The Role an Urban Level Spreader may play in the CAM process: BMP Monitoring in the Forum Nature Area

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Hinkson Collaborative Adaptive Management (CAM) Overview

Hinkson Creek placed on Clean Water Act 303(d) list 1998 - unknown pollutant
TMDL not issued within 10 years → lawsuit filed
MDNR/EPA made stormwater surrogate for pollution in TMDL
MS4 Partners (University/County/City) objected
MDNR, EPA, and MS4 Partners agreed to Collaborative Adaptive Management process

Hinkson Collaborative Adaptive Management (CAM) Overview

- EPA, DNR, City, County, and University agreed to address Hinkson Impairments through Collaborative Adaptive Management (CAM) in 2011
  - CAM is well suited to uncertainties of this situation
  - CAM is used in other environmental applications

This was the first CAM process implemented to address impairments in lieu of a TMDL

Hinkson CAM includes 3 Groups

- Stakeholder Committee
  - Made up of local interested parties to steer the process
- Science Team
  - Includes USGS, Department of Conservation, MU, DNR, EPA, Private Consultant
    To advise and make recommendations regarding technical issues
- Action Team
  - MS4 Partners (City, County, MU), Boone County Regional Sewer District, MoDOT
    To recommend how to get things done

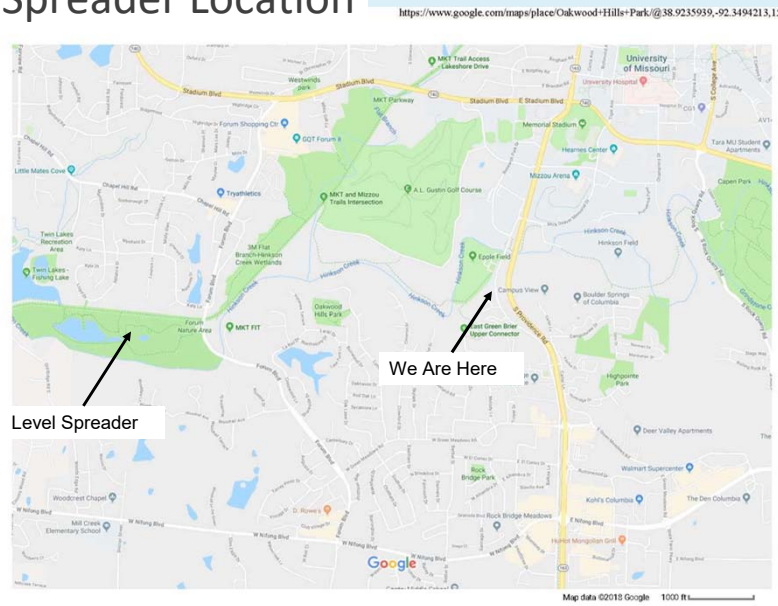
CAM / MS4 partners - projects

- Scientific studies
- Infrastructure improvements
- Best management practices

Premise

The Forum Nature Area monitoring project is intended to evaluate the stormwater level spreader BMP for improving the health of a watershed tributary to Hinkson Creek. It is a five-year project currently in the second year of monitoring.

