

LAKE GEORGE AND LAKE LOUISE SEDIMENT ASSESSMENT

CITY OF RIVER FALLS
UTILITY BOARD MEETING
MARCH 21ST, 2016



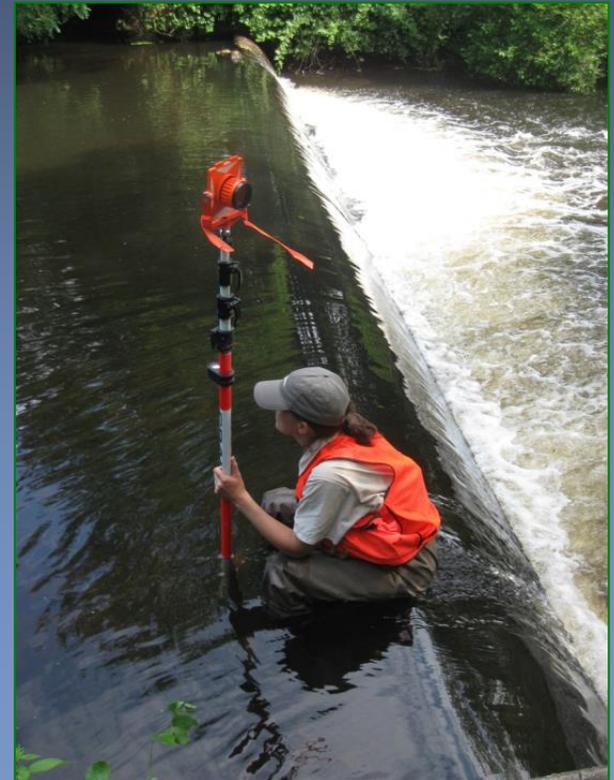
Marty Melchior
Regional Director

OUTLINE / SCOPE OF WORK

- *Sediment volume*
 - *Topographic and bathymetric survey*
 - *Sediment depth probing*
 - *Sediment volume analysis*
- *Sediment characterization*
 - *Sediment sampling plan*
 - *Laboratory analysis*
- *Technical Memorandum*
- *Public meetings*

SEDIMENT VOLUME

- *Surveying*
 - *Topography (land) and bathymetry (water, top of sediment) completed using sonar and standard survey equipment (GPS, total station)*



SEDIMENT DEPTH PROBING

- *Probing is done by pushing carbon fiber or aluminum rods to refusal (compacted historic floodplain, clay, gravel, cobble, boulder or bedrock)*
- *Feel or sound of material can give clues to type*



