# TMDL Implementation for Wisconsin DOT

Ann-Marie E. Kirsch, PE
Wisconsin Department of Transportation
Madison, WI

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# TMDL Reduction Determination for a Highway System

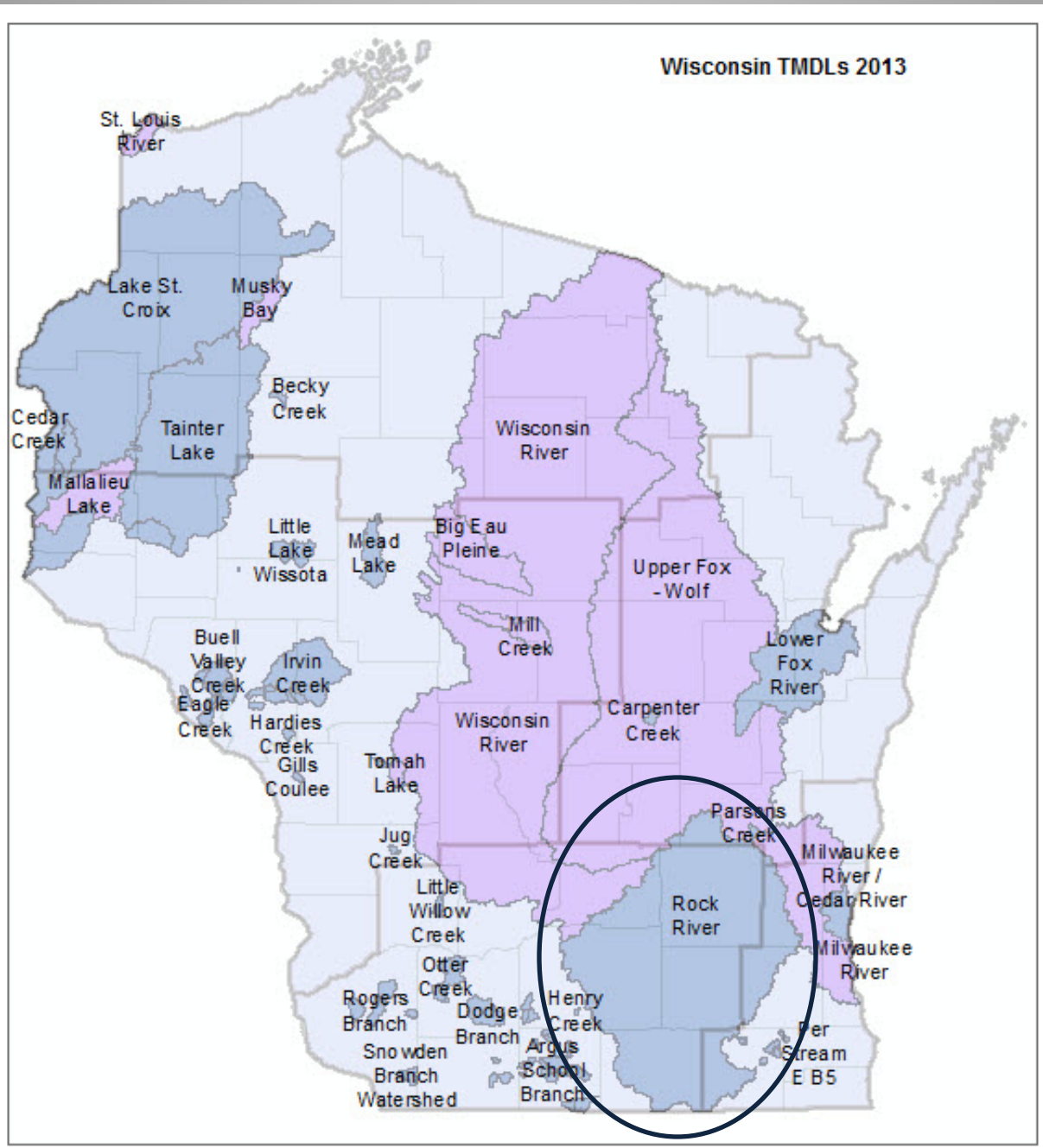
# TMDLs

- TMDL = Total Maximum Daily Load
- Defines pollutant load acceptable to water body such that the water meets its designated use.
- TMDLs completed and under development
  - Rock River—in implementation phase
  - Lower Fox—analysis complete, but likely revisions coming
  - Upper Fox, Wisconsin River, and Milwaukee Rivers—under development
- Sediment and phosphorus—most critical to DOT

