The Purple Dot Project: Building Better Maps for Better Decisions

CMDHD ENVIRONMENTAL HEALTH

TAYLOR IRWIN

MICHIGAN PREMIER PUBLIC HEALTH CONFERENCE

OCTOBER 8, 2026

Audience

What is your background?

- EH
- PH
- Health Care
- Private industry
- Other?



Background

- Historic physical road files
- Records scanned into digital database
- More effective permitting and inspections through GIS
- Community/facility-wide opportunities for strategic program management
- Ability to pull any information in GIS



Goals

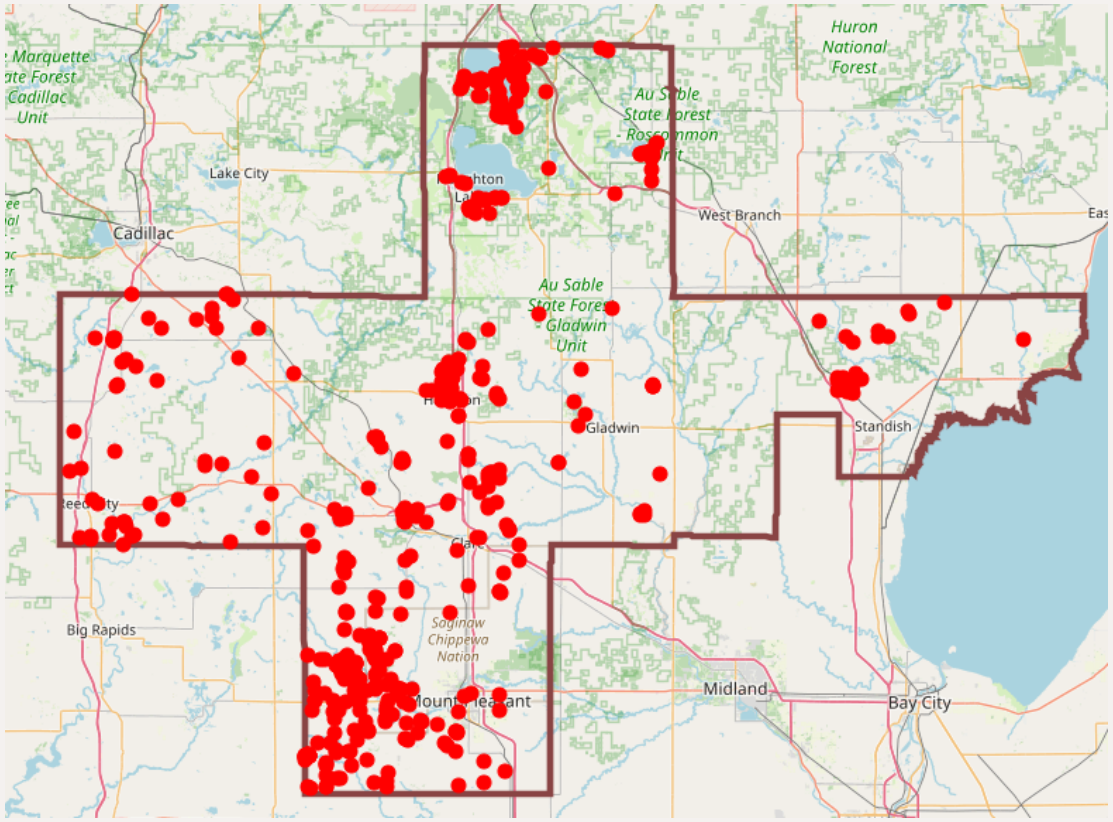
- Map all known wells and septic systems in the district.
  - Interpret historic records
  - Drawing each system
  - Recording basic details (sizes, types, and approved dates)
- Approximately 25% completed
- 8,050 hours of work to go!
- Help interested communities understand the status/inventory of wells and sewage systems and decide how to best manage them.

GIS Demo



Water Quality Data

- Geographic information on wells and water quality
- Improved assessment of public health considerations when permitting new wells
- More effective management of needs on a geographic scale



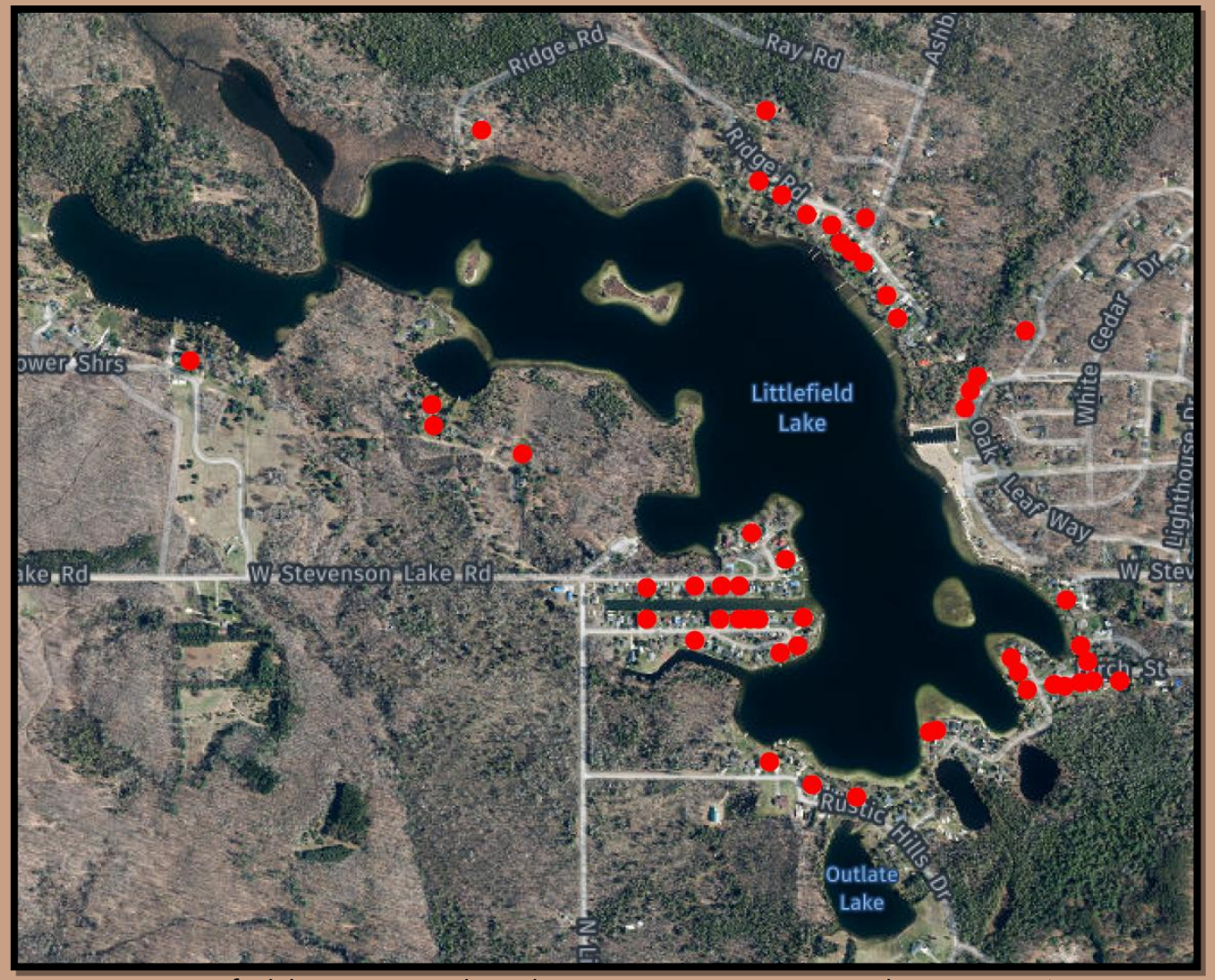
Nitrate samples above 2 mg/L

Sewage Management



Littlefield Lake

- 222 total homes
- 37-39% have sewage permits
- 61-63% unpermitted



Drainfields permitted under current Sanitary Code: 57; 26%

Using FetchGIS to assess outdated septic systems around Littlefield Lake, Isabella County, Michigan

L. Uzarski[1], T. Irwin[2]

[1]*Central Michigan University, Mount Pleasant, MI, USA*

[2]*Central Michigan District Health Department, Mount Pleasant, MI, USA*

Central Michigan District Health Department
Promoting Healthy Families, Healthy Communities

THE HERBERT H. & GRACE A. DOW COLLEGE OF HEALTH PROFESSIONS
CENTRAL MICHIGAN UNIVERSITY

Introduction

Thirty percent of Michigan residents use septic systems as their waste disposal method, which is ten percent higher than the national average.[1] However, many of these septic systems fail due to their age or size. Failing septic systems pose a risk to the nearby environment and community by discharging harmful pathogens, nutrients, and other chemicals into ground and surface waters.

