

ZONING AS A TOOL TO PROTECT GROUNDWATER

MAY 19, 2022

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College of Natural Resources
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Extension
UNIVERSITY OF WISCONSIN-MADISON



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?

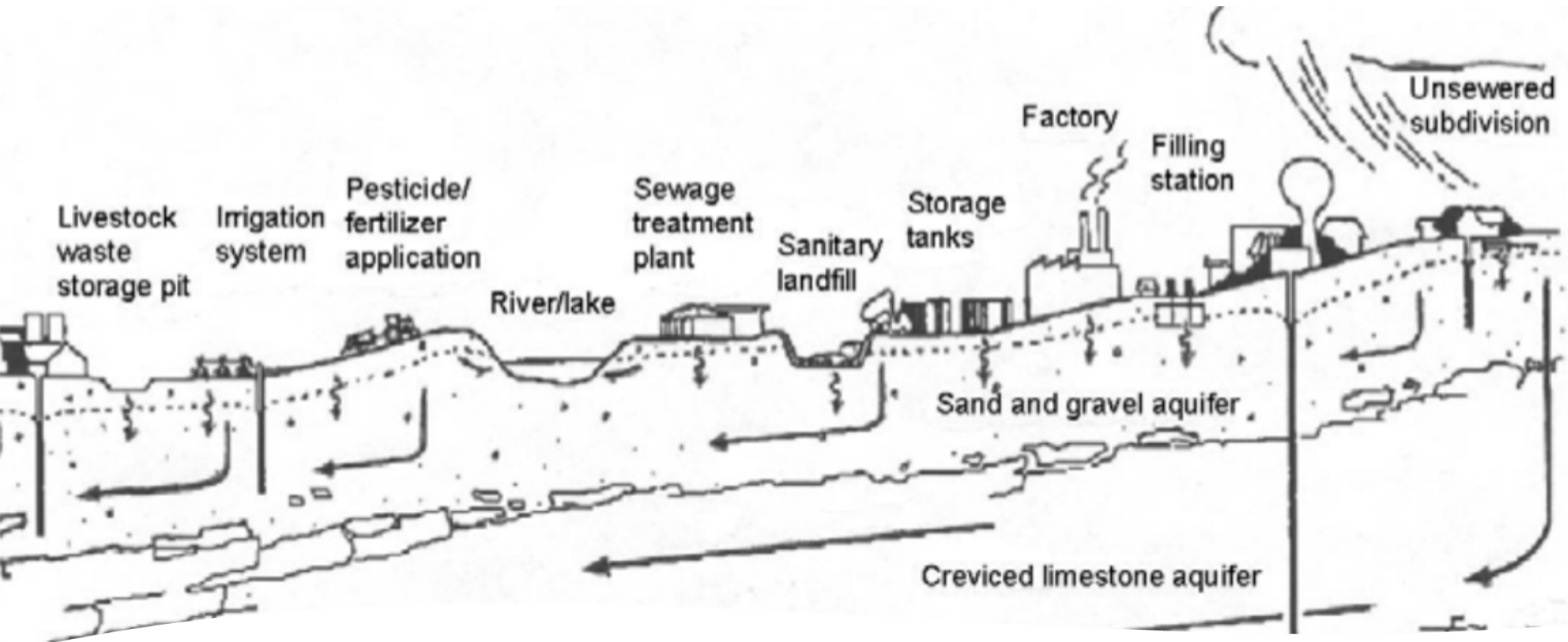
- 1, 2, 3, 4, 5, 6+



Key Takeaways



- Land use affects groundwater quality
- Over 95% of Wisconsin's communities use groundwater for drinking water
- Zoning and subdivision ordinances are tools to protect groundwater
- Weaknesses:
 1. 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. Wellhead protection ordinances protect municipal wells
 2. Land uses with potential pollutants can be listed as conditional or prohibited uses
 3. Subdivision design or minimum lot sizes protect private well water quality from septic system effluent



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

Guiding Document



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

See today's webinar resource page for example goals & policies

Comprehensive Plan

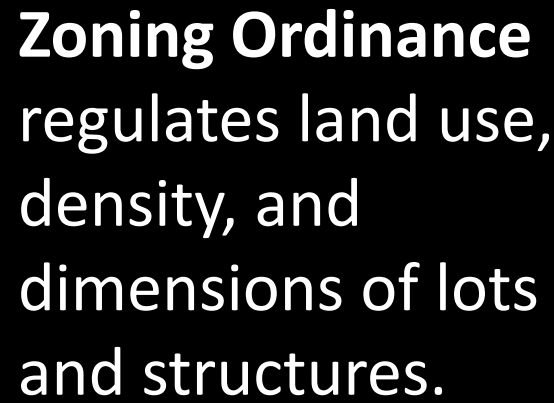
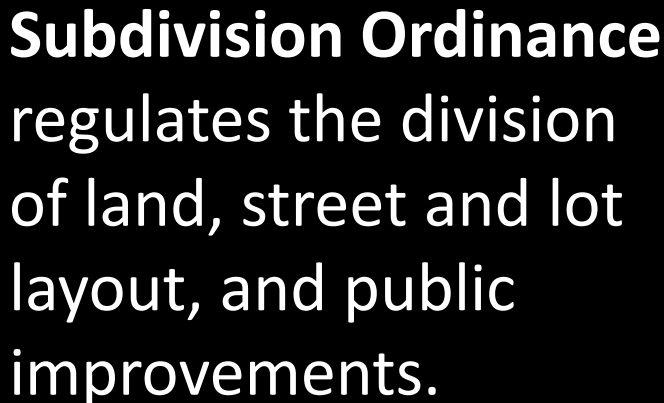
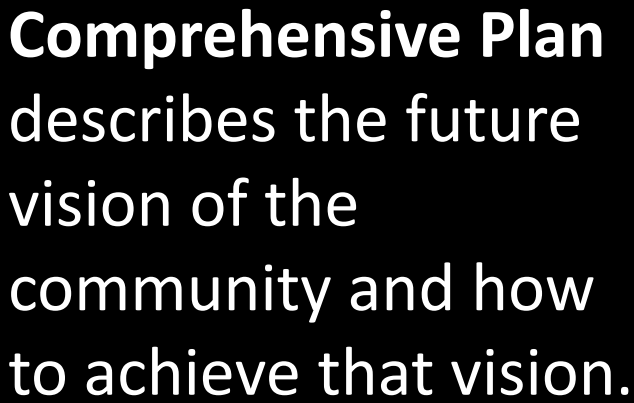
Regulatory Tools to Implement the Plan



Zoning Ordinance



Subdivision Ordinance



Lifespan of land uses 10 years



Lifespan of buildings 60-120 years



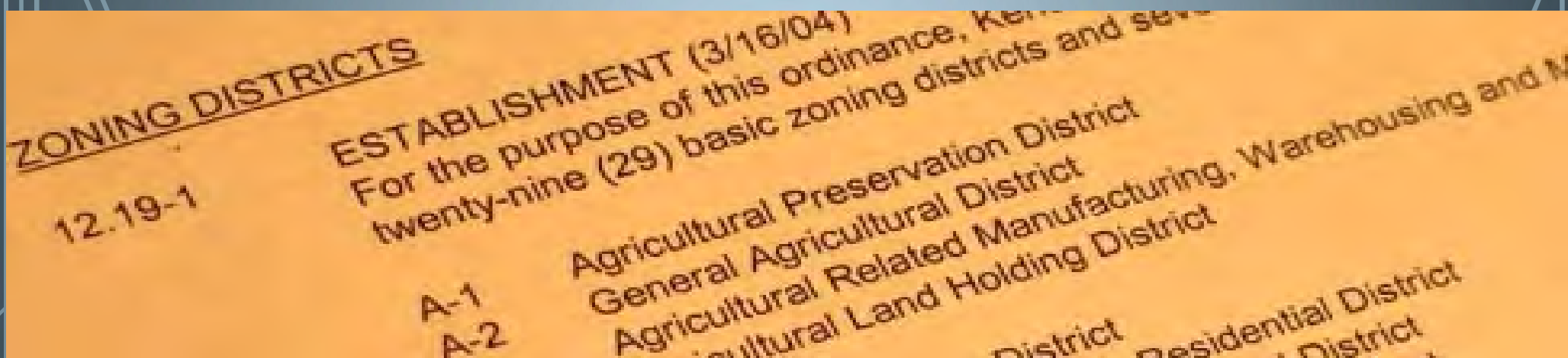
Lifespan of lots, blocks, communities

200+ years



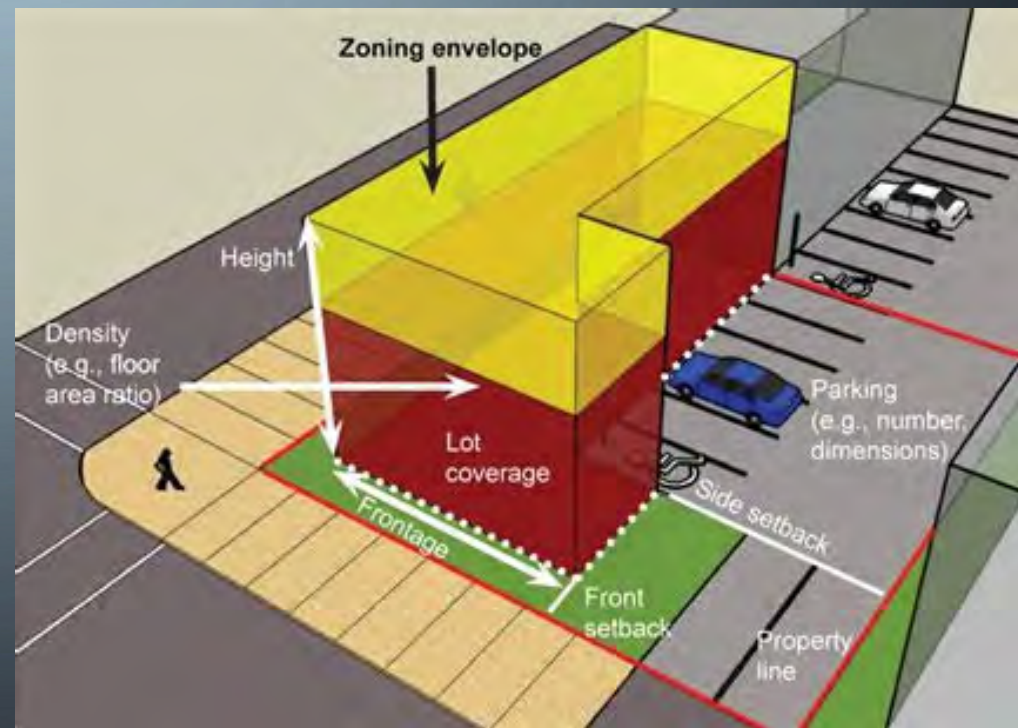
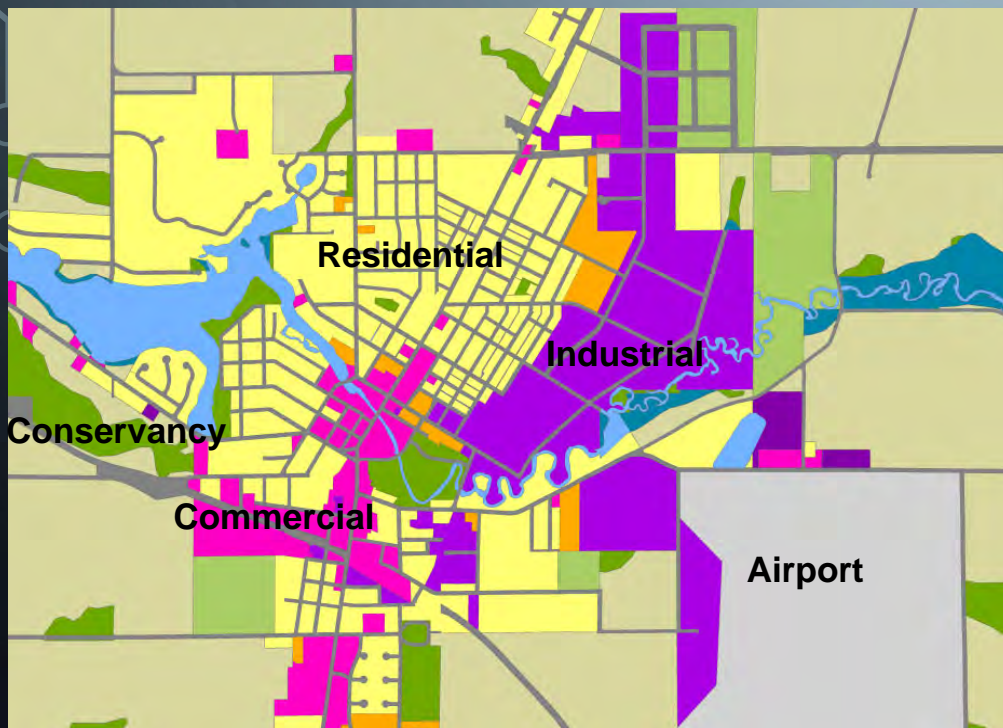