SEDIMENT DEPTH PROBING

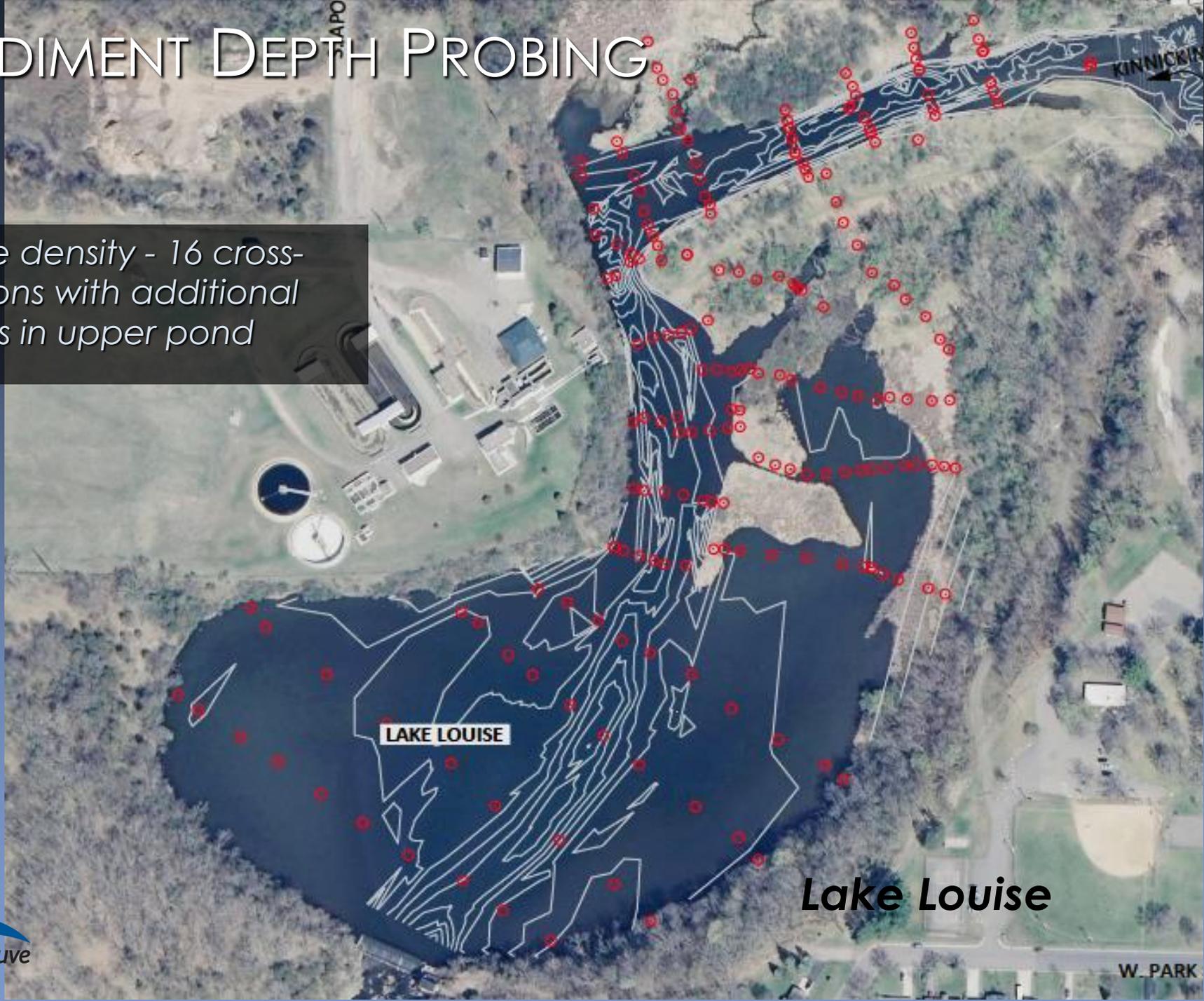
- Probe density - 15 cross-sections with additional points in upper pond
- Near the dam, probing was done during contaminant sampling



