

SPRUCE CREEK WATERSHED RESTORATION PROJECT – PHASE IV #2015RT06

FINAL PROJECT REPORT

Grantee: Town of Kittery
Grantee Contact: Jessa Kellogg
May 2015 – August 2017

Funding for this project, in part, was provided by the U.S. Environmental Protection Agency under Section 319 of the Clean Water Act. The funding is administered by the Maine Department of Environmental Protection in partnership with EPA. EPA does not endorse any commercial products or services mentioned

I. PROJECT SUMMARY

PROJECT PURPOSE

Spruce Creek is an ecologically and economically significant estuarine resource in Southern Maine supporting a diverse array of recreational and commercial water-based activities.

The goal of the Spruce Creek Watershed Restoration Project (SCWRP) - Phase IV was to reduce bacteria inputs in Spruce Creek (Kittery, ME), improve water and to potentially re-open recreational shellfish harvesting areas in Spruce Creek.

Through multiple town-funded and volunteer water quality monitoring projects, polluted runoff has been identified as the most significant nonpoint source contributing bacteria to Spruce Creek. Since 2009, multiple “hotspots” of bacteria to Spruce Creek have been identified and assessed under various weather conditions. These “hotspots” include stormwater outfalls, tributaries flowing to the main stem of the Creek, and concentrated developed areas. Many of these “hotspots” were addressed through the implementation of Phases I – III of the Spruce Creek Watershed Restoration Project and town-funded remediation.

Phase IV continued to build on the previous work to address sources of fecal indicator bacteria contamination in the watershed. This work included:

- implementation of Best Management Practices (BMPs) and Low Impact Development (LID) to treat polluted stormwater runoff from residential, commercial, and town-owned properties;
- expansion of sewer and septic system database to include the entire watershed to determine high-risk areas for potential septic system malfunctions or sewer leaks;
- continued water quality monitoring of Spruce Creek and its tributaries for any changes;
- outreach and education efforts to enhance community knowledge of the effects of stormwater pollutants (the “Green Streets” program) and to track community engagement in the solutions to date (follow-up on the residents who took the Watershed Pledge in Phases I-III).

The SCWRP involved a wide range of partners, including the administrative staff of the Town of Kittery (Shoreland Resource Officer Jessa Kellogg, Department of Public Works staff), the Spruce Creek Association (president Phyllis Ford and other members), consultants FB Environmental Associates (FBE), Maine Department of Environmental Protection (Maine DEP), a local business (Kittery Trading Post), and watershed residents. Most of these partners also served on the SCWRP Steering Committee, which met four times throughout the course of the project to discuss project progress and address any challenges that arose.

HIGHLIGHTS AND CHALLENGES

The SCWRP found success with many of its intended objectives. A highly visible LID project was completed at the Kittery Trading Post, a commercial property in the watershed. The bioretention cell installed at this property is in an area with heavy foot traffic and includes a stencil designating “drains to Spruce Creek” to indicate to visitors that stormwater impacts nearby waterbodies. Other LID BMPs were

completed on two town-owned properties (Department of Public Works parking lot and Emery Field). Emery Field was chosen to have bacteria cartridge inserts installed at catch basins adjacent to the field which has a well-known pet waste problem. A pet waste brochure was mailed to the residents in this area as educational outreach to combat this issue.

Additionally, a septic database was expanded to include all known parcels within the watershed. A follow-up septic memo and Septic Smart brochure was mailed by the Town to targeted homeowners where septic system information was missing or lacking in detail. Additional data received in response to the mailing will be recorded on the Town's GIS mapping system and documented in their property file and in the septic database created for this project.

The Protect Kittery Waters webpage was also updated. The updated site allows for watershed residents to stay informed and get involved.

Of all the stated tasks in the workplan, the most challenging was follow-up with all past pledgees who had pledged to take watershed-friendly actions as some of these pledgees lived outside the watershed and some had moved since signing the pledge. The success of this task was that a newer watershed resident volunteered to help with much of the follow-up contacts and to take part in the installation of conservation practices on their property, demonstrating an ongoing interest by watershed residents in the improvement of Spruce Creek's water quality.

II. TASK SUMMARY

TASK 1: PROJECT MANAGEMENT

The Town of Kittery and Maine DEP finalized the contract for this project in April 2015. The Town of Kittery subcontracted FBE in May 2015 to provide project management. FBE tracked project progress and completed four semi-annual progress reports. The Town of Kittery tracked town expenses and town match related to the project. The final report and NPS Site Tracker were submitted by FBE in September 2017.

TASK 2: STEERING COMMITTEE

The SCWRP Steering Committee was formed in 2008 during Phase I of the Spruce Creek Watershed Restoration Project, and has guided project activities throughout all phases of the project. The steering committee met four times over the course of the project (July 2015, May 2016, November 2016, and September 2017). The Committee includes representatives from Maine DEP, the Spruce Creek Association, municipal staff (Shoreland Resource Officer Jessa Kellogg), and FBE staff. Additional municipal staff (DPW, sewer department) and local citizens also occasionally attended meetings. The Steering Committee helped to ensure the schedule of the grant was on track and provided feedback on key project deliverables.

