

**2014 (YEAR 11)  
ANNUAL REPORT**

**GENERAL PERMIT FOR THE DISCHARGE OF  
STORMWATER FROM SMALL MUNICIPAL SEPARATE  
STORM SEWER SYSTEMS**

**NORTH HAVEN, CONNECTICUT**

Prepared for:

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## Summary

### Status of Compliance:

Submission of this report by the Town of North Haven maintains compliance with the reporting requirements of the General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (GP) issued on January 9, 2004 and reissued on January 9, 2009 and on January 9, 2013.

The Town of North Haven is in full compliance with the stormwater monitoring requirements of the General Permit. The in-stream stormwater sampling of June 19, 2014 and subsequent reporting of results to the State of Connecticut Department of Energy and Environmental Protection (DEEP) complied with the monitoring requirements of the GP for 2014. Annual sampling for each prior year of the GP had previously been completed and reported to DEEP.

### Assessment of Best Management Practices:

The Town of North Haven began implementation of Best Management Practices (BMPs) in 2004. Many of the BMPs identified in the Town's *Stormwater Management Plan* were already in place, particularly in the area of sedimentation and erosion control, and were considered to be effective in reducing contaminant loads in stormwater discharges. The Town has also significantly reduced the amount of road sand applied to town roads by use of an enhanced de-icing salt product starting in 2009.

Many of the BMPs in the *2004 Stormwater Management Plan* were implemented either through existing practices of the Town or by qualifying local programs conducted within the Town, most notably by the South Central Connecticut Regional Water Authority (RWA) and the Quinnipiac River Watershed Association (QRWA).

### Progress on Minimum Control Measures:

The Town made progress on several of the Minimum Control Measures (MCMs) by implementing appropriate BMPs identified in the Plan and achieved their respective Measurable Goals. The Town plans to incrementally implement any as yet unimplemented BMPs in so as to ultimately reach levels of compliance as originally intended in the Plan.

### Monitoring Data

In-stream stormwater sampling at upstream and downstream locations in three tributaries of the Quinnipiac River that pass through North Haven was conducted on June 9, 2014. The results were entered on DEEP's Stormwater Monitoring Report (SMR) forms and submitted to DEEP. Because the SMRs were previously transmitted to DEEP, they are not attached hereto.

The monitoring data did not identify the presence of obvious illicit discharges within the areas tributary to the sampling locations. There were some

exceedances of Environmental Protection Agency (EPA) or DEEP benchmark values for stormwater quality, but none of the exceedances were indicative of illicit discharges. A tabulation of the in-stream sampling is presented in Appendix A of this report.

## Minimum Control Measures

### 1.0 - Introduction

Best Management Practices and Minimum Control Measures are introduced in Section 1.0 of the Town's Stormwater Management Plan and itemized in Sections 2.0 through 6.0 of the Plan.

The following section describes what was planned for each BMP and whether or not measurable goals were achieved. If measurable goals were not achieved, plans for achieving them in the future are also discussed.

### 2.0 - Public Education and Outreach

BMP 2A – In support and partnership with South Central Connecticut Regional Water Authority (RWA) and Quinnipiac River Watershed Association (QRWA), the Town of North Haven continues to implement an outreach and education program, educating the public on watershed dynamics and pollution loading issues.

Measurable Goal: 600 students per year will receive a presentation and/or take-home materials. Teachers will evaluate available programs.

*The measurable goal was not achieved this year although there is a diversity of education opportunities available in North Haven, such as environmental/science courses taught in the North Haven Public Schools, classroom visits from RWA's Educator, and field trips conducted at RWA's Whitney Water Center.*

*Details regarding this measurable goal are discussed below. A total of 294 students received classroom presentations or performed loan boxes activities at Clintonville School.*

*RWA and QRWA provide environmental education outreach programs and pre-packaged presentation materials for students and the general public. North Haven's Conservation Commission continues its public outreach involvement through North Haven's Earth Day and HazWaste Central. DEEP, EPA, Boy Scouts and Girl Scouts websites were explored, as in past years, for educational material and opportunities for students and the public to get involved.*

## RWA

Lisa DiFrancesco, the company's Educator, was contacted again this year for information on RWA's outreach educational programs available for Elementary and Middle School aged students.

The easiest way to reach the most number of students is through the use of *Watershed* loan boxes from RWA. These self-contained teaching units come with teachers' guides and everything needed for various water science activities. The *Watershed* loan boxes can be lent to teachers, parents, youth group leaders, and the Town for use in their *Earth Day* event.

Lessons in the *Watershed* loan boxes include studies of the water cycle, watershed locations, mapping and modeling, aquatic macro invertebrates and the health of streams, and a demonstration of how pollution accumulates within a water body. *Watershed* Loan boxes offer flexibility not found in more formal classroom programs, and they can be reserved on short notice and integrated easily into science discussions.

Similar to the loan box activities is the *Watershed* classroom program. It involves about an hour in the classroom. Ms. DiFrancesco can cover an entire grade of 300 students by providing the presentation for 3 or 4 classes a day for 3 or 4 days. This program is recommended for Upper Elementary and Middle School students.

Another popular classroom program is *Problems with Pollution*, which identifies both point source and nonpoint source pollutants. The target students are 3<sup>rd</sup> and 4<sup>th</sup> graders, and again, Ms. DiFrancesco can teach 3 or 4 classes a day for a few days to cover an entire grade of 300 students.

RWA also offers a field trip program called *Project W.A.T.E.R. (Watershed, Aquatic, Terrestrial Ecosystem Research)* for 6<sup>th</sup> through 8<sup>th</sup> graders. Although not recommended for the targeted number of 600 students, a select number of children can be accommodated and transported on the RWA Project W.A.T.E.R. bus. After an introductory and background lesson on watersheds and water quality testing in the classroom, the students participate in an intensive few hours of checking water temperature, pH, dissolved oxygen and nitrate levels in the field along the Mill River watershed in Hamden. Afterwards, students are assisted with data interpretation and share a discussion on the impact that human activities have on water quality.

Statistics for North Haven's 2013-2014 school year are as follows:

*Watershed* Loan boxes:

- Ridge Road School: none

- Clintonville School: none
- Green Acres School: none
- Montowese School: none
- North Haven Middle School: none

Classroom participation programs:

- Clintonville School: 294 students
- Ridge Road School: none
- Green Acres School: none
- Montowese School: none
- North Haven Middle School: none

This year's participation total of 294 students is down significantly from last year's total of 433. There was no *Watershed* Loan Box participation for any of the eligible students. It is suggested that eligible schools in North Haven find ways to integrate *Watershed* loan boxes into their science curriculum. With only one school participating in classroom programs, apparent is the need for participation incentive at Green Acres, Montowese, and Ridge Road Elementary Schools and the Middle School.

For more information on RWA's education program go to [www.rwater.com/products-and-services/education/](http://www.rwater.com/products-and-services/education/) or to request the educational brochure or *Watershed* loan box reservation form, contact RWA's *Educational Programs* office by phone at 203-777-1142 between the hours of 8:30 A.M. and 4:30 P.M., Monday through Friday.

### HazWaste Central

North Haven's Conservation Commission remains involved in efforts to protect ground water through its cooperation with RWA's HazWaste Central (Household Hazardous Waste Collection Center), located at 90 Sargent Drive in New Haven, by providing publicity and volunteers on two Saturdays during the summer and fall.

"*North Haven Days*" at HazWaste Central utilize high school and adult volunteers, but also provide a good opportunity for distributing brochures and pertinent information regarding watershed protection to participating families and the general public. In 2014, RWA noted that the Town of North Haven provided high volumes of volunteers comprised of both high school and adult residents assisting RWA with carrying out the mission of HazWaste Central. HazWaste Central flyers or educational kits can be provided to North Haven's schools or Town offices for as many students, youth groups, small businesses, and residents as needed. HazWaste Central's website is [www.rwater.com/products-and-services/hazwaste-central/](http://www.rwater.com/products-and-services/hazwaste-central/). For more information, email [ask.hazwaste@rwater.com](mailto:ask.hazwaste@rwater.com) or call 203-401-2712. North Haven's Town website

has information about and a link for HazWaste Central on its Public Works page, and a link to RWA's home page in its Community tab, under *Utilities*.

### North Haven Conservation Commission

The continued support of the Conservation Commission can be utilized to educate the public with displays and demonstrations at *North Haven's Earth Day* and coordination of PSAs and other forms of public outreach. The Commission plans to continue reaching out to North Haven students to involve them in the yearly event.

Hugh Davis, Chairman of the Conservation Commission, was contacted about 2014's projects and issues. *North Haven's Earth Day* in April 2014 had several hundred attendees consisting of students and residents as well as 35-40 environmental product vendors and environmental groups with displays, exhibits and demonstrations for children. The DPW was in attendance to promote single-stream recycling and leaf composting.

More information about the Conservation Commission is available on the Commission's tab on the Town's website at:  
[www.town.north-haven.ct.us/Government/ConservationCommission.asp](http://www.town.north-haven.ct.us/Government/ConservationCommission.asp)

### QRWA

QRWA's *Quinnipiac Watershed Based Plan* at [www.ct.gov/deep/lib/deep/water/watershed\\_management/wm\\_plans/quinnipiac/quinnipiac\\_river\\_finalwbp.pdf](http://www.ct.gov/deep/lib/deep/water/watershed_management/wm_plans/quinnipiac/quinnipiac_river_finalwbp.pdf) was completed in December 2013 and contains pertinent information and examples for educating the public and municipalities about the principles of Watershed Management. This is a valuable reference manual for most of the topics presented in North Haven's *Annual Report*. The *Watershed Plan* is linked to DEEP's website.

As reported in previous years, QRWA offers opportunities for educating small groups of students and adults through combined stewardship and education fee- or grant- based volunteer programs and training programs for adjacent Towns' Departments of Public Works employees. QRWA has the support of DEEP, USDA's Natural Resource Conservation Service and US EPA, and serves as a liaison between scientists, volunteers and Town employees.

Students and youth groups can learn how to be stewards of the Quinnipiac River through training with QRWA staff. Students can also learn to assist DEEP through a program performing rapid bioassessments of stream life: categorizing and verifying macro invertebrates, and through a program called *Streamwalks*, which involves a grant used to fund students and youth groups to do physical surveys of the River and its tributaries. Volunteers are trained to National Resources Conservation Service's standards to identify missing riparian buffers,

erosion, algae blooms from over-fertilization, and other issues affecting water quality.

QRWA's *Landowner Education* outreach project uses trained students and volunteers to distribute door-to-door material. QRWA offers an abbreviated educational brochure entitled *Quinnipiac Greenway Landowner's Guide* to help landowners reduce pollution, maintain vegetative buffers, and use tax credits to conserve watershed land. QRWA can also supply a full-length guide for municipal officials. This is part of an ongoing program to restore vegetation along the River and to urge land developers and municipalities to follow strict practice in providing protective buffers to ensure water quality.

Labor-intensive *Friends of the River*, as part of QRWA's Clean Water Act Sec. 319 grant program, has student volunteers (aged 14 and older) recruit homeowners and businesses adjacent to the Quinnipiac River to implement six best management practices to help reduce runoff pollution.

*Source to Sound* is an annual clean-up program on the North Haven portion of the Quinnipiac River. Although it is mostly filled with adult volunteers, it can involve students and youth groups. (See BMP 3E) North Haven's DPW assisted with the ultimate disposal of debris, which resulted from the 2014 annual clean-up program.

QRWA's *Rapid Bio-Assessment Program by volunteers* is another opportunity for public involvement. This grant-based program supports QRWA's volunteer monitoring and citizen science programs and helps DEEP gather much needed data and monitor the Quinnipiac River's water quality.

The event involves volunteers categorizing aquatic creature samples along various points along the Quinnipiac River and its incoming streams, and returning the samples back into the water, sending some samples to DEEP for verification. The contact/trainer for QRWA's RBV program is Becky Martorelli.

