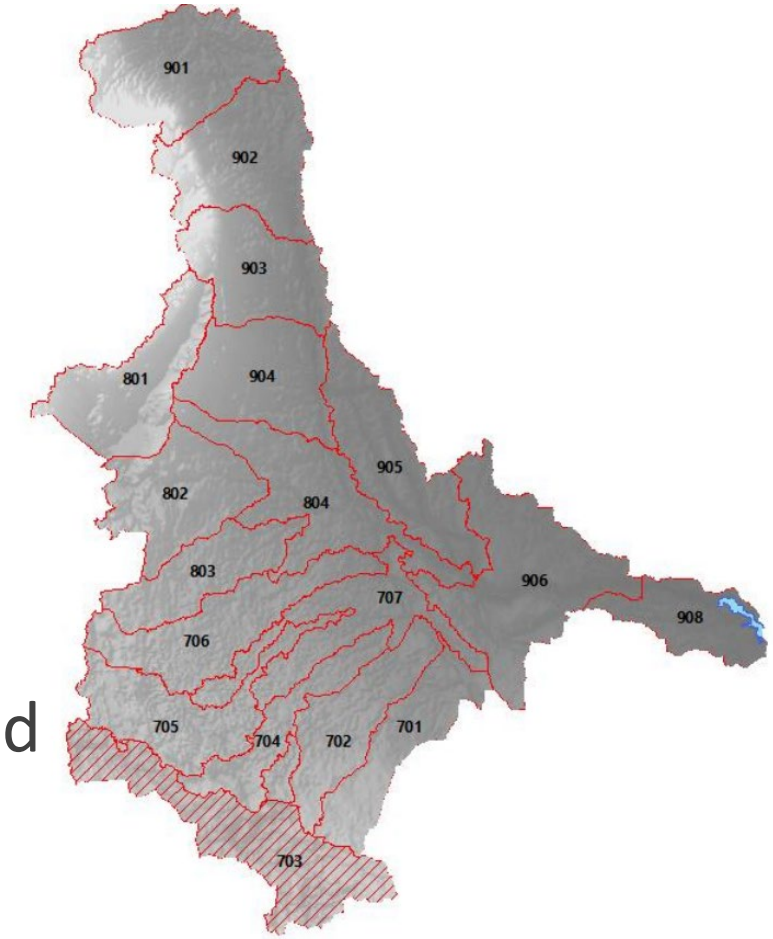
Lake Mitchell Update

CITY OF MITCHELL

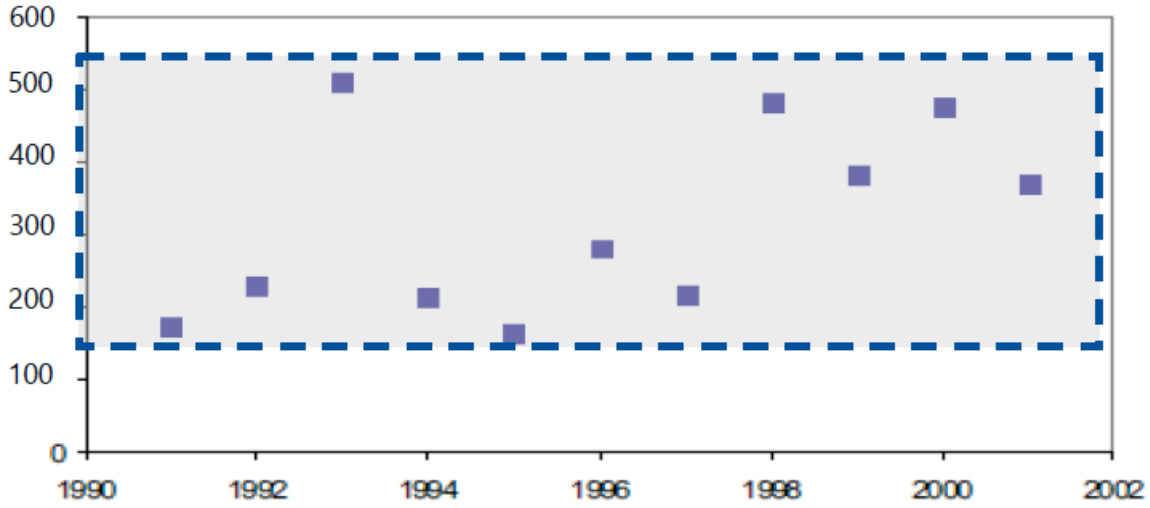
Lake Mitchell Quick Facts

- Built in 1928
- Lake surface area is 671 acres
- Watershed area is 350,000 acres
- Maximum depth is 23 feet
- 60,000 feet of lake shore
- 74% of lake shore is city property/park land
- Zebra muscles are present
- Watershed contributes 52% of phosphorus load
- In-lake contributes 48% phosphorus load

