

GERRISH AND LYON TOWNSHIP BOARD  
SPECIAL MEETING SEWER FEASIBILITY STUDY PRESENTATION  
October 15, 2019

Special meeting called to order at 10:00am at the Gerrish Township Municipal Center by  
Gerrish Township Supervisor David Udy.

Gerrish Township Board Present:

Supervisor Udy, Clerk Patchin, Treasurer Tulgetske, Trustee Lippert and Trustee Link.

Lyon Township Board Present:

Supervisor Nellist, Clerk Cleeves, Treasurer Williams, Trustee Carlson

Also, present: The team from Fleis & Vandenbrink consisting of John DeVol, Ben Kladder, Bob  
Wilcox and Ian Neercan along with 7 citizens

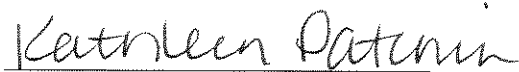
A power point presentation was given to both boards in the findings and  
recommendation in the sewer feasibility study conducted by Fleis & Vandenbrink.  
(see attached)

A question and answer session was held between board member and Fleis &  
Vandenbrink team members.

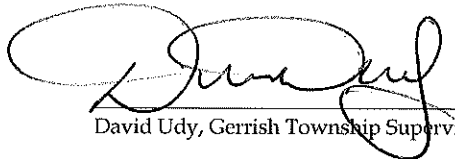
Public Comment: A citizen thanked both boards for bringing this together and strongly  
encouraged moving forward with this program.

Motion by Patchin, supported by Williams: CARRIED  
that the meeting adjourns.

Meeting adjourned at 11:50am



Kathleen Patchin, Gerrish Township Clerk



David Udy, Gerrish Township Supervisor

\_\_\_\_\_  
Terry Cleeves, Lyon Township Clerk

\_\_\_\_\_  
Ed Nellist, Lyon Township Supervisor

Approval \_\_\_\_\_

## Higgins Lake Sewer Feasibility Study Project Summary and Status Update October 15, 2019

### Background

- Residents in the Higgins Lake area and Lyon/Gerrish Townships expressed interest with investigating the feasibility of a public wastewater system to protect the water quality of Higgins Lake
  - Higgins Lake water quality makes it a recreation destination
  - High percentage of seasonal/vacation homes with several homeowners' associations
  - Two state campgrounds are located on Higgins Lake – North & South Higgins Lake State Parks
- F&V provided assistance with submitting an application for a planning grant in winter of 2019 from the United States Department of Agriculture Rural Development (USDA RD). A SEARCH grant was awarded in the amount of \$30,000 to Lyon Township cover the cost of the feasibility study
- Beginning in spring of 2019, work has progressed on the feasibility study. Highlights of the work include:
  - Establishing need of the project
  - Development of study areas
  - Development of alternatives for wastewater treatment and collection
  - Establishing costs for the project
  - Monthly progress meetings with the Higgins Lake Sewer Working Group including representatives of Lyon and Gerrish Townships
- Completed Deliverable will be a USDA Preliminary Engineering Report (PER) which can be used for future funding applications

**Process**

General Milestone	Est. Completion
Feasibility Study	October 2019
Public Information Meeting	October 2019
Townships determine to proceed and begin preparation for making a funding application	Winter 2019-2020
Prepare applications for funding	Spring 2020
Receive funding commitments	Summer 2020
Townships determine to proceed with funding option	Summer 2020
Begin engineering design	Fall 2020
Advertise for bids	Fall 2021
Construction	Spring 2022 - Fall 2023