TMDLs can be expressed through a formula:

**WLA + LA + MOS = TMDL**

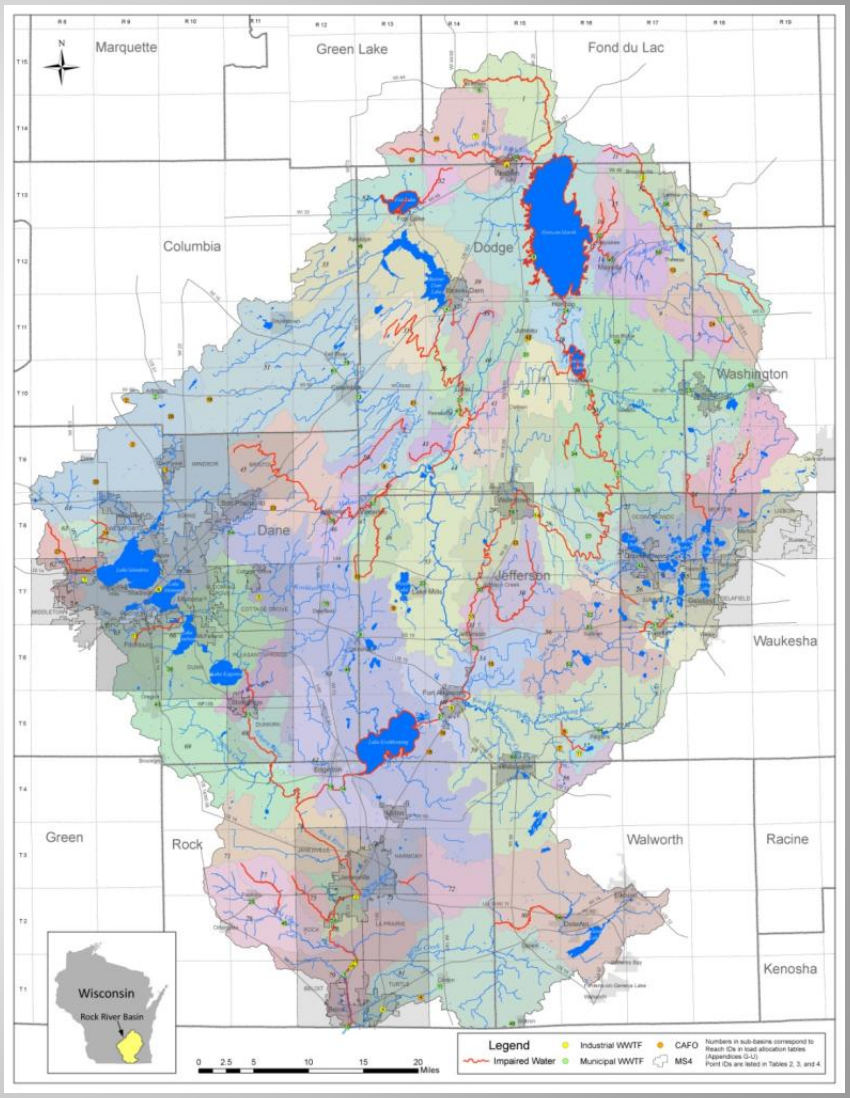
- WLA or Wasteload Allocation refers to the pollutant load from point sources: industrial and municipal treatment plants, municipal stormwater, CAFOs, etc.
- LA or Load Allocation refers to nonpoint sources such as: runoff from residential yards, parking lots, agricultural fields and barnyards.
- MOS or Margin of Safety refers to the level of uncertainty in the analysis.


Wisconsin TMDLs 2013
St. Louis River
Lake St. Croix
Musky Bay
Becky Creek
Cedar Creek
Tainter Lake
Mallalieu Lake
Wisconsin River
Little Lake Wissota
Mead Lake
Big Eau Pleine
Upper Fox - Wolf
Mill Creek
Lower Fox River
Buell Valley Creek
Irvin Creek
Eagle Creek
Hardies Creek
Gills Coulee
Wisconsin River
Carpenter Creek
Tomah Lake
Parsons Creek
Jug Creek
Milwaukee River / Cedar River
Little Willow Creek
Rock River
Milwaukee River
Otter Creek
Rogers Branch
Dodge Branch
Henry Creek
Argus School Branch
Snowden Branch Watershed
Pier Stream E B5