HOW DOES ZONING WORK?



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

Granted by zoning administrator

Conditional Use

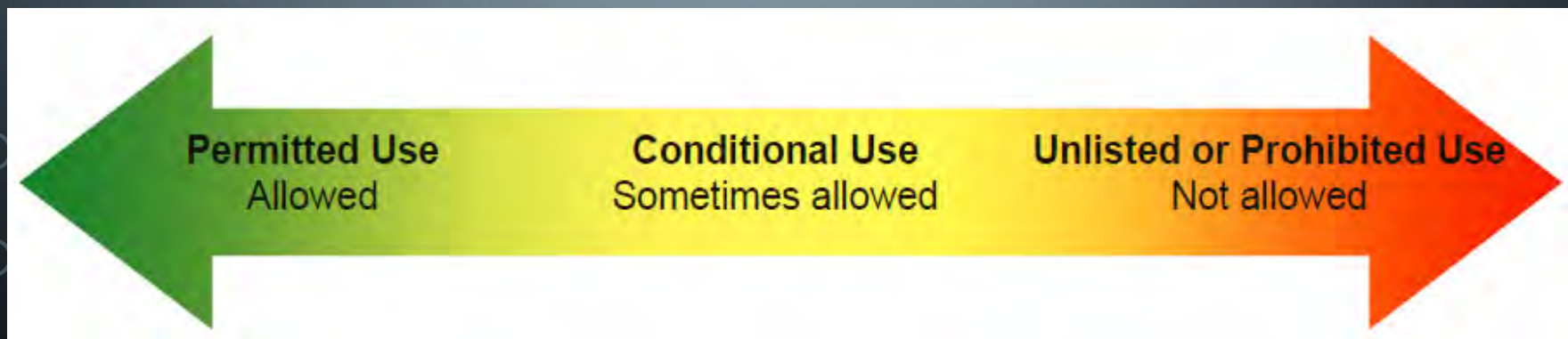
Use is listed for the district and may be allowed if suited to the location

Decided by zoning board, plan commission, or governing body

Prohibited Use

Use is not listed for the district or is expressly prohibited

May apply for rezone or use variance, if allowed



Land uses for each zoning district

VILLAGE CENTER; PERMITTED USES

- adult day-care homes
- bakery
- barber shop or salon
- bed and breakfast inn
- bicycle shop
- bookstore
- candy, pastry, ice cream, or snack shop
- child day-care homes
- copy center
- delicatessen
- financial institution
- florist
- fruit and vegetable market
- general office
- gift shop
- hardware/garden supply store
- health and fitness facility
- hotel/motel
- instructional services
- laundry and dry cleaning
- medical clinic
- neighborhood retail establishments
- multi-family dwelling units
- pharmacy
- place of worship
- plant nurseries, sales & greenhouses
- police, fire or rescue station
- post office
- printing and publishing
- restaurants
- retail sales
- single-family, attached dwelling unit
- single-family, detached dwelling unit
- theaters
- video rental store

Town Center, Conditional Uses

- automobile service station
- car wash
- motor vehicle repair
- retail gasoline sales
- veterinary

Sample land use table

P Permitted
 C Conditional
 Prohibited

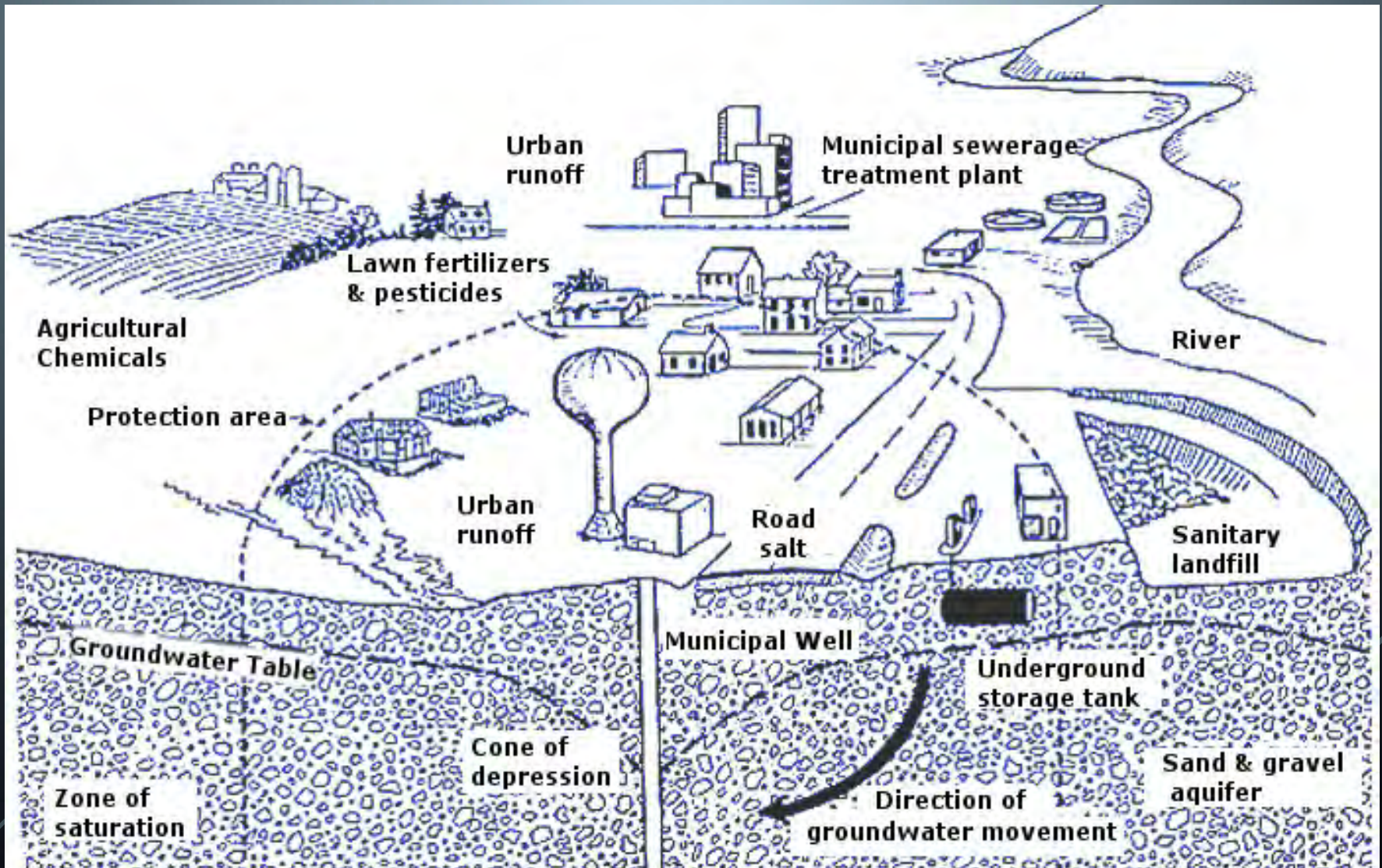
Zoning District	A1 Intense Agriculture	A2 Light Agriculture	RR Rural Residential	R1 Single Family	R2 Multi Family	C1 Commercial
Livestock facility	P	C				
Residential poultry and beekeeping	P	P	P	C	C	
Agricultural tourism	C	C	C			C
Agriculture-related business	P	P	C			C
Roadside stand	P	P	P			C

Overlay zoning

- A special zoning district, placed over an existing base zone(s), which creates special provisions in addition to those in the underlying base zone to protect a specific resource
- Examples
 - Shoreland zoning
 - Floodplain zoning
 - Wellhead protection



Wellhead protection – overlay zoning



Wellhead Protection Ordinance

What land uses would you prohibit near municipal wells to keep drinking water safe?
Type them in the chat box

Zone B – allows more land uses but prohibits gas stations, fertilizer plants, cemeteries, etc.

