

Beneath the Surface: Integrating Groundwater Resource Awareness into Master Planning

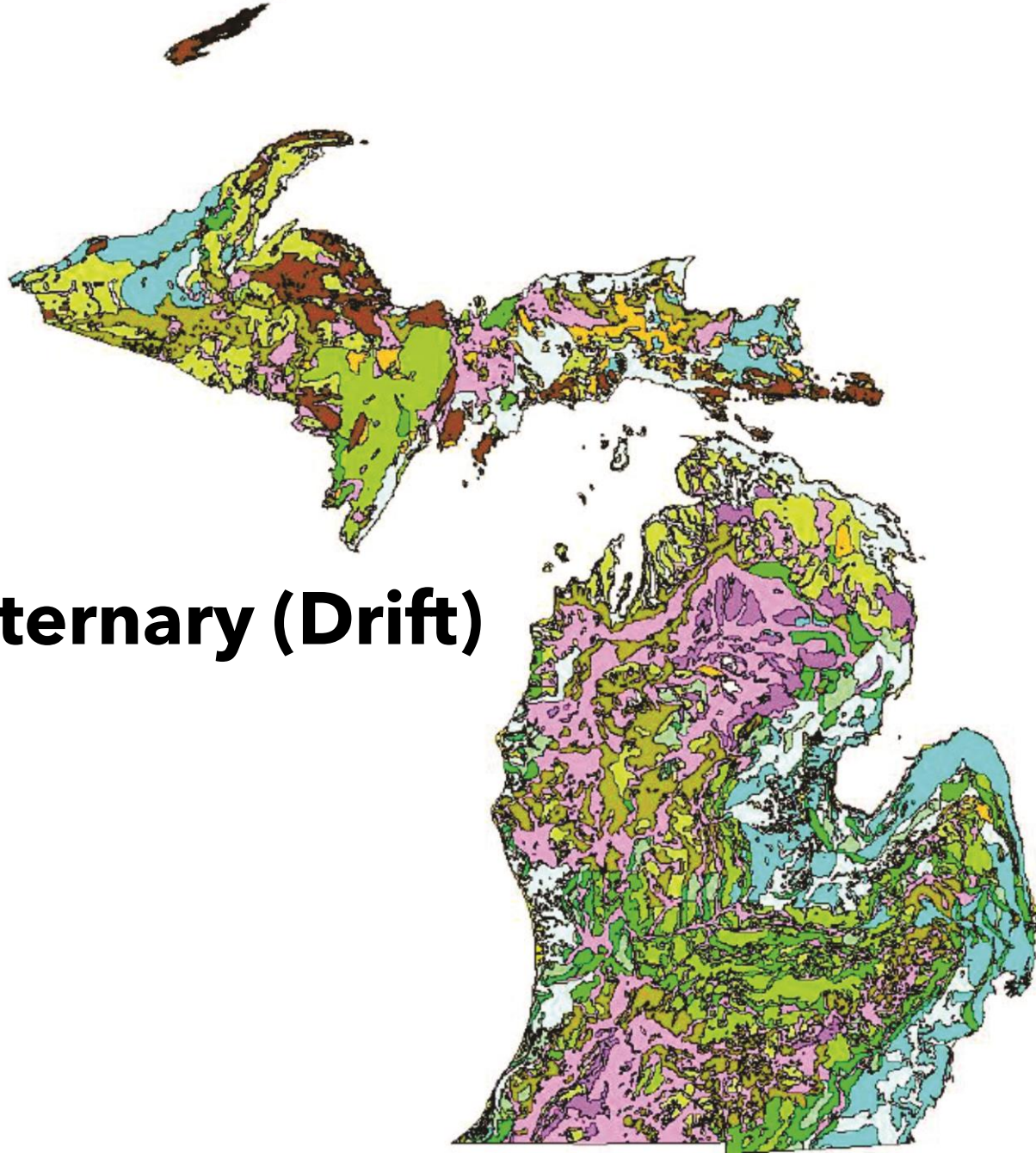


Dan Whalen, PE
Geological Engineer + President

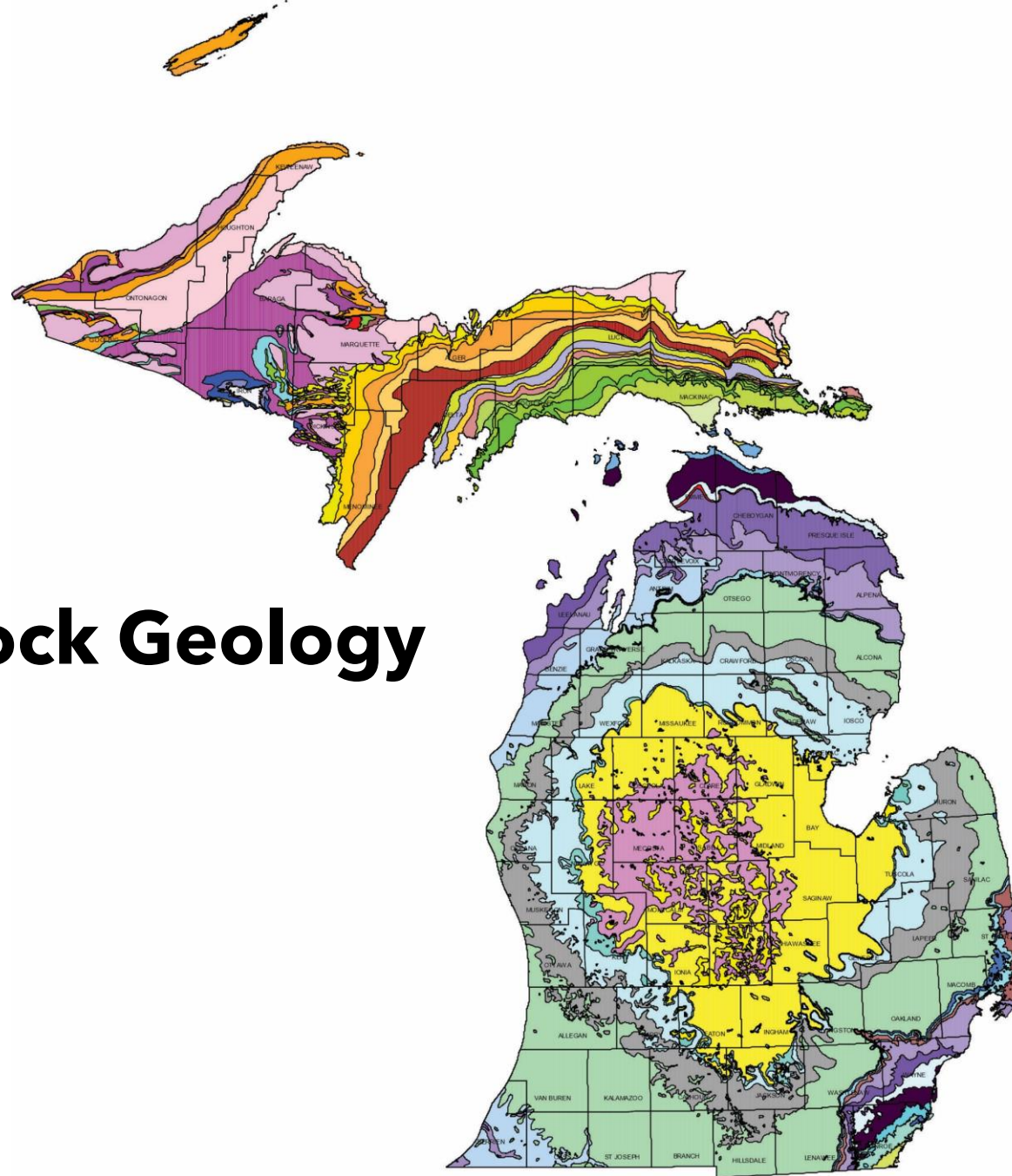
Tanya DeOliveira, AICP
Planner + Project Manager