# TMDL Reduction Determination for a Highway System

## Rock River Basin

- 3,750 square miles
- 62 listed waters for TSS, TP, or both
- 101 TMDLs
- 49 MS4s
- 76 permitted WWTFs
  - 15 industrial,
  - 61 municipal
- 27 CAFO's




**From: TMDLs for Total Phosphorus and Total Suspended Solids in the Rock River Basin - July 2011**

# Rock River TMDL Analysis Components

Loading Analysis consisted of four components:

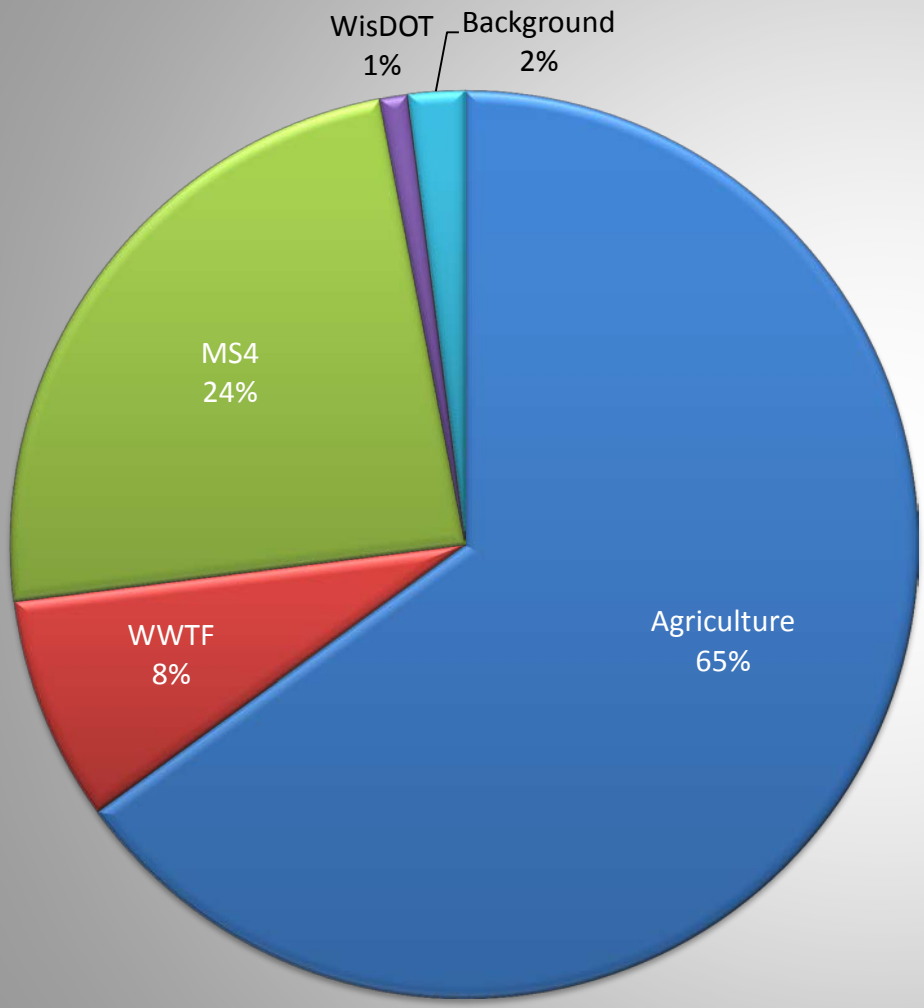
1. *Agricultural Runoff* (cropland, manure spreading, and other rural lands) - SWAT modeling
2. *CAFOs* - assume 0 load
3. *WWTFs* (public & private) – Permit Limits
4. *MS4s* ← WisDOT Urban Highways
   a) Unit Loads based on WinSLAMM (NR216) results
   b) TMDL "base" = 40% TSS control
   c) Waste Load Allocation based upon the capacity of the receiving waters in each reach shed to absorb the Phosphorus and Sediment discharged in stormwater runoff

WisDOT goal – To only discharge pollutants in DOT stormwater runoff equal to the Corridor Waste Load Allocation

