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Developing an Effective EPA 319 Watershed-Based Plan

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Benefits of Planning at Watershed Level

- Address water quality issues and natural resource management and protection across jurisdictional boundaries
- Pool resources and efforts of watershed stakeholders
- Increase likelihood of receiving grant funding
  - CWA Section 319
  - Illinois Green Infrastructure Grant

EPA's Minimum Nine Elements

1. **Identification of causes of impairment and pollutant sources**
2. **Estimate load reductions** expected from management measures
3. **Describe nonpoint source (NPS) management measures** needed to be implemented to achieve load reductions
4. **Estimate technical and financial assistance needed, associated costs**, and/or the sources and authorities that will be relied upon to implement the plan
5. **Information and education component** used to enhance public understanding of the project
6. **Schedule for implementing the NPS management measures** identified in the plan
7. **Describe interim measurable milestones** to determine whether NPS management measures are being implemented
8. **Set of criteria** that can be used to determine whether loading reductions are being achieved over time
9. **Monitoring component** to evaluate the effectiveness of the implementation efforts over time

Overarching Considerations

- Plan should:
  - Describe tangible, realistic actions capable of being implemented
  - Have stakeholder buy-in
  - Be written to reach a wide audience
  - Be based on an adaptive management approach

Why Watershed Plans Fail

The Center for Watershed Protection conducted a broad assessment of the value of planning documents in protecting water resources and identified a number of reasons why some plans had failed:

- Planning activities were conducted at too great a scale.
- The plan was a one-time study rather than a long-term management process.
- Stakeholder involvement and local ownership were lacking.
- The plan skirted land use/management issues in the watershed.
- The document was too long or complex.
- The recommendations were too general.
- The plan failed to identify and address conflicts.

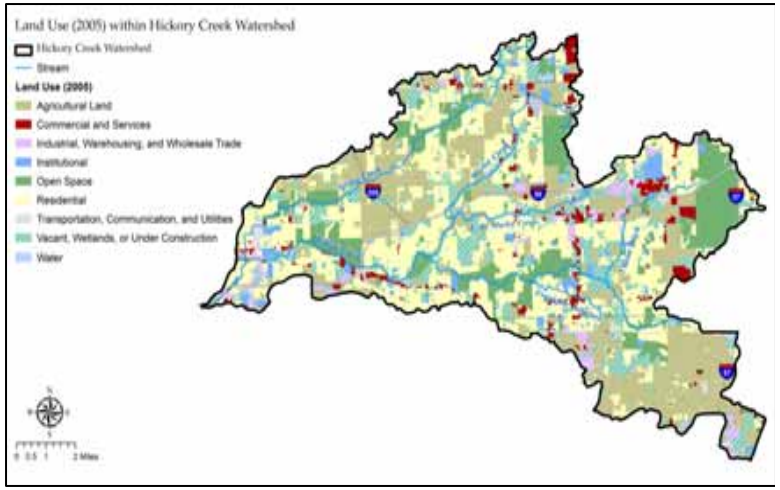
Source: USEPA "Handbook for Developing Watershed Plans to Restore and Protect Our Waters," March 2008.

Stakeholder Involvement

- Stakeholder group should include:
  - Representatives of various interests within watershed—citizens, municipalities, environmental groups
  - Critical decision-makers
- Meeting should be held at times that allow stakeholder attendance
  - Evening meetings for citizens
  - Day meetings for municipal staff, other professionals, etc.

Understanding the Watershed

- Potential causes of impairment and sources of pollutants from IEPA 305(b) and 303(d) List
- Collect and analysis existing watershed characteristics
  - Land use, topography, soils, wetlands, etc.
- Physical, chemical and biological data
  - IEPA, IDNR, municipal data, etc.



Example from Hickory Creek Watershed

- Data compiled in one comprehensive database
  - Total Number of Sites: 51 (40 w/water quality data)
  - Total Entries: 26,166
  - Period of Record: 1967-2008
  - Samples per Site: 1 to 268
  - Number of Parameter Codes: 340
- Processed ("cleaned up") to allow for analysis
- Data were geo-referenced

Note: The Hickory Creek Watershed Plan, currently in draft form, was prepared using U.S. Environmental Protection Agency funds under Section 604(b) of the Clean Water Act, as authorized under the American Recovery and Reinvestment Act of 2009, distributed through the Illinois Environmental Protection Agency . The plan was prepared for the Hickory Creek Watershed Planning Group with overall project oversight by the Chicago Metropolitan Agency for Planning.

