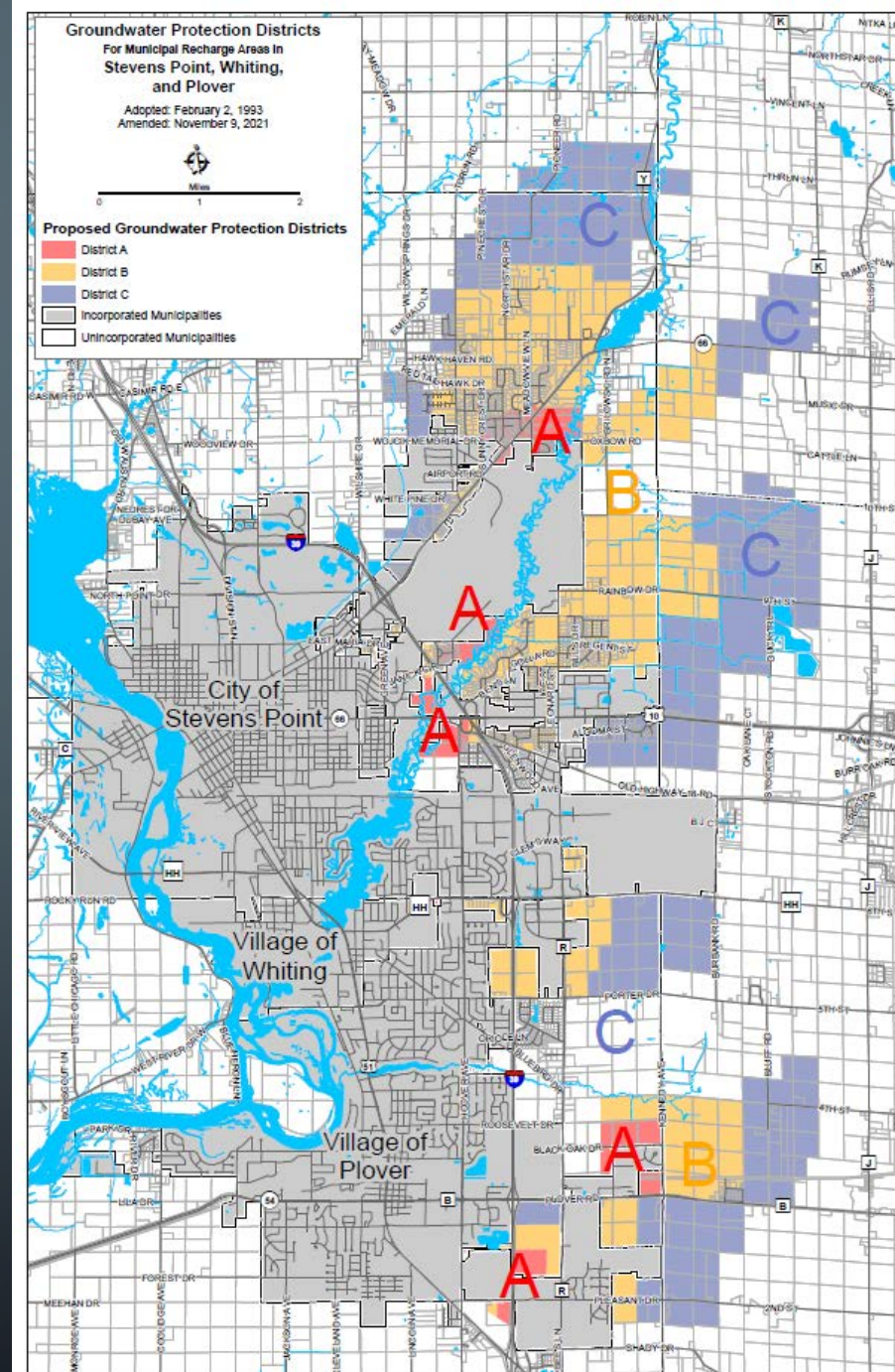
On webinar resource page

1. DNR model wellhead protection ordinance – Dave Johnson
2. Chippewa County
3. Portage County

# WELLHEAD PROTECTION ORDINANCE

*Purpose.* The residents of Portage County, whether served by private wells or municipal supplies, depend exclusively on groundwater for a safe drinking water supply. Certain land use practices and activities can seriously threaten or degrade groundwater quality. The purpose of this Wellhead Protection Ordinance is to institute land use regulations and restrictions to protect the municipal water supplies of the Villages of Amherst, Junction City, Plover and Whiting, and the City of Stevens Point, and to promote the public health, safety and general welfare of the residents of Portage County.

<https://www.co.portage.wi.gov/386/Wellhead-Protection>



## District A

District A of the groundwater protection overlay district is the area of land within the cone of depression as shown on the groundwater protection overlay district maps. These lands are subject to the most stringent land use and development restrictions because of close proximity to the wells and therefore greatest threat of contamination

## District B

District B of the groundwater protection overlay district is the area of land which contributes water to the municipal well starting at the line which delineates the cone of depression and ends at the line delineating the ten year time of travel. Land use regulations within Groundwater Protection Overlay District B are less restrictive than in Overlay District A because of longer flow times and a greater potential for remediation, dilution and attenuation. Agricultural Best Management Practices (BMP) minimizing use of pesticides and fertilizers are strongly encouraged.

