

# Introduction to Flexible Treatment Options

November 18, 2011  
MIDS Work Group Meeting

# Presentation Outline

- Background
  - Review benefits and limitations of MIDS Phase 1 Performance Goal
- “Flexible Treatment Options”
  - Objective and relationship to existing regulations and approaches
- Next Steps
  - What information does the Work Group need?

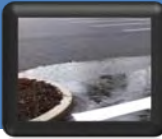
# Background: Performance Goal

“For new, nonlinear developments that create more than one acre of new impervious surface on sites without restrictions, stormwater runoff volumes will be controlled and the post-construction runoff volume shall be retained on site for 1.1 inches of runoff from impervious surfaces statewide.”



1.1  
inch

x



- Sometimes...
  - Some volume control is achievable, but not the entire requirement
  - Infiltration is physically impossible
  - Infiltration might lead to other problems
  - Volume control might be excessively expensive

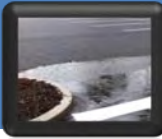
Background:

# Performance Goal Limitations



1.1  
inch

x



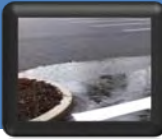
- Can we achieve similar performance outcomes in these situations using flexible treatment options?
  - Let's review performance goal benefits

# Background: Regulatory Benefits

BARR

1.1  
inch

x



Performance goal meets 2009 legislation and complies with antidegradation requirements

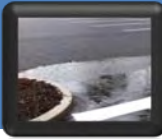
- Legislation:
  - MIDS sites will mimic native hydrology
- Antidegradation:
  - MIDS sites will “avoid and minimize net increases in loading”

# Background: Benefits to MN Waters

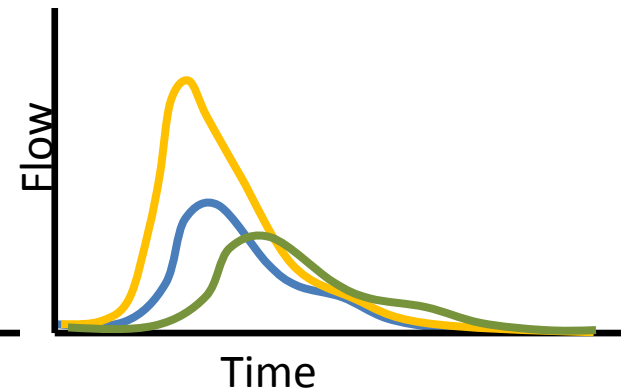
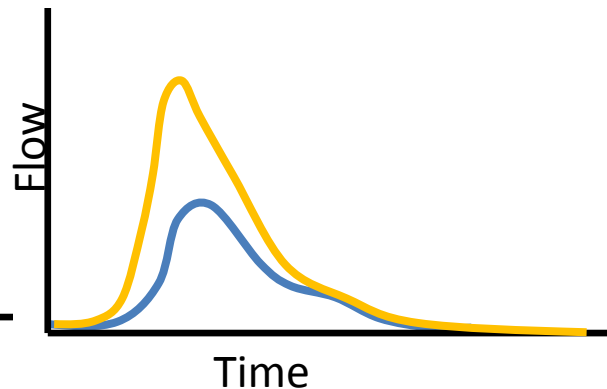
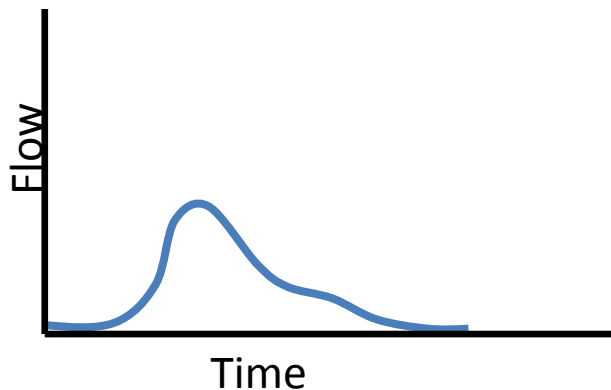
BARR

1.1  
inch

x



- Stormwater performance goal will:
  - Reduce the volume to downstream waterbody