TASK 3: DEVELOP A "GREEN STREETS" PROGRAM

Phase IV of the SCWRP addressed three nonpoint source pollution (NPS) sites on commercial and town-owned properties within the Spruce Creek Watershed by implementation of Best Management Practices

(BMPs). Candidate sites were selected based on results from water quality investigations and a stormwater survey conducted in 2014 as part of an update to the Spruce Creek Watershed Based Plan (original 2008; update 2014). Final site selection was based on feasibility, current local knowledge of known problem areas, and landowner interest in participating in the project. The work completed at each site is documented in the NPS Site Reports (submitted as deliverables to Maine DEP). A summary of the work completed in Task 3 includes the following:

- **LID Site 1 – Kittery Trading Post:** Improvements to this site include installation of one “FocalPoint” high rate biofiltration system (to treat the first 0.5” of runoff from the front parking lot, 0.68 acres), one Harco drain with beehive cover (for major storm overflow), one rain guardian “Turret” system (pretreatment gross pollutant screen structure), and landscaping of area around the FocalPoint, including planting within the FocalPoint itself. These improvements treat stormwater runoff (including bacteria) from the parking lot and road surface and encourage infiltration of water to the ground before stormwater empties into Spruce Creek (approximately 500 feet away). This is a highly visible demonstration site that includes an educational stencil on the pavement next to the site (“Keep It Clean, Drains to Spruce Creek”). Pollutant reduction achieved: 0.3 tons/yr sediment, 7.3 lbs./yr nitrogen, 1.7 lbs./yr phosphorus.
- **LID Site 2 – Kittery DPW Parking Lot:** Improvements to this site include installation of two Fabco StormBasin catch basin inserts with a total of four filter cartridges inside a concrete drain structure. The filter inserts provide treatment for approximately 35,000 square feet (0.80 acres) of impervious area (i.e., parking lot and buildings) that contribute stormwater (and associated bacteria) to a tributary to Spruce Creek located behind the DPW yard. This stream is a tributary to Spruce Creek, which has shown high bacteria counts in the upper part of the estuary. The installed BMP can provide a demonstration site to DPW staff of an effective BMP. Pollutant reduction achieved: 0.3 tons/yr sediment, 6.4 lbs./yr nitrogen, 1.6 lbs./year phosphorus.
- **LID Site 3 – Emery Field:** Improvements to this site include installation of two Fabco 24 ID Stormpods 9734-1A with bacteria cartridge, one each for the two catch basins. The filter inserts provide treatment for 0.62 acres of urban area (roads and residential homes) in the Admiralty Village neighborhoods near Emery Field. The athletic fields and walkways are heavily used by dog walkers. Dog waste is not always properly disposed, which is a threat to nearby waterbodies. Many nearby locations within the Admiralty Village area have been identified as hotspots of bacteria in previous water quality monitoring studies of Spruce Creek and its tributaries. The stenciling of these catch basins is highly visible to dog-walkers and other residents in the neighborhood. Pollutant reduction achieved: 0.2 tons/yr sediment, 3.8 lbs./yr nitrogen, 1.0 lbs./year phosphorus.
- **Green Streets Tour:** The Town of Kittery held a Green Streets Tour on 9/14/2017 to highlight the successful installation of BMPs at the three LID site locations. The Shoreland Resource Officer presented to members of the Spruce Creek Association, Conservation Commission, Planning Board, Conservation Law Foundation Piscataqua Waterkeeper, Maine DEP project manager, FB Environmental consultant, Public Works staff, and other interested residents. The presentation provided an overview of Phases I-III, highlighted the successes of Phase IV and gave a glimpse

into Phase V scheduled to begin in Spring 2018. A Green Streets Tour of three BMP installation sites followed the presentation.

TASK 4: SPRUCE CREEK BACTERIA HOTSPOT MONITORING

An USEPA-approved Quality Assurance Project Plan (QAPP) was developed under this project for water quality monitoring in the Spruce Creek watershed from 2015-2016. This water quality monitoring was funded by the Town of Kittery to be used as cash match for this grant.

In 2015, *E. coli* bacteria sampling was conducted during three wet weather and three dry weather samplings events at 12 tributary monitoring locations throughout the Spruce Creek watershed within an hour of low tide between July and November 2015. The middle estuary was also sampled for *E. coli* six times during in-field maintenance of sondes by FBE staff or with the help of local volunteer, Rich DeMarco. Dissolved oxygen (DO), temperature, and salinity data were also collected during sampling events at each location using an YSI ProODO meter and a refractometer. Bacteria collection was conducted in accordance with methods outlined in the QAPP. Additional samples were collected for DNA analysis during one wet (8/11/2015) and one dry (8/31/2015) weather event. DNA analysis can identify the primary bacteria source based on genetic markers in the bacterial DNA. This analysis was conducted by Dr. John Bucci at the University of New Hampshire. Samples were tested for the presence of human, canine, and avian (Canada goose) bacterial DNA markers. Bacteria samples were analyzed for *E. coli* at Nelson Analytical Water Testing Laboratory in Kennebunk, Maine. Though Enterococci is typically used as an indicator of the presence of fecal material in brackish/marine waters (such as the main channel of Spruce Creek), all monitoring sites throughout the Spruce Creek watershed are tested for *E. coli* (typically used for freshwater environments) to allow comparison with historical data. FBE also conducted baseline continuous and discrete water quality monitoring of the estuarine portion of Spruce Creek at the upper and middle estuaries in 2015. Two data sondes (YSI 6920), along with DIVER water level loggers, were deployed in Spruce Creek at the middle and upper estuary stations for 95 days from 8/7/15 to 11/10/15. The sondes monitored for dissolved oxygen (saturation and mg/L), temperature, relative water depth, pH, turbidity, and specific conductivity at 15-minute intervals. Three sets of grab samples were also collected (8/7/15, 9/10/15, 10/8/15) at the middle and upper estuaries and sent to Katahdin Analytical Services in Scarborough, Maine for various analyses (nitrate-nitrite, total phosphorus, total suspended solids, biological oxygen demand, total Kjeldahl nitrogen, and total organic carbon). Six sets of grab samples were also collected for fecal coliform on 8/7/15, 9/10/15, 10/8/15, 10/26/15, 11/6/15, and 11/10/15 at both sites. All samples were collected within 2 hours of dead low tide.

