Stroudwater River Watershed

Survey Report

Photo credit: Jeff McDonald

Cumberland County Soil & Water Conservation District

June2014

Acknowledgments

The following people and organizations were instrumental in the Stroudwater River Watershed Survey and deserve special recognition for their efforts:

Sponsors

Cumberland County Soil and Water Conservation District (CCSWCD)
Maine Department of Environmental Protection (MDEP)
Stroudwater Village Association (SVA)
Westbrook Conservation Commission
US Environmental Protection Agency
Cities of Portland and Westbrook, Town of Gorham

Steering Committee

John Bliss - Agricultural landowner
Matt Craig - Casco Bay Estuary Partnership
Mary Ellen Dennis - Survey Grant Administrator, MDEP
Nathanial Dyer - Westbrook Conservation Commission and Portland Trails
David Galbraith - Zoning Administrator, Town of Gorham
Dan Koloski - President, SVA
Lynda Mullen - SVA
Genie O'Brien - SVA
Doug Roncarati - Stormwater Program Coordinator, City of Portland and Westbrook resident
Robyn Saunders - CCSWCD
Heather True - Project Coordinator, CCSWCD

Watershed Survey Volunteers

Eugenie de Rahm
Nathanial Dyer
Lee Edwards
Tom Gordon
Ron Graff
Colleen Griffin
Eric Griffin
Holly Hoffman
Dan Koloski
Maiya Koloski
Carla MacDonald
Betsy Mayberry
Lynda Mullen
Genie O'Brien
Lynda Reed
Michael Rogers
Jim Steinberg

Technical Volunteers

Joe Anderson - *Survey team leader*
Phoebe Hardesty - *Survey team leader*
Don Kale - *Survey team leader*
Betty Williams - *Survey team leader*
John Zastrow - *Impervious cover analysis*

Technical Staff

Mary Ellen Dennis - MDEP
Wendy Garland - MDEP
Pat Marass - CCSWCD
Ryan Messier
Kate MacDonald - CCSWCD
Heather True - CCSWCD

The Stroudwater River Watershed Survey was funded in part by the US Environmental Protection Agency (EPA) under Section 319 of the Clean Water Act. Section 319 grants are administered by the Maine Department of Environmental Protection in partnership with EPA in order to prevent or reduce water pollution in Maine.

All programs and services of the Cumberland County Soil & Water Conservation District are offered on a non-discriminatory basis, without regard to race, ethnicity, color, gender, religion, age, disability, political belief, sexual orientation, or marital or family status.

Table of Contents

Stroudwater River and its Watershed	1
Stroudwater River's Water Quality	2
Stroudwater River Watershed Survey	4
METHOD #1: Shoreland Zone Survey	4
Shoreland Survey Results	6
METHOD #2: Hotspot Site Investigation (HIS)	10
HSI Results	10
HSI Recommendations	11
METHOD #3: Neighborhood Source Assessment (NSA)	13
NSA Results	13
NSA Recommendations	14
Impervious Cover Analysis	15
Conclusion	17
Appendices	
A.1. Shoreland Zone Survey Datasheet	18
A.2. Shoreland Zone Survey Checklist	19
A.3. Shoreland Zone Survey Cheat Sheet	20
A.4. Shoreland Zone Survey Sites and Maps	21
B.1. Hotspot Site Investigation Datasheet	36
B.2. Neighborhood Source Assessment Datasheet	38
B.3. Neighborhood Source Assessment Summary	40
Maps	
Stroudwater River Watershed	2
Shoreland Zone Survey Site Maps	6 & 28-35
Stroudwater Watershed's Hotspot and Neighborhood Survey Areas	12
Impervious Cover by Sub-Watershed	16

Stroudwater River watershed surveyors, May 11, 2013

Stroudwater River

Stroudwater River and its Watershed

A **WATERSHED** is the land area that drains to a river, stream, or other body of water.

The Stroudwater River is 15.2 miles long. The River starts at Duck Pond in Buxton and empties into the Fore River in the historic Stroudwater Village in Portland. A dam at the mouth of the River near Westbrook Street prevents tidal waters from the Fore River from flowing up the River's channel. Smaller contributing streams include Deering Brook, Gully Brook, Fogg Brook, Strout Brook, and Silver Brook. The River's **watershed**, which includes all of the land that drains into the River, is 27.8 square miles and is located primarily in the towns of Buxton, Gorham, Scarborough, Westbrook, and Portland (Figure 1). Land use within the watershed includes forest lands (54.3%), developed areas (20.5%), cultivated/pasture (19.6%), wetlands (2.9%), and scrub/grass/bare (2.3%).

Stroudwater Village, located in the southeastern portion of the watershed, has a number of historic structures including Portland's oldest standing building, the Tate House and Museum, which was built in 1755. This village was once powered by the River and was an important producer of masts for the Royal Navy. The Stroudwater Village Association is a registered Maine non-profit corporation whose mission is to preserve the integrity of the Village, both historical and current uses, by looking at land uses, structures, water, and air quality.

Population within this watershed has increased rapidly over the past decade with population increases of 3% in Portland, 8.4% in Westbrook, 8.5% in Buxton, 13.9% in Scarborough, and 15.8% in Gorham between 2000 and 2010. Gorham's population increase has resulted in it surpassing the City of Waterville as Maine's 15th largest community. Despite increased development in the area, the watershed provides habitat to a wide variety of native Maine species and provides the only known deer wintering area in Portland, which is located to the west of the Maine Turnpike on both sides of the River and extends into Westbrook.

Many residents and visitors enjoy kayaking, canoeing, swimming, and fishing in the Stroudwater River. Portland Trails maintains a three-mile public trail that follows the wooded banks of the River from Stroudwater Village to the Westbrook city line. There are three public trailhead access points with parking to access the trail. A METRO route bus stop is located at the most eastern trailhead. Residents and visitors access the trail year-round for hiking and birding in the summer and snow shoeing and cross country-skiing in the winter.