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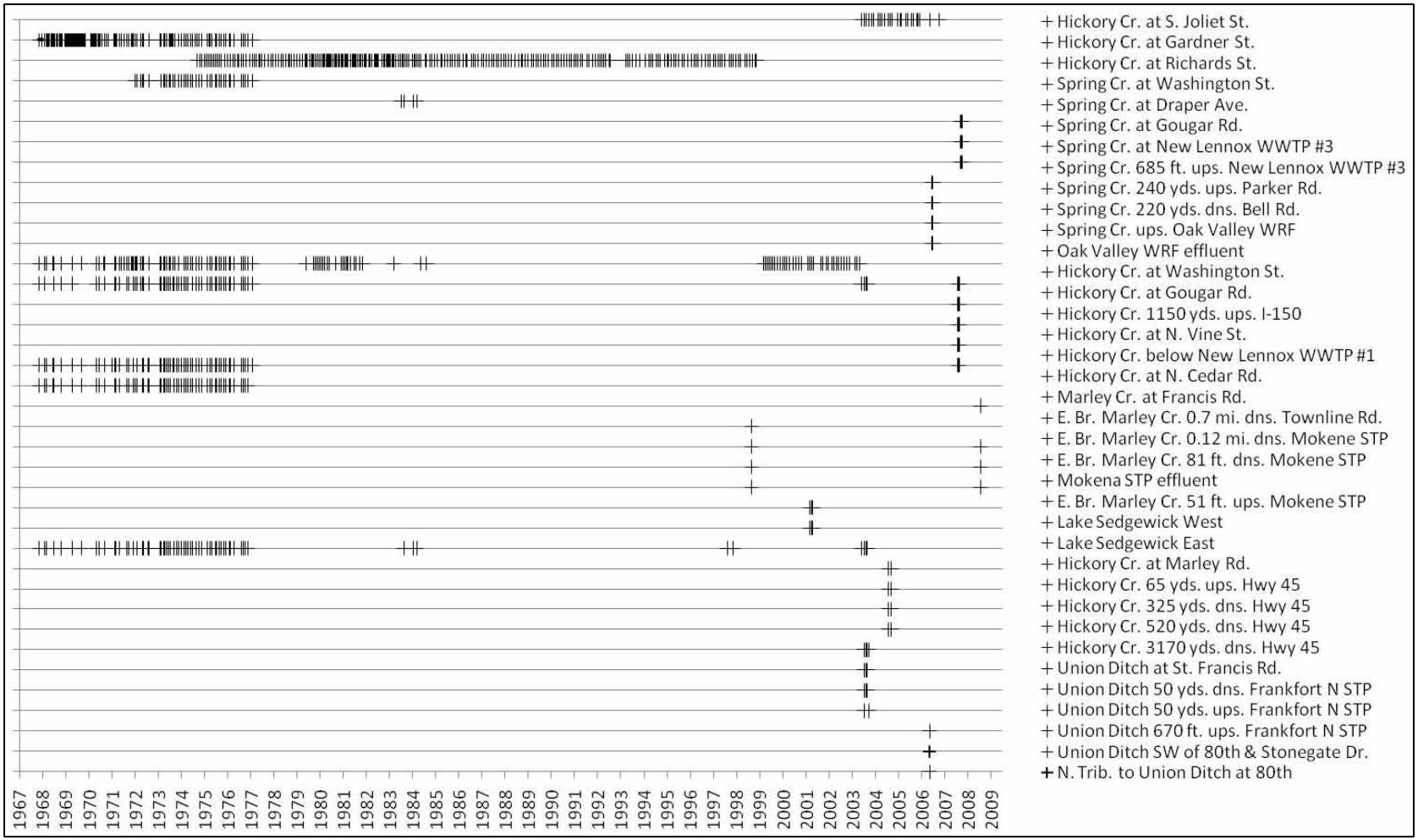
Data Analysis Examples