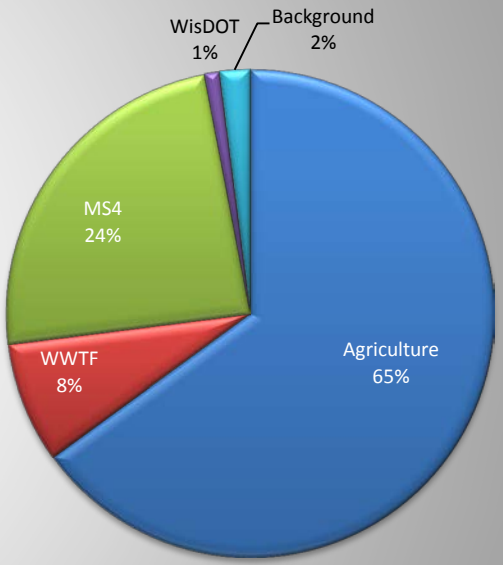
# Implementation Challenges

- Scale:  3750 $mi^2$ watershed vs. 40 mile highway corridor
- Timing: Implementation plan not yet completed
- Models: TMDL used agriculture based SWAT model, highway design uses SLAMM
- DOT facilities modeled as part of surrounding MS4s

# Proportional Load Allocation




Baseline = 1000 lb




Allocation = 200 lb

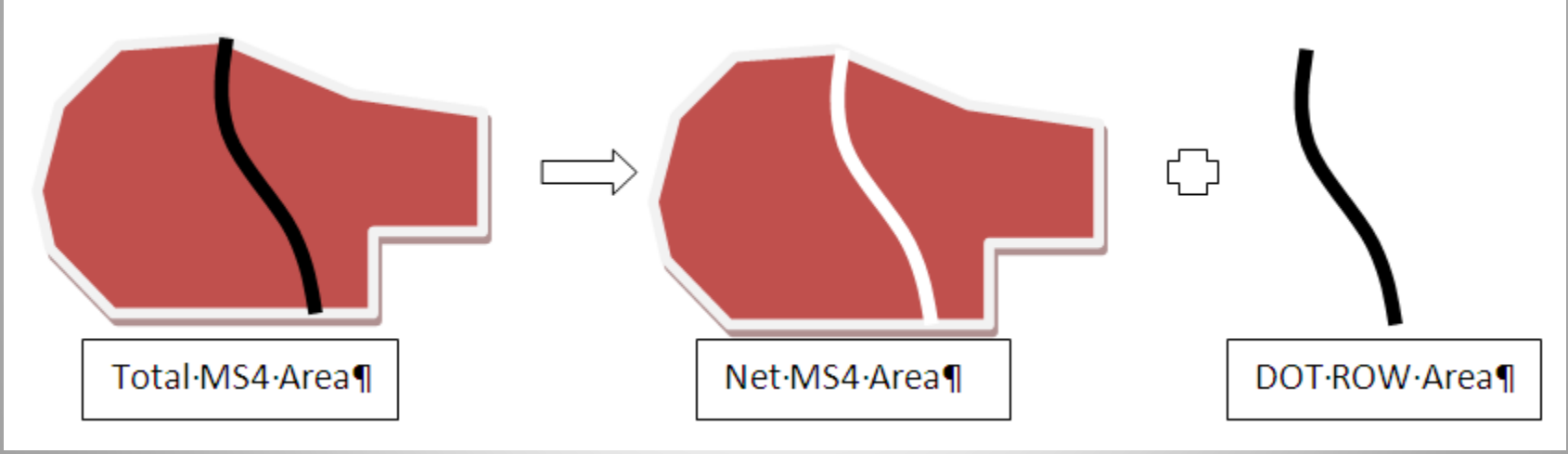
# Proportional Load Allocation

Example

- Total reduction required = 800 lbs
- DOT is 1 percent of load, so is responsible for 1 percent of the required reduction (8 lbs)
- The greatest load generators are responsible for the greatest reductions

# Proportional Load Allocation

Determine WisDOT load as percentage of MS4 load




Load = Total Area * Unit Load

Load = Net Area * Unit Load

Load = Computed using SLAMM

# Proportional Load Allocation

**Positives**

- Perceived fairness
- Limited change in potential reduction based on recalculation of others' loads
- Not sensitive to treatment of pervious surface in ROW
- Required load reductions are achievable and not cost-prohibitive

**Negatives**

- Actual MS4 urban loads are unknown
- Reductions are higher than required by TRANS 401

