



# Walworth County

## Well Testing Results

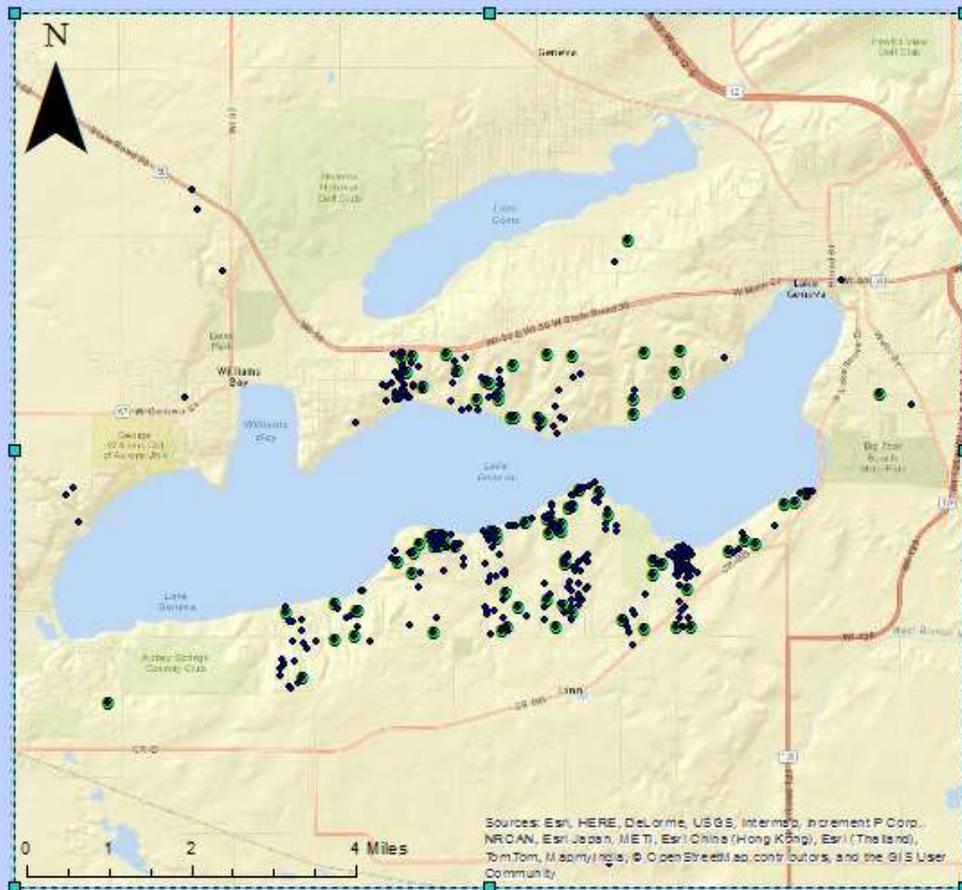
Researched and Presented by:

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This well testing program was made possible through the cooperative efforts of the Geneva Lake Environmental Agency, George Williams College, Linn Sanitary District, and Walworth County Public Health.



# Lake Geneva Area Well Water Results: Coliform Map #1

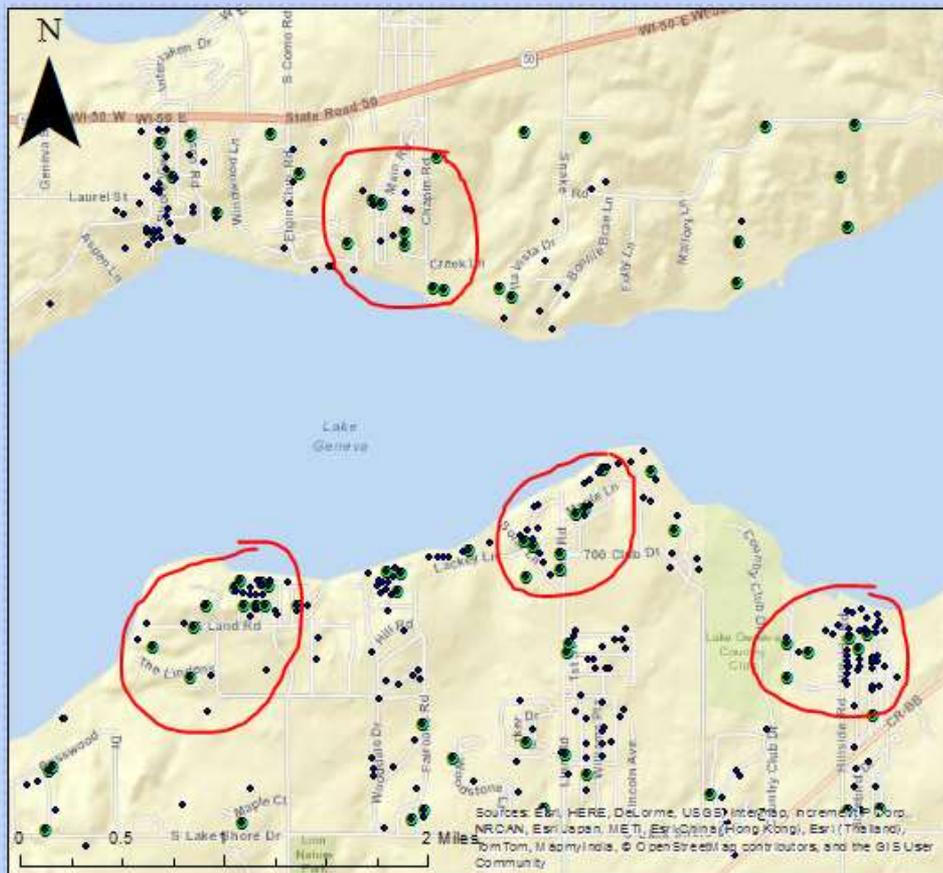


Well Water Coliform Status was retrieved from the Geneva lake Environmental Agency 2014 data. This map has been created to the best of the cartographer's abilities. Any injuries, misinterpretations, or other issues which may result from the use of this map are not the responsibility of the mapmaker. Any questions can be directed to the Geneva lake Environmental Agency of Williams Bay, WI, 53191 or call Ted Peters at 262.245.4532