The focus of this study was Littlefield Lake in Isabella County, Michigan. Residential development surrounding this lake started prior to a time when sewage systems were permitted, causing the systems to be out of date and built on lot sizes that cannot account for the proper septic system. Additionally, many of the homes here were initially built for seasonal residence and are now permanently occupied, meaning the septic system use has increased significantly. The density of houses in an area, age of septic systems, and condition of septic systems are all significant risk factors for pollution. This project aims to assess the age and permit status of the septic systems in the homes surrounding Littlefield Lake, and the associated environmental risks.

Objective

To develop the capability to view on-site sewage management from a community perspective using FetchGIS. By mapping data into a geographic and searchable database, at-risk and priority areas can be identified, and community-wide strategies can be implemented.

Methods

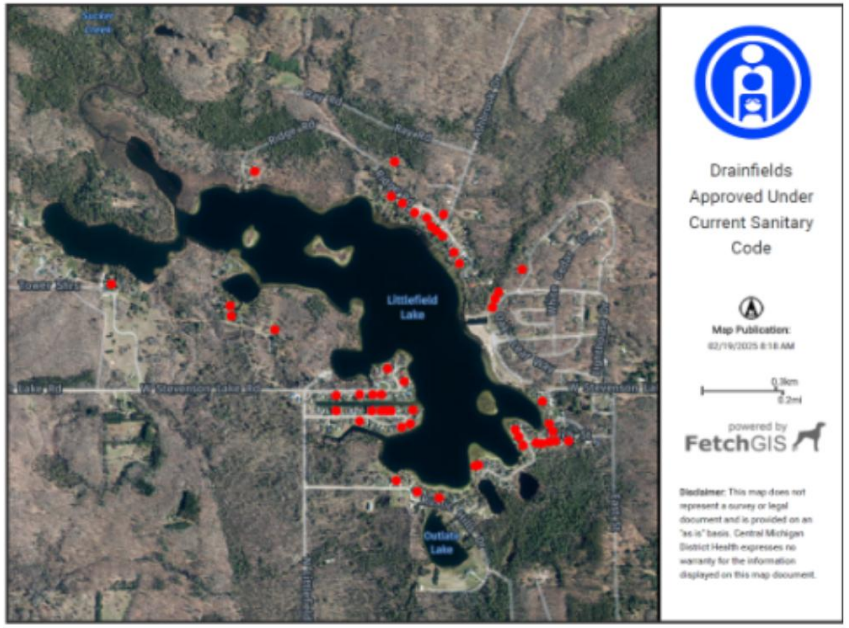


Figure 1. View of Littlefield Lake and surrounding drainfields approved under the current sanitary code, using FetchGIS.

- Littlefield Lake in Isabella County, Michigan was used as the focus of this study. It has a surface area of 183 acres, a maximum depth of 65 feet, and 222 houses along the lake were included in the data.[2] The primary soil types surrounding Littlefield Lake are Tawas Muck, Plainfield Sand, and Udipsamments. The area around the lake is densely populated, with the densest areas housing four to five homes per acre.

- Using previous records including permits and affidavits, septic system data including age, depth, size, and status for houses surrounding Littlefield Lake were recorded on FetchGIS.

- Using the data entered, risk factors including the number of permitted septic tanks and drainfields, and the number of septic tanks and drainfields installed before the current sanitary code was established on January 1st in 1997, were calculated.

Results

Out of the total 222 houses:

- 79 septic tanks and 3 holding tanks are permitted (37%).
- 87 drainfields are permitted (39%).
- 31 permitted septic tanks were installed before the current sanitary code was established (38%).
- 30 permitted drainfields were installed before the current sanitary code was established (34%).

Discussion

Unpermitted septic systems and systems built before the current sanitary code may be leaking and discharging waste into the nearby environment. Additionally, the high water table surrounding most of Littlefield Lake provides a pathway for sewage effluent to discharge into the lake. The primary soil types all have poor septic tank absorption fields, meaning they are less efficient at filtering and absorbing wastewater. The dense population of homes means that potential pollution is highly concentrated. These factors combined pose a significant risk of poorly treated wastewater entering the groundwater and Littlefield Lake. Homeowners should be educated on signs of a poorly functioning system and need for periodic tank pumping and maintenance. The U.S. Environmental Protection Agency works with local government offices to implement the SepticSmart program, which teaches the public how to properly care for, use, and maintain their septic systems.[3]

However, for densely populated lake areas such as this, a more effective alternative would be adopting a municipal sewage system. Building a municipal sewage system in this community would ensure an up-to-date waste disposal system and be the appropriate size to support all the houses in the area. This course of action could significantly reduce the risk of contamination to nearby water sources, resulting in a healthier and safer environment.

References

1. Brockett B. 2023 May 2. Michigan could become the 50th state to get a septic code. https://shorturl.at/rJTzL
2. Simmons A. 2023. Littlefield Lake . Michigan Dept. of Natural Resources.
3. U.S. Environmental Protection Agency . 2024 Jul 16. SepticSmart. https://www.epa.gov/septic/septicsmart.

