Targeting and Prioritizing Stormwater Master Planning Projects in Vermont

ESRI Water Conference, February 2019

KERRIE GARVEY, GIS MANAGER
WATERSHED CONSULTING, BURLINGTON, VT
Project Goal:

Create a stormwater master plan (SWMP) to identify and prioritize stormwater best management practices (BMPs) to improve water quality
Where in the world?

Vermont

Part of the Lake Champlain Basin

Lake Champlain Basin: 8,234 sq. miles

56% of the Basin is in Vermont

Basin population: 571,000 (68% in Vermont)

Important resource for the area:

- ~200,000 people (~35% of Basin’s population) depend on lake for drinking water
- 99 public water systems draw water from Lake Champlain
- Tourism (billions of $s)

Lake Champlain Phosphorus TMDL - 2016

Lake Champlain Facts Source: http://www.lcbp.org/about-the-basin/facts/
Study Area

- 12 municipalities in the Winooski River watershed
- Winooski River drains west to Lake Champlain
- 388 mi²
- ~5,500 acres impervious
Stormwater problem areas

- Large developments that predate stormwater regulations
- Sub-jurisdictional developments
- Steep rural roads
- Constrained development along rivers
Stormwater Master Planning

Problem:
- Limited funding
- Public and private properties
- Large area

Approach:
- Targeting practices based on:
  - Where pollution is generated
  - Where pollution can be captured and removed efficiently
- Developing master plans:
  - With public involvement
  - As comprehensive as possible
  - Listing all known problems
  - Based on a prioritized list of projects

Goal:
- Develop a comprehensive plan for addressing stormwater runoff:
  - Mitigate impacts before they create problems
  - Avoid creation of new problems
  - A strategic approach to make implementation more likely
Targeting BMP Identification

How to prioritize?

GIS overlay analysis focusing on:

✓ High-percentage of impervious coverage
✓ Publicly owned parcels
✓ Large stormwater outfalls
✓ Areas with existing stormwater permits
✓ Possible infiltration sites (NRCS Hydrologic Soil Group A or B soils)
✓ Problem areas identified by Stakeholders
✓ Areas not in conflict with wetlands
✓ Practices compatible with river corridor regulations
Targeting BMP Identification

Green Streets identification

Methodology: Adapted from “Promoting Green Streets” 2016 report
1. Road Slope - Flat
2. Road Right-of-Way (ROW) Width - Wide
3. Hydrologic Soil Group - Good infiltration

Data we have:
- ROW polygons (from parcel data)
- Elevation information (LiDAR)
- NRCS Soils

There’s a model for that!
- Segment ROW polygons
- Assign soil group
- Assign slope
- Assign ROW Width
- Score each segment
Targeting Priority Areas

768 sites to field investigate

Two Phase approach:
• Phase 1: Field season 2017
• Phase 2: Field season 2018

.... Leads to a data deluge
Dealing with the Data Deluge

More than 775 sites were field assessed

Our workflow:

- Identify potential BMP point locations
- Use established template in GIS to record site specific information
- Customize mobile app
- Upload GIS point layer to mobile app – field mapping
Dealing with the Data Deluge

- Field investigation using mobile app
- Data collection:
  - BMP concept
  - Photos
  - Follow-up notes or questions
  - Confirming existing infrastructure
  - If existing BMP, confirm specifications
- Upload to the Cloud
- Download in .gdb format
- Update as projects progress
Prioritization

Goal:
• Prioritize and rank projects
• Keep organized while ranking 775 projects

Our workflow:
• Use coded value domains to ensure users use same values
• Standardized fields to ensure consistency
• Describe and rank projects based on:
  • drainage area size
  • pollutant load reduction potential
  • hydrologic connectivity
  • ownership
  • feasibility issues
• Score and rank projects using model
• Identify top 20 projects per municipality (240 projects total)
Modeling

Goal:
Model 240 projects in HydroCAD and WinSLAMM

Approach:
Automate as much as possible!
- Delineation of drainage areas
- HydroCAD time of concentration calculations
- Summarize hydrologic soil group and landcover type for HydroCAD modeling
- Summarize soil class and landcover type for WinSLAMM modeling
Hydrologic and Pollutant Load Modeling

SWMPs include:

- 240 projects that will:
  - Reduce TSS load by 6,474,202 lbs annually
  - Reduce TP load by 1,019 lbs annually
Preliminary BMP Opportunities

Explore the photo tour to the right to visit each potential BMP location. Click each photo to be zoomed to the site's location on the map. You can pan and zoom around on the map to look at the site in more detail.

A preliminary ranking system was utilized to prioritize these 74 projects.

This prioritization was accomplished by completing an assessment of:

- benefit
- drainage area size
- pollutant load reduction potential
- proximity to water
- ownership
- feasibility issues.

The goal of this ranking was to identify the 20 sites that would provide the greatest water quality benefit and have a high likelihood of implementation.
Targeted desktop assessment

Data collection using custom mobile app

Ranking and prioritization

Watershed-wide plan for maximum stormwater management

Final SWMPs for 12 municipalities
Questions?

Funding for the development of these Stormwater Master Plans was obtained by the Central Vermont Regional Planning Commission via the Vermont Department of Environmental Conservation Clean Water Fund grants.

CONTACT INFORMATION:

KERRIE GARVEY – KERRIE@WATERSHEDCA.COM