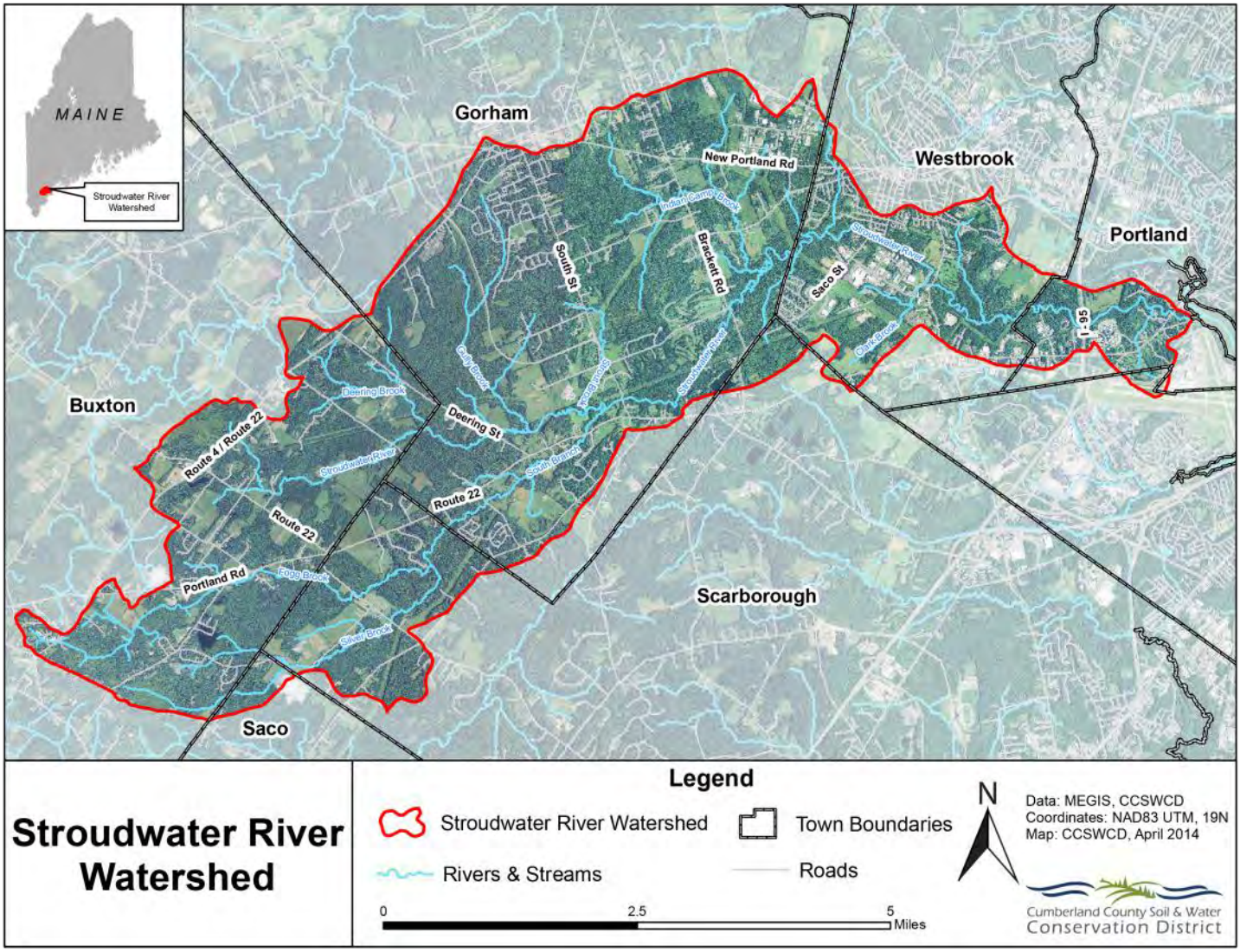


Figure 1. Stroudwater River watershed map

Stroudwater River's Water Quality

DISSOLVED OXYGEN is necessary for fish and other aquatic animals to survive in the river.

Water samples collected by the Maine Department of Environmental Protection (MaineDEP) and Friends of Casco Bay over the past 10 years show slightly higher amounts of nitrogen and phosphorus than the levels established for its Class B water quality status. Increased levels of phosphorus and nitrogen and low levels of **dissolved oxygen** can greatly reduce the River's water quality. Poor water quality can be aesthetically unpleasant and makes it difficult for fish and other stream life to survive.

The section of Stroudwater River in Portland/South Portland is listed in the 2010 Maine Integrated Water Quality Report for a **TMDL** to be developed in 2012 to address dissolved oxygen. In 2012 it was prioritized for sampling to evaluate its listing, and its TMDL was delayed until 2016. The 2012 Maine Integrated Water Quality Report lists the portion of the Stroudwater River in Gorham for not meeting its classification for biological monitoring in 2005 and 2010. These findings resulted in MaineDEP listing Stroudwater River on the 303d list, which identifies Maine's impaired water bodies.

A **TMDL,** or Total Maximum Daily Load, is the maximum amount of pollution a water body can receive and still maintain desired water quality.

What Causes Poor Water Quality?

A common cause of poor water quality is **polluted runoff** washing into the River from surrounding land and streams when it rains or when snow melts.

Common pollutants found in runoff include:

- Metals - *from cars (tires, exhaust, brakes) and structures*
- Chemicals (such as hydrocarbons) - *from gas/diesel and pesticides*
- Salt - *from treating roads, parking lots, and walkways in winter*
- Phosphorus and nitrogen - *from landscaping/fertilizers, roadway runoff, and rainwater*
- Animal and human waste - *from pets, wildlife, and leaking septic systems or sewer pipes*

POLLUTED RUNOFF is also called:

- Surface runoff
- Stormwater runoff
- Overland flow
- Nonpoint source (NPS) pollution

On a forested landscape, rain and snowmelt is slowly filtered by tree and shrub roots, grasses, leaves, and other natural debris on the forest floor. An uneven, or hummocky, forest floor helps to collect water in pools that will then slowly filter into the ground.

On a developed landscape, the water quickly washes off the hardened surfaces such as paved and gravel roads, parking lots, and roofs, then flows directly into the River. This water is not filtered through the soil, so it carries pollutants (metals, chemicals, salt, etc.) directly into the water body without treatment. The result is poor water quality in the receiving water body.

IMPERVIOUS COVER is any surface that cannot absorb or infiltrate runoff, such as driveways, roads, parking lots, rooftops, and sidewalks.

Built up or developed land is referred to as **impervious cover** or impervious surfaces. Studies by MaineDEP have found that in order to support Class B aquatic life, land cover in watersheds should be no more than 9% impervious. Part of this survey included analyzing the impervious cover within each of the smaller subwatersheds based on available information (see Page 15).

The purpose of the Stroudwater River Watershed Survey is to determine the extent to which polluted runoff in the developed portions of the watershed is contributing to its impairment.

Water quality sampling

Impervious cover can negatively affect water quality

Stroudwater River Watershed Survey

The Stroudwater River Watershed Survey was a grant-funded project awarded to the Cumberland County Soil & Water Conservation District (CCSWCD) from Maine DEP through their NPS Grant Program. Funding for this project was provided in part by the US Environmental Protection Agency (EPA) under Section 319 of the Clean Water Act.

The purpose of this project was twofold: (1) to identify, document and prioritize potential pollution (or NPS) sources that may wash contaminants into the Stroudwater River; and (2) to provide basic recommendations to fix these identified pollution sources. Data gathered from this survey is intended to be used to guide maintenance and future restoration efforts. The long-term goal is to reduce pollution flowing into the River.