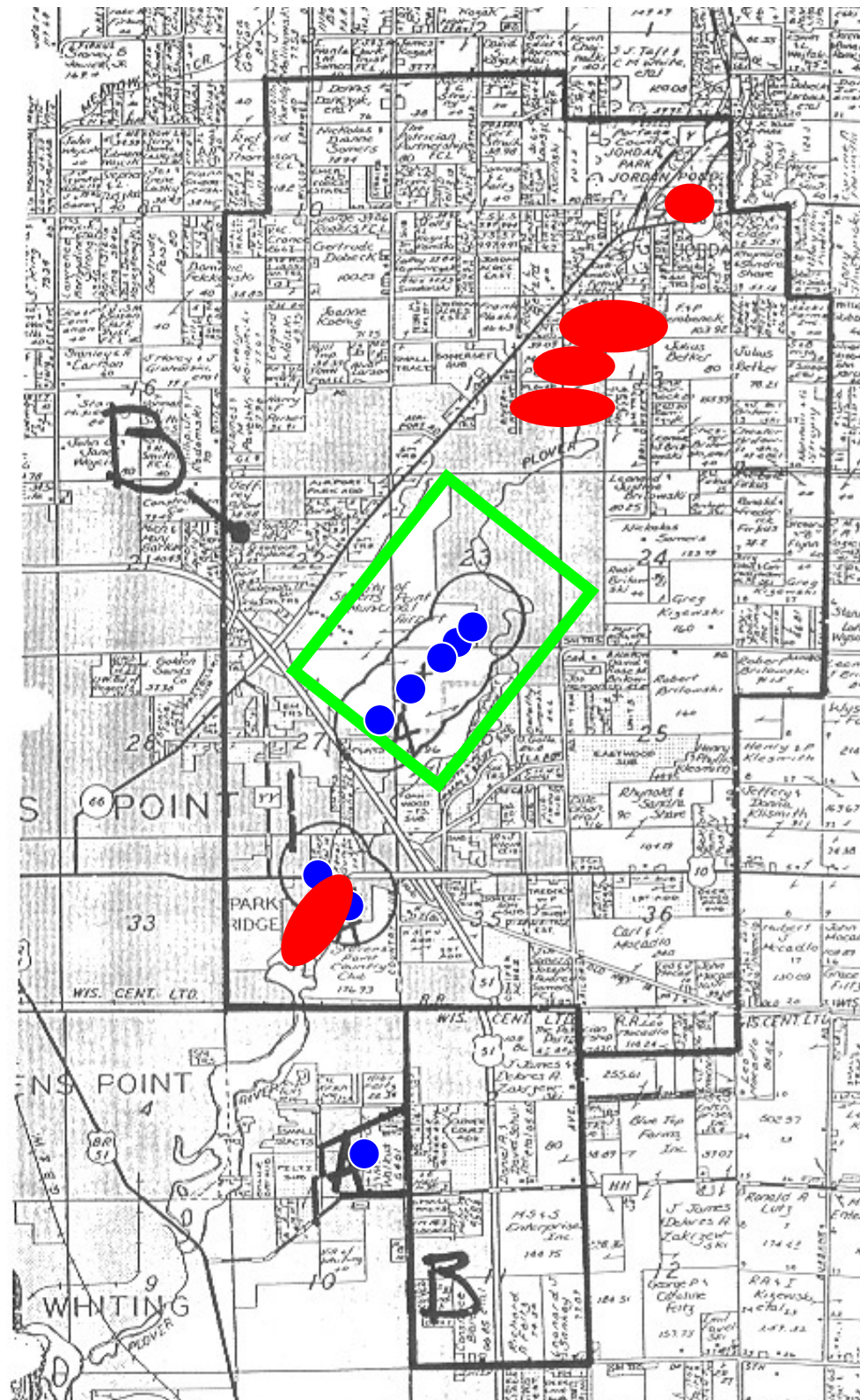
Municipalities can save \$ by keeping their drinking water safe



Other approaches to wellhead protection

- Purchase and lease of lands around the wells:
 - City forested recreation area
 - Izaak Walton League lodge and shooting range
 - Boy Scout camp
 - Conservation easement

ARPA funding?



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
- \$440 million estimated to replace all private wells over the health standard for nitrate (estimates by county available)



Be prepared for new land uses

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 pickup trucks with advanced batteries. But forthcoming plans and actions in the new year will prove whether the company and the state are committed to protecting the existing environment at the megasite

Photo: Memphis Sands.com/Satellite.com

The background is a dark blue gradient. In the center, there is a faint, light blue ripple effect, suggesting a drop in water. The corners of the image are decorated with white, stylized circuit board traces and small circles, giving it a technological or scientific feel.

Nitrate

A common groundwater contaminant

Bedford Falls

Municipal Well

Private Well

Groundwater is a LOCAL resource – falls within 1/2 mile of well

Nitrate can enter groundwater from fertilizers and animal & human waste

DEPTH BELOW GROUND SURFACE (feet)

0
20
40
100
120
260

water table

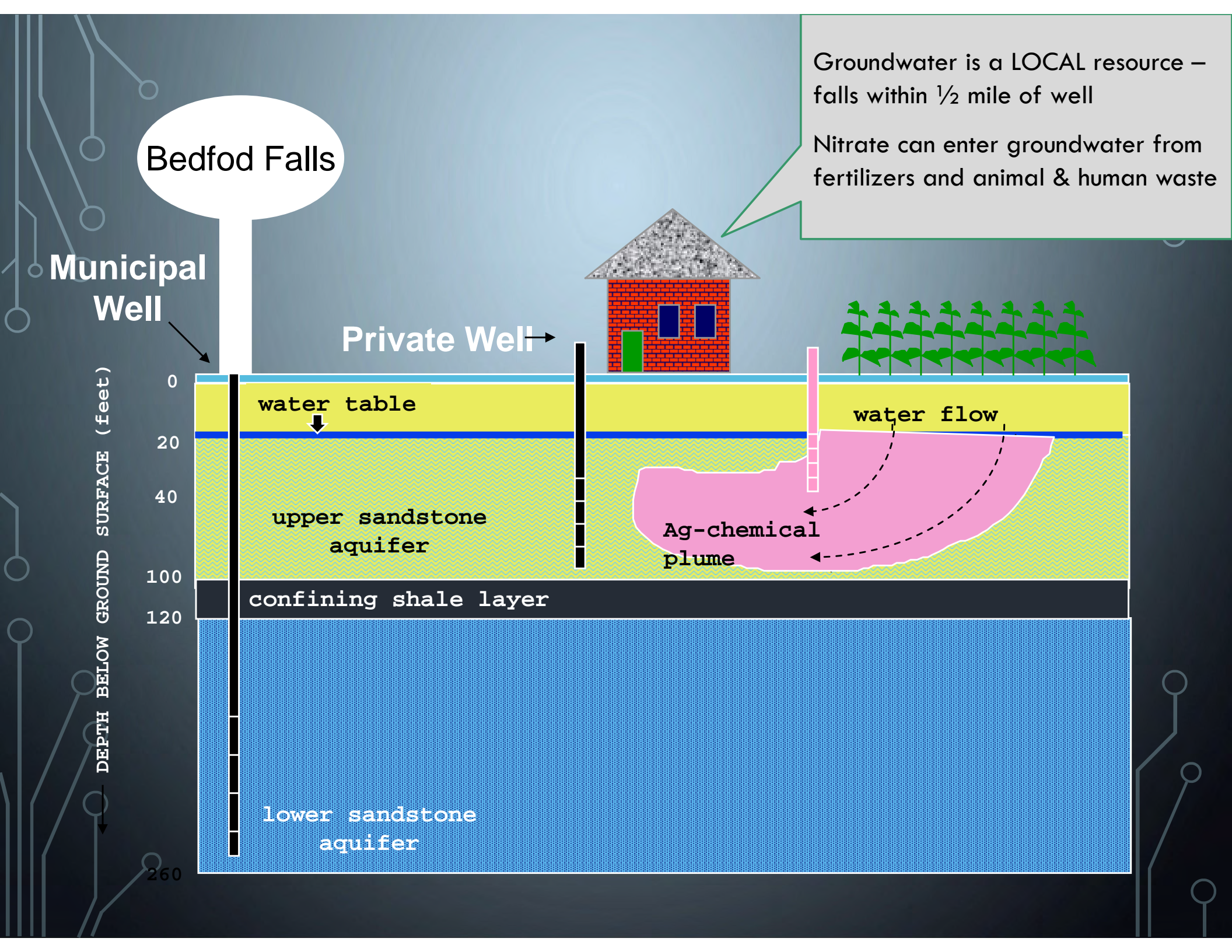
upper sandstone aquifer

confining shale layer

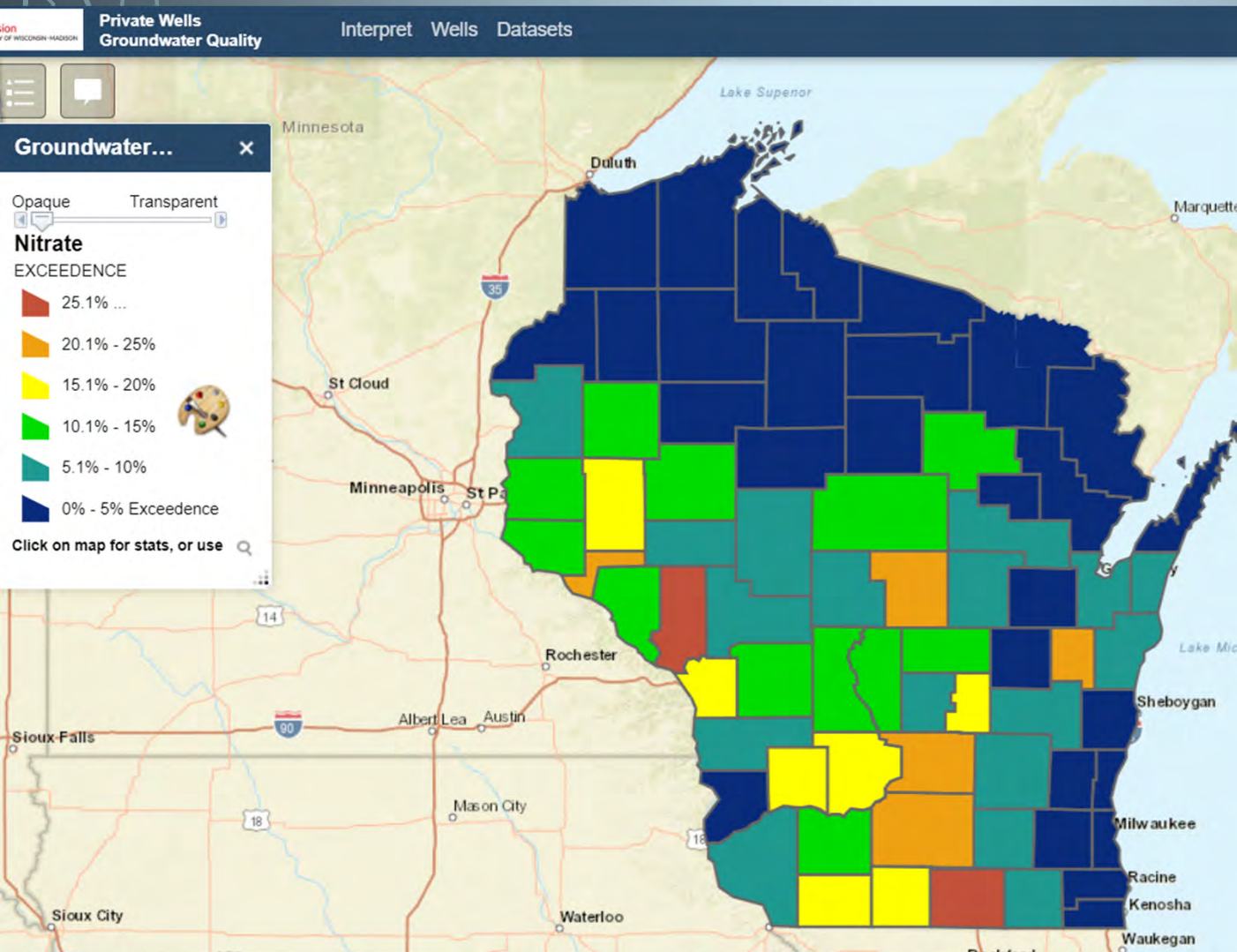
lower sandstone aquifer

water flow

Ag-chemical plume



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*


Health effects of nitrate




WISCONSIN DEPARTMENT
of HEALTH SERVICES


A central illustration of a diverse family of seven people (two adults, two children, and two grandparents) and a small dog, standing together. The family is drawn in a friendly, cartoonish style with various ethnicities and ages represented.