Data Analysis Examples

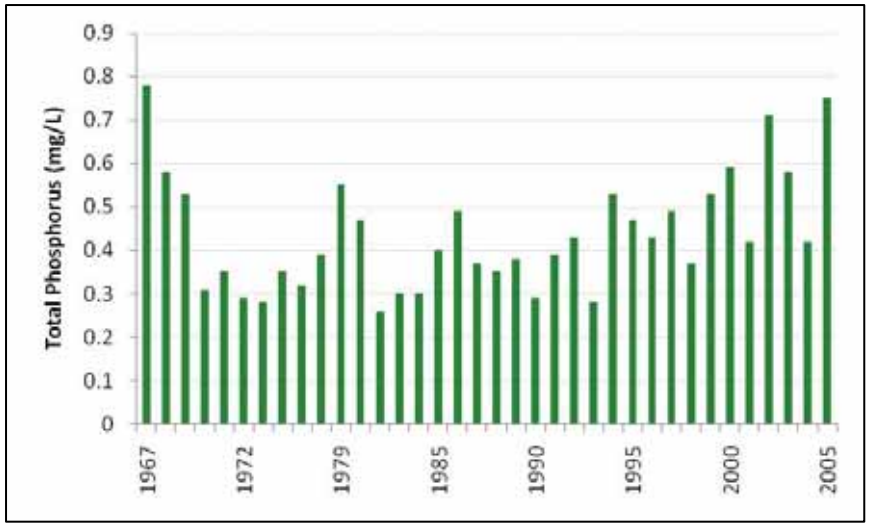


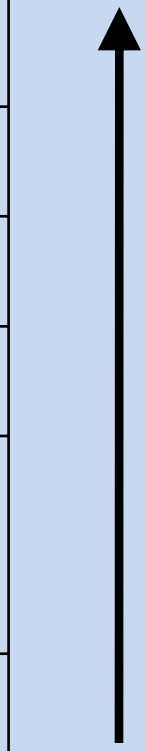
Table A-1. Chloride Statistics for the Hickory Creek Watershed

Segment ID	Water Body	Begin Date	End Date	Count	Maximum (mg/L)	Average (mg/L)	Geomean (mg/L)	Median (mg/L)
IL_GG-04	Hickory Creek	3/7/1968	9/17/2003	125	**786**	159	117	127
IL_GG-06	Hickory Creek	3/7/1968	9/17/2003	31	**720**	178	124	115
IL_GG-22	Hickory Creek	12/5/1967	12/28/2005	290	**933**	148	119	130
IL_GGA-02	Spring Creek	6/14/1972	7/17/2006	22	170	69	53	45
IL_GGB-01	Marley Creek	3/7/1968	11/1/1976	27	240	81	68	57
IL_GGC_FN_A1	Union Ditch	7/24/2003	9/17/2003	4	**684**	270	182	227
IL_GGC_FN_C1	Union Ditch	7/24/2003	9/17/2003	6	**918**	476	325	**509**
Trib. to IL_GGB-01	Trib. to Marley Creek	8/6/2008	8/6/2008	3	110	110	110	110

Note: Chloride has a 305(b) criterion of 500 mg/L. Table values in excess of this criterion are denoted by bold font and cells highlighted in gray; however, this does not necessarily denote a water quality standards violation.

Pollutant Load Estimation Approaches

- Various approaches available
  - Choice is often data and budget driven
- Identify sources of pollutants

Model	Complexity	Application	Function
HSPF		Agriculture & Urban (~hourly)	Management Scenario Generation
SWMM		Urban (~hourly)	
SWAT		Agriculture (~daily)	Critical Source ID
GWLF		Mostly Rural (~monthly)	
Load Duration Curves		Agriculture & Urban (relative contribution)	Diagnostic Only
Spreadsheet Tools (STEPL)		Agriculture & Urban (relative contribution)	

