MIDS Work Group Meeting
February 18, 2010

Performance Goal Review

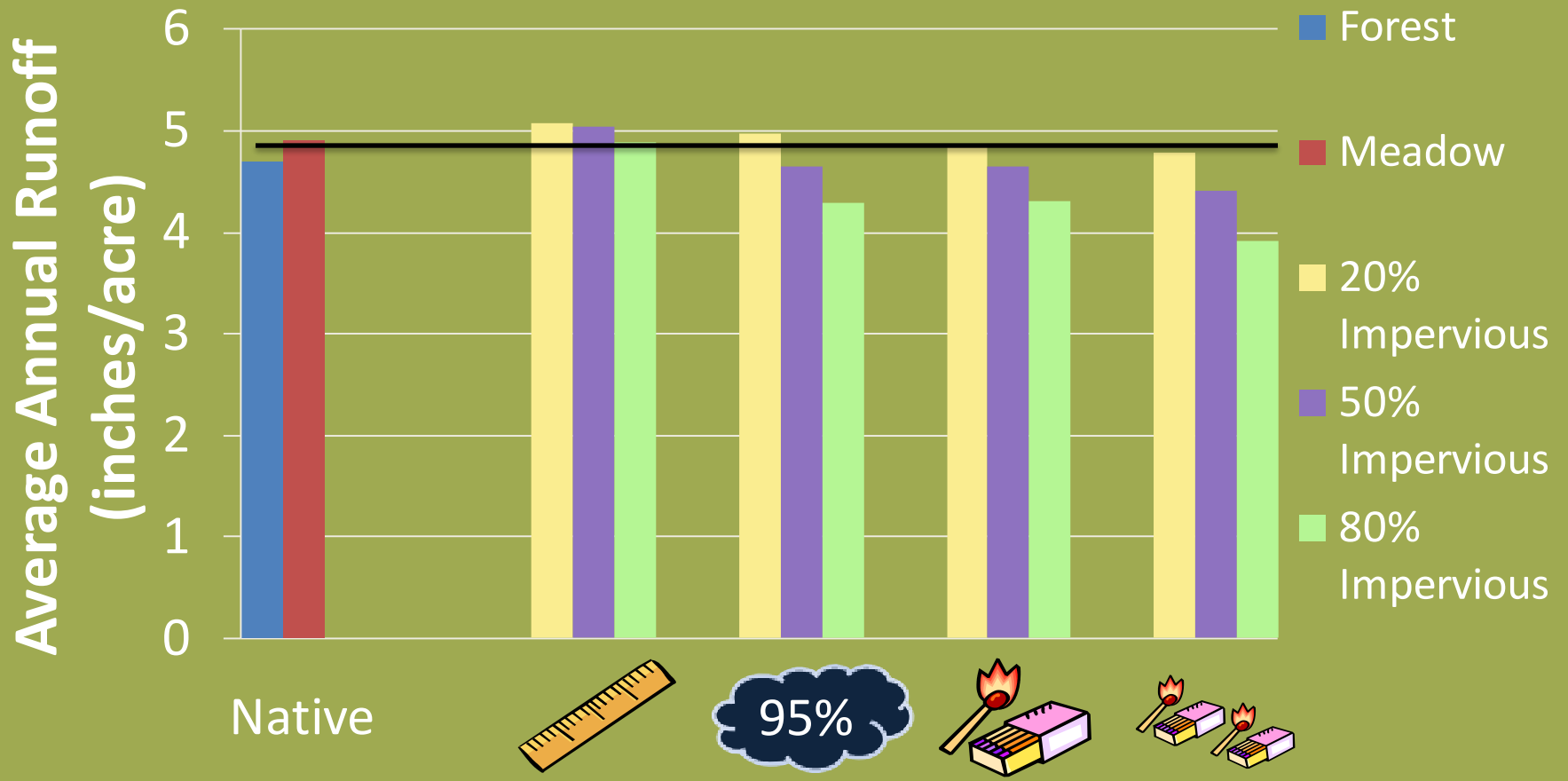
Our GOAL Today

- Identify additional info needed to make a performance goal decision – March 18
  - Provide big picture review of work to date
  - Show some real-world examples
  - Discuss outstanding critical issues