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

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

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.

- Test private wells once per year
- If nitrate level is high, water is more likely to contain pesticides

Different crops leach different amounts of nitrogen to groundwater

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

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

		Inputs			Outputs		Storage	
Crop	Yield (per acre)	Fertilizer	Irrigation ¹	Precip+ Deposition	Harvest Yield N	Misc. losses	Change in N	Leachable Nitrogen
		-----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 ²	8 ton	40-80	41	8	62	14-17	0	15-51

¹Assumes 10 inches of irrigation water containing 18 mg/L nitrate-nitrogen. At this concentration each inch of irrigation water contains 1.8 lbs N/acre.

²Non-nodulating

Sandy soils.

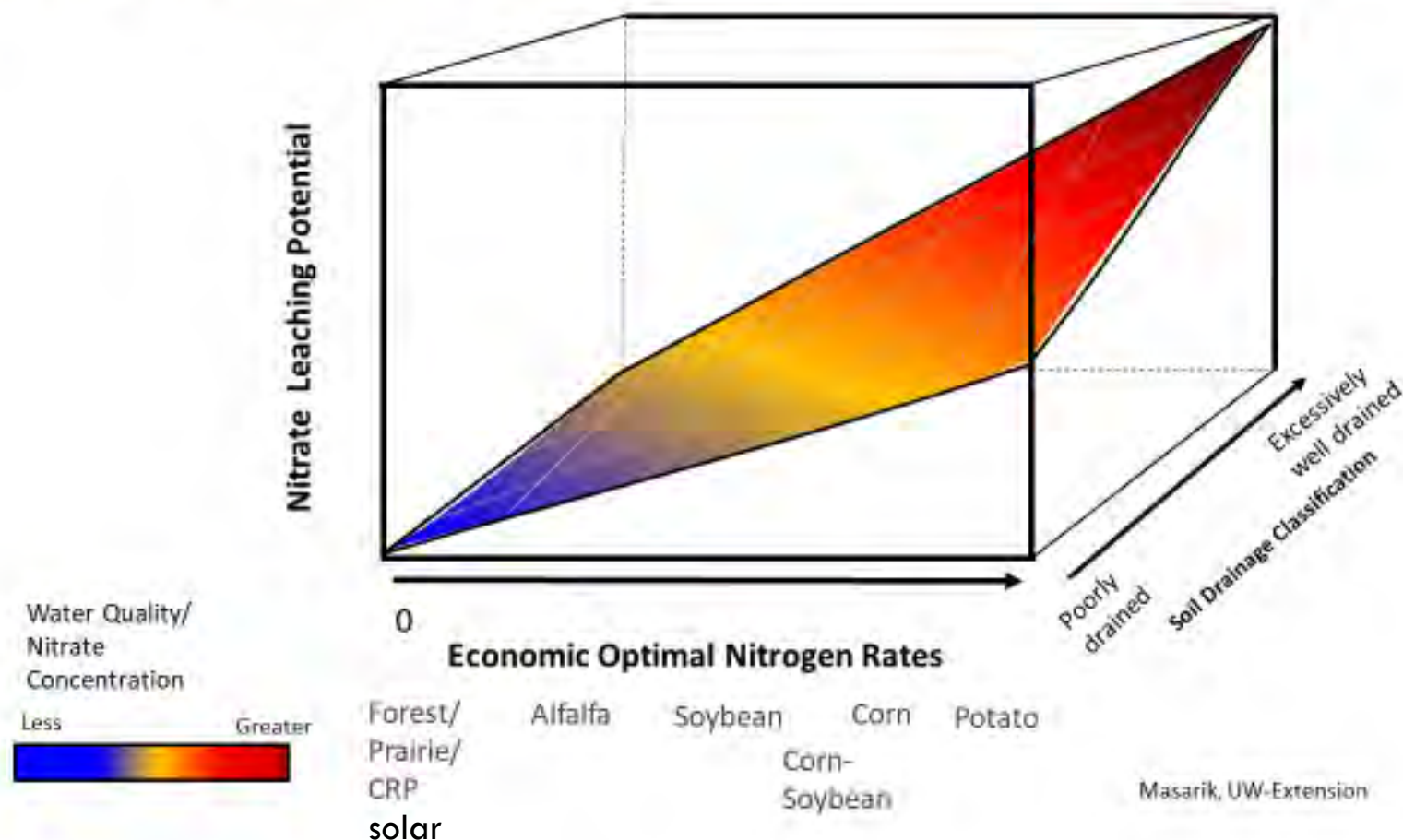
Comparing Land-use Impacts

	Corn ¹ (per acre)	Prairie ¹ (per acre)	Septic ² System
Total Nitrogen Inputs (lb)	169	9	20-25
Nitrogen Leaching Loss (lb)	36	0.04	16-20
Amount N lost to leaching (%)	20	0.4	80-90

1 Data from Masarik, Economic Optimum Rate on a silt-loam soil, 2003

2 Data from Tri-State Water Quality Council, 2005 and EPA 625/R-00/008

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. **LWCD and FSA offices can affect this topic.**

General zoning can make land uses with high potential for groundwater contamination conditional or prohibited uses

	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>Conditional uses: 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>Permitted uses: Ag uses, golf courses and cemeteries. Allowed.</p> <p>Comment: Portage Co has GW flow maps, depth to GW, irrigated fields, water quality viewer, locations of wells and <u>septics</u>.</p>					

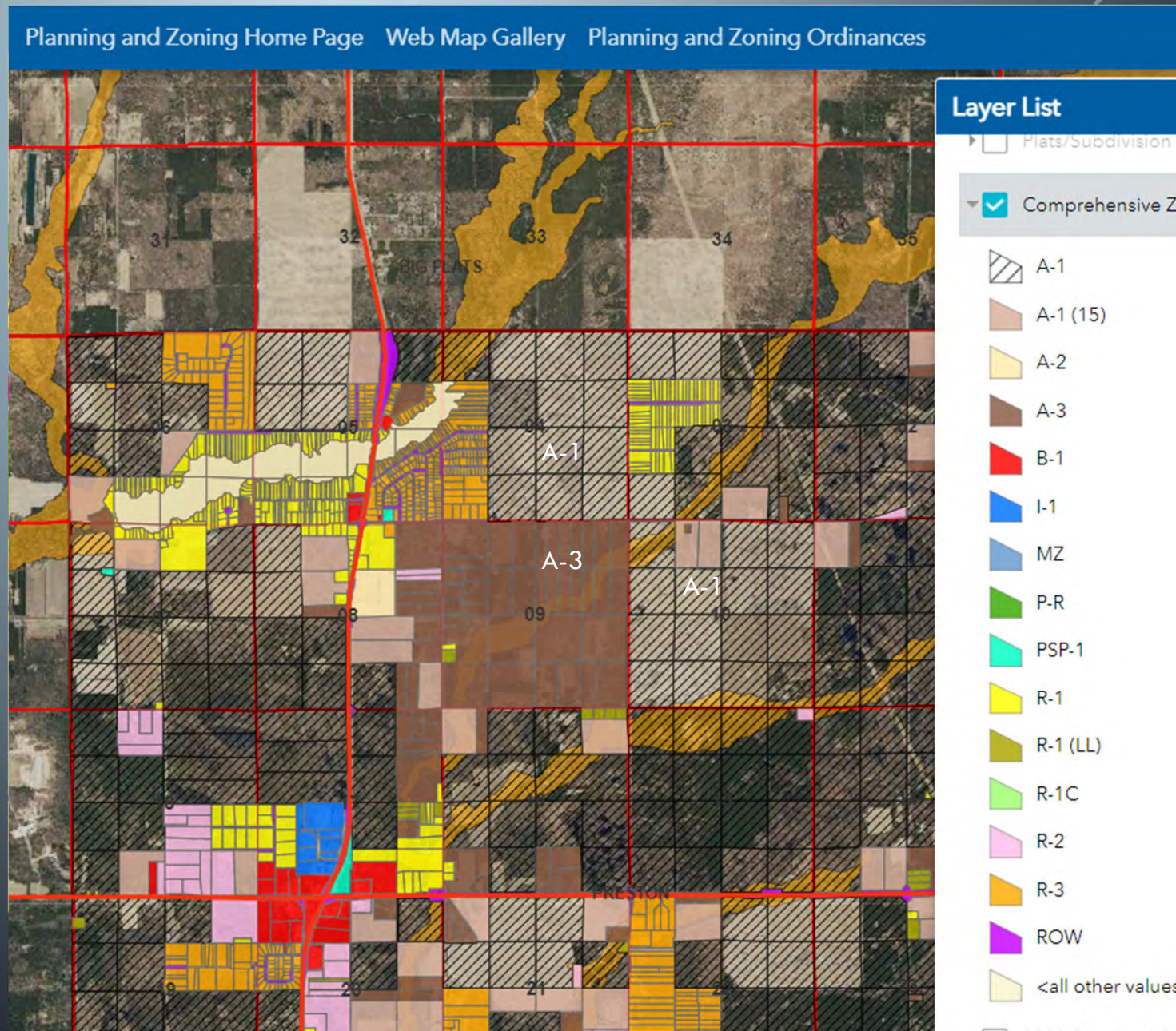
- Review the permitted, conditional, and unlisted/prohibited uses listed for each zoning district in your ordinance. Compare your zoning maps with your groundwater susceptibility/soil maps. Do they need to be updated to protect groundwater quality?
- State law says if a landowner meets or agrees to meet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