In 2016, two data sondes were again deployed in Spruce Creek at the middle (YSI 600 XLM) and upper estuary (YSI 600 OMS-V2) stations for 64 days from 8/8/16 to 10/10/16. The sondes measured dissolved oxygen (saturation and mg/L), temperature, relative water depth, and specific conductivity at 15-minute intervals. Three sets of grab samples were also collected (8/8/16, 9/8/16, 10/10/16) at the middle and upper estuaries and sent to Alpha Analytical in Portsmouth, New Hampshire for various analyses (fecal coliform¹ and *E. coli*, nitrate-nitrite, total phosphorus, total suspended solids, biological oxygen demand, total kjeldahl nitrogen, and total organic carbon). All samples were collected within two hours of dead low tide.

¹ Fecal coliform samples were not collected on 9/8/2016.

Two water quality reports were developed following completion of monitoring (submitted April 2016 for 2015 monitoring, and March 2017 for 2016 monitoring). Results from these reports helped guide preparations for targeted outreach tasks.

TASK 5: RESIDENTIAL PLEDGE PROGRAM FOLLOW-UP

During Phases I-III of the Spruce Creek Restoration Project, a Watershed Pledge program was implemented. The Watershed Pledge is a public outreach tool that encourages residents to discuss what they can do to improve water quality in the Spruce Creek watershed with their families, and commit to implementing these actions. Residents can pledge to improve buffers around their homes, care for their lawns and gardens in a more watershed-friendly way, prevent erosion and reduce runoff from their property, or simply spread the word to other residents. For their pledge, homeowners received a yard sign indicating their participation. Between 2008 and 2014, 93 people pledged to complete over 1,400 watershed-friendly practices on their properties.

For pledge follow-up in Phase IV, the pledge list was narrowed down to only those who live within the watershed (41 residents). Spruce Creek Association volunteer Rich DeMarco contacted past pledgees, reaching out by phone and email. Voicemail messages and/or emails were left for 18 people who did not respond or reply. Letters from Phyllis Ford of the Spruce Creek Association were sent to 10 residents for whom a valid phone number or email address could not be found. Contact information could not be found for one additional person. Rich DeMarco and staff from FBE reached 12 people, who had completed a total of 75 watershed-friendly practices such as installing rain barrels and cutting their grass high. Four of the contacted residents were not interested in any additional technical assistance.

Of the contacted residents, 4 responded and received technical assistance reports from FBE. Two additional technical assistance visits and accompanying reports were completed for other watershed residents who reached out to FBE for assistance.

From these technical assistance reports, 1 BMP was installed at one residence in the watershed.

- **Residential Site 1 – 10 Tudor Drive:** The owners were concerned that stormwater from their roof and driveway runs off their property and carries sediment and pollutants to the tidal pond at the northeast corner of the property. Improvements to this site included installation of a rain garden to treat the stormwater runoff from the roof and encourage infiltration of water to the ground to stop runoff from collecting pollutants (including bacteria) as it runs over the ground towards Spruce Creek. Pollutant reduction achieved: 0.01 tons/yr sediment, 0.15 lbs./yr nitrogen, 0.03 lbs./year phosphorus.

TASK 6: BACTERIA DETECTION AND ELIMINATION

In Phase III of the SCWRP, a septic system database was created for the Spruce Creek watershed for homes within 250 feet of a waterbody. In Phase IV, this database was expanded to include all tax parcels within the entire Spruce Creek watershed (Kittery and Eliot, ME). The database was researched by FBE staff, with assistance from the municipal staff and the Kittery Wastewater Treatment Department. Out of 1,823 parcels in the Town of Kittery, only 21 parcels in the database remain with an unknown utility status (septic, sewer, or vacant).

The database includes information on age, date, and maintenance history of the systems in the watershed when known. Parcels in the database were organized into 5 priority categories based on completeness of information, septic age (or home age), pump-out status, and sewer connection verification. Parcels were ranked within each category by risk factor (with highest risk factors receiving the highest rank). An accompanying memo describing the process and how to use the database was written by FBE.