Stevenson Lake

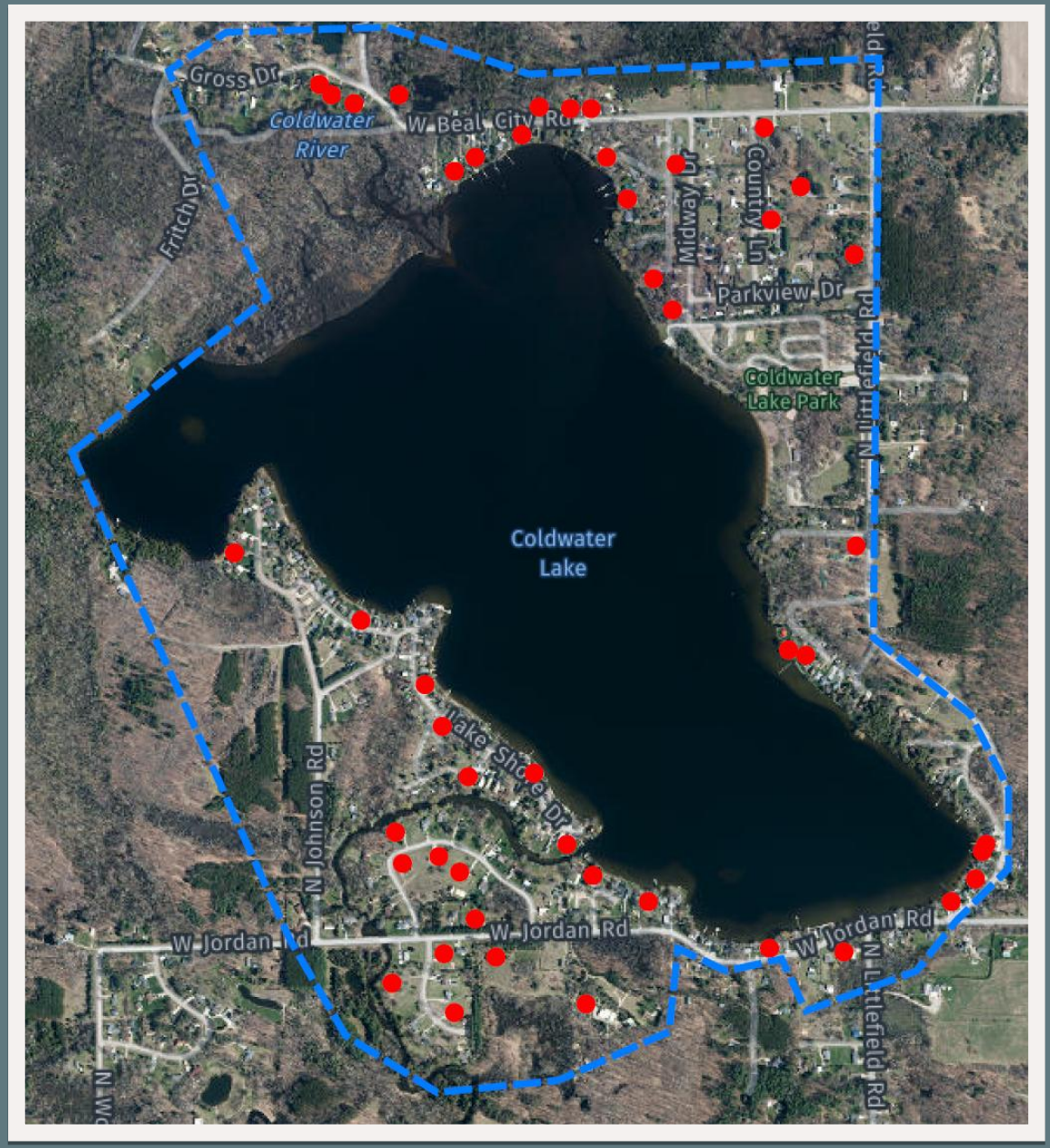
- 84 total homes
- 42% have permits
- 58% unpermitted



Photo credit: Stevenson Lake, Clare MI Facebook Page

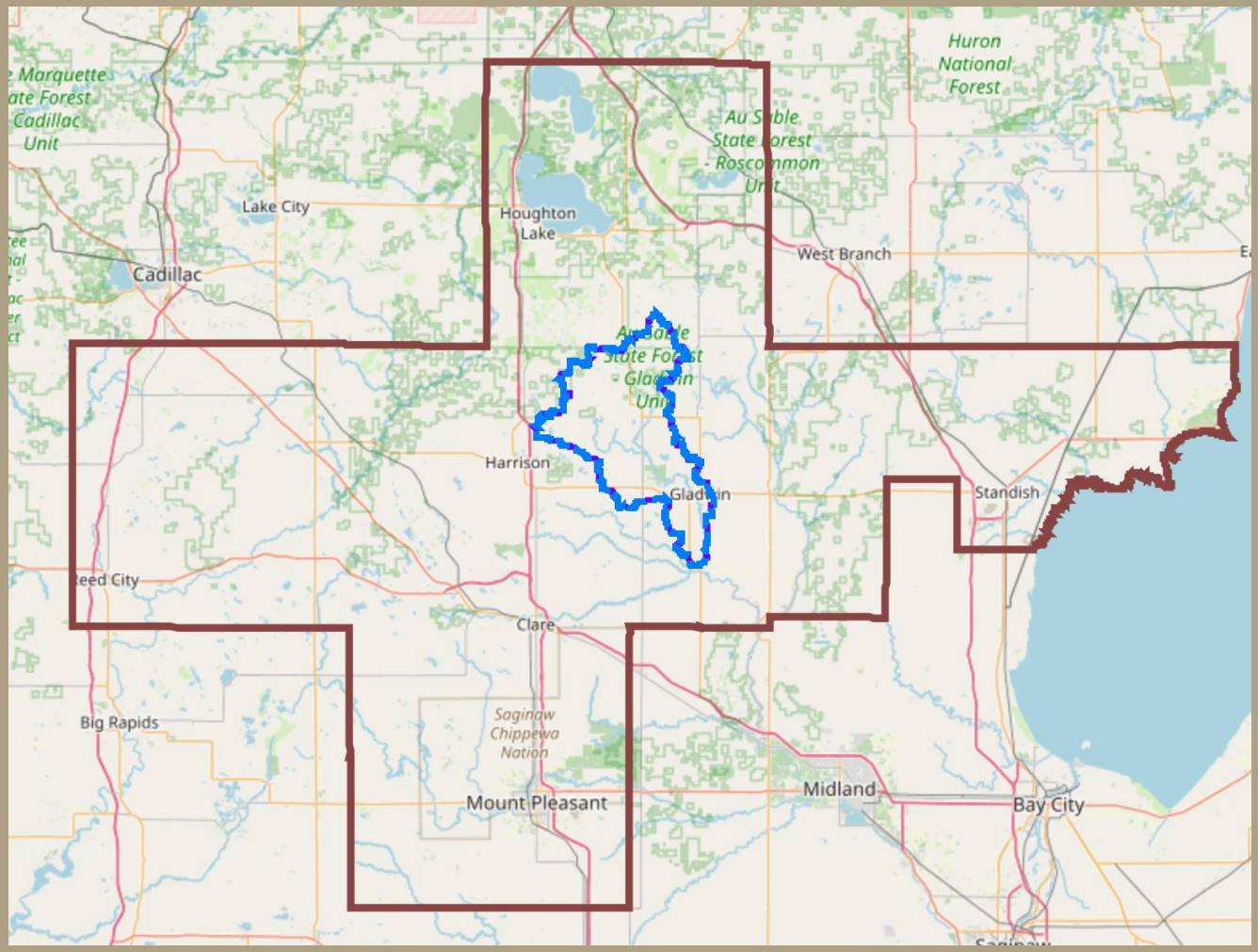
Coldwater Lake

- 322 total homes
- 33-37% have permits
- 63-67% unpermitted
- Sewers currently proposed