QRWA's *Stewardship and Education* programs:  
[www.qrwa.org/Content/Programs.asp](http://www.qrwa.org/Content/Programs.asp)

QRWA's *DPW Training*:  
[www.qrwa.org/Content/Training\\_Sessions\\_for\\_DPW.asp](http://www.qrwa.org/Content/Training_Sessions_for_DPW.asp)

QRWA contact information: 203-237-2237 or [qrwa@sbcglobal.net](mailto:qrwa@sbcglobal.net).

*North Haven's Earth Day* can provide the opportunity for recruiting volunteers for any of the above programs.

It is recommended that North Haven High School include QRWA as an appropriate agency through which environmentally minded students can fulfill community service/volunteer requirements.

### DEEP

The DEEP website has a page called *Environmental Websites for Teachers* found at: [www.ct.gov/deep/cwp/view.asp?a=2691&q=322532&depNav\\_GID=](http://www.ct.gov/deep/cwp/view.asp?a=2691&q=322532&depNav_GID=). Opportunity for environmental homework assignments and extra credit can be found in the links. One of the links, *The Watershed Game*, which is set up with novice and intermediate levels, explores watershed issues in a fun and colorful way.

### U.S. EPA

EPA's website for students in Grades K-12 at <http://www.epa.gov/students/> has homework resources and opportunities for learning about environmental issues. There is a *Teacher Resources and Lesson Plans* page with games, homework ideas and more at: [www.epa.gov/students/teachers.html](http://www.epa.gov/students/teachers.html). There are many ways in which to get involved on the *Adopt Your Watershed* page at <http://water.epa.gov/action/adopt/>, including ideas on the sidebar under "What You Can Do".

### Boy Scouts/Girl Scouts

One of the Boy Scouts contributions to environmental public service is the *Conservation Good Turn Award*, which focuses on the conservation of wildlife, energy, forests, soil, and water. Girl Scouts has including *Girl Scout Journeys* and the *Elliott Wildlife Values Project (EWVP)*, which combine wildlife conservation and environmental stewardship.

Future Plan: The Town plans to continue to utilize educational opportunities available from local, state, and national organizations as described above.

### Eagle Scouts

In 2014, the Eagle Scouts approached North Haven's DPW in an effort start dialogues for assistance with the implementation of the marking of catch basins and the education of residents in Town on the importance of stormwater protection. The Eagle Scouts will commence their assistance and efforts in Spring – Summer of 2015.

BMP 2B – Distribute information on lawn fertilizer, pesticides, impacts of overuse, and other household contaminants.

Measurable Goal: Educate 400 homeowners per year through brochures and fact sheets.

Measurable goal was achieved by making brochures available at the Library and Town Hall Annex and through distribution to homeowners in Town. In addition, the Town annually sponsors its *North Haven's Earth Day* where information and displays regarding these matters are made available to participants. Most of the residences in Town (those that are customers of RWA) periodically receive informational flyers in their water bills along with recommendations regarding safe disposal of hazardous wastes at HazWaste Central.

On September 30, 2014 a second *Pesticides Forum* was held in the Library Community Room. The panel included representatives from the Connecticut Agricultural Station, North Haven Department of Public Works, and Nancy Alderman, president of Environment and Human Health, Inc.

The following tasks were completed under BMP 2B in 2014:

1. Continue to research and recommend a brochure or fact sheet regarding lawn fertilizer, pesticides, impacts of overuse and other household contaminants to be printed and distributed to homeowners by the Town and/or made available at Town Hall or Town Hall Annex offices and the Library.
2. Provide materials for annual *North Haven's Earth Day*.
3. Recommend methods for further education and outreach avenues via local access cable television (NHTV) and/or links to the Town's website.

Further information and possible future opportunities to enhance homeowner education regarding fertilizers, pesticides and household contaminants that were identified by completion of the above-listed tasks are discussed below. Various websites for educational material about contaminants and fertilizer use have been explored for possibilities on how to display or present content.

One of the Town's Conservation Commission's main focuses is to work with Town officials and residents to make the community more eco-friendly, with *Integrated Pest Management (IPM)* being a spotlighted effort to establish a ban on using toxic pesticides and herbicides on all school lawns, playgrounds and playing fields, and to find alternatives to keep all of North Haven's public spaces safe and "green". The Commission continues to work with the Town's Board of Education, the DPW, DEEP and other State officials in its attempt to incorporate *IPM* into a successful plan and adopted policy.

*North Haven's Earth Day* provides an excellent opportunity to educate the Town's students and home/business owners on the hazards of overuse of fertilizer, pesticides, and other yard and household contaminants. Environmental brochures and flyers containing recommendations for adopting a more "green" lifestyle can be distributed to homeowners in town.

Northeast Organic Farming Association (NOFA) has an organic land care program (NOFA OLC) which focuses on sustainable landscaping practices. Their *Introduction to Organic Lawns and Yards* pdf is available online at: [www.organiclandcare.net/sites/default/files/upload/2011\\_nofa\\_booklet\\_online\\_final.pdf](http://www.organiclandcare.net/sites/default/files/upload/2011_nofa_booklet_online_final.pdf). Information: NOFA website: [www.organiclandcare.net](http://www.organiclandcare.net); NOFA is also on Facebook. Connecticut's NOFA website: [www.ctnofa.org/](http://www.ctnofa.org/); phone: (203) 308-2584.

As recommended in the past, reference brochures can include:

- QRWA's *Greenway Landowners' Guide to the Quinnipiac River & its Tributaries* 2-page abridged version found here: [www.southington.org/filestorage/17210/50/2424/70/Stormwater\\_Regulations.pdf](http://www.southington.org/filestorage/17210/50/2424/70/Stormwater_Regulations.pdf)
- National Watershed Coalition's *What is a Watershed?* at [www.watershedcoalition.org/?page\\_id=79](http://www.watershedcoalition.org/?page_id=79)
- Rivers Alliance of Connecticut's *The Importance of Streamside Buffers* at <http://conservect.org/LinkClick.aspx?fileticket=FGon71VYdFE%3D&tabid=267>

EPA's brochure and online video *After the Storm* is a comprehensive guide to understanding stormwater management. It explains stormwater runoff and the problems of pollution contained in runoff relating not only to lawn care and residential landscaping, but also septic systems, auto care, and pet waste. It also contains information for those involved with commercial establishments, construction sites, agricultural areas, and automotive facilities.

As suggested previously, information can also be made available through Public Service Announcements (PSAs) and programs on North Haven's local cable channels at NHTV, Channel 18- Local Access channel, Channel 19- Educational Access channel, and Channel 20- Governmental Television programming. A representative from NHTV was previously contacted for information about the studio and possible bulletins and programs.

In December 2014, North Haven's Zoning Enforcement Officer and the Inland Wetlands Commission Chairman conducted an informational session on NHTV providing education to the public on Erosion Control Measures, reasons behind the regulations of Inland Wetlands and ways to improve and protect Inland Wetlands throughout North Haven.

Students in various environmental science or communication classes or clubs at North Haven High School could be encouraged to create educational PSAs if coordinated with the Town's Superintendent of Schools, the High School Principal, and with applicable teachers or club leaders.

The Town could allow for a time slot to present environmental videos such as EPA's *After the Storm*. For the *After the Storm* brochure and video, go to: <http://water.epa.gov/action/weatherchannel/> .

For information about submittals of PSAs, programs, and general information about NHTV go to [www.NHTV.com](http://www.NHTV.com) .

The Town government website [www.town.north-haven.ct.us](http://www.town.north-haven.ct.us) can be used to post similar educational information. Links to RWA [www.rwater.com/](http://www.rwater.com/) and QRWA [www.qrwa.org/](http://www.qrwa.org/) are already posted on the website, and links to Rivers Alliance of Connecticut [www.riversalliance.org/main.cfm](http://www.riversalliance.org/main.cfm), the National Resources Defense Council (NRDC) [www.nrdc.org/](http://www.nrdc.org/) and the NRCS [www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/](http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/) can be introduced in a tab for more general topics such as watershed protection, "green" living, and environmental awareness and stewardship.

Getting the word out about *North Haven's Earth Day* and HazWaste's *North Haven-sponsored Days* can be achieved in the *Announcements* sidebar on the Town's website.

**Future Plan:** The Town plans to continue to distribute and make available brochures and fact sheets, continue sponsoring the annual *North Haven's Earth Day* and explore other opportunities, such as local access cable television and the Town's website to further educate homeowners regarding lawn fertilizer, pesticide use, impacts of overuse and other household contaminants.

**BMP 2C –** Continue to reduce the impact of failing septic systems and their effect on the quality of water bodies in the Town of North Haven.

**Measurable Goal:** Update the number of homes currently using septic systems.

Educate 400 homeowners per year through brochures and fact sheets. *In 2010 the Engineering Office identified and mapped areas in Town that use septic systems, and some septic system homeowners received brochures on septic system care. Additionally, the Quinnipiack Valley Health District (QVHD) has brochures available at their office. The Health District conducts inspections of septic systems and enforces corrective actions should failing septic systems be detected. Lastly, add a dedicated section on septic systems, care and feeding and groundwater protection on the Town's website under the DPW portion of the site.*

The following tasks were completed under BMP 2C in 2014:

1. Continue to recommend brochures or fact sheets regarding the impact of failing septic systems and their effect on the quality of water bodies; to be printed and distributed to homeowners by the Town and/or available on the Town's website.

2. Continue to recommend methods for the most effective outreach avenues via local access cable television and/or links on the Town's website, or annual informational workshop, as originally proposed in the *2004 Stormwater Management Plan*.
3. Distribute septic system information to homeowners of newly built homes.

Further information and possible future opportunities to enhance homeowner education regarding septic systems that were identified by completion of the above-listed tasks are discussed below.

*Various websites have been explored for pertinent content.*

QVHD offers information to educate homeowners about the impact of failing septic systems and the effect on regional water quality. They have various brochures available as well as their *Do Your Part! Be Septic Smart!* Page, on their website at [www.qvhd.org/septic-system-care](http://www.qvhd.org/septic-system-care).

Connecticut Onsite Wastewater Recycling Association (COWRA) has a brochure that focuses on proper septic system maintenance: *Homeowner's Guide to Septic Systems* ([www.cowra-online.org/images/COWRA\\_Brochure\\_Rev7.pdf](http://www.cowra-online.org/images/COWRA_Brochure_Rev7.pdf)). This small, 4-fold (two sided) pdf is recommended for printing and distribution to applicable homeowners in Town based on its content and size. COWRA has additional information on its website's Consumer's Page: [cowra-online.org/consumerspage.html](http://cowra-online.org/consumerspage.html).

National Small Flows Clearinghouse (NSFC) - (as part of National Environmental Services Center) 3-part collection of brochures:

Part 1: *So...now you own a septic system*  
[www.nesc.wvu.edu/pdf/ww/septic/septic\\_tank1.pdf](http://www.nesc.wvu.edu/pdf/ww/septic/septic_tank1.pdf)

Part 2: *The care and feeding of your septic system*  
[www.nesc.wvu.edu/pdf/ww/septic/septic\\_tank2.pdf](http://www.nesc.wvu.edu/pdf/ww/septic/septic_tank2.pdf)

Part 3: *Groundwater protection and your septic system*  
[www.nesc.wvu.edu/pdf/ww/septic/septic\\_tank3.pdf](http://www.nesc.wvu.edu/pdf/ww/septic/septic_tank3.pdf)

NSFC also has free downloads related to septic systems on their *Septic Systems* page: [www.nesc.wvu.edu/subpages/septic.cfm](http://www.nesc.wvu.edu/subpages/septic.cfm). This link can be added to North Haven's website under it's newly dedicated septic system care section.

The North Haven Library (contact number: 203-239-5803) has available space for pertinent environmental and educational material. Also, the Public Works Department and Town Hall provide up-to-date informational material for visitors.

A QVHD sanitarian representative can be available (schedule-permitting) to participate in the *North Haven Earth Day* event with an informational workshop or question and answer session to educate the public about healthy septic systems. (QVHD is scheduled to participate in North Haven Earth Day, April 2015.)