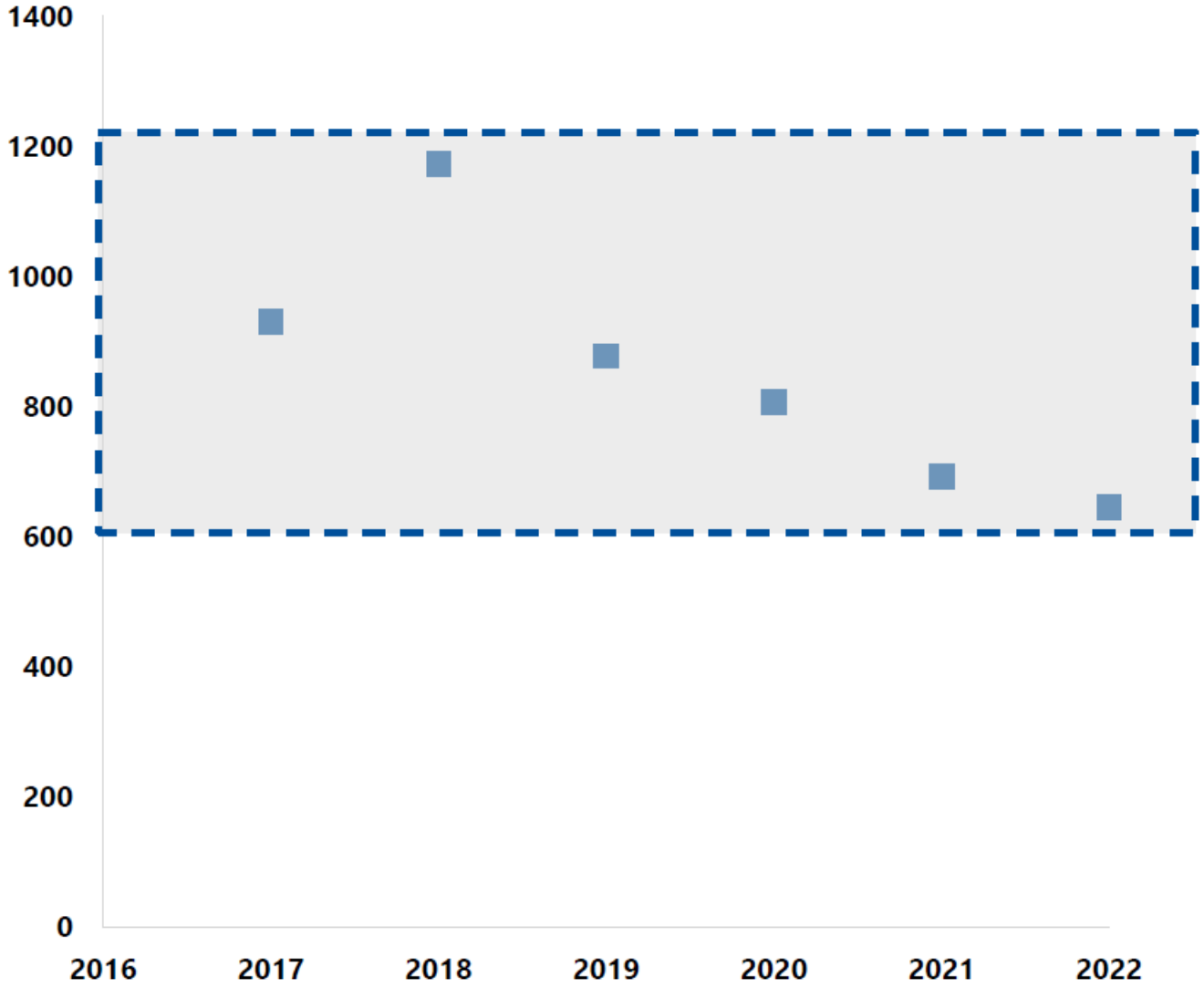


Lake Water Quality Trends

Lake Mitchell phosphorus concentrations have continued to increase since previous studies



Adapted from Figure 3-4, 2002 *Water Quality Assessment and Modeling (Freshwater Research)*

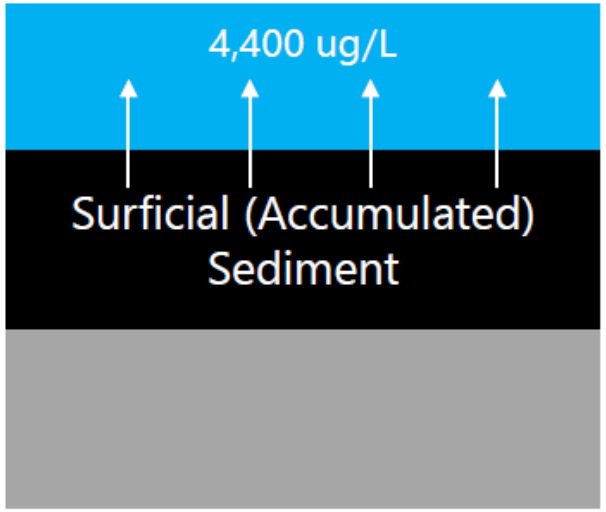


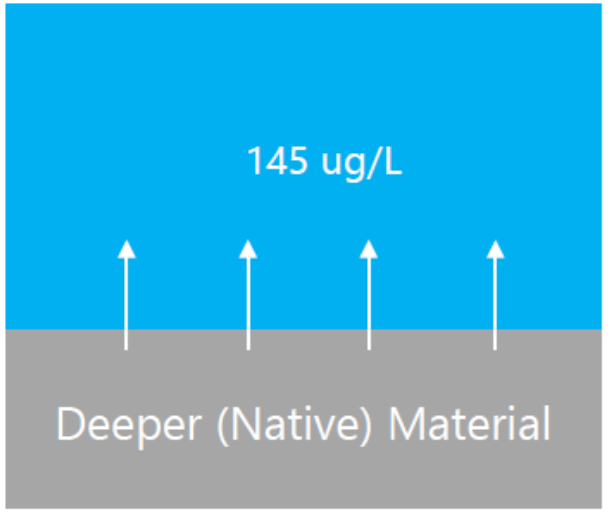
Average annual lake center TP concentration (typically measured May-Oct)

