

## GREEN INFRASTRUCTURE FOR NEW HAMPSHIRE COASTAL COMMUNITIES REPORT ON COLLABORATIVE SCIENCE METHODS

### Collaborative Science

The Green Infrastructure for New Hampshire Coastal Watershed proposal defined its Collaborative Science element as: 1) developing a collaboration between municipalities and the research community to understand the benefits of GI for creating resilient systems and cost effective policies; 2) increasing willingness to implement innovative stormwater management through building trust between the selected community representatives and the project team, ensuring the relevance of these methods to community priorities, and 3) delivering needed and relevant technical support.

### Collaborative and Outreach Methods

The Collaborative Science Team applied multiple methods to guide the project, engage stakeholders, build capacity for implementation, and obtain feedback on the effectiveness of these methods. Methods utilized are summarized below.

- Collaboration between Regional Planning Commissions
- Formation of an Advisory Board
- Scoring criteria for implementation grant applications
- Creation of outreach materials (website, fact sheet series, case studies and presentations)
- Delivery of watershed-based workshops
- Delivery of a final site implementation tour and advisory board meeting
- Project Team, Advisory Board and stakeholder surveys

### *Advisory Board*

An Advisory Board (AB) was developed to play a vital role in helping to facilitate the success of the project. The AB served in a collaborative leadership role with the Project Team.

Invitations to AB participants went out to the 42 municipalities and 7 Rivers Advisory Committees – (Salmon Falls/Piscataqua, Cochecho, Isinglass, Oyster/Bellamy, Lamprey, Exeter/Squamscott, Winnicut). Governing watershed wide decisions in the region and a final body of 18 members participated in over 8 meetings at key times throughout the project period. Attendance at the AB meetings was strong and well attended and directly led to changes in the approach the project team used.

The AB was a key link between collaborative project activities and local communities and other stakeholders. The roles of the Advisory Board will be to ensure:

- Each phase of the project is responsive to the concerns and priorities of local governments
- Includes a diverse and thorough representation of local community members
- Identify priority issues relating to stormwater management, water quality and water resource management
- Implement community-community mentoring and peer-to-peer learning opportunities

- Assist with evaluation process of project goals and objectives (need revision or achieved)

The Advisory Board was comprised of 17 members representing diverse interests across the coastal watershed including: 12 Municipalities, 1 Non-Governmental Organization, 1 Regional Planning Commission, 2 Watershed Groups, and 1 New Hampshire State Agency.

*Activity: Selection Criteria for Technical Assistance Grants*

The AB provided guidance to the Project Team in preparation of the technical assistance grant applications to select municipal project proposals that most closely represented the “Complete Community Approach” (refer to the fact sheet for details).

The goal of this approach was to ensure the project selection criteria would yield successful implementation and long term commitment by municipalities.

*Activity: Brainstorming Barriers to Implementation*

In particular, a brainstorming activity about “barriers” was regarded by AB members as being most useful to understanding failure or lack of interest toward green infrastructure implementation by municipalities. Participants explored barriers using “role play” to gain perspectives of a concerned citizen, land use board member, elected official and municipal staff. Primary barriers focused around several themes: technical and physical barriers, legal and regulatory barriers, financial barriers, and community and institutional barriers. As part of the activity participants identified specific strategies and approaches to address barriers. Refer to the Fact Sheet “Overcoming Barriers to Green Infrastructure” for more information.

During the final project debriefing discussion at the final tour event in June 2015, participants noted that the “brainstorming” activity was very useful. In the final project survey, AB members reported a high level of agreement that nearly all of the core project output goals were met (several of which address identified barriers including increased access to scientific information in a useful format, and increased level of trust of scientific information among project participants).

*Watershed-Based Workshops*

Focused Sub-watershed Methods Workshop were also held in each of the coastal sub-watershed areas (four) where river advisory committees or watershed associations existed. Workshops were held to introduce GI concepts in more detail, get watershed specific feedback on requested tools, type of information. AB membership was critical to the development and implementation of the workshop series for the project.