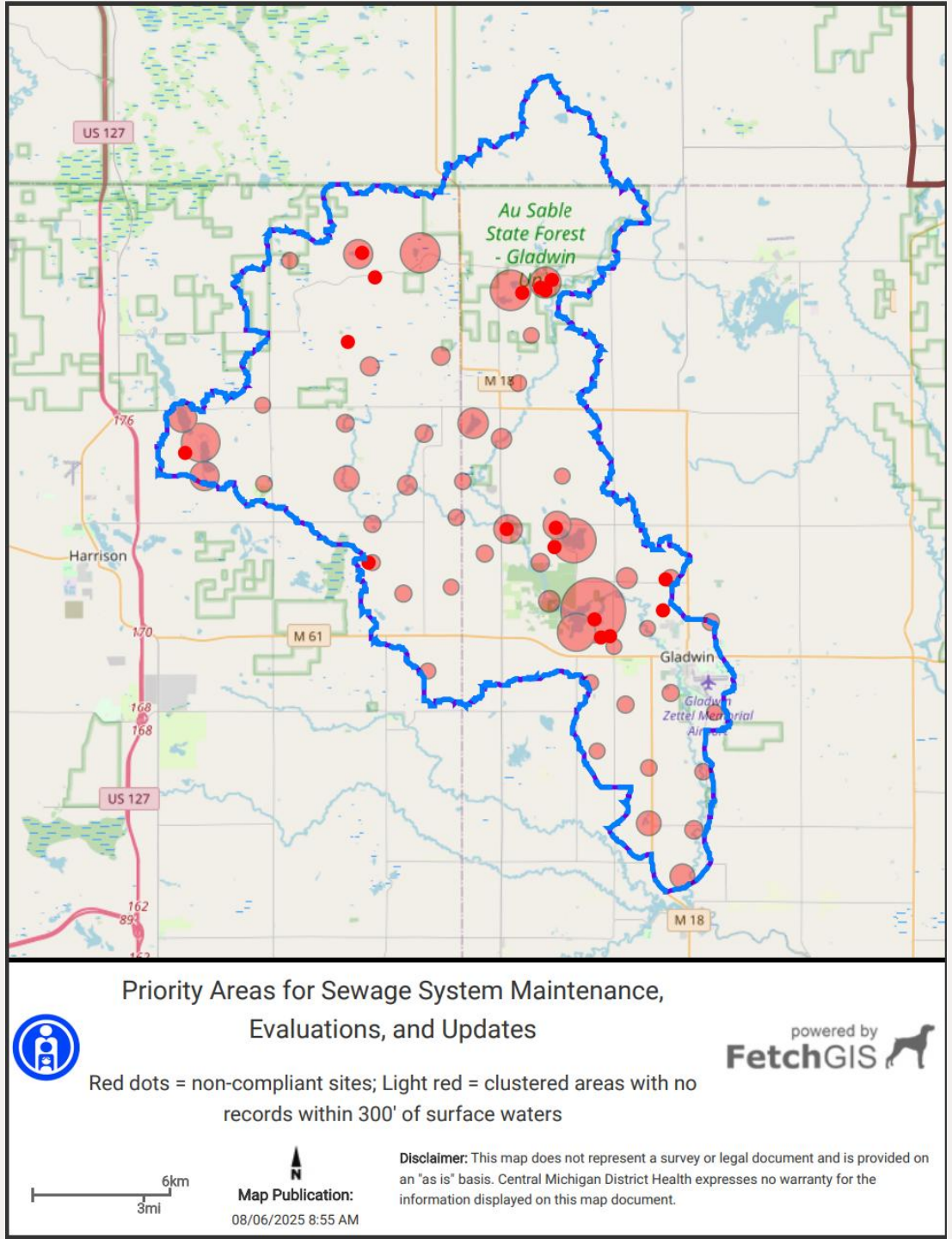


Cedar River Watershed

- 1,922 unpermitted sites (36%)
- 3337 permitted sites (64%)