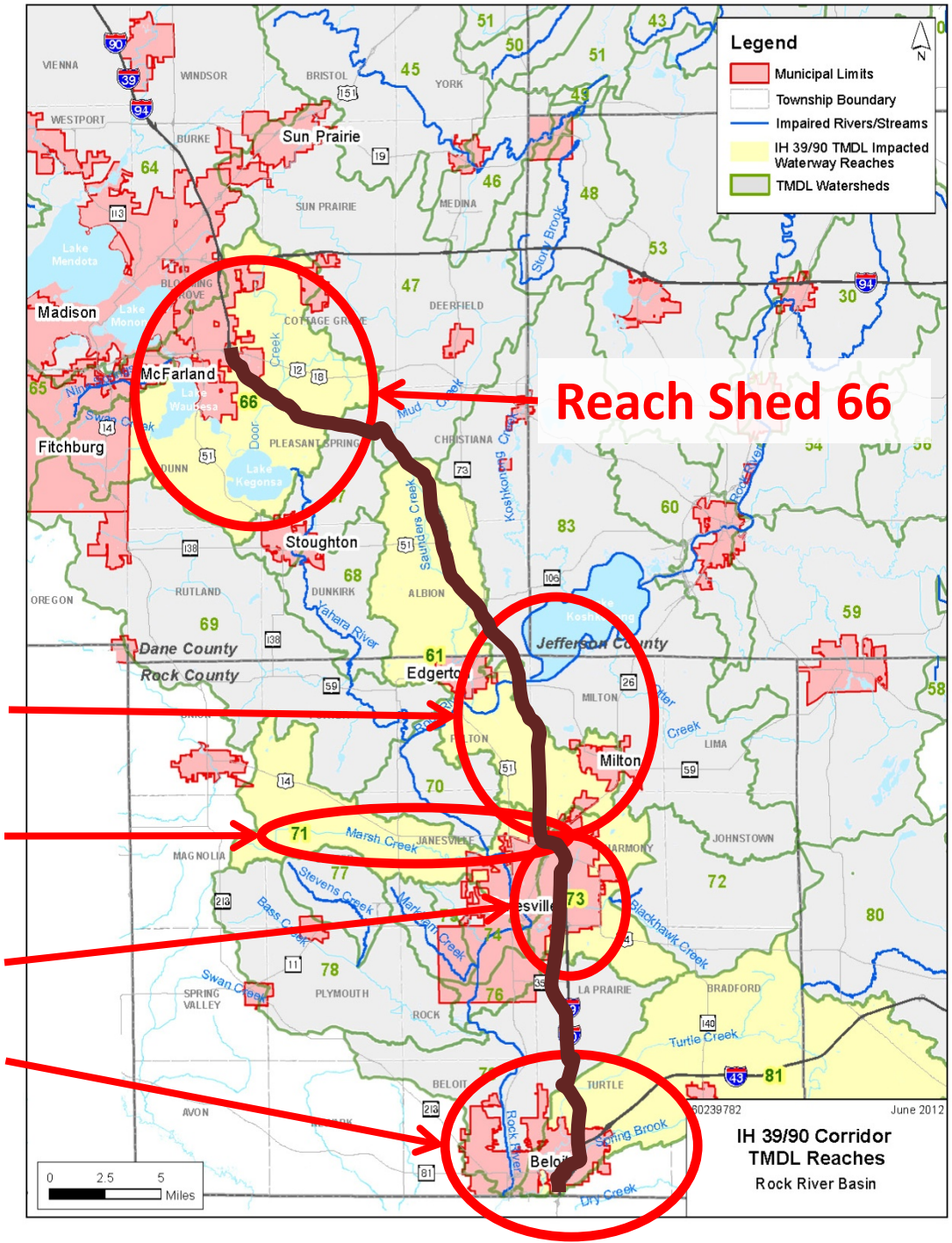
# I-39/90 Corridor TMDL Reaches

**Reach Shed 61**

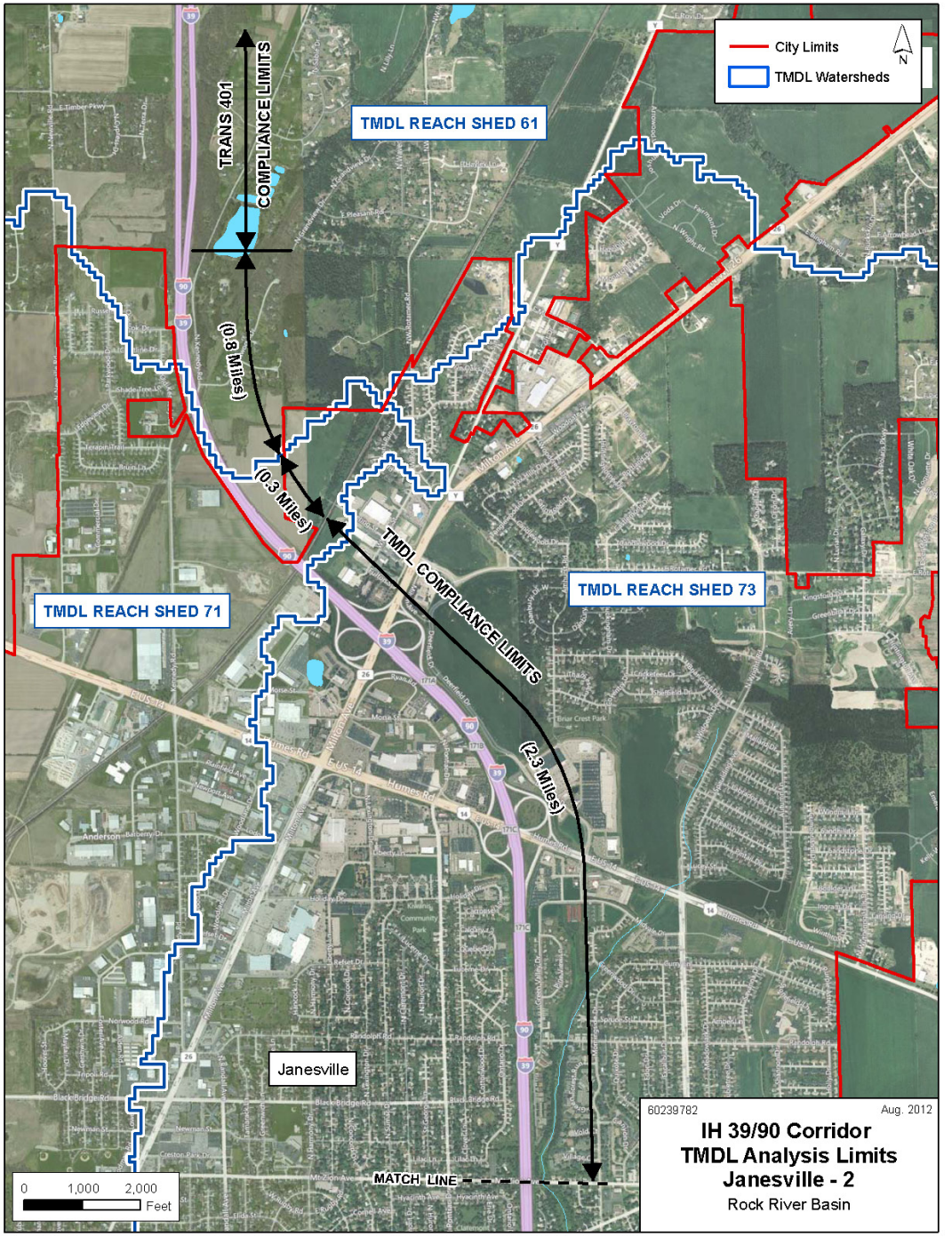
**Reach Shed 71**

**Reach Shed 73**

**Reach Shed 81**



# Janesville North



# Corridor TMDL Area TSS and TP Reduction Requirements

| MS4 Municipality | Reach Shed Number | TMDL Section of Corridor Length in Reach Shed (mi) | TRANS 401 Section of Corridor Length in Reach Shed (mi) | Percent Total Phosphorus Load Reduction | Percent TSS Load Reduction | Notes |
|---|---|---|---|---|---|---|
| Janesville | 61 | 0.86 | 13.71 | N/A | 40.0 % | No added TMDL reductions required beyond TRANS 401 |
| Madison | 66 | 1.50 | 4.34 | 70.4 % | 76.9 % | May be combined with non-MS4 area in reach shed |
| Janesville | 71 | 0.35 | 0.00 | 59.5 % | 71.0 % | No non-MS4 area in reach shed |
| Janesville | 73 | 4.70 | 0.89 | 80.2 % | 82.8 % | May be combined with non-MS4 area in reach shed |
| Beloit | 81 | 3.23 | 2.05 | 47.3 % | 40.5 % | May be combined with non-MS4 area in reach shed |

# To Achieve these Percent Reductions WisDOT will -

1. Primarily rely on practices like filter strips, grass swales and biofiltration fields
2. Use enhanced and engineered soils to increase TSS reduction where appropriate
3. Share credits within Reach Sheds by achieving reductions greater than 40% in TRANS 401 areas
4. If required load reductions prove unfeasible, work with DNR on alternatives without affecting project schedules