Based on the new database, FBE provided recommendations to the Town for candidate neighborhoods for follow-up to help fill in unknown information such as utility status and system or building age. Using this database, the Shoreland Resource Officer mailed a letter to 143 property owners requesting additional information for these parcels along with a Septic Smart brochure for educational outreach on proper septic system maintenance and 41 responses were received. One of the challenges with this effort was in retrieving old data on the location, size and condition of the septic systems, with many of the 41 respondents unsure of one or more of these questions. All 41 respondents knew approximately where their septic system was (i.e. somewhere in the front yard), 16 knew the size of the septic tank, and all respondents believed their septic system was in good working order. 18 respondents stated that they regularly pumped their septic system at least every five years and every resident who responded to the letter was educated on the importance of regular maintenance and what not to put into the system. 12 respondents knew the exact location of their septic system and that information was added to the Town's GIS mapping system and documented in the town property file and in the septic database created for this project.

TASK 7: POLLUTANT REDUCTION ESTIMATES

Pollution reduction estimates were calculated for all sites where applicable. The STEPL model was used to estimate load reductions for BMPs installed in 2016 and 2017; no BMPs were installed as part of Phase IV in 2015. It is estimated that a total of 0.81 tons/year of sediment, 17.7 pounds/year of total nitrogen, and 4.3 pounds/year of total phosphorus were reduced through the implementation of BMPs. Pollutant reductions were reported in Pollutants Controlled Reports (PCRs) for the Maine DEP (deliverable).

III. DELIVERABLES SUMMARY

Deliverable #1

- Contract between the Town of Kittery and Maine DEP was signed in April 2015.
- Sub-agreement between the Town of Kittery and FBE was signed on May 27, 2015.
- Semi-annual progress reports were submitted four times throughout the project (November 2015, May 2016, November 2016, and May 2017).
- Final Project Report and NPS Site Tracker were submitted in September 2017.

Deliverable #2

- NPS Site Reports were submitted for each of the three commercial/municipal BMP installations (submitted to Maine DEP September 2016; September 2017).

- NPS Site Reports were submitted for the one residential NPS site (submitted to Maine DEP October 2016).

Deliverable #3

- Press releases submitted on March 16, 2016 (link to news article - <http://www.seacoastonline.com/article/20160317/NEWS/160319171>), on November 16, 2016 and on August 28, 2017.
- Outreach materials for Task 6, including a septic memo with a Septic Smart brochure, and a pet waste brochure mailed by the Town to targeted areas, submitted on May 12, 2017 or included as a summary in this final report, submitted September 2017.
- Green Streets Tour summary, including presentation slides, sign-in sheet and tour locations, submitted September 25, 2017.

Deliverable #4

- QAPP approved September 3, 2015. Water quality reports for 2015 (April 2016) and 2016 (March 2017) were completed and submitted to Maine DEP.

Deliverable #5

- Memo of residential pledge follow-up results, completed May 23, 2017

Deliverable #6

- Septic database update and accompanying memo completed March 14, 2016.
- Memo of recommendations for door-to-door septic follow-up completed April 25, 2016
- Summary of door-to-door outreach completed by the Town included in this final report, submitted September 2017

Deliverable #7

- Pollutants Controlled Reports were submitted in 2016 and 2017. A Pollutants Controlled Report was submitted for 2015, but all completed BMPs that year were part of Phase III.

IV. PROJECT OUTCOMES

A. MAJOR OUTCOMES OF THE PROJECT

There were several major outcomes from the Spruce Creek Watershed Restoration Project – Phase IV:

- A total of four NPS pollution sites were treated with 5 best management practices. These BMPs reduced pollution loads by a total of 0.81 tons/year of sediment, 17.7 pounds/year of total nitrogen, and 4.3 pounds/year of total phosphorus. These BMPs also targeted reducing bacteria inputs to Spruce Creek by focusing on stormwater infiltration and filtration practices.
- Two water quality reports were produced in 2015 and 2016.
- Follow-up on residential pledges and outreach efforts (press releases, letters to watershed residents) resulted in technical assistance being provided to six residents within the watershed.

- Expansion of the septic and sewer database allowed the Town to identify areas in the watershed at risk for septic failure based on environmental (soil limitations, etc.) and infrastructural (system age, etc.) factors.

B. ENVIRONMENTAL RESULTS OF THE PROJECT

One major environmental result of this project was the reduction of stormwater flow (and thus bacteria loading) from the Kittery Trading Post parking area along Route 1, DPW parking lot, and Emery Field area. Stormwater from these developed areas drains directly to or indirectly via tributaries to Spruce Creek, often without any treatment. Runoff over these hard surface picks up a variety of pollutants, including bacteria (most especially at Emery Field where dog-walkers improperly dispose of pet waste).

As of September 2017, water quality in the Spruce Creek is still considered impaired based on Maine DEP's Draft 2014 Integrated Water Quality Monitoring and Assessment Report and 2016 water quality results. Future phases of this project and ongoing efforts by the Town of Kittery will continue to address the bacteria sources that have been identified throughout Phases I-IV.

