Managing a Cost Efficient Water Quality Utility

City of Prior Lake
Evolution of our Water Quality Utility

2005-2006 Planning, Rules & Regulation
• How do we deal with all the additional liabilities on our plate? What mix of infrastructure and programs will be enough?

2007-2008 More Rules & Regulation, System Maintenance and Implementation
• How do we build and maintain a system that meets rules?

2009-2010 Utility Focus
• Will the next dollar invested in water quality be doing the most good? Can we meet the goal? How long before our waters meet standards?

Goal of Efficient water quality utility management
• How do we continually learn from our experiences and improve our service delivery?
Collaboration and Innovative Tech

Intra-organizational
• How do we make sure transportation, sanitary or drinking water utilities do not have negative water quality externalities?

Cross- jurisdictional
• How do we partner with our local watershed organizations to promote efficient allocation of public resources?

Cross-sector
• How do we align the economics of private users of land and water to prevent negative water quality externalities?

Technology
• How do we lower overall water quality treatment and source control costs by applying new methods or technology?
Utility Management Decision Making & Tools

- **Asset Management**: How do we track O&M cost and system performance of a utility spread out over 20 square miles?
- **Rapid Assessment**: How do we select and size an individual BMP for any catchment?
- **Lifecycle Cost Analysis**: How do we balance current costs with future maintenance burden?
- **Marginal Cost Analysis**: How do we value-engineer even the components of an individual BMP? What is the right size?
- **System understanding**: How do we stay focused on long term goal of efficiently designing a layered system of BMPs?

**Goal of Efficient water quality utility management:**

Will the next dollar invested in water quality be doing the most good?
**POND & OUTFALL INSPECTION FORM**

**02020201**

**Inlet:** Wet detention pond  
**BMP Unique ID:** 02020201

**Location:** NW of intersection of KOP pike and Main Ave  
**Inspection Date:** 05/23/08

**City:** Prior Lake  
**Type of Inspection:** 20% Per Year

**Inspector:** Leslee Sterlie

### 1 Findings:

- **Sediment:** Maintain a low level of sediment discharge or capacity. Estimate the radius of all sediment cliffs.
  - [ ] 0-2"
  - [ ] 2-5"
  - [ ] 5-10"
  - [ ] 10"

- **Erosion and Slope Degradation:** Dikes and slopes aim their grading to hold in water and prevent sedimentation.
  - [ ] None
  - [ ] Minimal
  - [ ] Moderate
  - [ ] Severe

- **Vegetation:** The shoreline and side slopes should stay free of landscaping.
  - [ ] None
  - [ ] Minimal
  - [ ] Moderate
  - [ ] Severe

- **Vegetation Recommendations:**
  - Vegetation 5" radius around South Inlet
  - Remove debris from inside South Inlet

**Notes:**

- In outlet is low,

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**Photo 1**

**South Inlet**

**Photo 2**

**North Outlet**

**Photo 3**

**Photo 4**
Snow and Ice Control

- Mean Chloride Level (mg/L)

- 65.0
- 55.0
- 45.0
- 35.0
- 25.0

- 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Date

- 12/29/2009
- 12/03/2009

- 12/28/2009

- 12/28/2009
2007-2009 Reconstruction Retrofits

- Reduced Street width and overall impervious.
- 3 Acre Prairie/Oak Savannah Restoration.
- 14 Privately owned, publicly built rain gardens.
- Grass top on 1.5MG reservoir.
- 3 Pervious Pavement applications.
- 3 Bioretention/infiltration systems.
- 2 Bioretention/filtration system.
- 2 Storm water quality ponds.
Marginal Cost Example

Component:
- Sand Filter 1
- Sand Filter 2
- IESF 1
- IESF 2

Lifecycle Marginal Cost (Dollars/Pound Phosphorus - Year)

- $10,000
- $1,000
- $100
- $10

Cost Breakdown (in dollars):
- Sand Filter 1: [Colorful bars representing different costs]
- Sand Filter 2: [Colorful bars representing different costs]
- IESF 1: [Colorful bars representing different costs]
- IESF 2: [Colorful bars representing different costs]
# 2011 Retrofit Project Menu

- **Water Quality Ponds, Hydromodification, Sand Filtration and Iron Enhanced Sand Filtration**

**City of Prior Lake**

**Upper Prior Lake Subwatershed Analysis**

**Ross T. Bintner, P.E.**

## Table: Retrofit Model & Component Cost

| Pond & Active head | Retrofit Model | acres | Uses | P/hr | Ib/Plac | Ib/Pfyr | Retrofit | Annual Reduction | Marginal Reduction | Cumulative Reduction | Annual O&M Cost | Marginal Cost | Component Cost DL ($/y) |
|--------------------|----------------|-------|------|------|--------|--------|----------|------------------|--------------------|--------------------|---------------------|-----------------|--------------|--------------------------|
| **Optimum MC E**   | Optimum MC E 42.36 | R1     | 0.90 | 38.66 | 222-1+2Z | 53.12  | 20.53    | 0.96  | 2.79                 | $43                | $2,150           | 15.0            | $1                 |
| **Optimum MC E**   | Optimum MC E 42.36 | R1     | 0.30 | 38.66 | 1AZ-1AA | 59.5   | 23.01    | 2.48  | 5.27                 | $129               | $5,693           | 15.0            | $1                 |
| **Optimum MC E**   | Optimum MC E 42.36 | R1     | 0.30 | 38.66 | 1AZ-1AA | 60.8   | 5.55     | 0.30  | 0.63                 | $160               | $5,300           | 15.0            | $1                 |
| **Optimum MC E**   | Optimum MC E 42.36 | R1     | 0.30 | 38.66 | 1AZ-1AA | 72.8   | 28.16    | 7.63  | 10.42                | $193               | $19,813          | 15.0            | $1                 |

**Design Note:** Values are calculated based on specific parameters and formulas. The table above depicts the cost breakdown for various retrofit models considering different scenarios such as existing pond upgrades and new installations. The calculations include annual reduction, marginal cost, and component cost DL for each scenario. It is crucial for stakeholders and decision-makers to review these details for informed project planning and execution.

**Recommendation:** A, B, C, D
Utility Approach: Applications

Goal of Efficient water quality utility management:

How do we solve a generational challenge like nonpoint source pollution insuring that the next dollar invested in water resources will be doing the most good?

• Build from the bottom up, focusing on the infrastructure and programs needed to solve the problem.
• Learn how externalities from all sectors affect the overall resource.
• Revise rules to provide maximum flexibility to avoid wasting resources.
• Plan for more efficient project implementation.
• Rework agricultural subsidies and conservation programs to incorporate offset for negative externalities.
• Rework grant programs to pay a level-of-service specific “bounty” and make more competitive types grants based on cost efficiency.
• Enable sector-to-sector pollutant trading, and allow trading of a steadily decreasing margin.
When will we get to the goal?
How much new treatment or source control will be needed?
Who will do the work? How will we assess progress?

WHAT IS THIS GOING TO COST?!