The contact at QVHD for public outreach and health education programs is Deborah Culligan at 203-248-4528. QVHD is linked on North Haven's website in the *Community* tab, under "Health Care": [www.qvhd.org/](http://www.qvhd.org/). It is recommended that a *Septic System Care* tab be added to provide homeowners with the information and fact sheets as mentioned above.

DEEP has a link to an informative pdf called *Septic Systems 101- Operation and Maintenance of a Subsurface Sewage Disposal System* at [www.ct.gov/dph/lib/dph/environmental\\_health/environmental\\_engineering/pdf/Septic\\_Systems\\_101.pdf](http://www.ct.gov/dph/lib/dph/environmental_health/environmental_engineering/pdf/Septic_Systems_101.pdf). EPA has *A Homeowners Guide to Septic Systems*: [www.nesc.wvu.edu/pdf/ww/septic/epa\\_septic\\_guide.pdf](http://www.nesc.wvu.edu/pdf/ww/septic/epa_septic_guide.pdf). As previously suggested, these links can be added to North Haven's website along with other related links and information about septic system care and wastewater.

Future Plan: The Town plans to continue to use brochures and fact sheets and to explore other opportunities, such as local access cable television (NHTV) and the Town's website, to further educate homeowners regarding the impact of failing septic systems and their effect on the quality of water bodies in the Town of North Haven. By adding a topic tab/web page for *Septic System Care* on North Haven's website's Community/Health page dedicated to QVHD, all pertinent information can be explored in one place.

BMP 2D – Reduce nutrient loading through pet wastes and waterfowl wastes reduction.

Measurable Goal: Post four signs in the Town; develop and distribute flyers by the end of year four.

The CT River Coastal Conservation District website has information and links on its *Pet Waste, Water Quality & Your Health* page at [www.conservect.org/ctrivercoastal/PetWaste/tabid/317/Default.aspx#PET\\_WASTE MANAGMENT RESOURCES AND LINKS](http://www.conservect.org/ctrivercoastal/PetWaste/tabid/317/Default.aspx#PET_WASTE_MANAGEMENT_RESOURCES_AND_LINKS). CT DEEP has a brochure called *Do Not Feed Waterfowl*. UConn has a fact sheet on how to manage manure for landowners on which horses and other barn animals live at <http://animalscience.uconn.edu/extension/publications/manuremanagement.htm>. EPA's pdf *Animal Waste and Water Quality* is available online at <http://cfpub.epa.gov/npstbx/files/animalwaste.pdf> .

*The information from the above websites will be used as educational material for the public regarding pet waste disposal, discouraging the feeding of waterfowl at*

*public areas, and livestock manure piles. North Haven Earth Day can provide the opportunity for educating the public and distributing appropriate material related to animal waste and water quality. The North Haven Library and the Public Works Department can display and provide brochures for the public. The Town may consider an ordinance prohibiting feeding of waterfowl if education is ineffective.*

*Signs have previously been posted at Town Parks, particularly Sinoway Pond and Todd's Pond, which are locations where residents have frequently fed geese. Vegetative buffers have been planted around Todd's Pond in an effort to discourage geese from flocking there. Rehabilitation on the Pond began in 2012 and was completed in 2014 to improve water quality, improve buffers, and discourage waterfowl. (See BMP 7A).*

*Signs regarding curbing and picking up after of your dog/pet were developed by the Public Works Department and have been installed on the Town Green, Sinoway Pond and Montowese Park.*

The following tasks were completed under BMP 2D in 2014:

1. Continue to identify and recommend a brochure or fact sheet regarding the impact of pet and waterfowl wastes on the quality of water bodies; to be printed and distributed to homeowners by the Town and/or displayed on the Town website.
2. Continue to display/replace missing signs advising against feeding waterfowl or encouraging collection of pet wastes at appropriate locations in the Town.
3. Continue to research wording and material for ordinances prohibiting the feeding of waterfowl.

*QRWA, DEEP and EPA websites were explored for pertinent information.*

The majority of ponds and streams in North Haven drain into and contribute to the Quinnipiac, Muddy, and Mill Rivers. Reducing nutrient loading from waterfowl and other animal wastes can enhance water quality.

On-going from previous years, QRWA volunteers at the Town's ponds have asked visitors to cease feeding geese and ducks, and have informed them verbally and with flyers of the volunteer effort to replace vegetative buffers around ponds, explaining that buffers provide natural and safe food for waterfowl and reduce waste in the ponds.

Signs discouraging the feeding of waterfowl and those that remind pet owners to clean up after their pets have been placed at access points to the Quinnipiac and

Muddy Rivers, Town pond areas, parks, and other places in town where waterfowl congregate or where dogs are walked.

According to QRWA's Quinnipiac River Watershed Based Plan, Urban River Stewardship signs have been installed along the Quinnipiac River.

As noted in previous years, a sign created by New York Department of Environmental Conservation (NY DEC) and found online at [www.dec.ny.gov/docs/regions\\_pdf/feeddock.pdf](http://www.dec.ny.gov/docs/regions_pdf/feeddock.pdf) is posted in New York locations where waterfowl live. It may be used with permission from the NY DEC at [www.dec.ny.gov/animals/7001.html](http://www.dec.ny.gov/animals/7001.html). The last paragraph would have to be reworded to direct inquiries to *Connecticut Department of Energy and Environmental Protection*.



If local ordinances are eventually put into effect, signs for *pet waste pickup and proper disposal* should reflect their specifics and combine with an image.

Examples found online include the following:



**Future Plan:** The Town plans to continue to distribute flyers to educate residents regarding the impact of pet and waterfowl wastes on the quality of water bodies in the Town of North Haven.

**BMP 2E –** Develop and maintain a library of educational materials on stormwater management.

**Measurable Goal:** Collect data and information by end of year one. Catalog and organize materials by end of year two. Distribute library of educational material to staff employees of Town departments by the end of year four. Make the library of educational materials available to public and consultant community by the end of year five.

*Measurable goal has been achieved by assembling a binder of educational materials and placing the binder in the Town's Public Library.*

**Future Plan:** The Town plans to continue to collect additional educational materials regarding stormwater management and other related water quality issues to make available to the public at the Town Library, and to update the binder as appropriate.

**BMP 2F –** Alternate information sources – website, brochures, small posters.

**Measurable Goal:** Develop/select a brochure and develop a website by the end of year two.

*Measurable goals were achieved in previous years by the inclusion of QRWA's "Friends of the River" poster on the Town's website. The poster has since been removed so the opportunity exists for the addition of another environmental and educational poster or printable brochure. Numerous environmental, stormwater management and watershed protection websites were explored for appropriate links to add to North Haven's town website.*

The following task was completed under BMP 2F in 2010 and continued through 2014:

Research and update content, such as brochures or posters regarding stormwater management, for inclusion on a page or pages on the Town's website or on links to other stormwater or environmentally related websites.

Other websites, such as the QRWA, North Haven Trail and Peter's Rock Associations have been explored to identify brochures or posters regarding stormwater management, with the following findings:

An environmental awareness or "green living" tab could be added to North Haven's website to serve as a clearinghouse for related and pertinent material and links to other websites, facts, brochures and posters for stormwater

management and related environmental education. Links and information could be cross-referenced on the appropriate tabs and pages already established. The new page could be divided into sections for students/kids and for homeowners, including a subcategory for those with septic systems.

As noted previously, the North Haven Trail and Peter's Rock Associations are already linked to North Haven's website. The North Haven Library can include information on its website about the environmental and stormwater management brochures and material available there, including copies of *Annual Reports on the General Permit for the Discharge of Stormwater from Small MS4s*.

EPA's *Stormwater Outreach Materials and Reference Documents* link has various materials to download and print or to order:  
<http://water.epa.gov/polwaste/npdes/stormwater/Stormwater-Outreach-Materials-and-Reference-Documents.cfm>

One good brochure from EPA called *Make your Home the Solution to Stormwater Pollution* is at [www.epa.gov/npdes/pubs/solution\\_to\\_pollution.pdf](http://www.epa.gov/npdes/pubs/solution_to_pollution.pdf).

An EPA *door hanger* with check boxes for different pollutants found in the storm sewer system in the area (for volunteers to determine) can be found at [www.epa.gov/npdes/pubs/doorhanger.pdf](http://www.epa.gov/npdes/pubs/doorhanger.pdf)

EPA has 2 pages of *stormwater stickers* for kids to print up:  
[www.epa.gov/npdes/pubs/stormwaterstickers.pdf](http://www.epa.gov/npdes/pubs/stormwaterstickers.pdf).

EPA has a *clean water bookmark* available at [www.epa.gov/npdes/pubs/nps\\_month\\_bookmark.pdf](http://www.epa.gov/npdes/pubs/nps_month_bookmark.pdf).

EPA also has a placemat with a *stormwater facts crossword puzzle* to fill out:  
[www.epa.gov/npdes/pubs/stormwaterplacemat.pdf](http://www.epa.gov/npdes/pubs/stormwaterplacemat.pdf).

DEEP's *Stormwater Management* link can be added to North Haven's website:  
[www.ct.gov/deep/cwp/view.asp?a=2721&q=325702&depNav\\_GID=1654](http://www.ct.gov/deep/cwp/view.asp?a=2721&q=325702&depNav_GID=1654).

DEEP's *Environmental Protection Begins with You* page, which is full of information and tips, would be an appropriate link on North Haven's website:  
[www.ct.gov/deep/cwp/view.asp?a=2690&q=322450&depNav\\_GID=1511&depNav](http://www.ct.gov/deep/cwp/view.asp?a=2690&q=322450&depNav_GID=1511&depNav).

DEEP's informative *Earth Day 40* video link can be found at:  
[www.depdata.ct.gov/video/mainpsa.asp?url=http://u10videos.com/DEP/EarthDay/earthday.wmv&name=Earth%20Day%2040:%20Connecticut's%20Environment%20Past,%20Present%20and%20Future](http://www.depdata.ct.gov/video/mainpsa.asp?url=http://u10videos.com/DEP/EarthDay/earthday.wmv&name=Earth%20Day%2040:%20Connecticut's%20Environment%20Past,%20Present%20and%20Future).

QRWA's *Quinnipiac River Watershed Based Plan* at [www.ct.gov/deep/lib/deep/water/watershed\\_management/wm\\_plans/quinnipiac/q](http://www.ct.gov/deep/lib/deep/water/watershed_management/wm_plans/quinnipiac/q)

[uinnipiac\\_river\\_finalwbp.pdf](#) contains a wealth of information and area Towns' examples of Watershed Protection practices and proposals.

As noted previously, any of the informational or educational posters/brochures from BMPs 2B, 2C, 2D, and 2E can be recommended and added/linked to an environmental page on North Haven's website or displayed in Town offices, schools, or the Library.

**Future Plan:** The Town plans to continue reviewing links to add to the Town's website from other websites, such as those identified above to include fact sheets and printable brochures or posters regarding stormwater management and other water quality issues.

### 3.0 Public Involvement and Participation

**BMP 3A** – Introduce the *North Haven Stormwater Management Plan* to the public.

**Measurable Goal:** Hold a public workshop to kick off the Public Education and Outreach Program in Year 1.

*Measurable goal was achieved by holding a public meeting on March 26, 2004 to introduce the Plan.*

The following task was again explored under BMP 3A in 2014:

Consider possible agenda items for public meetings if needed to reinforce interest in the *Stormwater Plan* and related pollution prevention topics. As previously mentioned, a September 30, 2014 *Pesticides Forum* was held for the public in the Library Community Room. Supporting stormwater information is available to residents elsewhere, as enumerated throughout this report.

The DEEP website was explored, as well as Stormwater Management material from other towns in Connecticut in past years.

It has been recommended that the Public Works Department advertise (complying with all State and local public notice requirements) an annual public meeting/hearing to reintroduce the *Stormwater Plan* and related pollution prevention topics. Ideally, participants can include teachers and students, and engineers who regularly make submissions to the Planning and Zoning or Inland Wetlands Commissions. The Town website, NHTV, the North Haven Library, and the Town Hall can display the memo or post the date/advertise the meeting.