C. LESSONS LEARNED

One important lesson learned from this project was with the challenges following-up with all past pledgees who had pledged to take watershed-friendly actions, as some of these pledgees lived outside the watershed and some had moved since signing the pledge. This task was only successful with the help of a new watershed resident volunteer, Rich DeMarco, who helped to follow-up with most of the pledgees, helped collect bacteria samples in 2015, and took part in the installation of conservation practices on their property. This demonstrated the importance of volunteer passion and drive to improve the water quality of Spruce Creek. Earlier phases of this project received tremendous support from volunteers, but that momentum has been stalled in Phases III and IV. Many volunteers have been over-worked or burnt out or too busy. This represents a significant hurdle when faced with restoration efforts that could take decades. Fortunately, the Town of Kittery brought on their Shoreland Resource Officer (Jessa Kellogg) full-time; her dedication to the project has allowed for successful project completion phase after phase.

V. SUMMARY OF TOTAL EXPENDITURES

	<u>Federal NPS Grant</u>	<u>Non-Federal Match</u>	<u>Total</u>
Funds Originally Allocated	\$59,050.00	\$62,875.00	\$121,925.00
Funds Expensed	\$59,050.00	\$85,080.12	\$144,130.12
Funds Remaining	\$0	\$(22,205.12)	\$(22,205.12)

SCWRP Phase IV Grant Expense and Non-Federal Match Summary							
		Non-Federal Match					Grant + Match
Watershed Project Activity or Workplan Element	Grant Funds Expended	Volunteer Match	In-Kind Services	Kittery Cash Match	Cost Share	Total Match	
Task 1: Project Management	\$9,005.63		\$6,616.25			\$6,616.25	\$15,621.88
Task 2: Steering Committee	\$2,483.80	\$262.50	\$1,214.00			\$1,476.50	\$3,960.30
Task 3: Green Streets	\$29,125.08		\$19,651.82		\$3,951.95	\$23,603.77	\$52,728.85
Task 4: Hotspot Monitoring	\$2,085.00	\$563.00	\$14,386.85	\$29,840.00		\$44,789.85	\$46,874.85
Task 5: Residential Pledge	\$6,381.78	\$405.00	\$3,277.50			\$3,682.50	\$10,064.28
Task 6: Bacteria Detection and Elimination	\$9,233.71		\$4,806.25			\$4,806.25	\$14,039.96
Task 7: Pollutant Reduction Estimates	\$735.00		\$105.00			\$105.00	\$840.00
TOTAL	\$59,050.00	\$1,230.50	\$50,057.67	\$29,840.00	\$3,951.95	\$85,080.12	\$144,130.12

IV. NON-FEDERAL MATCH DOCUMENTATION / CERTIFICATION

GRANTEE INFORMATION:

Name: Town of Kittery
Address: 200 Rogers Road
Kittery, Maine 03904
Telephone: (207) 475-1321
Contact Person: Jessa Kellogg

PROJECT INFORMATION:

Project Title: Spruce Creek Watershed Improvement Project Phase IV
Project ID#: 2015RT06
Match Amount planned under the Grant Agreement \$ 62,875.00
Match Amount Claimed \$ 85,080.12

CERTIFICATION STATEMENT:

I certify that the non-federal match detailed in the attached information were expended in the course of completing work described in the Grant Agreement for the Project referenced above, and that detailed documentation of the match information is on file and available for review at the Grantee address shown above.

Date 9/28/2017 Signature of Grantee - Authorized Official

Table 1: Total Non-Federal Match for all Tasks for the SCWIP Phase IV

Source	Activity or Item	Task	Hours	Rate/Value	Total
Shoreland Resource Officer	Project Management	1	229	\$22.25/hour	\$5,100.25
Town Manager	Project Management	1	19	\$40/hour	\$760.00
FB Environmental	Project Management	1	756.5	\$10/hour	\$756.50
Shoreland Resource Officer	Steering Committee Attendance	2	14	\$22.25/hour	\$318.75
DPW Commissioner	Steering Committee Attendance	2	12	\$40/hour	\$480.00
FB Environmental	Steering Committee Attendance	2	42.5	\$10/hour	\$420.50
Volunteers	Steering Committee Attendance	2	17.5	\$15/hour	\$262.50
Shoreland Resource Officer	Green Streets	3	142.5	\$22.25/hour	\$3,168.75
DPW Commissioner	Green Streets	3	12.5	\$40/hour	\$500.00
FB Environmental	Green Streets	2	46.25	\$10/hour	\$462.50
DeMarco Cost Share	Green Streets	3		Lump Sum	\$3,951.95
DPW Labor/Equipment	Green Streets	3		Lump Sum	\$15,519.32
Shoreland Resource Officer	Hotspot Monitoring	4	67.5	\$22.25	\$1,500.00
FB Environmental	Hotspot Monitoring	4	24.5	\$10/hour	\$240.50
FB Environmental	Hotspot Monitoring	4		Lump Sum	\$12,367.85
Harbormaster	Hotspot Monitoring	4	14	\$25/hour	\$350.00
Harbormaster Boat/ Volunteer Boat	Hotspot Monitoring	4	15.5	\$14/hour	\$217.00

Source	Activity or Item	Task	Hours	Rate/Value	Total
Rich DeMarco	Hotspot Monitoring	4	8	\$15/hour	\$120.00
Kristina DeMarco	Hotspot Monitoring	4	10	\$15/hour	\$150.00
Town of Kittery Cash Match	Hotspot Monitoring	4		Lump Sum	\$29,840.00
Shoreland Resource Officer	Residential Pledge Follow-Up	5	100	\$22.25/hour	\$2,225.00
FB Environmental	Residential Pledge Follow-Up	5	105.25	\$10/hour	\$1,052.50
Rich DeMarco	Residential Pledge Follow Up	5	27	\$15/hour	\$405.00
Shoreland Resource Officer	Bacteria Detection & Elimination	6	142	\$22.25/hour	\$3,168.75
FB Environmental	Bacteria Detection & Elimination	6	163.75	\$10/hour	\$1,637.50
FB Environmental	Pollutant Reduction Estimate	7	10.5	\$10/hour	\$105.00