The Watershed was surveyed using three methods:

1) Method #1: Shoreland Zone Survey - conducted by walking and surveying all non-forested land within 250 feet of the River and its south branch. The survey also looked at all road-stream crossings throughout the watershed.
2) Method #2: Neighborhood Source Assessment - conducted by driving through selected neighborhoods and documenting neighborhood-specific characteristics that could be affecting water quality (such as the lack of vegetation to filter and treat runoff). This assessment also ranked each neighborhood on how easily they could take action to protect water quality.
3) Method #3: Hotspot Site Investigation - Similar to the Neighborhood Source Assessment, yet looking at discrete areas within the watershed (a potential "hotspot"). Surveyed areas included commercial, industrial, institutional and municipal properties. The investigation identified the potential impacts these properties could have on the River's health.

The survey's youngest volunteer helps document sites.

An overview of the results and recommendations for each of the three methods used during the field survey is presented herein, along with impervious cover analysis for each smaller subwatershed and general recommendations for the entire watershed.

The **SHORELAND ZONE** is the land within 250 feet of the River that is protected by Maine's Shoreland Zoning Act.

METHOD #1: Shoreland Zone Survey

On May 11, 2013, a polluted runoff (or NPS) Shoreland Zone Survey was conducted on all non-forested land within the **shoreland zone** of the River (approximately 11 linear miles) and the South Branch of Stroudwater River (approximately two linear miles) and all road-stream crossings (approximately 35 total). Highly developed areas along tributaries of the main and south branches of the Stroudwater River were also surveyed. Twenty-six volunteers and staff were trained on survey techniques and pollution identification during a two-hour morning presentation. Following the training, volunteers were divided into eight teams, and volunteers spent the afternoon surveying assigned sectors of the watershed under the guidance of an experienced

technical leader. Sectors that were not completed on May 11 were revisited by volunteers and a trained technical leader later in the summer. Survey methods and training provided to volunteers were based on Maine DEP's publication: *A Citizen's Guide to Basic Watershed, Habitat and Geomorphology Surveys in Stream and River Watersheds, Volume I.*

Volunteer documenting erosion around a culvert at a stream crossing.

Notification about the survey was posted in local newspapers, on CCSWCD and partner websites, and via postcards sent to all landowners falling within the targeted survey zone. Properties wishing to be excluded from the survey were marked and avoided by survey teams. Survey teams were also instructed to not survey areas where no trespassing signs were posted (unless permission had been specifically granted) nor any areas where the felt unsafe.

The following sources of pollution and other potential water quality impacts were recorded:

- Stream Culvert Crossings
- Exposed Pipes or Pipe Outfalls
- Channel Alterations
- Fish Barriers
- Land-Based Erosion/Bare Soil
- Nutrient or Bacteria Sources
- Current Construction Sites
- Dumping (Trash)
- Unusual Conditions

Table 1. Impact rating guide

Condition	Rating Description	Rating
Size/Amount	Small: <10 square feet	1
	Medium: 10 square feet to 20 square feet	2
	Large: >20 square feet	3
Pollutants	Single pollutant documented	1
	Multiple pollutants documented	2
Transport to Water Body	Limited: Runoff eventually absorbed or infiltrated into the ground prior to reaching a stream or the River	1
	Direct: Pollutant in runoff flows directly into the water body with very little filtering	2

For each source observed, a survey datasheet was completed, site location was recorded, and photos were taken. A survey checklist, or quick reference guide, was provided to each team. The checklist showed examples of issues that may be observed and the basis for determining the impact of the site to water quality. Each of these forms are included in Appendix A. When possible, each team ranked the site's potential impact to water quality based on size, number of pollutants, and whether there was a direct flow of the pollutant to the waterbody (Table 1). Points were then tallied for each site resulting in an overall impact rating of three (smallest impact) to six (greatest impact). Volunteers were also asked to recommend ways to fix the site whenever possible and were given a comments section to further explain the site's condition. Survey data was then entered by a volunteer into a Microsoft Excel spreadsheet and compiled/checked by CCSWCD.

