

Silver Lake Golden Township Sewer Options



Planning for the future of Silver Lake



**AUGUST
2017**

Algae Blooms



Fish Kill

3,000 dead fish, just on the north shore alone



Water Quality



Silver Lake North Shore May 19, 2012



Hunter's Creek May 15, 2012



Upper Silver May 15, 2012

Bill's House – June 6, 2012



Previous Studies

- 1979 Kroft
- 1993 Progressive
- 2001 Wally Fusilier
- 2003 Prein & Newhof
- 2006 MSU
- 2009 Voogt

**All had Same conclusion:
Sewer are needed**

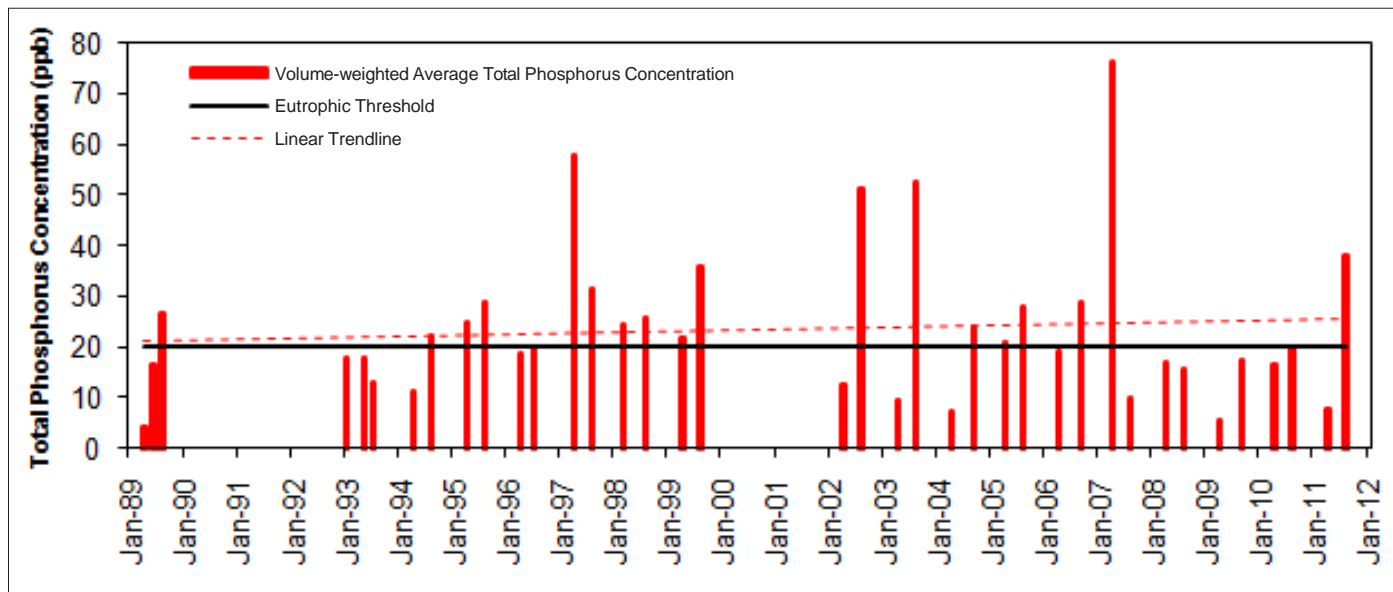
The **Quality** of the Lake has **Deteriorated**

20 years of Data have shown worsening conditions.

- Increased **Phosphorous** Level
- Decreased **Water Clarity**

Progressive Engineering: in September 2011 stated:

*“...recent and historical sampling data indicate that **Silver Lake is undergoing accelerated eutrophication.**”*