# Background: Benefits to MN Waters

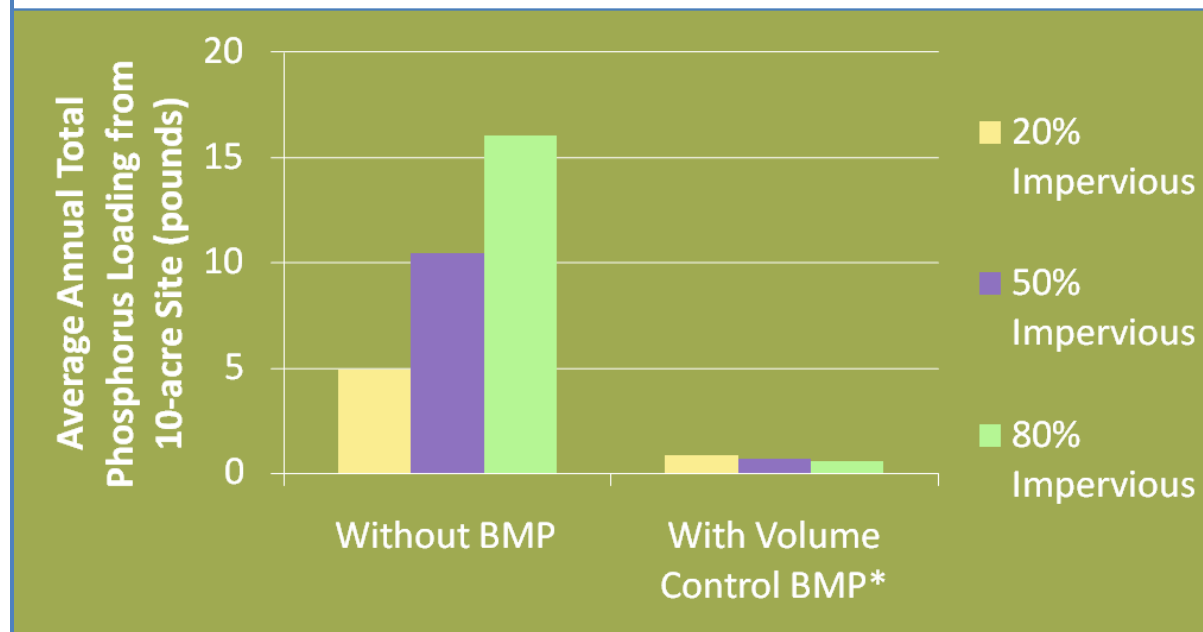
1.1  
inch

x



- Stormwater performance goal will:
  - Reduce the phosphorus loading to downstream waterbody