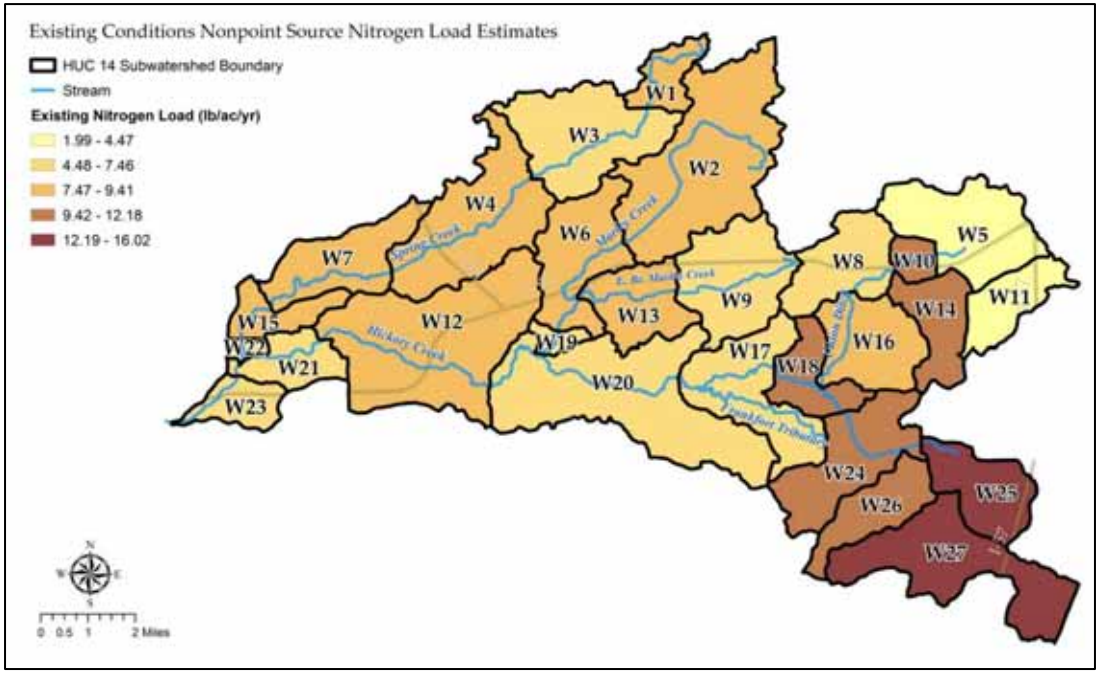
Example from Hickory Creek Watershed

- Two approaches employed:
  - USEPA's Spreadsheet Tool to Estimate Pollutant Loads (STEPL)—relative contributions of pollutant loads by land use
  - Load Duration Curves—load estimates by flow regime; also allow for analysis needed load reductions based on selected appropriate water quality criterion

Example STEPL Estimates

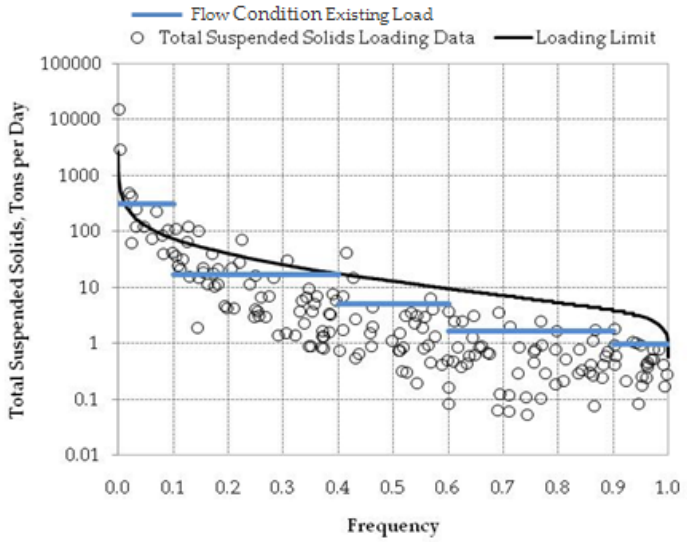
Table 2-9. Non-Point Source Pollutant Load Estimates

Sources	Nitrogen Load (lb/yr)	Phosphorus Load (lb/yr)	Sediment Load (t/yr)
Urban	229,358	28,528	8,586
Cropland	336,032	45,035	10,206
Pastureland	1,122	127	22
Forest	4,285	1,968	121
Septic	22,124	8,665	--
Total	**592,922**	**84,322**	**18,934**



Example Load Duration Curve Estimates

Figure B-10: Total Suspended Solids LDC Developed Using the Illinois 305(b) Water Quality Criterion of 116 mg/L and the 85th Percentile of Existing Data.