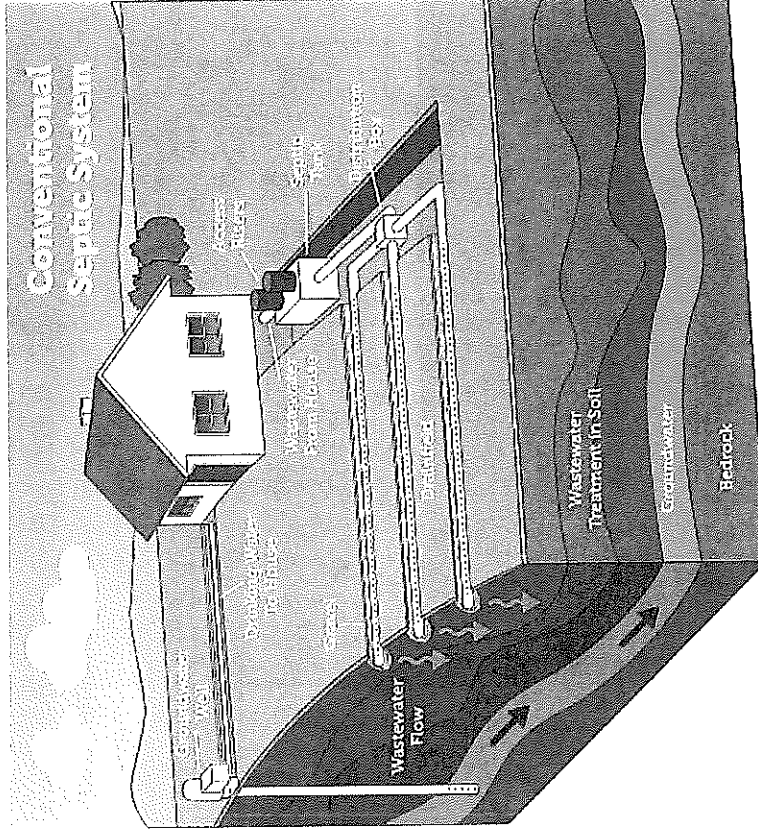
## Identifying the Problem

### Typical Septic System and connecting conditions:

- High (shallow) water table
- Soil type – generally sandy, highly permeable
- Dense Development
- Proximity to lake

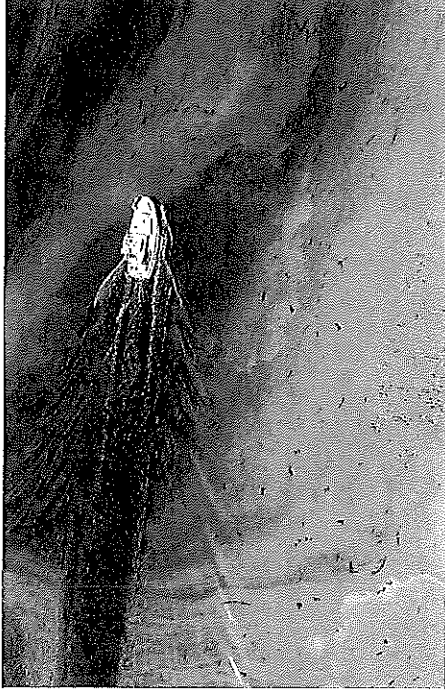
### Problems with Septic Systems:

- **Water quality conditions**
  - Nutrient loading
  - Average Groundwater flow into lake, > 1ft/day \*
  - System life expectancy: 20yrs
- **Continued use of Septic Systems**
  - Nutrients in surface water
  - Seasonal use
  - Expansion/replacement
- **Pollutants Identified**
  - Phosphorus
  - Nitrogen
  - E-coli
  - Chlorophyll



## Prior Lake Studies

- Maintaining the High Water Quality of Higgins Lake; (Bosserman, 1969)
- US EPA Natural Eutrophication Survey – Higgins Lake #195; (US EPA, 1975)
- A Water Quality Study of Higgins Lake, Michigan; (UofM, 1984)
- Effects of Residential Development on the Water Quality of Higgins Lake, Michigan 1995-99 (USGS, 2001)
- Changes in nearshore water quality from 1995 to 2014 and associated linkages to septic systems in Higgins Lake, MI; (MSU, Martin, Kendall, Hyndman, 2014)
- Algae and Water Chemistry Sampling Project; (UofM BS, Lowe, Kociolek, 2016)
- Higgins Lake Water Analysis (Raven Analytical - Roscommon High School Students, 2018, 2019)
- Three Prior sewer feasibility studies



## Common Findings of Prior Studies

Documentation that lake is impacted by septic systems:

- Continually increasing nitrogen and phosphorus levels in Higgins Lake
- Changes in Trophic State Index indicators (Total P, blue-green algae, anoxic conditions, etc.)
- Septic drain field seepage is likely the largest controllable source of phosphorus loading in Higgins Lake