Lake George

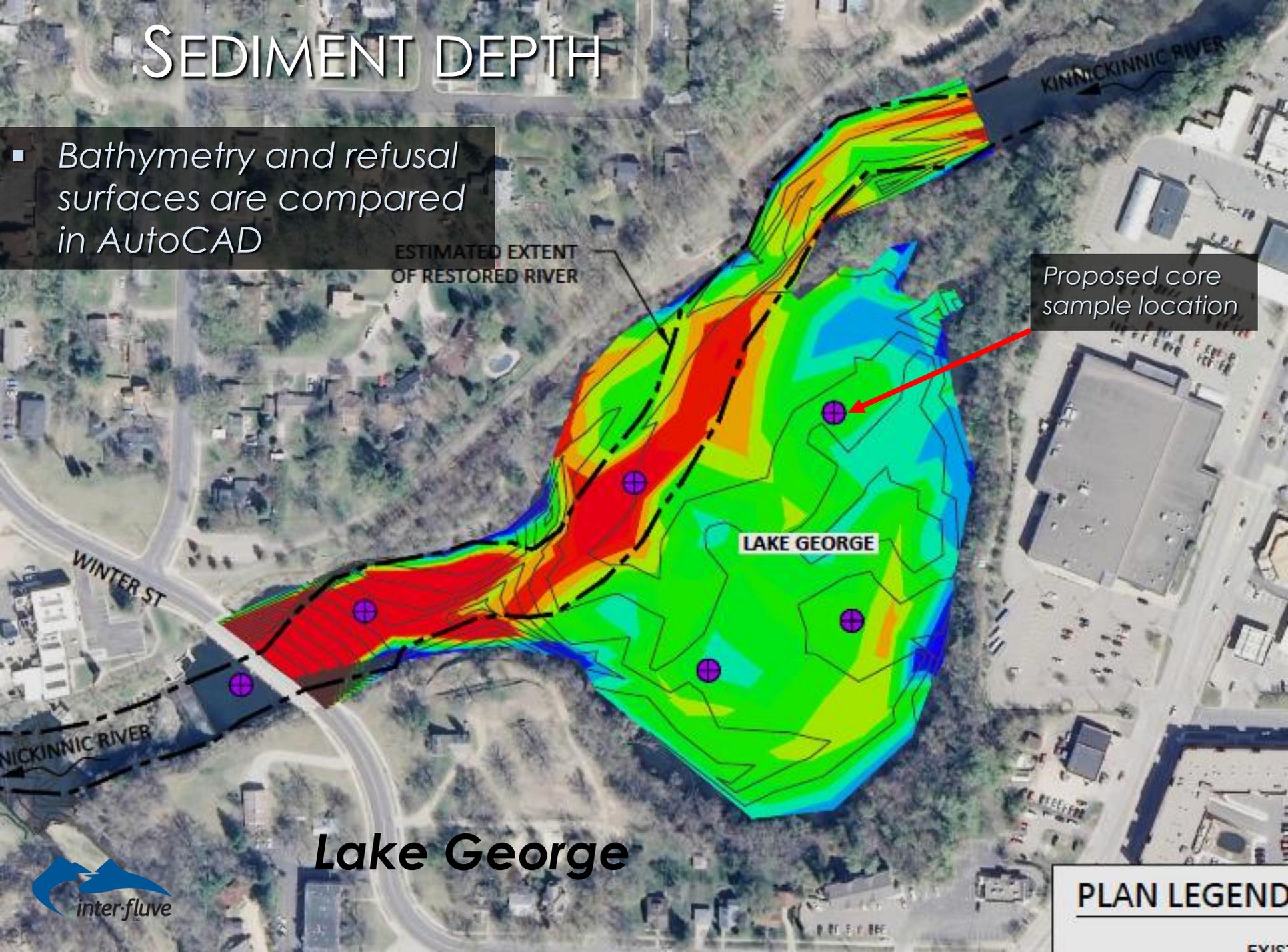
SEDIMENT DEPTH PROBING

- Probe density - 16 cross-sections with additional points in upper pond



SEDIMENT DEPTH

- Bathymetry and refusal surfaces are compared in AutoCAD



ESTIMATED EXTENT OF RESTORED RIVER

Proposed core sample location

LAKE GEORGE

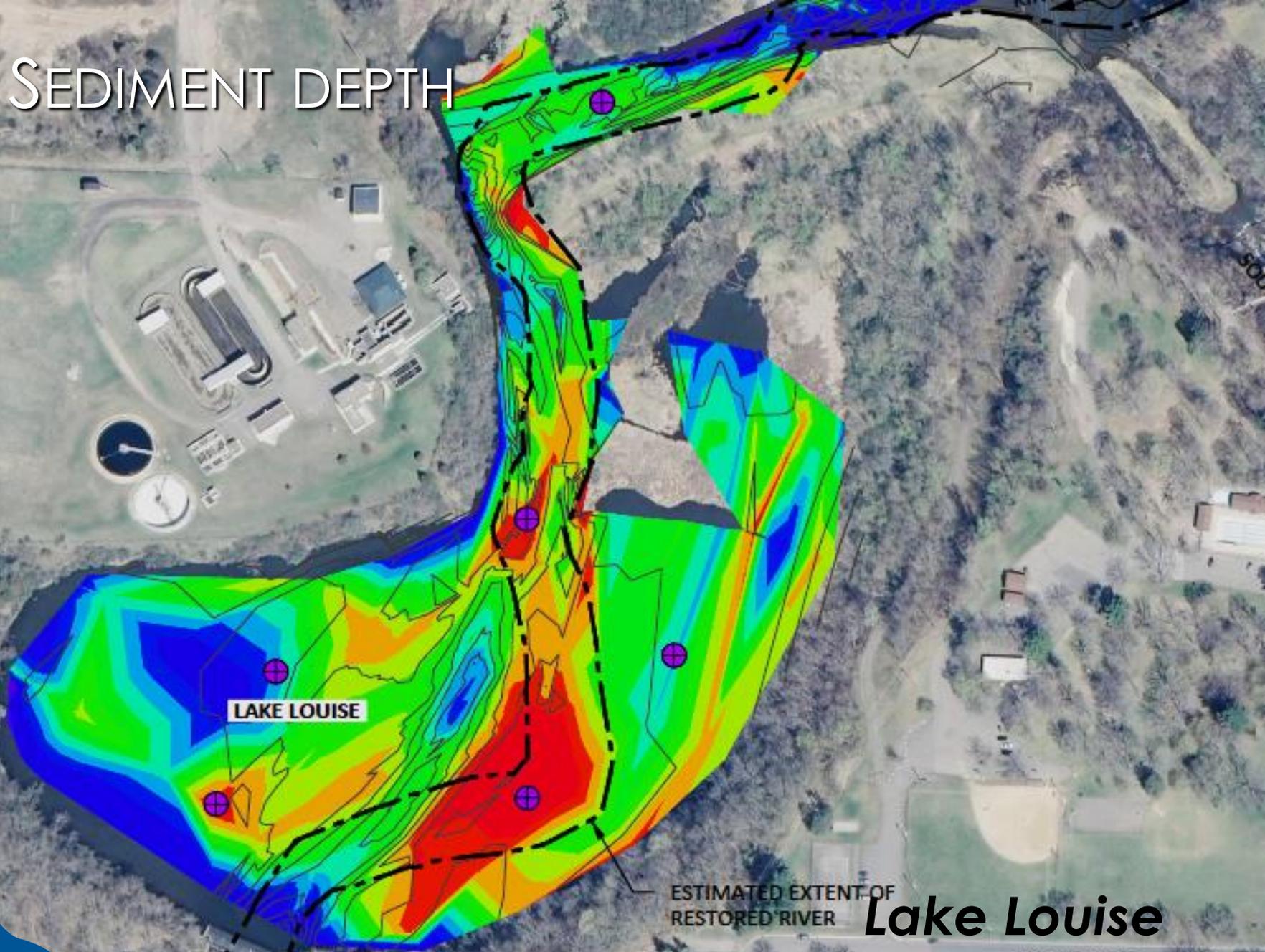