Silver Lake Nutrient Loading Study, Oceana Co., MI 2012-2015

Angela Brennan
Christopher Hoard
USGS MI-OH Water Science Center
&
GVSU-AWRI

In cooperation with the Silver
Lake Improvement Board

U.S. Department of the Interior
U.S. Geological Survey

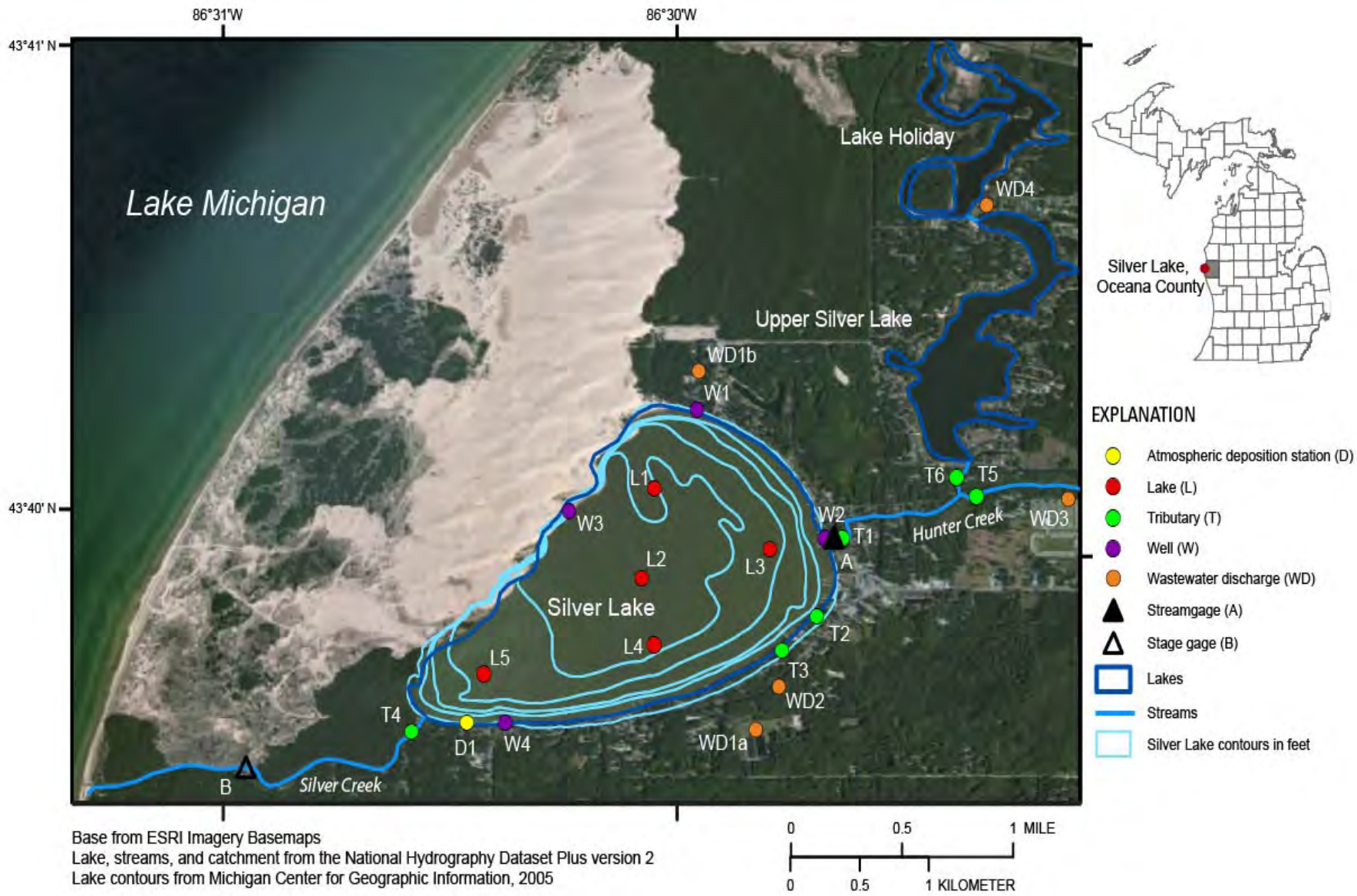


Project Problem

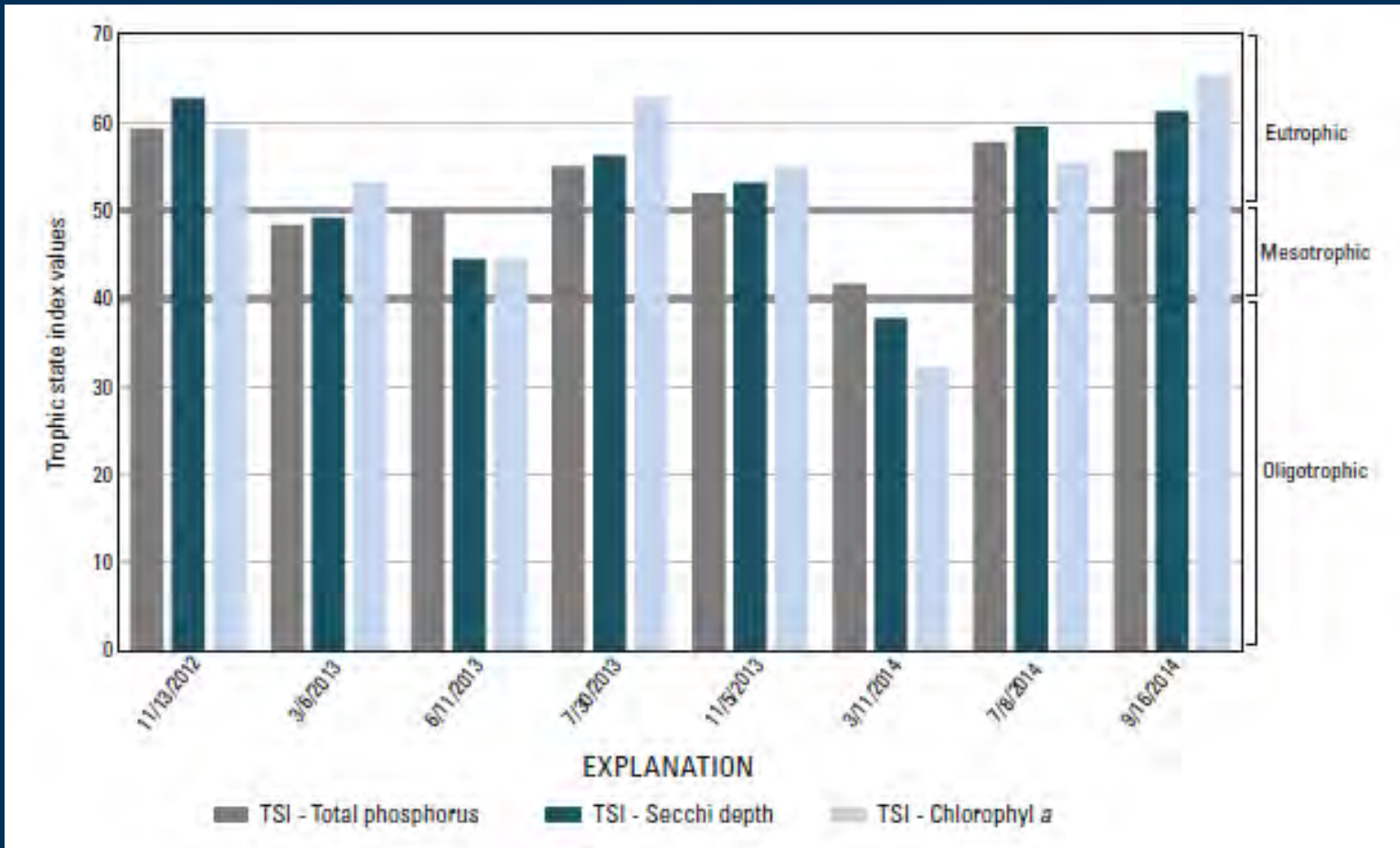
- In 2011, Progressive AE published the “Silver Lake 2011 Water Quality Monitoring Report”
- Study results indicated Silver Lake appeared to be undergoing more accelerated eutrophication and if the trend continued, that there would be more frequent and prolonged algal blooms, reduced transparency, and a decline in overall water quality.



Silver Lake, Oceana County, MI



Project results – Trophic Status



Trophic status of Silver Lake, Oceana County, Michigan, based on Carlson's Trophic State Index. (TSI, trophic state index; less than 40 represents oligotrophic conditions, 40-50 mesotrophic, greater than 50 represents eutrophic conditions).