In designing the workshop agenda we asked each watershed group to self-select the topics for presentation to ensure the content reflected the issues, interests and informational needs of the watershed and its communities. Each workshop incorporated ample time for group discussions and dialog between participants and presenters. Below is a summary of notes captured for each workshop. Major themes common among all of the workshop discussions included:

- Basics of green infrastructure functions, benefits and costs,
- Adaptation of model stormwater standards in zoning ordinances and land use regulations, and
- Case studies of successful green infrastructure implementation

The workshop series engaged approximately 50 participants representing 19 municipalities in the coastal watershed and Hampton-Seabrook Estuary. Participants included elected officials, municipal staff, land use boards and commissions, non-profit organizations, local river advisory committee members, state agencies, regional planning commissions, consultants, and coastal watershed residents.

Base on the aggregate survey results from the workshops, the majority of workshop participants represented local government and participants reported that the information presented and discussed was either Useful/Relevant or Very Useful/Relevant.

Refer to the Appendix for complete discussion notes from each of the workshops.

#### *Lamprey River Watershed*

The Lamprey River Watershed Green Infrastructure Workshop was held on May 13, 2014 with presentations about water quality and water resource management, the SWA model stormwater standards, and a case study from the Town of Newfields about their adoption of the SWA Model Standards. Participant discussion focused on the following themes:

#### *Hampton-Seabrook Estuary*

The Hampton-Seabrook Estuary Green Infrastructure Workshop was held on May 14 & 17, 2014 with presentations about site design and installation of rain gardens. A rain garden was installed at the front entrance of the Lane Memorial Library in Hampton by volunteers from Hampton and Hampton Falls. Participant discussion focused on the following themes:

#### *Exeter-Squamscott Rivers Watershed*

The Exeter-Squamscott Rivers Watershed Green Infrastructure Workshop was held on May 27, 2014 with presentations about the functions and benefits of green infrastructure, strategies for complying with federal and state stormwater permits, and municipal implementation. Participant discussion focused on the following themes:

#### *Winnicut River Watershed*

The Winnicut River Watershed Green Infrastructure Workshop was held on November 13, 2014 with presentations about the functions and benefits of green infrastructure, strategies for complying with federal and state stormwater permits, and municipal implementation. Participant discussion focused on the following themes: Why Are We Here, Issues We Want to Understand Better, and Municipal Challenges.

### *Workshop Survey Results*

Participants of the workshop series (N=21) completed a survey to assess the effectiveness of their workshop. Results indicate that the majority of participants found the scientific and technical information “useful and relevant.” Overall, they expressed that their understanding and awareness of green infrastructure as a stormwater management tool “somewhat” increased as a result of the evening workshop. Participants reported the most useful aspects of the workshops were:

- ✓ Specific examples of where and how green infrastructure was implemented successfully (e.g. Newfields’ adoption of the Southeast Watershed Alliance model stormwater standards).
- ✓ Networking with stormwater professionals and municipal representatives.
- ✓ Adaptation/use of the Southeast Watershed Alliance model stormwater standards.

Topical presentations (about stormwater management, green infrastructure, zoning and regulatory options, and functions and benefits of low impact development).

### *Outreach Materials*

#### *Website*

The *Green Infrastructure for NH Coastal Watershed Communities* website at <http://southeastwatershedalliance.org/green-infrastructure/> serves as the primary information hub for the project. All project materials are archived on the website as well as links to additional technical resources about stormwater, non-point source pollution and low impact development.

The following Outreach Materials are available on which are available on the *Green Infrastructure for NH Coastal Watershed Communities* website.

#### *Fact Sheet Series*

Project team members, student interns and a professional designer contributed to production of the Green Infrastructure Fact Sheet Series: Green Infrastructure Project, The Legal Basis in New Hampshire: Adopting Stormwater Zoning Ordinances and Land use Regulations, The Up Side of Implementing Green Infrastructure and Low Impact Development Practices, Overcoming Barrier to Green Infrastructure, and Using Green Infrastructure and Low Impact Development to Address Impacts of Climate Change.