williams&works
engineers | surveyors | planners

Michigan Quaternary (Drift) Geology

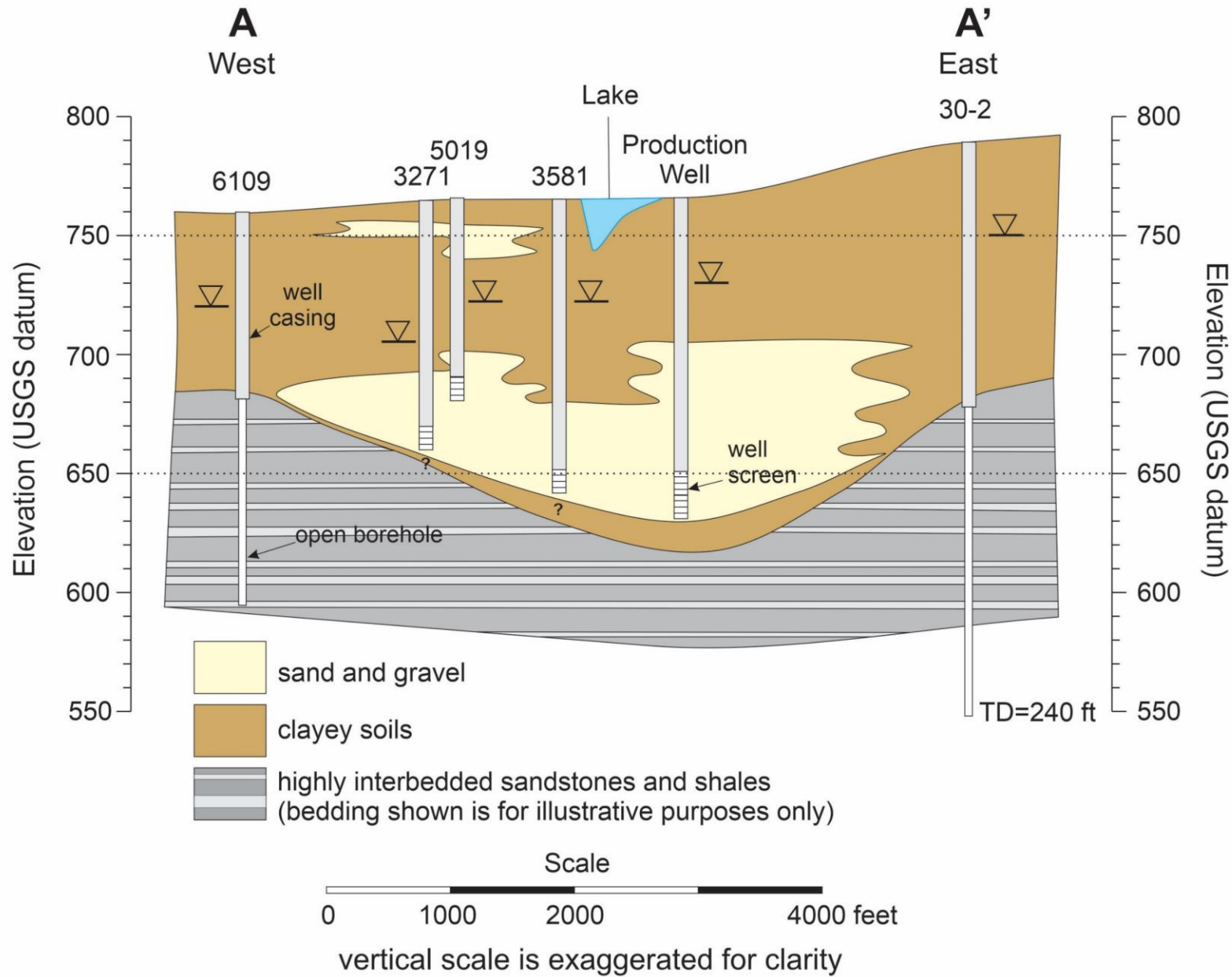


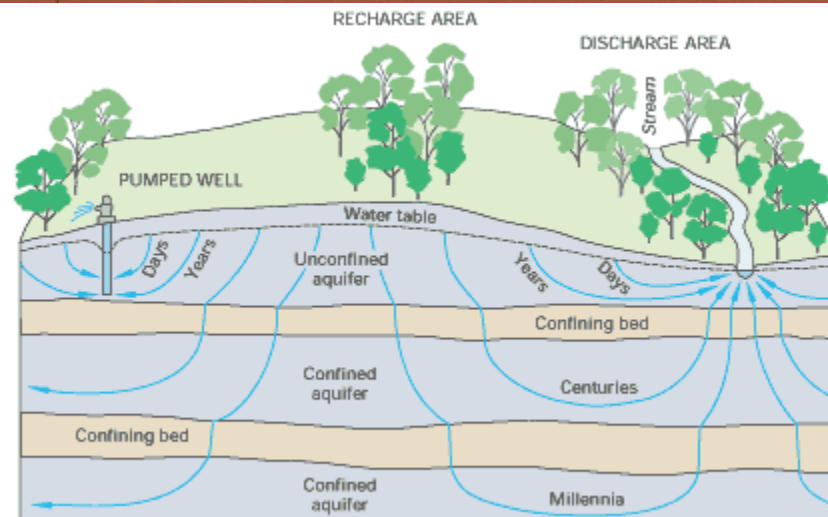
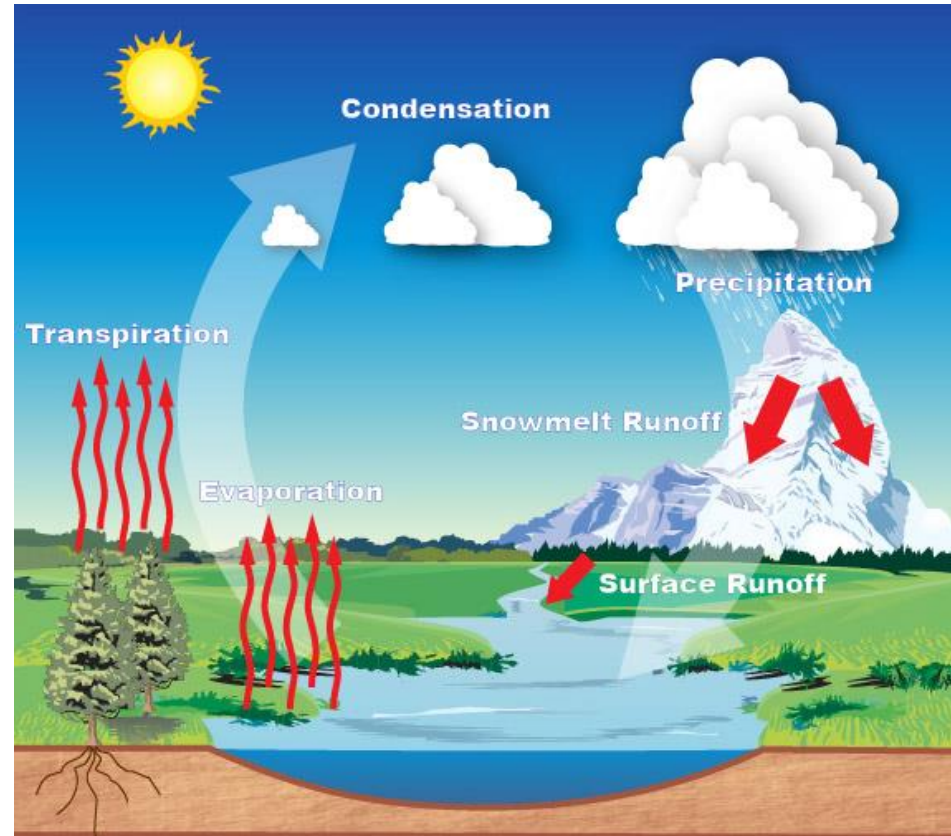
Michigan Bedrock Geology