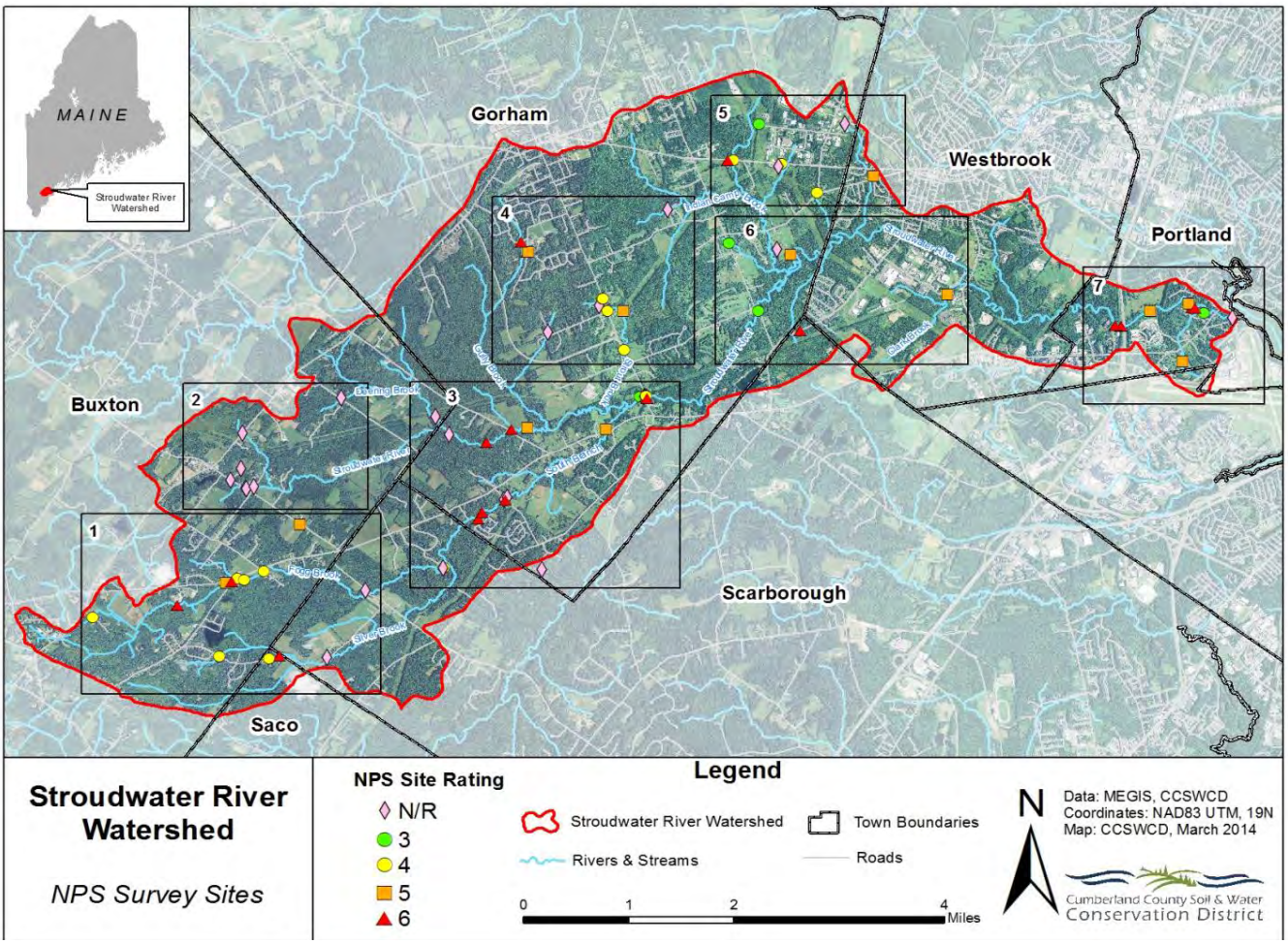


Figure 2. Shoreland zone (NPS) survey sites

Shoreland Zone Survey Results

Seventy-five NPS pollution sites and sites of concerns were identified in the 2013 shoreland survey. Table 2 shows the number of sites identified by land use with their associated **impact ratings.** The majority of sites identified are associated with state and town roads (35 sites), which have the greatest number of high impact ratings. Nineteen sites were not ranked, mainly because they are considered fish barrier issues (hanging culverts, misaligned culverts, dams) and are not NPS pollution sources. Detailed information for each of the sites identified during the shoreland zone survey are summarized in Appendix A.3.

Common issues identified at survey sites include:

- Road and/or ditch erosion
- Bare soil, unstable and/or eroding road shoulders
- Hanging and rusted culverts
- Erosion due to failed culverts
- Trash in stream

An **IMPACT RATING** is given to each site based on size of the affected area, the number of pollutants observed, and if runoff flows directly into the River.

Basic recommendations to improve these problems include:

- Stabilizing areas of bare and eroded soil (using riprap, plantings, seed and hay, erosion control mulch, turf reinforcement mats, etc.)
- Replacing failing culverts with properly sized culverts (both in diameter and length)
- Removing trash from the stream and preventing trash dumping
- Diverting, dispersing, and infiltrating concentrated runoff

Table 2. Summary of site categories and impacts

Primary Land Use	Low Impact (3)	Medium-Low Impact (4)	Medium-High Impact (5)	High Impact (6)	Unranked	Total
Agriculture		1	1			2
Commercial				1	1	2
Driveway		2				2
Logging				1	1	2
Municipal/Public	1			1		2
Private Road			1	1	2	4
Residential			2	1		3
State Road		9	1	4	4	18
Stream Channel		2	1	2	3	8
Town Road	3	5	1	4	4	17
Trail or Path	2		3	2		7
Forest				1		1
Other*			2	1	4	7
Total	6	19	12	19	19	75

* Other sites include power line, an open field, dam, outfall, and three unknown land uses.

A sand pile washing into a catch basin in the Stroudwater River watershed may contribute pollutants to the River.

All photos taken during the Survey are available on the CCSWCD's website at the following link: http://1drv.ms/1kCCC72

Road shoulder erosion was commonly identified at sites visited during the shoreland survey.

Shoreland Zone Soil Loss

The amount of soil entering the River due to erosion is of concern because it can cause murky water. It also carries the nutrient phosphorus. In excessive amounts, phosphorus can cause algal blooms and kill fish. The amount of soil that has been washing into the Stroudwater River due to erosion was estimated for all sites that had an impact rating of a five or six (23 erosion sites in total). These sites were estimated to be contributing approximately 71 tons of soil (equating to 60 pounds of phosphorus) to the River each year. Soil loss and phosphorus loading estimates for these 23 impacted sites are listed in Table 3.

Table 3. Soil Loss and phosphorus loading results for 23 highest priority erosion sites

Site	Soil Loss (Tons/Year)	Total Pounds of Phosphorus	Soil Loss Method*
1-5	14.40	12.24	GEE, CEE
2-2	2.28	1.94	GEE
2-3	0.99	0.84	CEE
3-1	0.46	0.39	GEE
3-6	3.38	2.88	CEE
3-7	6.93	5.89	CEE
3-8	3.79	3.22	CEE
3-12	0.22	0.19	GEE, CEE
4-1	7.09	6.02	CEE
6-1	4.32	3.67	GEE
6-2	0.95	0.80	CEE
6-4	6.43	5.47	GEE
6-8	7.81	6.63	GEE
8-4	2.53	2.15	GEE, WEPP
10-4	0.79	0.68	GEE, CEE, WEPP
13-1	0.08	0.06	GEE
13-3	0.26	0.23	WEPP
14-6	0.06	0.06	WEPP
14-7	1.23	1.04	CEE
15-2	0.66	0.56	GEE, CEE
15-3	0.97	0.83	GEE
15-5	0.84	0.71	CEE
15-8	4.80	4.08	CEE
Totals	**71.27**	**60.58**	

**CEE (Channel Erosion Equation) and GEE (Gully Erosion Equation) Methodologies are from "Pollutant Controlled Calculation and Documentation for Section 319 Watersheds Training Manual", MI DEQ; WEPP (Water Erosion Prediction Project) road methodology from Washington State University http://forest.moscowfsl.wsu.edu/cgi-bin/fswepp/wr/wepproad.pl*

Hanging culvert flowing to Stroudwater River

Survey volunteer documents an eroding gully along a gravel pathway

METHOD #2: Hotspot Site Investigation

Following the Center for Watershed Protection's (CWP) protocol, a Hotspot Site Investigation (HSI) and a Neighborhood Source Assessment (NSA) (Manual : Unified Subwatershed and Site Reconnaissance: A User's Manual, T. Wright, C. Swann, K. Cappiella, T. Schueler, 2005) were completed for pre-identified commercial and residential areas within the Stroudwater River watershed based on acreage of sites, proximity to the River and its main tributaries, and accessibility. These surveys were conducted by CCSWCD staff during the fall of 2013. The objective of these two assessments was to analyze seemingly significant and similar pollution sources and restoration opportunities in upland areas of the watershed.

The HSI focused on commercial, industrial, institutional, municipal, and transportation-related operations such as bus garages, train stations, and airports. The goal of the HSI was to generally quantify the impacts of potential hotspot activities on the watershed and identify possible restoration practices that may be conducted. HSI locations were chosen by accessibility and proximity to the River (most of which are within 500 feet of the main branch). In the Stroudwater River Watershed, the most prevalent areas of hotspots are around the main branch of the River in Westbrook and Portland (Figure 3). For each hotspot site, a CWP HSI datasheet was completed, (Appendix B.1) listing observed pollution sources and suggested remediation actions. The survey looked at vehicle operations, outdoor materials, waste management, turf and landscaped areas, storm water infrastructure, and buildings.

