

Flexible Treatment Options: High Impervious Surface Example and Voting on Performance Goal for Sites with Restrictions

St. Urho's Day, March 16, 2012

MIDS Work Group Meeting



Presentation Outline

- Conclusions from previous presentations
- Use example high-impervious, D-soil site and determine BMP treatment efficiencies
- Show real high-impervious examples with distributed BMPs
- Discuss previously-presented draft performance goal for new developments with restrictions

Refresher

- Of the phosphorus in stormwater, ~55% is particulate and ~45% is soluble (dissolved)
- Many BMPs only address particulate P
- To achieve >55% TP removal, few BMP options are available
 - Volume-reducing BMPs
 - Enhanced filtration (e.g., iron)
 - Additives (e.g., alum)

Refresher

“Because dissolved phosphorus has a higher bioavailability factor than particulate forms (Sharpley et al., 1992), removing only particulate fractions from stormwater only minimally reduces phosphorus bioavailability.”

Performance Assessment of an Iron-Enhanced Sand Filtration Trench for Capturing Dissolved Phosphorus, Authors: Erickson, Andrew J. and Gulliver, John S.

Refresher

- To match loading from natural D soil sites, need >87% TP removal
- Performance goal at non-restricted A-, B-, C-soil sites results in 87-92% TP removal
- To address stream, shallow lake, and lake standards in Twin Cities, need 67-92% TP removal

Refresher

- Achieving 75% TP removal on a restricted site with 50% impervious is feasible, but fewer BMP options are available
- Treatment train is helpful
- Calculator is a tool to estimate reductions
- Removals in calculator will be revised based on feedback/science

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High Impervious Site with Restrictions Example

Example Site:

14.2 acres, 80% impervious, Assume Clay Soils



Assume not regional stormwater ponds/ can't use

Assume can't use this greenspace for stormwater treatment (slope, trees, etc.)

96th Ave N

52

94

Example Site:

14.2 acres, 80% impervious, Assume Clay Soils



TP % Reduction	50
DP% Reduction	0
TSS% Reduction	84
BMP Area % of Site	7
BMP % of Construction Cost*	0.3
Maintenance Cost	\$2,800

Example Site:

14.2 acres, 80% impervious, Assume Clay Soils



TP % Reduction	77
DP% Reduction	60
TSS% Reduction	84
BMP Area % of Site	7
BMP % of Construction Cost*	0.3
Maintenance Cost	\$3,200

Example Site:

14.2 acres, 80% impervious, Assume Clay Soils



TP % Reduction	55
DP% Reduction	10
TSS% Reduction	80
BMP Area % of Site	7
BMP % of Construction Cost*	0.7
Maintenance Cost	\$7,200

Example Site:

14.2 acres, 80% impervious, Assume Clay Soils



TP % Reduction	82
DP% Reduction	60
TSS% Reduction	80
BMP Area % of Site	7
BMP % of Construction Cost*	0.7
Maintenance Cost	\$8,000

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High Impervious Sites and BMPs

Real Life Example (without restrictions): Proposed Eagle Brook Church, Woodbury, 65% Impervious



Plan: Loucks Associates

Green: Bioretention/biofiltration; Blue: Wet Pond; Purple: Greenspace; White: Imperviousness

Real Life Example: Mills Fleet Farm, Rochester



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48th St SE

20

48th St SE

Main

Real Life Example:

