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The City of Fond du Lac (FdL) WPCP  
New Phosphorus Effluent Limits and Initial  
Compliance Steps

**October 15, 2013**

**Presentation to Outlying Sewer Group and City Stormwater Department  
Strand Associates, Inc. (SAI)**



## Outline of Presentation

- New Permit – Effluent Limits and Schedule
- Operational Evaluation Report Status
- Study of Feasible Alternatives Status
  - WPCP Treatment Technologies and Costs
  - Upper Fox-Wolf Basin TMDL
  - Watershed Adaptive Management
- Site-Specific Standard, Variances, Water Quality Trading, and Other Approaches



## Water Quality Problems in the Fox River Basin and Lake Winnebago

High nutrient loads (mostly phosphorus) = excessive algae and low dissolved oxygen

Hydraulic modifications (dams, etc.)

Sedimentation

Legacy pollution



## WPDES Permit – Phosphorus Effluent Limits

Item	Date
Current/Interim Limit	1 mg/L
Future WQBELs*	
Six-Month Average	0.04 mg/L
Monthly Average	0.12 mg/L
Mass limits are also included	

\*WQBEL = water quality based effluent limit.

\*Lowest WQBELs in the state to date.



## WPDES Permit – Compliance Schedule Related to Phosphorus

Item	Date
Permit Effective	1/1/13
Operational Evaluation Report	12/31/13
Study of Feasible Alternatives:	
Start*	12/31/13
Status Report	12/31/14
Preliminary Plan	12/31/15
Final Plan	12/31/16
Achieve Compliance with WQBELs	1/1/2022



\*Started early 2013

## Operational Evaluation Report (OER)

- Permit Requirement:
  - Determine if effluent phosphorus can be reduced through source reduction and/or minor operational changes and optimization at the WPCP
  - Implement recommended source reductions and minor modifications
- Additional goal: look for synergies and cost savings



## OER Status

- Reviewed data from WPCP, water supply, various customers (including OSG)
- City discontinued addition of ortho and polyphosphates to water supply
- Industrial and commercial customer survey sent
- Reviewed and documented WPCP processes
- Developing additional action plans
  - Customer source reduction
  - Jar test various chemicals for P removal
  - Additional testing of biological P removal



## Study of Feasible Alternatives

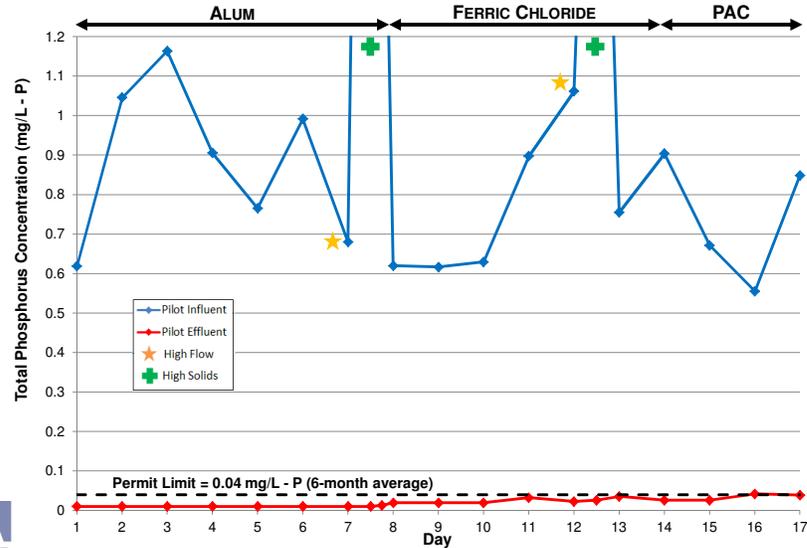


\*TMDL= Total Maximum Daily Load

## Treatment: Pilot Testing – CoMag Ballasted Settling



## Treatment: CoMag Results



## Treatment: Incremental Costs to Meet 0.04 mg/L Effluent P Limit (Preliminary)

	<u>CoMag</u>	<u>Reactive Filtration</u>
<b>Capital Cost</b>	\$10,808,000	\$50,670,000
<b>Annual Debt Retirement (20 yrs at 3%)</b>	\$726,000	\$3,406,000
<b>Annual O, M, &amp; R</b>	\$1,342,000	\$1,840,000
<b>Total Annual Costs</b>	\$2,068,000	\$5,246,000
<b>Additional P removed, lb/year</b>	22,800	22,800
<b>Cost per lb additional P removed</b>	\$90	\$230

### Notes:

All costs are June 2013 basis and assume meeting a 0.04 mg/L 6-month average limit. Present worth analysis assumes a 20-year life and WDNR facility planning discount rate of 4.125%.