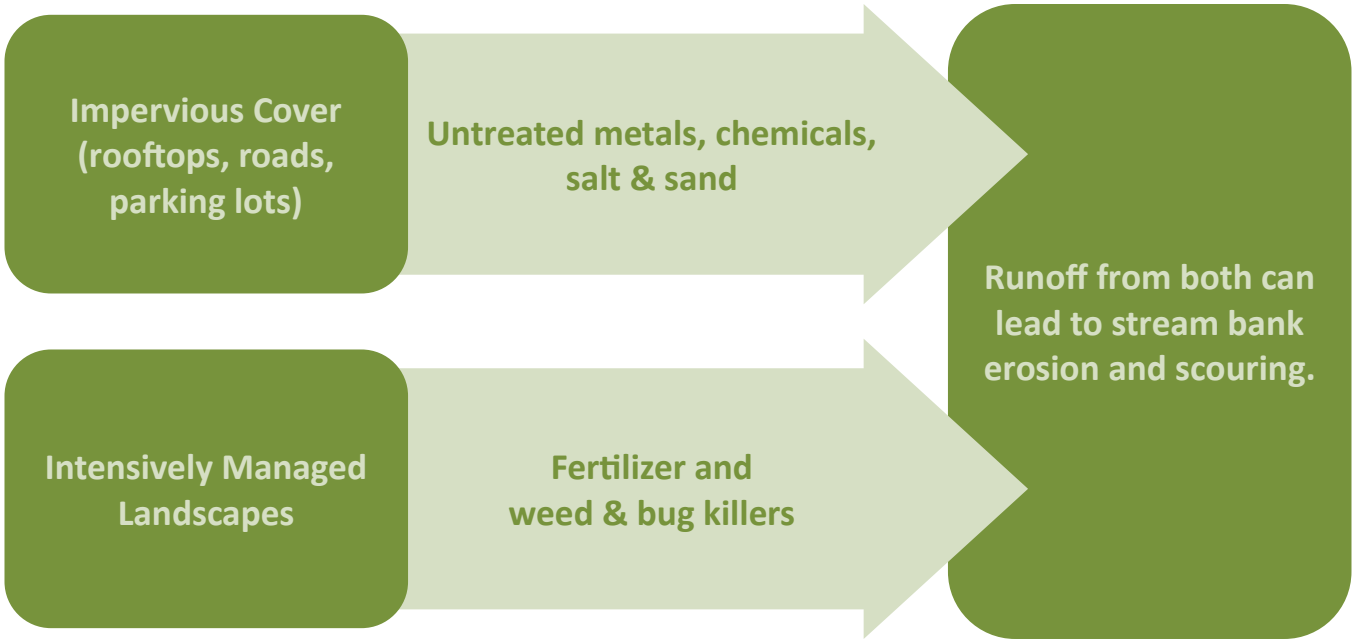
Hotspot Site Investigation Results

Eleven hotspots were identified and evaluated. They consisted of an airport, two commercial office complexes, two golf courses, two municipal sites, and four industrial operations. Most of these properties were observed to have extensive areas of impervious parking lots and roof tops and large areas of **intensively managed landscaping.**

INTENSIVELY MANAGED LANDSCAPES, such as lawns and flower gardens, require ongoing maintenance. These areas can affect water quality if fertilizer or weed and bug killers wash off, and into, a water body.

Rooftops, parking lots, and lawns quickly convey rain water and snowmelt and can also contribute pollutants to the runoff. Untreated runoff from these impervious surfaces contribute metals and chemicals from vehicle exhaust, driveway sealers, salt and sand from winter maintenance, as well as pesticides and fertilizer from landscaped areas and lawns. Without trees, shrubs, and forest floor, runoff will also wash into the River more quickly, which can cause erosion of the land and stream banks. The absence of vegetation also contributes to erosion in the stream channel because a greater amount of rain water is flowing through the channel in a shorter amount of time without being slowly infiltrated into the ground. This causes stream channel scouring and erosion which in turn leads to unstable stream banks and a less biologically healthy stream.

Storm drain marked with a clean eater message.



Runoff from impervious surfaces and intensively managed landscapes can contribute pollution to the River and lead to erosion of the stream bank and channel.

Hotspot Site Investigation Recommendations

First Step Recommendations:

- Inspect all onsite stormwater **BMPs** to ensure they are functioning properly.
- Encourage facility managers to meet with a stormwater professional to review maintenance needs and to develop an operation and maintenance plan if needed.
- Work with municipalities to revise ordinances to protect surface water.

A **BEST MANAGEMENT PRACTICE (BMP)** prevents pollution from entering water or treats polluted runoff .

Common maintenance recommendations:

- Vacuum/sweep winter sand as soon as practicable after snowmelt.
- Vacuum/sweep sand in high-use areas (roads, retail driveways/parking lots and commercial drive thrus) periodically throughout the year.
- Frequently inspect and clean out catch basins and other stormwater BMPs in accordance with Maine DEP maintenance schedule or as recommended by the manufacturer for proprietary systems.
- Repair poorly functioning stormwater BMPs.
- Keep an up-to-date stormwater operation and maintenance notebook that includes details of BMPs and maintenance schedules following properties operation and maintenance plan.
- Train contractors and municipal staff on proper sand/salt application practices (available regionally throughout the year).
- Work with landscapers to implement reduced fertilization-dependent lawns.

Common practices to implement (if not already present):

- Stencil catch basins to notify public that dumping leads directly to waterway.
- Plant native vegetation to buffer along pavement for stormwater filtration and along stream for shading.
- Maintain and/or promote sheet flow from parking areas and roofs into vegetated buffers.