Michigan Major Drainageways

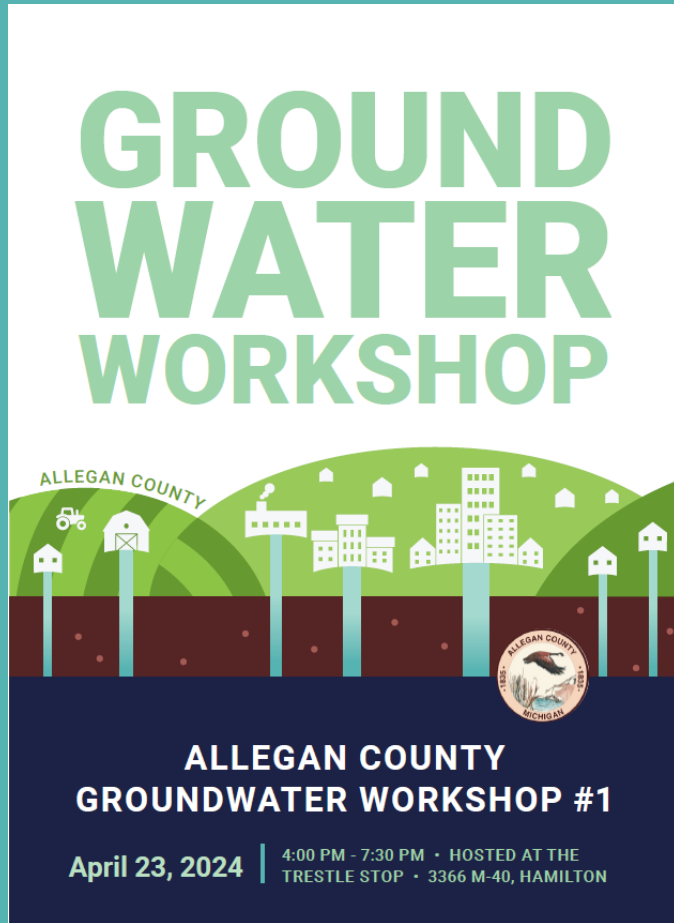







Allegan County

Assessing Groundwater Resources
& Identifying Future Strategies



**GROUND
WATER
WORKSHOP**

ALLEGAN COUNTY



ALLEGAN COUNTY
MICHIGAN

**ALLEGAN COUNTY
GROUNDWATER WORKSHOP #1**

April 23, 2024 | 4:00 PM - 7:30 PM • HOSTED AT THE
TRESTLE STOP • 3366 M-40, HAMILTON

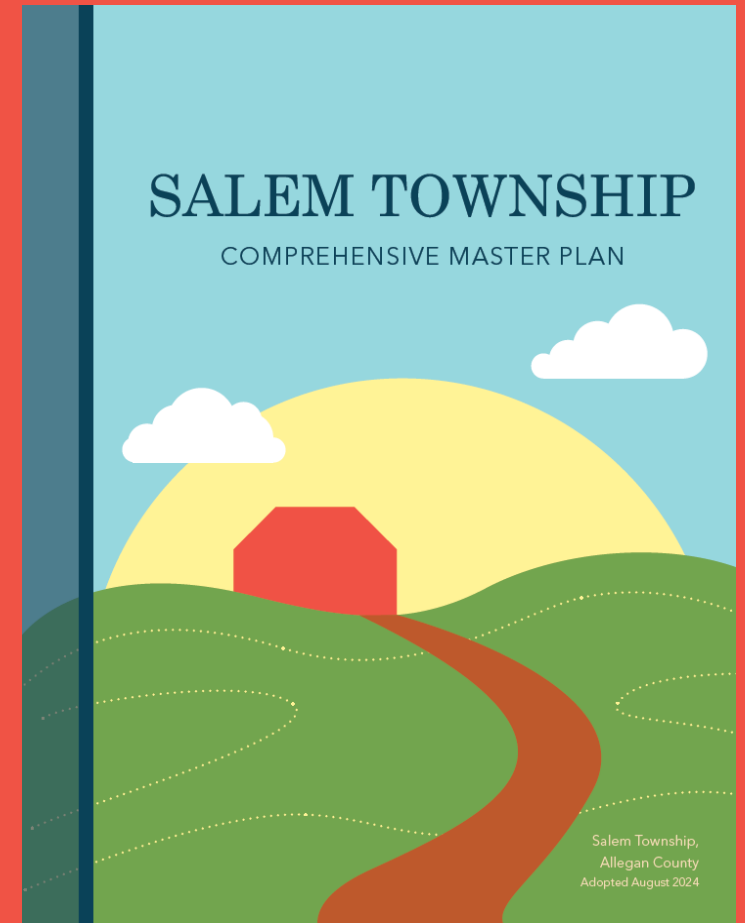
Olive Township

Master Plan + Groundwater
Community Engagement




Salem Township

Acknowledging Groundwater
Concerns in Master Planning



SALEM TOWNSHIP
COMPREHENSIVE MASTER PLAN



Salem Township,
Allegan County
Adopted August 2024

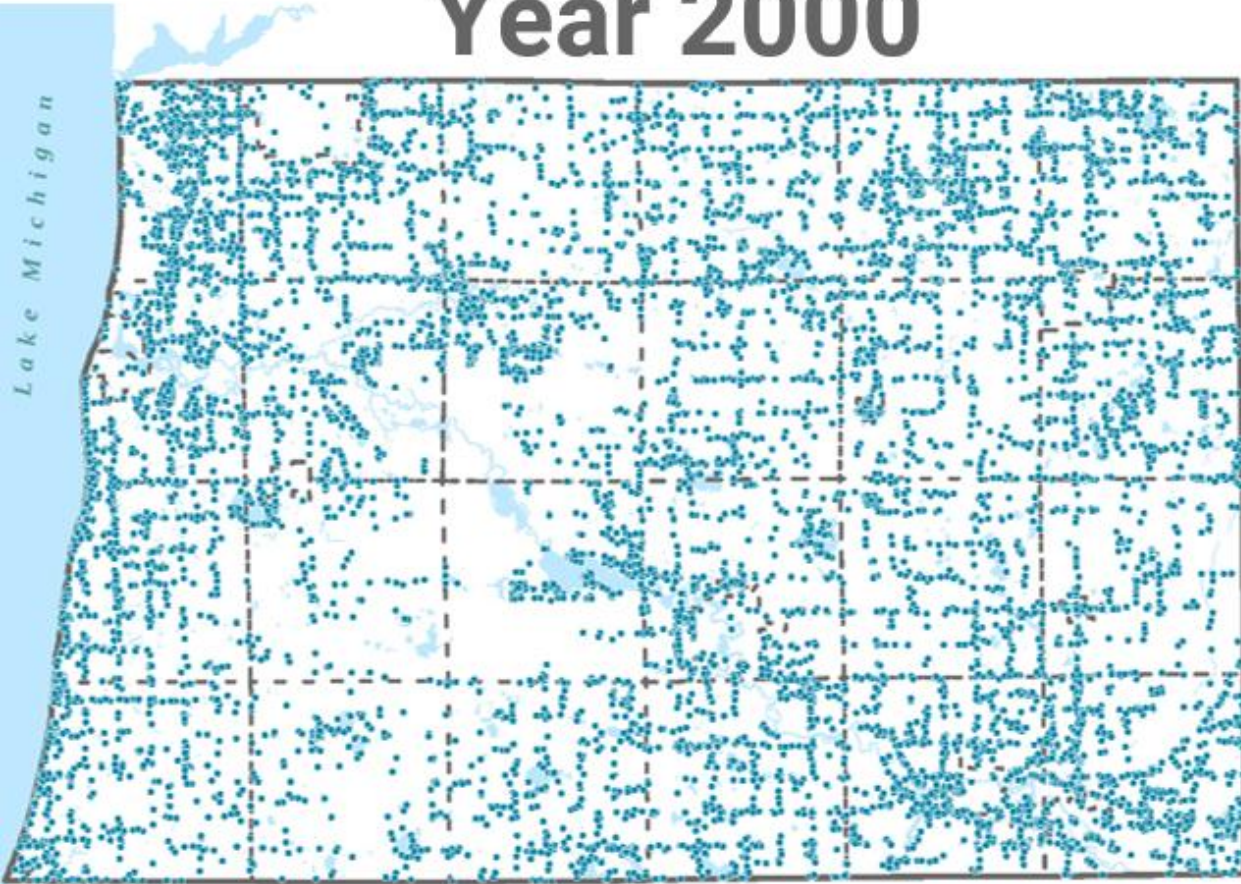
Alleghan County

Assessing Groundwater Resources & Identifying Future Strategies