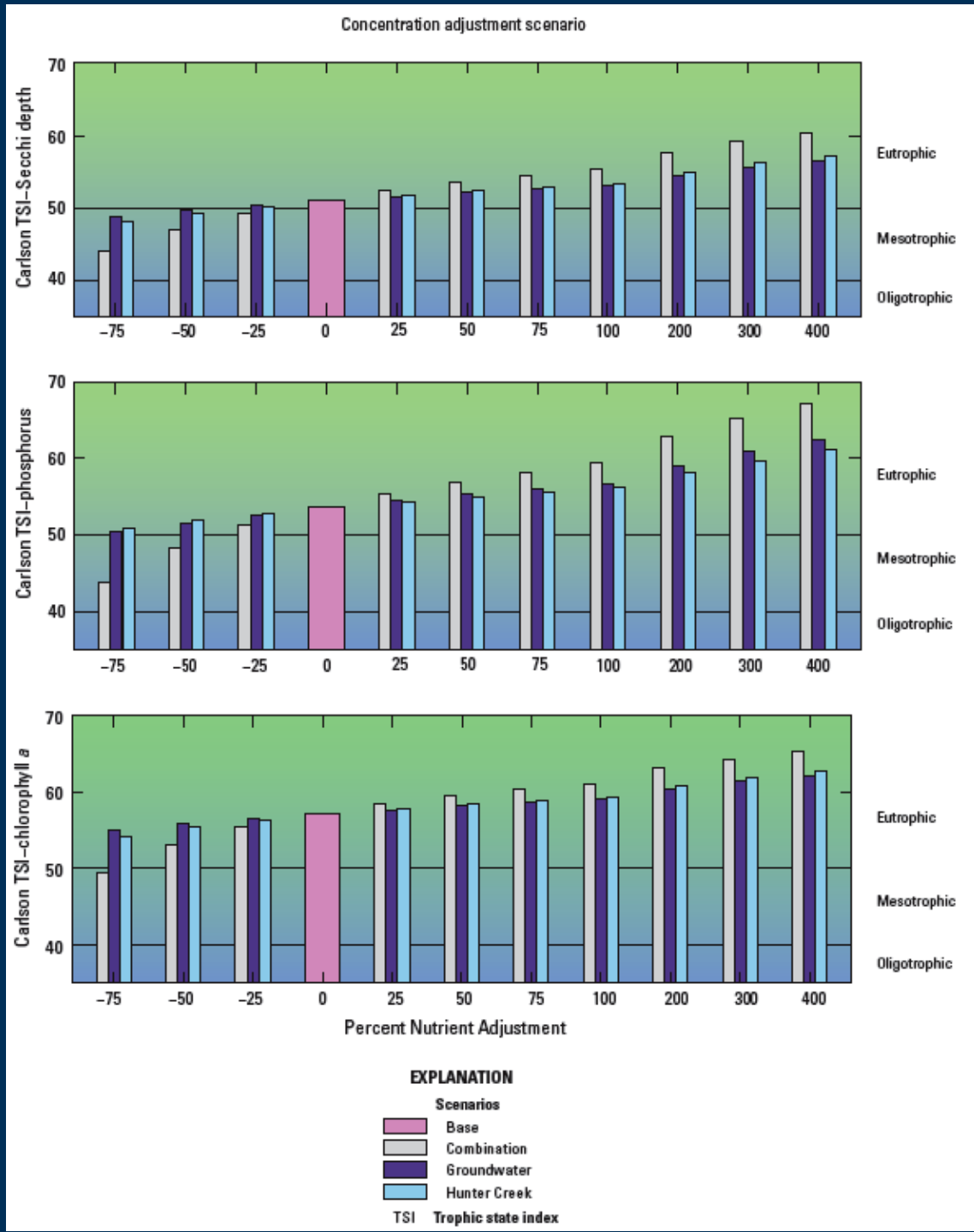
Project results

- Concluded that internal loading is not a major source of P to Silver Lake
- Algal growth appears to be co-limited by P and N
- Cyanotoxin levels are not an issue to date