Content for the meeting can include a *Stormwater Management Plan* power point presentation by an Environmental Professional, the Town Engineer or Public Works Director or another qualified person or agency. A question and answer

period with a QVHD or DEEP representative, if possible, can be added. The presentation should include the *MS4 Report*, DEEP's various *General Permits for the Discharge of Stormwater*, the 2004 Connecticut Stormwater Quality Manual, QRWA's Quinnipiac River Watershed Based Plan, and stormwater regulations and requirements for plan submissions. Brochure handouts from DEEP and US EPA should be made available.

Pollution prevention steps that the Town and its citizens can practice can be discussed, with topics including the street sweeping schedule, catch basin and outlet cleaning, roadside litter pick-up, and the use of environmentally friendly salt products for deicing streets.

For those who wish to conduct development in town, reference material which includes the latest revisions of the following should be made available in the form of a handout: General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4s) (reissued January 9, 2013 and extended to January 8, 2016), General Permit for the Discharge of Stormwater and Dewatering Wastes Associated with Construction Activities (reissued August 21, 2013 and effective October 1, 2013), 2000 Connecticut Department of Transportation Drainage Manual, 2004 Connecticut Stormwater Quality Manual, and 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

*North Haven's Stormwater Management Plan* can be made available for public education at *North Haven's Earth Day* or at the *Town Library*.

**Future Plan:** The Town will rely on the public education and outreach BMPs discussed above to maintain a high degree of public interest in the *Stormwater Plan* and related pollution prevention topics.

BMP 3B – Public hearing to present the *North Haven Stormwater Management Plan*.

**Measurable Goal:** Public notification, hold hearing in Year 1.

*It is believed that notification and a hearing were conducted.*

**Future Plan:** Unless re-notification and a hearing are required, there are no future plans in this area because many other avenues for public outreach are planned, as described herein.

BMP 3C – Implement Neighborhood Watch.

**Measurable Goal:** 20 people trained and signed on as watchmen in years 3 through 5.

*Measurable goal was not achieved. The program was impractical because of lack of participation and was therefore discontinued.*

Future Plan: The neighborhood watch BMP will be modified, using volunteer programs through QRWA and RWA as substitutes.

BMP 3D – Storm drain marking / decals.

Measurable Goal: 40 storm drains decaled by 5 volunteers in years one through five.

*In 2014, student volunteers from UConn, Quinnipiac University and North Haven High School continued to mark storm drains. An additional 700 drains were decaled and DPW sent out letters containing stormwater awareness inserts to applicable neighborhood residents.*

Additional information regarding the storm drain marking program is described below:

The QRWA website describes fee- or grant-based programs offered, combining stewardship and education. The outreach project which best provides an opportunity for teams of students or youth groups to earn community service hours and/or Eagle Scout badges is to perform storm drain marking while accompanied by adult volunteers. QRWA requires funding from the Town (either directly or through grants) to organize and train teams and to order appropriate detail stickers (either specialty or generic) and informational flyers to cover the goal of marking all storm drains and distributing related material to the adjacent neighborhood homes and businesses.

For more information on *Storm Drain Marking*, go to the EPA link to storm drain marking: <http://water.epa.gov/polwaste/npdes/swbmp/Storm-Drain-Marking.cfm>

Future Plan: The Town plans to continue this activity by placement of additional catch basin markers in other areas of Town by supervised student volunteers until all applicable catch basins (2,500+) are decaled.

BMP 3E – Litter and debris cleanup

Measurable Goal: Work with the QRWA and other community organizations to participate in cleanup events focusing on the Quinnipiac River. Involve the North Haven Conservation Commission and 20 volunteers by Year 5.

*Measurable goal has been substantially achieved by QRWA in conducting their annual Q-River Cleanup from Source to Sound. QRWA has local coordinators in each Town in the watershed, including North Haven, so that litter along all sections of the river is removed. The Town Public Works Department*

*participates by hauling away and properly disposing of the litter and debris collected by the volunteers.*

*The annual cleanup has been extremely effective in improving the appearance of the river and its banks. A declining amount of litter and debris is observed each year indicating that debris that had accumulated over a long period of time before the annual cleanups were initiated has been largely eliminated.*

*The Department of Public Works has also picked up trash removed by North Haven Trail Association volunteers at cleanup events along certain sections of the Quinnipiac River.*

*Twice in 2014, North Haven High School students provided Park clean-ups where litter and storm debris are concerned.*

**Future Plan:** The Town plans to continue to work closely with QRWA, the North Haven Trail Association, and the Conservation Commission to intensify, expand and improve litter cleanup, as needed. Additionally, through the Quinnipiac University (QU) "Big Event" the Town will work with QU student volunteers to clean-up sensitive river and watershed areas of litter.

#### 4.0 Illicit Discharge Detection and Elimination Program

**BMP 4A** – Continue to develop and then enforce an ordinance that prohibits illicit discharge and dumping and authorizes enforcement actions, including on private property.

**Measurable Goal:** Develop an ordinance in year one.

*A model ordinance to prohibit illicit discharges was forwarded to the Town for its consideration. Adoption of any new Town ordinance is a lengthy process involving legal reviews and careful consideration of how the proposed ordinance would be enforced by whom and at what cost. Hence, the suitability of the model ordinance to prohibit illicit discharges will be determined by the Town and/or the Town Attorney.*

**Future Plan:** The Town plans to evaluate the model ordinance and determine its suitability for use.

**BMP 4B** – Develop and implement a program in conjunction with existing public outreach activities to inform the public employees, businesses, and the general public of hazards associated with illicit discharges.

**Measurable Goal:** Develop an outreach program by the end of year one.

*Measurable goal has been partially achieved, as described under section 2.0 of this report. Also, Department of Public Works employees and Water Pollution Control Facility employees receive annual stormwater training through the industrial stormwater management program. Additionally, through the efforts of QRWA, several North Haven business owners and employees have taken the "Friends of the River" Business Program Pledge to conduct their businesses in a manner so as to prevent stormwater pollution and improve water quality.*

*In 2012 the Public Works Department sponsored a stormwater/illicit discharge discussion and lunch at the Public Works Garage office. Speakers included representatives from DEEP and QRWA. Present were Public Works and Land Use personnel, members of the Inland Wetlands Commission, environmental consultants, and other persons associated with the Town and related projects.*

**Future Plan:** As described above, the Town plans to continue its outreach programs and will include education regarding the water quality hazards of illicit discharges.

**BMP 4C –** Create a storm sewer mapping system showing all known storm drain outfalls and receiving waters.

**Measurable Goal:** Map and verify the location of all known outfalls from a pipe or conduit with a diameter of 12" or larger by end of year two.

*Measurable goals were achieved in year one as part of the Stormwater Management Plan.*

**Future Plan:** The Town plans to review and update the mapping, particularly in areas where new developments have been built or drainage improvements have been made.

**BMP 4D –** Develop Standard Operating Procedures (SOPs) to detect and address illicit discharges that include, at a minimum, the following components:

- Identification of priority areas for assessment;
- Procedures for receipt and consideration of complaints;
- Procedures for catch basin and manhole inspections for illicit discharges;
- Procedures for dry weather surveys including field screening for non-stormwater flows and tests of selected parameters and bacteria;
- Characterizing any discharges found;
- Procedures to trace an illicit discharge;
- Procedures to remove an illicit discharge;
- Procedures for referral to DEEP of illicit discharges;
- Record keeping and tracking of all actions taken to detect and address illicit discharges; and
- Procedures for program evaluation and assessment.

**Measurable Goal:** Develop SOPs to detect illicit discharges by the end of year two.

**Measurable Goal:** Determine 50% of illicit discharges by the end of year two and 90% by end of year three.

**Measurable Goal:** Eliminate 90% of illicit discharges by the end of year three.

**Measurable Goal:** Detect and eliminate most illicit discharges by the end of year four.

*A draft "Illicit Discharge Detection and Elimination (IDDE) Program" is currently under consideration by the Town. The draft program addresses the above listed SOPs and goals and is subject to revisions before implementation.*

*In the meantime, Department of Public Works employees report any unusual conditions they may observe to supervisors for follow-up. In addition, the Town and the Quinnipiac Valley Health District investigate and correct, as needed, citizen complaints or inquiries regarding possible illicit discharges. It is suggested that the Illicit Discharge Detection and Elimination Manual- A Handbook for Municipalities by the New England Interstate Water Pollution Control Commission be reviewed for pertinent information.*

**Future Plan:** The Town plans to review the draft IDDE program described above and implement a plan to detect and address illicit discharges.

**BMP 4E –** Develop and implement a stormwater monitoring/sampling plan.

**Measurable Goal:** Each year, take six in-stream samples from three tributaries of the Quinnipiac River, including three upstream and three downstream samples. Samples will be analyzed by a State approved laboratory.

*The Town is in full compliance with the stormwater monitoring requirements of the General Permit. Eleven annual monitoring events have been completed through the first eleven years of the stormwater management program.*

*The monitoring data for 2013 and 2014 did not identify the presence of obvious illicit discharges within the upstream or downstream portions of the tributaries sampled. There were a few exceedances of EPA benchmark values for stormwater quality, but none of the exceedances were indicative of illicit discharges.*

*Six in-stream locations were sampled in 2013 and 2014. Upstream and downstream sampling was conducted in Pine Brook, Muddy River, and Little River. Sampling locations in each of these streams are shown on Figures 1*

through 3, respectively. Various land use types are present in the watersheds for each of the sampling locations, as shown on Table 1.

Testing parameters are discussed as follows:

*pH:* Upstream and downstream values were consistently in the neutral range town wide, with no unusually high values to indicate alkaline conditions or unusually low values to indicate acidic conditions. Upstream and downstream pH values yielded opposite results in 2013 compared to 2014. In 2013, pH values consistently decreased in the downstream direction, but in 2014, pH values increased in the downstream direction.

*Hardness:* Hardness values vary from the soft water range, with values less than 70 mg/L in Pine Brook, to moderately hard water in the Muddy River, where values ranged from 83 to 97 mg/L. Except for the 2014 samples in the Little River, hardness increased downstream. Hardness may increase in the downstream direction as runoff picks up greater quantities of dissolved minerals that contribute to hardness and delivers them to the receiving stream.

*Conductivity:* Conductivity is an indirect measure of the presence of inorganic dissolved solids such as sodium, chloride, nitrate, phosphate, etc., which may conduct an electrical current. Like hardness, conductivity increased in the downstream direction, except for the 2014 samples in the Little River. Conductivity may increase in the downstream direction as runoff picks up greater quantities of inorganic dissolved solids that increase conductivity and delivers them to the receiving stream. Except for the 2013 and 2014 samples from the Pine Brook upstream location, none of the samples met the benchmark value of 50 to 100 umhos/cm for conductivity.

*Oil and Grease:* Oil and grease were detected in one sample in 2013, the only one of the 66 stormwater samples collected since the start of the monitoring program (6 samples/year x 11 years). The Little River upstream sample of 2013 showed a value of 9 mg/L, the source of which is not clear. It is not suspected that illicit discharges of oil and grease are present because there were no visual signs of oil or grease and the area draining to that sample point is largely undeveloped. Oil and grease was not detected in the 2014 sampling of the Little River upstream sample, suggesting that there is not a continuous source of oil and grease in the Little River watershed draining to that sampling point.

*Chemical Oxygen Demand (COD):* COD was not detected in all 6 samples for 2013, indicating the absence of oxygen-demanding organic matter in those samples. In contrast, all six samples from 2014 contained COD at concentrations ranging from 8 to 27 mg/L, all of which were well below the benchmark value of 75 mg/L for COD.