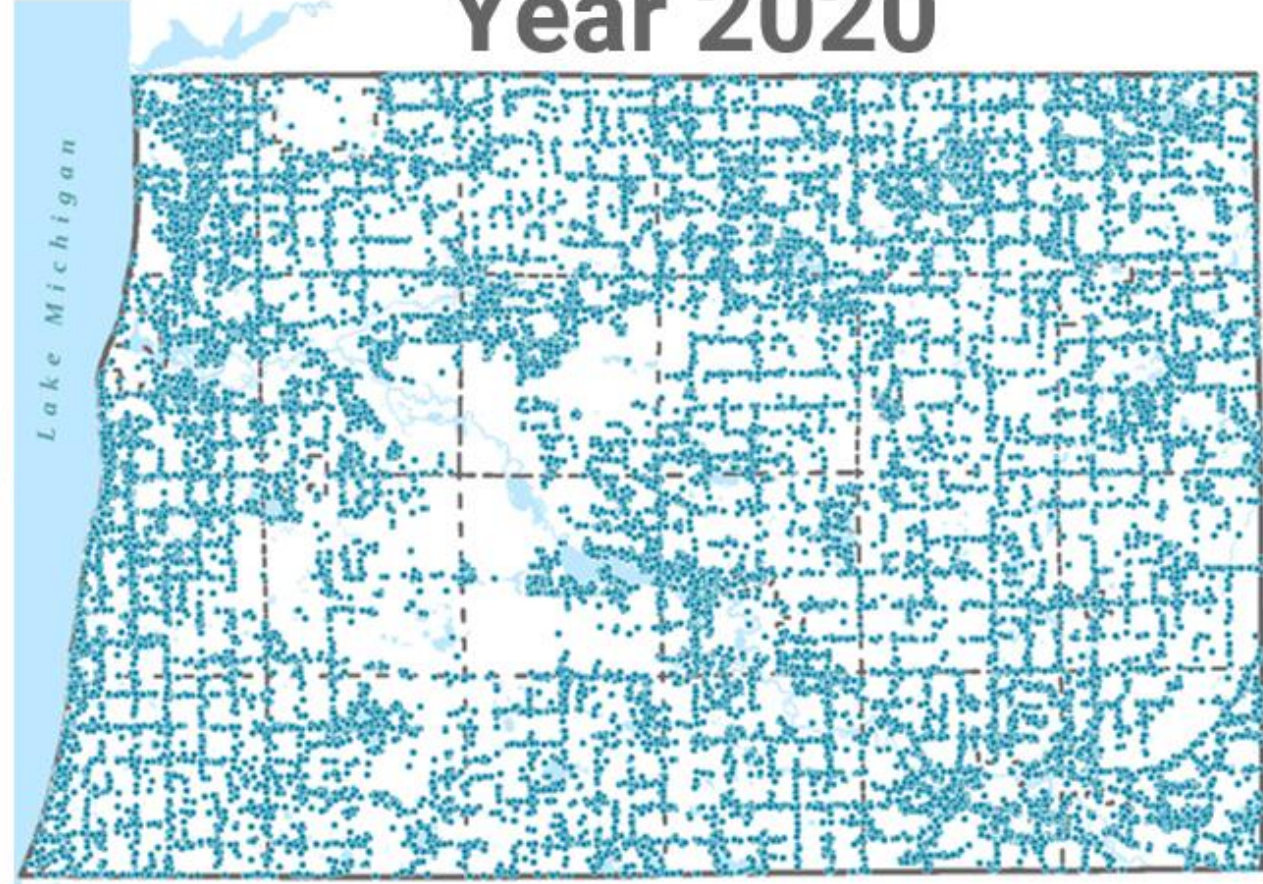


Alleghen County

Year 2000



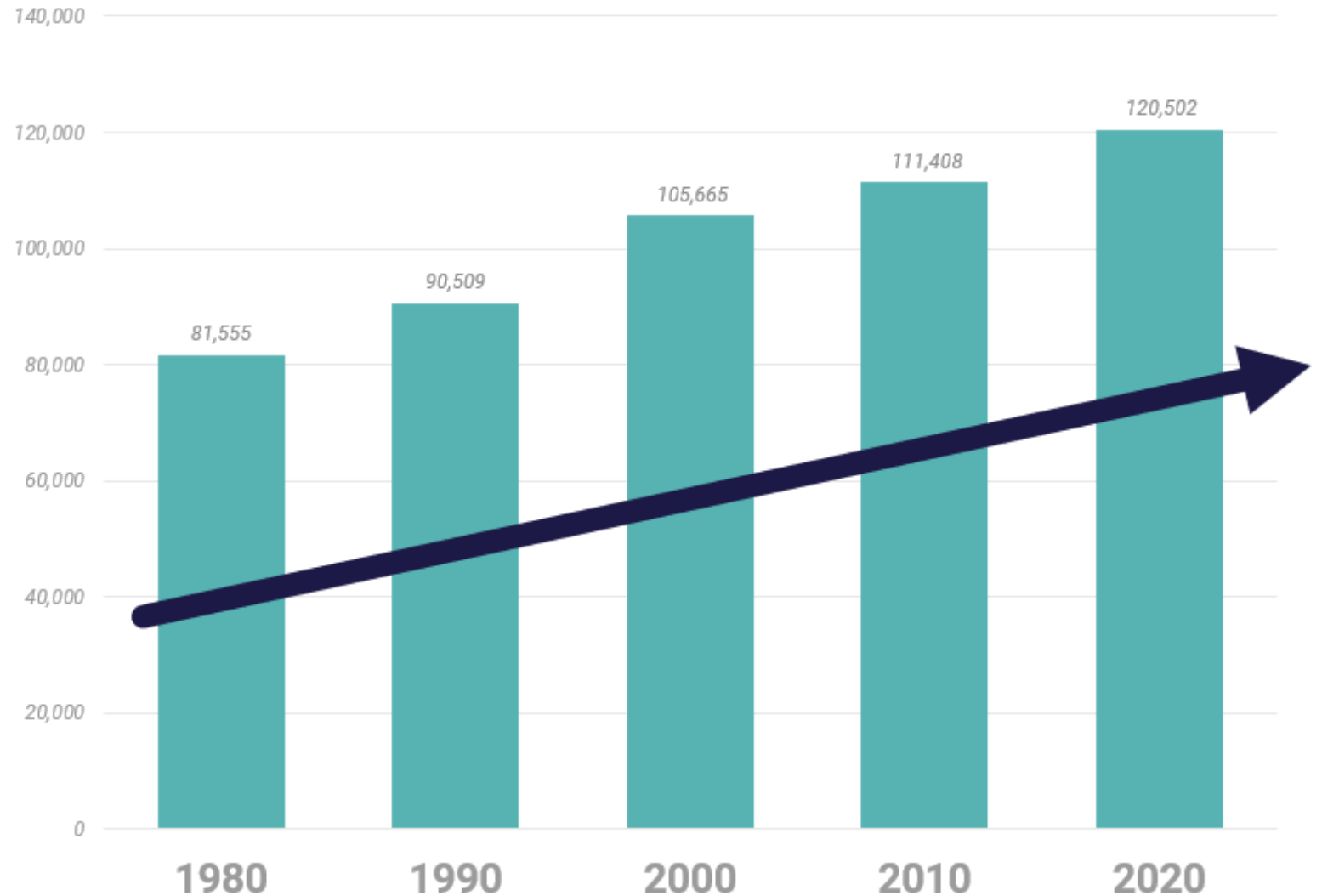
Year 2020



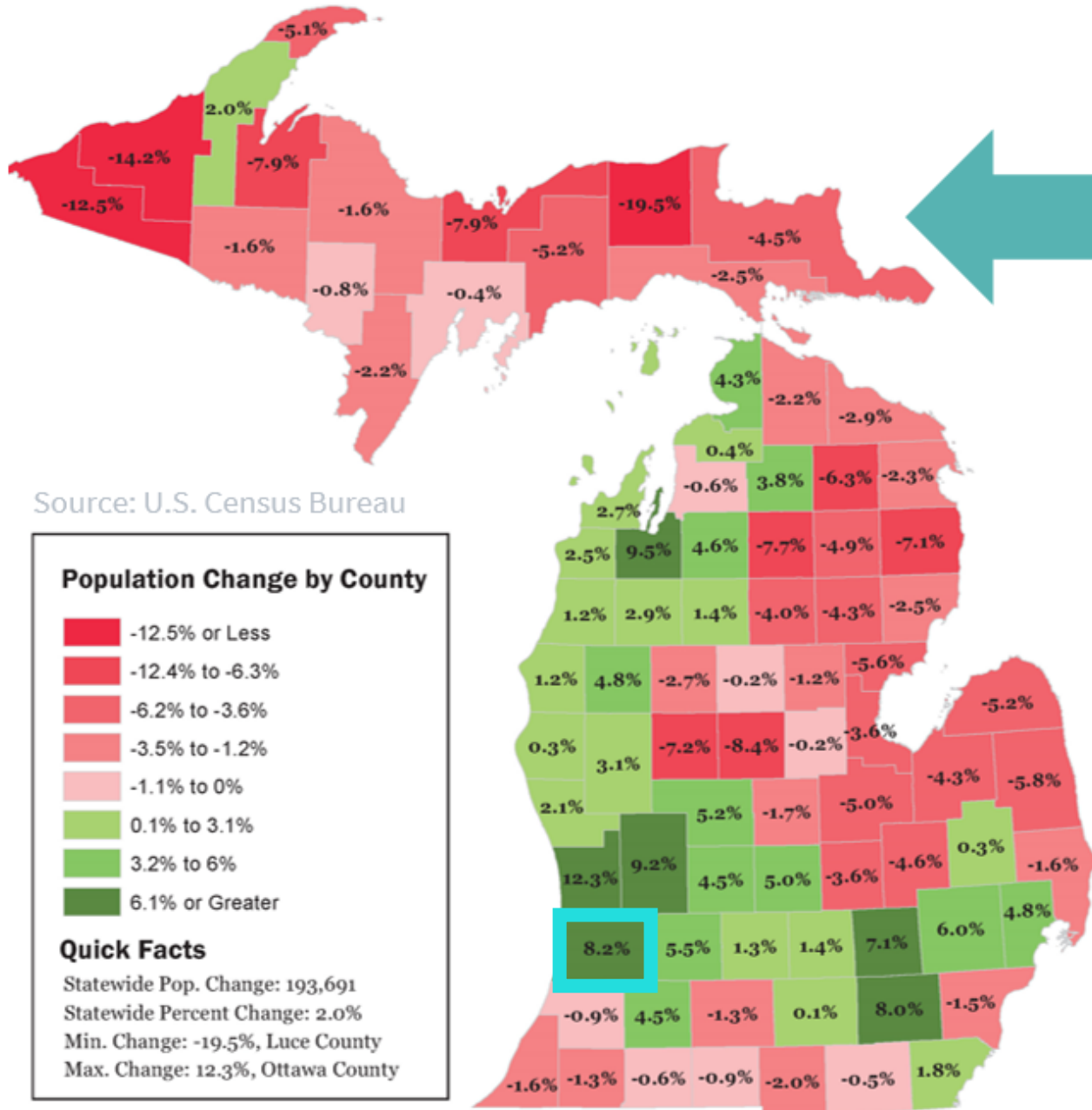
Water Well Network Growth

As the population grows, anticipated groundwater demand grows too.

Population, Allegan County 1980-2020



Source: U.S. Census Bureau

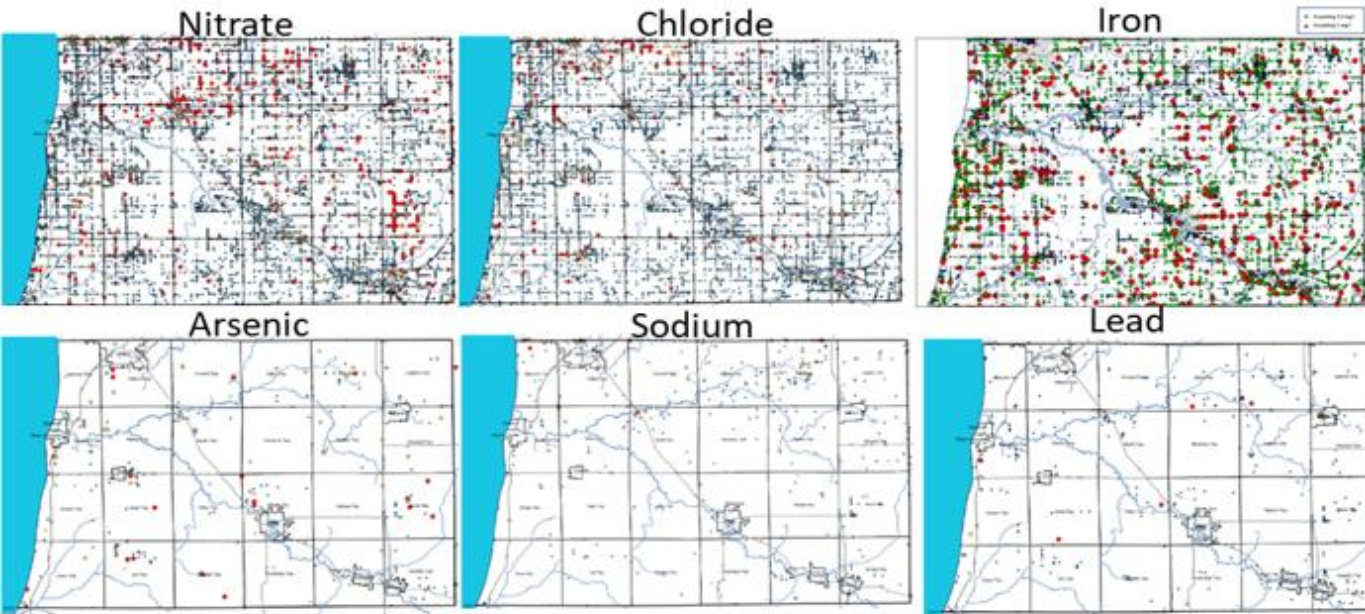


Populations are moving within the state.

From 2010 to 2020, Allegan County experienced some of the highest population growth in Michigan at 8.2%.

Composite Water Quality Risk Map Elements

Elevated Non-Point Source Concentrations



Point Source Risk Ranking Map



Composite Water Quality Risk Map Elements