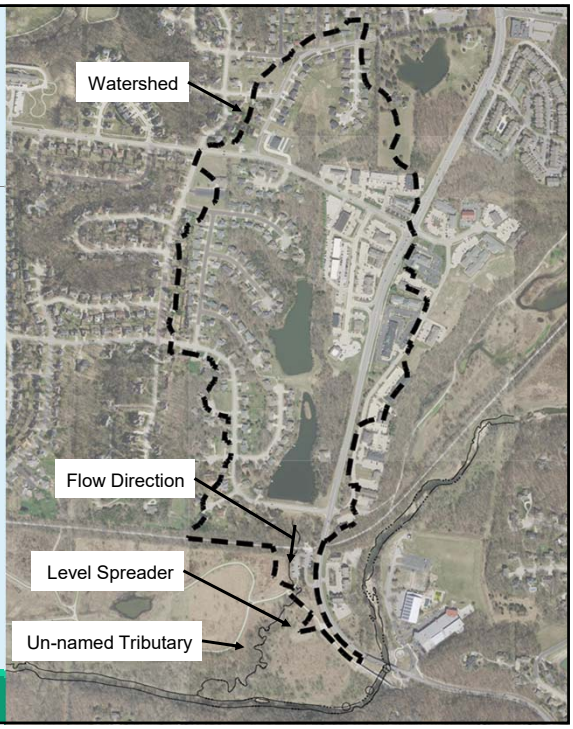
Forum Level Spreader Location



Watershed

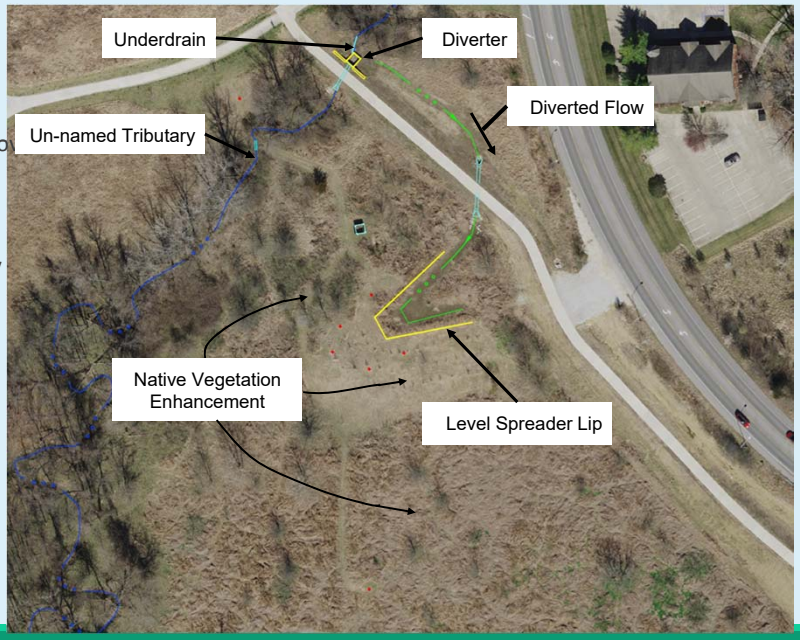
Minor un-named tributary to Hinkson Creek
125 acres
- ~45% Residential
- ~30% Commercial, Arterial Road R.O.W.
- ~25% Woods, Open Areas, Ponds

Heavily influenced by ponds



Design Goals

1. Maintain a base flow in tributary
   - Perf. pipe underdrain
2. Spread relatively minor flows o floodplain
   - Divert flows to 200' level lip
   - Lip is level within +- ½"
3. Bypass large flows to tributary
   - Level Spreader semi off-line
4. Re-establish native vegetation
   - Reduce invasive species
   - Encourage existing natives
   - Plant trees and shrubs