## Camp Curnalia – A Case Study

- Camp Curnalia wastewater collection and treatment constructed in 2009
- The 2014 MSU study analyzed pre- and post-construction sampling with USGS/MSU sampling locations
- Results Show –
  - Significant reduction in Total Phosphorus
  - Nitrate and Nitrite levels dropped below detection levels
  - Boron levels exhibited significant declines
  - Specific conductivity measurements were lowest at the Camp area of the lake

Table 5. Comparison of average TP values from the USGS and MSU studies in the Camp Curnalia area along with periods averaged for each.

Site Number	Period Averaged	Surface water TP (ug/L)	Groundwater TP (ug/L)
USGS-23	1997-1998	12.0	21.0
USGS-24	1996-2000, 2007	11.6, 15.2	24.3, 250
USGS-29	1997-2000, 2007	11.0, 12.3	32.8, 58.7
MSU-22	2014	10.3	4.2
MSU-23	2014	8.5	8.7

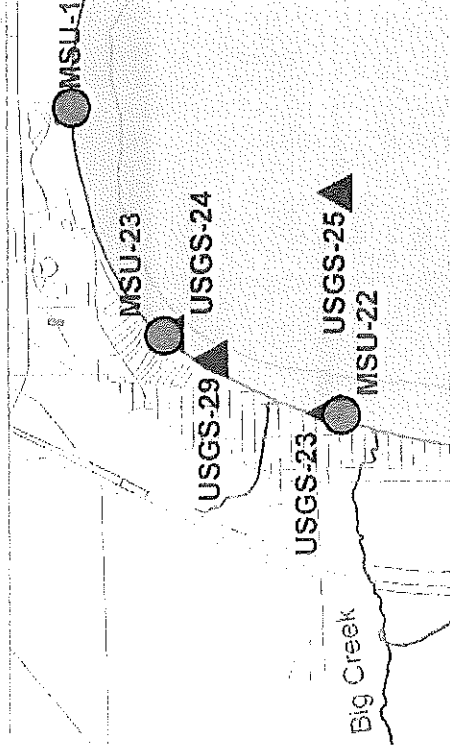


Figure 13. Close-up map of north-west corner of Higgins Lake, highlighting MSU sites 23 and 22 and USGS sites 23, 24, and 29. Many cottages in this area have been converted from onsite septic systems to sewage treatment through the Camp Curnalia Sewer project.

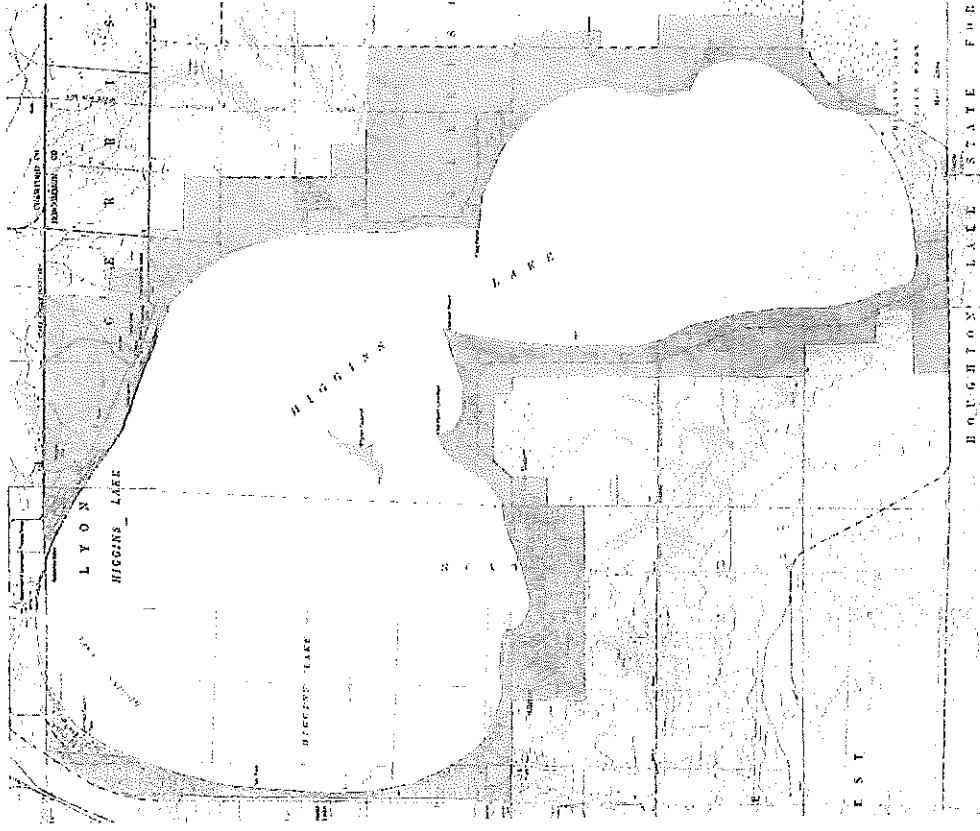
## Benefits of a Proposed Public Sewer System