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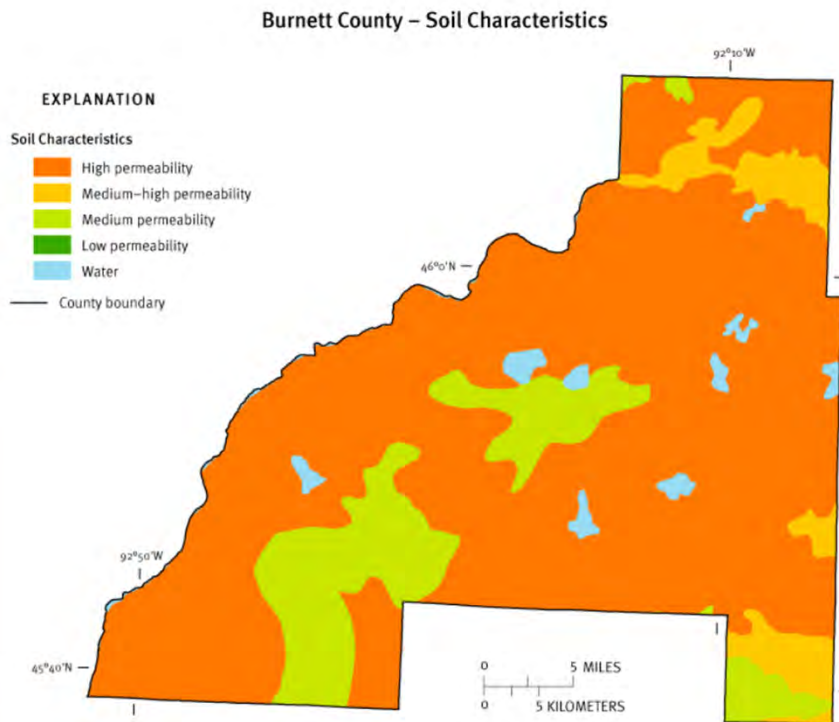
LIST OF AG PERMITTED, CONDITIONAL AND PROHIBITED USES

Consider adjacent zoning districts

A-1 and A-3
are adjacent
to residential
zoning districts



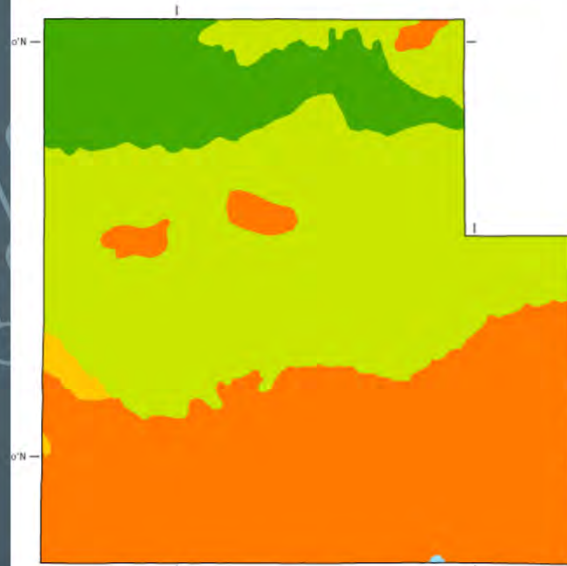
BURNETT COUNTY PLANS TO USE GW SUSCEPTIBILITY MAPS AND ZONING TO LIMIT WHERE NEW CAFOS CAN BE LOCATED



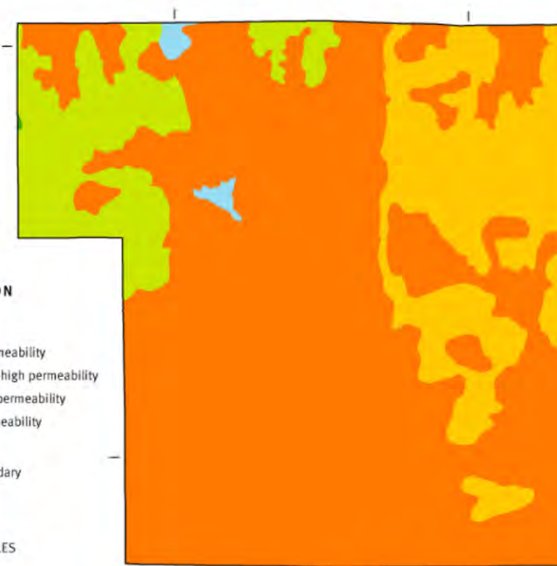
- About 80% of Burnett County is less than 20 feet to the water table and has highly permeable soils
- Burnett County has three ag districts
- Not much exclusive ag zoning (A1) is located in the sandy soil areas of the county
- Land use committee is working on a proposal to allow CAFOs (1000 animal units or more) only in A1, and limit other ag districts to 250 or 500 animal units

- All counties in the Central Sands have areas of highly permeable soils, and some areas with less permeable soils
- Areas with less permeable soils are likely safer places for land uses that are potential sources of groundwater contamination
- Zoning can be used to determine where NEW land uses will be located (e.g. fertilizer plant, manufacturing)

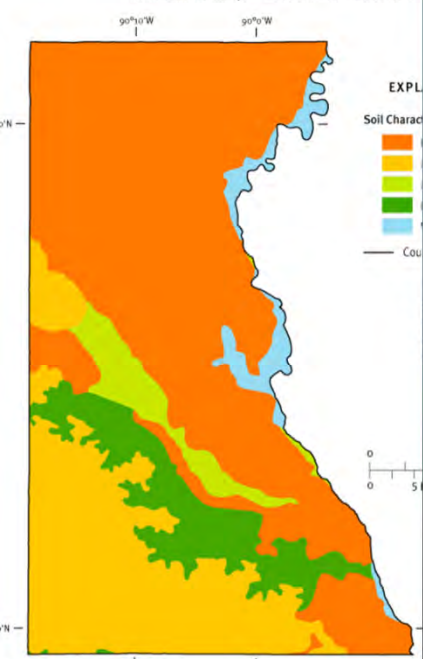
Wood County – Soil Characteristics



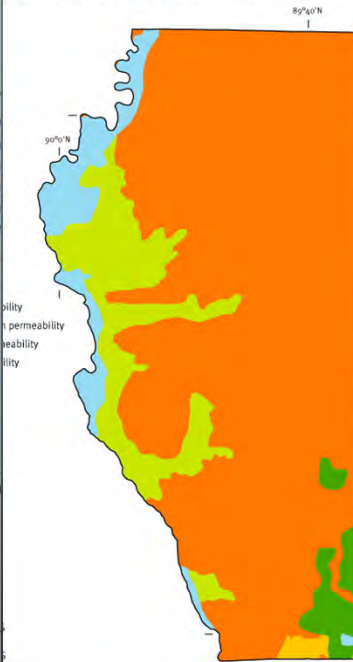
Portage County – Soil Characteristics



Juneau County – Soil Characteristics



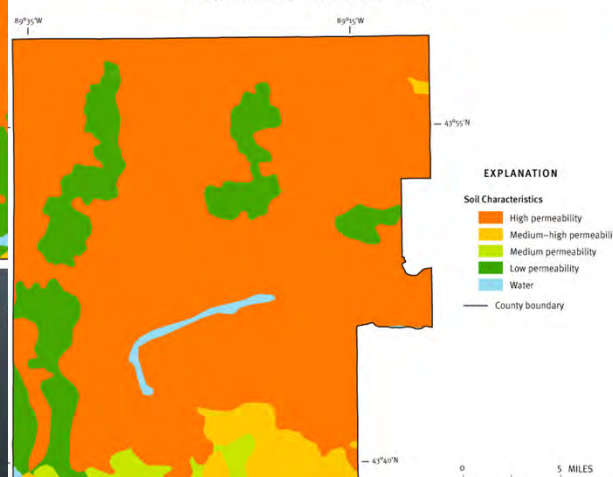
Adams County – Soil Characteristics



Waushara County – Soil Characteristics



Marquette County – Soil Characteristics



Zoning districts can maintain land uses with low groundwater impacts

- Forested areas
- Prairies
- Grazing land and hay
- Solar farms
- GW downgradient of these areas may be protected & low nitrate. Map?



Comparing Land-use Impacts



20 acres

36 lbs	36 lbs	36 lbs	36 lbs
36 lbs	36 lbs	36 lbs	36 lbs
36 lbs	36 lbs	36 lbs	36 lbs
36 lbs	36 lbs	36 lbs	36 lbs
36 lbs	36 lbs	36 lbs	36 lbs

36 lbs/ac x 20 acres = 720 lbs

16 mg/L

20 acres

20 lbs

20 lbs/septic system x 1 septic systems = 20 lbs

1/36th the impact on water quality

0.44 mg/L

Assuming 10 inches of recharge -

Comparing Land-use Impacts



20 acres

36 lbs	36 lbs	36 lbs	36 lbs
36 lbs	36 lbs	36 lbs	36 lbs
36 lbs	36 lbs	36 lbs	36 lbs
36 lbs	36 lbs	36 lbs	36 lbs
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36 lbs/ac x 20 acres = 720 lbs

20 acres

20 lbs	20 lbs	20 lbs	20 lbs
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20 lbs	20 lbs	20 lbs	20 lbs
20 lbs	20 lbs	20 lbs	20 lbs
20 lbs	20 lbs	20 lbs	20 lbs
20 lbs	20 lbs	20 lbs	20 lbs
20 lbs	20 lbs	20 lbs	20 lbs