## Phosphorus Loading Reduction from Volume Control BMPs



\* Based on average loading from the four performance goal scenarios

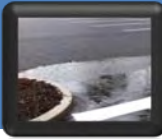


# Background: Benefits to MN Waters

BARR

1.1  
inch

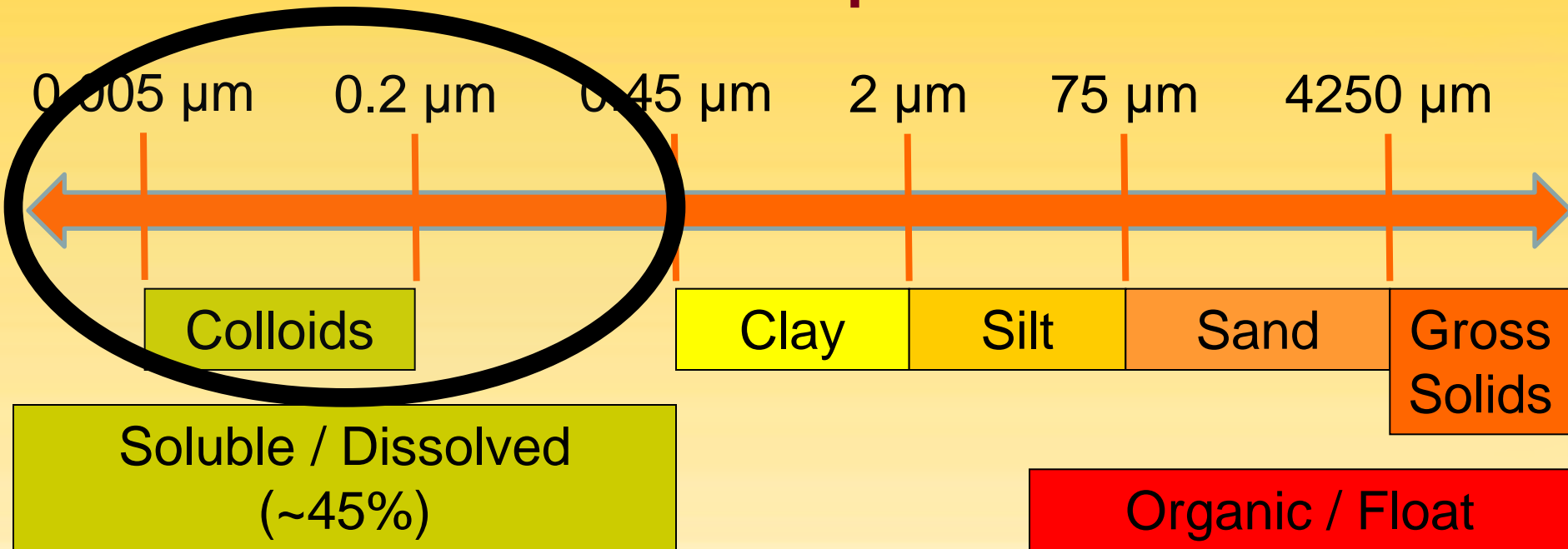
x



- Volume reduction BMPs remove pollutants from entire particle size spectrum
- Especially significant with phosphorus
  - Dissolved phosphorus difficult to remove