- Reduces risk of contamination of shallow drinking water wells
- Lake water quality improvements
  - A controllable way to reduce nutrient loading impacting lake health
- Removal of septic systems
  - Eliminates aging, undersized and improperly functioning septic systems
  - Eliminates impractical control for inspection/enforcement of privately owned septic systems
  - Eliminates performance concerns due to seasonal use
- Allows the community to better manage the sustainability of Higgins Lake
- Helps to protect property values



## Study Area

- The feasibility study area focused on areas most likely to be contributing to water quality declines in Higgins Lake with respect to septic tank effluent impacting public health and safety and water quality.
- Factors that influence the septic tank efficiency include:
  - **Proximity to Higgins Lake** – Part of the treatment process occurs as wastewater moves through the soil. The closer a septic tank and drainfield is to surface water, there is less opportunity for treatment
  - **Groundwater elevation** – Similar to proximity to surface water, less distance between a drainfield and the groundwater table below allows for less treatment and nutrient removal. Once wastewater reaches the groundwater below, it also moves quickly in the direction of groundwater flow to sensitive areas like wetlands, lakes, or streams.
  - **Poor soils** (excessively drained or poorly drained) – Wastewater treatment requires sandy soils for treatment. Oxygen is needed for nutrient removal, as well as permeability to allow wastewater to move through the soil. Soils that are too permeable don't not facilitate filtering and treatment.
  - **Small parcel size and high structure/parcel density** – if lots are small, it is very difficult to construct onsite septic systems that meet health department requirements. A 50 foot isolation zone is required between wells and septic systems, and in some instances there simply may not be enough room to construct a septic system on a lot





## Alternatives Analysis

### Collection System Alternatives Considered:

#### Low-Pressure & Gravity Collection System

- Consists of gravity sewer where feasible and lift stations; low-pressure Septic Tank Effluent Pumping (STEP) where gravity sewer is not possible

#### Low-Pressure Collection System

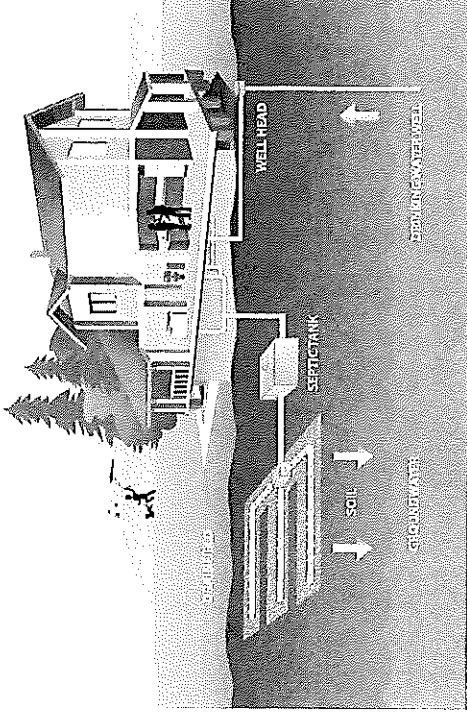
- Entirely low-pressure collection network