Capital costs are based on 9.84 mgd design average flow and 50 mgd design maximum flow through treatment.

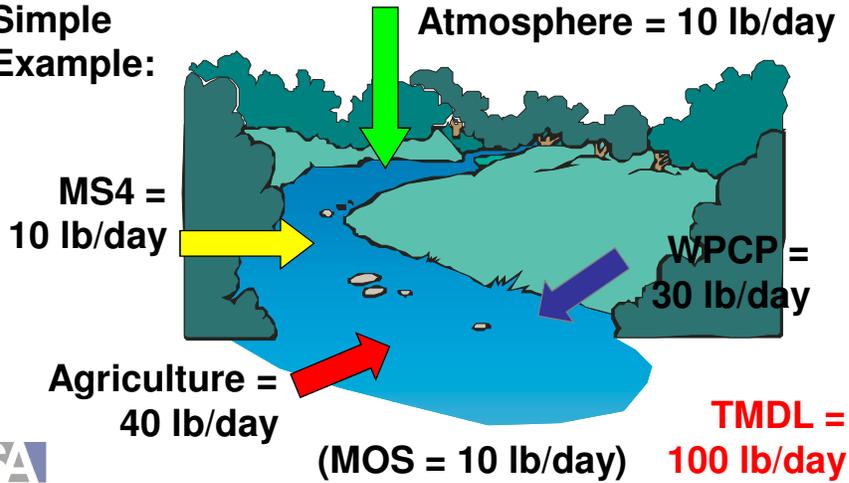
O, M, & R = operation, maintenance, and replacement.

Annual costs are based on DAF of 9.84 mgd.



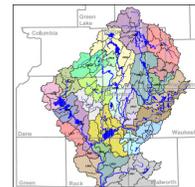
## Upper Fox-Wolf Basin TMDL (in Development) – What is It?

Simple Example:



## Upper Fox-Wolf Basin TMDL

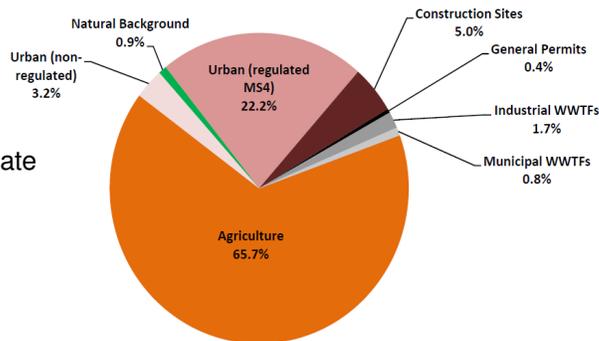
- **Opportunity for a TMDL-Based phosphorus limit in lieu of 0.04 mg/L WQBEL at the WPCP**
  - RR Basin TMDL-based WPCP limits range from 0.075 mg/L to 1 mg/L or higher
  - Lower Fox River Main Stem TMDL limits are ~0.2 mg/L
  - Cost Impact of 0.2 compared to 0.04 is significant
  - Timing of TMDL compared to permit compliance schedule is critical (*or use adaptive management or variance to delay imposition of stringent limit until TMDL is done*)



## Upper Fox-Wolf Basin TMDL

- **Stormwater permittees (MS4s)\* may have more stringent requirements**
  - Current regulations require 20% TSS reduction
  - Rock River Basin and Lower Fox River TMDL MS4 limits are much more stringent in many cases (P and TSS)

\*MS4 = municipal separate storm sewer system



## Watershed Adaptive Management: a Possible Cost-Saver

- Adds an extra ~10 years in permit compliance schedule (for TMDL development, etc.)
  - Perform surface water monitoring
  - Reduce phosphorus coming from other sources
    - Agriculture
    - Urban stormwater
    - Other point sources
- Allows stormwater MS4s to be brought under the compliance “umbrella”
- Partnerships are important (including OSG, MS4s, Fond du Lac County, etc.)



