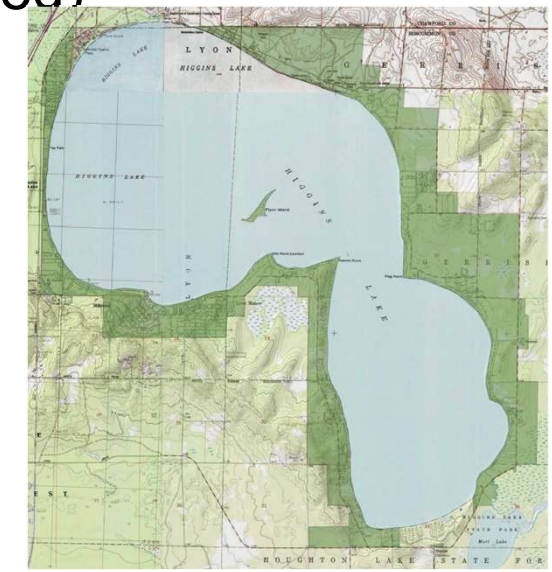
GERRISH LYON UTILITY AUTHORITY (GLUA)

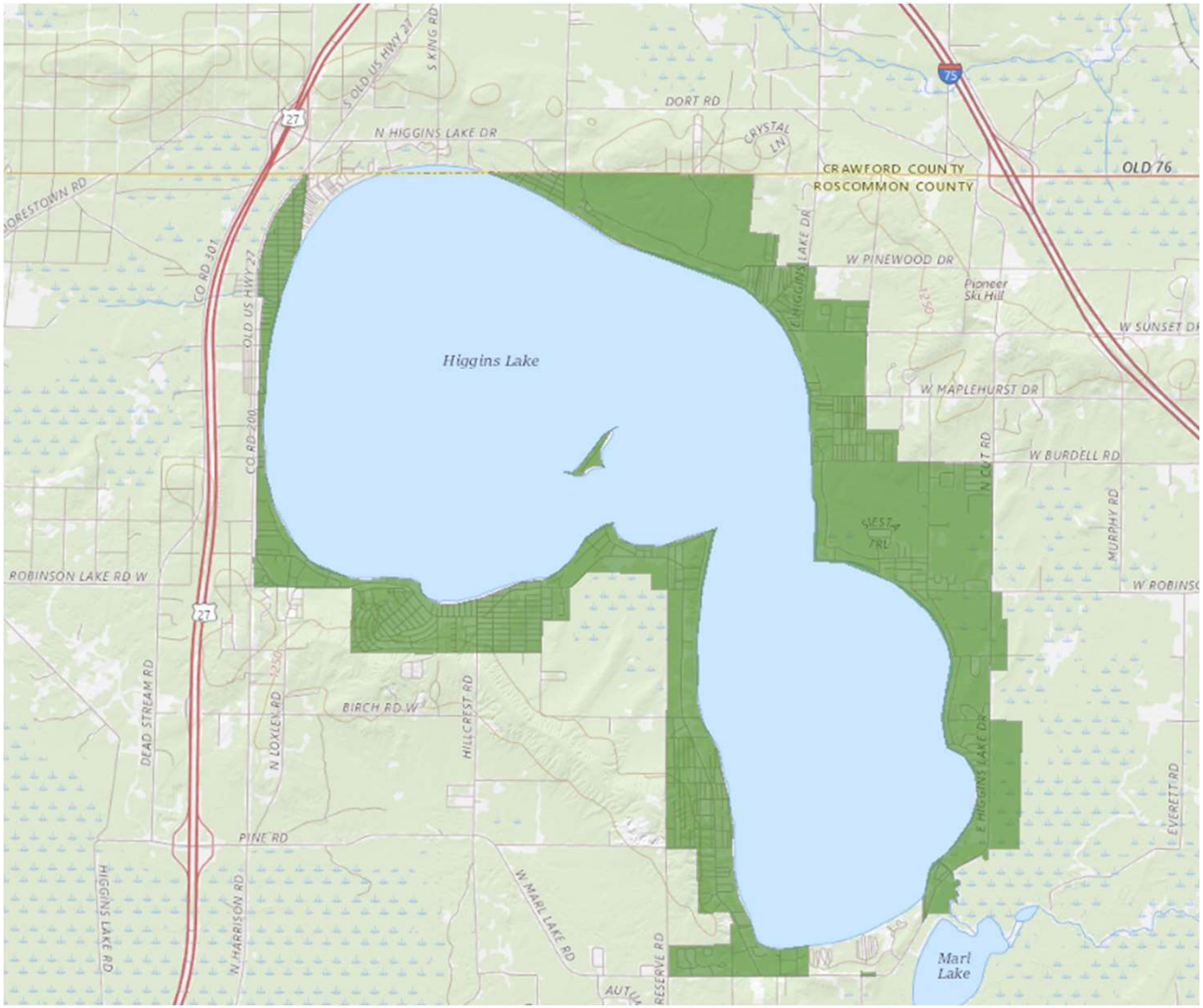
PROPOSED WASTEWATER COLLECTION AND TREATMENT SYSTEM