Parking Lot Island, Mills Fleet Farm, Rochester



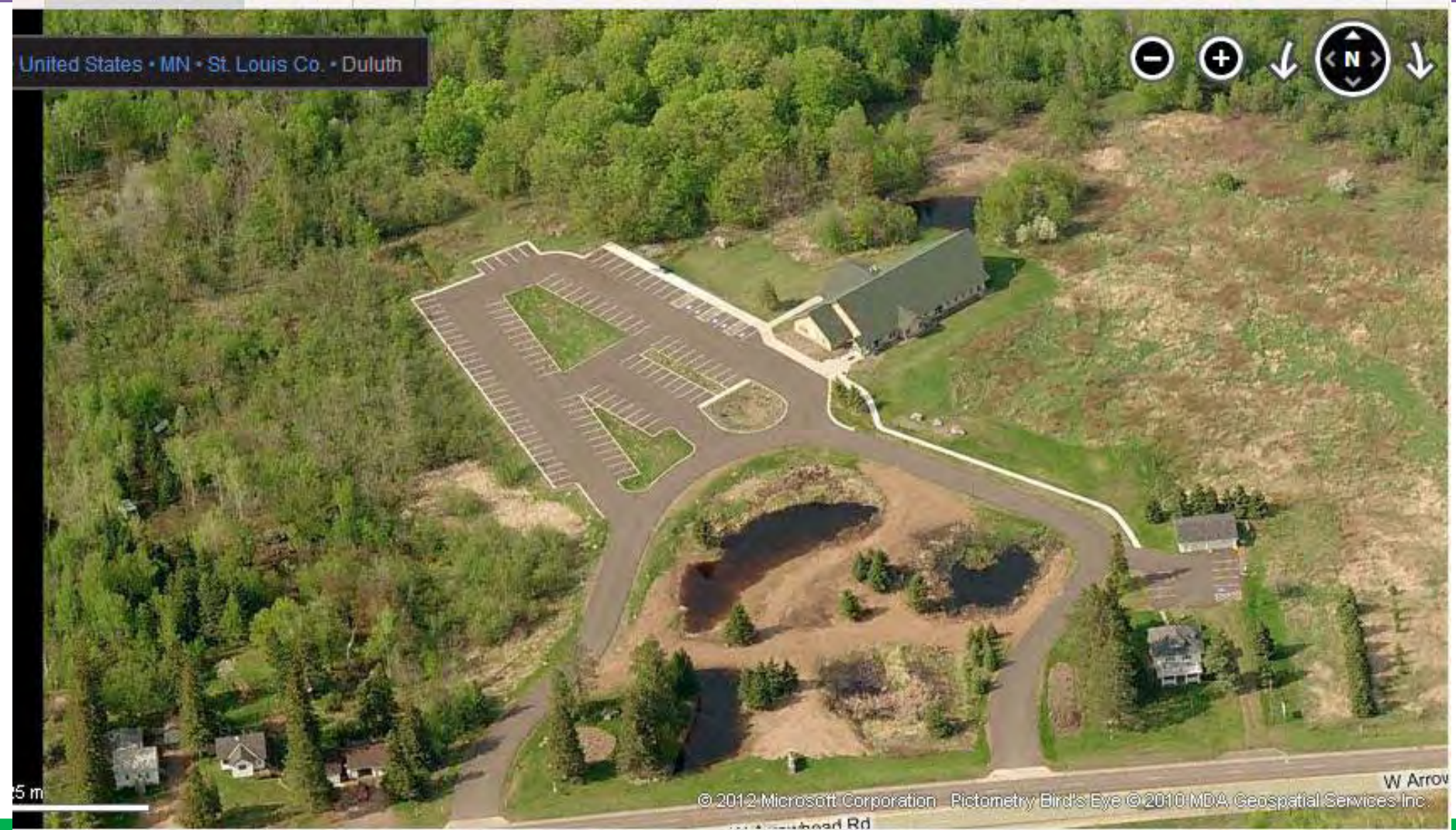
Photo: Michelle Kimble, Barr Engineering Co.

Real Life Example: Parking Lot Island, Mills Fleet Farm, Rochester



Photo: Michelle Kimble, Barr Engineering Co.

Real Life Example: Eastridge Community Church, Duluth



Real Life Example: Eastridge Community Church, Duluth



Real Life Example

7 SIGMA, Minneapolis



Real Life Example: 7 SIGMA, Minneapolis

BARR



Photos: Barr Engineering Co.