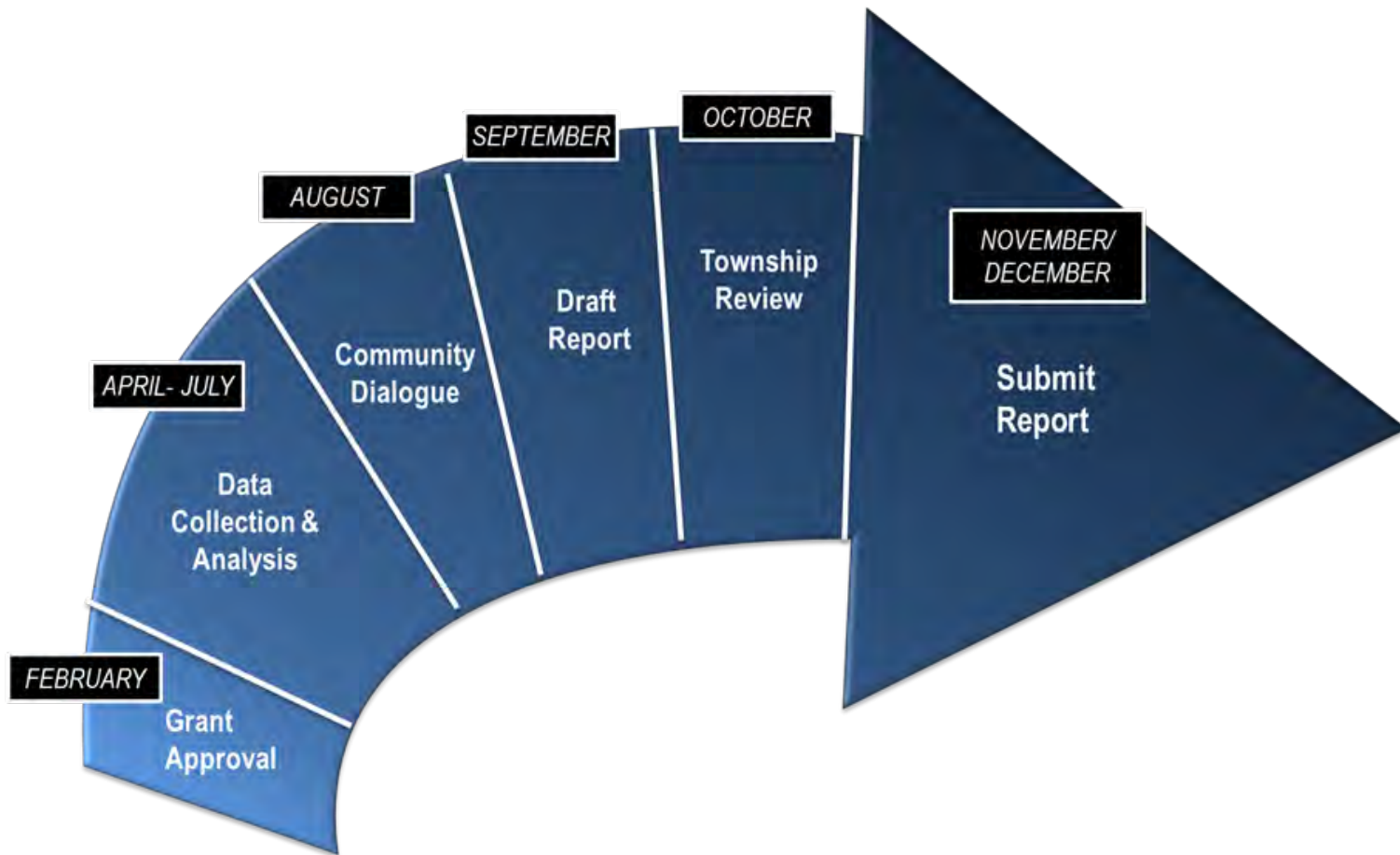


Predicting future lake conditions

- Nutrient adjustment scenarios of phosphorus and nitrogen to Silver Lake were processed using the BATHTUB model.



USDA: Rural Development SEARCH GRANT



Financial Information

Type of Financing

- **Municipal Bonds**
- **USDA Rural Development**
 - Low Interest Loans
 - Grants

Type of Financing	*Approximate Annual Cost Per Household
Conventional Municipal Financing	\$1,000 + Operating cost
USDA: Water & Waste Disposal Loan & Grant Program	\$600 + Operating cost

*Rough Estimate

Operational Cost

Oceana County	Monthly Operating Fees
Hart City	\$30
New Era Village	\$20
Walkerville Village	\$18
Shelby Village	\$22