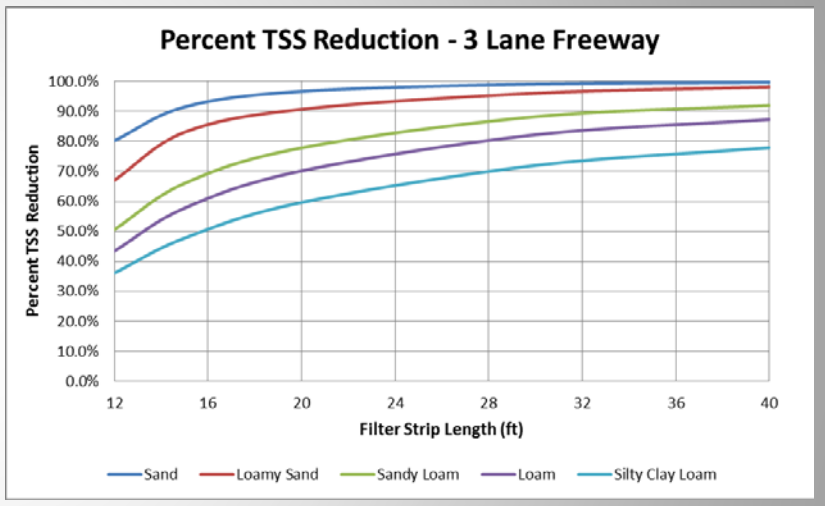
# Highway Project TMDL Analysis Process

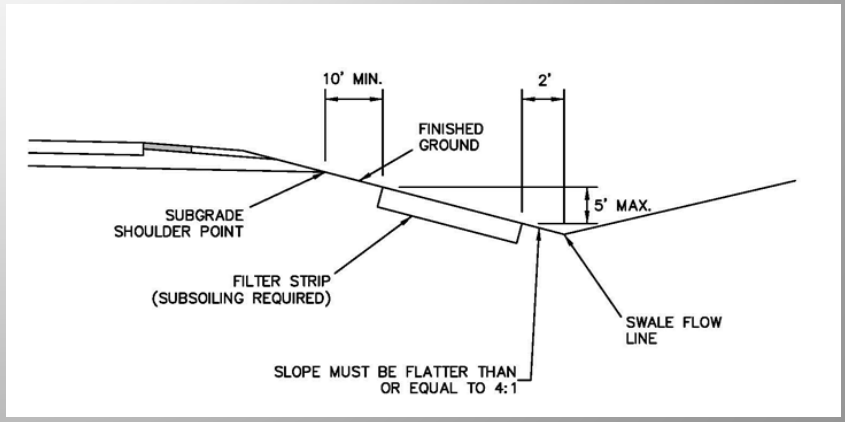
- Each project engineer designs roadways with standard drainage practices
- Areas with more right-of-way, such as interchanges, include infiltration fields
- Designers calculate the load reductions from practices using either unit area loads or modeling

# Highway Project TMDL Analysis Process

Unit Area Loads – Typically applied to roadway segments

- Pollutant loads (Total Suspended Solids and Total Phosphorus) determined from unit area values developed for highway corridors using WinSLAMM
- Pollutant load reductions determined using highway specific design charts developed from WinSLAMM model runs