Real Life Example: UMD Parking Lot



Real Life Example: UMD Parking Lot

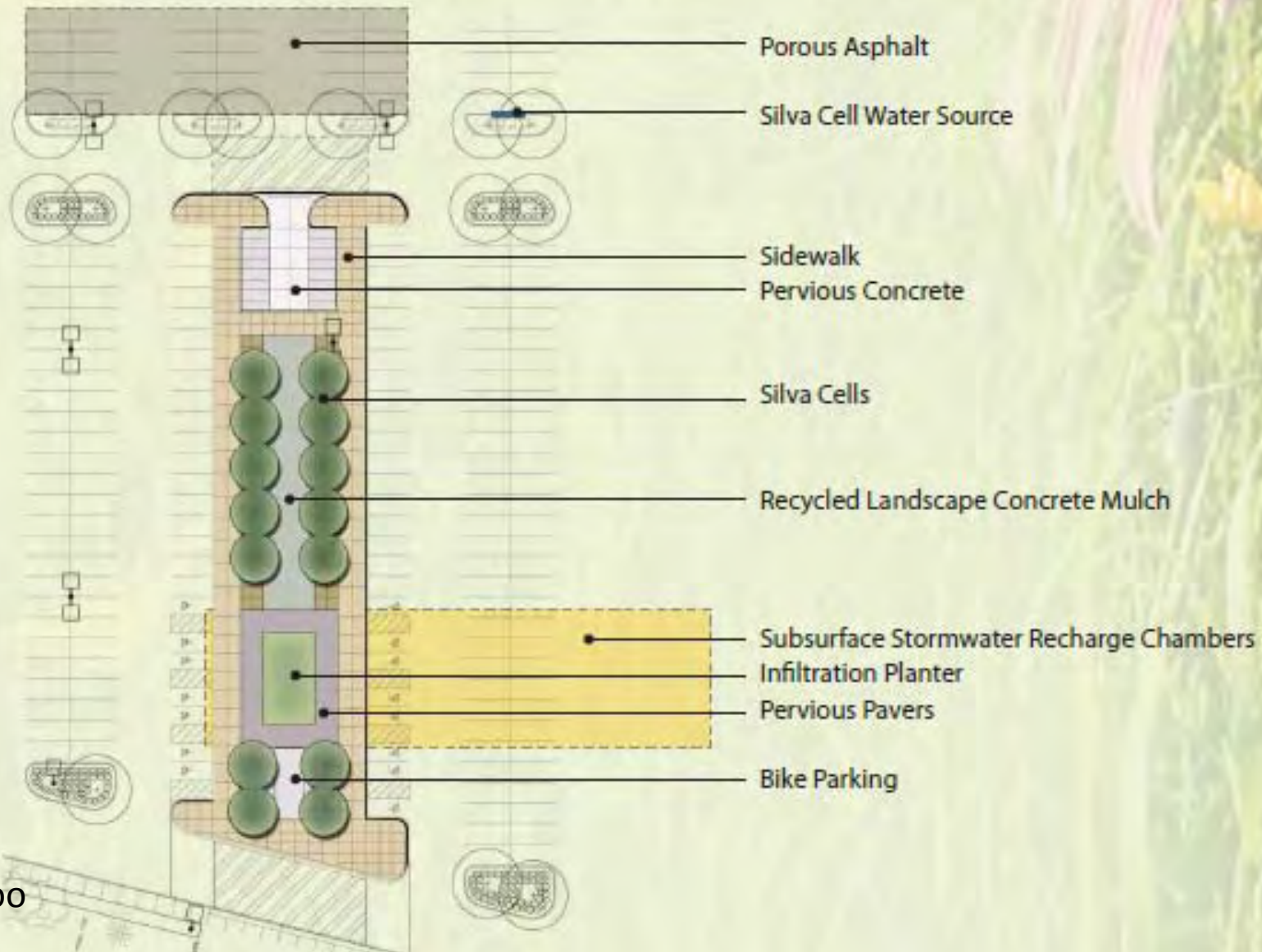


Real Life Example: West Parking Lot, Century College, White Bear Lake



Real Life Example:

West Parking Lot, Century College, White Bear Lake



Real Life Example: West Parking Lot, Century College, White Bear Lake



Real Life Example:

West Parking Lot, Century College, White Bear Lake

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Real Life Example: Minnetonka Civic Center



Source: Bing.com

Real Life Example: Minnetonka Civic Center



Real Life Example: Minnetonka Civic Center



Photo: Barr Engineering Co.

Real Life Example: Wirth Lake Beach House Parking Lot, Golden Valley



Project Engineers: SEH

High Impervious Sites Conclusions

- BMPs can be installed and distributed throughout site
- At restricted sites, filtration can be used instead of infiltration
- Filtration can be enhanced to address soluble phosphorus

Non-Stormwater Regulations Limit Impervious Surface Coverage

- **Woodbury:** In commercial, business and industrial zoning districts, the total open space requirement is a minimum of 30 percent gross lot area.
- **Blaine:** Smaller commercial sites of 1 or 2 acres may only get to 70% impervious cover while larger sites would max at 80%.

Summary

- Achieving 75% TP reduction is feasible on high impervious sites
- Is it prudent?



Discussion

- Possible Flexible Treatment Option Performance Goal
 - Ok?
 - If not ok, what do you suggest?