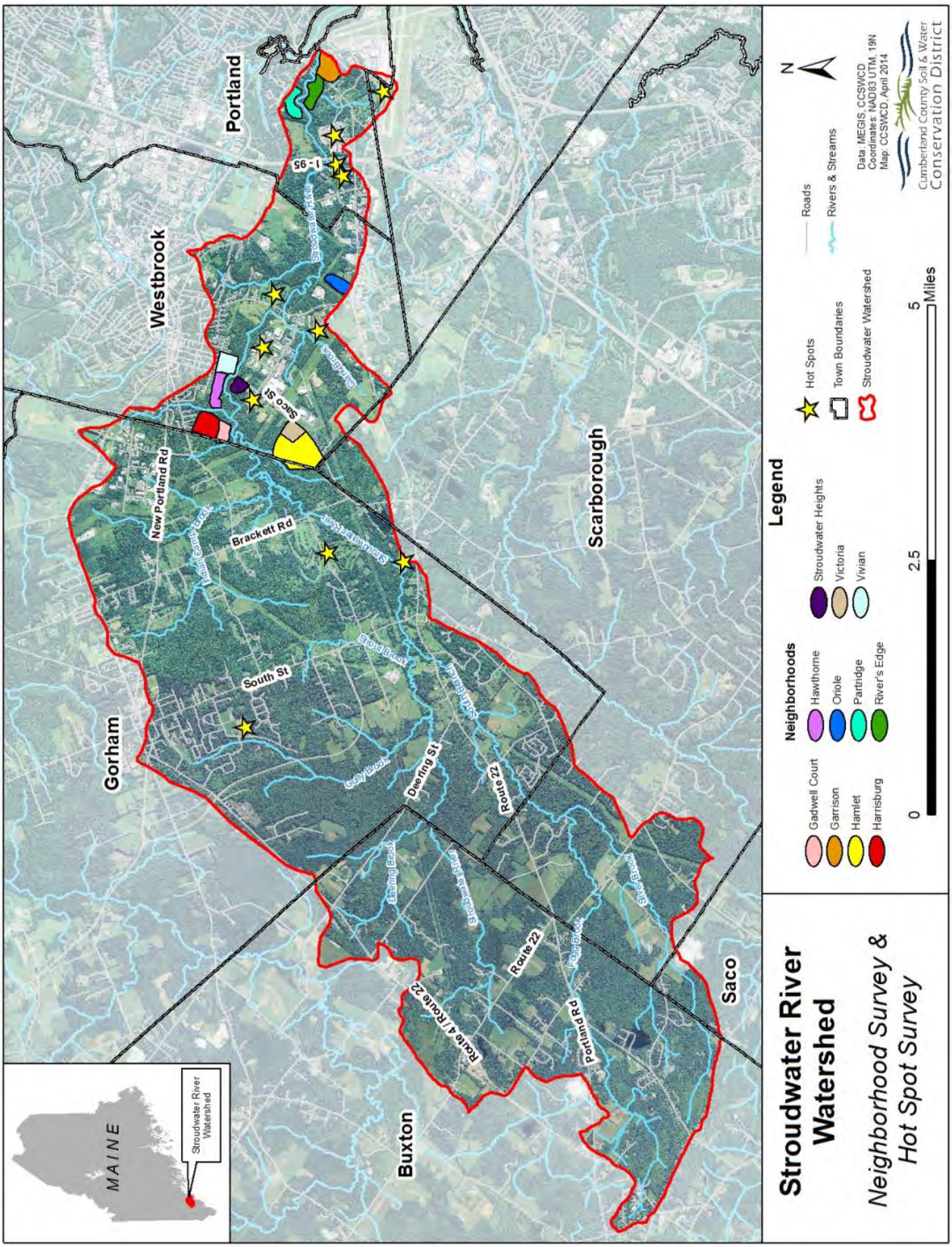


Figure 3. Stroudwater River watershed hotspot and neighborhood survey areas

METHOD #3: Neighborhood Source Assessment Method

Following the CWP's protocol as previously discussed under Method #2 (Page 10), a Neighborhood Source Assessment (NSA) was conducted that looked at 11 distinct neighborhoods within 500 feet of the main branch of the Stroudwater River. Neighborhoods were selected based on size of neighborhood (greater than 10 residences) and location to the main branch of the Stroudwater River (within 500 feet of the shoreline) using aerial photos. The NSA evaluated potential pollutant impacts associated with the following factors: (1) yards and lawns; (2) driveways, sidewalks, and curbs; (3) rooftops; and (4) common areas. A CWP NSA datasheet was filled out for each neighborhood (Appendix B.2: NSA Datasheet).

The very green lawn (background) is likely maintained using fertilizer. Overuse of fertilizer can pollute the River. To prevent overuse, lawns should be fertilized in the fall and only after a soil test has been done.

Neighborhood Source Assessment Results

Nutrients were the number one concern recorded in the NSA based on the four factors listed above. Nutrients ranked high mostly due to the large number of intensely managed lawns. Sediment, untreated runoff from parking lots, and oil and grease were also observed.

Of the 11 neighborhoods surveyed, 10 were ranked as having a moderate impact to the River, and one ranked as high impact. Most of the neighborhoods also had a moderate rating for ability of improvements to be done. These ratings will help prioritize restoration efforts by allowing the neighborhoods to be compared to one another. Please refer to Appendix B.3: NSA Summary for an overview of findings per neighborhood.

A gutter downspout empties onto a paved driveway. Downspouts should be directed to vegetated areas so the water can soak into the ground.

Neighborhood Source Assessment Recommendations

Common recommendations included:

- Educate homeowners about healthy lawn care practices. (Please see below for information abut CCSWCD's YardScaping program),
- Diverting roof runoff into rain gardens (also see below),
- Installing native plants with root systems that can absorb and infiltrate significantly more stormwater than grass,
- Reduce coal tar sealcoating of driveways and roads
- Divert driveway runoff into adjacent vegetation to be filtered

YardScaping is a program provided by CCSWCD that teaches homeowners how to grow a beautiful lawn using less fertilizer and without weed and bug killers. Some of the techniques taught through this program include setting mower blades at three inches, leaving lawn clippings on the lawn as free fertilizer, and adding new grass seed to lawns to help outcompete weeds. For more information on this program, please visit www.cumberlandswcd.org/yardscaping

Rain gardens are flower beds that are designed to collect and infiltrate runoff from roofs, driveways, and other hard surfaces. For more information on rain gardens, please visit www.cumberlandswcd.org/publications and click on the Rain Garden fact sheet.

Please refer to Appendix B.3: NSA Summary for more detailed information on the neighborhoods surveyed and their individual recommendations.

Rain garden installed at residential property in Minnesota. (Source: www.apwa.net)

Impervious cover or hard surfaces include rooftops, driveways, sidewalks, and roads.

Impervious Cover Analysis

As previously mentioned, impervious cover refers to the hard surfaces that do not allow runoff to soak into the ground. These hard surfaces can contribute pollutants (such as sand, salt, metals, chemicals, oil, etc.) to adjacent waters. As the amount of hard surfaces in any given area increases, the likelihood of polluted waters increases.

Studies suggest that impervious cover at 10% or greater within any watershed puts a water body at a high risk of being impaired. For the Stroudwater River Watershed, the amount of impervious cover was estimated for each subwatershed (Figure 4). The main branch of the River had the highest amount of impervious cover with 30.4% of all the subwatershed's land being impervious (Table 4). The sub-watersheds of Clark Brook and Beaver Pond Brook were estimated to be the with next highest levels of impervious cover at 16% and 12.8%, respectively. This data suggests that the areas around the main branch of Stroudwater River, Beaver Pond Brook, and Clark Brook should be analyzed for strategies and effectiveness of reducing impervious cover impacts.