#### *“Complete Community Approach”*

With substantial guidance from the Advisory Board, the project team prepared a framework outlining the elements necessary for institutionalization of green infrastructure by municipalities called *The Complete Community Approach*. These approach describes core values and actions for successful long term implementation and integration of green infrastructure practices across all sectors of municipal policy, infrastructure management, land use standards and water resource protection activities. The Complete Community Approach requires collaborative solutions, problem solving and implementation.

#### *Case Studies*

Implementation project case studies were prepared for the Exeter Brickyard Pond Community Project (prepared by Kristin Murphy, Project Coordinator for Town of Exeter), City of Rochester Stormwater Management Standards Update project (prepared by SRPC), and Town of Durham Installation Project (prepared by SRPC). Each case study documents project goals, outcomes, partners, installation and benefits to the community.

#### *Powerpoint Presentations*

Powerpoint presentations were created for the customized watershed-based workshop series and presentations by various project team members at conferences and professional meetings about the Green Infrastructure for NH Coastal Watershed Communities project. These presentations are available on the project website at <http://southeastwatershedalliance.org/green-infrastructure/>.

#### *Final Site Implementation Tour and Advisory Board Meeting*

##### *Goals and Outcomes*

The goals of this event were:

- ✓ Showcase green infrastructure and BMP installation sites.
- ✓ Provide an opportunity for grant awardees to present their projects (e.g. the problem, process, elements and outcomes) and progress toward next steps in green infrastructure implementation.
- ✓ Inform participants about skills acquired or new practice or procedure adopted by grantees, project benefits and lessons learned.

The outcomes achieved were:

- ✓ Interaction and exchange of ideas between participants.
- ✓ Increased knowledge of how green infrastructure performs.
- ✓ Increased knowledge of how green infrastructure is installed.
- ✓ Exposure to how grantees engaged the public (neighbors, residents and visitors).

The final project survey was provided to the Advisory Board, municipal project partners and Project Team at the Site Implementation Tour and wrap-up discussion. Survey results are summarized below and in the Appendix).

#### *Advisory Board and Municipal Project Partners Survey Results*

The final “end of project” survey was conducted following the Site Implementation Tour and Wrap-up Discussion held on June 4, 2015. In addition, prior information was solicited from Advisory Board members at the end of their final meeting in spring. Ten individuals completed the “end of project” survey that excluded project leadership team members. The survey was designed to solicit feedback on the following seven key questions as well as other areas.

- 1) How successful or useful were the outcomes (including the pilot site demonstration projects)?
- 2) How effective were resources and support provided?
- 3) How equitable and fair was stakeholder representation and the overall project process?
- 4) Was a shared vision developed?

- 5) Were mechanisms for collaboration between stakeholder groups established that will continue after the project?
- 6) Is there willingness among local officials and other stakeholders to participate in future collaborative climate change adaptation planning projects?
- 7) Are there tangible next steps being pursued on additional green infrastructure implementation?

Although the sample (N=10) was small, there was an excellent diversity of participants that were well informed and involved in the project. The results indicate that the participants believe that all seven goals were somewhat or fully achieved. The successful outcomes of the pilot sites and the effectiveness of resources and support provided by the Project Team were rated as the highest. The results to other survey questions clearly indicate that as a result of this project, trust of scientific information by the participants was significantly increased.

#### *Project Team Survey Results*

Project Team Members completed a survey at the close of the project to assess their perspective on following these guiding principles of collaborative planning. The Project Team responded (N=5) in the affirmative noting that the involvement of the Advisory Board early in the project was important along with the holding brainstorming sessions and other open discussions. They mentioned the importance of the website, workshops and survey for giving participants a significant and equitable opportunity to voice their concerns, ideas, and priorities. Project Team members also indicated that they had either “frequent” or “very frequent” communication and sharing of resources with local governments as well as with other educational and academic organizations. They had “sometimes” to “very frequent” communication with watershed and conservation organizations. At the other extreme, communication and sharing of resources with business groups and or private contractors averaged as “sometimes.”