Lake George



PLAN LEGEND

EXIST

SEDIMENT DEPTH



LAKE LOUISE

ESTIMATED EXTENT OF RESTORED RIVER

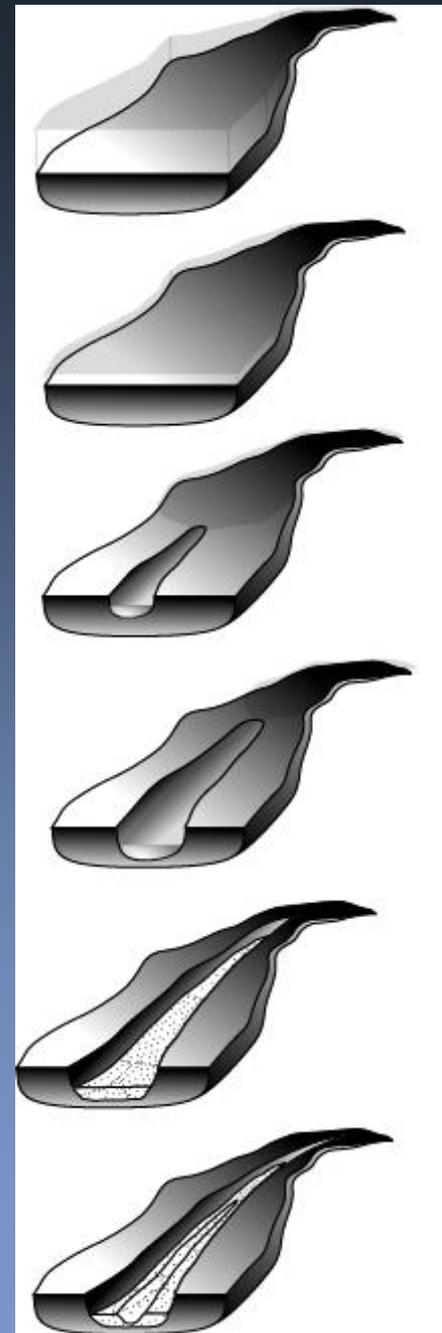
Lake Louise

W. PARK ST.



SEDIMENT VOLUME ANALYSIS

- *Total Sediment volume = Depth to refusal – top of impounded sediment*
- *Sediment evacuation volume*
 - *Assumes rapid drawdown or long term staged drawdown*