Sediment Investigation – Conclusions

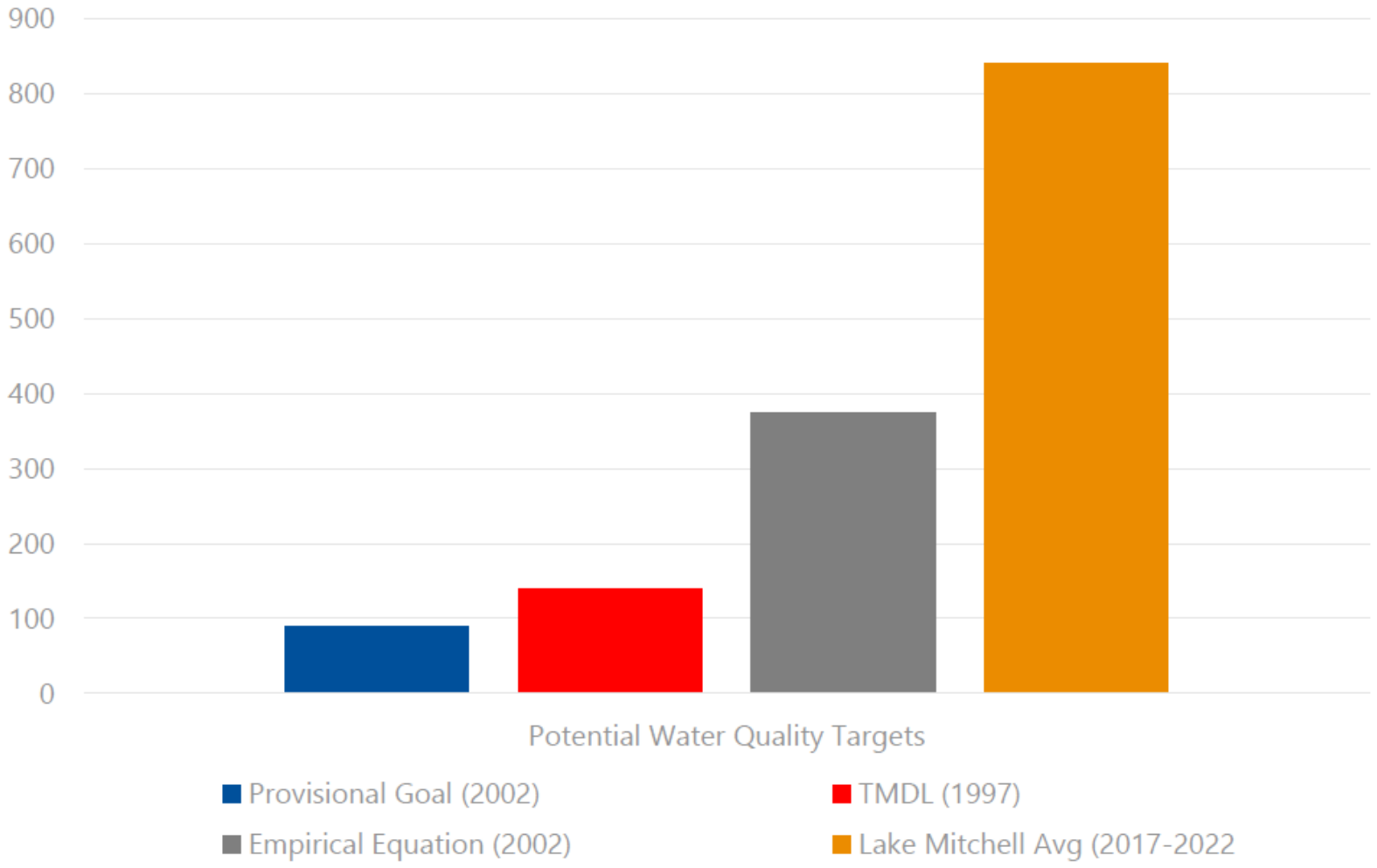
- Phosphorus release in surficial sediments is *extremely* high
- Significant (>10x) reduction in release rate for deeper sediments/native material
- Phosphorus concentrations are higher in upper portions of lake

Removal of soft sediment expected to result in less internal loading





Potential Water Quality Targets
Correlation of Total Phosphorus to Algal Growth



- 90 ppb
  - Published Provisional Goal (2002)
  - Based on Ecoregion correlations
  - Estimated to result in 50% algal bloom frequency
- 139 ppb
  - Total Maximum Daily Load (TMDL, 1997)
  - Based on meeting trophic state index value for Chl-a (close to a mesotrophic lake designation)
- ~375 ppb
  - Based on Lake Mitchell data and empirical equation (2002)
  - Estimated to result in 50% algal bloom frequency