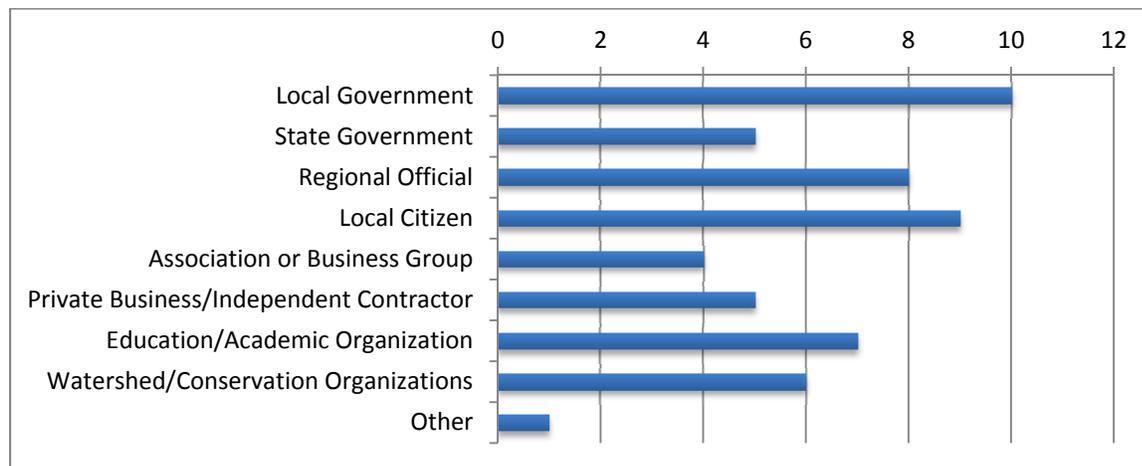
Complete survey results are provided in the Appendix.

**APPENDIX: DETAILED REPORT OF SURVEY RESULTS**

**A. Final Site Implementation Tour, End of Project Survey, and Advisory Board Survey**

The final “end of project” survey was conducted following the Site Implementation Tour and Wrap-up Discussion held on June 4, 2015. In addition, prior information was solicited from Advisory Board members at the end of their final meeting in spring. 10 individuals completed the “end of project” survey that excluded project leadership team members. These individuals, through their self identified primary or secondary affiliations, represented all target groups of the project (Figure XX1). Note: Project leadership team members also had an opportunity to complete the “end of project” survey to compare their view with those of participants. This data is not included in these survey results.

Figure XX1 provides responses to the question “What groups are you affiliated with have an interest or involvement in green infrastructure and stormwater related issues (primary and secondary affiliations)? (N=10, may include multiple affiliations by one individual)