## District C

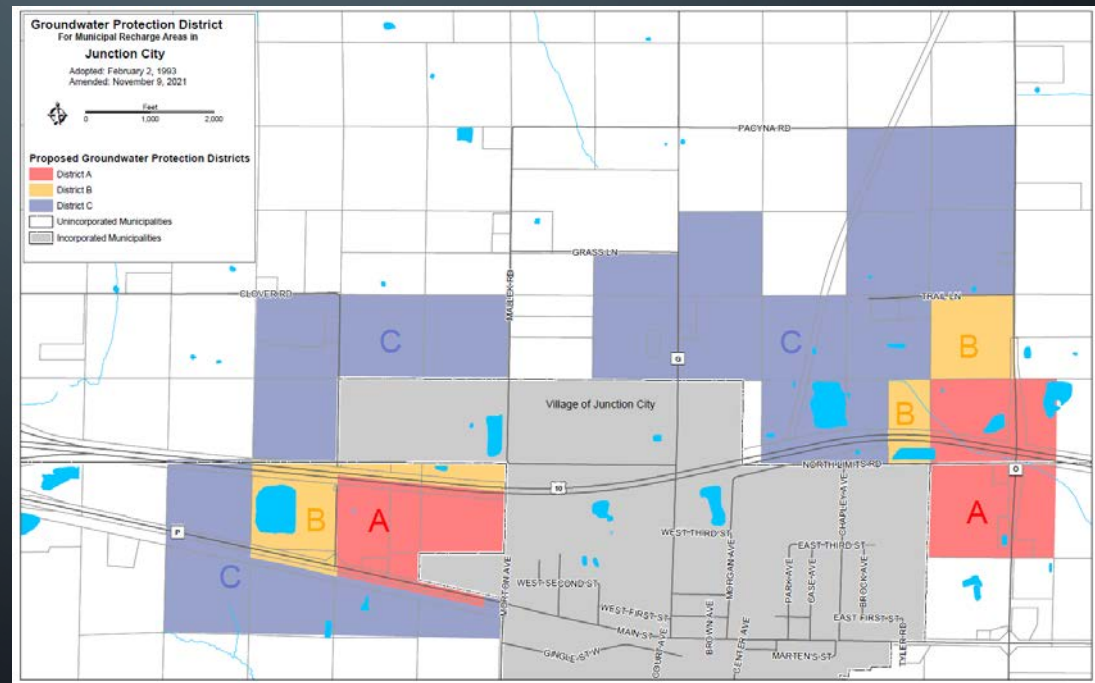
District C of the groundwater protection overlay district is the area of land which contributes water to the municipal well starting at the line which delineates the ten-year time of travel and ends at the line delineating the 20-year time of travel. Management measures in this District are the least restrictive of the recharge districts. Agricultural Best Management Practices (BMP) minimizing use of pesticides and fertilizers are strongly encouraged.

## Each District (A,B, and C) has:

- Permitted Uses
- Special Exception Uses
  - These uses may be allowed but are subject to a hearing and conditions placed by the Board of Adjustment.

<https://www.co.portage.wi.gov/386/Wellhead-Protection>

- Prohibited Uses



# CHIPPEWA COUNTY WELLHEAD PROTECTION ORDINANCE

- ARTICLE III. WELLHEAD PROTECTION Sec. 30-181. Purpose and authority. (a) Purpose. The residents of the county depend exclusively on groundwater for a safe drinking water supply. Certain land use practices and activities can seriously threaten or degrade groundwater quality. The purpose of this article is to institute land use regulations and restrictions protecting the municipal water supplies and to promote the public health, safety and general welfare of the residents of the county.



# ZONE 1

- Zone 1 of groundwater protection overlay district. Zone 1 of groundwater protection overlay district is the area of land which contributes water to the well in questions, out to a 30-day time of travel to the well. Time of travel delineations must be based on accepted hydrogeological research as outlined in the State Wellhead Protection Program Plan for Public Water Utilities, Chippewa County Code of Ordinances Chapter 30 – Environment March 12, 2024 Page 24 of 30 Appendix 2 with zone boundaries normalized to road centerlines, railways, surface water features, and the public land survey lines, one-half, one-quarter, one-eighth, or one-sixteenth section lines. (b) Zone 2 of the groundwater protection overlay district.

# ZONE 2

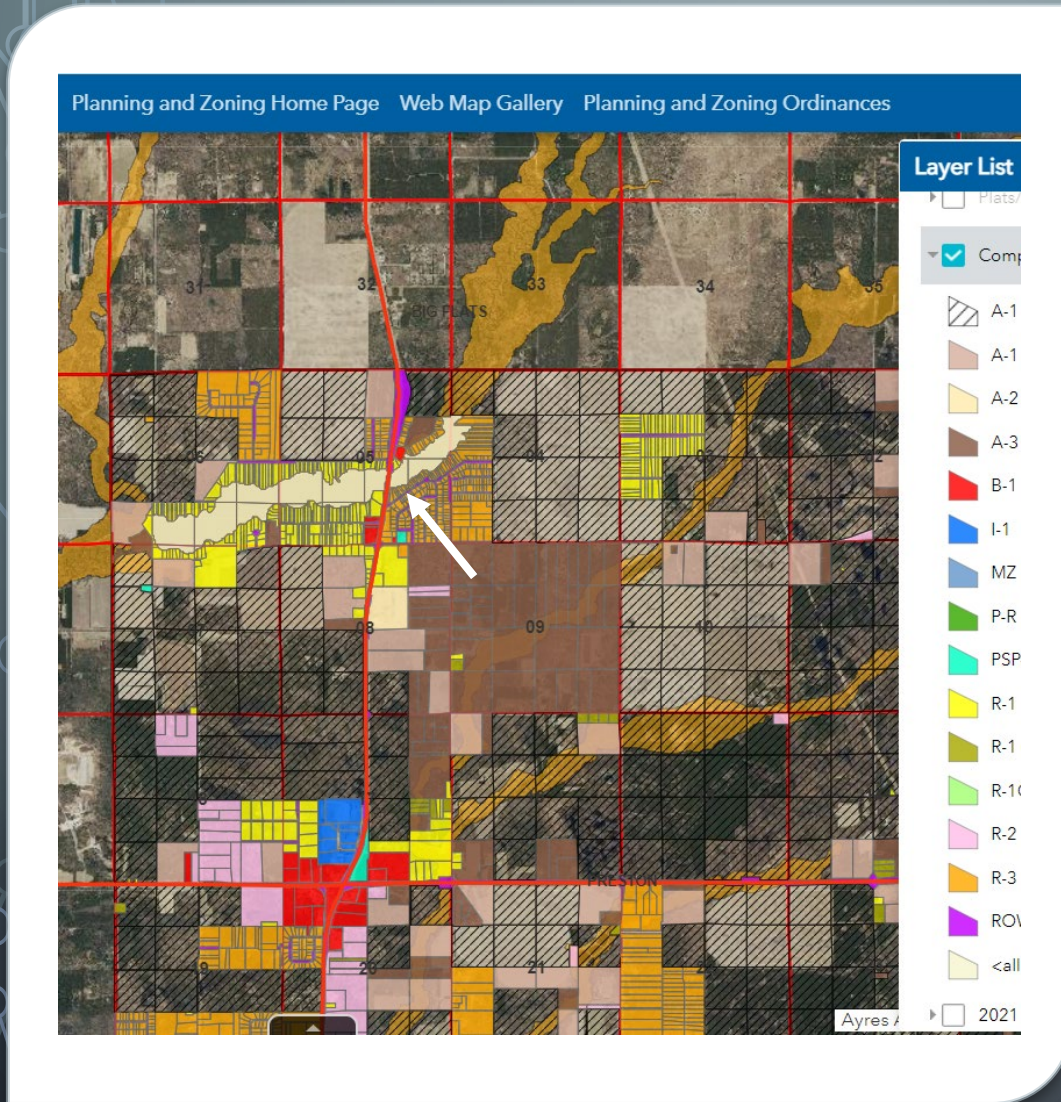
- Zone 2 of groundwater protection overlay district encompasses the area of land which contributes water to the well starting at the line which delineates the 30-day time of travel and ends at the line delineating the five-year time of travel to the well. Time of travel delineations must be based on accepted hydrogeological research as outlined in the State Wellhead Protection Program Plan for Public Water Utilities, Appendix 2 with zone boundaries normalized to road centerlines, railways, surface water features, and the public land survey lines, one-half, one-quarter, one-eighth, or one-sixteenth section lines.