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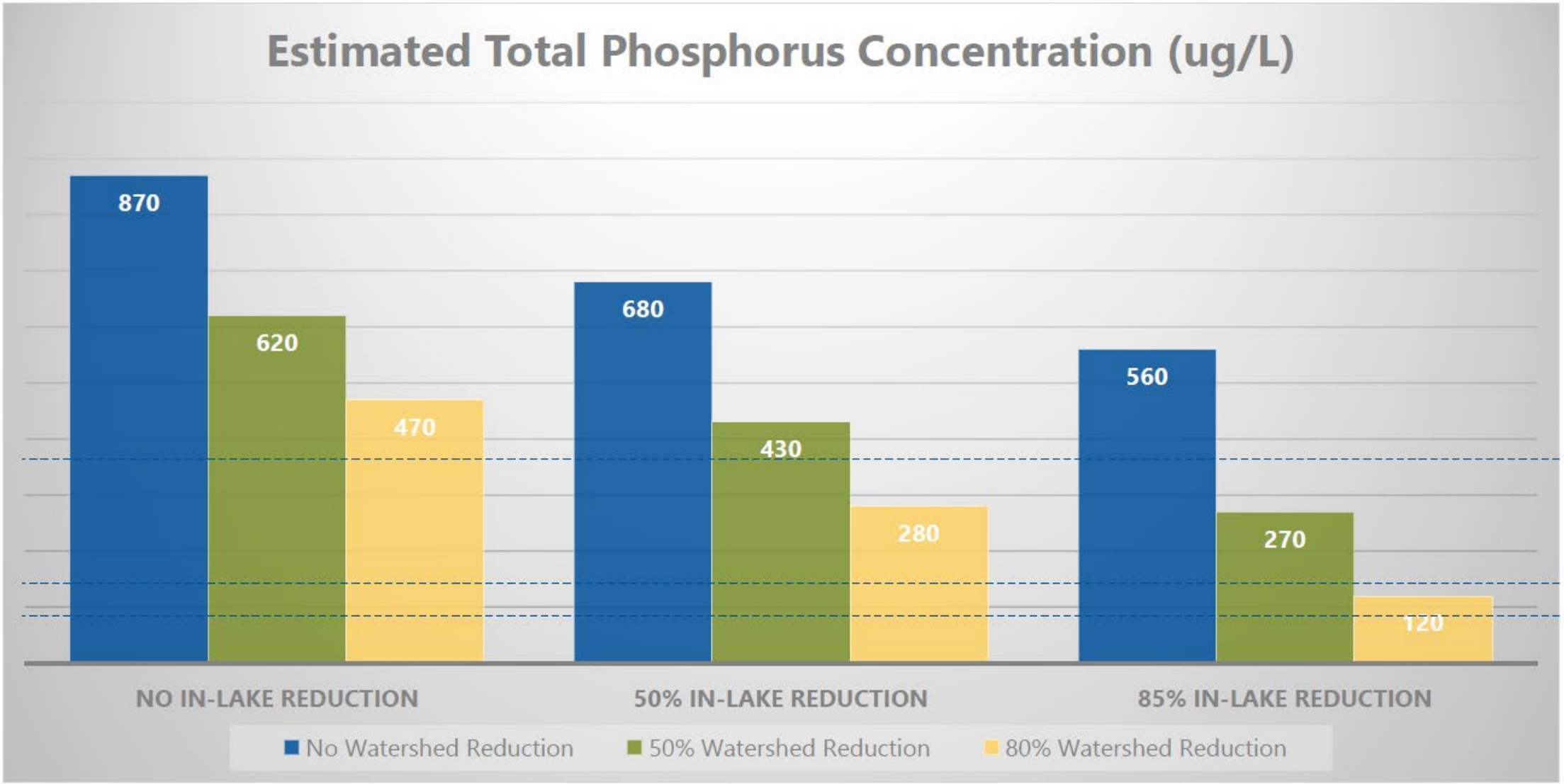
Water Quality Estimates - Results