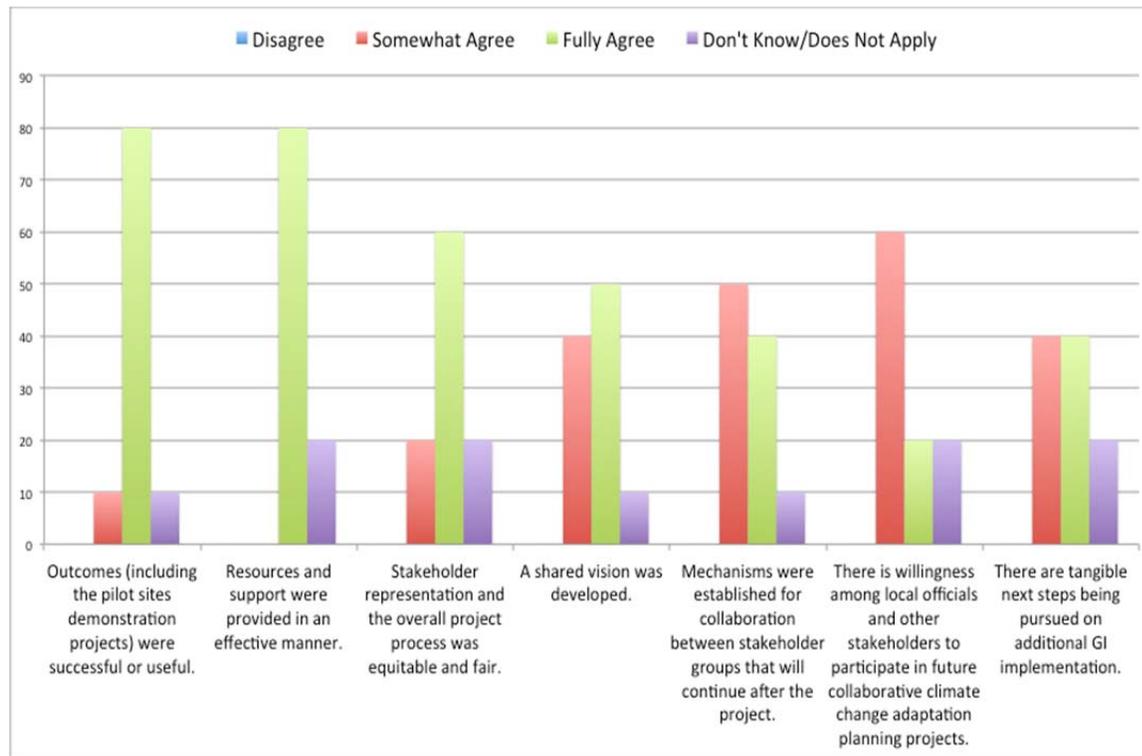


The scope of work in the grant agreement described the following information that was to be assessed. This information was solicited through the “end of project” survey and the final Advisory Board members’ survey.

*“At the end of the project, information will be solicited from all project participants on: 1) how successful or useful were the outcomes (including the pilot site demonstration projects), 2) how effective were resources and support provided, 3) how equitable and fair was stakeholder representation and the overall project process, 4) was a shared vision developed, 5) were mechanisms for collaboration between stakeholder groups established that will continue after the project, 6) is there willingness among local officials and other stakeholders to participate in future collaborative climate change adaptation planning projects, and 7) are there tangible next steps being pursued on additional GI implementation.”*

Figure XX2 provides the response to these seven key project goals. Although the sample (N=10) was small, there was an excellent diversity of participants that were well informed and involved in the project. The results indicate that the participants believe that all seven goals were somewhat or fully achieved. The successful outcomes of the pilot sites and the how effective the resources and support were provided were rated as the highest.

Figure XX2 provides responses by participants to questions about the 7 key project goals. (N=10; Scale: Disagree, Somewhat Agree, Fully Agree, and Don't Know/Does Not Apply) Note: Vertical Axis = % Response Rate.



In addition to these seven core project output goals, the project worked to provide scientific information in a useful format and hoped to raise the level of trust of scientific information for project participants. Figures XX3 and XX4 summarized how well the project achieved these goals. The results clearly indicate that as a result of this project, trust of scientific information by the participants was significantly increased.

Figure XX3 provides response of participants to the question (N=10): “I find scientific information on stormwater issues for my area to be trustable and useful.”