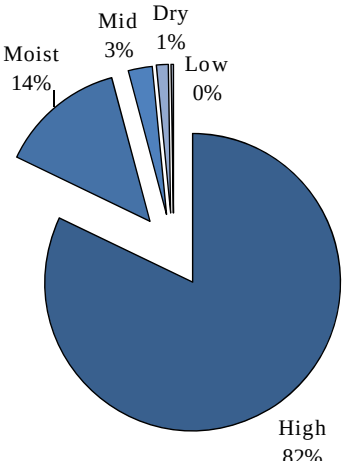


Load Analysis Summary

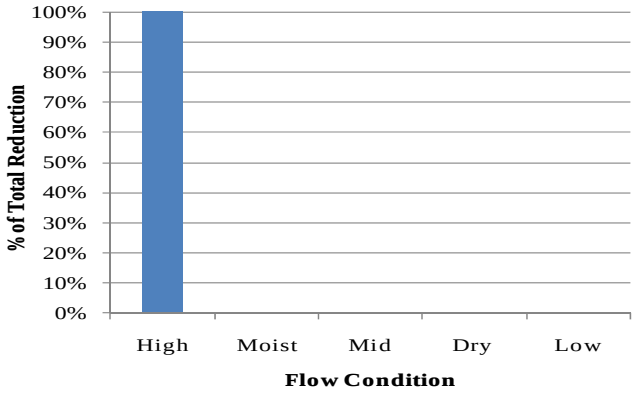
Flow Condition (ID)	Existing Load* (tons/year)	Allowable Load* (tons/year)	Required Reduction (tons/year)	Required Reduction (% Existing Load)
High	11,302	4,621	6,681	59%
Moist	1,889	3,423	0	0%
Mid	362	936	0	0%
Dry	177	685	0	0%
Low	35	112	0	0%
Total	**13,766**	**9,777**	**6,681**	**49%**

*Loadings given in tons/year are weighted according to frequency of occurrence.

Existing Load by Flow Condition
(As Percent of Total Existing Load)



Load Reductions by Flow Condition
(As Percent of Total Needed Reduction)



Future Watershed Condition

- Analysis of future watershed condition is critical for identification of control measures to protect and restore watershed in long term
- Future watershed condition approximated based on comprehensive plans, zoning maps, population projections, etc.
- Associated pollutant load estimates developed to identify potential relative contributions of different pollutant sources

Identifying NPS Management Measures

- Specific Project Recommendations
  - Stormwater management retrofits, stream channel protection and restoration, agriculture BMPs, etc.
  - Identify implementers, cost estimates, technical assistance needed and potential funding sources
- Non-Structural NPS Management Measures
  - Plans—e.g., municipal comprehensive plan updates
  - Policies—e.g., ordinance revisions and additions
  - Programs—e.g., education and outreach opportunities