Recommended Internal Load Control Project Concept

Areas 1 and 2

Dredge

Area 3-5

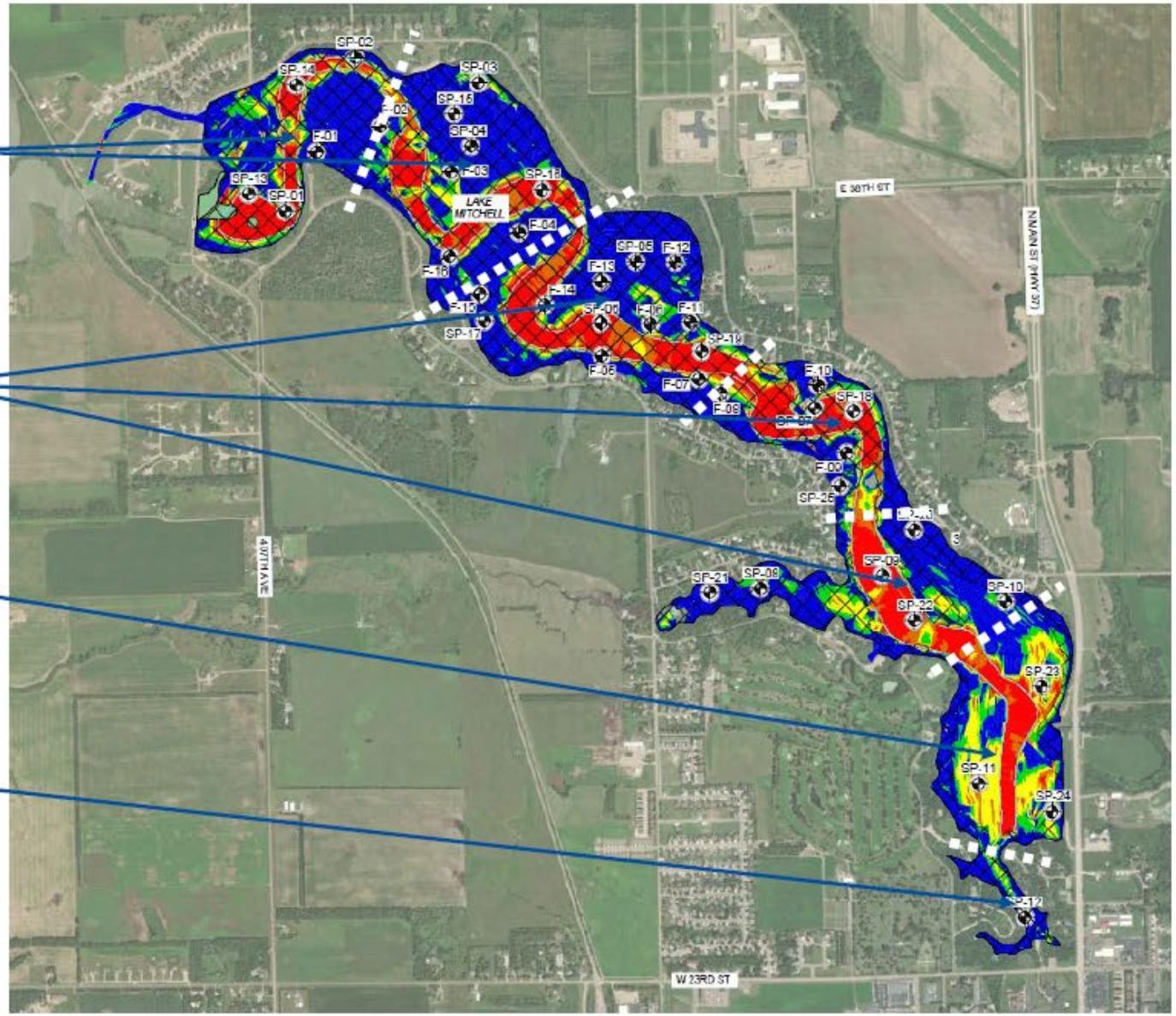
Dredge Outside Channel
Alum Inside Channel

Area 6

Alum

Area 7

None*

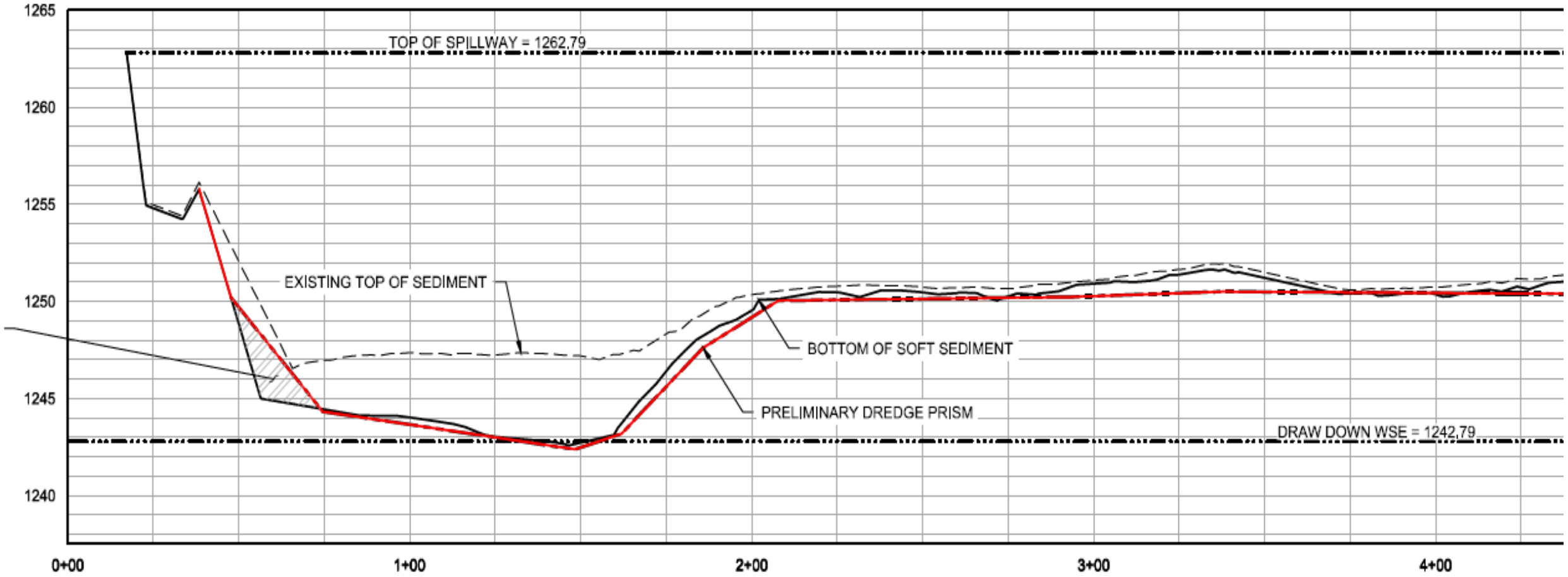


Key Elements

- Prioritizes dredging areas with highest phosphorus concentrations
- Includes alum treatment where dredging is less cost-effective
- Includes 97% of lake area
- Within targeted budget