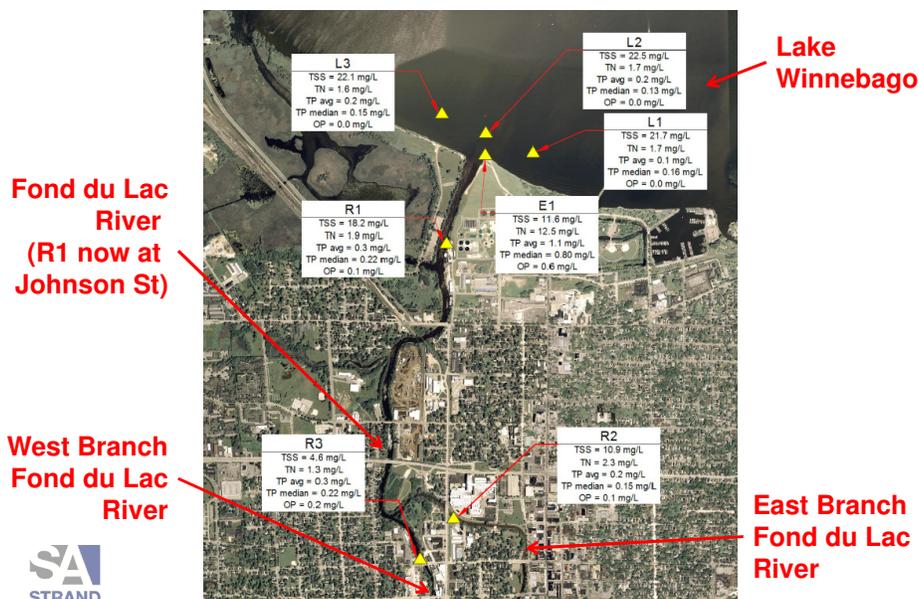
## Putting Costs into Perspective

- Currently:
  - Typically remove 5 – 6 mg/L of P
  - Typical cost ~ **\$3 to \$7 per lb of P**
- Proposed:
  - Remove additional ~ 0.75 mg/L of P
  - Incremental cost ~ **\$90 to \$230 per lb of P**
- Watershed Best Management Practices (BMPs) used in Adaptive Management:
  - Remove ~ 1 lb. P per acre per year
  - Cost ~ **\$27 to \$80 per lb. of P\***



\*Strand's Clean Lakes Alliance project for rural BMPs; includes a phosphorus delivery factor

## Current AM Baseline Monitoring Program



## Current Criteria and Conditions

<u>Waterbody</u>	<u>Phosphorus Criterion (mg/L)</u>	<u>NR217 Rolling Median Total P (mg/L)</u>
Lake Winnebago	0.04	0.13
Fond du Lac River	0.075	0.24
Fox River (at Lake Winnebago)	0.1	0.1
Fox River (upstream)	0.1	0.11
Wolf River	0.1	0.07