#### STEP Systems

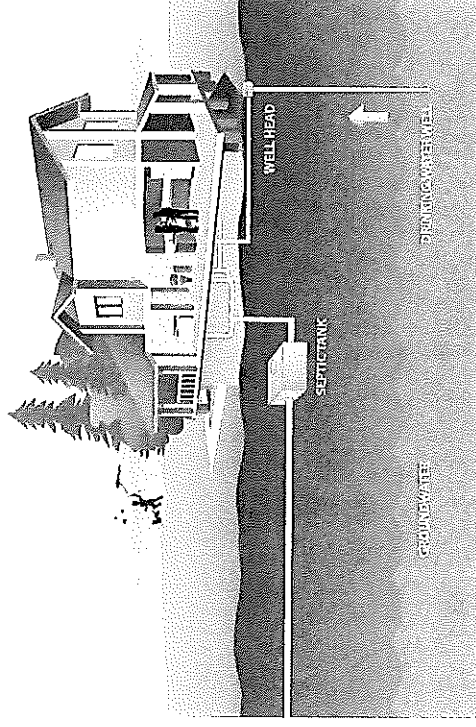
- Eliminates Drainfield & Pumps to WWTP
- Municipal Ownership & maintenance by municipality
- Wastewater treated to EGLE standards & Oversight by EGLE
- Not affected by seasonal use

#### Responsibility & Maintenance:

- **Property Owner:**
  - Pipe from house to tank,
  - Electric cost for pumping, Est. at <\$1.50/month
- **Utility:**
  - Tank, pump, pump controls and all downstream piping
  - Utility will periodically pump tanks, operate, maintain & replace system



Conventional Septic System



STEP System

## Treatment Alternatives

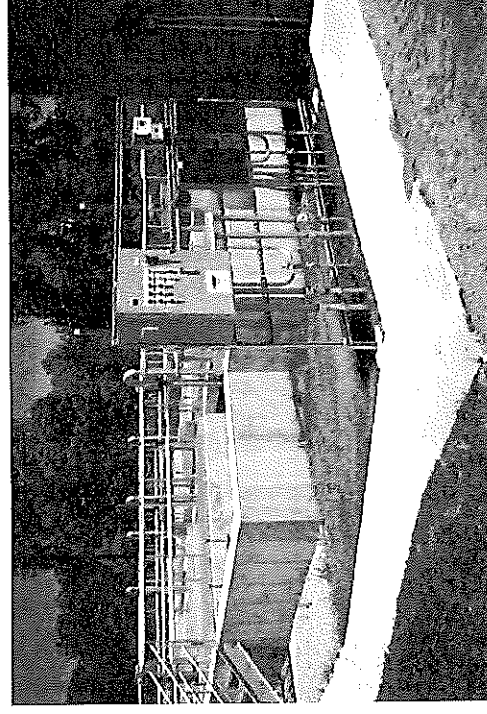
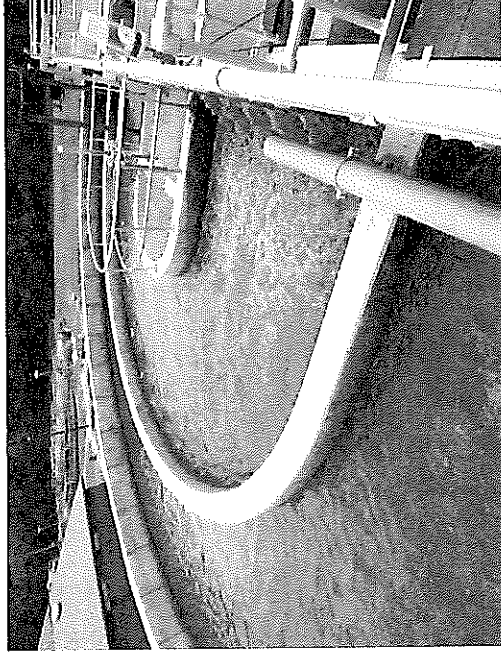
- Regional Collection and Treatment
  - Construct a new collection system and utilize existing wastewater treatment facilities in the area for waste processing.
- Lagoon Wastewater Treatment
  - Large earthen lagoons and rapid infiltration basins
- Mechanical Wastewater Treatment
  - Concrete treatment and settling tanks with rapid infiltration basins

