# VERMONT AGENCY OF NATURAL RESOURCES (ANR) GREEN STORMWATER INFRASTRUCTURE IMPLEMENTATION WORK PLAN

Stormwater runoff, caused by precipitation running off impervious surfaces and developed lands, is a leading cause of surface water pollution in Vermont. Impervious surfaces generate hundreds of thousands of gallons of untreated runoff per year[1] resulting in various negative affects to streambank stability, aquatic habitat, and infrastructure. Managing the quality and quantity of this runoff in a sustainable way is of utmost importance for the health of our communities and the protection of natural resources.

The traditional approach to managing stormwater runoff is with "gray infrastructure," a network of pipes, storm drains, and concrete tanks where collected runoff is conveyed and then discharged to receiving waters. Time has shown that this approach is very effective at moving water but does little to mitigate volume and pollutant loads. In fact, this traditional method can cause, and has caused, additional issues downstream from outlets and end-of-pipe structures.

An alternative approach is to use green stormwater infrastructure (GSI), which relies on natural and semi-natural systems to infiltrate, evaporate, and store water in dispersed locations throughout the landscape. This decentralized approach deals with stormwater as close to the source as possible. Groundwater recharge, flow control, and filtration are all inherent features of GSI. As a result, GSI has many benefits including reduced and delayed stormwater runoff volumes, enhanced groundwater recharge, stormwater pollutant reductions, reduced sewer overflows, urban heat island mitigation, improved air quality, additional wildlife habitat and recreational space, improved human health, and increased land values.

In light of these facts, ANR has chosen to embrace the use of GSI as an effective means of avoiding, mitigating, and managing stormwater. ANR is proud of the efforts put forth to date in regards to GSI and recognizes that there are many challenges ahead. The following work plan will bring many of those challenges to light and look at a variety of ways to address them over the course of the coming year.

## ANR'S LONG-TERM VISION FOR GSI

GSI becomes an integral component of efficient stormwater management and is promoted, supported, and utilized at a local, regional, and statewide scale.

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[1] An impervious area of 100 square feet will generate 62.3 gallons of stormwater runoff for every inch of precipitation.

## CURRENT GSI INITIATIVES WITHIN ANR

Green Stormwater Infrastructure Website

The Vermont Department of Environmental Conservation (DEC) hosts a website for individuals seeking information on GSI and Low-Impact Development (LID).[2] Launched in 2010, the site features information on individual best management practices, links to various publications related to the subject, and an additional resources page that highlights groups doing similar work.

Vermont Low Impact Development Guide for Residential and Small Sites

In 2010, a non-technical guide for individuals seeking to incorporate GSI on small and residential sites was developed and distributed. The guide contains a wide array of examples, and is designed to educate homeowners and municipal officials about different types of GSI. The guide also contains additional resources for those seeking more information, as well as a glossary of terms for those who are unfamiliar with stormwater basics. The guide is available for download on the GI website and distributed to individuals at a variety of events and workshops by ANR staff and partners.

GI Roundtable

In 2010, ANR established the GI Roundtable – a group of interested parties representing both the public and private sectors. The Roundtable assists ANR in moving specific GSI initiatives and strategies forward. The group was instrumental in the development of the GSI Strategic Plan (see below) and will provide support as the Plan moves towards implementation. The Roundtable also advocated for the Executive Order that led to the development of this work plan.

Vermont GSI Strategic Plan: 2011-2013 (Appendix A)

With the assistance of the GI Roundtable, ANR was successful in developing and adopting a GSI Strategic Plan. The overall goal of the plan is to ensure that GSI is being used to minimize changes to natural hydrology during and after development. To accomplish this, the plan targets four key audiences: stormwater professionals, municipal governments, property owners, and State agencies. The plan identifies specific objectives and tactics for working with each target audience. The plan will be reviewed on a biennial basis and revised as necessary based on progress.

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[2] Low Impact Development (LID) is an innovative land planning and engineering design approach that seeks to maintain a sites pre-development ecological and hydrologic function through the protection, enhancement, or mimicry of natural processes. LID, GI, and GSI are many times used interchangeably although there are definite differences between the three.