Volume Control Conclusions

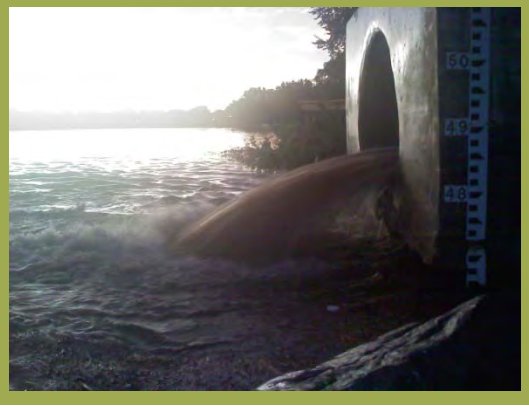
- All performance goals come close to matching native runoff ***volume*** conditions on an average annual basis

Comparison of Volume Controls:
Stormwater Runoff Volume Leaving 10-Acre Site with B Soils



Rate Control Conclusions

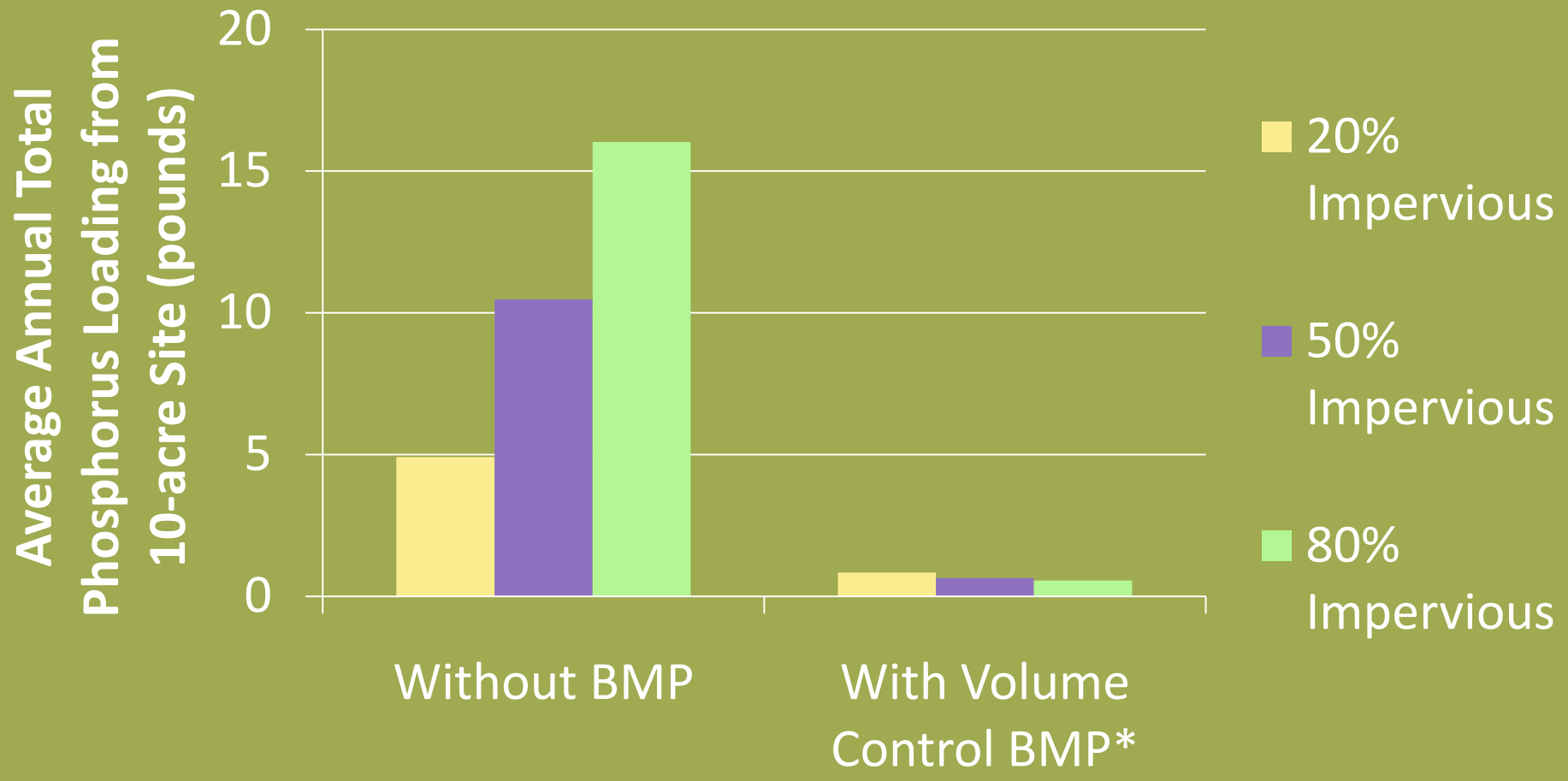
- All performance goals are effective at reducing volume
- Reducing volume reduces rate for small storms (1-yr storm and less)
- Additional rate control is required to get to “natural hydrology”