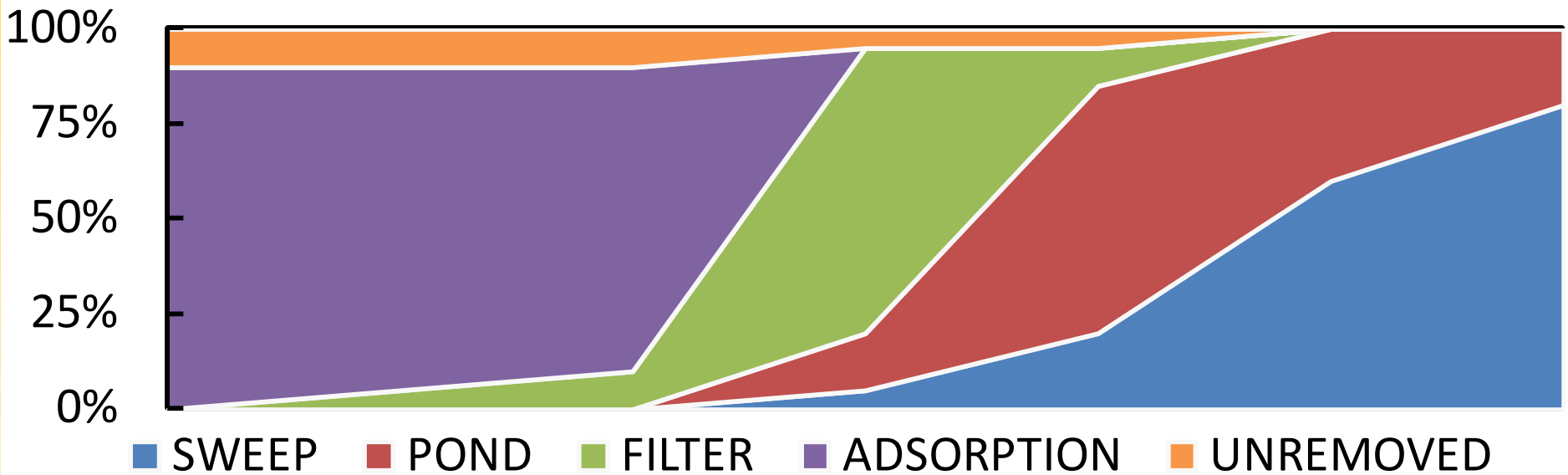
# Pollutant Spectrum



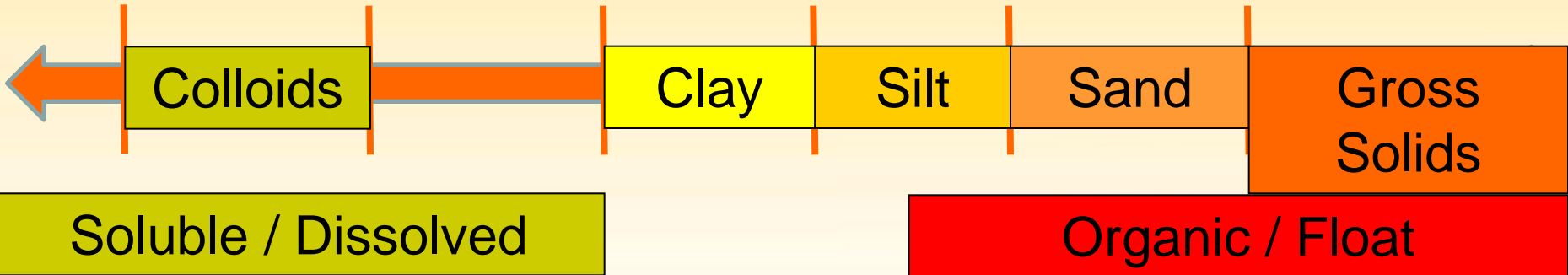
- Varies by:
  - Pollutant
  - Location in management system