Ecosystem Restoration Program (ERP), Watershed Grant, Section 319, and 604(b) Funding

Numerous GSI proposals have ranked highly and been funded through state (ERP and Watershed Grants) and federal (Section 319 and 604(b)) programs. ANR expects to see additional projects proposed as GSI increases in popularity. ANR will continue to fund these and similar types of projects so long as they continue to be high priority and meet eligibility requirements for funding. Specific projects or geographically explicit target areas that are identified within Tactical Basin Plans will receive higher rankings for funding support under these grant programs.

GI Coordinator Position

Since 2009, ANR has supported a GI Coordinator position within DEC through various funding mechanisms. This position plays a critical role in coordination of GI and GSI efforts both internally and externally. The GI Coordinator is housed in the Ecosystem Restoration Program of the Watershed Management Division.

Vermont Stormwater Management Manual (VSMM) Revisions

In March 2013, the Stormwater Program of DEC sought proposals for a contractor to review the existing VSMM and develop a draft update. The Stormwater Program intends to update the VSMM to integrate advances in stormwater management, including the incorporation of LID and GSI techniques. Similar revisions have been done in other states such as New York and Rhode Island. These revisions, once approved, should allow more flexibility for LID and GSI in the permitting process.

Stormwater Master Planning

In the spring of 2013, DEC developed a set of guidelines that highlight key steps in the stormwater master planning process. Stormwater master planning is used to identify data gaps, define stormwater problem areas, summarize current conditions, and propose recommended actions for developed lands where better stormwater management is needed or desired. There are a variety of ways to complete a master plan and the guidelines highlight at least eight different scenarios. Two of those scenarios include elements of low impact development and green infrastructure.

Urban and Community Forestry Program (U&CF)

In 2012, U&CF was awarded a USDA Forest Service grant to support and address three key elements in the GSI Strategic Plan: state leadership in GSI, outreach and support to municipalities, and a possible state and municipal credit system to incentive GSI practices including trees. Work is in progress with partners to meet grant deliverables. The program has an established partnership with DEC to support the GI initiative.

## CURRENT CHALLENGES TO WIDESPREAD UTILIZATION OF GSI IN ANR

Over the course of the past five years, ANR has made progress in the promotion and adoption of GSI practices. However, in order to fully integrate GSI into Agency processes and programs, a number of existing challenges must be addressed.

1. *Awareness and knowledge of GSI is low*

One major challenge is a general lack of understanding and knowledge regarding GSI among the majority of agency staff. GSI is a fairly new concept and while staff that deal with stormwater on a day-to-day basis have a strong working knowledge of GSI, those who do not deal with stormwater are less likely to be informed. Given the multifunctionality of GSI, it is important that other staff throughout ANR gain a greater understanding of GSI and how it may help fulfill a number of policy aims and Agency goals.

2. *Information about GSI is inaccessible or limited*[3]

The general lack of knowledge is exacerbated by insufficient information about GSI and its benefits. Currently, the GI page of the DEC website and the Vermont Low Impact Development Guide for Residential and Small Sites are the main sources of information related to GSI that have been developed by ANR. Although these resources provide background information about GI and GSI, they do not go into great depth about the cost, benefits, and challenges of using GSI. This is partially because data demonstrating benefits, costs, and performance are limited, somewhat variable, and not always applicable to Vermont's unique soils and climate. Additional research and data is needed to convince a broader audience that GSI is a viable, effective and worthwhile endeavor.

3. *Vermont specific GSI design standards and specifications do not exist*

A lack of design standards and specifications for GSI is another hurdle. While many GSI standards have been developed[4], very few have been adopted in Vermont. This results in a general hesitancy on behalf of developers (and ANR engineers) to incorporate GSI into new construction and redevelopment

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[3] It should be noted that a good deal of information does exist in relation to broader landscape level GI elements such as riparian buffers, wetlands, open space, etc.

[4] Design standards and specifications have been developed in various places throughout the country including Minnesota, Michigan, New York, and Rhode Island.

projects. The perceived risk associated with a new or untested design is simply too great to take in many cases.