Construction & First Runoff

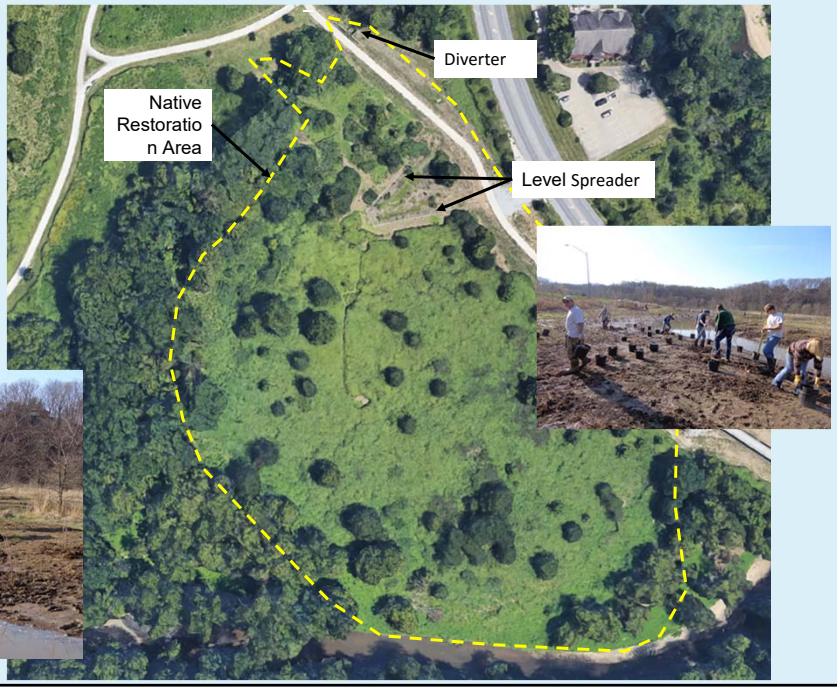

Laying out the Level Spreader


Setting the Diverter

Cutting the Swale

Native Restoration

- 100s of trees and shrubs planted by volunteers and staff
- Staff working to control several invasives