*Turbidity: Turbidity is a measure of the cloudiness of water, often caused by suspended solids and colloidal matter. In the 2013 samples, turbidity ranged from 0.9 NTU in the Pine Brook downstream sample to 8.3 NTU in the Pine Brook upstream sample. In 2014, turbidity ranged from 5.4 NTU in the Pine Brook downstream sample to 12.0 NTU in the Muddy River downstream sample. For 2013 and 2014, turbidity decreased in the downstream direction in Pine Brook. The Pine Brook upstream sample may have contained natural colloidal matter as it picked up runoff from the heavily vegetated slopes of Sleeping Giant. Turbidity, like hardness and conductivity, increased in the downstream direction in the Muddy River and Little River, except for the 2014 Little River samples, which like hardness and conductivity decreased in the downstream direction.*

*Total Suspended Solids (TSS): TSS concentrations are consistently and significantly less than DEEP's benchmark of 90 mg/L for both 2013 and 2014, indicating that significant sources of suspended solids (such as from erosion at construction sites) were not present in any of the monitored areas.*

*Total Phosphorus (TP): TP did not exceed DEEP's benchmark of 0.40 mg/L in any of the 2013 and 2014 samples. Total phosphorus, which includes organic and inorganic phosphorus, is associated with runoff, such as from agricultural sites, which contains organic particulates or soil. The consistently acceptable TP concentrations indicate the absence of significant sources of organic particulates or soil in the monitored areas.*

*Nitrogen Compounds, Ammonia, Total Kjeldahl Nitrogen (TKN), Nitrate, and Nitrite:*

*Ammonia was detected at a maximum concentration of 0.18 mg/L in the twelve samples from 2013 and 2014, all well below the benchmark value of 10 mg/L. Where present, ammonia was detected at very low levels, indicating the absence of sources of raw wastewater discharges within the monitored areas.*

*TKN, which is a measure of ammonia plus organic nitrogen, was detected only at very low concentrations in all twelve samples from 2013 and 2014. Given the virtual absence of ammonia as discussed above, the concentrations of TKN were attributed to the presence of organic nitrogen in those samples. Organic nitrogen is a byproduct of living organisms and includes proteins peptides, nucleic acids and urea. Hence, the low levels of TKN suggest minimal sources of organic nitrogen in the monitored areas.*

*Nitrate and nitrite are oxidized states of nitrogen, with nitrite being an intermediate, unstable form that is rapidly oxidized to nitrate. In 2013, four of the six samples exceeded the benchmark value of 0.68 mg/L and in 2014, two of the six samples exceeded that benchmark. Nitrate sources, such as runoff from fertilized landscapes or agricultural areas, are suspected to be contributing to the*

*sample areas, except for the Little River upstream sample, which is representative of runoff from a wooded area.*

*E. Coli: Coliform bacteria, common to the intestinal tract of both humans and warm-blooded animals, provide an estimate of the degree of fecal contamination from human and animal wastes. All but one sample in 2013 and all of the 2014 samples indicated moderate to high levels of E. Coli. It appears to be ubiquitous in runoff samples town wide, suggesting the common occurrence of fecal matter from dogs, deer, fowl, etc. throughout the monitored areas.*

*A tabulation of the 2013 and 2014 monitoring rounds, topographic maps showing the sampling locations, and the laboratory report on the 2014 sampling are presented in Appendix A of this report.*

**Future Plan:** The Town plans to continue annual stormwater sampling rounds so as to maintain compliance with monitoring requirements.

**BMP 4F –** Develop and implement a plan to detect and address future non-stormwater discharges.

**Measurable Goal:** Develop procedures to implement the program by the end of year five.

*As noted previously under BMP 4D, a draft “Illicit Discharge Detection and Elimination (IDDE) Program” is currently under consideration by the Town. The draft program includes on-going procedures to detect and correct future non-stormwater discharges.*

**Future Plan:** The Town plans to continue to evaluate information gained from implementation of BMPs 4A through 4E so as to implement on-going procedures to detect and address potential non-stormwater discharges.

**BMP 4G –** Develop procedures to evaluate BMPs and measurable goals of the *Illicit Discharge Detection and Elimination Program*.

**Measurable Goal:** Develop procedures to evaluate the program by the end of year two.

*Measurable goal was not achieved because it relies on the experiences gained from other prerequisite activities outlined in the Stormwater Management Plan.*

**Future Plan:** The Town plans to continue to evaluate information gained from implementation of BMPs 4A through 4F so as to develop procedures to evaluate the *Illicit Discharge Detection and Elimination Program*.

## 5.0 Construction Site Stormwater Runoff Control

BMP 5A – Update existing ordinances to ensure compliance with the General Permit, State regulations and the Storm Sewer Use Ordinance. Ordinances will require construction operators disturbing at least one acre to obtain a permit from the Town. The Town may, at their discretion, require erosion and sediment controls for smaller sites based on local conditions and needs.

Measurable Goal: Review existing ordinances and draft new ordinance if necessary to meet General Permit requirements by end of year one.

Measurable Goal: Update existing ordinances to meet General Permit requirements by end of year two.

*Measurable goal was generally achieved because the Town's existing regulations already require a certified erosion and sediment control plan for any development when the disturbed area is cumulatively more than one-half acre. In addition, Town wetlands regulations regulate activities within a 50-foot buffer strip between any developed areas and adjacent wetlands or watercourses.*

Future Plan: The Town plans to continually review and evaluate its erosion and sediment control requirements for construction sites so as to provide effective and appropriate control measures.

BMP 5B – Notify construction site developers and operators of the requirements for registration under the General Permit for the Discharge of Stormwater and Dewatering associated with Construction Activities.

Measurable Goal: Implement registration requirements for all projects exceeding one-acre threshold by end of year one.

Measurable Goal: Continue compliance with registration requirements years two through five.

*Measurable goals were achieved through the standard operating procedures of the Town's Engineering and Land Use Offices, notifying developers early in the local permitting process of DEEP registration requirements for discharge of stormwater from construction sites with land disturbance of one acre or more.*

Future Plan: The Town plans to continually ensure compliance with DEEP General Permit (GP) registration requirements for all projects exceeding the one-acre threshold.

BMP 5C – Develop a plan that will require construction site operators to implement appropriate erosion and sediment control BMPs.

**Measurable Goal:** Continue requirements for construction site operators to implement appropriate erosion and sediment control BMPs, in years one through five.

*Measurable goals were achieved through the standard operating procedures of the Town's Engineering and Land Use Offices, requiring construction site operators to implement appropriate erosion and sediment control BMPs.*

**Future Plan:** The Town plans to continue requirements for construction site operators to implement appropriate erosion and sediment control BMPs.

**BMP 5D –** Require construction site operators to control waste at the site.

**Measurable Goal:** Continue requirements for construction site operators to control waste at the site, in years one through five.

*Measurable goals were largely achieved through the standard operating procedures of the Town's Engineering and Land Use Office, requiring construction site operators to control waste at the site. In addition, the Town has re-examined the waste control performance principles in the Town's Stormwater Management Plan to ensure conformity with the details of those performance principles by site operators.*

**Future Plan:** The Town plans to continue requirements for construction site operators to control waste at the site.

**BMP 5E –** Review site plans prior to construction to ensure inclusion of erosion and sediment controls and post-construction controls in compliance with local ordinances and 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

**Measurable Goal:** Continue to review all site plans subject to ordinances and subdivision regulations.

*Measurable goals were achieved through the standard operating procedures of the Town's Engineering and Land Use Office, requiring review of site plans prior to construction to ensure inclusion of erosion and sediment controls and post-construction controls in compliance with local ordinances and 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.*

**Future Plan:** The Town plans to continue requirements for review of site plans prior to construction to ensure inclusion of erosion and sediment controls and post-construction controls in compliance with local ordinances and 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

BMP 5F – Continue training or coordinate with existing training efforts to educate plan reviewers in erosion and sediment controls and post-construction controls in compliance with local ordinances and 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

Measurable Goal: Annually train plan reviewers and attend any relevant training seminars.

*Measurable goals have been achieved through professional development of local plan reviewers and employees by attendance at seminars and training opportunities, as available and as their schedules permit.*

Future Plan: The Town plans to continue to train plan reviewers and applicable employees and avail them of any relevant training seminars (including those offered by DEEP) so as to stay current with erosion and sediment controls.

BMP 5G – Continue to inspect all construction sites during construction period that are regulated by local ordinance.

Measurable Goal: Inspect all construction sites meeting DEEP threshold criteria and that are not subject to a waiver. Inspection frequency will be based on prioritization criteria; however, all construction sites must be inspected at least once.

*Measurable goals have been largely achieved through the standard operating procedures of the Town's Engineering and Land Use Office, with inspections of construction sites.*

Future Plan: The Town plans to continue to inspect all construction sites meeting DEEP threshold criteria and to inspect all construction sites at least once.

## 6.0 Post-Construction Stormwater Management

BMP 6A – Require through an ordinance the installation and proper maintenance of post-construction runoff controls in compliance with state and local laws for projects disturbing one acre or more of land. The Town may require post-development stormwater controls for smaller sites.

Measurable Goal: Incorporate post-construction runoff controls in the Storm Sewer Use ordinance by end of year two.

*Measurable goal has been generally achieved because the Town's existing Erosion and Sediment Control regulations already require the installation and proper maintenance of post-construction runoff controls in compliance with state and local laws for any development when the disturbed area is cumulatively more than one-half acre. The Town's Soil Erosion and Sedimentation Control*

*Regulations require compliance with governing state statutes and requires conformance with 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. North Haven's Soil Erosion and Sedimentation Control Regulations (dated 1985 in the Town's Zoning Regulations) closely follow the model ordinance included in Appendix A of 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.*

**Future Plan:** The Town plans to continually review and evaluate its erosion and sediment control requirements for construction sites so as to provide for the installation and proper maintenance of post-construction runoff controls in compliance with state and local laws.

**BMP 6B –** Develop and implement strategies which include a combination of structural and/or non-structural BMPs.

**Measurable Goal:** Continue implementation of BMPs including projects one acre or greater in disturbance in years one through five.

*Measurable goal was achieved as evidenced by structural and non-structural BMPs emplaced on recent projects constructed in North Haven. Past examples include the installation of vortex separators at the North Haven Commons and North Haven Crossing Shopping Centers on Universal Drive and wetlands restoration adjacent to the North Haven Athletic complex on the site of the former North Haven High School. In 2014, construction was begun on a new movie theater off Universal Drive with a designed detention basin. The recently approved new North Haven Middle School will include onsite rain gardens and underground storage for groundwater discharge. According to QRWA's Quinnipiac River Watershed Based Plan a potential retrofit of bioretention parking islands for the Target store and vicinity located on the southern end of North Haven Commons. The proposal calls for two catch basins to be removed and seeks to improve water quality by treating parking lot runoff using bioretention in the parking islands.*

**Future Plan:** The Town plans to continually develop and implement strategies, which include a combination of structural and/or non-structural BMPs.

**BMP 6C –** Develop a plan to address post-construction stormwater runoff during plan review, construction inspection and the post-construction maintenance inspection process.

**Measurable Goal:** Develop and adopt a plan by the end of year five.

*Measurable goal has been largely achieved through the standard operating procedures of the Town's Engineering and Land Use Office, notifying developers early in the local plan review process of requirements for zero net increase in runoff from pre-construction and pre-development conditions.*

**Future Plan:** The Town plans to continually address post-construction stormwater runoff during the plan review, construction inspection, and post-construction maintenance inspection process.

The following is a discussion of research conducted in relation to BMPs 6A, 6B, & 6C to evaluate possible improvements to the Town's post-construction stormwater management requirements and procedures.

**BMP 6A –** Continue to review and evaluate the Town's erosion and sediment control requirements for construction sites so as to provide for the installation and proper maintenance of post-construction runoff controls in compliance with state and local regulations and laws.

**BMP 6B -** Continue to develop and implement strategies that include a combination of structural and/or non-structural BMPs.

**BMP 6C –** Continue to address post-construction stormwater runoff during the plan review, construction inspection, and post-construction maintenance inspection process.