*4. ANR's ability to regulate the vast majority of stormwater runoff issues is limited*

The main mechanism through which ANR regulates stormwater is the permit process. This process is meant to support both Act 250 regulation and Vermont Water Quality Treatment Standards. This process has been very successful at mitigating stormwater runoff but unfortunately is somewhat limited. The permitting process only came about a few decades ago and Vermont was already significantly developed at that time. This means that a majority of the existing sites were not required to meet the standards, which still holds true. The State's jurisdiction only comes into play when projects create or redevelop greater than one acre of impervious surface, and for projects that expand existing impervious surface by more than 5,000 square feet where the total resulting impervious surface is greater than one acre. Anything below this threshold is considered sub-jurisdictional and covered by local zoning ordinances or regulations. Very few towns have ordinances or bylaws that manage stormwater. As a result, only about 6% of existing developed land is regulated under state/federal stormwater permits. The inclusion of Municipal Separate Storm Sewer Systems (MS4) permitted lands brings this number up to about 12%. The vast majority of existing developed land is not regulated, does not manage or treat stormwater, and can cause adverse water quality impacts to surface waters.

*5. The Vermont Stormwater Management Manual favors traditional stormwater management approaches*

The Vermont Stormwater Management Manual, last revised in 2002, contains the regulatory requirements for the management of stormwater as well as technical guidance to assist in the design of stormwater treatment practices. The manual is predicated on five treatment standards: water quality volume, recharge volume, channel protection volume, overbank flood protection, and extreme storm protection. The manual does include GSI approaches, including infiltration, bioretention, and GSI site design credits, however these are optional, and certain new GSI approaches, including pervious pavement, are not included. This fact, in addition to a difficulty in meeting the channel protection and extreme storm protection criteria, means developers and designers would need to go to additional lengths to get practices approved and permitted.

*6. Funding does not meet demand*

Another challenge is a lack of funding. Despite a growing interest and need for increased GSI in Vermont, limited funding is available. Much of the state funding recently used to implement GSI projects comes from either Ecosystem Restoration Program (ERP) Grants or Watershed Grants. These

grants are highly competitive and have limited monies available. ERP funding is also restricted to capital eligible projects that preclude or severely limit planning oriented activities. State Revolving Funds (SRF) are another option as they have mandatory percentages of funding dedicated for green reserve projects, but these loans are often used for energy efficiency and not GSI.

*7. Lacking incentives*

One way to increase adoption of new technologies is through incentive-based programs. Unfortunately, very few GSI incentive programs exist in Vermont. Grants, rebates, recognition programs, discounts, and development incentives (expedited permitting, decreased fees, zoning upgrades, and reduced stormwater requirements) have not yet been used on a large scale for the purposes of promoting GSI. Increased use of these tools could assist in greater adoption of GSI throughout the state. This may be a particularly important means of addressing existing impervious.

*8. Uncertainty about how to incorporate GSI concepts into existing programs*

A lack of a comprehensive plan is also an issue. The GSI Strategic Plan identifies in broad strokes what should be done at the state level to promote GSI but does not go into detail as to the specific actions that need to be taken. In order to move the initiative forward, additional details will need to be worked out. As an example, Vermont State Parks are a perfect place to display GSI in action. Yet before that can happen, the following questions must be asked. What process is used to assess park infrastructure? How are projects prioritized? Where does the funding come from?

*9. Inconsistent definitions and terms*

There is some inconsistency in the use of the terms Low Impact Development, Green Infrastructure, and Green Stormwater Infrastructure throughout the state. While these are generally used interchangeably, they do represent slightly different concepts and should be more clearly defined to avoid confusion. Additional clarity could also be shed on the difference between structural and nonstructural components of GSI.

*10. Competing priorities*

In certain situations, competing priorities may make utilization of LID and GSI difficult. This can occur on sites with limited space for both wastewater and stormwater management, or on sites with exclusive management priorities or restrictions. It may also occur because of regulatory requirements, such as with a 1272 Order and a stormwater flow control/restoration requirement.