# BMP pollutant size removals



0.005 µm    0.2 µm    0.45 µm    2 µm    75 µm    4250 µm

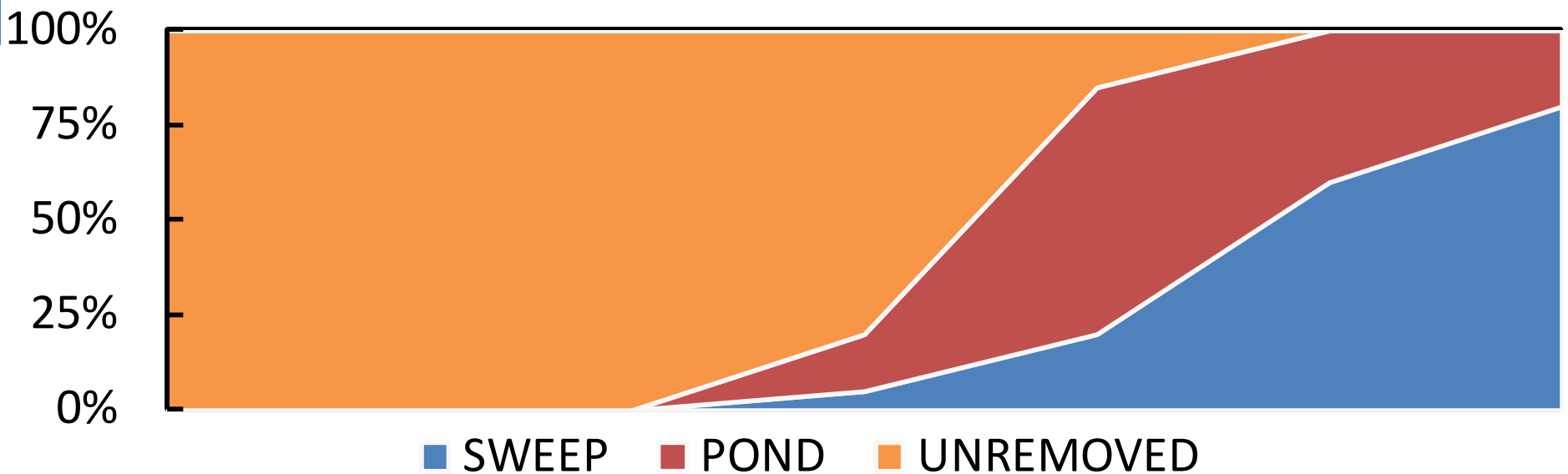


# Background Phosphorus Removal of Non-Volume Reducing BMP

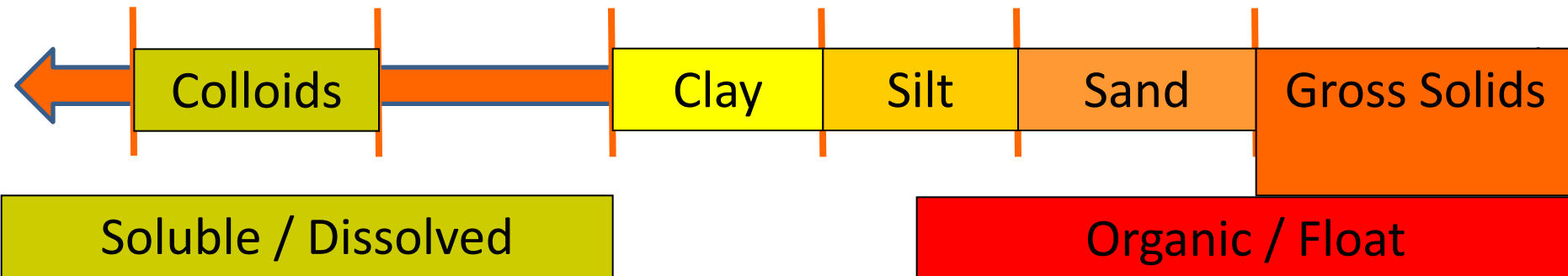
## Example: Wet Ponds



# Background Pond pollutant size removals



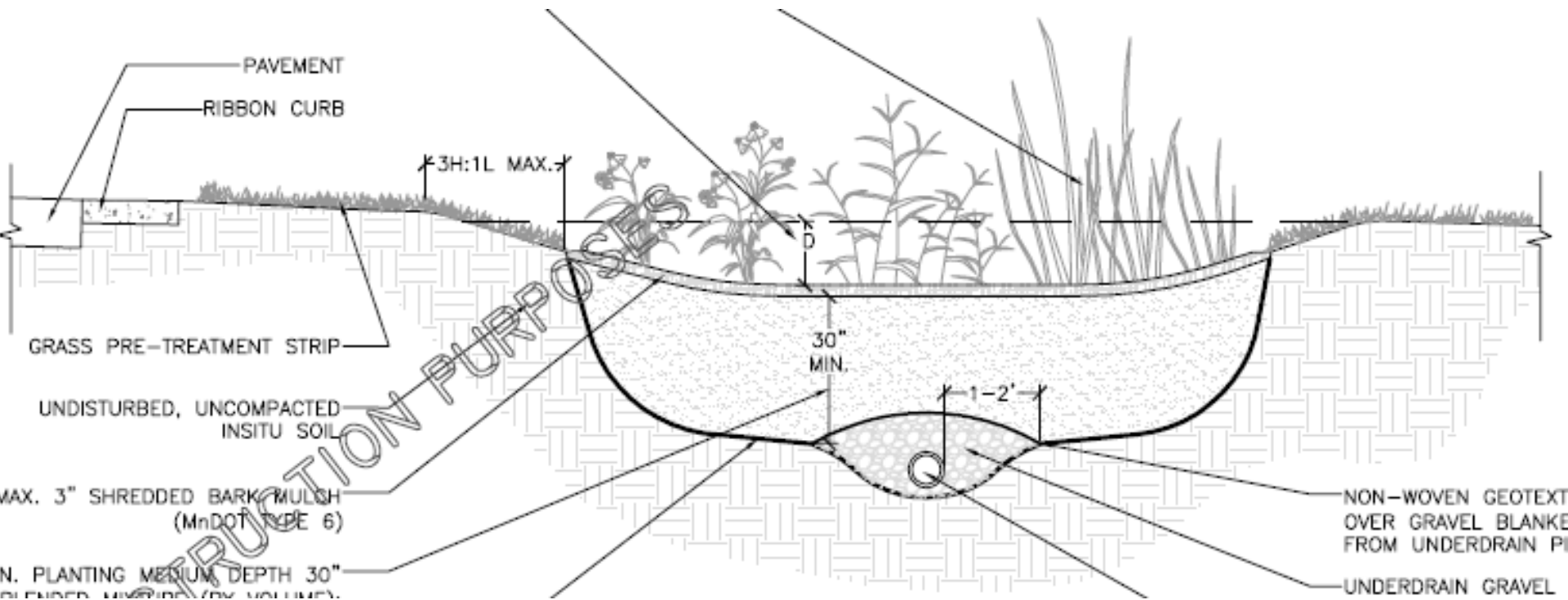
0.005 μm    0.2 μm    0.45 μm    2 μm    75 μm    4250 μm