Table 4. Impervious Cover Per Sub-Watershed

Sub-Watershed	Total Acreage	Total Impervious Acreage	% Impervious Cover
Strout Brook	546	31	5.7%
Beaver Pond Brook	345	44	12.8%
Clark Brook	618	99	16.0%
Deering Brook	970	28	2.8%
Gully Brook	1551	83	5.3%
Indian Camp Brook	2815	250	8.9%
South Branch Stroudwater River	4679	182	3.9%
Stroudwater River	6264	501	30.4%

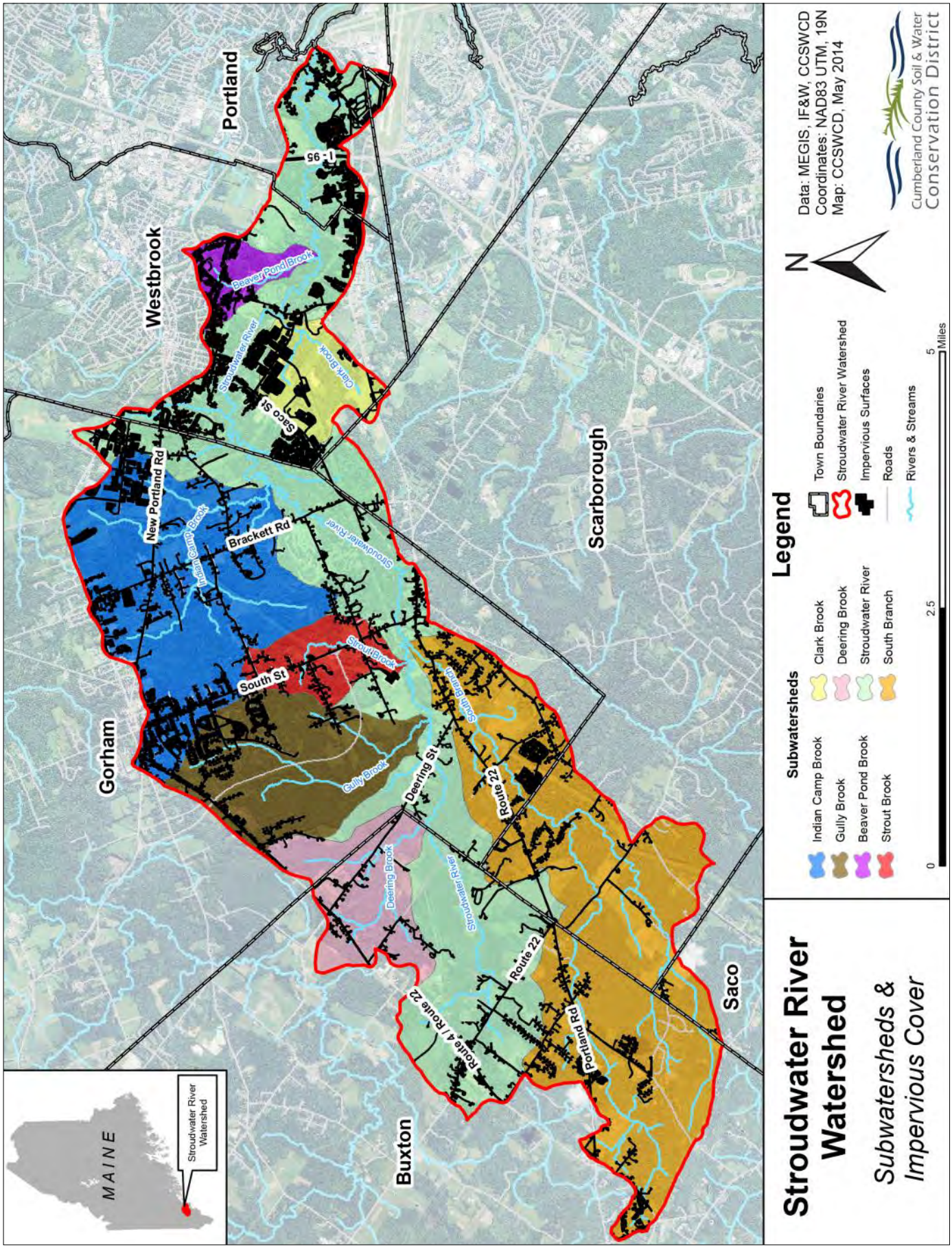


Figure 4. Stroudwater River impervious cover by subwatershed

Conclusion

The surveys conducted through this project serve as an overview of potential threats to the River (Table 5). Based on these findings, areas for more detailed analyses can be determined as recommended in the summary of surveys below. A community discussion and a plan of action (management plan) is likely the next best step to improve and protect the Stroudwater River from pollutants. Funding for the creation of a management plan can be pursued through individual Towns and/or the Maine DEP's 319 Clean Water Act competitive funding grant process. For more information, please contact CCSWCD.

Table 5. Summary of Surveys

Assessment	Number of Sites	Most Common Types of Issues Observed	Most Common Recommendations	Location for details
Shoreland Zone Survey	75 Total: 31 med./high to high impact, 25 low to med./low impact, 19 not ranked due to being a fish barrier	• road ditch erosion • bare soil • unstable road shoulders and road shoulder erosion • hanging and rusted culverts • erosion due to failed culverts • trash in stream	• stabilize areas of bare and eroded soil • replace failing culverts with properly sized culverts • remove trash from the stream and preventing trash dumping • divert, disperse, and infiltrate concentrated flows of stormwater runoff.	Page 4, Appendix A.1-4
Hotspot Site Investigation	11 properties	• extensive areas of impervious parking lots and roof tops • large areas of intensively managed landscaping	• Inspect all onsite stormwater treatment BMPs to ensure they are functioning as intended. • Have a stormwater professional meet with individual facility managers to review maintenance needs. • Work with municipalities to revise ordinances to be protective of surface water. • Stencil catch basins to notify public that dumping leads directly to waterway. • Plant native plant buffers along pavement for stormwater filtration and along stream for shading. • Encourage sheet flow from parking areas and roofs into vegetated buffers.	Page 11, Appendix B.1
Neighborhood Source Assessment	11 neighborhoods: 10 moderate impact; 1 high impact. Most neighborhoods have a moderate rating for ability of improvements to be done.	• Nutrients ranked high mostly due to the large number of highly managed lawns. • Sediment, untreated runoff from parking lots, and oil and grease were also observed.	• Outreach to landowners about lawn care practices • Diverting roof runoff into rain gardens • Installing native plants with root systems that can absorb and infiltrate significantly more stormwater than grass, • Reduce coal tar sealcoating of driveways and roads • Divert driveway runoff into adjacent vegetation to be filtered	Page 13, Appendix B.2-3

2013 Stroudwater River Watershed Survey

Sector & Site_____

Date _____

Surveyor Initials _____

Location (house #, road, utility pole #, river/stream) _____

Tax Map & Lot _____ Landowner Name _____ Talked to Landowner?_____

GPS Coordinates in Lat./Long.: __ __ . __ __ __ __ __° __ __ . __ __ __ __ __° # Photos Taken_____

Land Use: (Circle Primary) ✓Check all secondary

❑ State Road	❑ Residential	❑ Municipal/Public	❑ Trail or Path
❑ Town Road	❑ Driveway	❑ Water Access/Boat Launch	❑ Logging
❑ Private Road	❑ Commercial	❑ Recreational	❑ Agriculture
❑ Undist. Forest	❑ Stream Channel	❑ Gravel Pit	❑ Other:_____