STUDY AREA

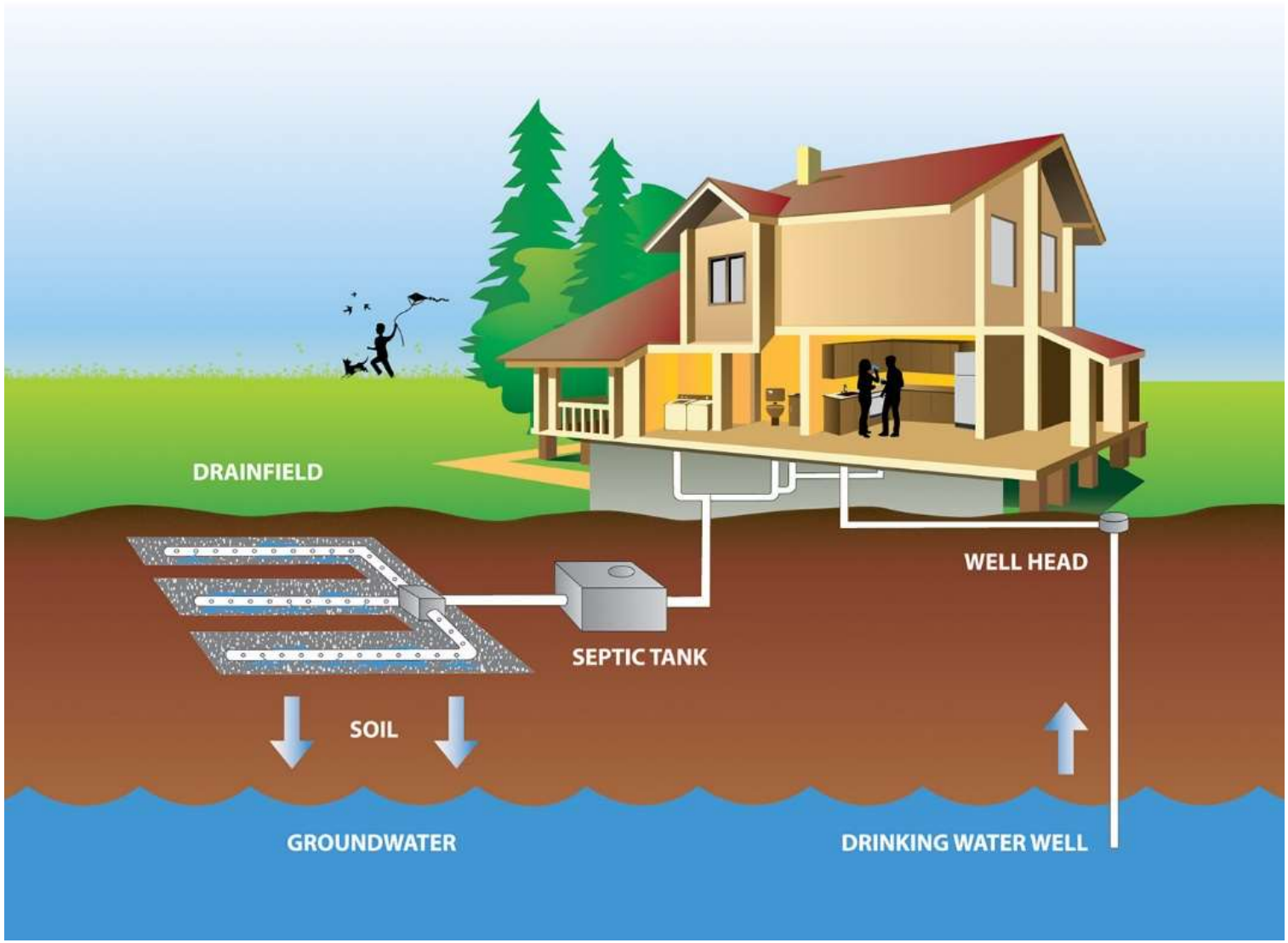
- How was the Study Area identified:
  - Potential areas influencing water quality
  - Health and safety
- Areas that will benefit from community sewer due to:
  - Isolation distances, lot size/density
  - Poor soils (clay, excessively drained)
  - Depth to groundwater
  - Lot density