APPENDIX A. Example Technical Assistance Report

Spruce Creek Watershed Restoration Project

TECHNICAL ASSISTANCE SITE DESIGN REPORT

Prepared for:

Rich & Kristina DeMarco

10 Tudor Lane, Kittery, ME 03904



September 2015



Prepared by:

Krystal Costa, FB Environmental Associates

Spruce Creek Restoration Project TA Report

Site Location

This residential property is located along Route 103 in Kittery, ME and directly borders the Spruce Creek River just before it flows under Route 103, connects with the Piscataqua River, and flows into the Atlantic Ocean. This area is ideal for stormwater retrofits because of the property's close proximity to the Spruce Creek River and the presence of a tidal pond in the backyard.

Description of Problem

The owners are concerned that stormwater from their roof and driveway runs off their property and carries sediment and pollutants to the tidal pond at the northeast corner of the property. FBE personnel walked the property and found potential areas to be improved upon including unbuffered areas and erosion from stormwater drainage from the southern half of the roof.

Stormwater runoff can contribute to nonpoint source (NPS) pollution, which is a term used to describe diffuse sources of pollution in surface and groundwater delivered to receiving waterbodies. Urban watersheds have a disproportionate amount of stormwater runoff from impervious surfaces (e.g. paved areas, sidewalks, rooftops and compacted footpaths) that prevent rain from percolating into the soil. These hard surfaces force rainwater to flow overland where it can collect a variety of pollutants, such as metals, winter sand and salt, pesticides, petroleum products, animal and human waste, fertilizers, and sediment. These pollutants are delivered to nearby waterbodies, bringing with them harmful bacteria, which can pose human health risks, and excess limiting nutrients, such as nitrogen and phosphorus, which can cause unwanted algal blooms.

Additionally, heavy precipitation events in urban watersheds can result in large water surges to receiving streams, which may be unable to accommodate the excess water. This can scour out streambeds and undercut banks, sending eroded sediment downstream to deposit as sand plumes and embed critical benthic habitat for aquatic macroinvertebrate communities. These disturbances to habitat and geomorphic structure pose a significant threat to the health and function of waterbodies.

Spruce Creek Restoration Project TA Report



Figure 1. Gully formation caused by the large quantities of stormwater from the gutter.



Figure 2. Stormwater from the southeast corner of the house is rapidly released from the gutter, causing erosion.

Recommended Solutions

Install a series of stormwater Best Management Practices (BMPs) to slow down the flow of stormwater runoff from impervious surfaces at this residential property and encourage the infiltration of water to the ground. We recommend one major BMP for this area.

Area 1 - Rain Garden

Rain gardens are carefully designed landscape depressions planted with native perennials. They act as bioretention cells for stormwater treatment by allowing the water to seep into the ground where it is filtered of pollutants. Most importantly, rain gardens are a low maintenance option for at home stormwater management.

Installing a rain garden will require minor excavation of the existing area to create a small depression for water collection. The dug area is filled with a loam and compost mix before the plants are put in, and an earthen berm is created on the downslope edge. An inlet will direct stormwater into the garden and an outlet will maintain the integrity of the garden in the event of a significant storm event. The area is covered with erosion control mulch to stabilize the soil and plants during storm events. Installation requires physical labor, a shovel, and wheelbarrow.

Spruce Creek Restoration Project TA Report

To collect the roof runoff from the southeast corner of the property it is recommended that the downspout be connected to a 600 ft² garden with a 4-inch ponding depth. This sized garden would capture 1,549 gallons of water during a rain event and requires approximately 250 perennials. These calculations are based on the approximate square footage of roof being drained by the singular downspout, soil quality and slope of the yard. The footage of the roof was calculated by Google Earth to be approximately 1,450 sq ft. During the site visit the soil was noted to have a 0-3% slope, the soil consists of mostly fill with a fine sandy texture and a variety of crushed stone sizes.

The size of this garden is sufficient for an average storm event equaling approximately 1 ½ inches of precipitation. A slightly smaller garden is feasible; however, sacrificing too much when it comes to size reduces the garden's ability to perform its intended purpose and puts the structural integrity of the garden at risk.

Think creatively about the desired shape of your rain garden! It can be round, long and skinny, or meandering around to imitate a dry river bed. Maintenance will include regular watering within the first few weeks of planting to ensure adequate plant establishment, and occasional watering thereafter during dry conditions.

For guidelines, see:

[Rain Garden Alliance Calculator](#)

[Maine Department of Environmental Protection's rain garden fact sheet](#)

Spruce Creek Restoration Project TA Report



Figure 3: A carefully designed rain garden can be beautiful spring through fall while adequately managing storm water.