## Proposed Treatment System

### Township Wastewater Treatment Plant

- Mechanical treatment facility with solids handling.
  - Designed to treat summer time flow rates
- Certified Operator in charge of treatment
- Effluent quality monitored for compliance by EGLE
- High quality effluent discharged to groundwater far away from the Lake
  - Nitrogen <5 ppm
  - Phosphorus <1 ppm

	Raw Wastewater	Drainfield Discharge	Municipal WWTP Treated Water
Nitrogen	60 ppm	60 ppm	<5 ppm
Phosphorus	10 ppm	8.1 ppm	<1 ppm

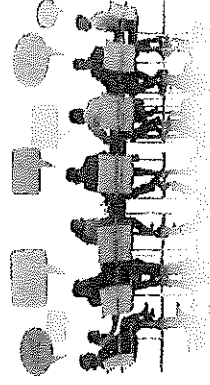


## Financial Considerations

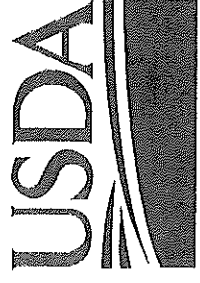
- State & Federal Program finance construction of water and sewer systems with loan and grant programs
- Must go through application process to know loan terms and potential grant awards
- USDA Rural Development
- EGLE SRF (State Revolving Funds)
- Residential Assistance
  - USDA Rural Development
  - Loan and Grant opportunities
  - MI Treasury Programs

## Legal Considerations

- Although there are many legal structures that could be utilized to own, operate and finance a system, the most likely will include:
  - Creation of sewer authority
    - Board will be appointed by townships
    - Will own and operate the sewer system
    - May hire staff and contractors



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## Project Costs

Following are opinions of probable construction costs for collection and treatment alternatives.

- Costs are preliminary in nature and will require refinement as the study and project moves forward. F&V does not have control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing. Bid prices may vary significantly based on these factors and market conditions at time of bid. Costs are based on an assumption of 2021 construction dollars.
- Although potentially eligible for financial assistance, the costs below do not assume any funding assistance, either by low interest loans or grant.

**Summary Table: Engineer's Opinion of Probable Capital Costs**

Alternative	Capital Cost	Annual OM&R Cost	Net Present Worth of OM&R Cost (1)	Total Present Worth	Salvage Value	Net Present Worth
Alternative 2 - Gravity & LP Combined	\$101,936,000	\$933,000	\$16,020,000	\$ 117,956,000	\$36,721,000	\$81,235,000
Alternative 3 - Low Pressure STEP System	\$82,559,000	\$692,000	\$11,880,000	\$ 94,439,000	\$39,825,700	\$54,613,300

**Summary Table: Engineer's Opinion of Probable Capital Costs**

Alternative	Capital Cost	Annual OM&R Cost	Net Present Worth of OM&R Cost (1)	Total Present Worth	Salvage Value	Net Present Worth
Alternative 1 - Lagoon WWTP	\$28,010,000	\$860,000	\$14,770,000	\$ 42,780,000	\$2,900,000	\$39,880,000
Alternative 2 - Mechanical WWTP	\$24,400,000	\$980,000	\$16,800,000	\$ 41,200,000	\$3,800,000	\$37,400,000

(1) Net Present Worth calculated using the real discount rate for a 20-year period ( $i = 1.5\%$ ) based on USDA RD guidance for FY2019.

## Next Steps

- Feasibility Study will provide conclusions as to the most cost-effective alternatives for the Townships to consider
- There are many funding options, including a combination of special assessments, grants, loans and participation by state and federal partners
- There will be several opportunities for the Townships and public to determine whether to proceed throughout the process
- The funding applications do not involve a commitment to continue the project

General Milestone	Est. Completion
Public Information Meeting	October 2019
Townships determine to proceed	November 2019
Townships complete legal work in order to apply for funding	Winter 2019 –2020
Prepare applications for state and federal funding	Spring 2020
Receive funding commitments	Summer 2020
Townships determine to proceed	Summer 2020
Begin engineering design	Fall 2020
Advertise for bids	Fall 2021
Construction	Spring 2022 - Fall 2023