# Coliform

- **Coliforms** are a broad class of bacteria found in the environment, including the feces of humans and other warm-blooded animals. The presence of coliform bacteria in drinking water may indicate a possible presence of harmful, disease-causing organisms.
- Drinking water standard for coliform bacteria is **zero**.
- There are 3 types of Coliform bacteria:
  - Total Coliform Bacteria: common in the environmental (soil and vegetation) generally harmless
    - Fecal Coliform Bacteria: subgroup of total, presence means recent fecal contamination
      - E.Coli: subgroup of fecal will cause illness, presence means recent fecal contamination.

## Lake Geneva Area Well Water Results: Coliform Map #2



### Legend

• Well Location

### Coliform

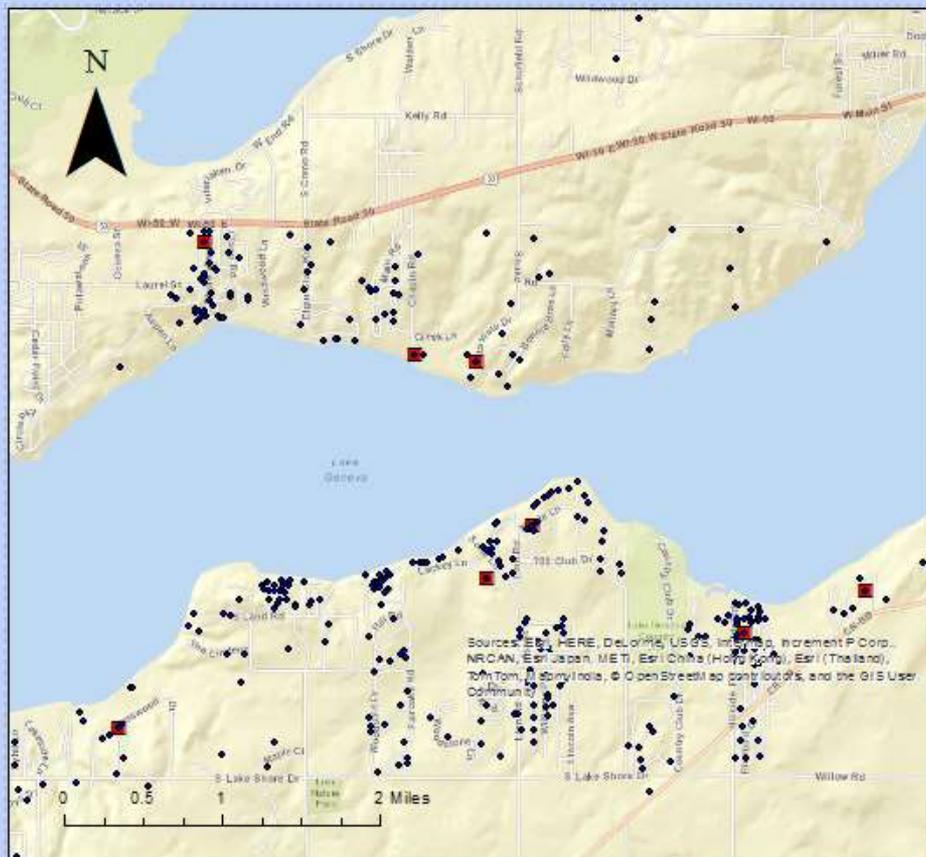
● Present

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# Possible Reasons for Contamination

- **A missing or defective well cap** - seals around wires, pipes, and where the cap meets the casing may be cracked, letting in contaminants
- **Contaminant seepage through the well casing** - cracks or holes in the well casing allow water that has not been filtered through the soil to enter the well. This seepage is common in the wells made of concrete, clay tile, or brick
- **Contaminant seeping along the outside of the well casing** - many older wells were not sealed with grout when they were constructed
- **Well flooding** - a common problem for wellheads located below the ground in frost pits that frequently flood during wet weather.