USDA Grant Deliverables

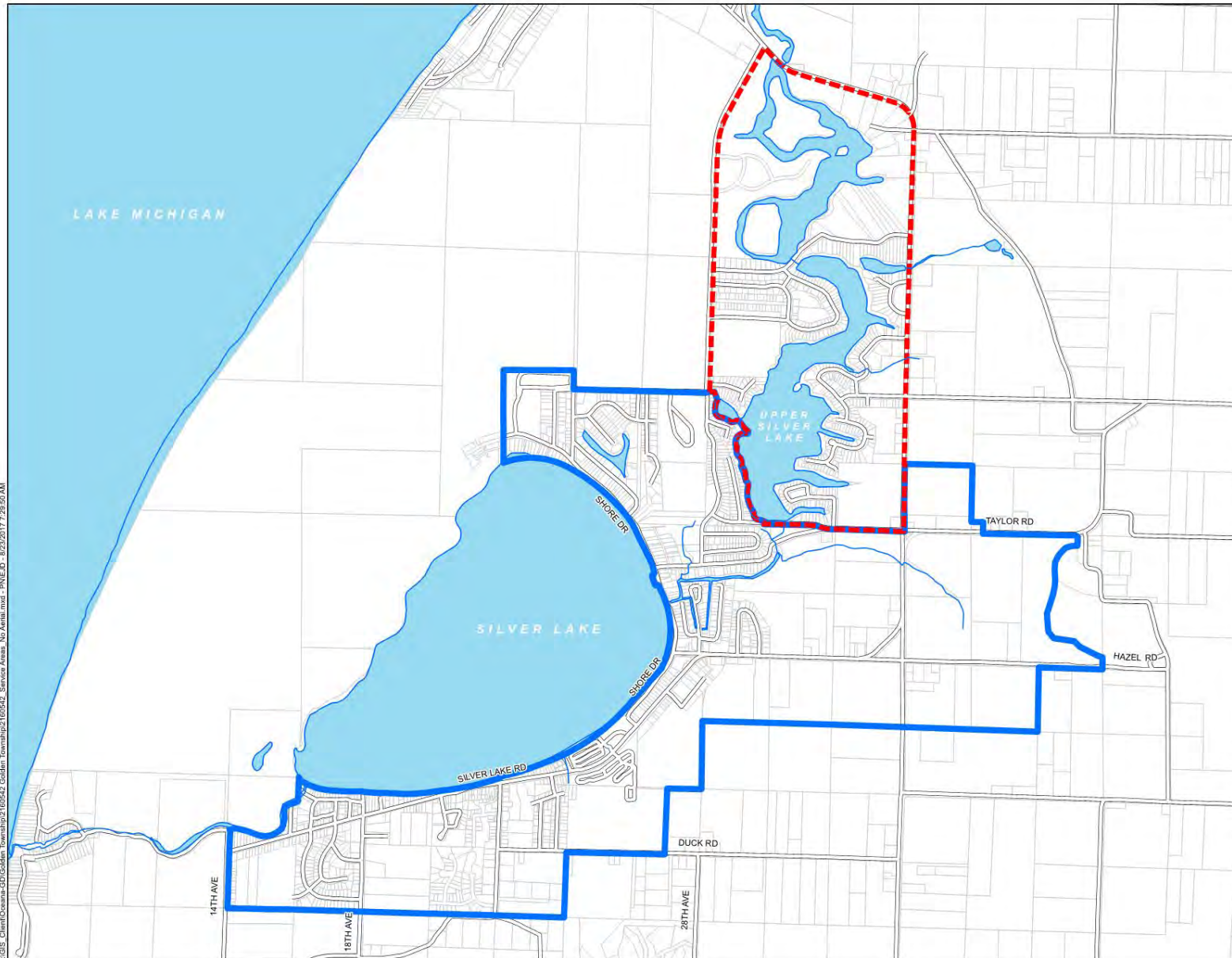
Preliminary Engineering Report

- Define Need
- Evaluate Alternatives
- Estimate Costs



Environmental Report

- Review potential environmental impacts of selected alternative
- Define mitigation if needed

Service Area



LEGEND

-  Phase I Service Area
-  Future Service Area

GOLDEN TOWNSHIP
OCEANA COUNTY, MICHIGAN
PROPOSED SERVICE AREAS

FIGURE 1
Prein&Newhof
2160542

Sewer Flows

- Sewer flows calculated from State and Federal guidance for Campgrounds, Hotels, Businesses and Residences
- Residence Assumes: 2.3 People x 100 gpd/person = 230 gpd/residence (REU)
- Campground's flow based on number of sites and type of sites
- Projected flow during Summer months = 430,000 gpd

What is a REU?

- REU is a Residential Equivalent Unit
- 1 House = 1 REU (For us REU = 230 gpd)
- REUs for businesses and campgrounds = Projected Flow ÷ 230 gpd
- Example: Flow is 23,000 gpd ÷ 230 gpd = 100 REUs
- Preliminary Total REUs = 1,865



= REU



=

REU, REU,
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Sanitary Sewer Options

Gravity

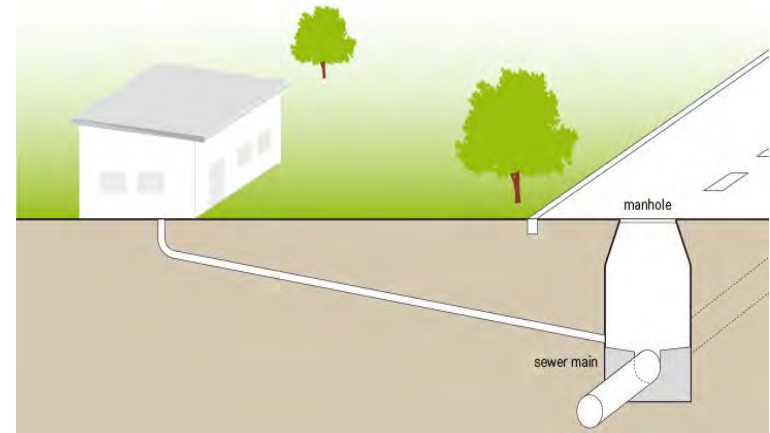
or

STEP

(Sep^utic Tan^uk Effluent Pump)