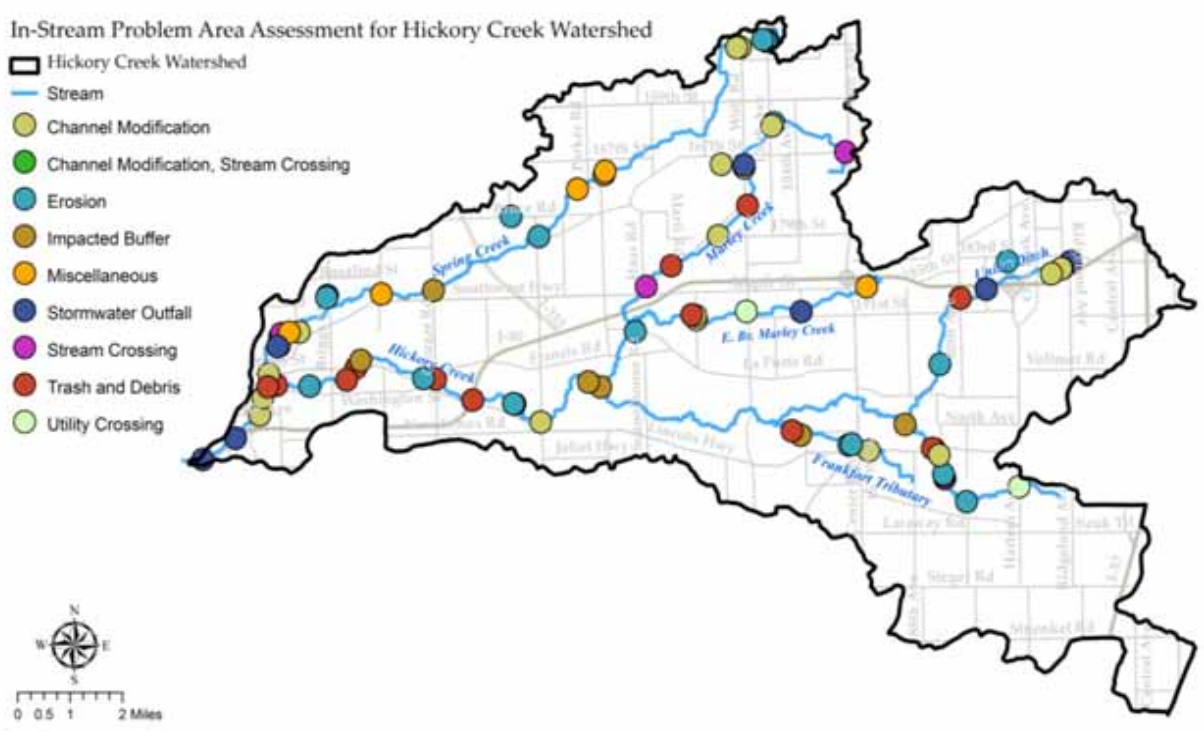
Identifying NPS Management Measures

- Watershed Reconnaissance
  - Allows for on-the-ground understanding of the existing watershed conditions
  - Evaluation of potential problem areas (i.e. streambank erosion, channel modifications, etc.)
  - Assessment of existing stormwater management approaches
  - Identification and evaluation of site-specific project recommendations

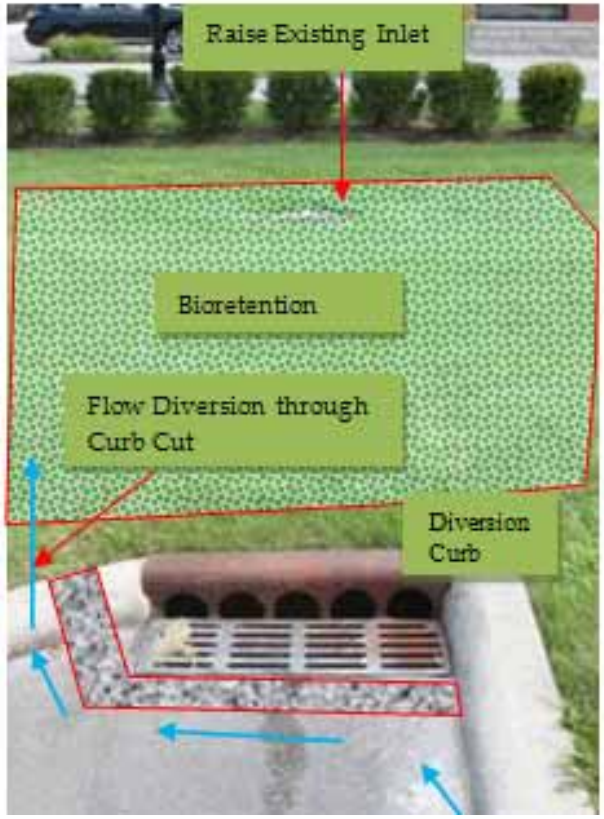
Example from Hickory Creek Watershed

- Three-pronged strategic reconnaissance
  - Upper watershed area assessment based on a modified version of the Center for Watershed's (CWP) Unified Subwatershed and Site Reconnaissance methodology
  - Evaluation physical stream characteristics (e.g., sediment deposition, channel sinuosity, etc.)
  - Potential problem area identification based on modified version of the CWP's Unified Stream Assessment methodology

Example Problem Area Assessment



Example Project Recommendations



Bioretention Retrofit

Streambank Stabilization

Example from Hickory Creek Watershed

- Comprehensive plans reviewed for opportunities to improve water quality and natural resources protection across municipal boundaries
- Ordinances reviewed against 70-question checklist developed from various sources (e.g., USEPA Water Quality Scorecard)
- Numerous programmatic recommendations—education and outreach, chloride reduction program, etc.

Schedule and Milestones

- Schedule should establish clear implementation actions
  - Stakeholder driven
  - Short-term—e.g., first five years
  - Long-term, on-going actions
- Milestones should be based on tangible, doable actions
  - Establish sense of achievement and accountability

Monitoring

- Establish monitoring program to allow for:
  - Evaluation of effectiveness of the implementation efforts over time
  - Watershed decision-makers to determine long-term trends and to improve characterization of different sources of pollutants in the watershed

Adaptive Management

- Watershed plans need to be living documents
- Improved decision-making based on additional monitoring and analysis efforts
- Provides flexibility in plan implementation
- Established formalized group of stakeholders
  - Continuity of stakeholders
  - Continued momentum for plan implementation

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