# Lake Geneva Area Well Water Results: E Coli Map #3



## Legend

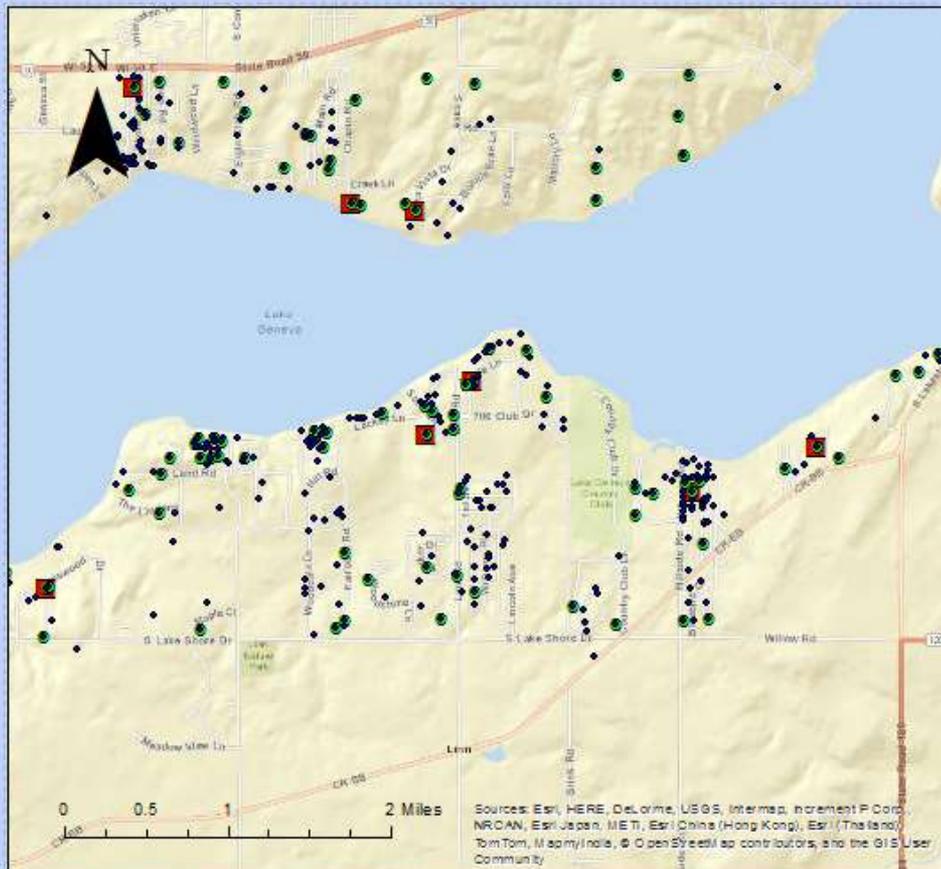
• Well Location

## E Coli

■ Present

Well Water E Coli Status was retrieved from the Geneva Lake Environmental Agency 2014 data. This map has been created to the best of the cartographer's abilities. Any injuries, misinterpretations, or other issues which may result from the use of this map are not the responsibility of the mapmaker. Any questions can be directed to the Geneva Lake Environmental Agency of Williams Bay, WI, 53191 or call Ted Peters at 262 245 4532

## Lake Geneva Area Well Water Results: E Coli and Coliform Map #4



Well Water E Coli and Coliform Status was retrieved from the Geneva lake Environmental Agency 2014 data. This map has been created to the best of the cartographer's abilities. Any injuries, misinterpretations, or other issues which may result from the use of this map are not the responsibility of the mapmaker. Any questions can be directed to the Geneva lake Environmental Agency of Williams Bay, WI, 53191 or call Ted Peters at 262 245 4532

# What is E Coli?

- A strain of bacteria called *Escherichia coli*.
- Most of these strains are healthy and can be found in human and animal intestines.
- There is a strain called O157:H7, that produces a harmful toxin that can cause severe illness.
- Drinking water standard for E-coli bacteria is **zero**.

(CDC, 2009). from [http://www.cdc.gov/healthywater/drinking/private/wells/disease/e\\_coli.html](http://www.cdc.gov/healthywater/drinking/private/wells/disease/e_coli.html)

# Possible Causes

- The well may be positioned too closely to a source of contamination
  - in-ground septic system
- A lack of well monitoring
  - Water testing
- Common Maintenance
  - Cracked pipes
  - Missing or defective well caps
  - Locating possible points of seepage where sewage, polluted stormwater or agricultural runoff can drain into.

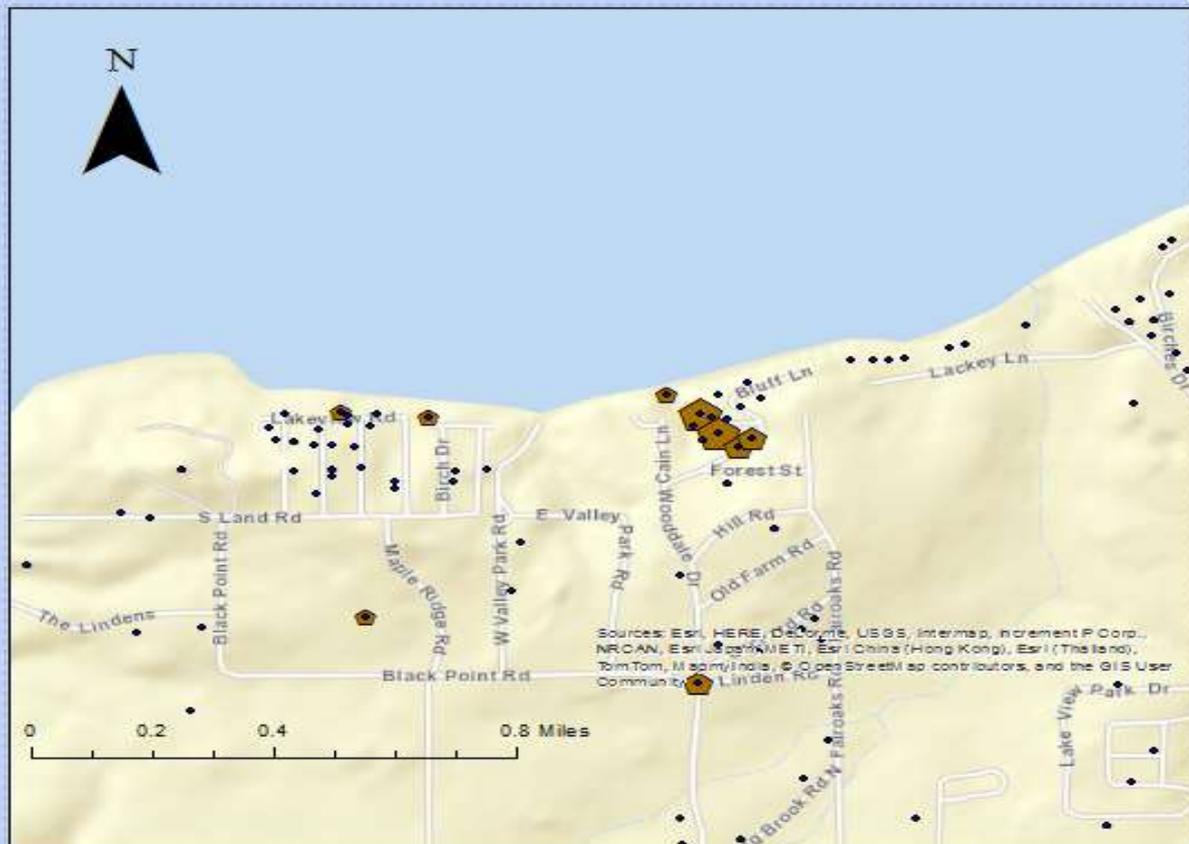
Disinfecting Private Wells - Drinking Water and Health Newsletter. (n.d.). from [http://www.waterandhealth.org/newsletter/private\\_wells.html](http://www.waterandhealth.org/newsletter/private_wells.html)  
(CDC, 2009). from [http://www.cdc.gov/healthywater/drinking/private/wells/disease/e\\_coli.html](http://www.cdc.gov/healthywater/drinking/private/wells/disease/e_coli.html)

# How much E Coli is too much?

If any E Coli is found in your drinking water take caution and retest your water system.