Table 1. Cost Estimates for Area 1

Item	Cost (\$USD)
Loam (2 yds)*	\$50
Erosion control mulch (2yds)*	\$50
Compost (1/2 yd)*	\$25
Native Plantings*	\$2050
TOTAL	\$2,175

*Price does not include delivery. Native planting price will vary depending on selection and availability.

General Recommendations

- Reduce large grassy areas by planting native, low maintenance species. Raise mower blade height to 3 inches.
- It is highly recommended that slope vegetation be kept natural and free from weed-whacking. Allowing natural vegetation to grow creates vegetated buffers which reduce

Spruce Creek Restoration Project TA Report

erosion and stormwater runoff by encouraging infiltration of water to the ground before it reaches the river. Replace any undesirable vegetation with native fruiting trees, shrubs, and flowers.

- ☀ Mulch any heavily trafficked pathways with heavy woodchips or erosion control mix to reduce the amount of exposed soil susceptible to erosion.
- ☀ Consider areas of your property for improvement where stormwater pools!
- ☀ Refer to [Landscaping at the Water's Edge](#) - a manual for landowners.

Permitting Process

Two laws in Maine require permits for activities adjacent to wetlands and waterbodies:

- ☀ **Shoreland Zoning Law:** Applies to any construction, clearing of vegetation, and soil movement within 75 feet of most streams. This is administered by the Town of Kittery and its Code Enforcement Officer, Robert Marchi. The Contractor (FBE Associates) will contact Mr. Marchi to determine if a building permit will be required for a project of this size on private property. If required, a [building permit](#) application will be filled out by the Contractor.
- ☀ **Natural Resources Protection Act (NRPA):** Applies to any soil disturbance or any other activity within 75 feet of a stream. This is administered by the Department of Environmental Protection. For this project, the single-page [application for a Permit by Rule](#) (PBR) will be submitted to Maine DEP by the Contractor. The PBR is a streamlined process to allow permits for small projects to be processed in a timely fashion. Once submitted, the application will be reviewed by Maine DEP within 14 days.

Preferably, all applications for permits should be submitted by the Contractor at least two weeks before construction activities begin to allow time for review.

APPENDIX B - List of Plants

A list of locally available plants can be found below. In addition, the following link provides a more extensive lists of native plants to consider.

Gardening to Conserve Maine's Native Landscape: <http://umaine.edu/publications/2500e/>

Some Suggested Plants: Prices vary based on size, season and availability.

Flowering Perennials

- Daylilies (*Hemerocallis*): Different varieties should be selected for a full season of blooms. Day lilies are edible!(\$5-\$10)



- Irises (*Iris siberica* and *Iris versicolor*): Some irises attract hummingbirds. (\$5)



- Cardinal Flower (*Lobelia cardinalis*): This plant attract birds, hummingbirds, and butterflies.(\$7)



- Great Blue Lobelia (*Lobelia siphilitica*): This plant attracts birds and hummingbirds. (\$7)



- Sneezeweed (*Helenium autumnale*): This plant attracts butterflies. (\$5.25)



Spruce Creek Restoration Project TA Report

- Swamp Milkweed (*Asclepias incarnate*): This plant attracts hummingbirds and butterflies. (\$5)
- White Turtlehead (*Chelone glabra*): This plant attracts hummingbirds. (\$4.75)
- Red Bergamot (*Monarda didyma*): Red flowers attract multiple bird species including hummingbirds. The plant has a minty aroma. (\$5)



Ferns

- Lady Fern (*Athyrium filix femina*): (\$5)
- Royal Fern (*Osmunda regalis*): (\$8)
- Cinnamon Fern (*Osmunda cinnamomea*): (\$4.50)



Spruce Creek Restoration Project TA Report

Shrubs

- Southern Arrowwood (*Viburnum dentatum*): Attracts Eastern Bluebird, Northern Flicker, Gray Catbird, and the American Robin. (\$7.50)



- Common Winterberry (*Ilex verticillata*): This plant is very versatile and can adapt to all sun and moisture conditions. The berries attract birds and butterflies, though you must have a male and female plant to produce berries. (\$15)



- Northern Bayberry (*Morella pensylvanica*): This plant attracts birds and butterflies.



- Common Elderberry (*Sambucus nigra*): This plant attracts birds. Its berries contain high levels of antioxidants and is used as a common cold preventative (\$7 -\$14)



- Northern Spicebush (*Lindera benzoin*): This plant attracts birds and butterflies. (\$7-\$11)



- Low-Bush Blueberry (*Vaccinium angustifolium*): This plant attracts birds and humans! (\$6.50)



APPENDIX B. Examples of Outreach Materials and Presentations

LOCAL REGULATIONS

Licensing

Town Code – Title 6

6.1.6 License Required.

No dog may be kept within the limits of the town unless such dog has been licensed by its owner in accordance with the statutes of the state.

Animal Waste

Town Code – Title 6

6.1.13 Animal Waste.

It is a violation of this ordinance for any owner of a dog to fail to remove and properly dispose of feces left by his or her dog(s) on any improved portion of public ways or sidewalks.