STUDY AREA


Higgins Lake
N HIGGINS LAKE DR
DORT RD
CRAWFORD COUNTY
ROSCOMMON COUNTY
OLD 76
W PINEWOOD DR
Pioneer Ski Hill
W MAPLEHURST DR
W BURDELL RD
ROBINSON LAKE RD W
BIRCH RD W
PINE RD
W MARL LAKE RD
Marl Lake
S KING RD
CO RD 301
OLD US HWY 27
CO RD 200
DEAD STREAM RD
N LOXLEY RD
HILLCREST RD
N HARRISON RD
HIGGINS LAKE RD
E HIGGINS LAKE DR
MURPHY RD
EVERETT RD
75
27

EXISTING SEPTIC SYSTEM



PROPOSED COLLECTION SYSTEM

ALTERNATIVES EXPLORED

- Approached alternatives analysis without preconceived ideas – looked at all possibilities
- USDA Engineer reviewing the feasibility study requires alternatives that are modest in cost and scope
- Collection System
    - Gravity Sewer with Low Pressure component
    - Complete Low-Pressure System
        - Grinder System
        - Septic Tank Effluent Pumping Chamber (STEP)

GRAVITY VS. LOW PRESSURE

Gravity Sewer

- Minimal maintenance
- Higher risk of inflow & infiltration
- Dewatering costs are high and can be unpredictable
- Open trenching is disruptive & requires more restoration
- Terrain around Higgins Lake Requires a significant number of large pump stations
- Higher risk of odor
- Higher capital cost

Low pressure Sewer

- Each property has its own onsite pump system
- Directional drilling minimizes disruption to property
- Less susceptible to inflow & infiltration
- Pumping can allow more consistent flushing of sewers

STEP VS. GRINDER SYSTEMS

Septic Tank Effluent Pumping System (STEP)

- Solids pumped by the Sewer Authority, discharged at the WWTF
- High head/low flow pumps reduce the number of booster stations
- Less impact by seasonal use
- High efficiency, low horsepower pumps
- Longer life pumps
- Lower operations and maintenance cost
- Greater storage volume during power outages