# South High Arsenic Clusters: Arsenic (ppb) Map #6



## Legend

- Well Location

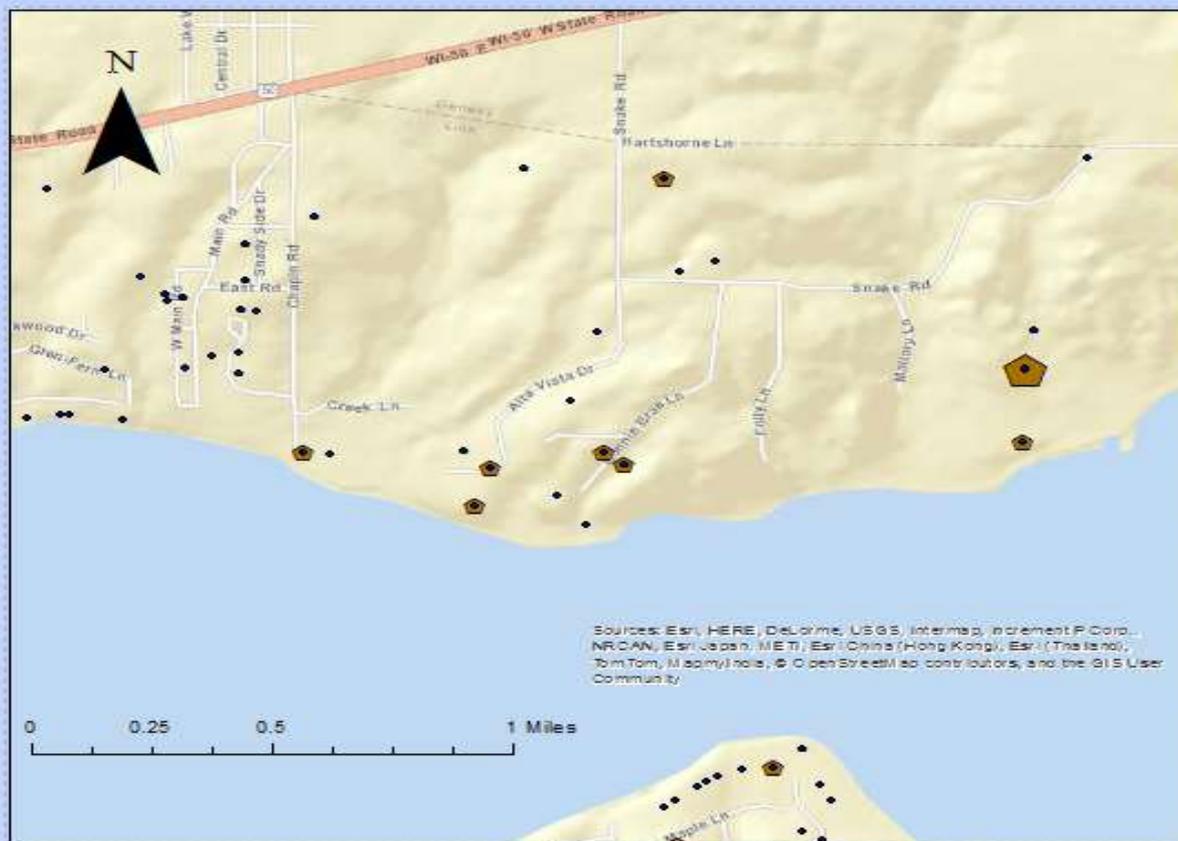
## Arsenic

### Arsenic Content ppb

- 2.000000 - 4.000000
- 4.000001 - 25.000000
- 25.000001 - 50.000000
- 50.000001 - 70.000000

Well Water Arsenic Status was retrieved from the Geneva Lake Environmental Agency 2014 data. This map has been created to the best of the cartographer's abilities. Any injuries, misinterpretations, or other issues which may result from the use of this map are not the responsibility of the mapmaker. Any questions can be directed to the Geneva Lake Environmental Agency of Williams Bay, WI, 53191 or call Ted Peters at 262 245 4532