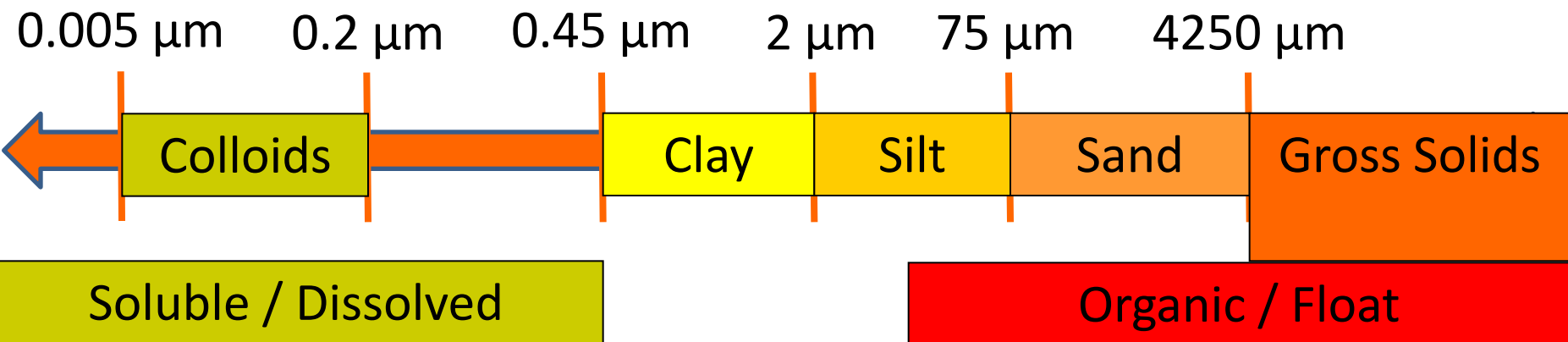
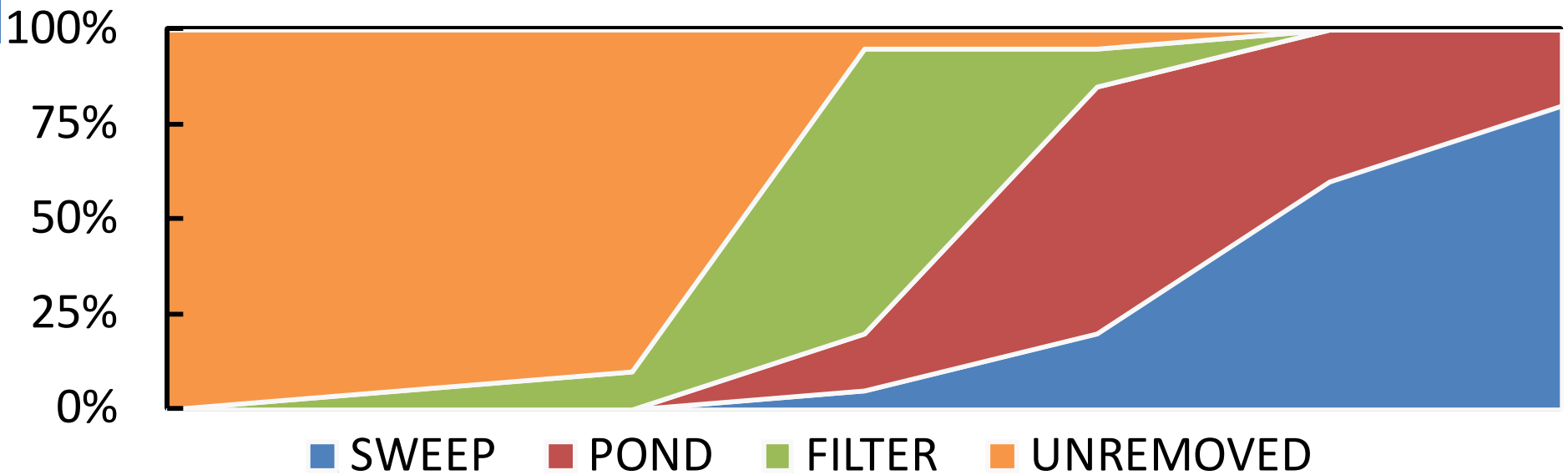
# Background