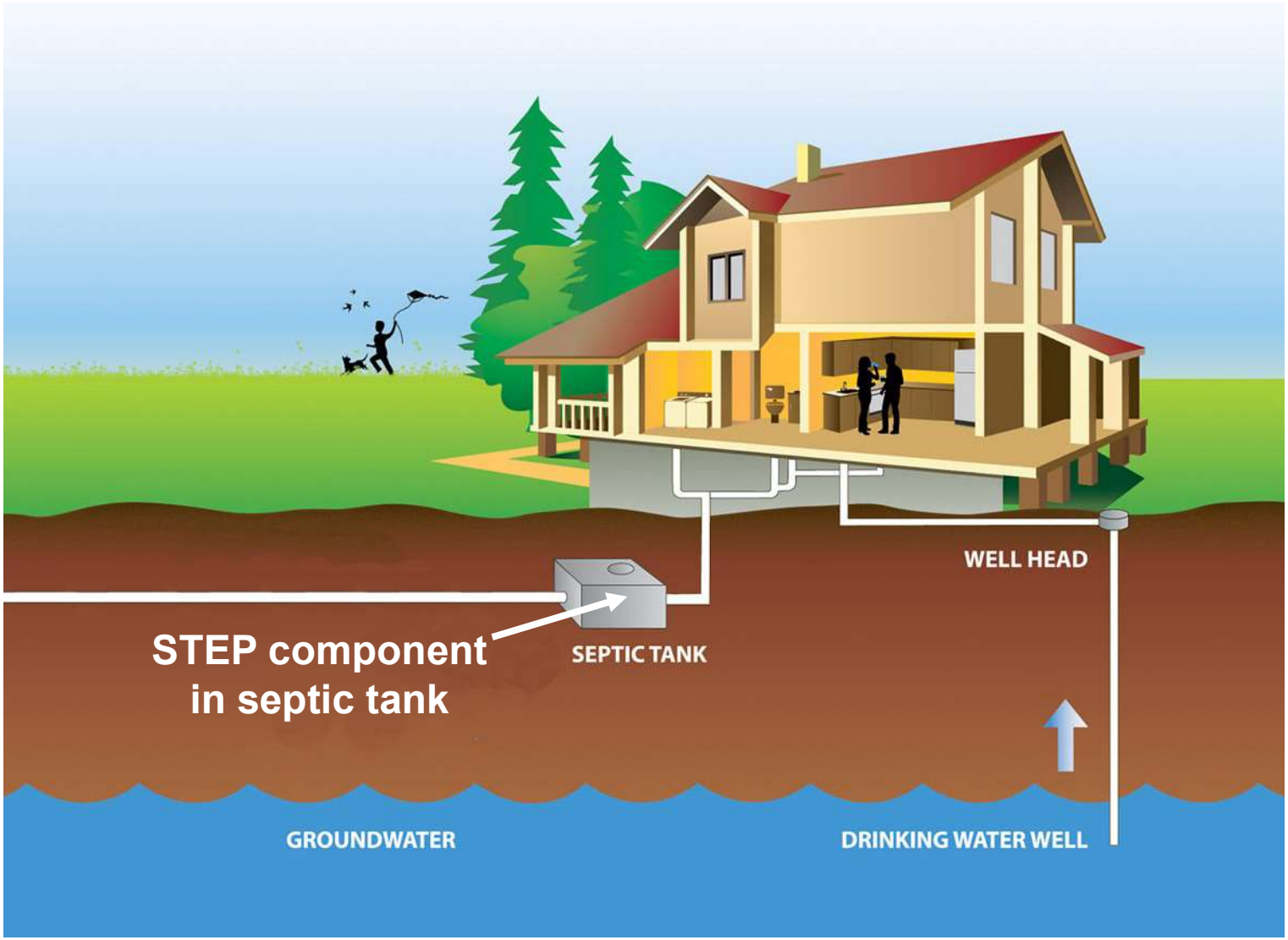
Grinder Systems

- Pumps convey both solids and liquid
- Larger less efficient pumps
- Higher electrical load requirements
- Shorter pump life
- More susceptible to seasonal usage and corrosive gas
- Higher annual operations and maintenance cost
- Grease and solids buildup with seasonal usage in sewers and pump chambers

PROPOSED SEWER SYSTEM - STEP

- Responsibility & Maintenance:
  - Property Owner:
    - Pipe from house to tank,
    - Electric cost for pumping
  - Utility:
    - Tank, pump, pump controls and all downstream piping
    - Utility will periodically pump tanks, operate, maintain & replace system
- Life of System:
  - 75 -100 years for most infrastructure
  - 15+ years on pumps and misc. components (built into the annual operation of system)