Water Quality Conclusions

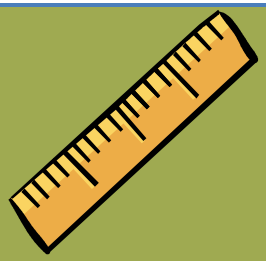
- Not specified in legislation
- Reducing volume improves water quality
- All performance goals are effective and almost equal at improving water quality
- No need to prove that over and over (every project)

Phosphorus Loading Reduction from Volume Control BMPs



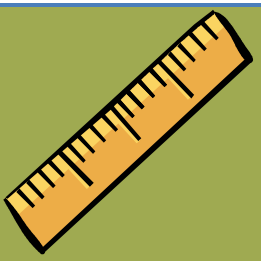
* Based on average loading from the four performance goal scenarios

Performance Goal Comparison Conclusions



1. All provide similar VOLUME reduction
2. All reduce RATE for small storms
3. All improve water quality – results are practically the same

Performance Goal Volume - Not all the same but close (Metro Area values)

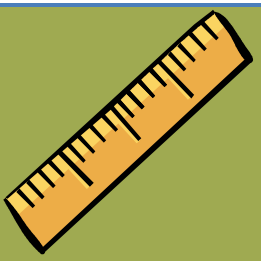


1. **RUNOFF of 1.0 inch** – no abstractions
   = 1.0 inch
2. **RAINFALL of 1.4 inches**

less abstractions for impervious and pervious
   = about 1.2 inches

3. **RAINFALL of 2.4 inches** less native runoff & less abstractions for imperv. & pervious, including infiltration during 24hr storm = about 1.2 inches

Performance Goal Volume - All can be adjusted to "mimic" (Metro Area values)



1. Change # to 1.2 inch from 1.0 inch

2. Change rainfall to 1.3 inches from 1.4 inches (94% storm)

3. Change rainfall to 2.6 inches from 2.4 inches (1.5 year 24 hr storm)

All volumes become essentially equal

All Approaches Can Mimic Natural Hydrology

Preliminary Modeling Results from Walker, MN

Method	Value Range Needed to Match Forest and Meadow Annual Average Runoff Volume
	0.8 inches – 1.0 inches
	87.5% - 95% (0.9 inches – 1.2 inches)
	Not determined – Maybe 0.8-year to 3-year 24-hour event

Range is based on Impervious % and soils

BARR

Performance Goal Comparison

Issue	Approach 1 : X Inches off Impervious Surface	Approach 2: Retain Y% Storm	Approach 3: Match Z-Year 24-Hour Volume
Treatment volume calculation	Very Simple	Simple	Moderately Simple
Incentive to reduce impervious surfaces?	Yes	Yes, less for sites with non-porous soils	Yes, less for sites with non-porous soils
Incentive to preserve natural areas with high infiltration rates	No (compensate with credits)	Yes	Yes
Applicable state wide?	Yes	Yes	Yes
Mimics native hydrology?	Yes	Yes	Yes
Provides consistent treatment among various impervious surfaces percentages ? (as seen in height difference of bars in charts)	Appears to be the most consistent	Appears to be very similar to Approach 3	Appears to be very similar to Approach 2