# GENERAL ZONING

Covers entire local government area

Zoning districts  
upgradient of private wells largely determine chemical use/storage and what may get into the groundwater (see arrow)

Must be consistent with your comp plan



# Comparing Land-use Impacts



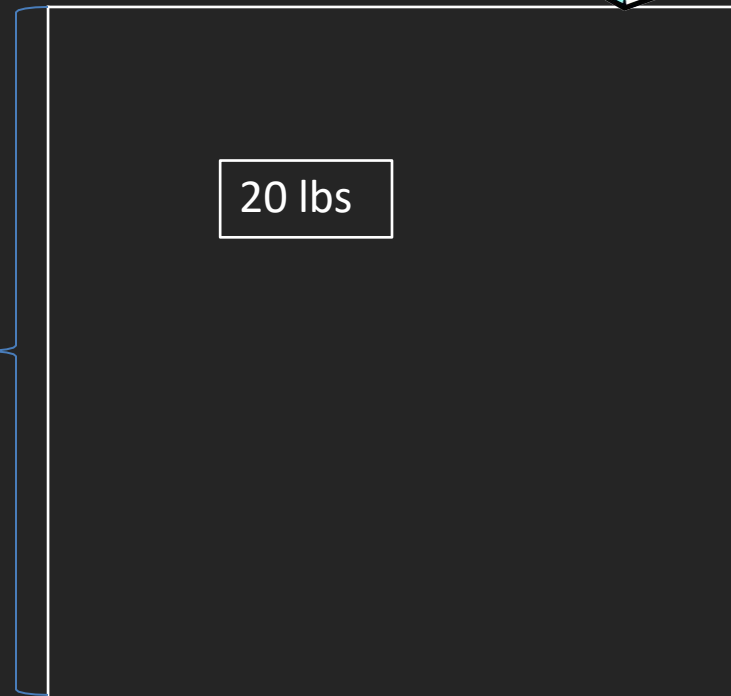
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$36 \text{ lbs/ac} \times 20 \text{ acres} = 720 \text{ lbs}$

**16 mg/L**

20 acres



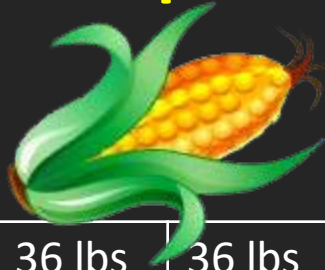
$20 \text{ lbs/septic system} \times 1 \text{ septic systems} = 20 \text{ lbs}$

$1/36^{\text{th}}$  the impact on water quality

**0.44 mg/L**

Assuming 10 inches of recharge -

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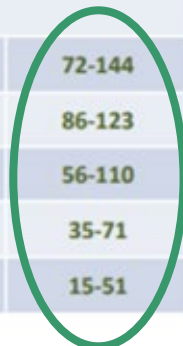
**Using these numbers:** 36 septic systems on 20 acres (0.55 acre lots) needed to achieve same impact to water quality as 20 acres of corn

# Different crops leach different amounts of nitrogen to groundwater

- Ag zoning districts do not differentiate based on how much nitrogen is leached to groundwater

$$\text{N Inputs} - \text{N Outputs} - \text{N Storage} = \text{Leachable N}$$

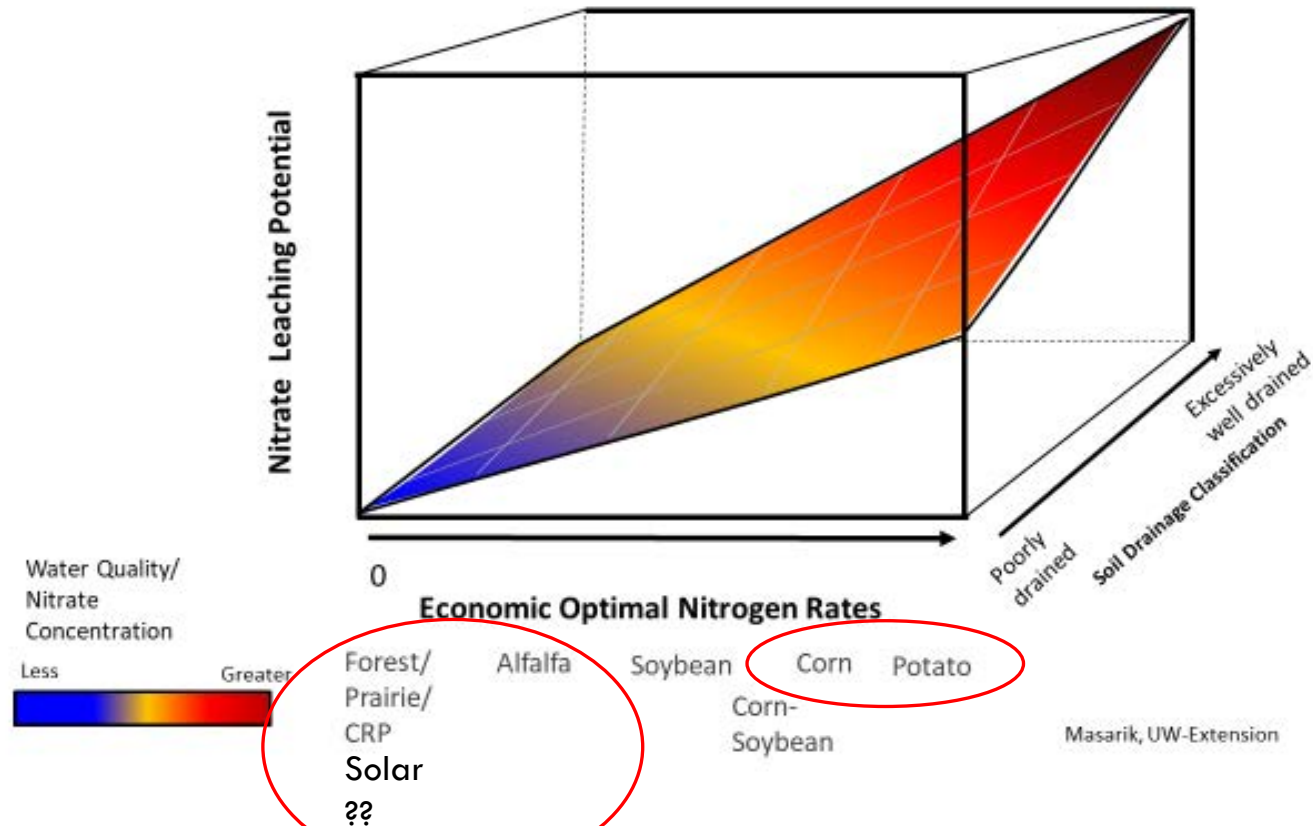
Crop	Yield (per acre)	Inputs			Outputs		Storage	Leachable Nitrogen
		Fertilizer	Irrigation <sup>1</sup>	Precip+ Deposition	Harvest Yield N	Misc. losses	Change in N	
-----lbs nitrogen per acre-----								
Potato	424 cwt	220-300	41	8	170	30-37	0	72-144
Sweet Corn	8.5 ton	130-170	41	8	73	22-25	0	86-123
Field Corn	204 bu	180-240	41	8	149	26-32	0	56-110
Carrots	27 ton	100-140	41	8	97	19-23	0	35-71
Snap Beans <sup>2</sup>	8 ton	40-80	41	8	62	14-17	0	15-51