# North Side High Arsenic Clusters: Arsenic (ppb) Map #7



## Legend

- Well Location

## Arsenic

### Arsenic Content ppb

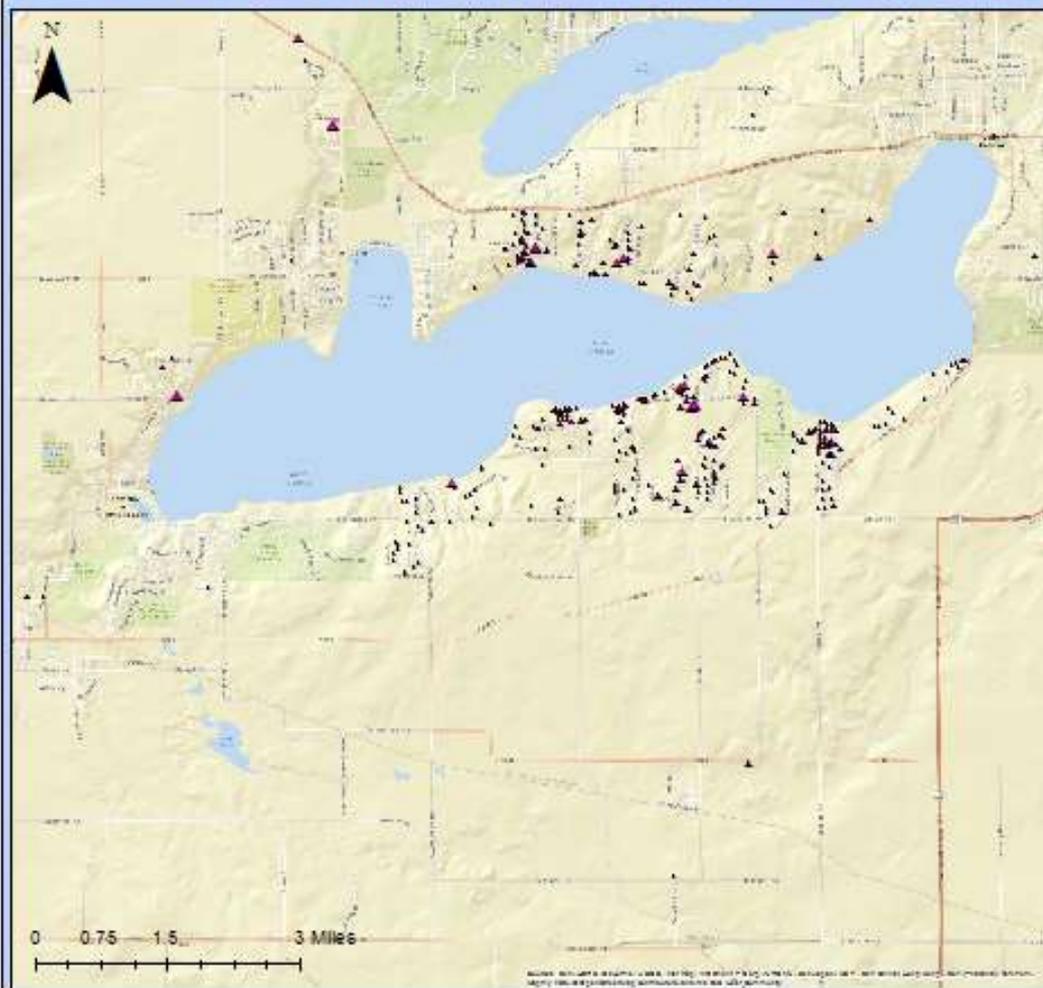
- 2.000000 - 4.000000
- 4.000001 - 25.000000
- 25.000001 - 50.000000
- 50.000001 - 70.000000

Well Water Arsenic Status was retrieved from the Geneva Lake Environmental Agency 2014 data. This map has been created to the best of the cartographer's abilities. Any injuries, misinterpretations, or other issues which may result from the use of this map are not the responsibility of the mapmaker. Any questions can be directed to the Geneva Lake Environmental Agency of Williams Bay, WI, 53191 or call Ted Peters at 262.245.4532

# Explanation of High Arsenic Presence

- Clusters of high arsenic content are thought to be attributed to the presence of Chromated Copper Arsenate (CCA), an inorganic arsenic chemical found in treated wood. The close proximity of the clusters to the Geneva Lake would require the presence of treated wood in housing to reduce moisture damage.
- Clusters of Arsenic presence on the North side of the lake exhibit the same close proximity to water as the South side. This evidence is conducive of the fact that CCA plays a role in the high level of contaminants within the wells.
- Another possible reason for arsenic contamination can be natural occurrences due to well depth.
- Drinking water standard for arsenic is 10.0 ppb.

# Lake Geneva Area Well Water Testing Results (Nitrate Levels) Map #8



## Legend

• Well Sites

## Nitrates

Nitrate\_Result\_\_mg\_L\_

• 0.0947 - 0.435

▲ 0.435001 - 1.02

▲ 1.020001 - 2.23

▲ 2.230001 - 4.33

▲ 4.330001 - 8.65

Well water Nitrate status was retrieved from The Geneva Lake Environmental Agency 2014 data.

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or other issues which may result from the use of this map is not the responsibility of the mapmaker.

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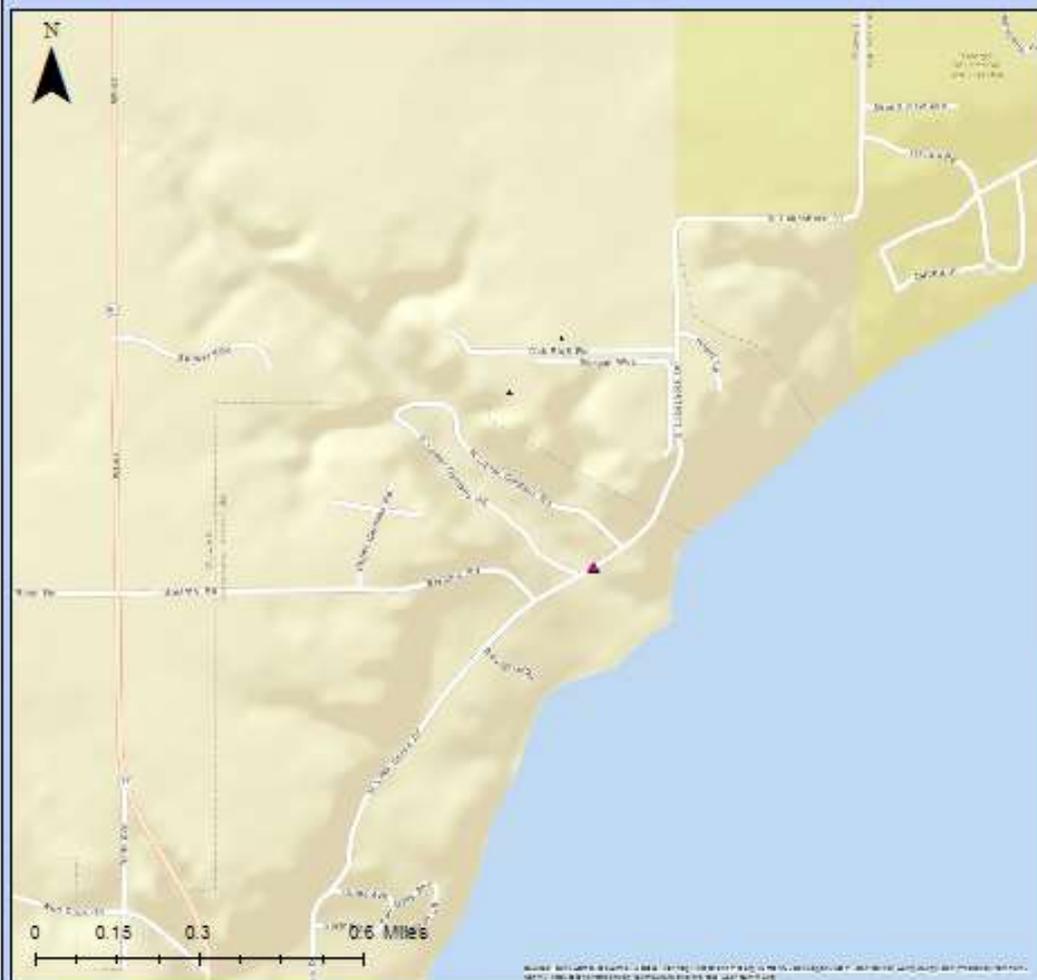
# What Causes Elevated Nitrate Levels