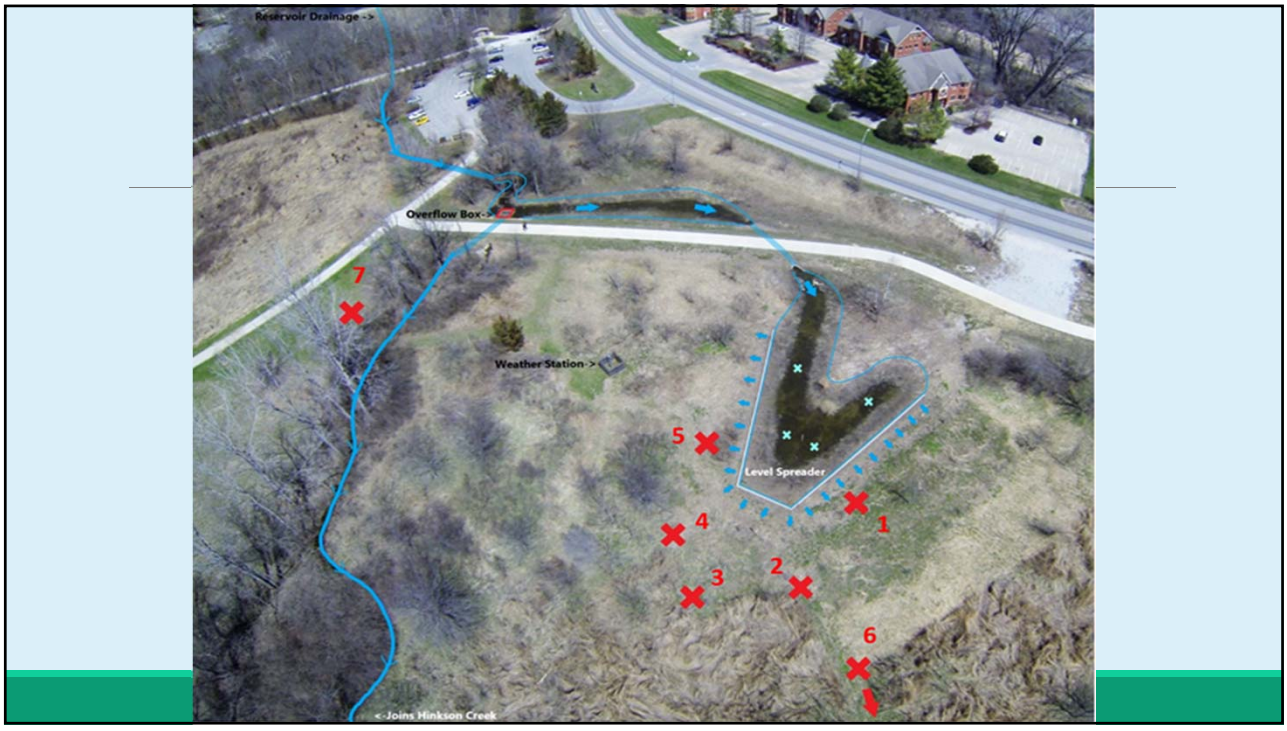


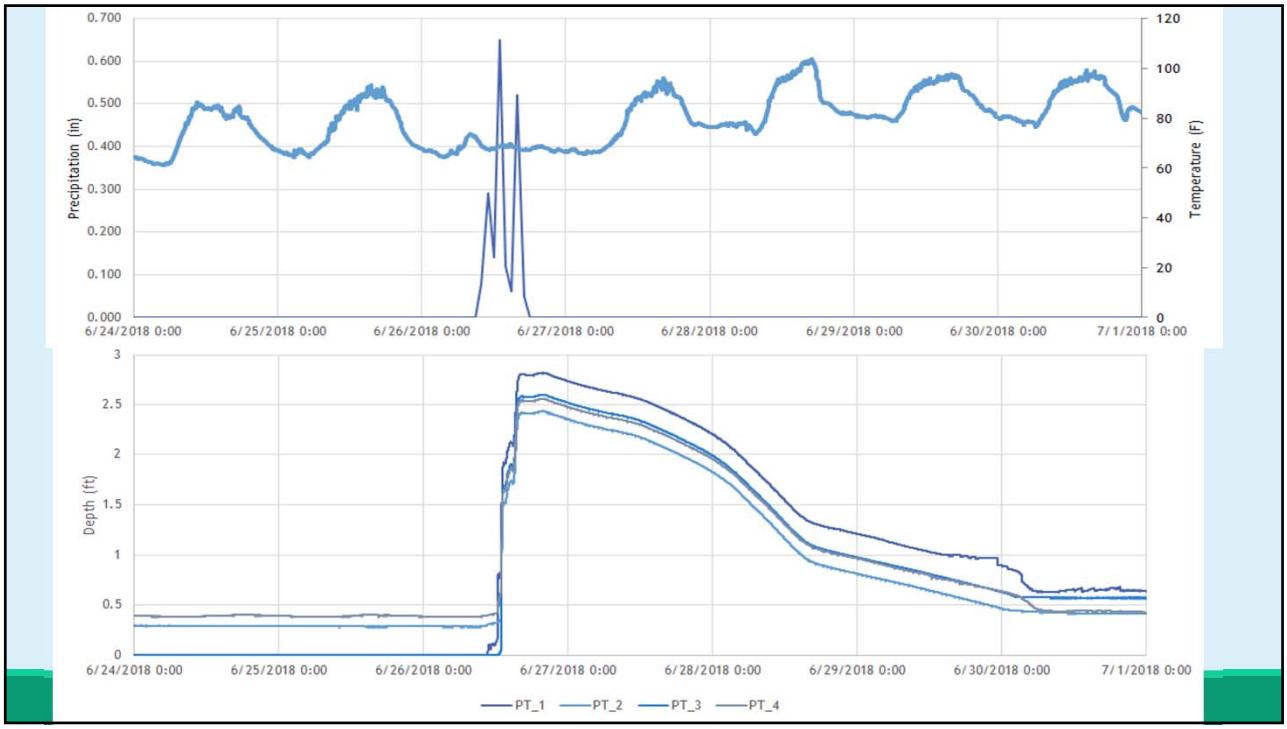
Pedway Project After Level Spreader Was Coordinated to Improve Performance