SEPTIC TANK EFFLUENT PUMPING (STEP) SYSTEM



LOW PRESSURE SEWER SYSTEM

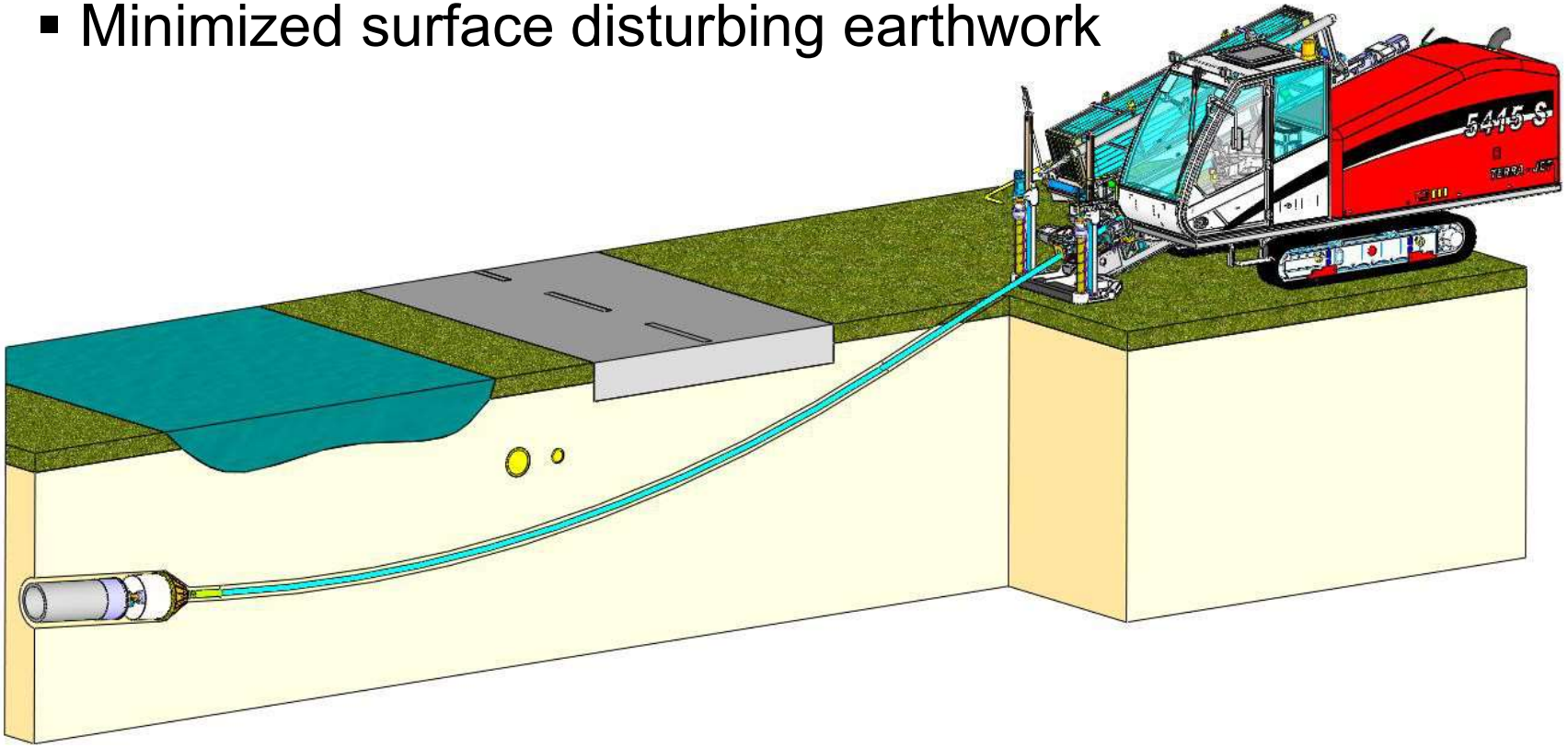
LOW PRESSURE CONSTRUCTION

Maximize this

Minimize this

CONSTRUCTION

- Utilize Trenchless Technology
- Directional Drilling
- Minimized surface disturbing earthwork



SYSTEM VISIBILITY

ONSITE STEP SYSTEM

SEPTIC TANK EFFLUENT PUMPING (STEP) SYSTEM

STEP System Equipment

PROPOSED TREATMENT SYSTEM

ALTERNATIVES EXPLORED

- Treatment Options
  - Regional Treatment
  - Lagoon WWTF
    - Large earthen lagoons and rapid infiltration basins
  - Mechanical WWTF
    - Concrete treatment and settling tanks with rapid infiltration basins

EXISTING SEPTIC SYSTEM

Water Quality Conditions

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

Source: EPA Onsite Wastewater Treatment System Manual, 2002 EPA/625/R-00/08
Crites and Tchobanoglous, Small and Decentralized Wastewater Management Systems, McGraw-Hill,1998.