Under BMPs 6A through 6C, DEEP is emphasizing improvement in post-construction minimum runoff measures and designing for improved stormwater quality from developed sites in the long run. DEEP is focusing more and more on *Low Impact Development (LID)* and will be including LID requirements in the next round of permits. DEEP is also encouraging disconnection of stormwater runoff from pipes and catch basins and getting it back into the ground.

In June, 2011, DEEP added Low Impact Development Appendices to the *2004 Connecticut Stormwater Quality Manual* ([http://www.ct.gov/deep/lib/deep/water/nps/swgp/lid\\_apdx\\_ctstormwatermanual.pdf](http://www.ct.gov/deep/lib/deep/water/nps/swgp/lid_apdx_ctstormwatermanual.pdf)) and to the *Connecticut Guidelines for Soil Erosion and Sedimentation Control* ([http://www.ct.gov/deep/lib/deep/water/nps/swgp/lid\\_apdx\\_ctsoilerosionguidelines.pdf](http://www.ct.gov/deep/lib/deep/water/nps/swgp/lid_apdx_ctsoilerosionguidelines.pdf)). These appendices cite LID projects and examples from throughout the State of Connecticut, and show cost analysis comparisons. QRWA's *Quinnipiac River Watershed Based Plan* contains information on LID and cites LID examples.

DEEP recommends that the *2004 Connecticut Stormwater Quality Manual* be referenced as a guide for post-construction design measures. Hence, the Town's current standard operating procedures of the Town's Engineering and Land Use Offices will be compared to the *2004 Connecticut Stormwater Quality Manual* to determine consistency with that manual.

The following task was completed under BMPs 6A through 6C in recent years and continued in 2014:

Review and evaluate the Town's current standard operating procedures regarding control of post-construction stormwater runoff against the 2004 Connecticut Stormwater Quality Manual, model ordinances and other references and make recommendations, as needed, for post-construction runoff control measures.

The following is an evaluation of the Town's ongoing procedures for these BMPs and recommendations for additional post-construction runoff control measures, if needed.

*The 2004 Connecticut Stormwater Quality Manual and the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control were researched, and numerous websites were explored for information on Erosion and Sediment Control, Stormwater Management practices, and low impact development.*

BMP 6A: The Town's regulations require conformance with and closely follow the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (<http://www.ct.gov/dep/cwp/view.asp?A=2720&Q=325660>), with the minimum acceptable standards for development of soil erosion and sediment control plans specifically using the principles from Chapters 3 and 4.

From North Haven's Zoning Regulations' Article VIII- Supplemental Regulations: Section 8.1.2 Activities Requiring a Certified Erosion and Sediment Control Plan: *A soil erosion and sediment control plan shall be submitted with any application for development when the disturbed area of such development is cumulatively more than one-half acre. This shall apply to uses in all zones in town. (A single family dwelling that is not a part of a subdivision of land shall be exempt from these regulations.)*

North Haven's *Soil Erosion and Sedimentation Control Regulations* require the installation and proper maintenance of post-construction runoff controls in compliance with Connecticut and local laws for development of disturbed areas equal to or more than one acre (1-5 acres and over 5 acres) and for tracts of land that are part of a larger common plan of development.

Chapters 7 and 9 of the 2004 Connecticut Stormwater Quality Manual ([http://www.ct.gov/DEP/cwp/view.asp?a=2721&q=325704&depNav\\_GID=1654#download](http://www.ct.gov/DEP/cwp/view.asp?a=2721&q=325704&depNav_GID=1654#download)) contain the appropriate method to be used in determining peak flow rates and volumes of runoff.

From North Haven's Zoning Regulations' Article VIII- Supplemental Regulations: Section 8.1 Soil Erosion and Sedimentation Control:

### 8.1.5 Minimum Acceptable Standards

*8.1.5.1 Plans for soil erosion and sediment control shall be developed in accordance with these regulations using the principles as outlined in Chapter 3 and 4 of the Connecticut Guidelines for Soil Erosion and Sediment Control (1985), as amended. Soil erosion and sediment control plans shall result in a development that minimizes erosion and sedimentation during construction; is stabilized and protected from erosion when completed; and does not cause off-site erosion and/or sedimentation.*

*8.1.5.2 The minimum standards for individual measures are those in the Connecticut Guidelines for Soil Erosion and Sediment Control (1985), as amended. The Commission (or the County Soil and Water Conservation District) may grant exceptions when requested by the applicant if technically sound reasons are presented.*

*8.1.5.3 The appropriate method from Chapter 9 of the Connecticut Guidelines for Soil Erosion and Sediment Control (1985), as amended, shall be used in determining peak flow rates and volumes of runoff unless an alternative method is approved by the Commission.*

North Haven's standard procedure includes a pre-construction application review by the Town Engineer for drainage calculations, soil erosion and sedimentation controls, and other pertinent information to the project. The Erosion and Sedimentation Control Plan requires a narrative describing the development, the schedule for grading and construction activities- start/completion dates, sequences of grading and construction activities, for installation and/or application of soil erosion and sediment control measures, and for final stabilization of the project site.

Also required are the design criteria, construction details, the installation and/or application procedure, and the operations and maintenance program for proposed soil erosion and sediment control measures and stormwater management facilities. The site plan must have a sufficient scale to show the location of proposed development and adjacent properties, the existing and proposed topography (including soil types, wetlands, watercourses, and water bodies); and any existing structures on the project site, proposed alterations, the location of the design details for proposed soil erosion and sediment control measures and stormwater management facilities, the sequences of grading and construction activities, for installation and/or application of soil erosion and sediment control measures, and for final stabilization of the project site. The plan must include any other information deemed necessary and appropriate by the applicant and regulations or as requested by the Commissions.

The Inland Wetlands Commission (where applicable), and the Planning and Zoning Commission each review the plan for compliance with the requirements

and objectives of the *Soil Erosion and Sedimentation Control Regulations*. Prior to certification, any plan submitted may be reviewed by the County Soil and Water Conservation District. The Commissions shall make inspections during development to ensure compliance with the certified plan and that control measures and facilities are properly installed and maintained, and may also require progress reports. The Land Use Administrator does follow-up inspection of control measures during the construction phase and works closely with the Town Engineer to monitor progress and compliance.

The *2004 Stormwater Quality Manual* cites numerous practices for post-construction runoff control, including:

- Frequent street/pavement sweeping, and the removal and proper disposal of sweepings. Street sweepings have limited reuse possibilities as aggregate in concrete or asphalt, daily landfill cover, and fill in road projects. Proper disposal is suggested at a permitted Solid Waste Facility.
- Proper street condition maintenance for facilitated sweeping and deicing. Roads and adjacent developed areas to be kept in good condition by filling potholes, repairing riprap, stabilizing vegetated areas, regarding berms and ditches, and maintaining silt fences where needed. Repair work on streets and bridges or culverts to be properly executed to contain chemicals, paint, soils, rock, and debris.
- The use of the proper products for deicing roads and pavement. *Since 2009-2010, North Haven has used a salt product that is more environmentally friendly than the previously used sand and salt combination. The Town utilized ClearLane deicing product beginning in 2009, and has recently switched to a product called Ice B'Gone Magic with the option to use ClearLane again as it becomes available.*
- Snow removed from roadways and other pavement can contain contaminants and should be kept away from environmentally sensitive areas and storm drainage systems.
- Storm drain systems to be checked and cleaned regularly.
- Illicit discharges to be detected and eliminated by checking for failing septic systems, wastewater connections in commercial and industrial developments, discharge testing, and monitoring and controlling illegal dumping.
- Responsible lawn care and landscaping practices including regular maintenance, proper planning and plant selection, limiting use of pesticides and fertilizers, proper irrigation/mulching practices.

- Animal waste management, including pets and waterfowl. Educating the public to discourage feeding and habitat modification with vegetation can help control waterfowl wastes. Pet owners can properly dispose of pet waste by bagging in household trash or by burying in at least 5 inches of soil away from vegetable gardens and water sources.
- Model Stormwater Ordinances to provide the legal authority for water resource protection on the local level.

### Model Ordinances reviewed

#### State of Connecticut:

*Appendix C of the 2004 Connecticut Stormwater Quality Manual contains Model Ordinances including one for Stormwater Operation and Maintenance, which was originally developed for use by coastal communities. For application requirements it states that Stormwater Management Plans should be strongly encouraged for *all* land use and development projects, even where they are not required.*

The application pertains to development or construction on one or more acres of total land area on a site, and a total disturbance of over 5 acres also requires the submission of registration to the DEEP under the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities. It also pertains to any site with one acre or more of impervious cover, new residential development of 3 or more units, and new industrial or commercial projects. It states that the commission which has jurisdiction over the application requires submission of a stormwater management plan pursuant to written findings that the activity proposed has the potential to cause significant nonpoint source pollution to groundwater, surface water drinking supplies, or to Long Island Sound or any other waters of the State. This may be based upon a written request by the Commissioner of DEEP.

*The stormwater management plan must provide at a minimum:*

- Soil characteristics of the site;
- Location of the closest surface water bodies and wetlands to the site and the depth to any groundwater or aquifer areas on or adjacent to the site;
- DEEP ground and surface water quality classification of water bodies on and adjacent to the site;
- Identification of any waterbodies on and adjacent to the site documented by DEEP as not meeting water quality standards;

- Location and description of all proposed stormwater control BMPs for both construction activities and post-construction long-term stormwater control;
- Proposed maintenance and operation schedule for catch basins or other BMP structures or techniques used to prevent runoff, encourage sheet flow or infiltration, or treat stormwater;
- Calculations of stormwater runoff rates, suspended solids removal rates, and soil infiltration rates before and after completion of the activity proposed in the application; and
- A hydrologic study of pre-development site conditions relating to probable impact of the proposed activity and the extent downstream where the proposed activity causes less than a 5% change in the peak flow rates.

*Standards for Criteria include:*

- Direct channeling of untreated surface water runoff into adjacent ground and surface waters shall be prohibited;
- No net increase in urban stormwater runoff from the site shall result from the proposed activity;
- Design and planning for site development shall provide for minimal disturbance of pre-development natural hydrologic conditions, and shall reproduce such conditions after completion of the proposed activity;
- Pollutants shall be controlled at their source in order to minimize contamination;
- Stormwater management systems shall be designed and maintained to manage site runoff in order to eliminate surface and groundwater pollution, prevent flooding and, where required, control peak discharges and provide pollution treatment;
- Stormwater management systems shall be designed to collect, retain, and treat the first inch of rain on-site so as to trap floating material (BMP techniques to include oil and grit separators and trash hoods);
- On-site storage of stormwater shall be employed to the maximum extent feasible (landscaped depressions, grass swales, infiltration trenches, and retention or detention basins);
- Post-development runoff rates and volumes shall not exceed pre-development rates and volumes. Stormwater runoff rates and volumes shall be controlled by slowing runoff velocities and encouraging infiltration (minimization of impervious surfaces, minimization of curbing and collection, use of grass or vegetative filter zones, landscape depressions, establishment of buffers from streams, wetlands, and water bodies); and
- Stormwater treatment systems shall be employed where necessary to ensure that the average annual loadings of total suspended solids (TSS) following the completion of the proposed activity at the site are

no greater than such loadings prior to the proposed activity. Stormwater treatment systems shall remove 80% of TSS from the site on an average annual basis (infiltration through vegetative strips, grass swales, and detention basins).

Town of East Lyme, Connecticut:

East Lyme's *Subdivision Regulations'* Site Design Standards (Section 6) contains a sub-section on Stormwater Management (6-8). It recommends that applicants meet with the Town Engineer prior to any applications that are subject to review by the appropriate regulations/commissions. They require that stormwater management systems are designed in accordance with the *2000 Connecticut Department of Transportation Drainage Manual* (<http://www.ct.gov/dot/cwp/view.asp?a=3200&q=260116>) and the CT DEEP's *2004 Stormwater Quality Manual*, the former containing very specific guidelines for design practices, criteria, and procedures. The *Regulations* require that peak flow rates and stormwater volumes be calculated for both pre- and post-construction conditions using the most appropriate of the U.S. Department of Agriculture Soil Conservation Service- Technical Release, and Army Corps of Engineers- Hydrologic Engineering Center series or other hydraulic programs approved by the Town Engineer. Their regulations are specifically worded regarding peak flow and volume control, groundwater recharge volume, water quality volume, infiltration basins/areas, filtration basins/areas, and general requirements.