*11. Need for additional leadership*

Finally, additional leadership is needed. It is unreasonable to expect people to deviate from traditional development and stormwater management practices without significant support, encouragement, and inspiration. ANR has made significant progress in this regard over the past few years but additional work can be done, specifically in terms of demonstrating GSI on state lands, developing and disseminating a consistent message, and promoting the use of GSI. Because GSI is a fairly new concept, this type of leadership is needed at all levels, from field staff directly involved in practice implementation to upper level managers looking at the benefits of GSI at a statewide scale.

## ANR'S SHORT-TERM OPPORTUNITIES AND STRATEGIES

Over the next year, ANR intends to improve its ability to promote and support GSI utilization. In conjunction with implementation of the GSI Strategic Plan, ANR will undertake the following tasks:

| Task | Task Description | Executive Order Items Addressed | Challenges Addressed |
|---|---|---|---|
| 1 | Review current regulatory barriers to GSI and consider revisions where appropriate. Pay particular attention to the Vermont Stormwater Management Manual. | A | C3, C4, C5 |
| 2 | Consider the role that GSI plays in the development of reasonable assurances and implementation of TMDL's. Research the use of GSI in other states to meet regulatory requirements (tree credits, stream restoration, and others). | A | C3, C4 |
| 3 | Review existing state processes and programs and develop a plan for incorporating GSI concepts. Pay particular attention to the following:<br>• Surface Water Management Strategy<br>• Tactical Basin Planning<br>• Stormwater Master Planning<br>• Corridor Planning<br>• LakeWise Certification Program<br>• Combined Sewer Overflow Policy<br>• NPS Management Program | A | C8, C9 |
| 4 | Consider incorporation of GSI concepts as appropriate when developing and implementing new programs. | A | C1, C8, C9 |
| 5 | Provide training opportunities to ANR staff and external partners to increase knowledge of GSI. | A, D | C1, C2 |
| 6 | Investigate the modification and development of funding sources to support the utilization of GSI. Consider green add-on funds for marginal costs (i.e. the cost difference to install a green roof instead | A, F | C6, C7 |

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| | of a conventional one). | | |
| **7** | Identify gaps in technical information and guidance and develop a plan for creating additional resources. Gather additional BMP cost, benefit, and performance information and make it readily available. | B | C1, C2 |
| **8** | Support additional research and monitoring opportunities related to GSI. Tie in with existing efforts such as the Monitoring Strategy Implementation Team and the Vermont Water Quality Monitoring Council. Work closely with Vermont institutions to develop and gather Vermont specific data. | E | C1 |
| **9** | Seek opportunities for greater inter-agency and intra-agency collaboration and cooperation. | A, D | C2 |
| **10** | Develop a process for auditing GSI on ANR owned and managed lands (e.g. State parks, wildlife management areas, and fishing access areas) and explore opportunities to enhance or utilize additional GSI. Discuss GSI concepts with ANR Lands Team. | A, C | C8, C11 |
| **11** | Review GSI components and develop a list of appropriate uses based on land type and land use. Consider lakes, ponds, wetlands, floodplains, and drinking water source protection areas. Take into account impact on land type or use, cost, and risk of failure. | B | C3, C8, C10 |
| **12** | Increase coordination between FED, Stormwater, and MAPP in regards to CSO projects. Bring appropriate parties together during the preliminary engineering phase for CWSRF projects. | A | C6, C8, C10 |
| **13** | Reconvene GI Roundtable. Priority tasks include:<br>• Create governance structure<br>• Review and track progress on Strategic Plan<br>• Agree on definitions and use of terms | A | C1, C2, C9, C11 |
| **14** | Assist external partners in efforts to provide GSI assistance, outreach, and training to municipal entities, private landowners, and design professionals. Determine specific funding needs. | F | C1, C4, C9, C11 |
| **15** | Revisit GSI Implementation Work Plan and review progress. Add additional challenges and opportunities as necessary. Continue to assume leadership role on Interagency GSI Council. | A,B,C,D,E,F | C11 |

**Approved by:**

**Deb Markowitz, Secretary**
**Agency of Natural Resources**

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**Date**