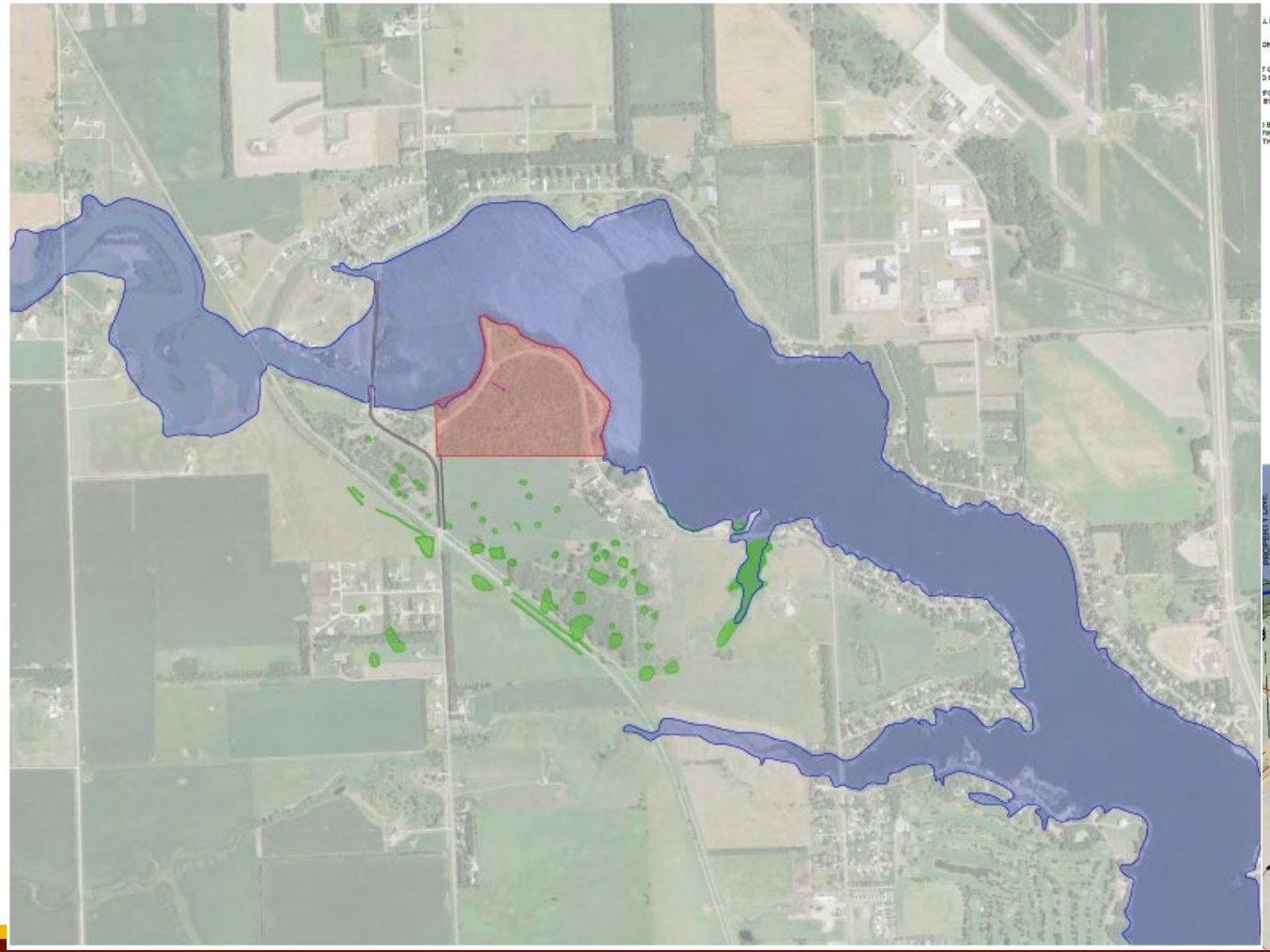
* Monitor and include in future O&M as needed