<sup>1</sup>Assumes 10 inches of irrigation water containing 18 mg/L nitrate-nitrogen. At this concentration each inch of irrigation water contains 18 lbs nitrogen per acre. Sandy soils.

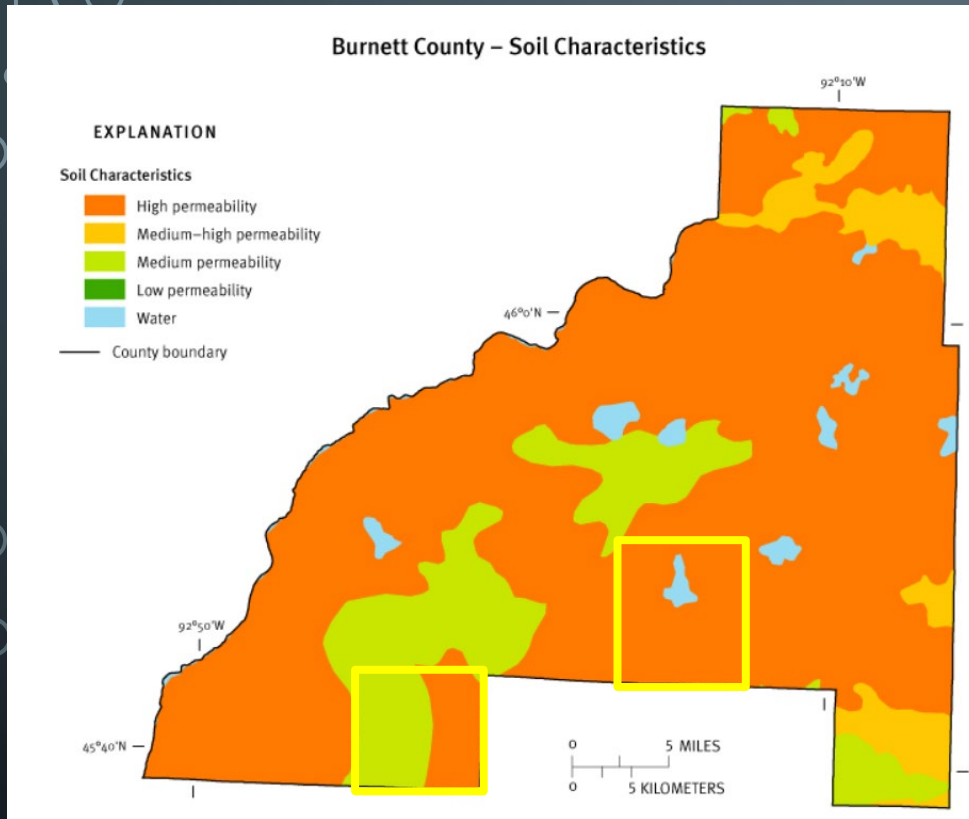
<sup>2</sup>Non-nodulating

# Nitrate Leaching Potential



- Different crops on the same soil have different rates of nitrate leaching that vary from year to year based on fertilizer inputs, yield, and weather
- Nitrate leaching below the same crop can vary depending on soil type and location in the state
- Zoning doesn't determine which crops are grown. Incentives & markets for crops with low nitrate leaching help.
- Who works with farmers? **County land and water conservation offices. Farm service agency. NRCS. Water utility managers.**