State of Georgia:

A Model Ordinance for post-development stormwater management for new development and redevelopment from the Metropolitan North Georgia Water Planning District, revised 12-7-06, requires compliance with State and Federal laws, regulations, and permits when addressing the impacts of post-development stormwater runoff quality and nonpoint source pollution.

Its general set of objectives is similar to those of North Haven's, and further encourages the use of *nonstructural* stormwater management and site design practices, as well as the establishment of provisions for long-term responsibility for and maintenance of structural stormwater control facilities and nonstructural stormwater management practices, including long-term follow-up. Similarities to North Haven's requirements for a stormwater management plan include the developer's initial consultation with the appropriate Town authority to review an existing conditions/proposed site plan, a natural resources inventory, and a stormwater management system concept plan.

*The Stormwater Management Plan* requires existing and post-development hydrologic analyses for the site as well as post-development downstream analysis, a stormwater management system, a construction-phase erosion and sedimentation control plan, a landscaping and open space plan, and an Operations and Maintenance (O and M) plan, *the latter three requirements similar to the Town of North Haven's*. Georgia requires that the applicant ensure access from public rights-of-way to stormwater management facilities for inspection and repair by securing access easements needed on a permanent basis. These easements are then documented on a map or document to be recorded on land records. The applicant must certify and provide documentation to the local authority that all other applicable environmental permits have been acquired for the site prior to approval of the stormwater management plan.

Prior to the issuance of any permit for land development requiring stormwater management where the local authority requires ongoing maintenance, the applicant or owner of the site must, unless an on-site stormwater management facility or practice is dedicated to and accepted by the local authority, execute an inspection and maintenance agreement, and/or a conservation easement, that shall be binding on all subsequent owners of the site.

For North Haven, continual review of erosion and sediment control requirements for construction sites, and the overseeing and provision of guidance for proper installation and maintenance of post-construction runoff controls will help to ensure compliance with State and local laws. The applicable authority and commissions may wish to set more specific design objectives based upon impervious surface area, watershed studies, total maximum daily load (TMDL) of pollutants, and other criteria; and incorporate applicable guidelines from the above model ordinances and others that can be researched.

**BMP 6B:** Minimize runoff from impervious surfaces using both structural and non-structural strategies.

Many *Structural BMPs* are actually based on natural systems and rely upon vegetation and soil mechanisms in order to perform as intended. Others are considered more conventional manmade techniques. They are to work in conjunction with other design-based approaches to minimize unavoidable impacts.

Examples of *Structural BMPs* include storm drainage systems, storage or detention facilities, hydrodynamic and oil/particle separators, and both infiltration and vegetative practices. The *Vortechs* type hydrodynamic separator is used in the newer shopping centers on Universal Drive. For information on the different separator designs, see EPA's hydro separator link:  
[http://water.epa.gov/scitech/wastetech/upload/2002\\_06\\_28\\_mtb\\_hydro.pdf](http://water.epa.gov/scitech/wastetech/upload/2002_06_28_mtb_hydro.pdf)

Oil/particle separators promote sedimentation of coarse materials and separation of free oil (as opposed to emulsified or dissolved oil) from stormwater runoff. Due to their limited storage capacity and volume, these systems are considered to have only limited water quality treatment capabilities.

Use of *crushed stone, permeable (grass/turf in spaces) pavers, catch basin inserts* and *constructed wetlands* can slow, direct, and enhance absorption of stormwater runoff. Utilizing oversized catch basins with 4 ft. or 6 ft. deep sumps (where applicable) is recommended if detention in the form of a basin or wet pond isn't used at the terminus of the drainage system. Using outlet protection such as riprap, erosion control matting and vegetative linings in outlet channels is also suggested.

*Biofiltration* is a pollution control technique using living material to capture and biologically degrade process pollutants and harmful hydrocarbons or silt from surface runoff. Examples of *structured biofiltration* include biobags around storm drains, the use of trickling filters, and living walls, which are concrete walls planted with greenery. The plants on living walls can be useful in purifying slightly polluted water (such as gray water) by absorbing the dissolved nutrients.

*Structured wetlands, vegetative buffers, structural grass, vegetative swales (bioswales) and trenches* act as natural filterers and help to direct stormwater runoff. Currently, *wetlands restoration* has been implemented adjacent to the North Haven Athletic Complex on the site of the former North Haven High School. *Grassed or vegetative filter strips* (biostrips) are sloped areas that are intended to treat sheet flow from adjacent impervious areas by slowing runoff and filtering out sediment and pollutants. Other examples of *biofiltration* and *bioretention* include slow sand filters, treatment ponds, and rain gardens (a form of bioretention), shallow depressions or low garden areas in parking lots or yards used to control sheet flow and filter litter and hydrocarbons from runoff. Planted with rain-loving native plants, rain gardens allows storm water to be filtered through the ground rather than running off into streets and storm drains where it would capture more sediment and nutrients, degrading water quality.

*Non-Structural BMPs* focus on the minimization of land disturbances and maximization of open space by protecting natural systems and incorporating existing landscape features such as wetlands, streams, riparian forests and zones into site plans to manage stormwater at its source. Limiting curbs and gutters on proposed roads and parking lots, the use of green belts, and the preservation of buffer strips are all examples of non-structural BMPs.

It is suggested that QRWA's *Quinnipiac River Watershed Based Plan* be explored for additional structural and non-structural examples.

BMP 6C: The Town's Engineering and Land Use Departments have standard operating procedures in place to notify developers early in the plan review process of the requirements for the construction site during development and post-construction. The Zoning Regulations' minimum acceptable standards for soil erosion and sedimentation control and stormwater management techniques reflect the four tenets of DEEP's *Low Impact Development* (LID) guidelines from the website page called *Stormwater General Permits and Incorporation of Low Impact Development Evaluation* ([http://www.ct.gov/deep/cwp/view.asp?a=2719&q=459488&depNav\\_GID=1654](http://www.ct.gov/deep/cwp/view.asp?a=2719&q=459488&depNav_GID=1654)):

*Four Tenets of LID: LID-style best management practices, such as vegetative filter strips, pocket sand filters, and infiltration systems for example, have been available for the control of stormwater for several decades, however the LID approach to site design is a relatively recent development and represents a significant change in site planning and stormwater management philosophy. LID emphasizes working within the constraints of landscapes to prevent stormwater generation, while traditional stormwater management emphasizes shunting away stormwater and treating it to the extent practicable (e.g., 80% total suspended solids removal from the first inch runoff from impervious surfaces) at or near its point of discharge.*

*The ideal way to manage stormwater is by preventing runoff generation. LID is a group of stormwater management techniques that do just that by controlling stormwater at its source. This occurs through the application of four key principles:*

- *Minimizing site disturbance;*
- *Working with site hydrology;*
- *Minimizing and disconnecting impervious surface; and*
- *Applying small-scale controls at the source.*

On the DEEP website is a page with important links concerning LID:  
[http://www.ct.gov/deep/cwp/view.asp?a=2719&q=464958&deepNav\\_GID=1654](http://www.ct.gov/deep/cwp/view.asp?a=2719&q=464958&deepNav_GID=1654)

Both the Planning and Zoning and Inland Wetland Commissions should strive to establish procedures to review applications and plans with the LID focus. The Town Engineer can establish an LID review process for applicants, and applicants can be required to fill out a questionnaire about which BMPs are included in their proposals. A top priority would be to educate developers about the key points of LID.

Include the review of the *2004 Stormwater Quality Manual* on hearings' agendas and require that Commission members specifically ask applicants about BMPs. In the regulations, applicants can be required to provide a presentation to demonstrate stormwater quality control measures being taken on a project, and

waste control by construction site operators at the site. Review and consider new procedures to receive and document information from the public of possible violations on sites.

Upon the completion of a project, require post-construction follow-up reports and implement regular inspection schedules by appropriate Town Departments or Commissions. *Appendix E* of the 2004 Stormwater Quality Manual has a *Maintenance Inspection Checklist* for the following:

- Stormwater Ponds and Wetlands;
- Infiltration Basins and Trenches;
- Filtering Practices- Sand and Organic Filters;
- Filtering Practices- Bioretention; and
- Water Quality Swales.

The link can be found at:

[http://www.ct.gov/deep/lib/deep/water\\_regulating\\_and\\_discharges/stormwater/manual/Apx\\_E\\_Maintenance\\_Ins\\_Chklist.pdf](http://www.ct.gov/deep/lib/deep/water_regulating_and_discharges/stormwater/manual/Apx_E_Maintenance_Ins_Chklist.pdf)

#### 7.0 Pollution Prevention and Good Housekeeping for Municipal Operations

BMP 7A – Revise existing maintenance activities and procedures to include new BMPs that reduce pollutants in stormwater from municipal maintenance activities.

Measurable Goal: Develop a revised O and M Plan by the end of year one.

Measurable Goal: Continue O and M requirements in years two through five.

*Measurable goal has been achieved through the standard operating procedures of the Town's Public Works Department, which emphasize the importance of environmental issues.*

*The following were notable activities recently completed by Public Works:*

*A new Leaf Composting Facility at the terminus of Powdered Metals Drive permitted in the fall of 2013 is a more efficient site to compost leaves collected throughout the town than was a prior facility located on the closed municipal landfill on Universal Drive. The new composting facility was designed and constructed to avoid disruption of a closed bulky waste site on which it is located and to prevent impacts to adjacent wetlands along the Muddy River. Wood chip erosion control berms/barriers were placed on downhill sides of the roadway and windrow areas. Leaf collection is conducted so as to keep loose leaves and debris from clogging roadside catch basins. Composted leaves are offered at 'no cost' year round to the residents of the Town while excess compost is auctioned off annually with proceeds being returned to support the leaf composting program.*

*The rehabilitation of Todd's Pond was completed in 2014. Progressive sedimentation had created a condition whereby the pond was only eight to nine inches deep. The rehabilitation project consisted of stabilizing the pond's side slopes and vegetative berms, draining the pond, dredging out the accumulated sediments, refilling the pond to its original depth, and installing an aerator to help improve water quality. DEEP allowed dredging soils to be placed at Hansen Farm Park.*

*In 2014 the Town hired Veolia Water to flush and capture sediments from the stormwater system in the Whitney Ridge area, including Wayland Street, Whitney Ridge Terrace, and portions of Buell and Mowry Streets and Garfield Avenue. Due to the success of the flushing program (as reported by the area residents) and the reduction in localized flooding realized, the Town (through Veolia Water) plans to implement the flushing of the stormwater lines every other year going forward.*

**Future Plan:** The Town plans to continue implementing BMPs that reduce pollutants in stormwater.

**BMP 7B –** Develop and implement a training program for public employees to provide education on pollution prevention and good housekeeping practices.

**Measurable Goal:** Annually train public employees and attend any relevant training seminars.

*Measurable goal was achieved through annual training of public works and treatment plant employees as part of the Town's Industrial Stormwater Pollution Prevention Plan.*

*Additionally, the Director of Public Works along with the Zoning Enforcement Officer attended a symposium on stormwater management, new technologies available for detention and retention and best management practices for erosion and sedimentation control measures.*

**Future Plan:** The Town plans to include training public employees under the Municipal Stormwater Program to provide education on pollution prevention and good housekeeping practices.

**BMP 7C –** Implement a catch basin cleaning and stormwater system maintenance program.

**Measurable Goal:** Inspect and maintain, as needed, catch basins and other stormwater drainage system facilities based on a schedule described in the O & M Plan by the end of year five.