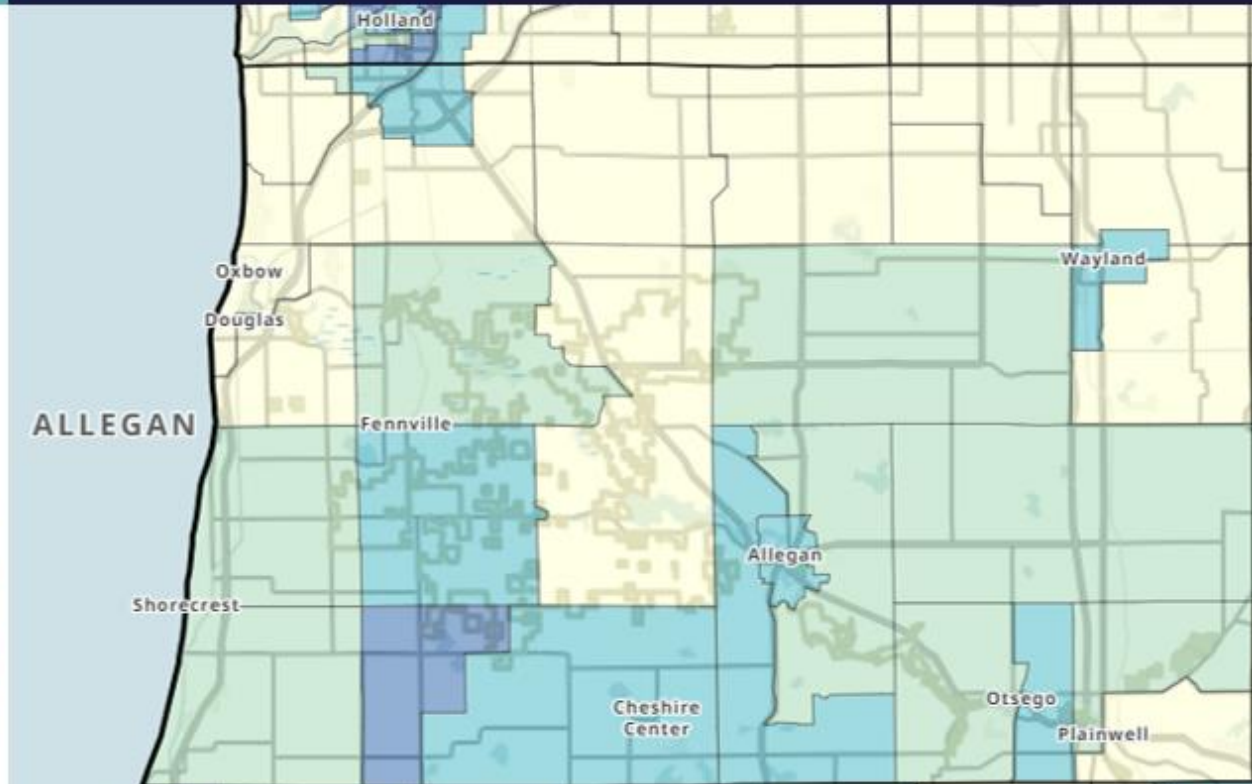
Assesses the potential negative effects on communities caused by external stresses on human health based on four themes:

- *Socioeconomic Status*
- *Household Characteristics*
- *Racial & Ethnic Minority Status*
- *Housing Type & Transportation*

Level of Vulnerability



CDC Social Vulnerability Index Overlay



Allegheny County Groundwater Study Results...

- A **complex geology** where some pockets within the aquifer system are water limited while other areas may be water rich.
- Highlighted the presence of numerous **potential or known sites of contamination** throughout the County.
- **Hints of declining groundwater levels** due to unsustainable water use trends. (More data is needed.)