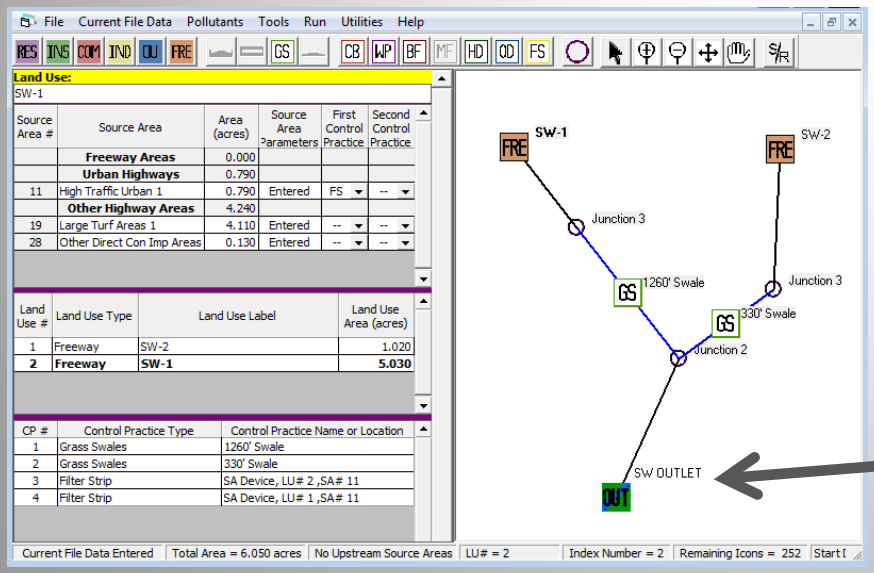


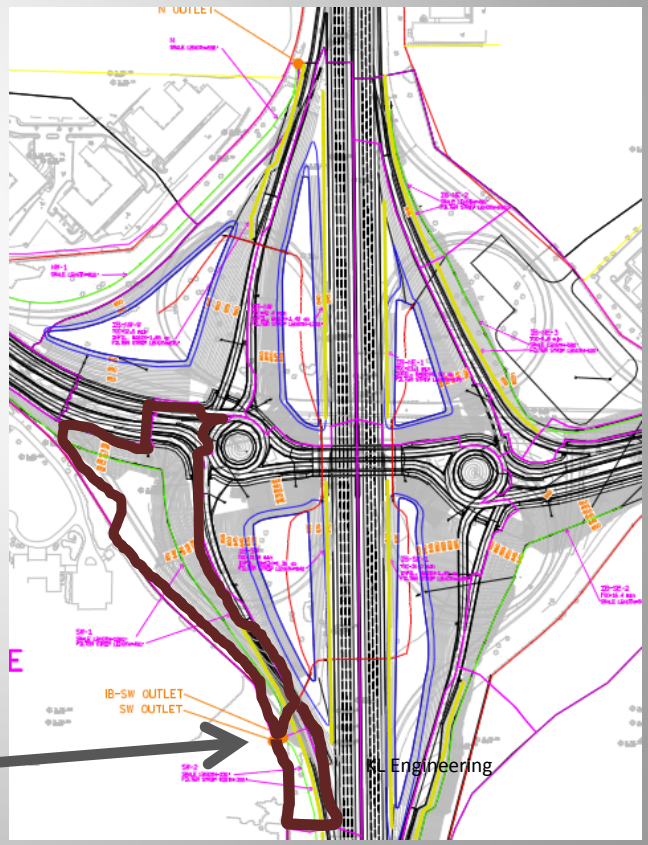



# Highway Project TMDL Analysis Process

Modeling – Typically applied to interchanges

- Pollutant loads and load reductions determined from drainage network model using WinSLAMM



# Highway Project TMDL Analysis Process

Load Reduction Table

- Load calculations are summarized for each project and reported to the I-39/90 Corridor Management Team
- All project load summaries are tabulated and submitted to the Wisconsin Department of Natural Resources

| ***Water Quality Results Summary*** | **Total Project Drainage Basin Area (ac)** | Grass Swales | Filter Strips | Wet Detention Ponds | Catch-basins | Street Cleaning | Biofilters | Other Devices | Untreated Areas |
|---|---|---|---|---|---|---|---|---|---|
| Drainage Area (ac) | **291.0** | 9.1 | 23.9 | 0 | 0 | 0 | 0 | 228.0 | 30.0 |
| ROW Drainage Area (ac) | **37.0** | 9.1 | 23.9 | 0 | 0 | 0 | 0 | 0 | 4.0 |
| TSS Load, No Controls (lbs) | **8841** | 3501 | 3878 | 0 | 0 | 0 | 0 | 1430 | 31.5 |
| TSS Load, With Controls (lbs) | **192.6** | 72.3 | 88.8 | 0 | 0 | 0 | 0 | 0 | 31.5 |
| TSS Load Removed (lbs) | **8648** | 3429 | 3790 | 0 | 0 | 0 | 0 | 1430 | 0 |
| TP Load, No Controls (lbs) | **72.7** | 6.4 | 10.1 | 0 | 0 | 0 | 0 | 55.0 | 1.2 |
| TP Load, With Controls (lbs) | **9.2** | 3.0 | 5.0 | 0 | 0 | 0 | 0 | 0.0 | 1.2 |
| TP Load Removed (lbs) | **63.5** | 3.4 | 5.1 | 0 | 0 | 0 | 0 | 55.0 | 0 |
| Percent TSS Reduction by Load | **97.8%** | | | | | | | | |
| Percent TP Reduction by Load | **87.3%** | | | | | | | | |

# TMDL Implementation for Wisconsin DOT

Questions?

AnnMarieE.Kirsch@dot.wi.gov