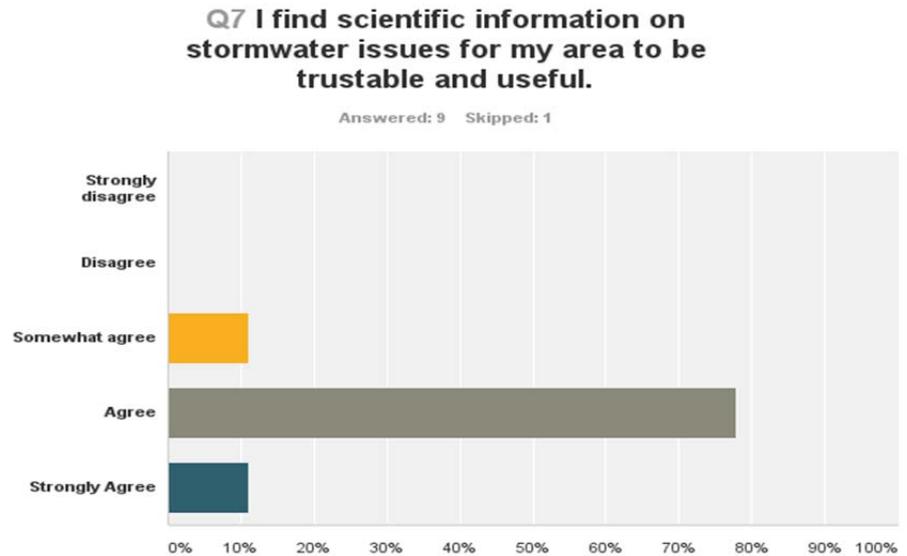
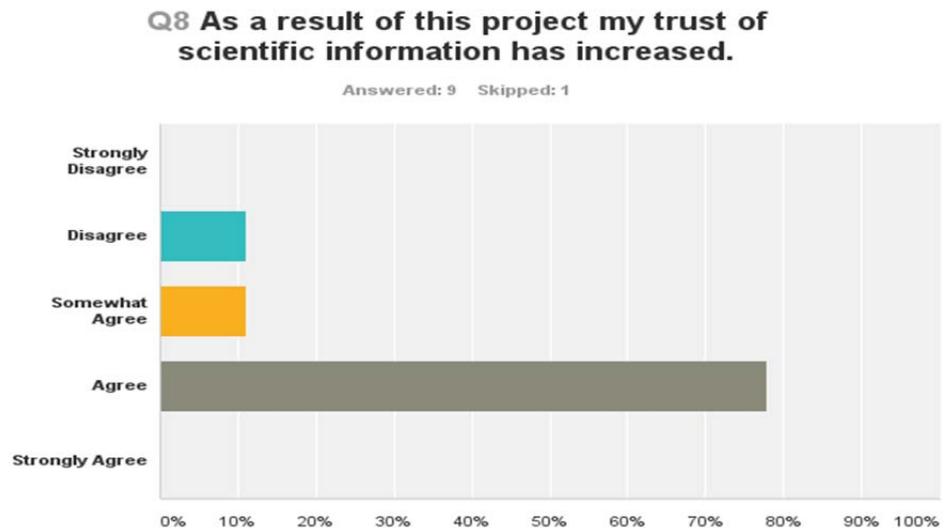


Figure XX4 provides Advisory Board response (N=9) to the question “As a result of this project my trust of scientific information has increased.”



Final Advisory Board (AB) meeting in Spring 2015 was closed with a survey of AB members present (N=3) to assess the nine roles for this advisory group that were described in the grant agreement. Table XX1 illustrates that AB members participated in each of these functions or roles either “occasionally or frequently.” Although this is a small sample, it is supportive of the conclusion that the AB members were active in all nine collaborative roles with the project leadership team.

Table XX1 provides the Advisory Board responses to the Question: “To what degree did you fulfill the following Advisory Board roles and responsibilities.”

## Advisory Board for GI - End of Project Survey

	Never	Occasionally	Frequently	Not Sure/Don't Know	Total
a. Participate in establishing priorities for the selection criteria for choosing demonstration communities?	0.00% 0	66.67% 2	33.33% 1	0.00% 0	3
b. Assist in identifying key stakeholders to help insure that the project includes a diverse and thorough representation of local community members?	0.00% 0	66.67% 2	33.33% 1	0.00% 0	3
c. Provide advice on the proposed types of communication materials?	0.00% 0	100.00% 3	0.00% 0	0.00% 0	3
d. Provide advice as to what items belong in a conceptual GI Toolbox?	0.00% 0	66.67% 2	33.33% 1	0.00% 0	3
e. Identify priority issues relating to stormwater management, water quality and water resource management?	0.00% 0	66.67% 2	33.33% 1	0.00% 0	3
f. Identify what is needed to implement better stormwater management?	0.00% 0	66.67% 2	33.33% 1	0.00% 0	3
g. Identify what is needed to repeat demonstration projects and institutionalize best practices?	0.00% 0	100.00% 3	0.00% 0	0.00% 0	3
h. Participate in evaluating the collaborative process throughout the project?	33.33% 1	33.33% 1	33.33% 1	0.00% 0	3
i. Participate in the project's final evaluation process?	0.00% 0	66.67% 2	33.33% 1	0.00% 0	3