20 lbs/septic system x 36 septic systems = 720 lbs

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

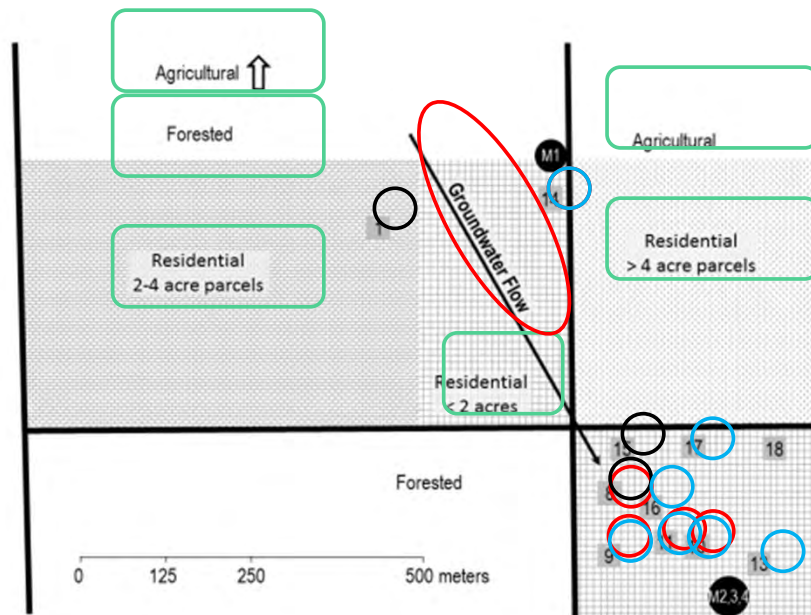
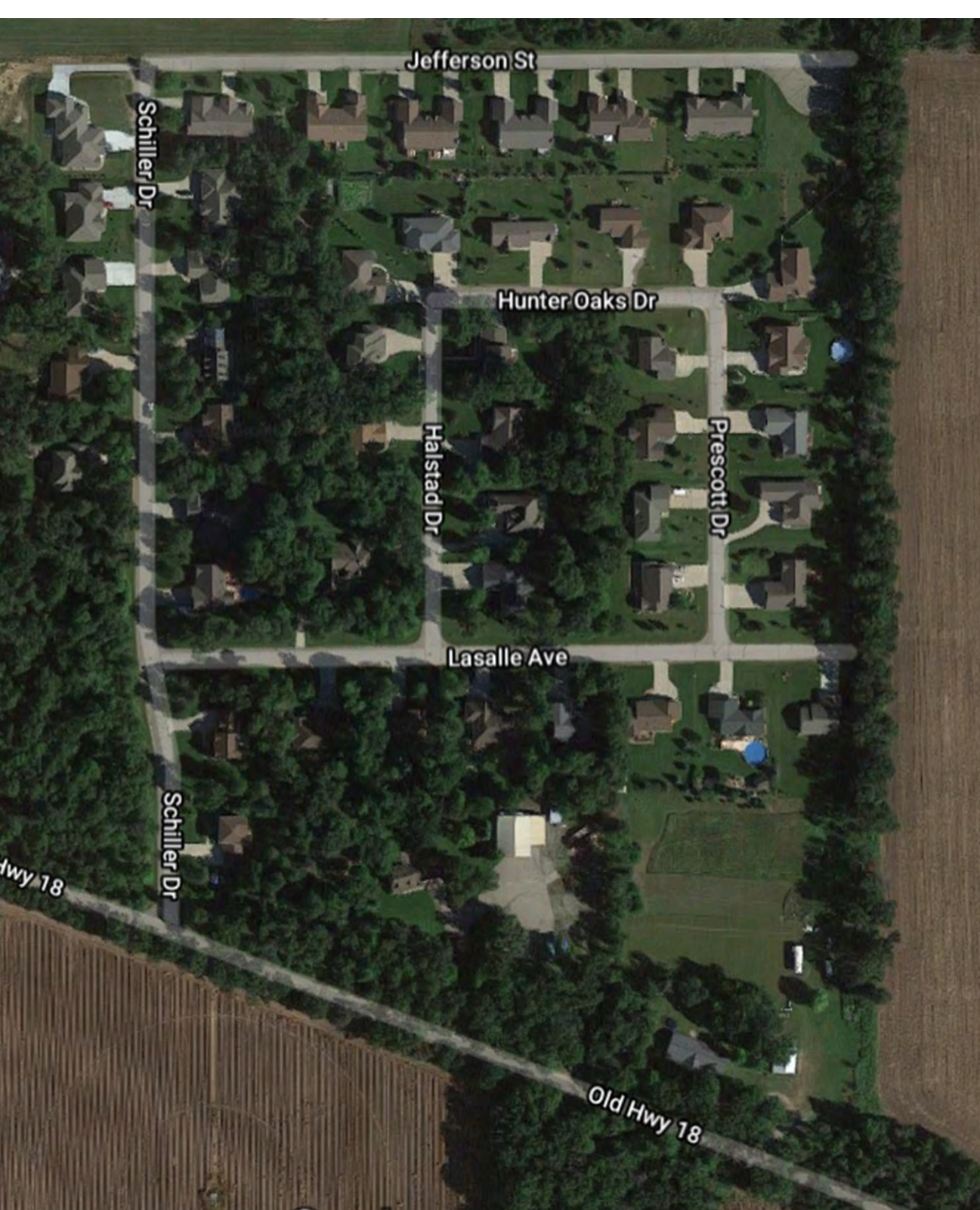


Figure 2. North study area showing land uses and density of homes in the residential areas. Numbered squares show location of private wells sampled and dark circles show the location of the monitoring wells.

UNSEWERED RESIDENTIAL AREAS

- In a sandy area with unsewered lot sizes less than 2 acres, nitrate levels were:
 - 7 wells 2-10 ppm = blue circles
 - 3 wells over 10 ppm = black circles
 - 1 well less than 2 ppm
- Sulfamethoxazole, a human antibiotic = red circles



RESIDENTIAL ZONING FOR UNSEWERED DEVELOPMENT

- Zoning 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 septics

2-year capture zones
for 30 lots on 78 acres
with 3X safety factor



Figure 5. Simulated two-year time-of-travel capture zones for individual wells and community wells.

Table 1. Minimum setback distances required between domestic wells and septic systems.

State	Minimum setback (ft.)		State	Minimum setback (ft.)	
	Septic tank	Leach field		Septic tank	Leach field
Alabama	100	100	Montana	50	100
Alaska	75	100	Nebraska	50	100
Arizona	100	100	Nevada	100	100 or 150 ^b
Arkansas	100	100	New Hampshire	75	75
California	100	100	New Jersey	50	100
Colorado	50	100	New Mexico	50	100
Connecticut	75	75	New York	50	100
Delaware	50	100	North Carolina	100	100
Florida	75	75	North Dakota	50	50
Georgia	50	100	Ohio	50	50
Hawaii	none	none	Oklahoma	50 or 100 ^c	50 or 100 ^c
Idaho	100	100	Oregon	50	100
Illinois	50	75	Pennsylvania	50	100
Indiana	50	100	Rhode Island	75	100
Iowa	50	100	South Carolina	50	50
Kansas	50	50	South Dakota	50 or 75 ^d	100 or 150 ^d
Kentucky	50	100	Tennessee	50	50
Louisiana	50	100	Texas	50	150
Maine	60	100	Utah	50	100
Maryland	50 or 100 ^a	50 or 100 ^a	Vermont	50	100–500 ^e
Massachusetts	50	100	Virginia	50	50
Michigan	50	50	Washington	50	100
Minnesota	50	50	West Virginia	50 or 100 ^f	100
Mississippi	50	100	Wisconsin	25	50
Missouri	50	100	Wyoming	50	100

Notes:

Setback distances apply to new wells; many states allow variances for older wells or sites where minimum setbacks cannot be achieved (due to lot size, for example).

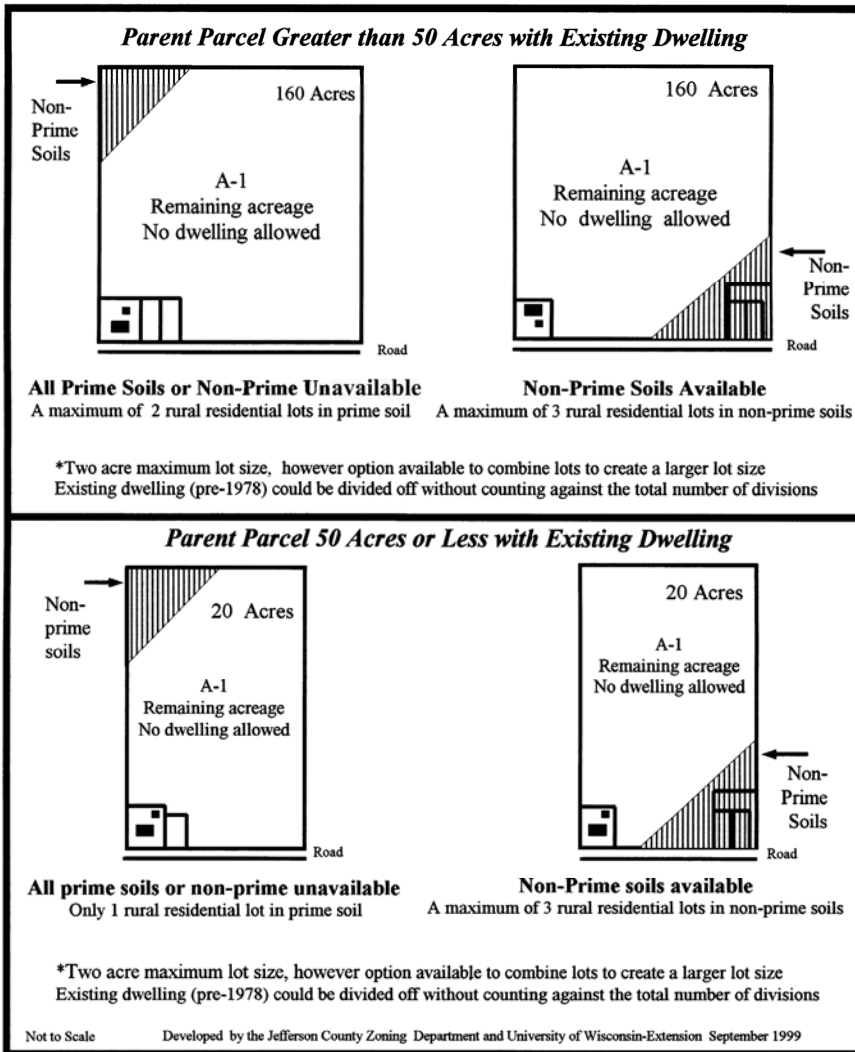
a. Based on well completion in a confined or unconfined aquifer.

Recommendations

- Require developers include groundwater flow direction in plans
- Increase setback distances or minimum lot sizes in unsewered residential subdivisions to protect drinking water
- Focus on well construction (casing depth)
- Community wells with source-area protection; allow smaller lot sizes with cluster subdivisions
 - need neighborhood assn or other group to take responsibility for well
- Change state rule/code to give local entities the authority to regulate well construction and setback distances

Wilcox et al. 2010. Using groundwater models to evaluate strategies for drinking-water protection in rural subdivisions. *Journal of the American Planning Association*. 76:3:295-304.

WHAT CAN I DO ON MY LAND AS A RESULT OF NEW POLICIES?



Limited residential allowed in a-1 zoning districts

- Farmland preservation
- Fewer new residential lots in A-1 zoning districts which may have high nitrate levels

Limiting new residential lots where drinking water is not safe

Do drinking water health standards such as 10 mg/l nitrate-nitrogen, pesticide standards, or other drinking water standards need to be met before subdividing land?

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.

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

Quick Review



Key Takeaways



- Land use affects groundwater quality
- Over 95% of Wisconsin's communities use groundwater for drinking water
- Zoning and subdivision ordinances are tools to protect groundwater
- Weaknesses:
 1. 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. Wellhead protection ordinances protect municipal wells
 2. Land uses with potential pollutants can be listed as conditional or prohibited uses
 3. Subdivision design or minimum lot sizes protect private well water quality from septic system effluent

Do you plan to take any of these actions after attending this session? (select all that apply)



See what groundwater goals and policies are in your comprehensive plan



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



Check if residential lot sizes for unsewered lots are 2 acres or more



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



Share webinar resources with my community

The background features a series of concentric circles in light gray, some solid and some dashed, creating a ripple effect. A solid blue callout box with a pointed bottom is centered on the page.