- Fertilizer runoff
- Leakage from septic tanks
- Erosion of natural deposits
- Improper well construction,
- Well location
- Industrial waste
- Food processing waste
- Overuse of chemicals (CDC, 2009.)
- They are formed when microorganisms break down fertilizers, decaying plants, manures and other organic residue (Colorado State, 2014).

# Nitrate Levels Characteristics

- Wells tend to be more vulnerable to contamination during times of flooding especially for shallow wells (CDC, 2009).
- Nitrate levels do not reach a dangerous level for consumption until it reaches 10 mg/L of absorbed nitrates (EPA, 2014).
- There is some concern for pregnant woman who consume water with levels below 10.0 ppm mg/l)
- No homes tested in the Geneva Lake watershed were at this level.
- Trends are present in specific areas that display abnormally high levels in comparison to the region's overall statistics.
- If these levels increase, reverse osmosis, ion exchange, distillation, or electro dialysis may need implementation for at risk wells which can spike seasonally (Colorado State, 2014).

# Lake Geneva Area Well Water Testing Results (Nitrate Levels) Map #9



## Legend

- Well Sites

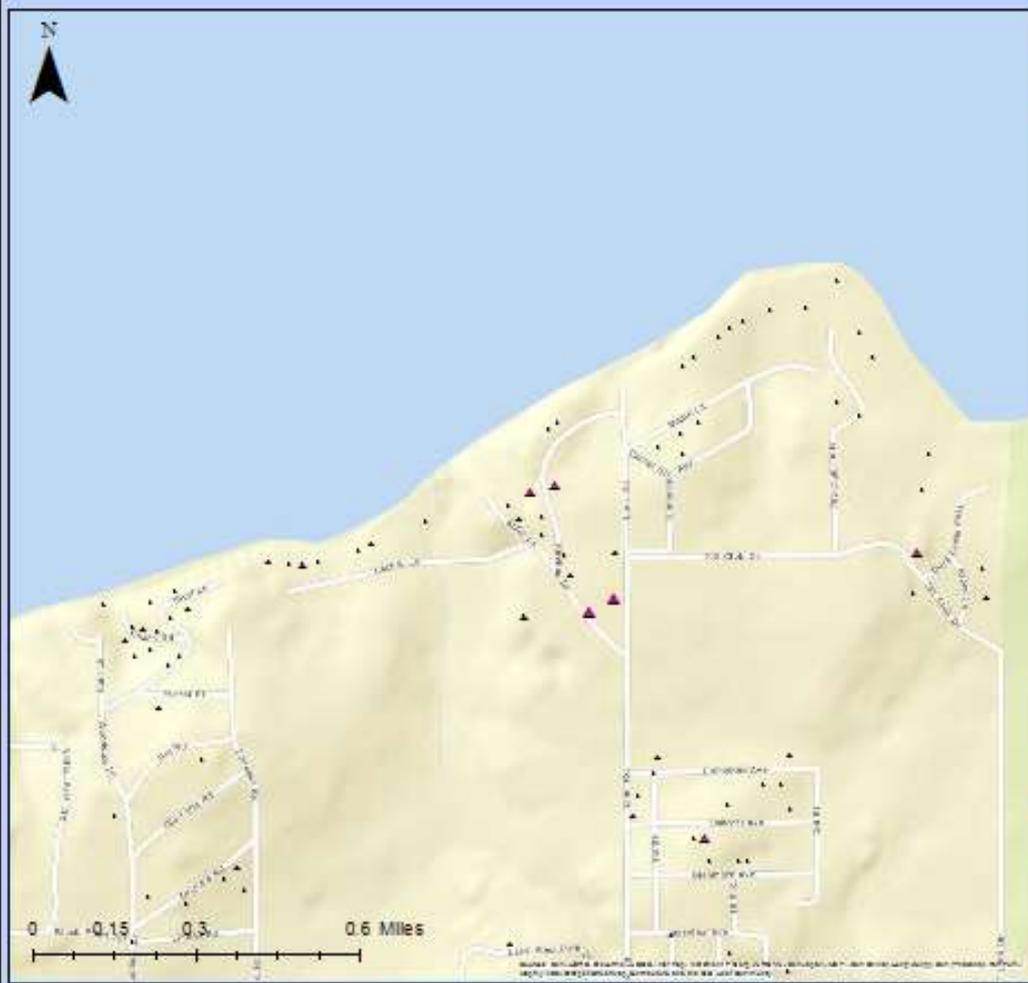
## Nitrates

Nitrate\_Result\_mg\_L\_

- 0.0947 - 0.435
- ▲ 0.435001 - 1.02
- ▲ 1.020001 - 2.23
- ▲ 2.230001 - 4.33
- ▲ 4.330001 - 8.65

Well water Nitrate status was retrieved from The Geneva Lake Environmental Agency 2014 data. This map has been created by the best of the cartographers abilities, any injuries, misinterpretations, or other issues which may result from the use of this map is not the responsibility of the mapmaker. Any questions can be directed to the Geneva Lake Environmental Agency of Williams Bay, WI or call Ted Peters at (262)-245-4532.