F&V

PROPOSED TREATMENT SYSTEM OVERVIEW

- 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

PROPOSED ALTERNATIVE: MECHANICAL TREATMENT FACILITY

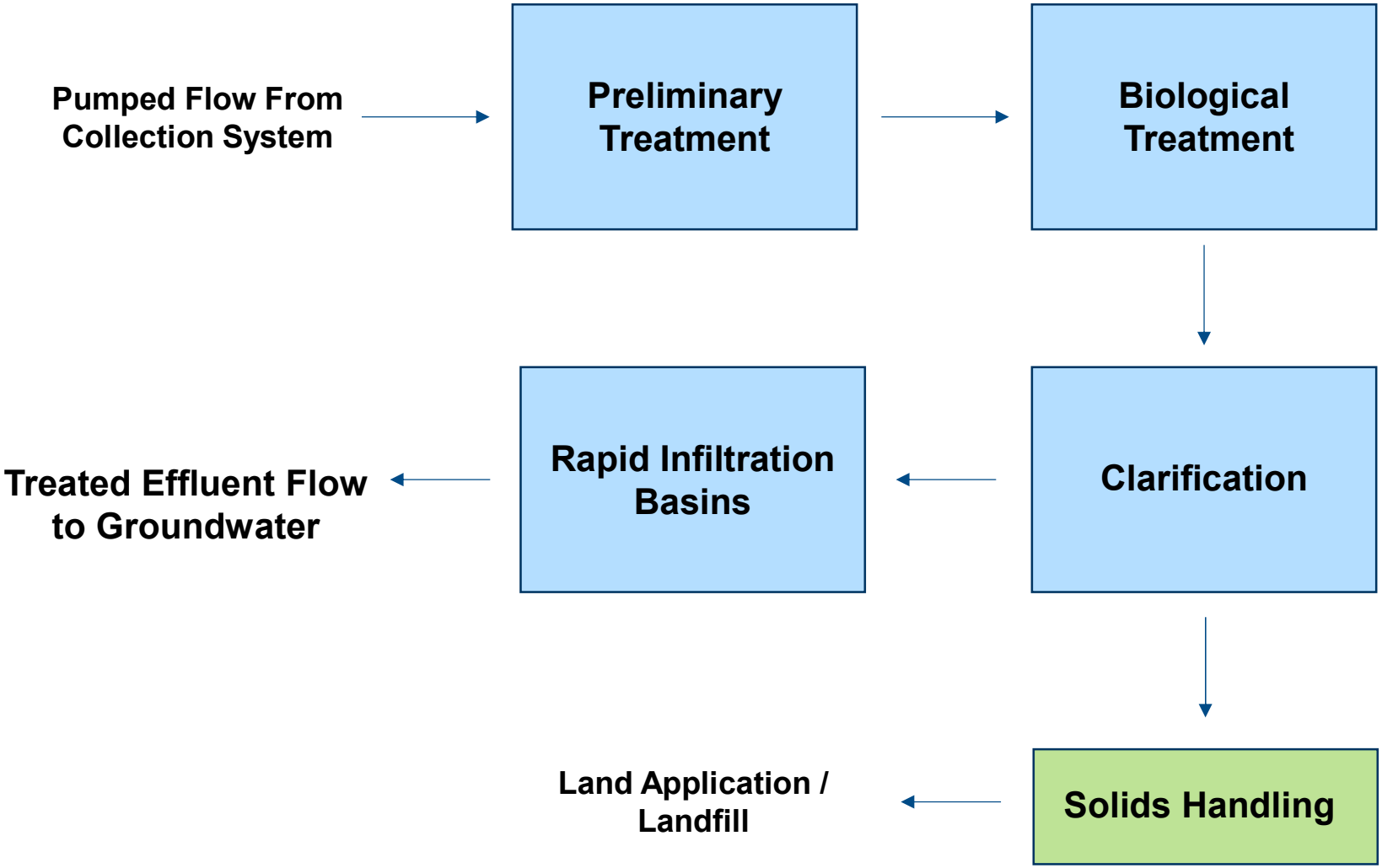
- Collection system delivers flow to concrete treatment and settling tanks
- Small treatment facility footprint
- Operational flexibility for seasonal flows
- Tanks can be covered to minimize odors