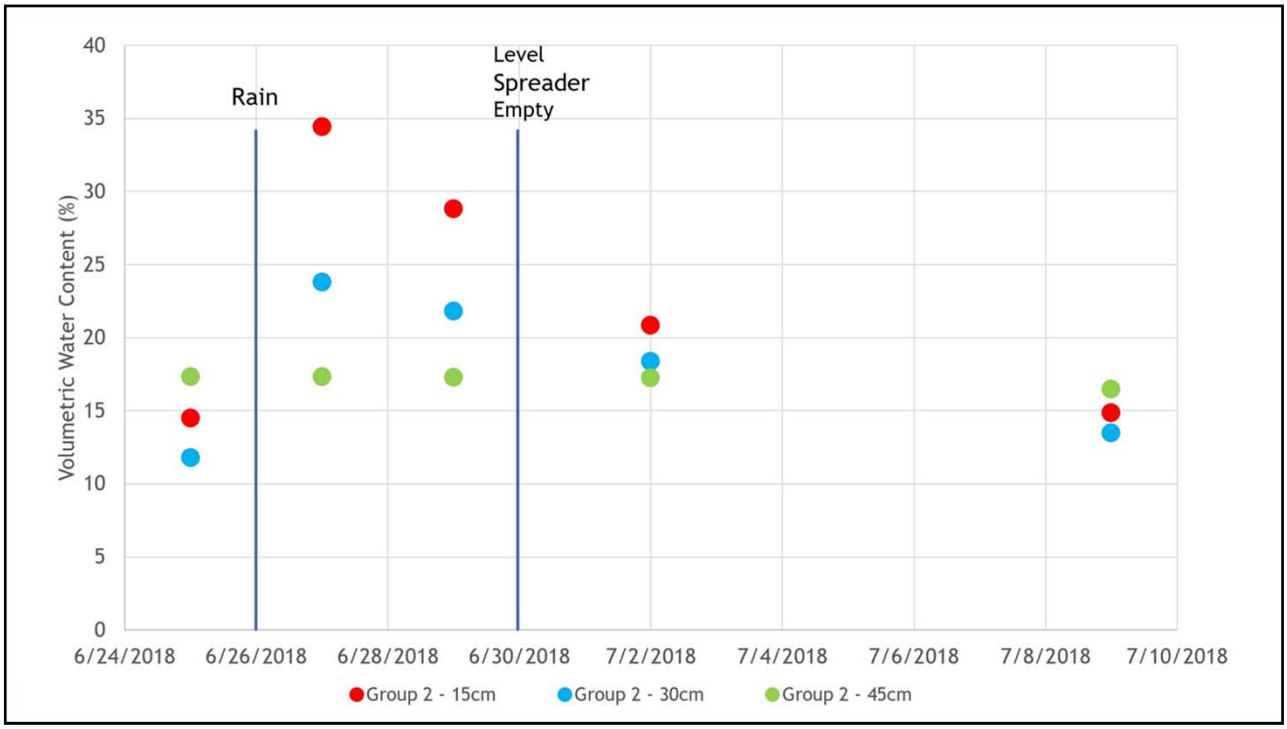
Monitoring - Goals

- Gather data for each rain event
- Characterize how the site reacts to rain events
- Evaluate effectiveness of the level spreader design in improving site hydraulics
- Determine other locations where a similar design may be useful

Equipment


Reservoir Drainage ->
Overflow Box ->
Weather Station ->
Level Spreader
1
2
3
4
5
6
7
<- Joins Hinkson Creek


Precipitation (in)
Temperature (F)
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
120
100
80
60
40
20
0
6/24/2018 0:00
6/25/2018 0:00
6/26/2018 0:00
6/27/2018 0:00
6/28/2018 0:00
6/29/2018 0:00
6/30/2018 0:00
7/1/2018 0:00
Depth (ft)
3
2.5
2
1.5
1
0.5
0
PT_1
PT_2
PT_3
PT_4



Future Sites and Uses

If the water balance for the site can be determined, then new sites can be selected to optimize infiltration, evapotranspiration, and other pathways for water into the riparian buffer

Lessons Learned

1. Spend more time modeling
   - Continuous simulation would be best
   - In single event modeling use many more types of storms and durations
2. Pay more attention to diverter
3. Ensure downstream side of lip helps spread water
   - Construction created preferential flow paths
   - Use Gravel to keep water from concentrating as long as possible while minimizing disturbance
4. Flowable fill seems to be acceptable foundation
5. Area upstream of diverter and level lip is significant