Recommended Resources



Zoning as a Tool to Protect Groundwater

May 19, 12:00 - 1:00 pm

This webinar discusses the strengths and weaknesses of zoning as a tool to protect groundwater. Topics include minimum lot sizes for homes on septic systems, zoning options for high nitrogen uses, and wellhead protection ordinances.

Webinar Materials

PowerPoint slides for the webinar will be available in PDF format a day before the event.

[Wisconsin Well Water Quality Viewer](#) - Private well data for Wisconsin includes nitrate and pesticide concentrations.

[Nitrate in Wisconsin's Public Water Systems](#)

[Protecting Wisconsin's Groundwater through Comprehensive Planning](#)

Note: this website was created in 2007, so data is old. For groundwater quality maps, use the Wisconsin Well Water Quality Viewer.

- [Groundwater policies by county in 2007](#)
- [Example groundwater goals, objectives and policies](#)

[Well Water for Rural Residential Subdivisions](#)

[Nitrate in Wisconsin's Groundwater, 2021](#)

[Pesticides in Wisconsin's Groundwater](#)

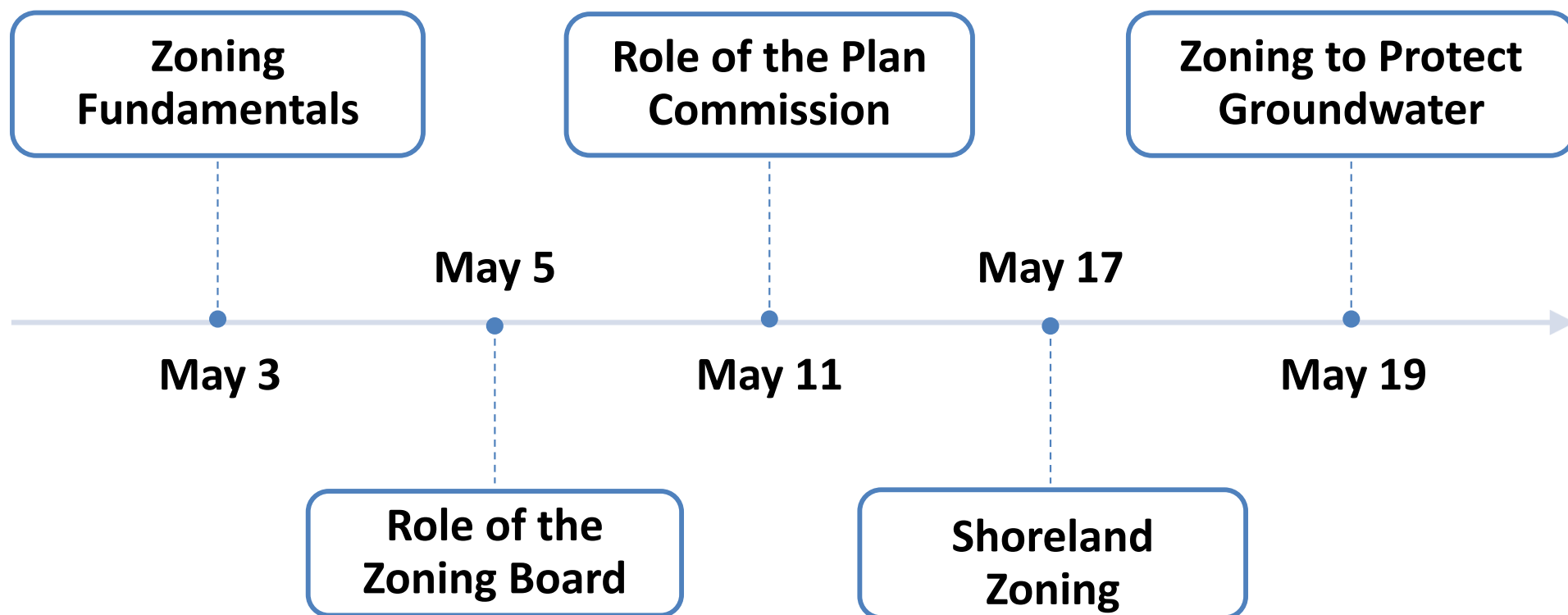
[Agricultural Chemical in Wisconsin's Groundwater, includes maps, 2017](#)

[Introductions to Zoning](#): Segments on different parts of zoning with explanations and short videos.

[Zoning](#)

(34 pages). Zoning is one tool used to carry out community goals and objectives as set forth in a comprehensive or land use plan. This compilation by Struck covers such topics as zoning powers and developing a zoning ordinance to extraterritorial zoning.

Spring Zoning Webinar Series



Thank You!

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



Extension
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Demographics

Understanding the demographics of our participant helps us improve Extension programs and services. Asking for the following also helps us meet our institutional requirements for compliance with Federal non-discrimination policies. Providing us with this information is **voluntary**.

If you have questions about this survey or why Extension collects this information, please contact Kim Waldman, Compliance Coordinator & Equity Strategist, UW-Madison Division of Extension, (608) 263-2776, kim.waldman@wisc.edu



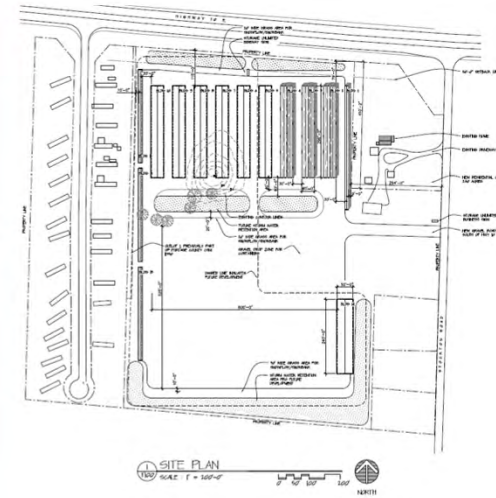
Center for Land Use Education
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EXAMPLE OF USING YOUR PLAN TO PROTECT GROUNDWATER

- Plans are only valuable if they are used in making decisions
- Changes to zoning are required to be consistent with the comprehensive plan
- Portage County used their comp plan to guide groundwater protection conditions for a new proposed development that required a change in zoning



NITRATE — HEALTH EFFECTS

- **Infants** below the age of 6 months who drink water containing nitrate in excess of the MCL are especially at risk, and could become seriously ill with “**blue-baby syndrome**”, which deprives the infant of oxygen and in extreme cases can cause death
- **Neural tube defects and other birth defects**
- **Very low birth weight, and very preterm birth**
- **Cancer.** Increased risk of
 - non-Hodgkin’s lymphoma
 - **colorectal cancer**
 - **thyroid cancer**
 - gastric cancer
 - bladder and ovarian cancer in older women

Wisconsin Groundwater Coordinating Council Report to the Legislature: 2018

dnr.wi.gov/topic/Groundwater/documents/GCC/gwQuality/Nitrate.pdf Yellow and white text above.

Temkin et al. 2019. Exposure-based assessment and economic valuation of adverse birth outcomes and cancer risk due to nitrate in United States drinking water. Environmental Research. <https://doi.org/10.1016/j.envres.2019.04.009>
(Findings in **green** above)

Nitrate – health effects

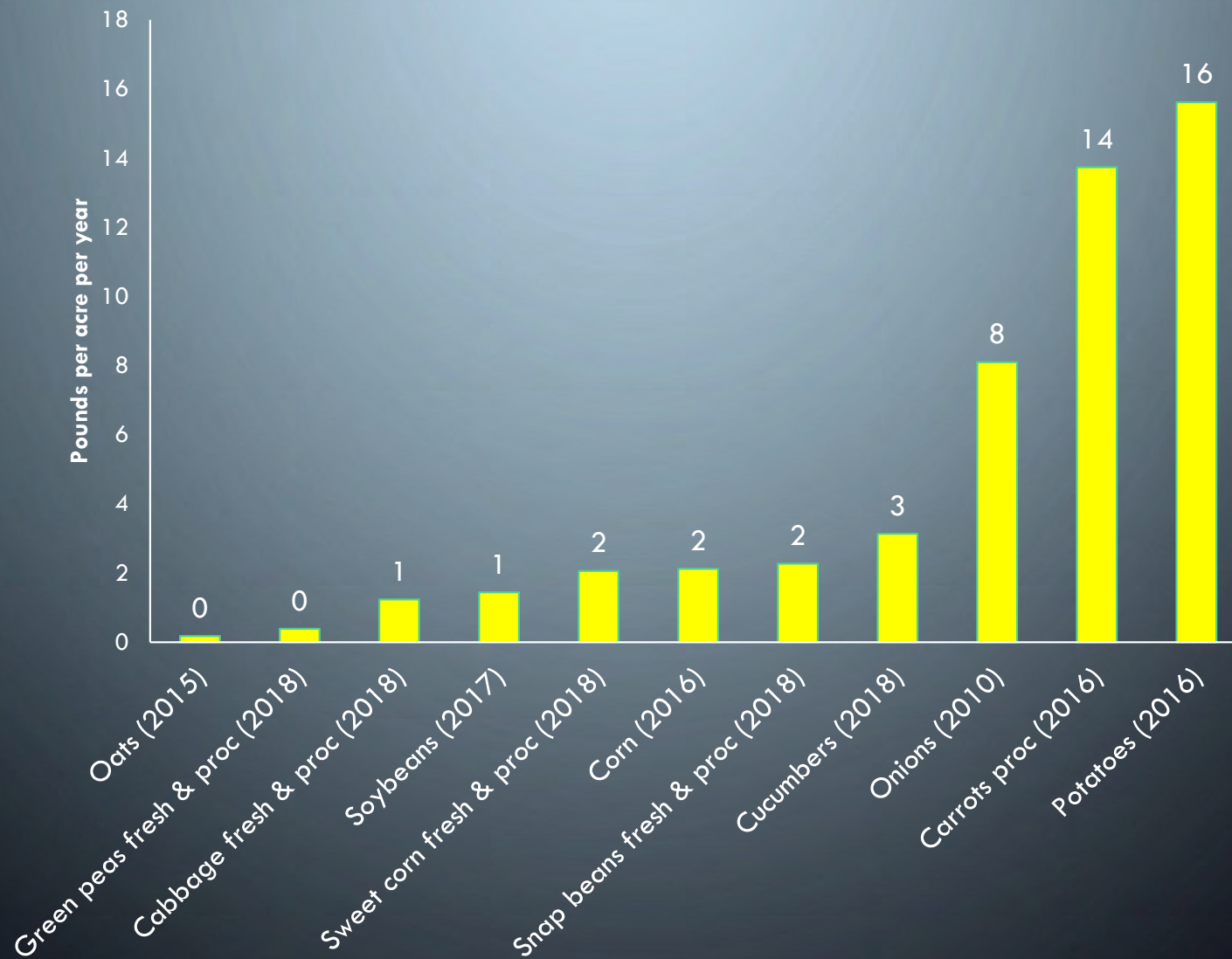
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 - bladder and ovarian cancer in older women

Wisconsin Groundwater Coordinating Council Report to the Legislature: 2018

dnr.wi.gov/topic/Groundwater/documents/GCC/gwQuality/Nitrate.pdf Yellow and white text above.