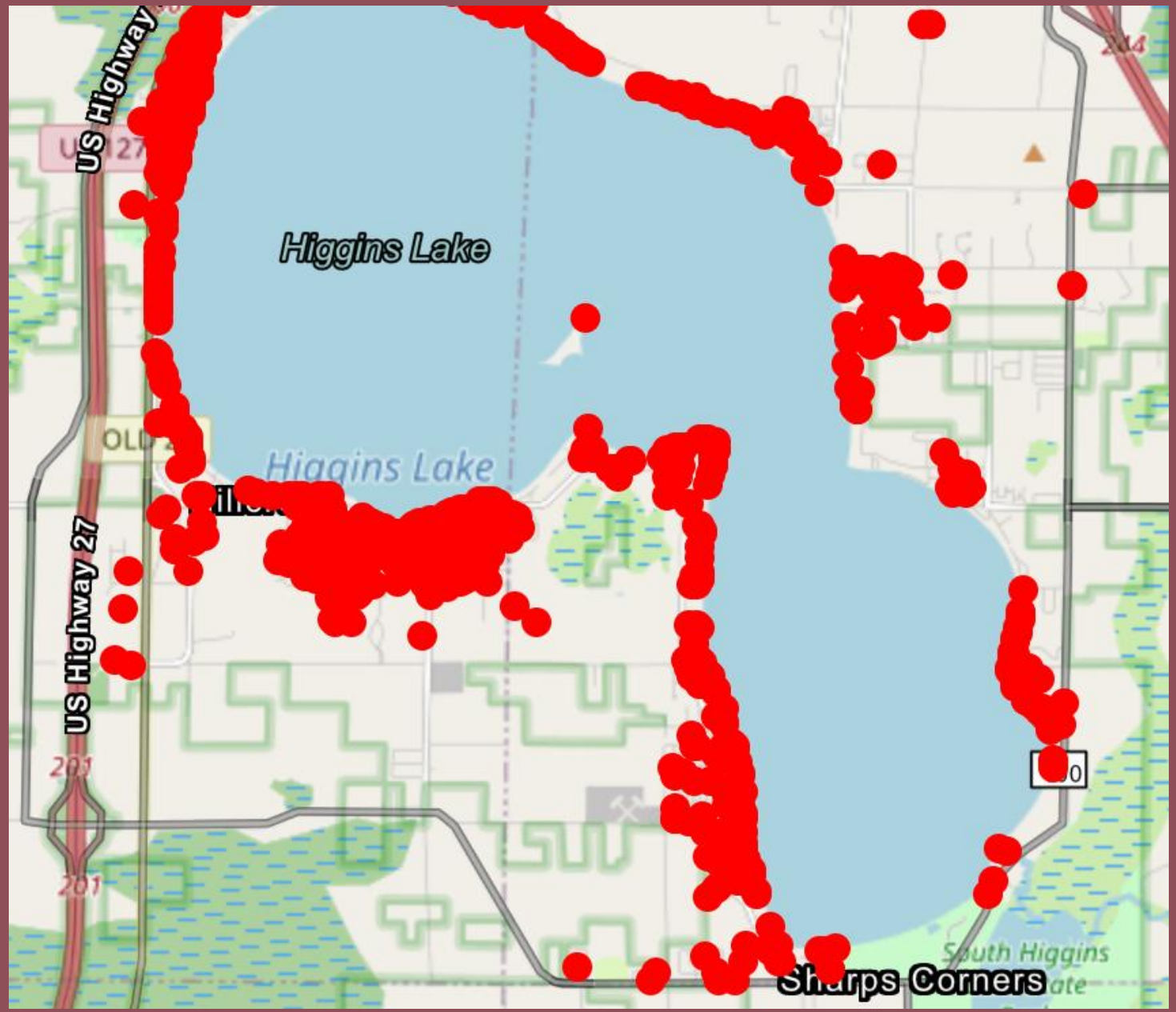


Cedar River Watershed Priority Sites

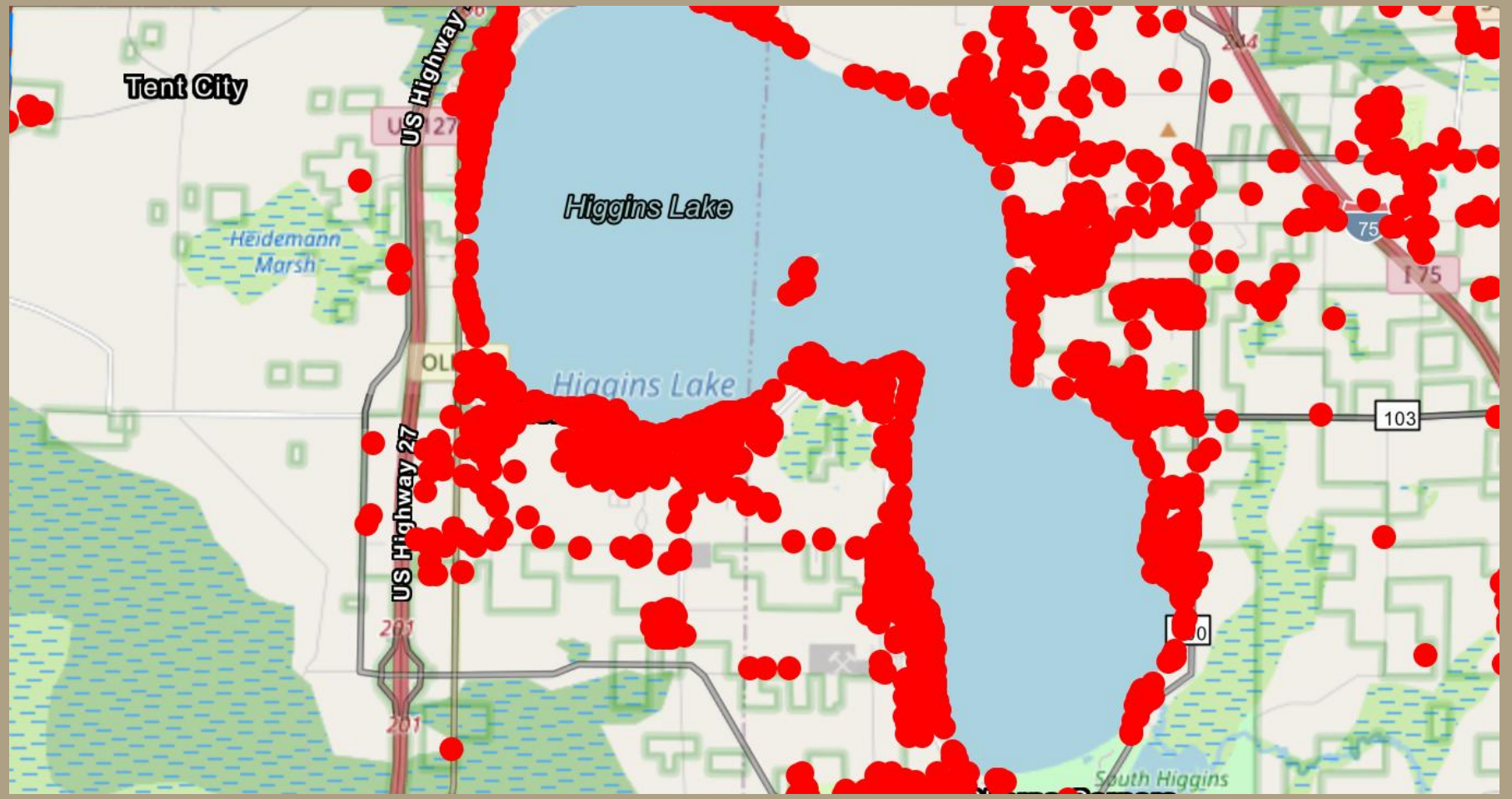


Higgins Lake

- 812 Drywells on Higgins Lake

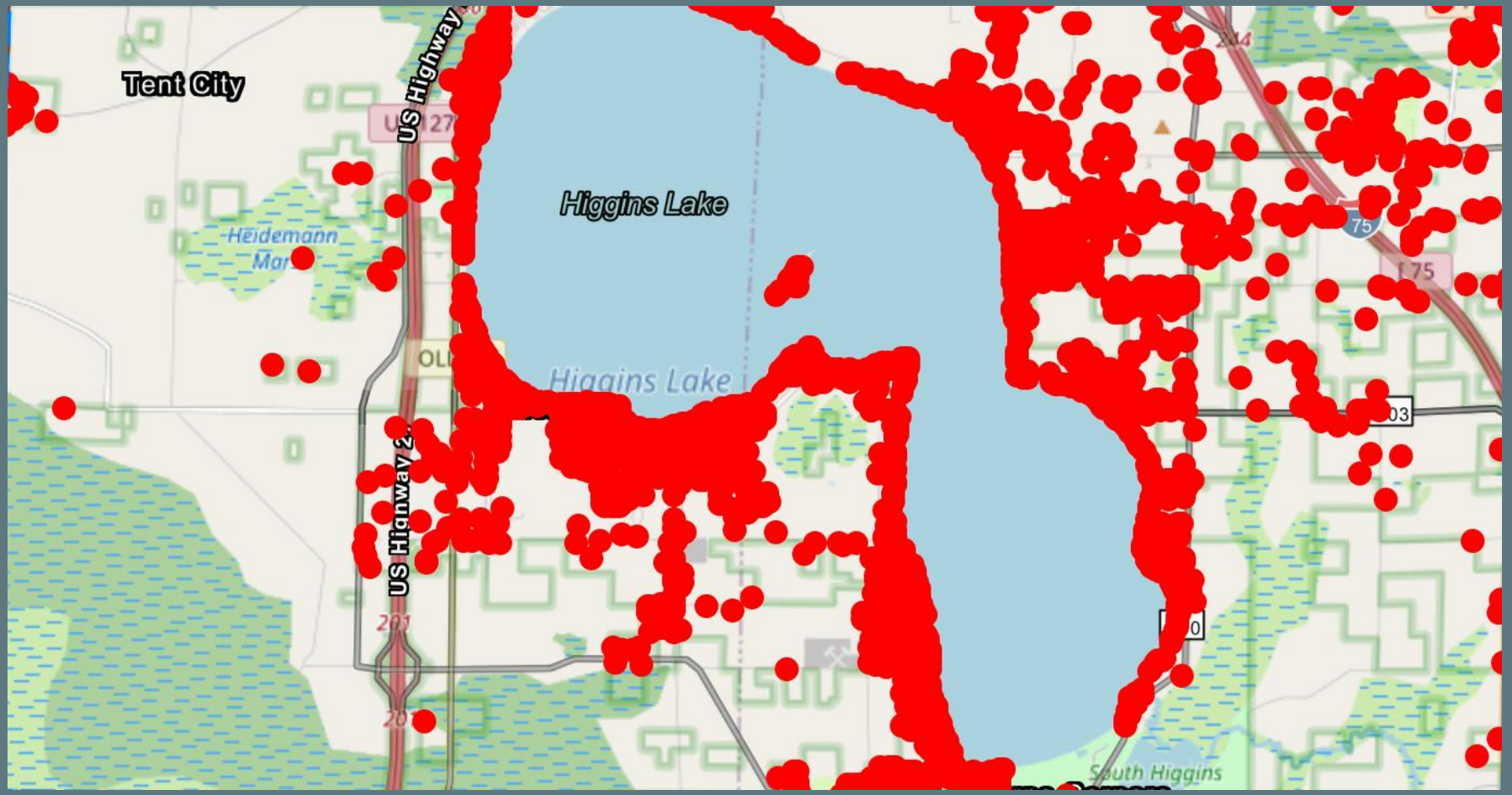


Higgins Lake



Sewage systems approved prior to current Sanitary Code (1997) - *approximately 1700*