Oxidation Ditch

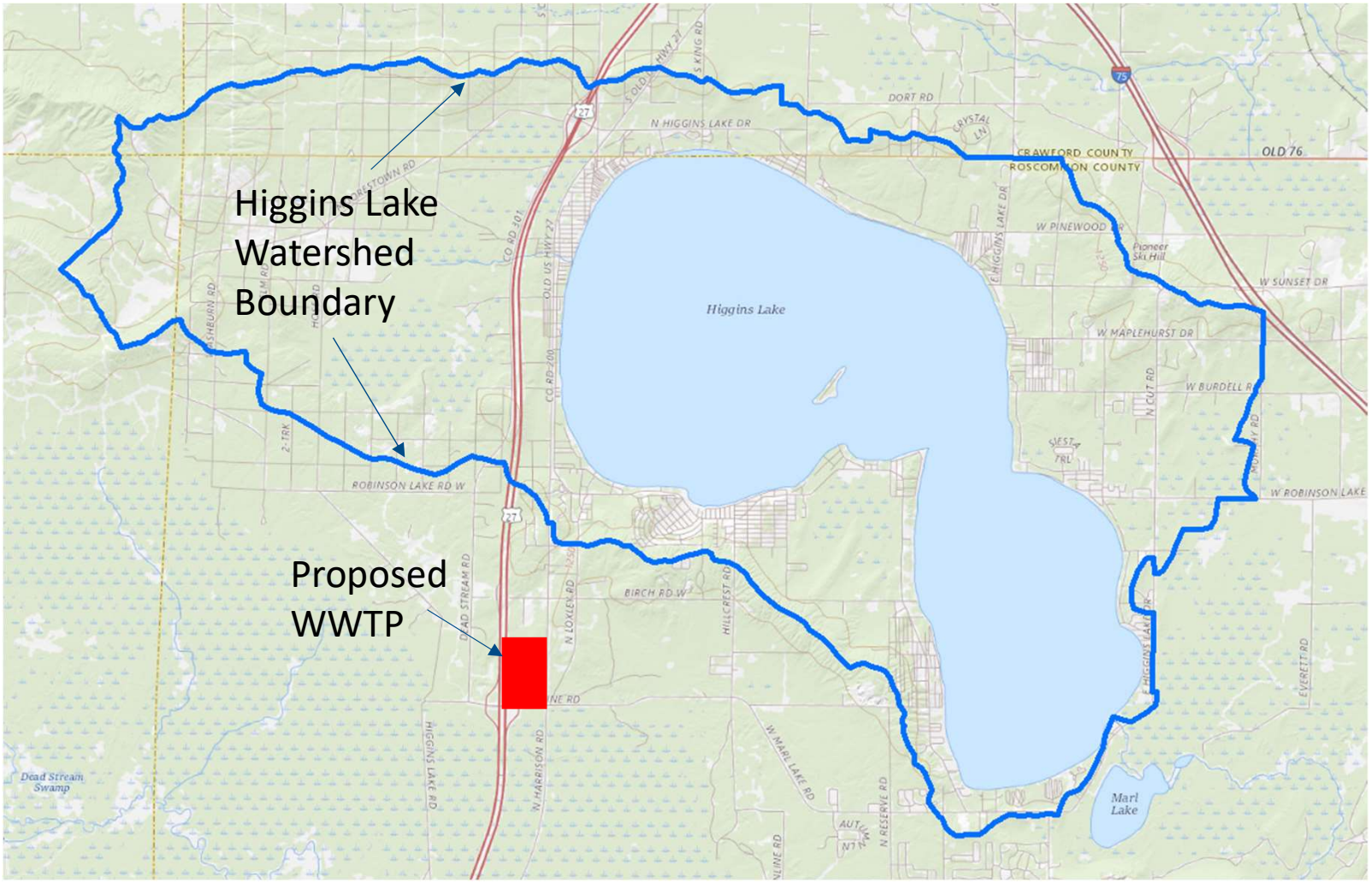
Mechanical Treatment Overview

Rapid Infiltration Basin

PROPOSED TREATMENT SYSTEM



PROPOSED WWTP LOCATION



PROJECT SCHEDULE

ANTICIPATED PROJECT SCHEDULE

2021:

- Public Participation
- Explore and Secure Funding Sources
- Begin Special Assessment District Proceedings.

2022:

- Complete Special Assessment District
- Engineering Design

2023-2024:

- Project Construction

2025-2026:

- Connect Customers to System