# Lake Geneva Area Well Water Testing Results (Nitrate Levels) Map #10



## Legend

• Well Sites

### Nitrates

Nitrate\_Result\_\_mg\_L\_

• 0.0947 - 0.435

+ 0.435001 - 1.02

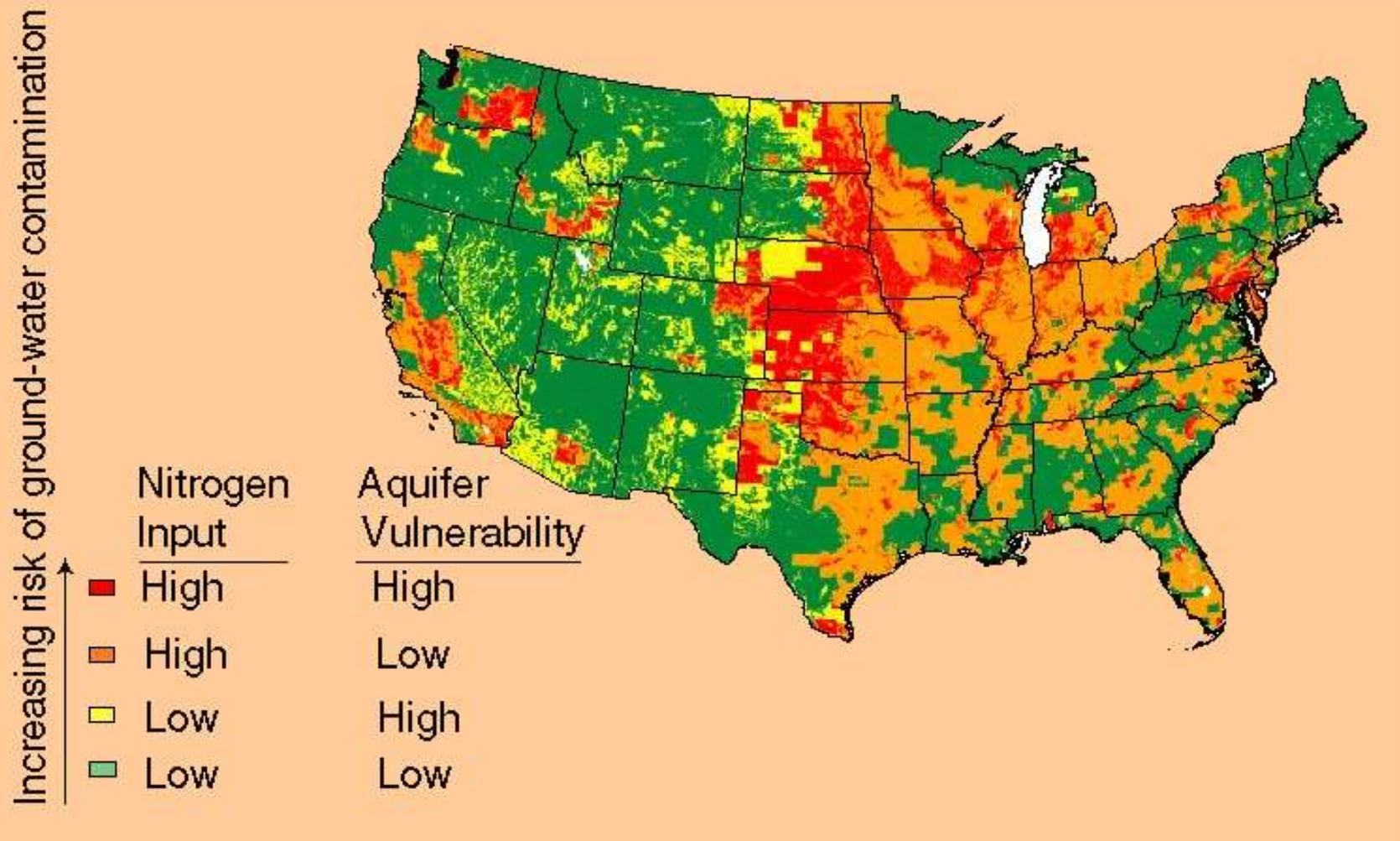
▲ 1.020001 - 2.23

▲ 2.230001 - 4.33

▲ 4.330001 - 8.66

Well water Nitrate status was retrieved from The Geneva Lake Environmental Agency 2014 data. This map has been created by the best of the cartographer's abilities, any injuries, misinterpretations, or other issues which may result from the use of this map is not the responsibility of the mapmaker. Any questions can be directed to the Geneva Lake Environmental Agency of Williams Bay, WI or call Ted Peters at (262)-245-4532.





(USGS, 2014)

# Concluding Points

- Some cause for concern is present in several areas specifically in E-Coli, Coliform, and Arsenic. Arsenic is more depth related than anything else.
  - Sample retesting should be conducted as soon as possible to determine accuracy.
- There is no single large area that displays overall large scale contamination with the exception of one or two addresses.
  - Each area needs to be addressed individually and implemented with pragmatic solutions tailored for each concern.