Gravity System

- Utilizes Gravity to minimize moving parts, water flows downhill
- Three pump stations to reduce depth of sewers
- For the Owner it is Flush and Forget



- Low lying houses will still need a pump & tank
- Solids travel with the water

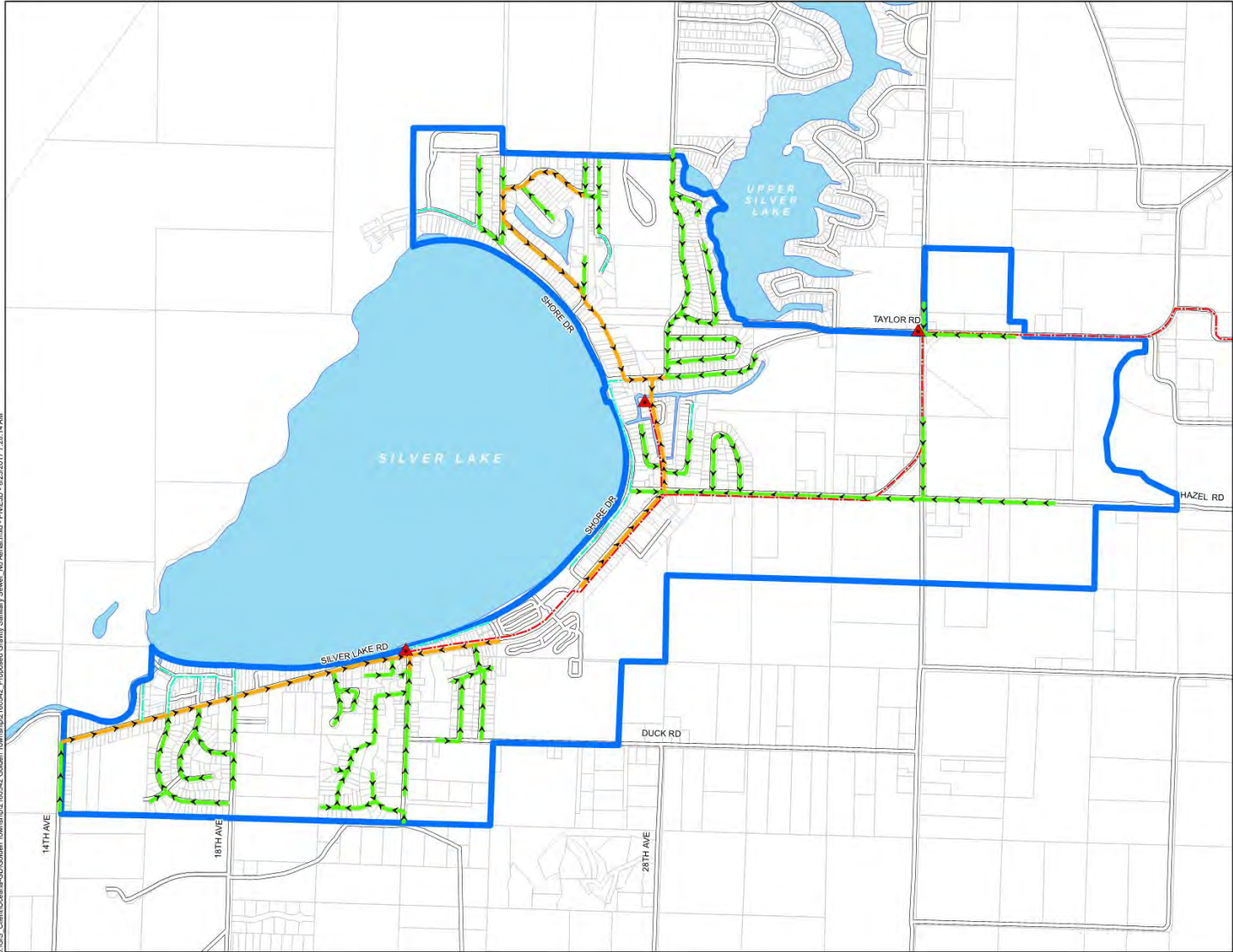
Gravity System

- Gravity pipe constructed with open cut method, 5 to 16 ft. deep
- Will require replacement of many streets
- Force mains installed with directional drill method



- Estimated Construction cost: \$22 million.
- Estimated annual Operation and Maintenance costs: \$84,000