Example of  Method – Rushmore RWGs, Burnsville

- 17 Rainwater Gardens
- Sized to capture 1.0 inch from tributary impervious
- Actual volume was 0.9 inches due to ROW limitations
- Monitoring completed before and after construction

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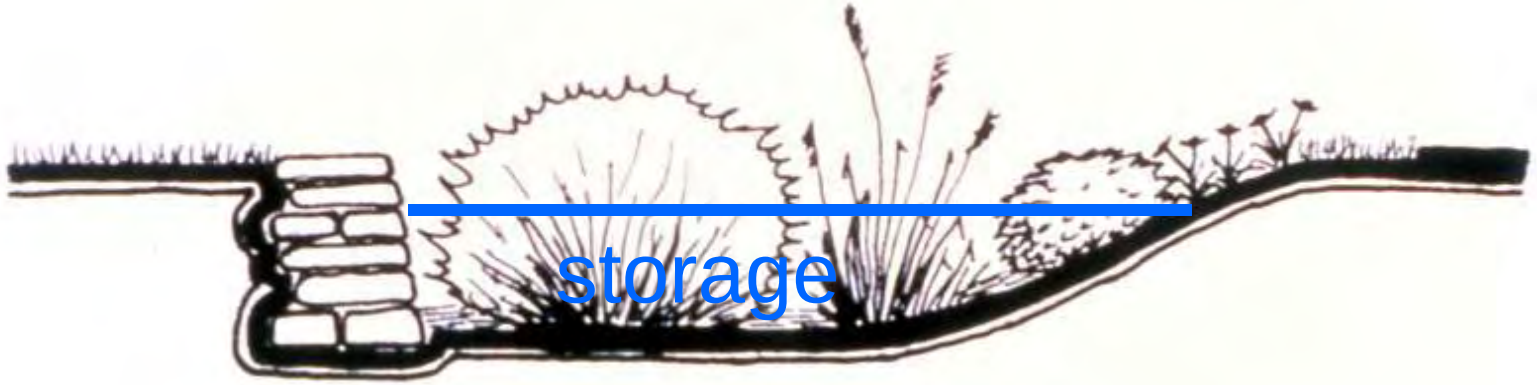
Example of Method – Rushmore RWGs, Burnsville