Lake Mitchell Improvements



Lake Mitchell Improvements

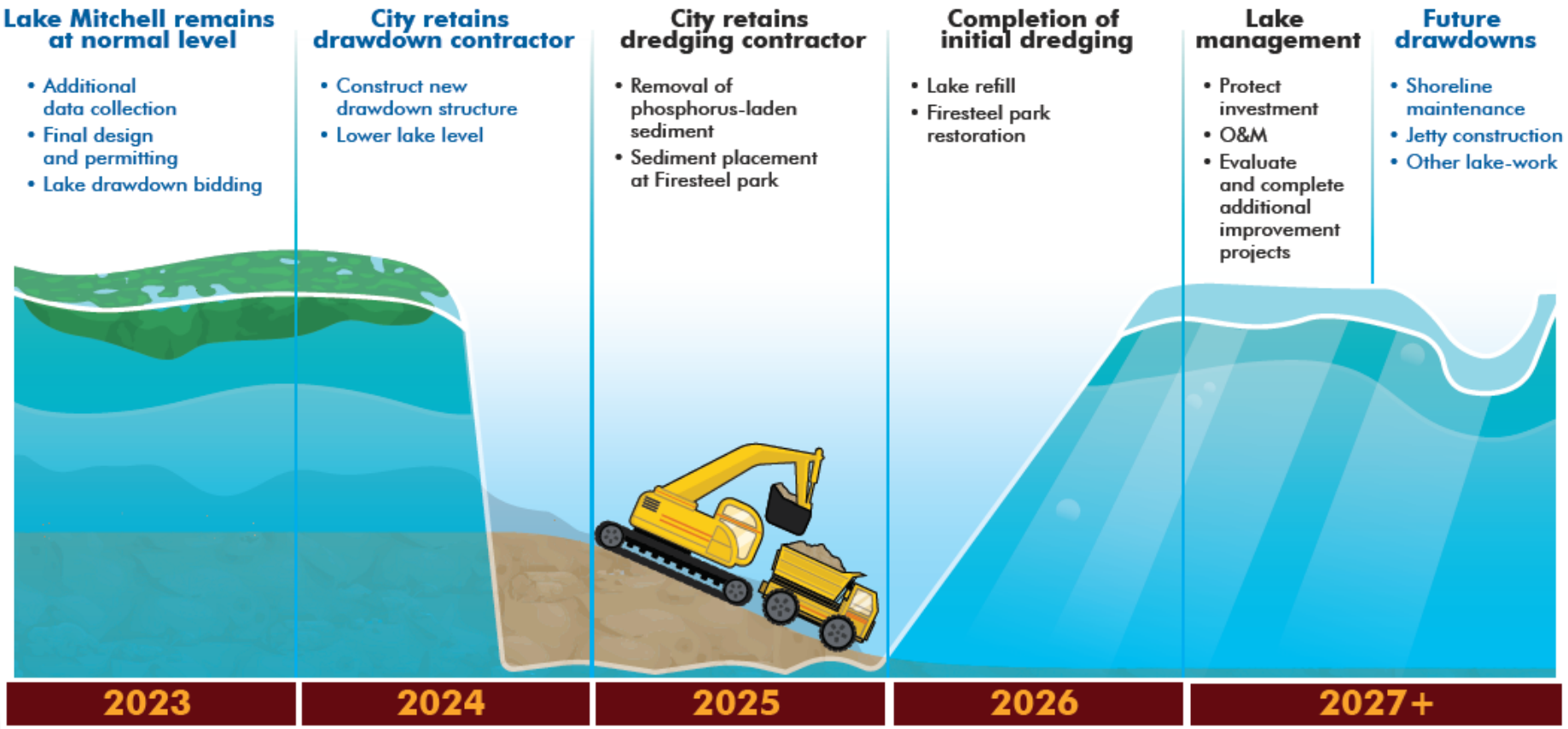
LAKE MITCHELL
MITCHELL, SOUTH DAKOTA



Targeted Project Budget - $25 Million

Item	Cost	Basis
Mobilization	$1,000,000	6% of construction estimate
Drawdown	$3,500,000	Engineer's Estimate
Disposal Site	$1,500,000	Preliminary Engineering Report
Additional Mouth-of-Lake Improvements	$1,000,000	Placeholder
Contingency	$4,000,000	20% of construction estimate
Construction Phase Services	$1,000,000	6% of construction estimate
Available for Internal Load Control	$13,000,000	Remainder
Total	**$25,000,000**	

Lake Mitchell restoration project timeline



Lake drawdown

Investigation, design, and permitting

Contracting & construction

Lake refill
(duration dependent on creek flow)