# Burnett county sets animal unit (AU) limits by ag district

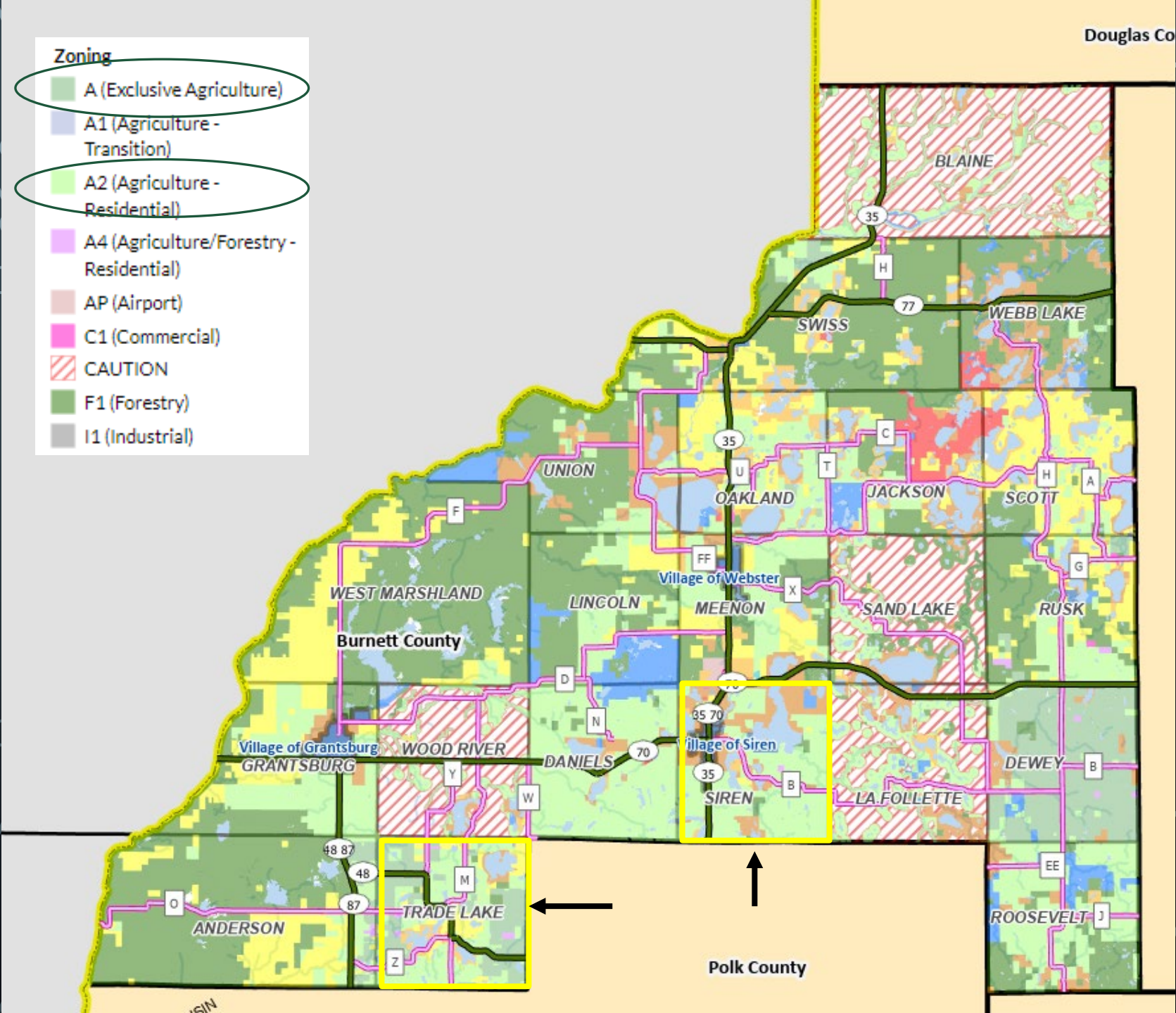


<https://www.burnettcountywi.gov/1108/Zoning-Division>.  
See TXT-23-03

- About 80% of Burnett County is less than 20 feet to the water table and has highly permeable soils
- Not much exclusive ag zoning is located in the sandy soil areas of the county
- Exclusive Ag
  - Unlimited AU
- Other ag districts allow:
  - Up to 500 AU per farm
- Livestock facility license needed for all facilities over 250 AU (in place prior to WI siting law)
- Required manure storage for 220 days based on science; over the 180-day state standard

Zoning

- A (Exclusive Agriculture)
- A1 (Agriculture - Transition)
- A2 (Agriculture - Residential)
- A4 (Agriculture/Forestry - Residential)
- AP (Airport)
- C1 (Commercial)
- CAUTION
- F1 (Forestry)
- I1 (Industrial)





# Land uses to protect groundwater

Encourage them through zoning, incentives, easements, etc.

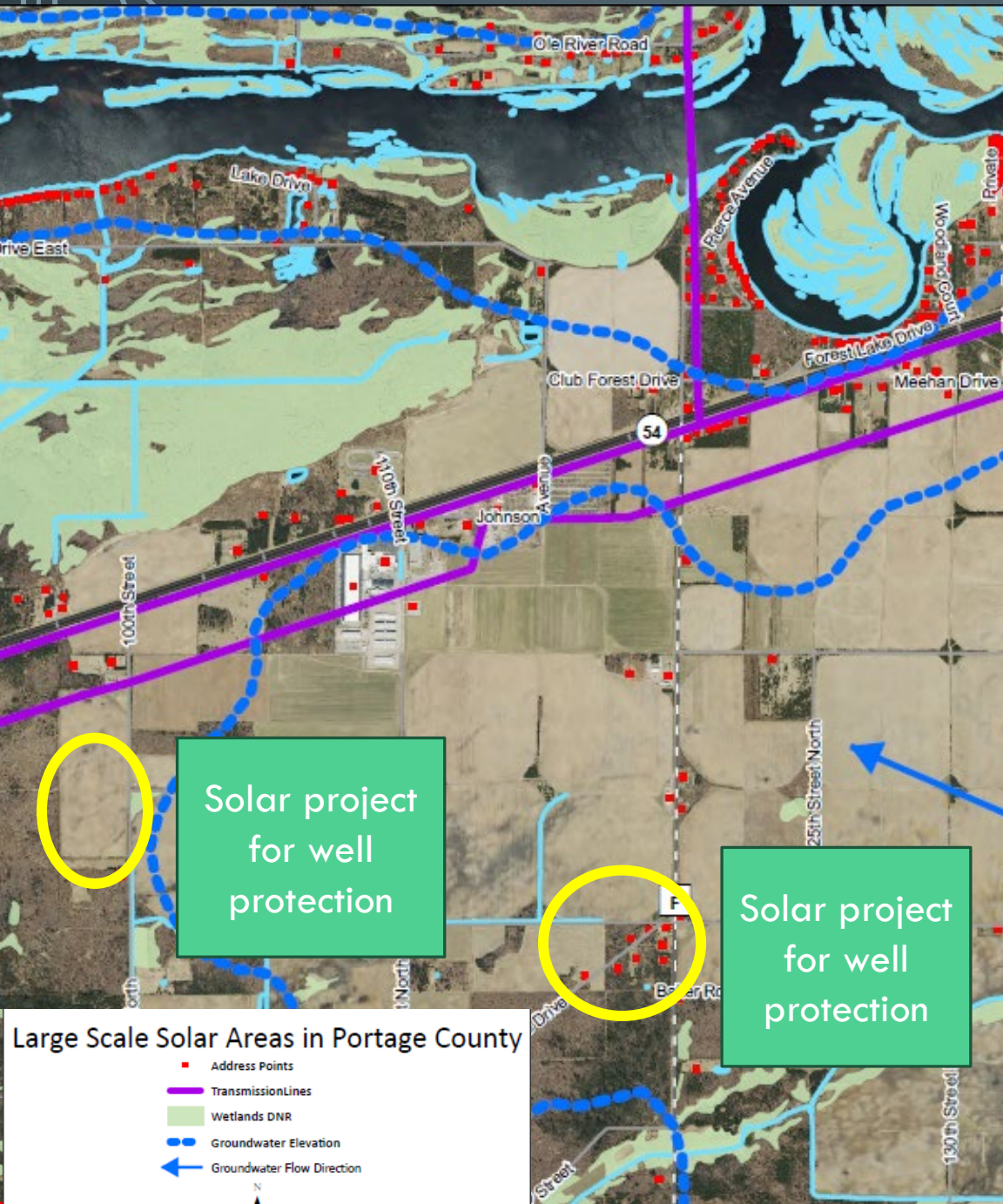
- Forested areas
- Prairies
- Grazing land and hay
- Solar projects
- GW downgradient of these areas may be protected safe water. Map and consider for future location of development/wells?



