MDOT’s Post-Construction Stormwater Program

Barb Barton
Water Quality Specialist
MDOT

What I Do

- Reviews MDOT projects for impacts to water quality
- Works with design staff to develop BMPs
- Communicates with DEAGL (formerly known as DEQ)
1972

The Clean Water Act’s long-range goal is zero discharge of pollutants.

MDOT Stormwater Management Program

- National Pollutant Discharge Elimination System (NPDES) Permit took effect on April 1, 2005
- New permit application in 2013
- Expecting new permit 2019
What Are Water Quality Standards?

State rules established to protect the Great Lakes, the connecting waters, and all other surface waters.
Water Quality Goals Defined by State Rules

- Uses of the lakes and streams
- Safe levels to protect the uses
- Procedures to protect high quality waters

Designated Uses of Michigan’s Waters

- Other indigenous aquatic life and wildlife
- Coldwater and warmwater fisheries
- Total and partial body contact
- Fish consumption
Surface Waters of the State

- Lakes
- Ponds
- Rivers
- Streams
- Drains
- Wetlands

OUTSTANDING STATE WATERS

- Trout Streams and Coldwater Lakes
- Natural Rivers
- Wild and Scenic Rivers
- National Parks and Lakeshores
Impairments

- E. coli
- Sedimentation/Siltation
- Mercury
- Gas and Oil
- Other substrate alteration
- Nitrogen
- Low dissolved oxygen
- Phosphorous
- PCBs

TMDLs - Total Maximum Daily Load

A TMDL is the pie, load allocations are the pieces of the pie.

- Factories
- Agriculture
- Municipal WTP
- Urban Runoff
- Forestry
DEAGL decides which water bodies need TMDLs and why

DEAGL uses data gathered within past 5 years

Plan is developed to determine pollutant load that will meet WQS

EPA must approve TMDL Plan

Implemented through NPDES permits and other programs

Channel Protection Standard

- Protects streams from erosion
- Applies if we increase impervious surface
- No increase in volume
- Retention – 2 year/24 hour storm event
Review Process Overview

- Is the permit applicable?
- Look at scope of work – can we do anything?
- Identify surface waters that might be impacted
- Identify TMDLs (Total Maximum Daily Load)
- Identify potential impacts of project to water quality

The Water Quality Review Process

Question 1
Does the Permit Apply?

YES
- If it impacts 1 acre or more of soil

HOWEVER...
- Less than one acre of soil disturbance – TMDL requirements still apply if present
Post-Construction Permit Exemptions

Stormwater is discharged into a combined storm sewer (CSS) or is treated at a waste water treatment plant.

Channel Protection does not apply if water is discharged to certain water bodies.

Questions for Project Manager

- Greater than 1 acre soil disturbance?
- Increase in impervious surface?
- Construction date?
- Determine BMP needs
Follow-up Questions for Project Manager

- Request information on BMP selection
- Provide guidance on potential BMPs
- Direct PM to others for assistance
- Frequent reminders because...

Mitigation Measures

Need proposed BMPs to meet anticipated new permit conditions before sign-off

- Sediment removal
- Retention if required
- TMDL requirements
BMP Determination Factors

- Volume
- Flow rates
- Site conditions
- ROW availability
- Constituents of stormwater

Some Common BMPs

- Grassy swales
- Detention/retention basins
- Widen ditches to reduce velocities and provide increased filtration
- Swirl separators
- Green infrastructure
Scoping Tool

- BMP online scoping tool
- Excel spreadsheet
- GIS map with applicable features
- Allows budgeting considerations

BMP Scoping Tool Summary

- Tool assists during scoping for five year plan
- Coarse filter to allow for BMP budgeting
- Supports NPDES compliance
- Easy to use
- Second phase – more detail for design
Example Project

US-23 Harrisville Bay Region

US-23 Bay Region JN 126605
- HMA reconstruction with ditching
- 2021 scheduled construction
- Widening of paved shoulders
Process

- Surface waters identified
- Trout streams
- Wetlands
- Increased impervious surface
- Construction after 2020
- Retention and infiltration required

BMP Development

- Calculated how much water to retain
- Designed retention trench
- Used vegetated ditches for sediment removal

US-23 Additional Runoff

Proposed Runoff Calculations

- Creole Dev. Runoff Coeff. = 0.90
- Offsite Runoff Coeff. = 0.00
- Tc (on-site) = 1440.0 min
- Creole area to basin = 1.16 acres
- Offsite area to basin = 0.00 acres
- Total area to basin, AD = 1.16 acres

Design of Detention/Retention Basin(s)

- Basin Vol. Provided = 3,480 cft
- Direct Release Allowed = 0.00 cfs
- Percol. Rate, P = 1 in/hr Assumed saturated soils.
- Infiltrating Basin Area, AB = 8,700 sq ft Assumed infiltration along sides of trench.

Storage Required:

- S2 = c*P - Qr*td = c*i^2*td - 0.13*AD - P*(AB/AD)*td
- S2 = c*P = Qallow/AD*td - P*(AB/AD)*td

Storm Event: 2 yr (pick 100, 50, 25, 10, 5, 3, or 2)

<table>
<thead>
<tr>
<th>Detention Cells.</th>
<th>Onsite</th>
<th>Offsite</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I2 yr Storage Storage</td>
<td>td(min)</td>
<td>(in/hr)</td>
<td>(in)</td>
</tr>
<tr>
<td>15.2</td>
<td>2.22</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>30.4</td>
<td>1.09</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>60.8</td>
<td>0.54</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>121.6</td>
<td>0.55</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>182.4</td>
<td>0.48</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>364.8</td>
<td>0.27</td>
<td>0.43</td>
<td></td>
</tr>
<tr>
<td>720.0</td>
<td>0.18</td>
<td>0.38</td>
<td></td>
</tr>
<tr>
<td>1440.0</td>
<td>0.09</td>
<td>0.20</td>
<td></td>
</tr>
</tbody>
</table>

Vol. Required: 3,317 cft
Vol. Supplied: 3,480 cft OK

PROPOSED DETENTION STORAGE

- Volume (A x L) 8,700 CFT
- Depth 2.0 ft
- Void Ratio 40.0 %
- Storage Area 1,740 SFT
- Storage Volume 3,480 CFT
- Perforated Pipe Volume CFT
- Drained Storage Volume CFT
- Net Storage Capacity 3,480 CFT
Can’t Meet Requirements?

- Site conditions most common reason
- New permit may allow
  - Mitigation
  - Payment in lieu

We can build good roads and protect the water.
Questions?

Barb Barton
bartonb4@michigan.gov
517-241-2311