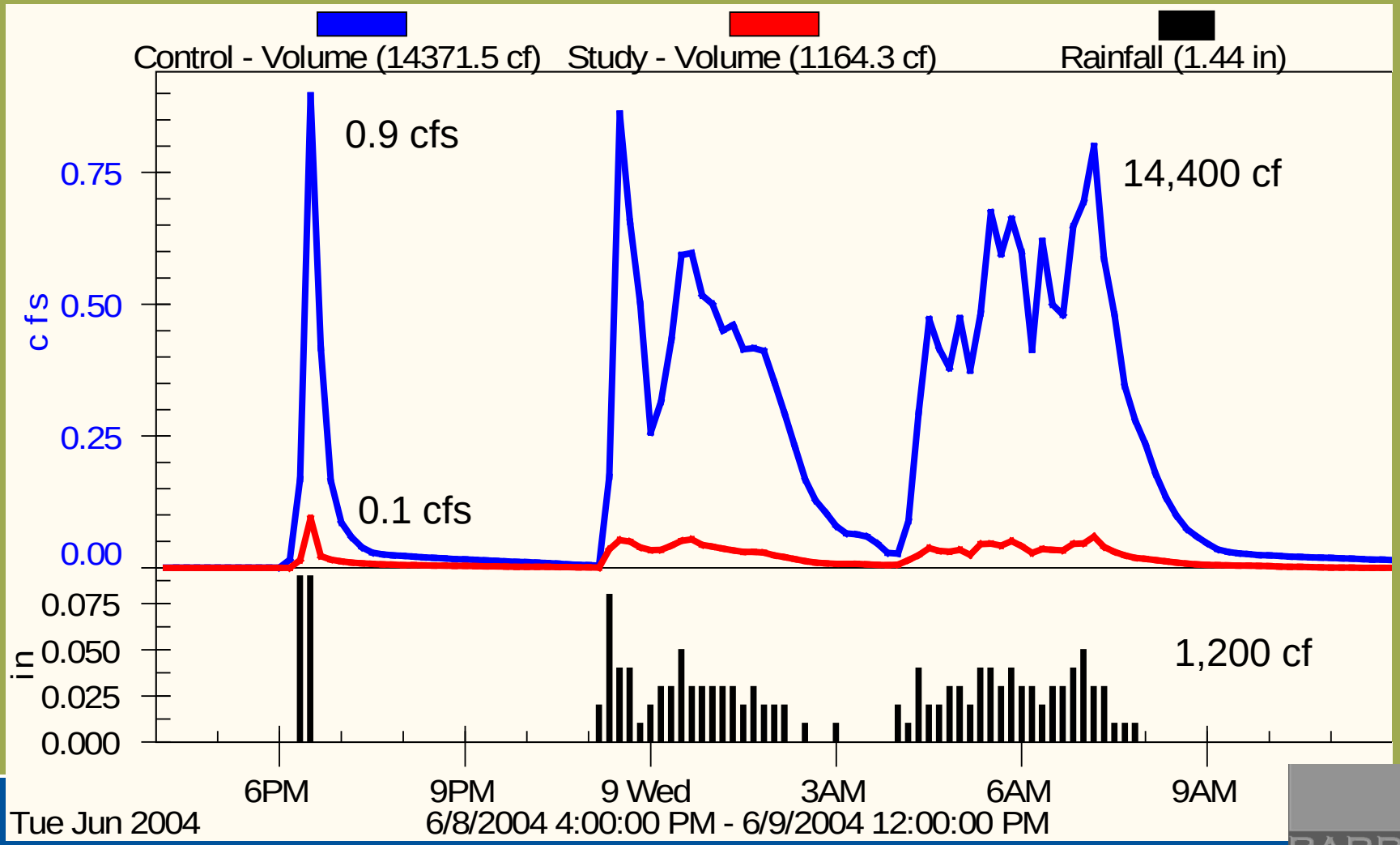

storage

Total Area = 16,000 sf

Imperv Area = 4,000 sf

Storage Volume = 4,000 sf . X 0.9 inch/12 = 300 cubic feet

Monitoring Results



Results - Burnsville

- Storage volume = 0.9 inches from tributary impervious (30%)
- Annual measured volume reduction about 90% compared to developed w/no BMPs
- Measured Runoff = 0.4 inches during non-frozen period
- Native RO, modeled, A soils =0.2 inches