*Measurable goal has been achieved through annual catch basin cleaning conducted by the Public Works Department. In addition, the volume of sand applied to Town roads has been drastically reduced by the use of enhanced de-icing salt products, reducing the volume of sand accumulating in catch basins and other stormwater drainage system facilities.*

*The catch basin cleaning program was formalized by dividing the Town into fifteen watersheds. Catch basins are cleaned in five watersheds per year on a three-year rotating schedule, as shown below.*

<u>Year One</u>	<u>Year Two</u>	<u>Year Three</u>
Waterman's Brook	Bradley Street	Sonne Drive and Homewood Avenue
Muddy River	Pine Brook	Skiff Street
Overbrook	King's Highway	Quinnipiac River
Five Mile Brook	Marlen Drive	Mill River
Little River	Dixwell Avenue	Wharton Brook

*The Town requested a camera assessment and cleaning of the storm drains and stormwater collection system in the Whitney Ridge area in late summer, 2012 before possible autumn hurricanes arrived. A summer storm caused flooding of the Wayland Street area, and as a result the Town hired Veolia under a subcontract to their wastewater contract to assess the stormwater system in that area. The result indicated many pipe sags, pipe breaks, some undersized pipelines, or too many pipelines coming into catch basins and manholes. The Town plans to evaluate necessary repairs and redesign of stormwater structures in this area in the future.*

*The Town is working with its Public Works Department on addressing catch basin clean-outs on a more regular basis with a goal of a minimum of 500 catch basins cleaned per year. Approximately 550 catch basins were cleaned in 2014.*

**Future Plan:** The Town plans to continue the catch basin cleaning schedule and record-keeping of catch basin cleaning, having integrated such activities into the overall pollution prevention O & M Plan.

**BMP 7D –** Implement a street sweeping program that evaluates and establishes priority areas as part of stormwater system maintenance pollution prevention and good housekeeping practices.

**Measurable Goal:** All Town roads will be swept on a schedule described in the DEEP General Permit, which will be incorporated into the Town's O & M Plan by the end of year one.

**Measurable Goal:** All Town roads will be swept once a year, with priority areas being swept with greater frequency as determined by field inspection, years two through five.

*Measurable goal was achieved through annual street sweeping conducted by the Town's Public Works Department. The volume of sand applied to Town roads has been drastically reduced by the use of enhanced salt products, reducing the volume of sand accumulating on roadways and limiting the need for street sweeping to a few areas.*

*In 2011, the Town formalized the schedule and record-keeping of street sweeping activities into an overall pollution prevention O & M Plan.*

#### Summary of Stormwater Activities Planned for Next Reporting Cycle

The following is a listing of the BMPs contained in the Town's Municipal Stormwater Management Plan. Each BMP is followed by a statement of the Town's planned future activities under that BMP.

In many cases, the planned future activities are simply a restatement of the BMPs as many of the BMPs are the Town's ongoing practices and their plan is to simply continue those practices.

#### Public Education and Outreach

**BMP 2A** – In support and partnership with RWA and QRWA, continue to implement an outreach and education program, educating the public on watershed dynamics and pollution loading issues.

**Plan:** Continue to utilize educational opportunities available from the QRWA, the RWA and others as described above.

**BMP 2B** – Distribute information on lawn fertilizer, pesticide use, impacts of overuse and other household contaminants.

**Plan:** Continue to use brochures and fact sheets, to continue sponsoring the annual North Haven Earth Day and explore other opportunities, such as local access cable television and the Town's website, as discussed above, to further educate homeowners regarding lawn fertilizer, pesticide use, impacts of overuse and other household contaminants.

**BMP 2C** - Reduce the impact of failing septic systems and their effect on the quality of water bodies in the Town of North Haven.

**Plan:** Continue to use brochures and fact sheets and explore other opportunities, such as local access cable television and the Town's website, to further educate

homeowners regarding the impact of failing septic systems and their effect on the quality of water bodies in the Town of North Haven.

BMP 2D – Reduce nutrient loading through pet wastes and waterfowl wastes reduction.

Plan: Distribute flyers and explore signs to educate residents regarding the impact of pet and waterfowl wastes on the quality of water bodies in the Town of North Haven.

BMP 2E – Develop and maintain a library of educational materials on stormwater management.

Plan: Continue to collect, catalog and make available to Town staff and the public additional educational materials regarding stormwater management and other related water quality issues and to update the material as appropriate.

BMP 2F – Alternate information sources – website, brochures, small posters.

Plan: Continue to add links to the Town's website from other websites, if appropriate, such as those identified above to include brochures or posters regarding stormwater management and other water quality issues.

#### Public Involvement and Participation

BMP 3A – Introduce the *North Haven Stormwater Management Plan* to the public.

Plan: Rely on the public education and outreach BMPs discussed above to maintain a high degree of public interest in the *Stormwater Plan* and related pollution prevention topics. If deemed advisable, the Town may hold public meetings to reinforce interest in the program.

BMP 3B – Public hearing to present the North Haven Stormwater Management Plan.

Plan: Unless re-notification and hearing are required, there are no future plans in this area because many other avenues for public outreach are planned, as described herein.

BMP 3C – Implement Neighborhood Watch.

Plan: The neighborhood watch BMP was modified, using "Friends of the River" as a substitute.

BMP 3D – Storm drain marking/decals.

Plan: Continue this activity by placement of stickers or catch basin markers in other areas of Town by supervised student volunteers working toward community service credits.

**BMP 3E – Litter and debris cleanup.**

Plan: Continue to work closely with QRWA and the Conservation Commission to intensify, expand and improve litter cleanup, as needed.

#### Illicit Discharge Detection and Elimination Program

**BMP 4A – Develop and enforce an ordinance that prohibits illicit discharge and dumping and authorizes enforcement actions, including on private property.**

Plan: Evaluate the model ordinance and determine its suitability for use by the Town.

**BMP 4B – Develop and implement a program in conjunction with existing public outreach activities to inform the public employees, businesses, and the general public of hazards associated with illicit discharges.**

Plan: Continue outreach programs which will include education regarding the water quality hazards of illicit discharges.

**BMP 4C – Create a storm sewer mapping system showing all known storm drain outfalls and receiving waters.**

Plan: Review and update the mapping, particularly in areas where new developments have been built or drainage improvements have been made.

**BMP 4D – Develop SOP's to detect and address illicit discharges.**

Plan: Review the draft IDDE program described above, and implement a plan to detect and address illicit discharges.

**BMP 4E – Develop and implement a stormwater monitoring/sampling plan.**

Plan: Continue annual stormwater sampling rounds so as to maintain compliance with monitoring requirements.

**BMP 4F – Develop and implement a plan to detect and address future non-stormwater discharges.**

Plan: Continue to evaluate information gained from implementation of BMPS 4A through 4E so as to implement on-going procedures to detect and address potential non-stormwater discharges.

BMP 4G – Develop procedures to evaluate BMPs and measurable goals of the Illicit Discharge Detection and Elimination Program.

Plan: Continue to evaluate information gained from implementation of BMPS 4A through 4F so as to develop procedures to evaluate the Illicit Discharge Detection and Elimination Program.

#### Construction Site Stormwater Runoff Control

BMP 5A – Update existing ordinances to ensure compliance with the General Permit, State Regulations, and Storm Sewer Use Ordinance. Ordinances will require construction operators disturbing at least one acre to obtain a permit from the Town. The Town may, at their discretion, require erosion and sediment controls for smaller sites based on local conditions and needs.

Plan: Continually review and evaluate erosion and sediment control requirements for construction sites so as to provide effective and appropriate control measures.

BMP 5B – Notify construction site developers and operators of the requirements for registration under the General Permit for the Discharge of Stormwater and Dewatering associated with Construction Activities.

Plan: Continually ensure compliance with DEEP GP registration requirements for all projects exceeding the one-acre threshold.

BMP 5C – Develop a plan that will require construction site operators to implement appropriate erosion and sediment control BMPs.

Plan: Continue requirements for construction site operators to implement appropriate erosion and sediment control BMPs.

BMP 5D – Require construction site operators to control waste at the site.

Plan: Continue requirements for construction site operators to control waste at the site. In addition, the town will re-examine the waste control performance principles in the *Town's Stormwater Management Plan* to ensure conformity with the details of those performance principles by site operators.

BMP 5E – Review site plans prior to construction to ensure inclusion of erosion and sediment controls and post-construction controls in compliance with local

ordinances and 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

Plan: Continue requirements for review of site plans prior to construction to ensure inclusion of erosion and sediment controls and post-construction controls in compliance with local ordinances and 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

BMP 5F – Continue training or coordinate with existing training efforts to educate plan reviewers in erosion and sediment controls and post-construction controls in compliance with local ordinances and 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

Plan: Continue to train plan reviewers and attend any relevant training seminars so as to stay current with erosion and sediment controls. In addition, the Town will avail its employees of training opportunities offered by the QRWA and DEEP.

BMP 5G – Continue to inspect all construction sites during construction period that are regulated by local ordinance.

Plan: Continue to inspect all construction sites meeting DEEP threshold criteria and to inspect all construction sites at least once.

#### Post-Construction Stormwater Management

BMP 6A – Require through an ordinance the installation and proper maintenance of post-construction runoff controls in compliance with state and local laws for projects disturbing one acre or more of land. The Town may require post-development stormwater controls for smaller sites.

Plan: Continually review and evaluate the Town's erosion and sediment control requirements for construction sites so as to provide for the installation and proper maintenance of post-construction runoff controls in compliance with state and local laws.

BMP 6B – Minimize runoff from impervious surfaces using both structural and non-structural strategies.

Plan: Continually develop and implement strategies, which include a combination of structural and/or non-structural BMPs to minimize runoff.

BMP 6C – Develop a plan to address post-construction stormwater runoff during the plan review, construction inspection, and post-construction maintenance inspection process.

Plan: Continually address post-construction stormwater runoff during the plan review, construction inspection, and post-construction maintenance inspection process.

#### Pollution Prevention and Good Housekeeping for Municipal Operations

BMP 7A – Revise existing maintenance activities and procedures to include new BMPs that reduce pollutants in stormwater from municipal maintenance activities.

Plan: The Town plans to continue implementing BMPs that reduce pollutants in stormwater.

BMP 7B – Develop and implement a training program for public employees to provide education on pollution prevention and good housekeeping practices.

Plan: Include training of public employees under the Municipal Stormwater Program to provide education on pollution prevention and good housekeeping practices.

BMP 7C – Implement a catch basin cleaning and stormwater system maintenance program.

Plan: The Town plans to continue the catch basin cleaning schedule (a minimum of 500 catch basins per year) and record-keeping of catch basin cleaning, having integrated such activities into an overall pollution prevention O & M Plan.

BMP 7D – Implement a street sweeping program that evaluates and establishes priority areas as part of stormwater system maintenance pollution prevention and good housekeeping practices.

Plan: Continue to update the schedule and maintain record-keeping of street sweeping activities as part of an overall pollution prevention O & M Plan.

#### Changes in Measurable Goals or Implementation Dates

Measurable goals or implementation dates have not changed appreciably from the original *2004 Stormwater Management Plan* with the exception of a Measurable Goal change in reference to BMP 4E – Develop and implement a stormwater monitoring/sampling plan. In 2013 outfall monitoring was terminated, and in-stream monitoring was approved for taking six samples from three tributaries of the Quinnipiac River, including three upstream and three downstream samples each year.

*Per DEEP Stormwater Engineers, the stormwater monitoring program was modified and approved in 2013 to incorporate in-stream monitoring during dry periods and during runoff events so as to enable comparison of background*

*water quality with runoff-affected water quality. The approved changes to the monitoring program were considered an amendment to the Town's Stormwater Management Plan.*

Unexpected natural conditions or experiences gained from stormwater related activities from 2004 though 2014 may result in changes in measurable goals or implementation dates for 2015.

Certification Statement of Chief Elected Official

I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that, based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that a false statement made in this document or its attachments may be punishable as a criminal offense, in accordance with Section 22a-6 of the Connecticut General Statutes, pursuant to Section 53a-157b of the Connecticut General Statutes, and in accordance with any other applicable statute.

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Michael J. Freda  
First Selectman, Town of North Haven

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(Date)