...that impacts future land use decisions

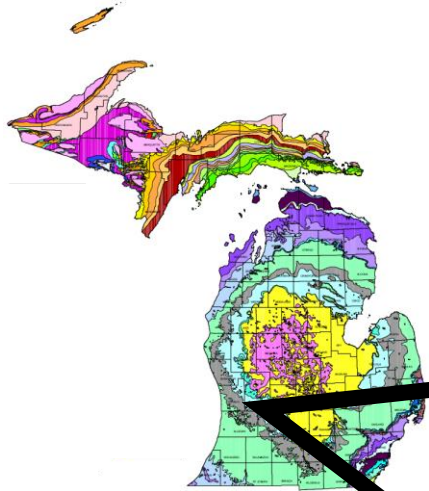
- **Data drives decision making**
- Development of **strategies, policies, programs**
- Determine the (level of a) **call to action** with Allegan County and Local Units of Government
- Relationship building




Groundwater is a resource that communities can manage.



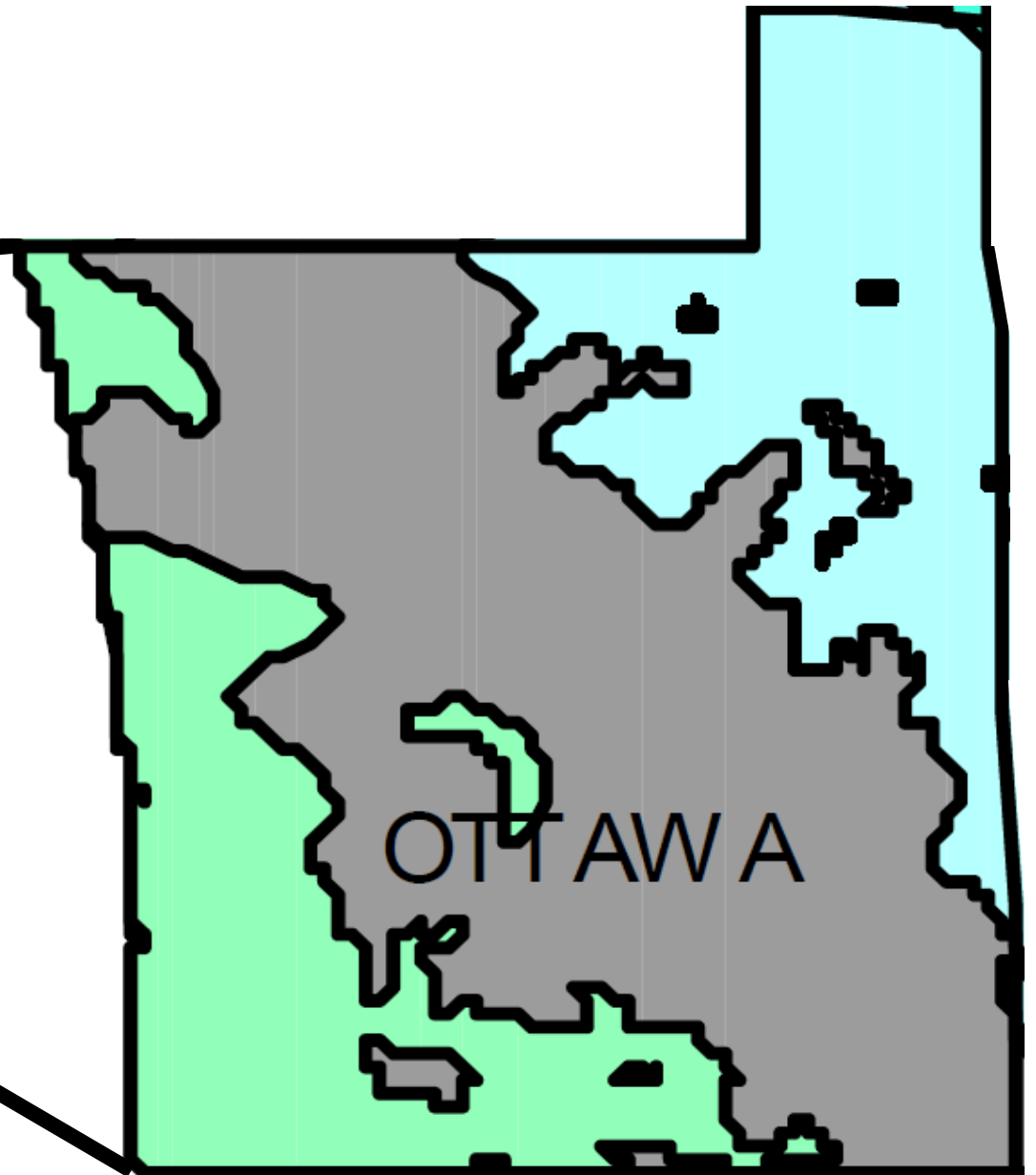
Olive Township: Master Plan + Groundwater Community Engagement