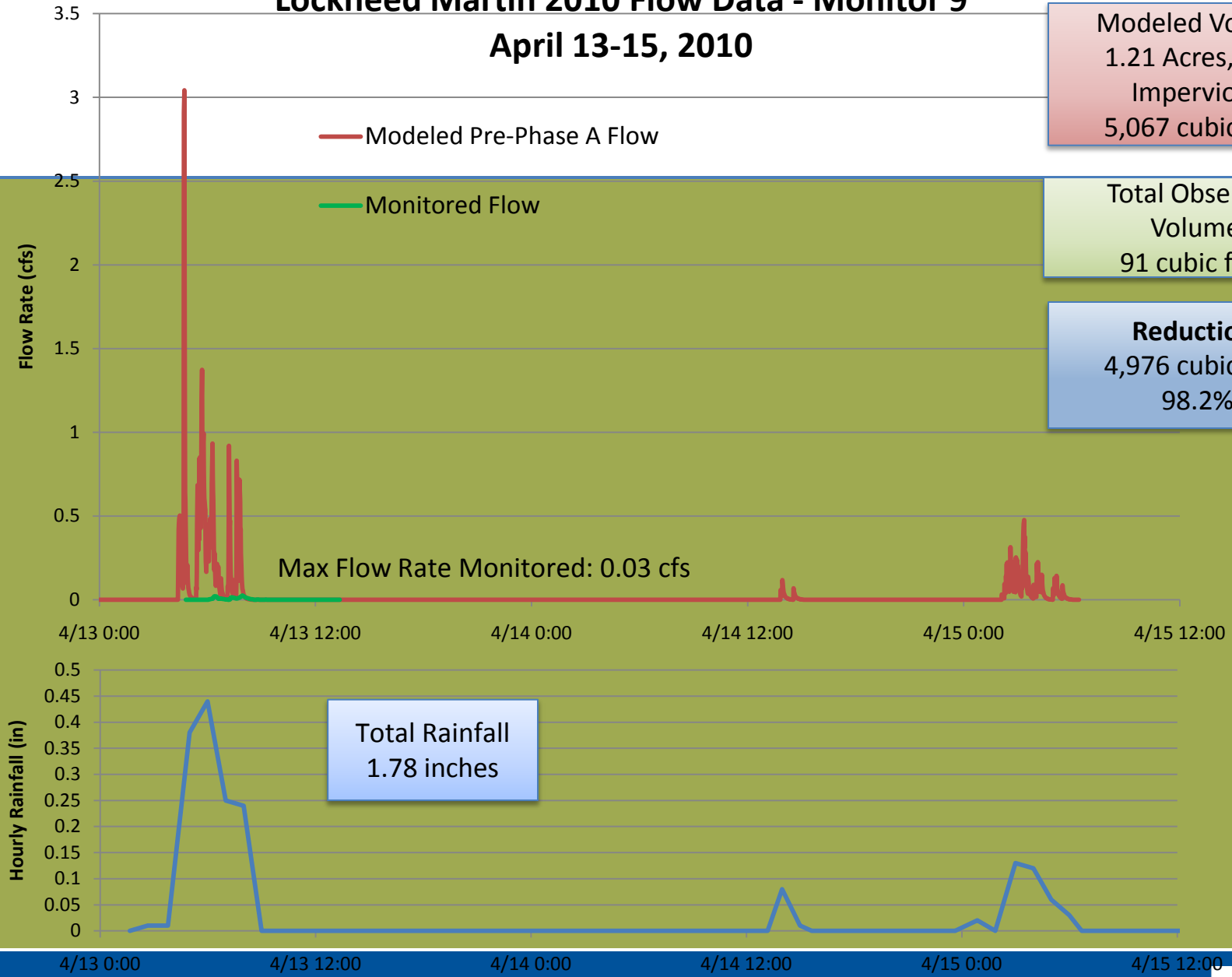
Example of Method – Lockheed Martin, Eagan

- 1.2 acre site
- sized for 1.0”
- Parking lot, 70% impervious
- Infiltration basin and porous bituminous

Infiltration Basin

145 Car Parking Lot

Lockheed Martin 2010 Flow Data - Monitor 9
April 13-15, 2010



Modeled Volume
1.21 Acres, 71% Impervious
5,067 cubic feet

Total Observed Volume
91 cubic feet

Reduction:
4,976 cubic feet
98.2%

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Results – Lockheed Martin

- Measured Runoff = 2.2 inches during non-frozen period
- Native RO, modeled, B soils = 0.9 inch
- Very wet period – rain gage = 30.2 inches
- 3 large storms (1.8”, 2.7”, 3.6”) accounted for 1.5 inches of the 2.2 inches

Frozen Ground Runoff

- Outstanding issue
  - How much of the 4 inches of winter precipitation runs off? 100%?, 50%?
    - Native conditions
    - Developed conditions
      - Do Infiltration BMPs work during the frozen ground period

Frozen Ground Runoff

- Working with MPCA to address issues and gain consensus on assumptions
- Results could affect the Performance Goal Volume.

3-26-08 AM

3-27-08 AM

3-28-08 AM

3-28-08 AM

3-28-08 PM

Any Performance Goal can mimic natural hydrology!

- Goal today: Identify additional info needed to make a performance goal decision – March 18