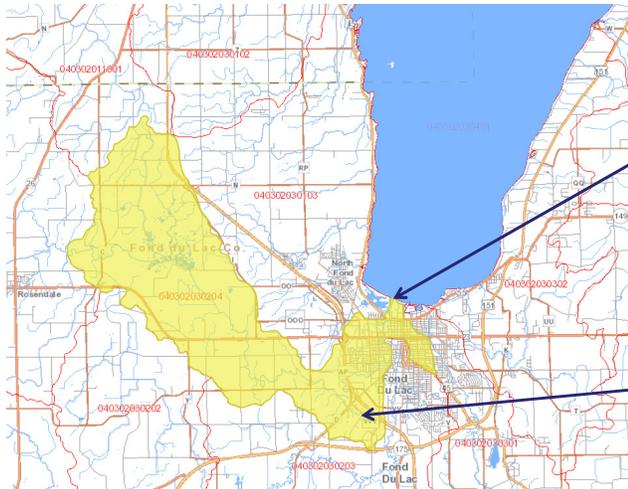
SOURCE: Surface Water Data Viewer



## Potential Adaptive Management Project Areas



## West Branch Fond du Lac River

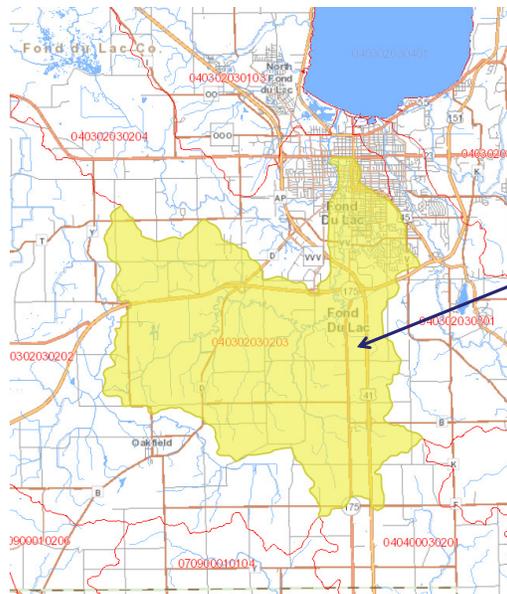


Fond du Lac  
WPCP

- HUC 12 Watershed
- 21,967 acres
  - PRESTO Nonpoint P Load = 6,028 lbs/yr



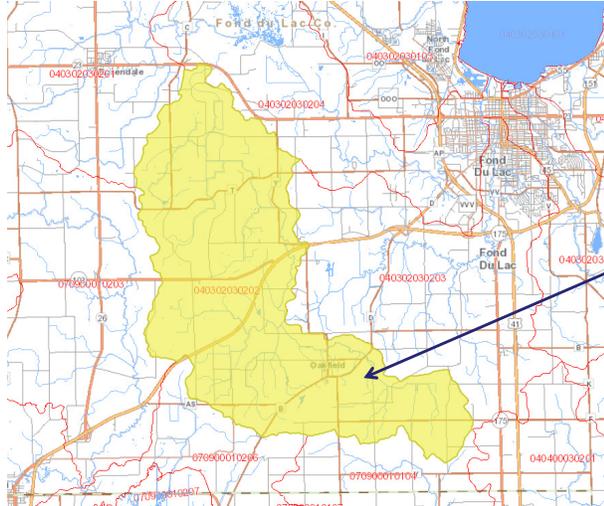
## East Branch Fond du Lac River



- HUC 12 Watershed
- 23,665 acres
  - PRESTO Nonpoint P Load = 9,794 lbs/yr



## Sevenmile Creek – Fond du Lac River

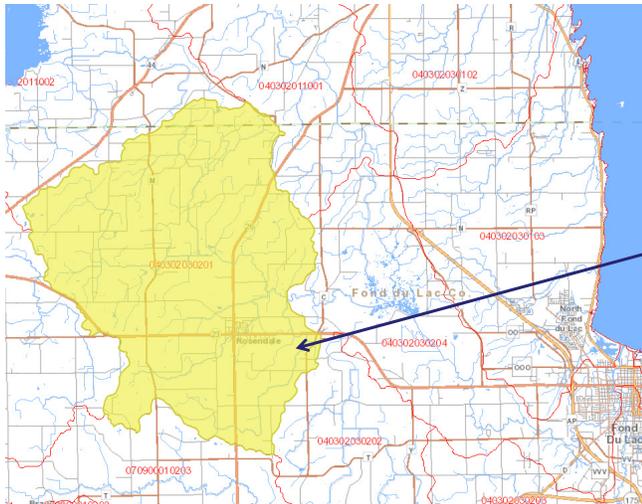


### HUC 12 Watershed

- 29,420 acres
- PRESTO Nonpoint P Load = 11,423 lbs/yr



## Rosendale – Fond du Lac River

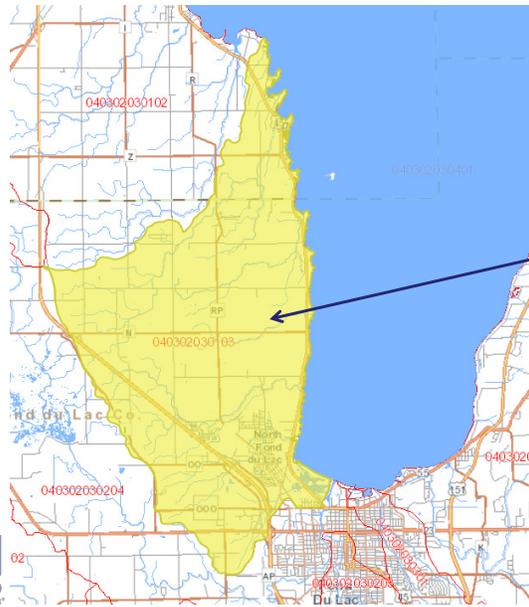


### HUC 12 Watershed

- 35,052 acres
- PRESTO Nonpoint P Load = 6,796 lbs/yr



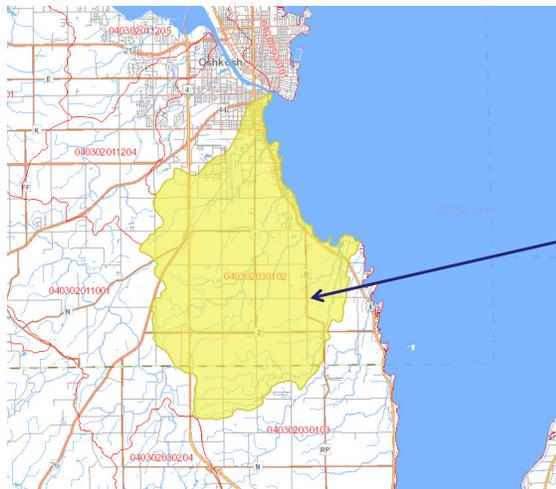
## Van Dyne Creek – Lake Winnebago



**HUC 12 Watershed**

- 23,554 acres
- PRESTO Nonpoint P Load = 14,055 lbs/yr

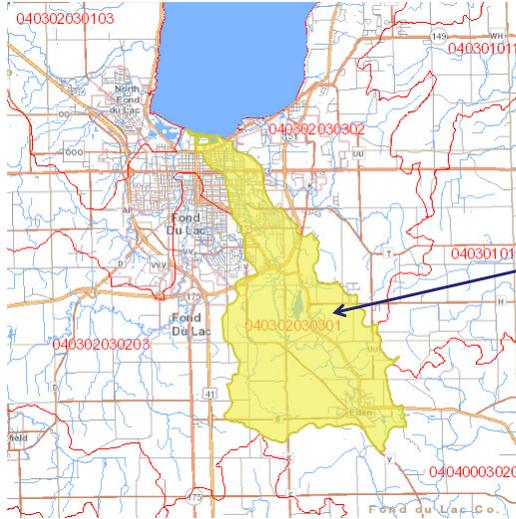
## Willow Harbor – Lake Winnebago



**HUC 12 Watershed**

- 22,464 acres
- PRESTO Nonpoint P Load = 14,047 lbs/yr

## De Neveu Creek



### HUC 12 Watershed

- 13,169 acres
- PRESTO Nonpoint P Load = 6,695 lbs/yr



## Development of Preliminary AM Plan

- Projection of costs is one of first steps
- Thoughts on potential other partners?
  - Upstream or neighboring WPCP's (or dischargers)

<u>West Branch FDL River</u>	<u>East Branch FDL River</u>
Saputo Cheese USA	Oakfield WWTP
Milk Specialties Global	Seneca Foods Corporation
Rickert Brothers LLC.	
Rosendale Dairy, WWTP	
Power Packaging Inc.	



## **Additional Options for Phosphorus Compliance**

- Site-specific standard for Lake Winnebago
- Water Quality Trading
- Variances or site-specific effluent limit based on non-reactive P, natural eutrophic conditions, other
- Other Options – Use Attainability Analysis, etc.



## **Action Items**

- Education of affected parties – customers, potential partners, etc.
- Phosphorus minimization: at industrial, commercial, and institutional customers; in and around homes
- OSG and City staff ideas for large-track or large-impact agricultural best management practices
  - Buffer strips along streams
  - Manure management
  - Wetland restoration
- Ideas for urban stormwater improvements
- Other OSG assistance





## Questions and Answers

Thank you!  
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