- *Based on hydraulic analysis for various flows up to the 5 year flood (frequent flows)*



SEDIMENT VOLUME

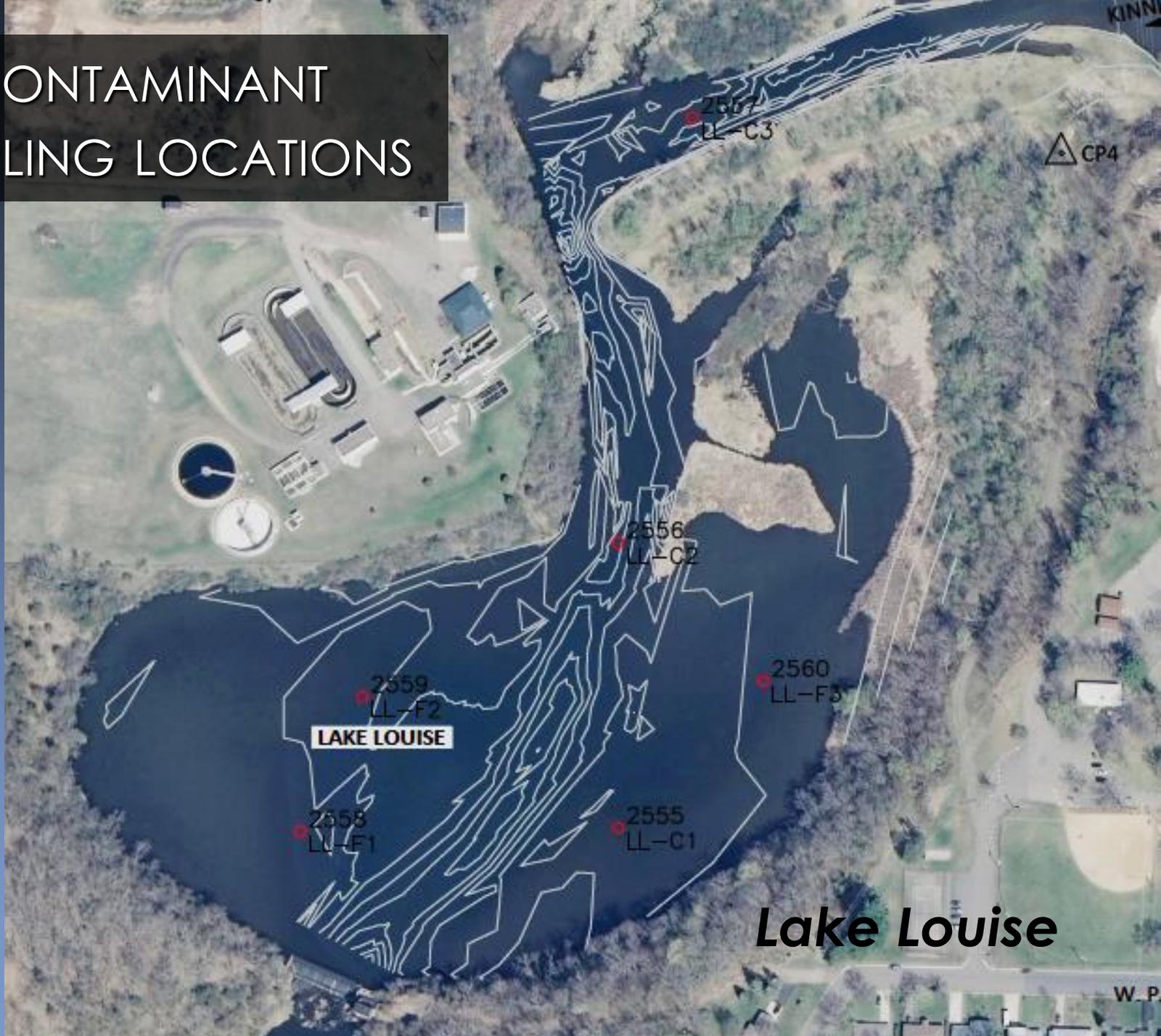
Analysis	L. George	L. Louise	Total
Total volume of impounded sediment	167,000	164,000	331,000
Expected evacuation volume	74,000	45,000	119,000
Evac as % of total	44%	27%	36%