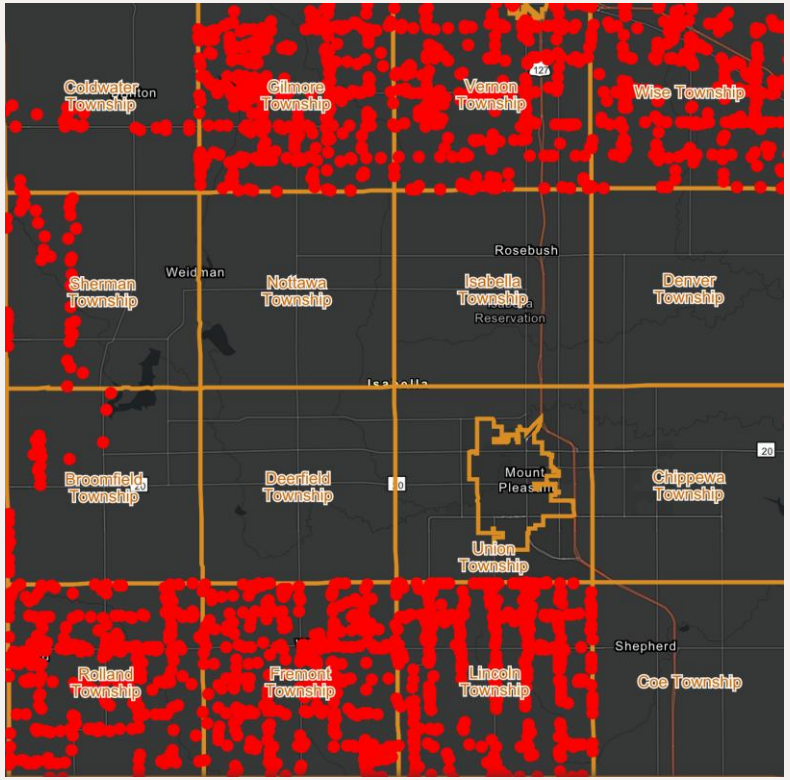
Higgins Lake



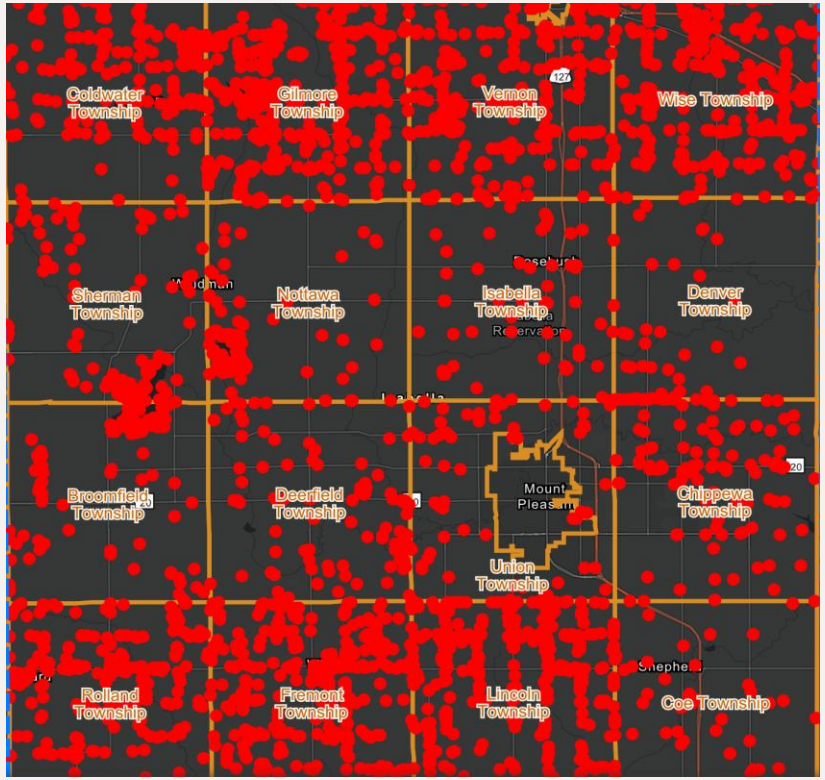
Sewage systems approved under current Sanitary Code (1997) - *approximately 2400*

Isabella County (Current Project)