This Power Point Presentation can be viewed on line at;

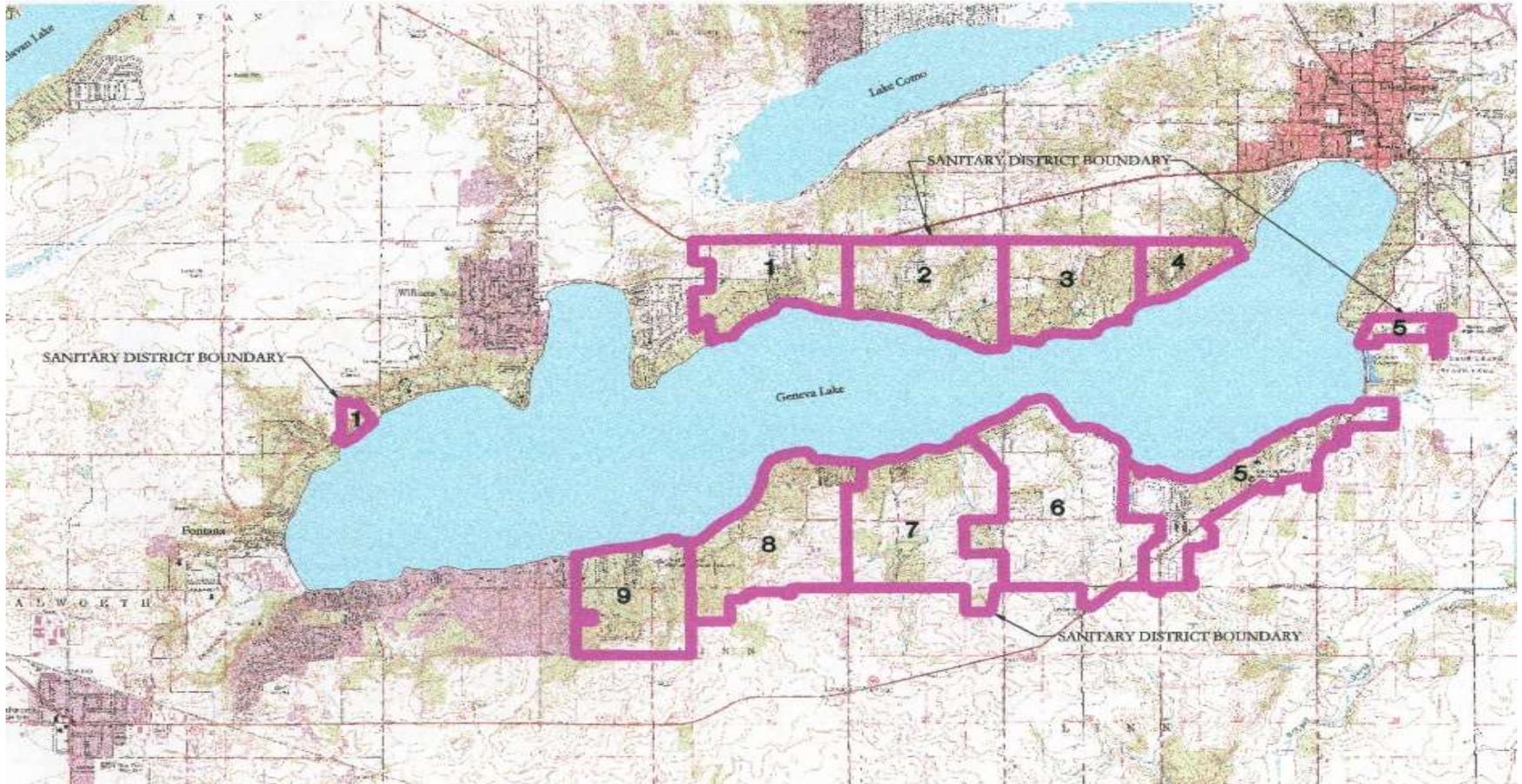
<http://www.co.walworth.wi.us/Health%20and%20Human%20Services/Public%20Health/GIS%20FINAL%20PROJECT.pdf>

# Summary of Well Testing Results

## Geneva Lake, Walworth Co. WI, 2014

Wells tested for Total Coliform -----	400
Wells positive for Total Coliform -----	90 - 23%
Wells tested for E-coli -----	92 - 23%
Wells positive for E-coli -----	8 - 8.6%
Wells tested for nitrate -----	404
Wells that tested greater than 10ppm. -----	2 – 0.5%
Wells tested for arsenic -----	79
Wells that tested greater than 10ppb. -----	29 – 36.7%
Number of wells that exceeded both bacteria and nitrate standards -----	<b>0</b>

# Linn Sanitary District Planning Subareas



# Comparison of “bad” POWTS and “bad” wells by subareas

Table 2. Well Test Results by Planning Areas, Geneva Lake, Walworth Co, WI.					
POWTS Inspected		Well Testing 2014			
Subarea	Needed Repair	Wells Tested	Positive Total Coliform.	Positive E-coli	Avg. Nitrate (mg/l)
1	34	53	8	2	0.78
2	138	33	10	1	0.61
3	13	14	3	0	0.54
4	13	7	5	0	0.59
5	160	83	16	2	0.44
6	91	70	10	1	0.76
7	44	59	12	1	0.45
8	83	42	13	1	0.3
9	83	24	6	0	0.36
TOTAL	659	385	83	8	
Source: Linn Sanitary District, Geneva Lake Environmental Agency					

# What's Next ?

- Additional assessment of data.
  - look closer at the nitrate concentration relative to bacteria and “bad” POWTS.
- Continue to encourage annual well testing.
- Continue POWTS maintenance and care.
- Consider an updated POWTS inspection program.
- Continue education program on POWTS and private wells.
- Continue to work with Walworth County on well and POWTS compliance.
- Continue to keep sewer extension as an option for areas with concentrated POWTS issues.



# LINN SANITARY DISTRICT

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