- *Volumes in Cubic Yards (CY)*
- *Lake George 80% sand, 20% silt and clay*
- *Lake Louise 65% sand, 35% silt and clay*
- *Evacuation estimate assumes a 55 ft wide bankfull channel with 3:1 bank slopes*
- *Most of the deposition since the 2006 study has occurred in the main channel*

CONTAMINANT SAMPLING LOCATIONS



CONTAMINANT SAMPLING LOCATIONS



Lake Louise



CONTAMINANT SAMPLING

- *Barge mounted vibrocore*
- *Manual core*



CONTAMINANT RESULTS

- *Parameters tested*

Category	Specific Parameters	Laboratory Method
Metals	As, Cd, Cr, Cu, Pb, Ni, Zn Hg	EPA 6010C EPA 7471B
Organics	PCBs PAHs organochlorine pesticides Oil and Grease	EPA 8082A EPA 8310 EPA 8081B EPA 9071B
Physical	Particle size (sieve) Percent total organic carbon (TOC)	ASTM C136-84A L-Kahn/9060A

PCB – polychlorinated biphenyl

PAH-Polycyclic Aromatic Hydrocarbon

- *PCBs examined only in upper floodplain cores*
- *Organochlorine pesticides/herbicides were tested only in the channel core downstream of the treatment plant*

CONTAMINANT RESULTS

- *Definitions*
 - **Consensus Based Sediment Quality Guidelines** – used by national and state programs in the U.S.
 - **Threshold Effects Concentration (TEC)** – Threshold below which effects are unlikely
 - **Probable Effects Concentration (PEC)** – Threshold above which effects to biota are probable

CONTAMINANT RESULTS

■ Lake George

- *PCBs detected in trace amounts, only one sample slightly exceeded the TEC*
- *Trace metals found in channel sediments, but generally below TEC*
- *Mercury found above TEC in 3 floodplain cores*
- *Four of the PAH compounds tested showed values above the TEC*
- *Other PAH compounds were detected but below TEC*

CONTAMINANT RESULTS

- *Lake Louise*
 - *PCBs were not detected*
 - *Trace metals found in channel sediments, but generally below TEC (mercury and nickel exceeded TEC at one floodplain site each)*
 - *Arsenic found above PEC in 1 channel core*
 - *DDD values above the TEC (LL-C2)*
 - *Lindane values above the PEC (LL-C2)*
 - *Ten of the PAH compounds tested showed values above the TEC in site LL-C3, four PAH compounds were above the PEC in site LL-F2A*
 - *Other PAH compounds were detected but below TEC*

SUMMARY

- *Sediments have a high percentage of sand content*
- *Potentially mobile sediment is roughly 40% of the total sediment volume*
- *Sediment is relatively clean, likely allowing for mechanical removal without special handling*
- *Some passive release of sediment may be possible*

SEDIMENT MANAGEMENT

- *In either a dam-in or dam out scenario, mechanical removal would be part of the solution*
- *Passive removal amounts may be limited by potential short-term ecological impacts downstream*

Table 3. Costs for active sediment removal, based on a unit cost of \$30 per CY.

Percentage of total assumed actively removed

Impoundment	Total Impoundment Volume (CY)	10%	25%	50%	100%
Lake George	73,900	\$ 221,700	\$ 554,250	\$ 1,108,500	\$ 2,217,000
Lake Louise	45,100	\$ 135,000	\$ 337,500	\$ 675,000	\$ 1,350,000

THANK YOU

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