# LARGE SOLAR PROJECTS

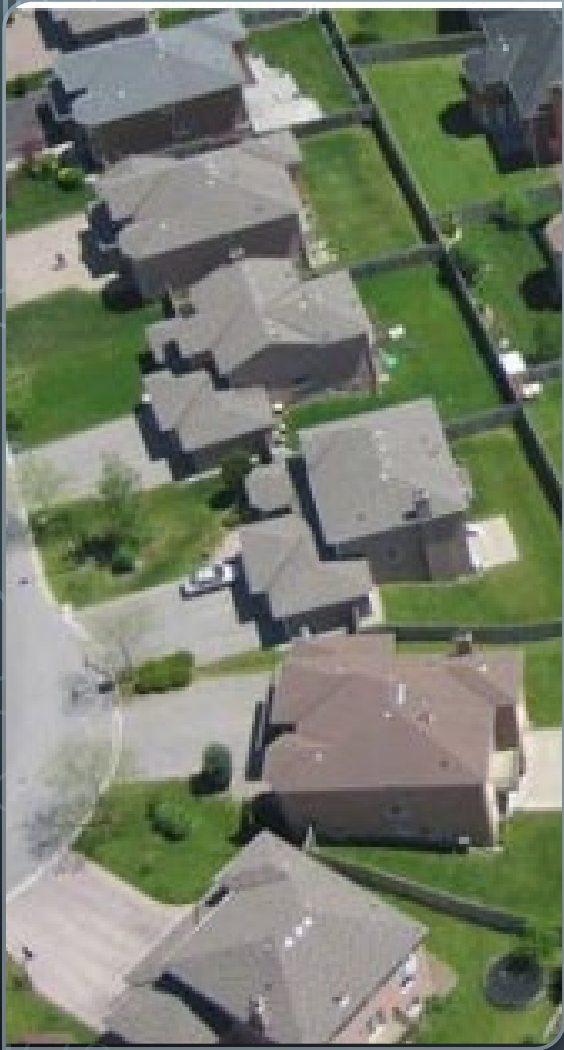
- Typically sited on ag fields
- Typically, no fertilizer and few pesticides used in solar, so likely to benefit groundwater quality
- Limited local authority to regulate
  - $< 100$  MW local, limited by statutes
  - $\geq 100$  MW WI Public Service Commission (100 MW is  $\sim 700$  acres of solar)
- What weight will be given to maps in local land use plans that show where community finds utility-scale solar suitable and not?
  - PSC? Solar developers?





If you know GW flow direction, strategically located solar developments could...

- Improve water quality for existing wells
- Buffer new subdivisions from known/likely GW contaminants for 20 years
- Must be near transmission line (purple) or energy user
- Look for solar developers who work at the scale you have in mind



# SUBDIVISION ORDINANCES

Legal process for dividing land and establishing minimum standards for development

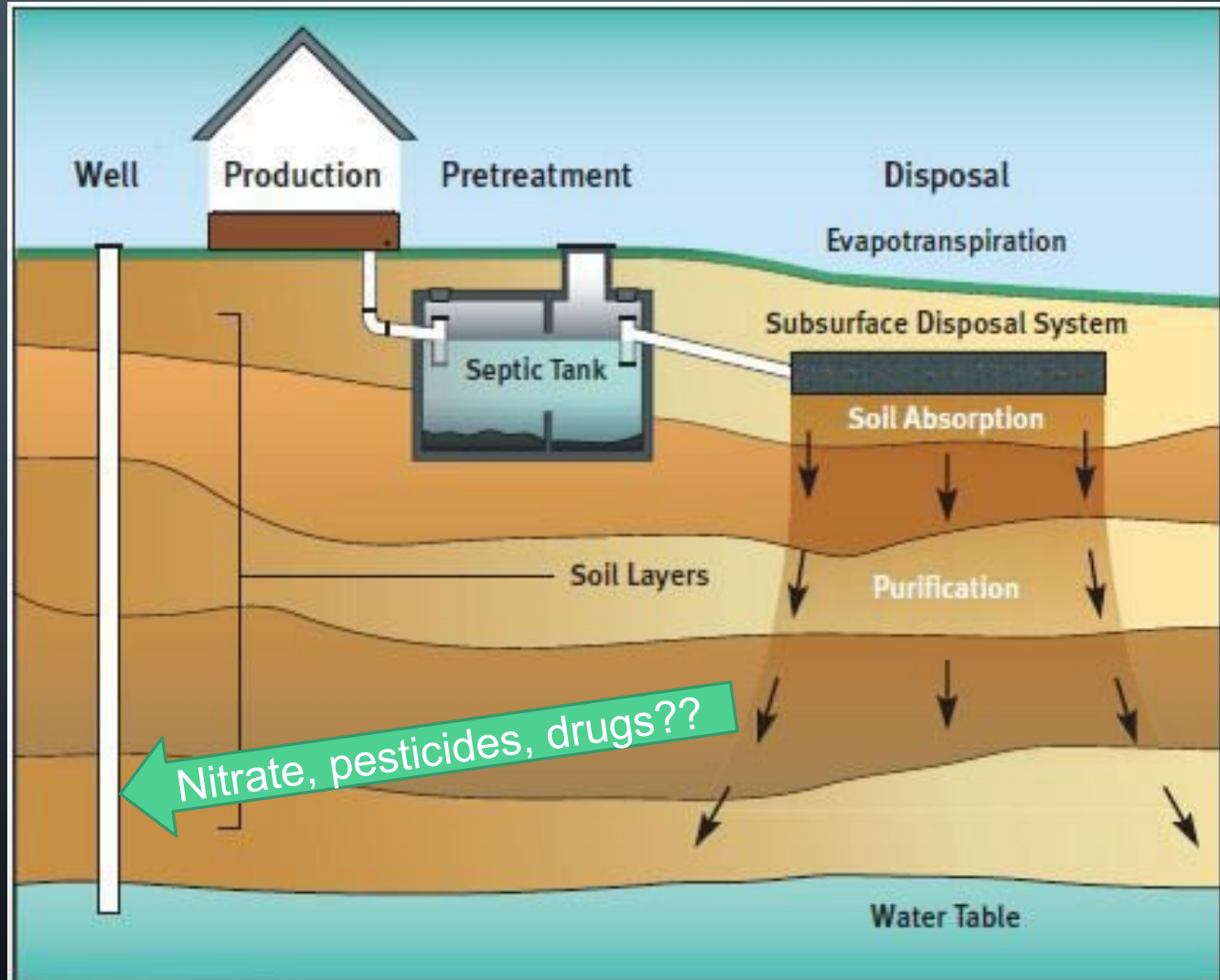
Must be consistent with the comprehensive plan