DEDICATED MAPPING PROJECT

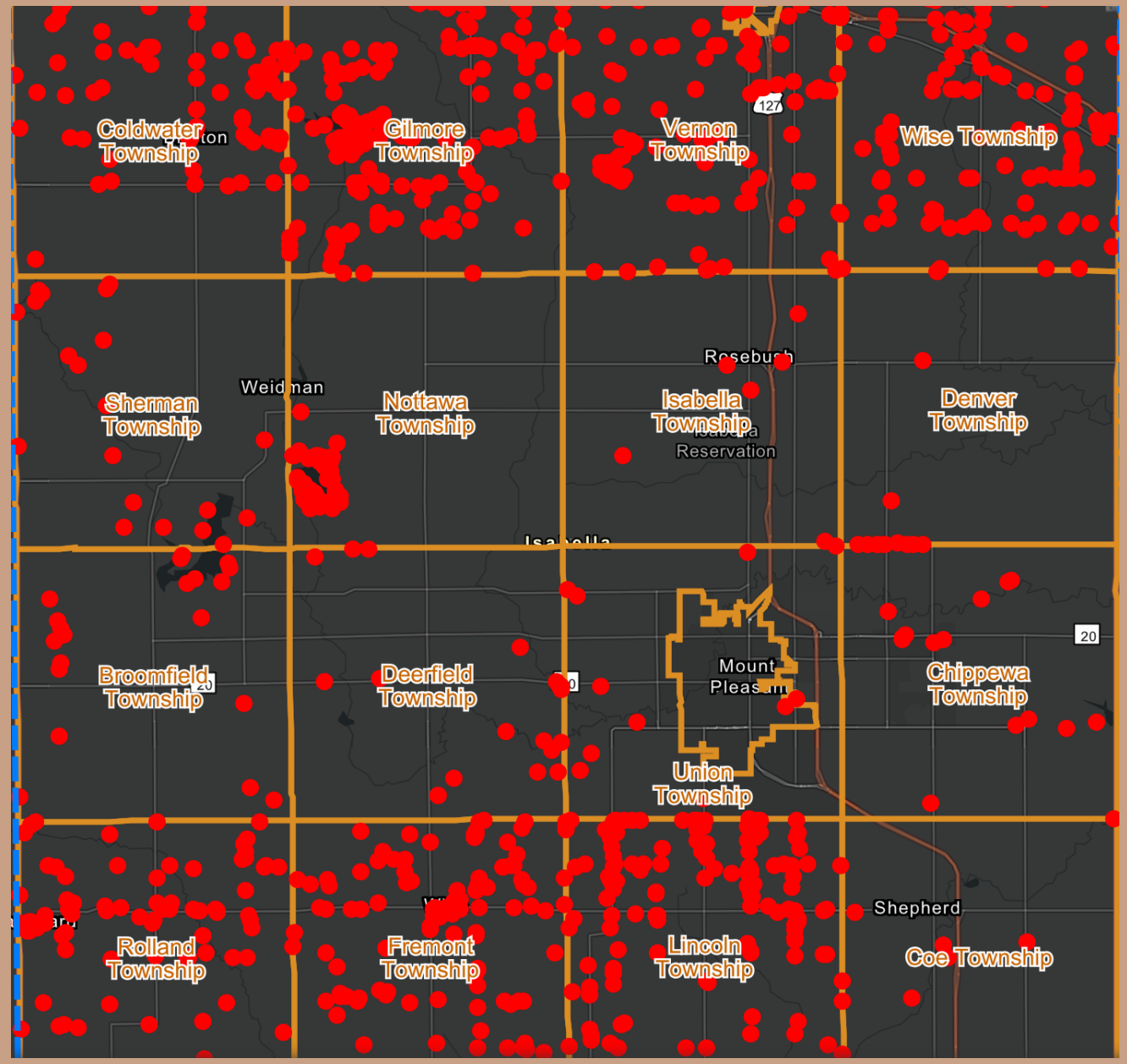


TOTAL COMPLETED- 29%



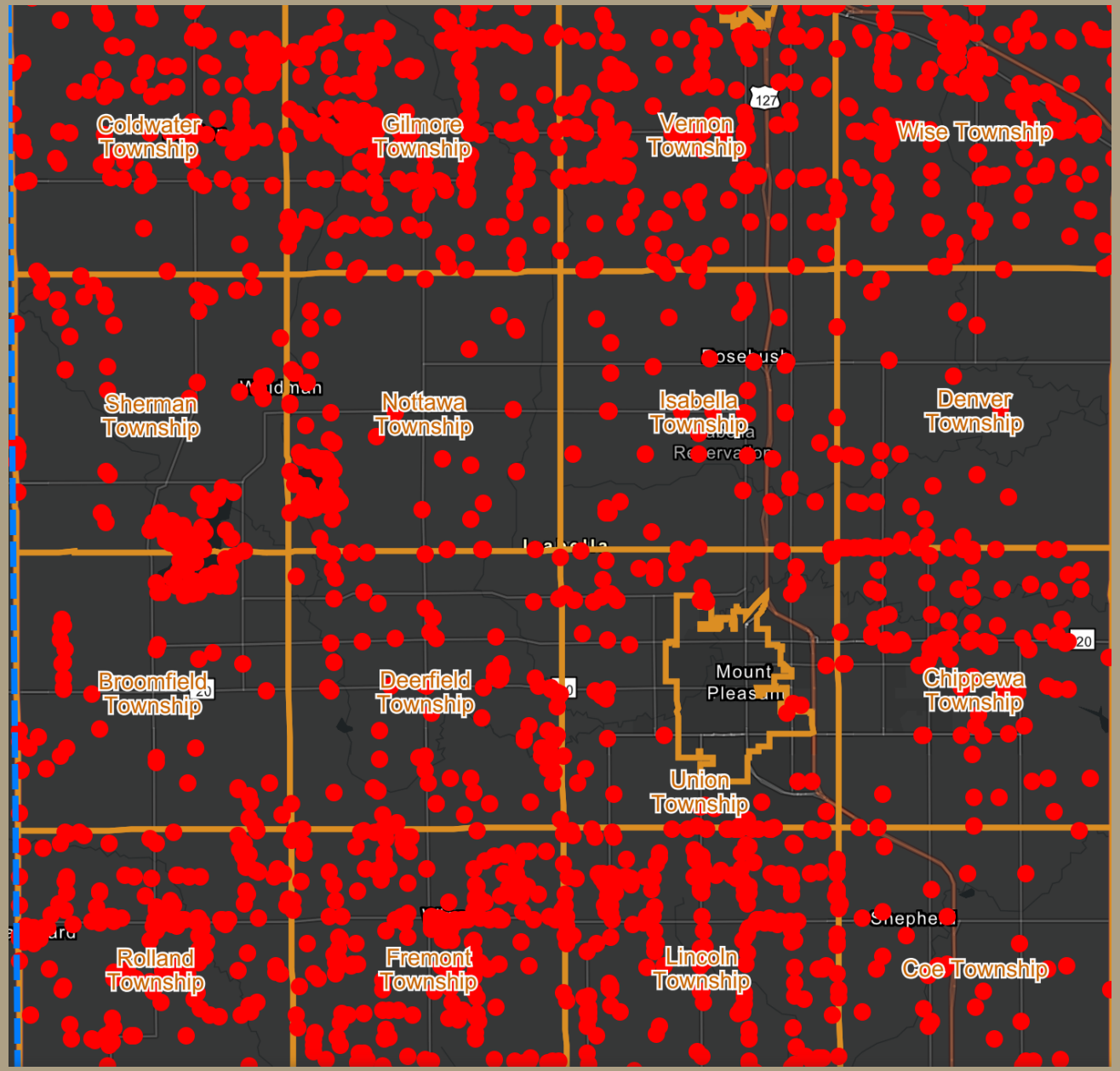
Isabella County

- Systems approved **before** Current Sanitary Code (1997)
- *Approximately 1/3 of mapped systems*



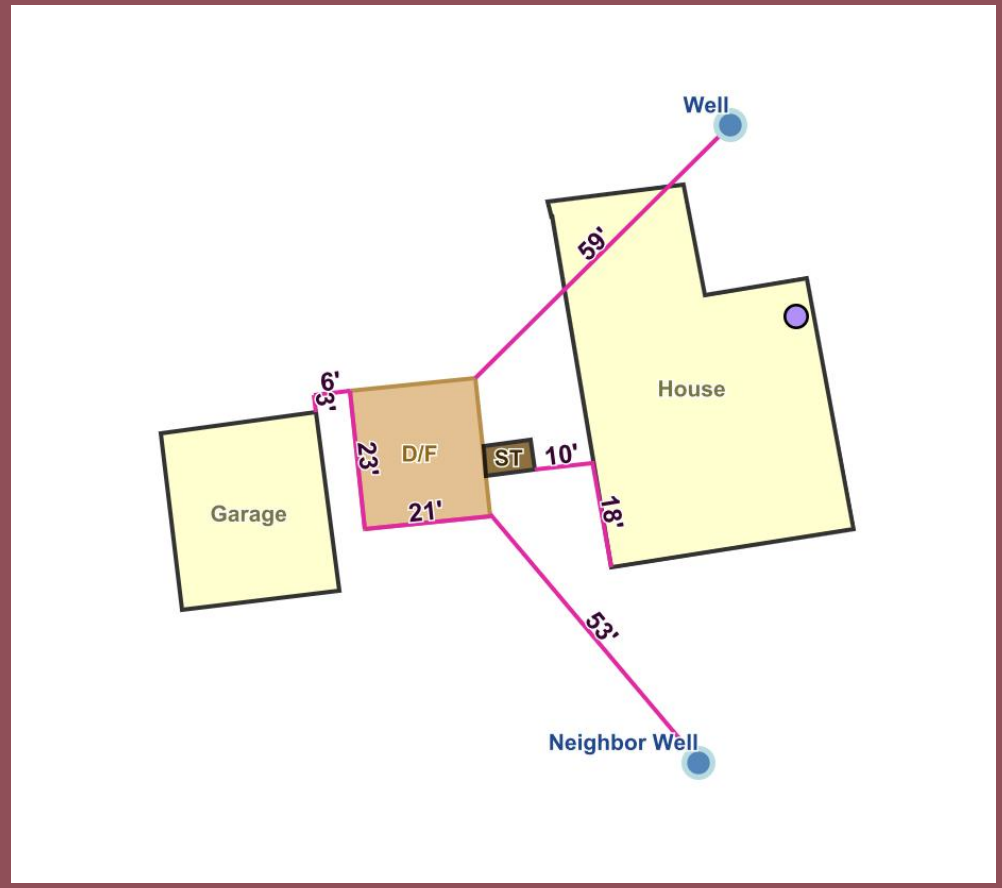
Isabella County

- Systems approved **under** Current Sanitary Code (1997)
- *Approximately 2/3 of mapped systems*



Projects

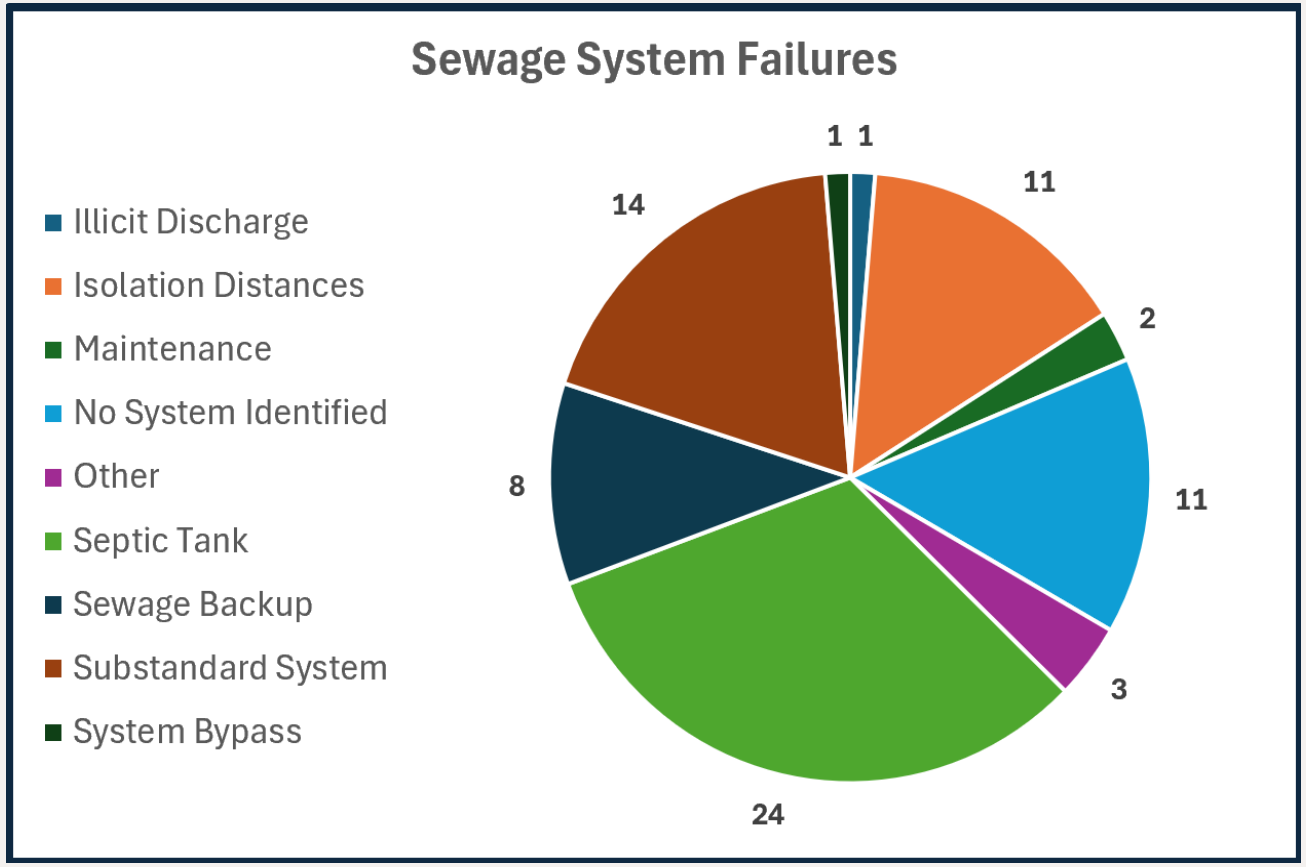
- **Late 2024 – early 2025:** Mapped Isabella County Lakes above
- **Current:** Historic files being added across the district, Isabella County mapping
- **Next step:** Continue mapping file information into extractable GIS database; collaborate and educate communities based on available data