Preliminary Layout



LEGEND

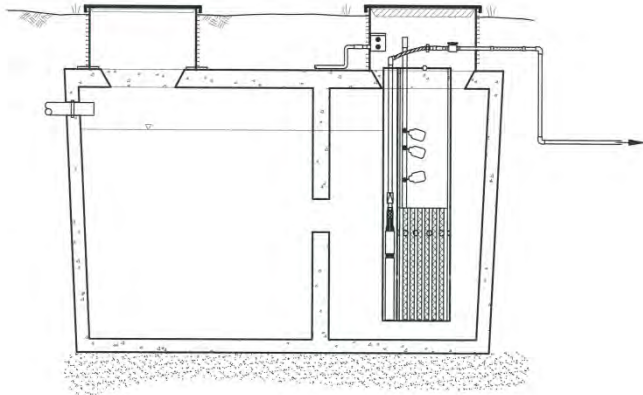
-  Proposed Lift Station
-  Proposed 8" Sanitary Sewer
-  Proposed 12" Sanitary Sewer
-  Proposed Force Main
-  Proposed Small Diameter Force Main
-  Phase I Service Area

GOLDEN TOWNSHIP
 OCEANA COUNTY, MICHIGAN
**PROPOSED GRAVITY
 SANITARY SEWER**
 FIGURE 2
 Preis&Newhof
 216542

J:\GIS_Client\Oceana\GD\Golden_Township\216542_Golden_Township\216542_Proposed Gravity Sanitary Sewer - No Aerial.mxd - PNE.JD - 6/23/2017 7:28:14 AM

STEP

- **Sepic Tank Effluent Pump**
- **Pressurized system with small diameter pipe**
- **Uses a pump and new septic tank at each property**



- **Pumps away the effluent and leaves the solids**
- **System Operator has ownership of tank and pumps on private property.**

STEP

- Pipe is installed by horizontal directional drilling thus minimizing restoration costs and disturbance
- Septic tank lids and small control panel are visible on the property
- Tanks pumped every 6 to 8 years and pump maintenance by Township



- Estimated Construction cost: \$15 million.
- Estimated annual Operation and Maintenance costs: \$110,000

Treatment Options

City of Hart

or

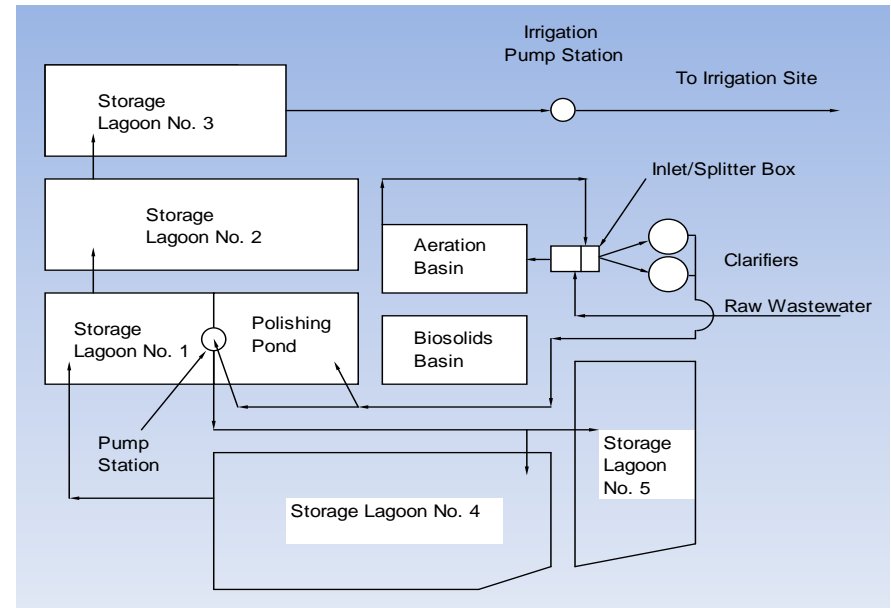
Golden Township

City of Hart



- Has Excess Capacity
- Eight mile force main & pump station
- Township has no responsibility to treat & meet discharge requirements

- Long term contract and user fee to be negotiated
- Estimated cost \$3,900,000 +
- Estimated O&M \$40,000 +



Golden Township



- Expandable to meet future capacity needs
- Lagoon Treatment System with mulch media
- Removes majority of Nitrogen and Phosphorous prior to discharge to groundwater
- Can take both collection systems with modifications

- Township sets all user rates
- Township is responsible for operating and with a licensed Operator
- Township must meet discharge requirements set by State
- Estimated Cost \$4,300,000
- Estimated O&M \$120,000