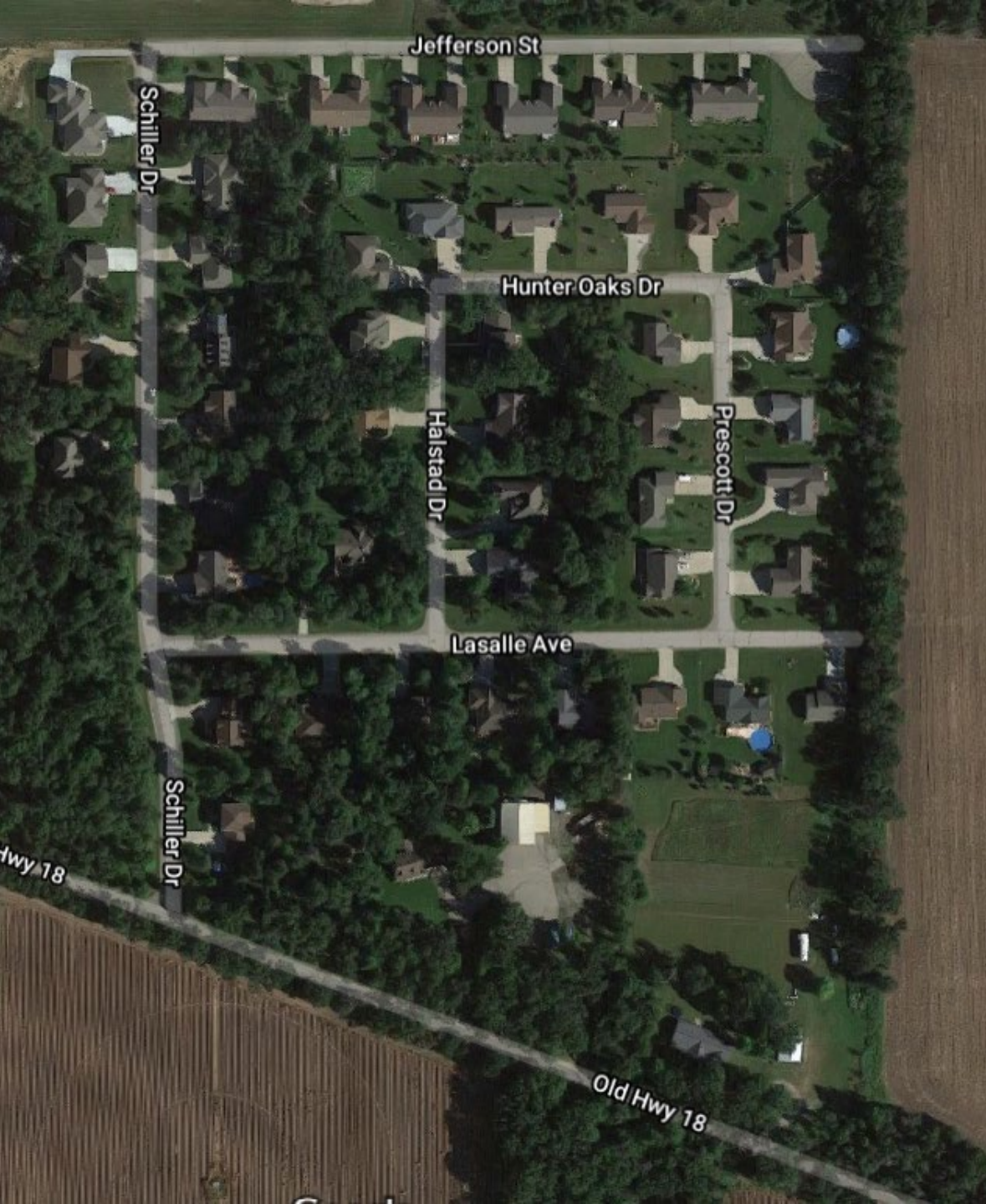
Separate from zoning

Can be adopted by counties, towns, villages and cities

# UNSEWERED RESIDENTIAL DEVELOPMENT

Small residential lot sizes may lead to drinking water contamination





## UNSEWERED RESIDENTIAL DEVELOPMENT

- Subdivision or zoning ordinances can be used to set unsewered minimum residential lot sizes at 2 or more acres to limit well contamination by nitrate and pharmaceuticals from nearby septic systems



## ALTERNATIVE TO LARGE RESIDENTIAL LOT SIZES

- Large residential lot sizes take more farmland and woodland out of production AND do not provide affordable housing
- An alternative is to guide new residential development to villages/hamlets with public water and sewer to provide safe drinking water

# Subdivision ordinances may require water testing before creating new lots

Portage Co has a subdivision ordinance that requires a water test prior to the division of land. However, it does not necessarily have to meet drinking water standards in order to be divided. Extremely elevated levels may prevent a property from being divided or may require notification be placed on the Certified Survey Map or treatment may need to be provided.