Time-of-Transfer 2025 Data

(Isabella County)

- 363 properties inspected
- 78% of water wells passed
- 81% of on-site sewage systems passed



Partnerships

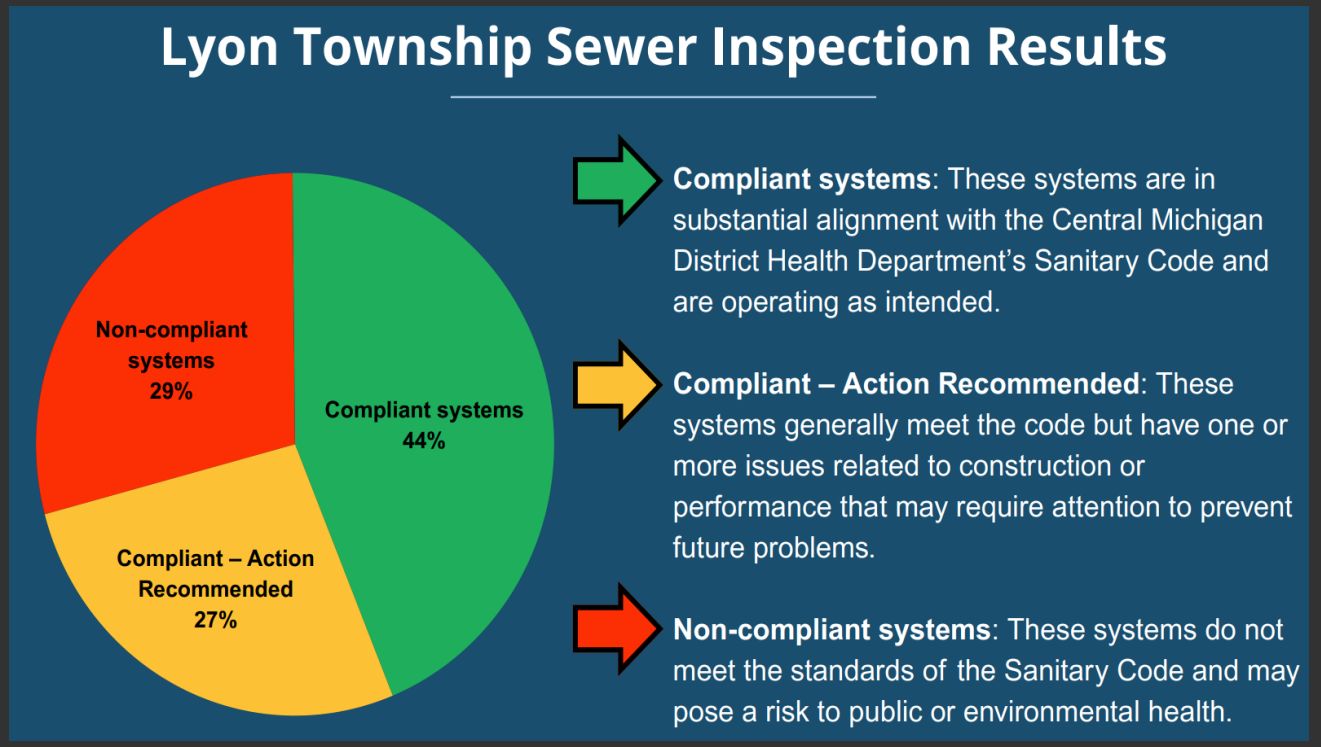
- GERRISH TOWNSHIP INSPECTION ORDINANCE, ROSCOMMON COUNTY

- LYON TOWNSHIP ORDINANCE, ROSCOMMON COUNTY

Time-Based Inspection Ordinance

(Lyon Township, Roscommon)

- 721 properties inspected
- Data reflects state trends
- Significant work remains



View full report: https://www.cmdhd.org/_files/ugd/03d0c9_4187f91749374836b252c0e97c91c359.pdf



Photo courtesy of Ron Wiltse

PURPLE DOT PROJECT:
Mapping Today to Protect Higgins Lake Tomorrow

What is this project?

Central Michigan District Health Department (CMDHD) entered historic records to create a digital map of septic systems and wells around Higgins Lake using Geographic Information System mapping, also called GIS. These maps show where systems are located, and the data behind them helps us understand how they may affect drinking water and Higgins Lake.

What information is collected?

For each system, we record:

- Permit number
- Tank size
- Disposal area size
- Installation date

Data entry for recorded systems is complete in Lyon and Gerrish Townships, thanks to the support of our local partners. The project included community volunteers, local organizations, municipalities, and private partnerships. CMDHD is supporting Gerrish Township as it develops an on-site well and sewage inspection ordinance by providing an inventory of existing records.

Why does this matter?

This project will:

- Help protect drinking water and Higgins Lake
- Support local planning and decision making
- Improve access to accurate system information

When finished, we plan to create a public map. Homeowners, realtors, septic pumpers, and installers will be able to find basic system information more easily.



Higgins Lake Volunteer "Purple Dot" Mapping Team: Left to right: Melanie Brown, Mary Barnwell, Marty Barta, Mark Jarski, Sue Gelderbloom, & Taylor Irwin.

Higgins Lake area mapping is a partnership of:

Central Michigan District Health Department

FetchEH

Higgins Lake Foundation

HLPOA Higgins Lake, Michigan

Environmental and Public Health Impact

- Ability to pull relevant information on a geographic basis
- Make strategic decisions for funding, partnerships, enforcement on a community/facility-wide basis
- Ability to correlate sewage data with other programs and research (*E. coli* beach samples, well contaminants, etc.)



Public Benefits

- Well and Sewage layers available for public viewing
- Homeowners
- Realtors
- Contractors
- Septage Haulers



https://www.tandmsepticpumping.com/septic-pumping

Boots on the Ground



https://youtu.be/ZBTFfEdSN4w?si=01_4PKerbsk7EfZP&t=213 short
https://youtu.be/ZBTFfEdSN4w?si=ys4MpAbhQYJqe7UX full

Presentation Objectives

- Objective 1: How many people (show of hands) gained an understanding of environmental health work during this presentation?
- Objective 2: How many people (show of hands) gained an understanding of how GIS technology can improve public and environmental health programs, strategic decision-making, community partnership, and communications with the public and community during this presentation?

Questions?

Taylor Irwin • Health Officer • 989-824-2518 • Tirwin@cmdhd.org