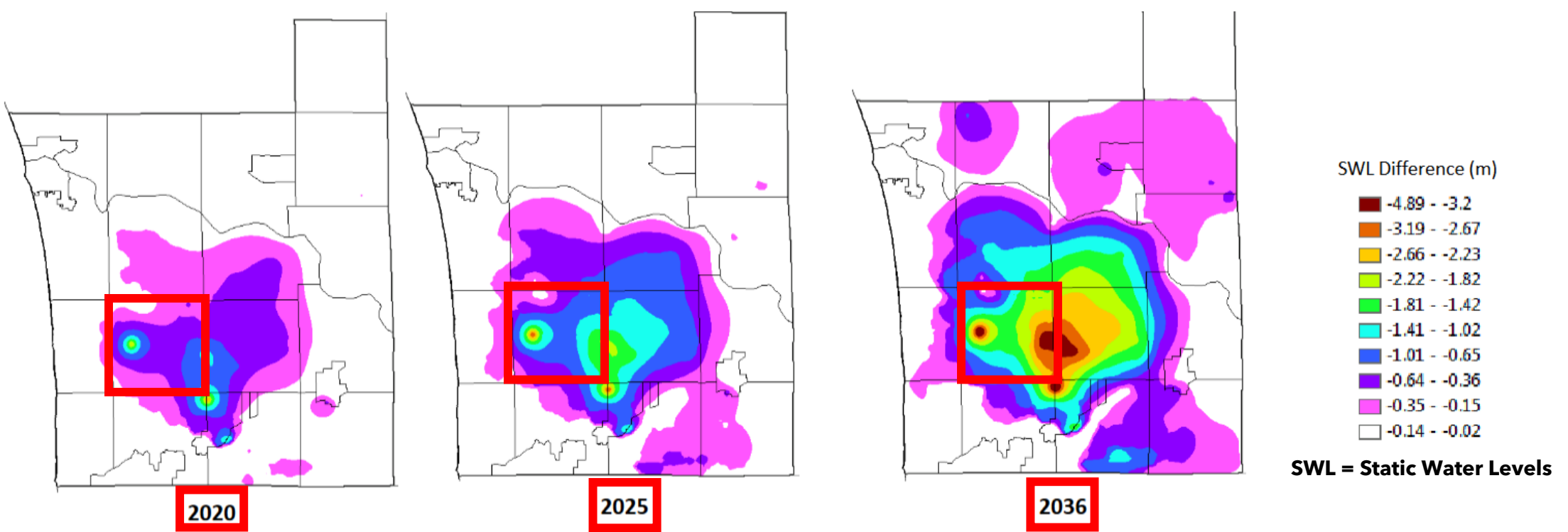




-  MICHIGAN FORMATION
-  MARSHALL FORMATION
-  COLDWATER SHALE

Groundwater In Ottawa County



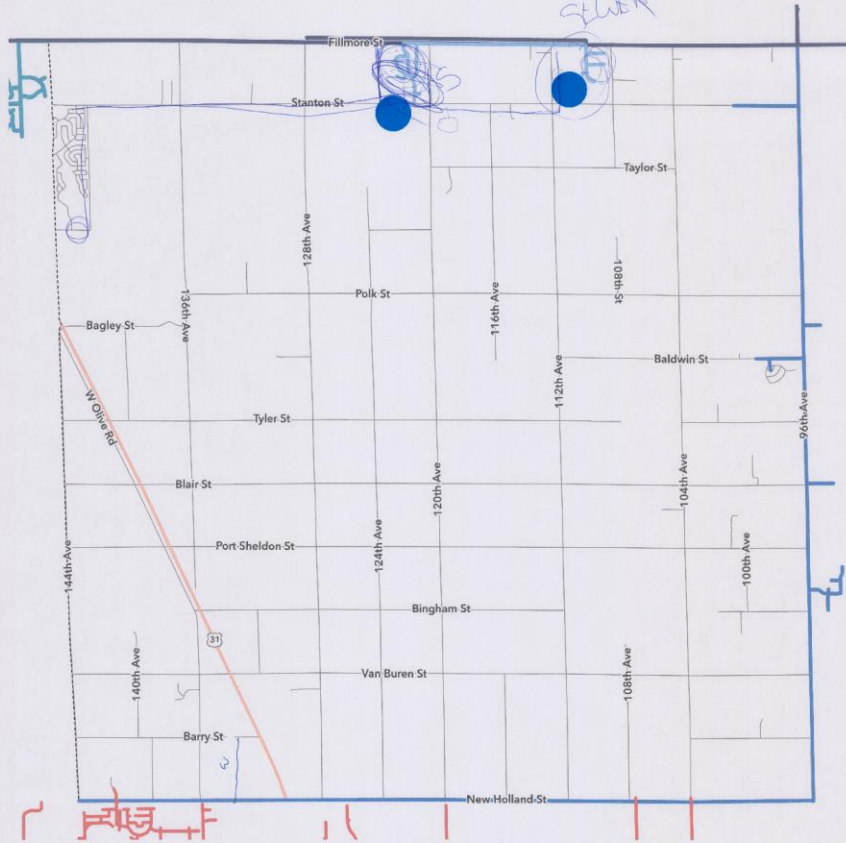


“Impact of **future well withdrawals**...These maps were generated for **5, 10, and 20 years into the future** ...The maps indicate that the most **significant decline due to pumping** is likely to occur in Blendon & Olive Townships .”

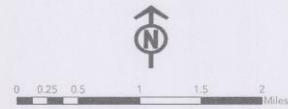
-Ottawa County Water Resource Study - Phase II (2018)

Olive Township Master Plan Open House

Water and Sewer Infrastructure



- Olive-Blendon Water System
- Olive-Robinson Fillmore Street Water Expansion
- Grand Rapids Water System
- Port Sheldon Water System
- Sanitary Sewer
- - - Township Boundary
- Highway
- Local Road



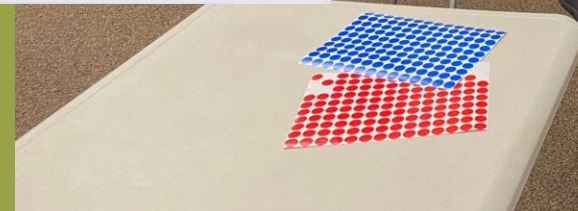
Olive Township
Ottawa County, MI

The map on the left shows the existing water and sewer infrastructure in and surrounding Olive Township.

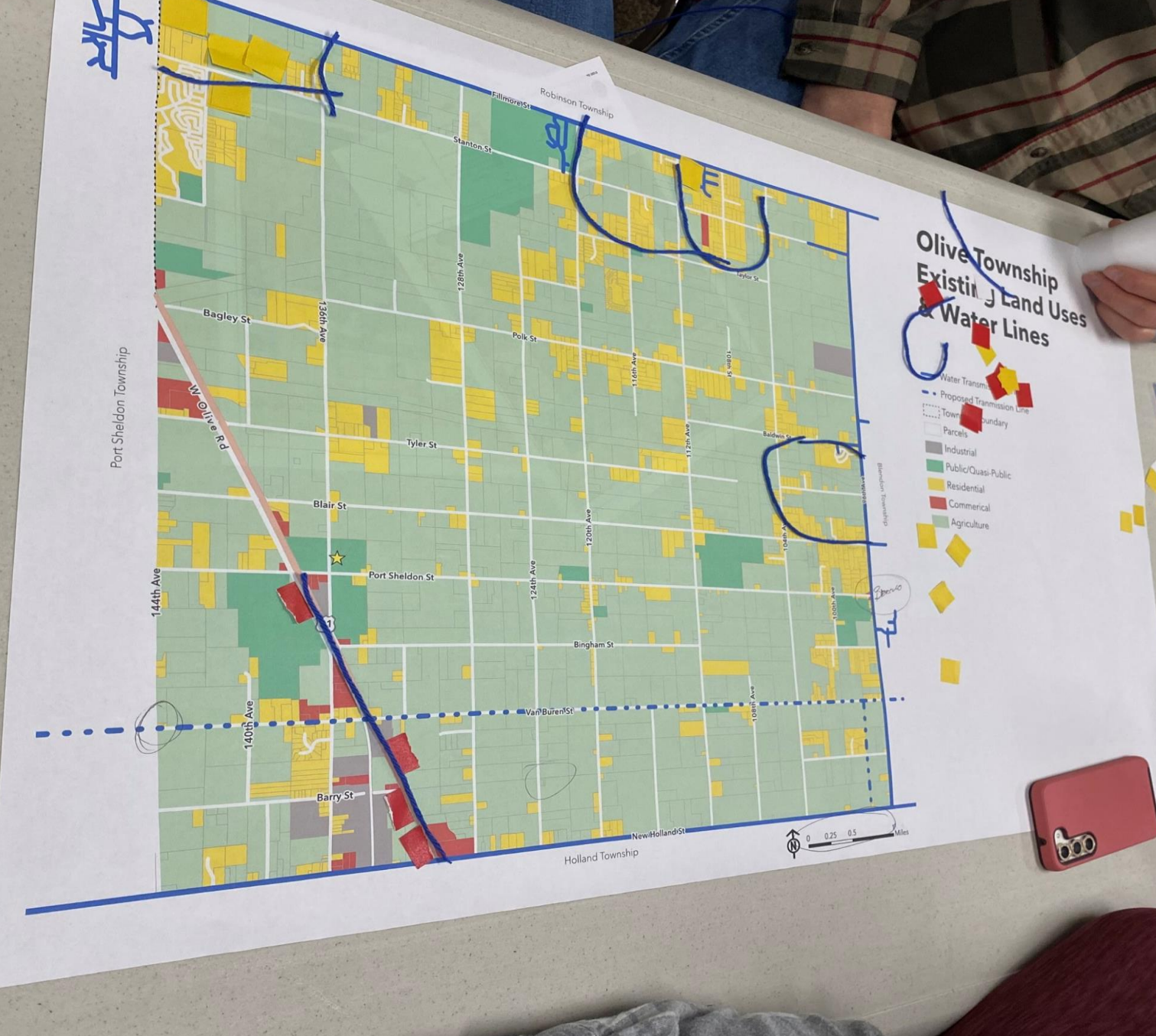
Use the **BLUE** pen to illustrate where you would like to see water infrastructure developed in Olive Township.

Use the **RED** pen to illustrate where you would like to see sewer infrastructure developed in Olive Township.

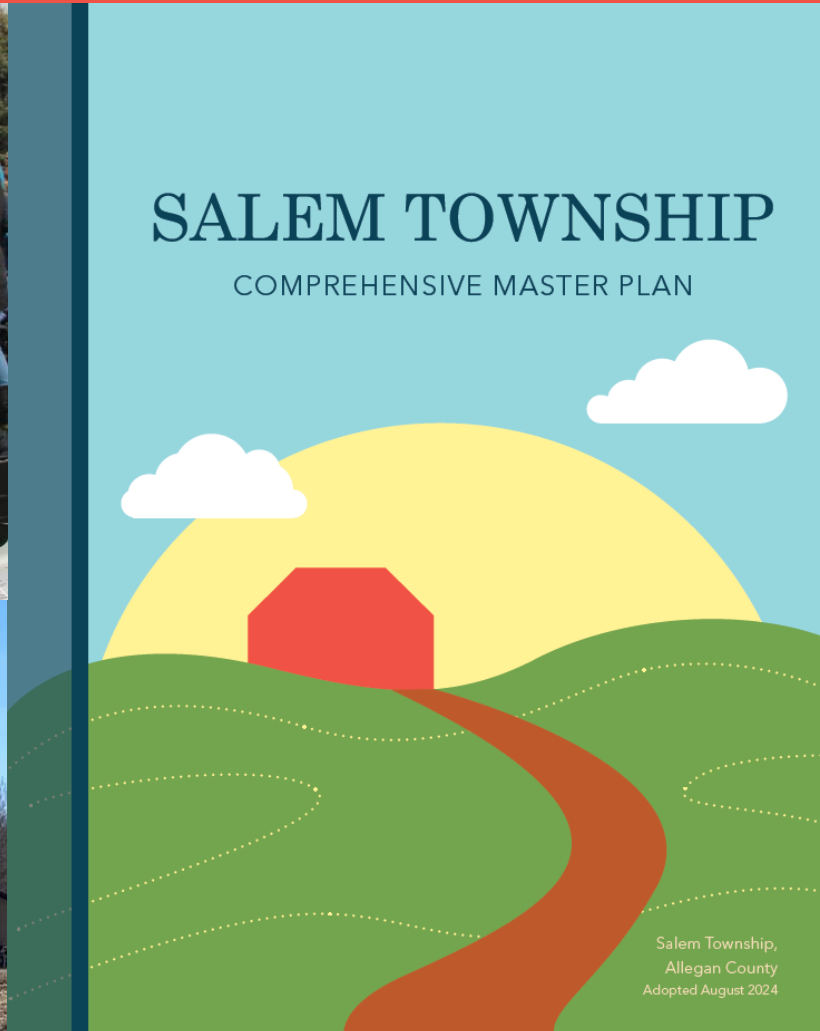
If you would like to see more water and sewer infrastructure in Olive Township, but are unsure where, leave a **BLUE** sticker to represent water infrastructure or a **RED** sticker to represent sewer infrastructure in the box to the right.