## Sec. 7.4. - Subdivision.

### 7.4.3 - Land Suitability.

No land that falls under the provisions of this section shall be approved as a major subdivision, county plat, or minor subdivision which is held unsuitable for the proposed use by the Planning and Zoning Committee for reason of flooding, inadequate drainage, severe erosion potential, unfavorable topography, **inadequate or contaminated water supply**, inadequate sewage disposal capabilities; potential for negative impacts to surface waters or groundwater; conflict with existing or planned parks, roads, highways, airports, drainage channels, schools or other public developments; conflict with intensive agricultural activities; or any other feature likely to be harmful to the health, safety or welfare of the future residents of the proposed subdivision or of the community.



# Groundwater Management and Water Supply Facilities.

Where there is no existing public water supply facility, the Planning and Zoning Department is empowered to require the subdivider to provide sufficient data to determine whether or not a water supply of acceptable quality exists. The data required of the subdivider shall be based on the advice and recommendations of the County Water Quality Specialist, the Central Wisconsin Groundwater Center and any other knowledgeable professionals that may assist the County with water quality issues.

Center for Watershed Science and Education  
 College of Natural Resources  
 University of Wisconsin - Stevens Point  
 Water and Environmental Analysis Lab  
 Stevens Point, WI 54481-3897  
 Phone 715.346.5200 or 768 from 877.363.6376  
 www.cenr.edu/cnr-spl/welal

Friday, February 27, 2023

**WELL INFORMATION:**  
 WI Unique Well Number:

**TREATMENT SYSTEM(S) OWNED:**  
 Water softener     Sew Conduit  
 Carbon Filter     Neutralizer  
 Particle Filter     Iron Filter  
 Other

**PROBLEMS OBSERVED:**  
 Color     Taste     Odor  
 Corrosion     Health     None  
 Other

**LEGAL DESCRIPTION:**  
 Town: EAU CLAIRE  
 NE 1/4 Sec 5 T 23 R 9E  
 1/4 1/4 (acres) (feet) (feet)  
 Map: Gov't Lot#

**LAST DATE TESTED:**  
 never     Unknown  
 less than 1 year     1-2 years  
 2-3 years     3-10 years  
 greater than 10 years

**REASON FOR TESTING:**  
 Curious about water quality  
 Suspect water quality problems  
 Regularly test my well  
 Required by lending institution  
 Detect of positive bacteria test  
 Detect following well disinfection  
 Infants/pregnant women/breasts  
 Other

**SOURCE:**  
 Municipal  
 Other

**MAIL TO:**

**SAMPLE(S) COLLECTED**  
 Date: 6/6/2022  
 Time: 08:48

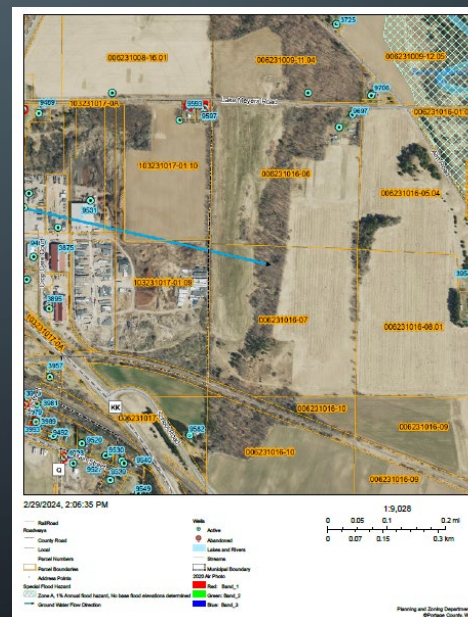
**SAMPLE(S) TAKEN FROM:**  
 Pressure Tank  
 Kitchen faucet  
 Bathroom faucet  
 Outside faucet  
 Bath  
 Other

Sample ID: 129142  
 Labno: 2200372-FL  
 Group: PORTAGE 22INV

**LABORATORY RESULTS**

Parameter	Qualifier	Results	Units	
Hardness-Total		243	mg/l CaCO3	
Alkalinity		246	mg/l CaCO3	
Conductivity		502	umhos/cm	
pH		7.75	std units	
Saturation Index		0.1		Corrosivity Balanced
Nitrogen-Nitrate/Nitrite		2.9	mg/l N	
Chloride		16.2	mg/l	
Calcium		53.52	mg/l	
Magnesium		26.640	mg/l	

**DISCLAIMER:** The analyses run on your samples only cover some of the more common water quality characteristics. Safe levels of these chemicals or factors do not guarantee that your water is free of all toxic chemicals, or other trace chemicals, which you would need additional analysis. Contact the lab or your Extension office for more information.



The background features a series of concentric circles in light gray, some solid and some dashed, creating a ripple effect. A large blue callout box is centered on the page, containing the text "Quick Review".

# Quick Review



# Key Takeaways



- Land use decisions affect groundwater quality
- Over 95% of Wisconsin's communities use groundwater for drinking water
- Zoning and subdivision ordinances are tools to protect groundwater

## Weaknesses:

1. Zoning has limited ability to address existing problematic land uses
2. Zoning doesn't determine which crops are grown in ag districts, even though they have different amounts of nitrogen leaching to groundwater

## Strengths:

1. Zoning can address where new land uses are allowed/sited, and where they're not allowed
2. Wellhead protection zoning can protect community drinking water wells
3. Zoning can list land uses with potential to pollute groundwater as prohibited uses, or as conditional uses with measurable standards
4. Land uses that protect groundwater can be encouraged through zoning & incentives
5. Guide residential development to sewered areas or to lot sizes 2 acres or more

## Possible actions



See what groundwater goals, policies and data are in your comprehensive plan



See if municipal well(s) have a wellhead protection ordinance



Residential development: guide to sewerred areas  
OR have lot sizes 2 acres or more



See how fertilizer plants, gas stations, etc. are listed in your zoning ordinance. Permitted, conditional or prohibited uses?



See resource page

Thank You!  
Questions??

Lynn Markham, [lmarkham@uwsp.edu](mailto:lmarkham@uwsp.edu)

Jen McNelly, [jmcnelly@wisc.edu](mailto:jmcnelly@wisc.edu)



Extension  
UNIVERSITY OF WISCONSIN-MADISON



Center for Land Use Education  
College of Natural Resources  
University of Wisconsin-Stevens Point