**B. Complete discussion notes from each of the watershed workshops.**

**Lamprey River Watershed (May 13, 2014)**

Watershed Issues

- Increased flooding and erosion
- Stormwater infrastructure maintenance agreements and inspections
- Stormwater Standards – best in zoning or regulations
- Increase in severe weather events
- Increased precipitation intensity and runoff
- Road washouts

Opportunities

- Green Infrastructure implementation on municipal property/facilities
- Lawn care programs (resources available through UNH Cooperative Extension)
- Pet waste disposal awareness programs
- Farm-agricultural waste management
- Septic System contributions to nutrient pollution
- Complete Streets applications – incorporate stormwater management into hardscape designs

General Discussion

- Opportunity to expand use of green infrastructure for stormwater management and water quality improvements
- Review/audit existing stormwater ordinances and regulations to identify deficits, needed improvements
- Incorporate green infrastructure with pedestrian improvements and access
- Address/identify water quality impacts due to “upstream” development in other towns; study watershed hydrology to better understand pollutant loading sources
- Build relationships to work cooperatively among towns
- Raise awareness of upper-watershed impacts, activities and stormwater regulation

Barriers

- Education about construction and maintenance costs
- Cost to homeowners to implement best practices and options to keep cost down

**Exeter-Squamscott Rivers Watershed (May 27, 2014)**

Regulatory and Management Issues

- EPA MS4 permits – what is their review and response time for annual submissions by towns?
- Stormwater utilities – are they needed and feasible in NH?

- NHDOT and Utility companies – what are their responsibilities for managing stormwater?  
Examples where ESRLAC participated in discussions about state highway repair project and made recommendations to protect water resources
- All non-point sources of pollution need to be addressed for MS4 compliance
- UNH Stormwater Center – new impervious cover maps, data and informational resources

#### Municipal and Private Issues

- Problems in older neighborhoods and developments without adequate stormwater controls
- Towns need to be partners with private developments/developers, particularly to retrofit where problems exist; need resources (financial, technical) to accomplish this
- Developers have become “more open” to using new GI and LID methods
- Need for raising awareness where stormwater problems exist
- Lawn – constant maintenance, consumes resources, introduce pollutants/nutrients
- Gravel roads and driveways are significant source of sediment pollution in rural areas – need better maintenance guidance and permitting standards; towns should adopt standards that protect water quality

#### Watershed and Environmental Concerns

- Stormwater creates thermal pollution in surface and groundwater and aquatic habitats
- Nitrogen from septic systems is problematic in suburban and urban areas – need to implement new system designs and nutrient removal technology
- Conservation lands – can easements be modified to allow installation of “new technology” practices such as GI
- Often overlooked, use of vegetated buffers as a GI practice
- SWA model stormwater standards – goal to achieve consistent stormwater management throughout the coastal watershed

### **Winnicut River Watershed (November 3, 2014)**

#### Why Are We Here?

- To learn about stormwater management, new techniques and practices.
- To learn how to apply knowledge to local project.
- Stormwater is interesting.
- My community is just beginning.
- Learn more about the intersection of public works and habitats.
- Education never hurts, always helps.
- My community has been very engaged in improving stormwater management through local initiatives, having dialog about the new EPA MS4 permit requirements.

#### Issues We Want to Understand Better

- Fertilizer use and application (certified and licensed?)
- Education on pesticide and herbicide application
- Guidance to consumers about application of chemicals to lawns, gardens, landscaping
- Soil testing to determine need based on what is being grown (grass, hay, crops, etc.)
- 2013 NH legislation about requirement to use slow release Nitrogen

Municipal Challenges

- Requiring the most effective practices in the right location.
- Wide range of best management practices – need to educate homeowners about options
- Responsibility for infrastructure maintenance needs to be part of stormwater regulations
- Integration of regional water and wastewater options