Penalties

Town Code – Title 1

1.3.2 General Penalty for Violation of Code - Continuing Violations.

Whenever in this Code or in any ordinance of the Town any act is prohibited or is made or declared to be unlawful or an offense, or a civil violation, or whenever in such Code or ordinance the doing of any act is required or the failure to do any act is declared to be unlawful, or a civil violation or an offense, where no specific penalty is provided therefor, the violation of any such provision of this Code or any ordinance must be punished by a fine of not more than five hundred dollars (\$500.00). Each day any violation of any provisions of this Code or of any ordinance continues constitutes a separate offense. All fines collected hereunder accrue to the benefit of the Town.

TOWN SEAL HERE

RESOURCES

Information on Spruce Creek Watershed Improvement Project (SCWIP)

Jessa Kellogg, Shoreland Resource Officer
200 Rogers Road
Kittery, Maine 03904

<http://www.protectkitterywaters.org/>
<http://www.sprucecreekassociation.org/>

Information on Town Code

http://www.kitteryme.gov/Pages/KitteryME_TownCode/index



Brochure design by L. Bizzari, FBE
Additional information from NHDES
Scoop the Poop resources
Photo credit: FBE, Town of Kittery
Clip art: openclipart.com






Funding for this project was provided in part by a Watershed Assistance Grant from the ME Department of Environmental Protection with Clean Water Act Section 319 funds from the U.S. Environmental Protection Agency.



TIPS FOR PET OWNERS





WHAT'S THE BIG DEAL?

-  Pet waste left on the lawn, street, or beach is carried by rain or snow runoff directly into nearby waterbodies or into storm drains (which drain to waterbodies without treatment).
-  Untreated animal feces can be a source of harmful pathogens and nutrients in water.
-  While it may not seem like a big deal if one more cat or dog contributes some waste to the neighborhood environment, think of how many pets are in our community...



FAST FACTS

-  A single gram of dog feces contains 23 million fecal coliform bacteria¹.
-  Pet waste carries disease-causing organisms such as Giardia and Salmonella². Infections can cause symptoms such as diarrhea, nausea, and stomach cramps.

¹van der Wel (1999); ²Pitt (1998)

WHAT TO DO: QUICK TIPS

BRING IT!— Always bring a plastic bag when you walk your dog. Old bread bags or newspaper bags work great!

BAG IT!— Use the bag as a glove to pick up the pet waste. Scoop up the waste and turn the bag inside out around waste.

DISPOSE IT!— Properly dispose of the waste by placing it in a trash can, flushing it unbagged down the toilet, or burying it. To bury waste, place in a hole at least 5" deep and away from any veggie gardens and water supplies.



NEVER PUT PET WASTE INTO A STORM DRAIN

Did you know that storm drains flow directly to nearby streams, rivers, or estuary without any treatment? This means that dog waste and other pollutants left in the yard, on the street, or placed in storm drains, go straight into our waterbodies when rain falls.

IMPACT OF PET WASTE ON PUBLIC HEALTH AND THE ENVIRONMENT

Pet waste contributes to unsafe levels of bacteria in our waterbodies and on our beaches. High fecal bacteria levels indicate a higher risk of potential illness from contact with the water. Pet waste also contains nutrients that can cause excess algae growth.



SPRUCE CREEK

Spruce Creek is impaired due to high levels of bacteria in the water. This impacts recreational activities such as shellfishing and swimming. Pet waste has been identified as one of the potential sources of bacteria to the Creek.



FOR IMMEDIATE RELEASE

August 28, 2017

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Website: www.kitteryme.gov

KITTERY'S GREEN STREETS TOUR 9/14/17 - SPRUCE CREEK WATERSHED RESTORATION PROJECT

The Town of Kittery will host an End of Project Green Streets Tour to commemorate the completion of Phase IV of the Spruce Creek Watershed Restoration Project, funded through the EPA Clean Water Act Section 319 grant program. This phase of the project is part of a larger initiative to identify and clean up nonpoint sources of pollution in the Spruce Creek watershed. Bacteria are the primary source of impairment to Spruce Creek as identified by federal, state, and local assessments, and pose the greatest threat to human and ecological health. The Spruce Creek Watershed Restoration Project, Phase IV is a two-year project that began in early June 2015 and has been guided by the existing project steering committee with members representing the Town of Kittery, Town of Eliot, Spruce Creek Association, local business owners, Maine DEP, and Maine DMR.

On Thursday, September 14th from 10am-11am the Town of Kittery will host a Green Streets Tour open to the general public to highlight several of the successful best management practices (BMPs) implemented during this fourth phase of the project. Attendees will meet at the Public Works Department building located at 200 Rogers Road in Kittery for an informational session and will have the opportunity to tour one of the stormwater improvement projects on site and then travel to a few other sites in Town and learn more about the work completed during Phase IV. Highlights include an overview of the "Spruce Creek Green Streets" program with the goal of reducing polluted runoff from stormwater at targeted streets and parking lots throughout the watershed.

The Town works closely with the Spruce Creek Association to raise community awareness and develop support for future water quality goals. For more information visit the Spruce Creek Association website: <http://www.sprucecreekassociation.org>, or contact Kittery's Shoreland Resource Officer, Jessa Kellogg at 207-475-1321 or email jkellogg@kitteryme.org.

Funding for this project, in part, was provided by the U.S. Environmental Protection Agency under Section 319 of the Clean Water Act. The funding is administered by the Maine Department of Environmental Protection in partnership with EPA. EPA does not endorse any commercial products or services mentioned.