## Phosphorus Removal of Non-Volume Reducing BMP

### Example: Filtration



# Background Filtration pollutant size removals



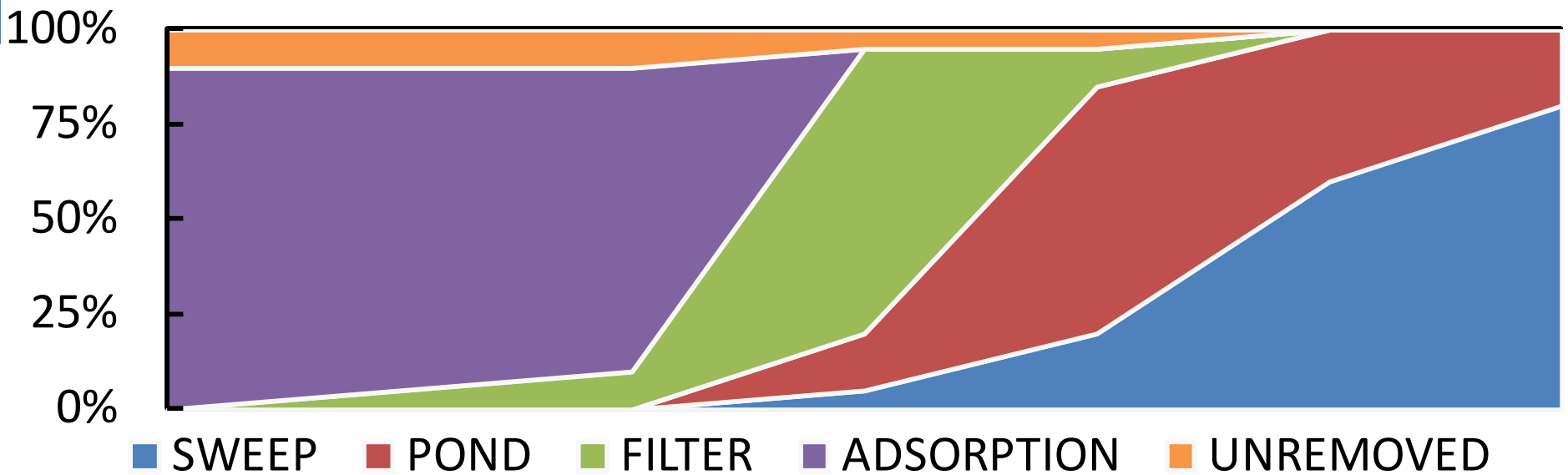


# Background Phosphorus Removal of Non-Volume Reducing BMP

## Example: Adsorption







0.005 μm    0.2 μm    0.45 μm    2 μm    75 μm    4250 μm

Colloids

Clay

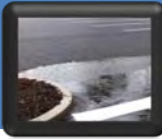
Silt

Sand

Gross Solids

Soluble / Dissolved

Organic / Float



- Again, sometimes...
  - Some volume control is achievable, but not the entire requirement
  - Infiltration is physically impossible
  - Infiltration might lead to other problems
  - Infiltration might be excessively expensive

# Flexible Treatment Considerations

So... questions to be answered:

- Can we achieve similar benefits through flexible treatment options?
- If not, what level of treatment is acceptable?