Periodic drawdowns

Sediment dredging & disposal

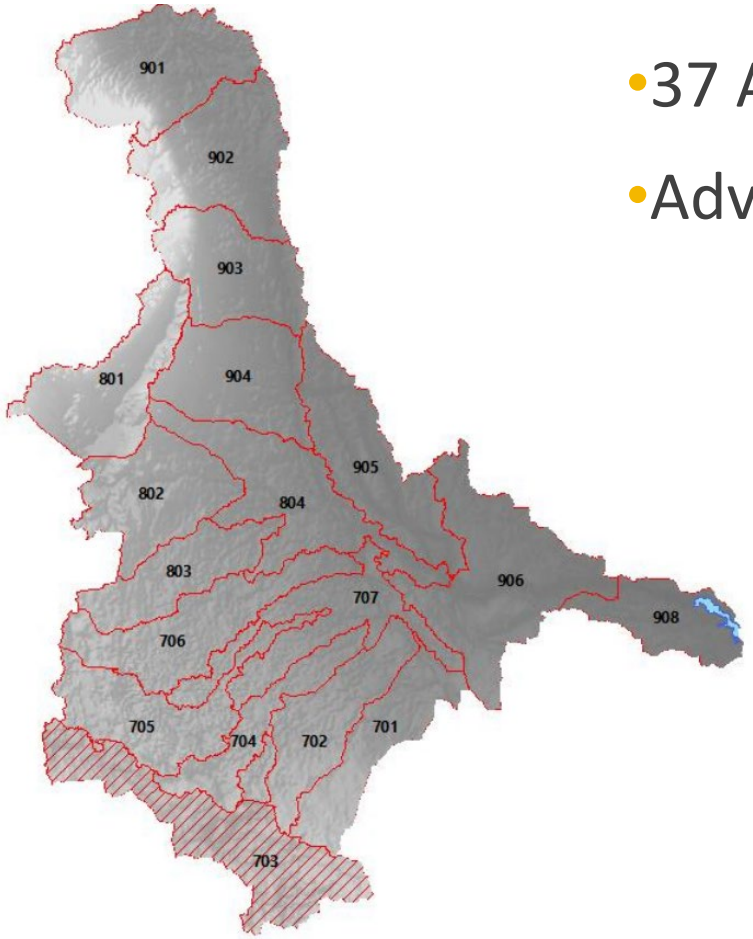
Investigation, design, and permitting

Contracting & construction

Disposal site restoration

Lake management and improvement projects

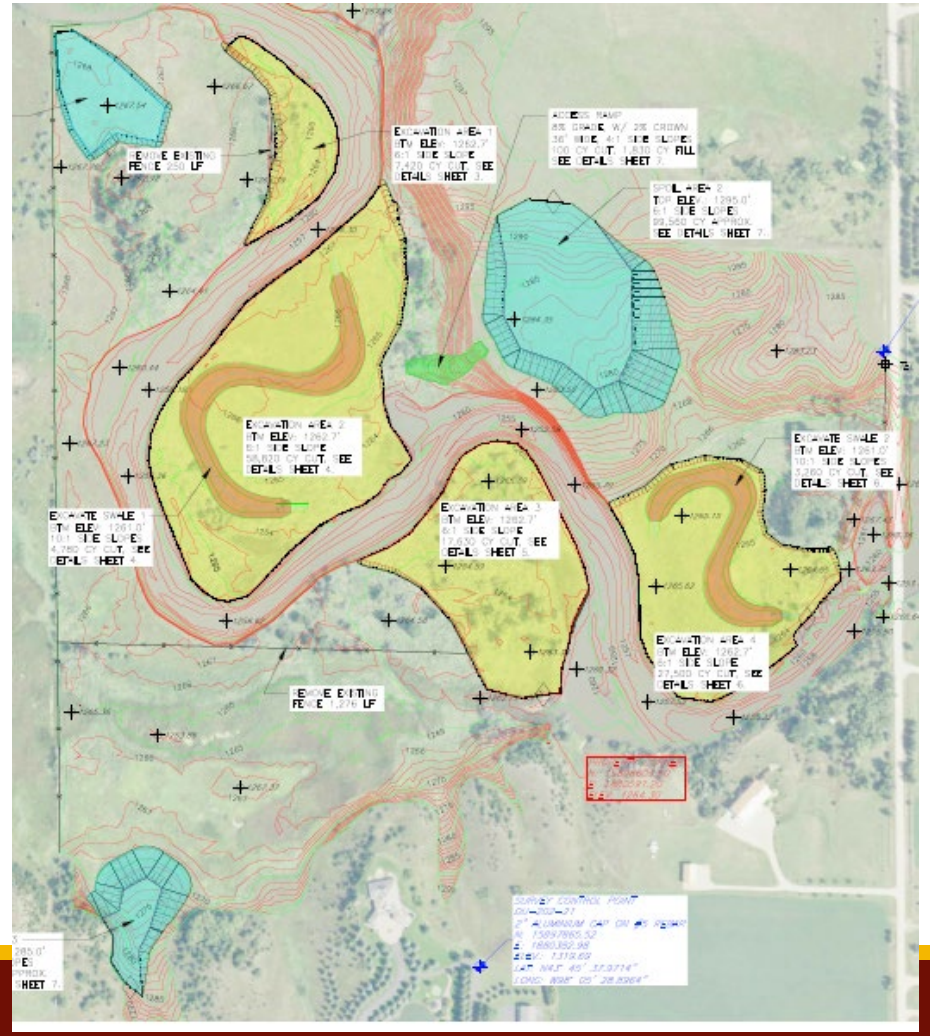
Watershed Improvements



- 37 Acre Wetland Project
- Advertise in June, Bid in July

Watershed Partners

- Ducks Unlimited
- Game Fish and Parks
- NRCS/USDA
- Pheasants Forever
- James River Development District
- US Fish and Wildlife Service
- Counties within the Watershed
- Farmers within the Watershed



Lake Mitchell Jetty Project

- Scheduled for 2024-2026 Construction
  - Depends on timing of lake drawdown project.
- Estimated Project Cost - $2,000,000
- 6,140 feet of bike trail
- EDA Grant - $1,000,000

Zebra Muscles

- Currently considered a light infestation
- Zebra muscles consume green algae prior to consuming blue-green algae.
- Multiple studies have found an increase in blue-green algae after the introduction of Zebra Muscles.
- Friends of Firesteel website is a great resource for zebra muscle information.

Questions

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