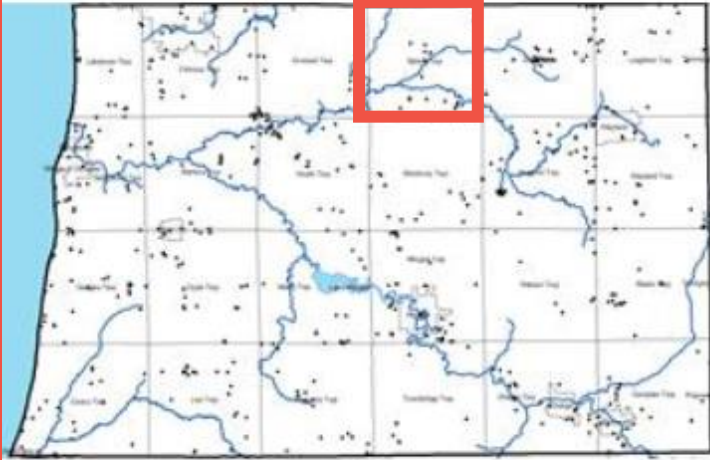
Olive Township Master Plan Land Use & Groundwater Visioning Workshop



Salem Township: Acknowledging Groundwater Concerns in Master Planning

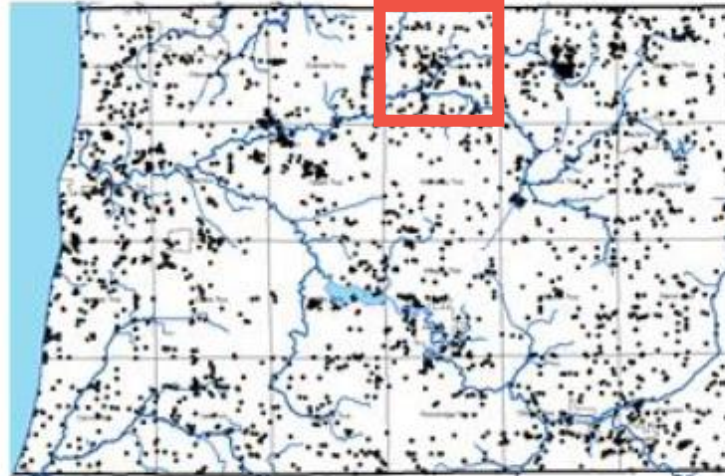


Up to 2000



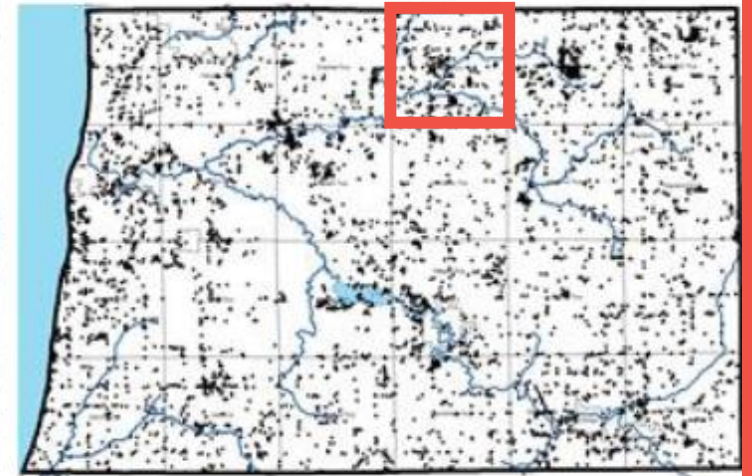
$N_{pts} = 631$

Up to 2002



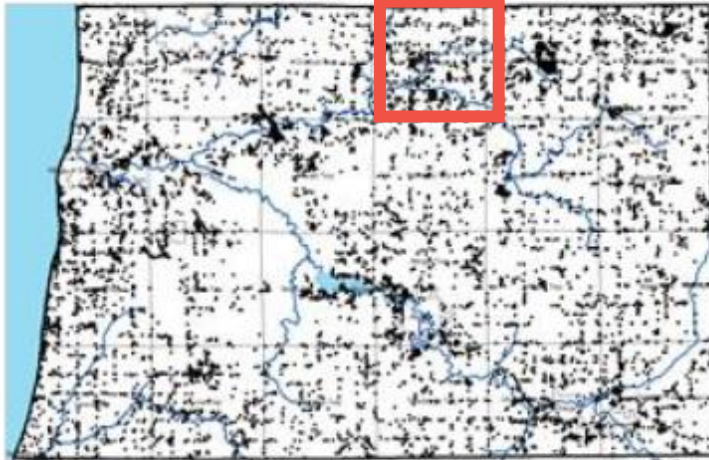
$N_{pts} = 2765$

Up to 2005



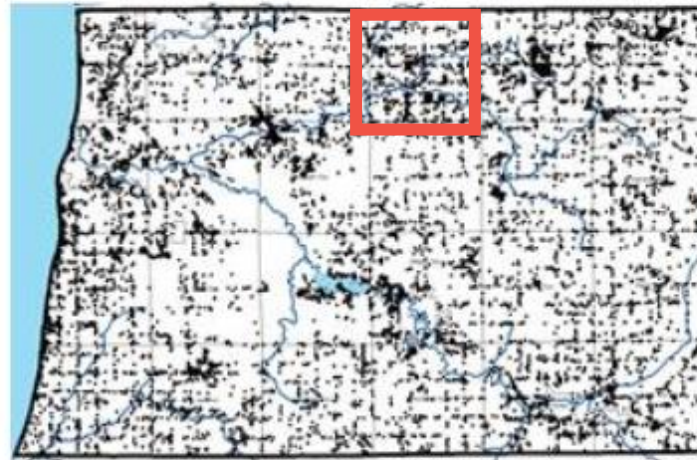
$N_{pts} = 5975$

Up to 2010



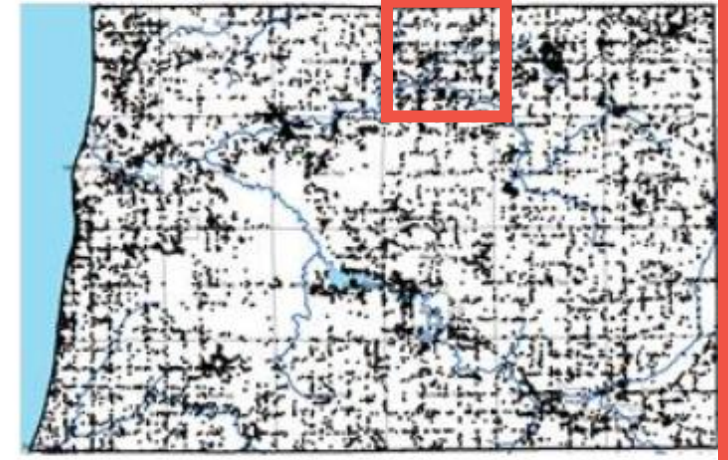
$N_{pts} = 9432$

Up to 2015



$N_{pts} = 11852$

As of Aug. 2020



$N_{pts} = 15114$

Take Aways



- **Data (should) drive decision-making.**
 - Understand the conditions of groundwater in your community.
 - Groundwater is not (abundantly) available everywhere in Michigan.
 - A master plan can be a place to document available data that can be used by local officials, and does not have to be pushed into becoming a local policy decision or goal.
- **Groundwater is a resource that communities can manage.**
- **Take time to educate the public during the engagement to:**
 - Build relationships
 - Increase local knowledge
 - Create opportunities for resident buy-in



Thank you!

Dan Whalen, PE
whalen@williams-works.com

Tanya DeOliveira, AICP
deoliveira@williams-works.com