# Flexible Treatment Considerations

- Objective for sites with restrictions is to still meet antidegradation requirements



Adoption of the MIDS package  
is a path to compliance with  
antidegradation

- MPCA's alternative analysis approach (draft) can provide a roadmap for evaluating flexible treatment options

# Framing Flexible Treatment Options

## Antidegradation

What are the prudent and feasible alternatives that avoid and minimize net increases in loading?

# Framing Flexible Treatment Options: Antidegradation

## Definition of “Prudent” Alternatives\*

“Prudent” (in context of antidegradation alternatives analysis):

- Selected with care and sound judgment
- Does not have unusual or extraordinary economic, social, or environmental costs

# Framing Flexible Treatment Options: Antidegradation

## Definition of “Feasible” Alternatives\*

**“Feasible”** (in context of antidegradation alternatives analysis):

- Capable of being done with existing technology;
- In accordance with acceptable engineering standards;
- Consistent with reasonable public health, safety, and welfare requirements;
- Legally possible; and
- Has supportive governance that can be successfully put into practice to accomplish the task.

# Framing Flexible Treatment Options: What are some WD/WMOs doing?

Elm Creek WMO	Rice Creek WD	Comfort Lake Forest Lake WD	Browns Creek WD	Valley Branch WD
No increase in P loads and extended detention	Water quality BMPs – preferred order	On-site to max extent feasible; equivalent off-site or banking; cash	On-site infiltration and off-site infiltration required to the extent feasible	NURP ponds or equivalent water quality treatment



# Framing Flexible Treatment Options: What are some WD/WMOs doing?

## Nine Mile Creek WD

Half of typical volume control required; if all options exhausted, cash in lieu of volume control BMP (currently \$40,000/acre)

## Minnehaha Creek WD

Abstraction of runoff to the greatest extent feasible, and at least 0.5 inches, and phosphorus control in an amount equivalent to that which would be achieved through abstraction of one inch of rainfall from the site's impervious surfaces

# Framing Flexible Treatment Options: What are some WD/WMOs doing?

## Vermillion River Watershed JPO

## Scott County WMO

## Carver County WMO

Various BMPs (credits) and site design practices to minimize the creation of connected impervious surfaces are used to the extent practical; filtration

90% removal of TSS;  
flexibility

# Proposed approach to evaluating flexible treatment options

Can [select BMP(s)] achieve similar results (volume, TP, and TSS removals)?

Yes

- Is this BMP(s) prudent and feasible?

No

- What other BMPs will result in less degradation?
- How much treatment is enough?

Yes



## Re-Use Example

Can harvesting & re-use achieve similar results (volume, TP, and TSS removals)?

Yes

• Is this BMP(s) prudent and feasible?

No

Yes



No

- What other BMPs will result in less degradation?
- How much treatment is enough?

## Wet Pond Example

Can a wet pond achieve similar results (volume, TP, and TSS removals)?

Yes

No

- Do wet ponds provide enough treatment?
- Will other prudent & feasible BMP alternatives result in less degradation?

# Stormwater Dissolved Phosphorus-Reducing BMPs

## Volume-Reducing BMPs

### ~~Infiltration Based~~

~~Bioretention  
Basins~~

~~Infiltration Basins~~

~~Pervious  
Pavement~~

~~Infiltration Trench~~

~~Dry Swale~~

### Non-Infiltration Based

Green Roof

Re-use

Trees

Extended Detention?

## Non-Volume-Reducing Structural BMPs

Enhanced filtration  
(e.g., iron)

Additive (e.g., alum)

# Big Question:

Only non-infiltration, volume control BMPs (e.g., green roofs, re-use) and BMPs that manage dissolved phosphorus (e.g., enhanced filtration) can achieve similar treatment results on sites with restrictions.

Is requiring these BMPs prudent and feasible?

Yes

- Performance goal for sites with restrictions can be “provide equivalent TP removal”

No

- How much treatment is enough?

# What does MIDS Work Group need to move forward?

## Potential needs:

- BMP performance and (cost) impacts?
- Definition of MPCA's acceptance?  
*(Maybe have MPCA talk in December on what is acceptable on sites with restrictions to comply with anti-deg?)*
- Draft performance goals to discuss, react to, and edit?
- Homework: Review other entities' performance goals (handout and individual research)



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