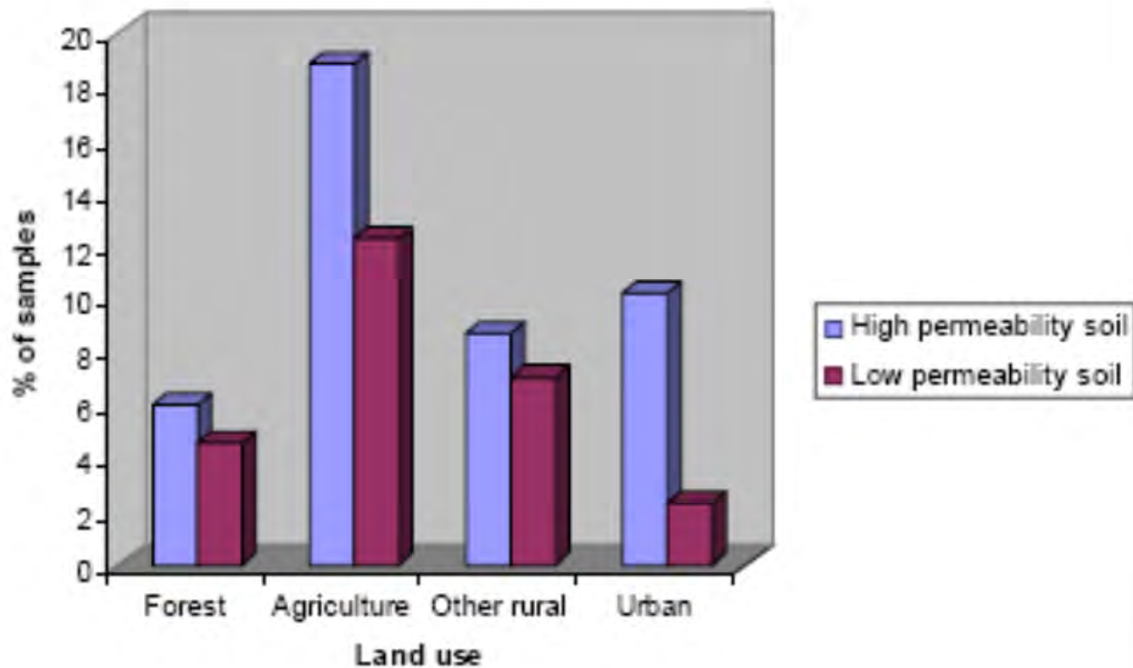
Temkin et al. 2019. Exposure-based assessment and economic valuation of adverse birth outcomes and cancer risk due to nitrate in United States drinking water. Environmental Research. <https://doi.org/10.1016/j.envres.2019.04.009>

Average pounds of pesticides applied per acre in Wisconsin



Land use - nitrate connection

Percentage of drinking water samples with nitrate levels over the health standard



In WI, nutrient application on agricultural fields accounts for 90% of nitrate in groundwater

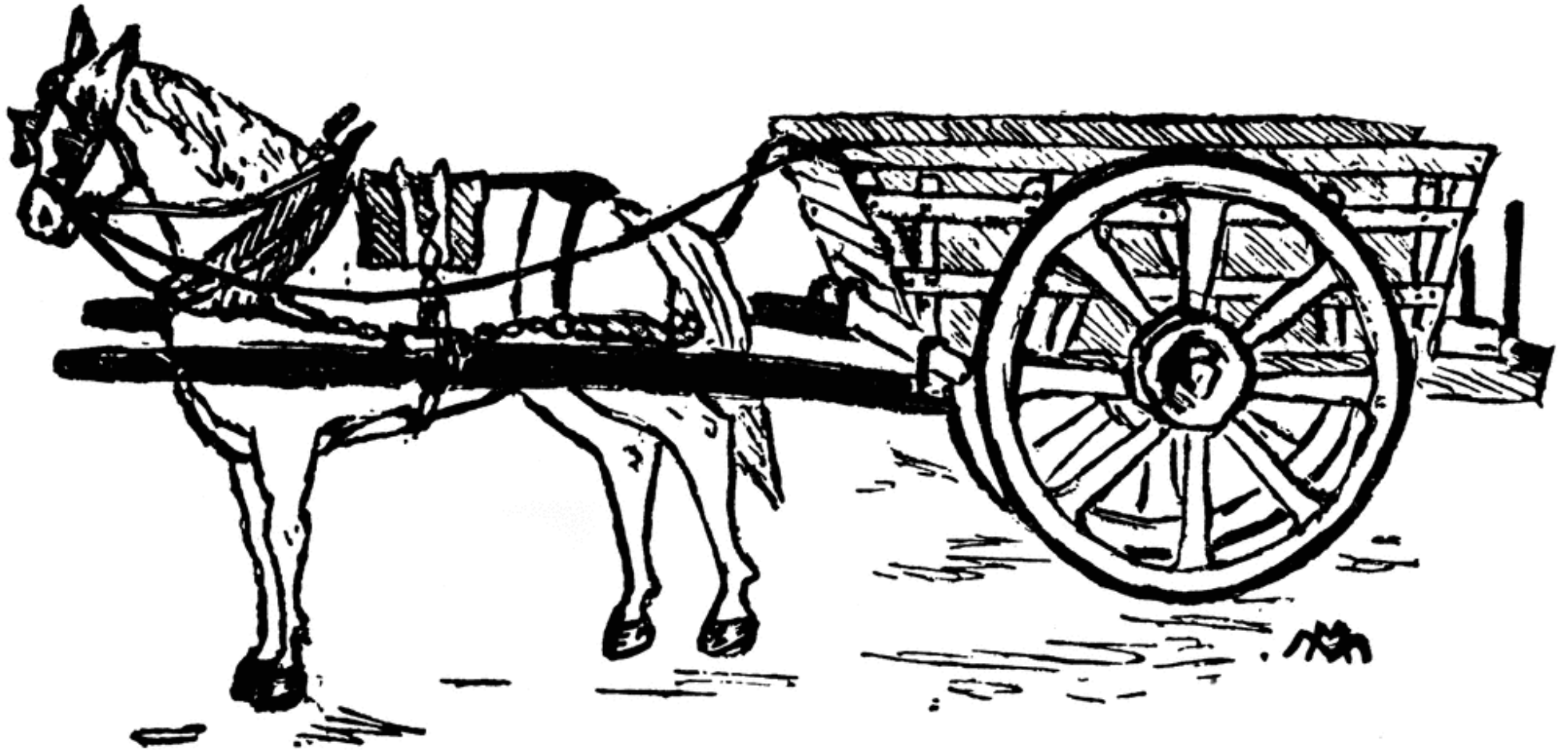
- Based on 35,000 samples from WI
- Drinking water is 3X more likely to exceed the nitrate standard in agricultural areas compared to forested areas
- High nitrate levels are also more common in sandy areas where the soil is more permeable
- Groundwater with high nitrate from agricultural lands is more likely to contain pesticides than groundwater with low nitrate levels

SUMMARY

- Zoning has strengths and weaknesses related to protecting groundwater
- Weaknesses
 - Limited ability to address existing problematic land uses
 - Zoning doesn't determine which crops are grown in ag districts, even though they have different amounts of nitrogen leaching to groundwater
- Strengths
 - Can use wellhead protection ordinances to protect municipal/community wells
 - Can set minimum lot sizes to space out residential septic systems and protect private well water quality from septic systems
 - Can list high nitrogen uses as conditional or prohibited uses (e.g. fertilizer plants, landfills, feedlots, cemeteries, golf courses, possibly CAFOs)
 - Can geographically separate high nitrogen uses from wells - theoretically
- Can be changed at any time by elected officials (town-county zoning). Land purchases are more certain long-term protection, and more expensive.

Comprehensive plan = Goals

Zoning = Way to achieve goals



WHAT DO ZONING AND SUBDIVISION REGS DO?

- Set the development pattern
 - Density
 - Land Uses
 - Building envelope dimensions (setbacks, height, etc.)
 - Roads
- Impacts how our communities look and how they function



General zoning can make land uses with high nitrogen leaching conditional or prohibited uses

	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>Conditional uses: 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>Permitted uses: Ag uses, golf courses and cemeteries. Allowed.</p> <p>Comment: Portage Co has GW flow maps, depth to GW, irrigated fields, water quality viewer, locations of wells and <u>septics</u>.</p>					

- Review the permitted, conditional, and unlisted/prohibited uses listed for each zoning district in your ordinance. Compare your zoning maps with your groundwater susceptibility/soil maps. Do they need to be updated to protect groundwater quality?
- If a conditional use applicant meets or agrees to meet all standards in ordinance and applied by the board, the conditional use must be granted

COUNTY SURVEY RESULTS

	Adams	Juneau	Marquette	Portage	Waushara	Wood
Which towns have county zoning?	Most	None	Most	Most	Most	All. 11/21 towns <u>also</u> have town zoning.
Large residential lot sizes that limit septic system density and nutrient loading?	At least one residential zoning district with a lot size ≥ 2 acres (R1 & R2)	N/A	No. Ag districts have lot sizes ≥ 2 acres	At least one residential zoning district with a lot size ≥ 2 acres (Rural & Urban Fringe)	At least one residential zoning district with a lot size ≥ 2 acres (Residential Single-Family Planned Devt)	No minimum lot sizes in county zoning
Comments	<ul style="list-style-type: none"> How widely do residential zoning districts with a minimum lot size 2 acres or greater apply in your county? What percentage of residentially zoned areas have minimum lot sizes 2 acres or greater? Where residential zoning districts have lot sizes 2 acres or greater, drinking water quality should be <u>fairly well</u> protected from nearby septic systems. Ag or other land uses applying nitrogen may still affect drinking water quality in residential zoning districts with minimum lot sizes 2 acre or greater. Large residential lot sizes also take more farmland and woodlands out of production. An alternative is to guide new residential development to villages/hamlets with public water and sewer to provide safe drinking water. Jefferson County uses this approach to an extent. Most ag districts have lot sizes greater than 2 acres, though some ag districts and <u>general purpose</u> districts have minimum lot sizes less than 2 acres and allow residential development (e.g. Waushara, Marquette, Town of Rudolph). 					