Impact

Size/Amount*	Pollutants Involved	Transport to Stream*
❑ Small (1)	❑ Single (1)	❑ Limited (1)
❑ Medium (2)	❑ Multiple (2)	❑ Direct Flow (2)
❑ Large (3)		

❑ Stream Culvert Crossing

❑Misaligned* ❑Undersized*
❑Hanging * ❑Too short*
❑Blockage
❑Other:

❑Exposed Pipe or ❑Pipe Outfall

Type of pipe:
❑Concrete ❑Terra Cotta
❑Metal ❑Other:
❑Plastic

Purpose of pipe:
❑Sewage ❑Drainage
❑Water Supply ❑Stormwater
❑Unknown/Other:

Evidence of discharge or leaking?
❑Yes ❑No
If yes, describe discharge:

❑ Channel Alteration*

Describe:

Length (ft.):

❑ Fish Barrier (not culvert)

Fish Blockage:
❑Total ❑Temporary
❑Partial ❑Unknown

Type of Barrier:
❑Built Dam ❑Natural Falls
❑Beaver Dam ❑Other:
❑Debris Dam

Fish Blockage Because:
❑Drop is too High ❑Too Fast
❑Too Shallow

❑ Land-Based Erosion/Bare Soil

Describe:

Length (ft.): Depth (ft.):
Width (ft.):
Proximity to Stream (ft.):

❑ Nutrient or Bacteria Sources:

❑Livestock/Manure ❑Pet waste
❑Wildlife ❑Septic / Sewer
❑Fertilizer Usage/Flags
❑Other:

❑ Current Construction

❑In Stream ❑Near Stream
If near, how close?(ft.):
Describe Activity:

Erosion and Sediment Control*:
❑Adequate ❑Inadequate
❑Unknown

❑ Dumping (Trash)

❑In Stream ❑Near Stream
If near, how close?(ft.):
Type of Trash:
❑Residential ❑Tires
❑Industrial ❑Construction
❑Yard Waste ❑Other:
Amt. of Trash (#pickup loads):
Easy Clean Up? ❑Yes ❑No

❑ Unusual Condition / Other

❑Bank Undercutting* ❑Landslide
❑Strange Color or Smell
Describe:

Comments:

Recommendations:

*Additional information provided on reference sheet

Sketch of site on back —>

Appendix A.2. Shoreland Zone Survey Checklist

Stroudwater River Watershed Survey 2013

Issues/Impacts

☐ Stream Culvert Crossing
☐ Exposed Pipe or Pipe Outfall
☐ Channel Alteration
☐ Fish Barrier (not culvert)
☐ Land-Based Erosion / Bare Soil
☐ Nutrient or Bacteria Sources
☐ Current Construction
☐ Dumping (Trash)
☐ Unusual Condition

_____

☐ Inadequate Buffer
☐ Impervious Surfaces

Appendix A.3. Shoreland Zone Survey Cheat Sheet

Misaligned Culvert

Culvert was not placed in same direction as stream flow. This can cause bank scouring.

Hanging Culvert

Culvert outlet is above water line. This impedes fish passage and causes stream bed scouring. cause bank scouring.

Undersized Culvert

Very common. Culvert diameter is much smaller that stream width. This can cause stream bank scouring and road washouts.

Too Short Culvert

Culvert is too short causing road shoulder to cave around ends of culvert.

Stream Channel Alteration

Stream has been altered by man-made means. Typically straightened to quickly drain adjacent land. Can also include riprapping or altering stream bank and channel.

Stream Bank Undercutting/Erosion

Changes in water flow levels, velocity, and patterns that cause bank erosion. Typically noticeable by the presences of exposed roots.

Erosion and Sediment Control at Construction Sites

Adequate: No sediment from construction site is washing of site / would be able to wash off site.

Inadequate: Sediment barriers are not present, are improperly installed, or have a gap in which sediment is or can wash off site.

Impact

Size/Amount

Small: <10 square feet

Medium: 10 sq. ft.—20 sq. ft.

Large: >20 square feet

Transport to Stream

Limited: Runoff eventually is absorbed or infiltrated into the ground prior to reaching a stream or the River.

Direct Flow: Runoff flows directly into a stream or the river with very little filtering.

Stroudwater River Watershed NPS Survey Data

Sector #	Site #	Map #	Location	Town	Primary Land Use	Additional Land Uses (if any)	Issues	Size/Amt. (1-3)	Pollutants (1 or 2)	Transport To (1 or 2)	Total Rating	Comments:	Recommendations:
1	1	1	Stream crossing Bradbury Lane, Culvert #88 on survey map	Buxton	Town Road?		Stream culvert crossing: Other	1	1	2	4	Potential culvert failing due to crack in pavement	Shortly downstream, lawn adjacent to stream. Unsure of impact.
1	2	1	Town of Buxton Transfer Station	Buxton	Municipal/Public		Nutrient or Bacteria Sources: Other - Transfer Station Compost Site	3	2	1	6	Spoke to manager (Greg). Will be moving (shortly) the compost site - 20 feet further from the stream. Septic is also close to stream on south side of property. Facility does frequent water quality testing.	NA
1	3	1	Silver Brook Crossing, Tapley Road	Buxton	Town Road		Stream culvert crossing: Undersized	1	1	2	4	Small sediment dam at culvert outlet	Older culvert. Consider enlarging when replacing.
1	4	1	Portland Road Culvert #45 on survey map	Buxton	State Road		Stream culvert crossing: Misaligned; Other - Rusty, misshapen	1	1	2	4		Culvert outlet needs stabilization
1	5	1	Portland Road East of Culvert #45 on survey map	Buxton	State Road		Stream culvert crossing: Too short; Ditch drainage	2	1	2	5	Shoulder erosion. Stream parallels road. Need to be cautious of stream undercutting.	NA
1	6	1	Portland Road Culvert #63 on survey map	Buxton	State Road		Stream culvert crossing: Other (see comments)	1	1	2	4	Rusty culvert. Some road erosion at culvert outlet.	Rip-rap culvert outlet
			Road, 1st culvert crossing, #35 on survey map	Buxton	Town Road?		Stream culvert crossing: Hanging	1	1	2	4	Three culverts, some banking.	Needs a bigger culvert
1	8	1	New driveway off Portland Road between Town Farm Road and Pease Road	Buxton	Driveway	Residential	Stream culvert crossing: Misaligned	1	1	2	4	Slightly misaligned culvert, could cause erosion issues in future; Large culvert, heavily riprapped inlet and outlet	Monitor and seek experienced remediating if erosion should occur
2	1	1	Wolf Run Farm/1606 Plains Road	Buxton	Agriculture	Town Road	Nutrient or Bacteria Sources: Livestock/Manure	1	2	2	5	Horse farm, Prosperous Pond. Horse paddock with ditch draining. Manure storage/roofless	Buffer around pond and ditches. Watering system for horses. Roof on manure storage. Check with USDA re cooperation.
2	2	1	Portland Road culvert at intersection of Town Farm Road	Buxton	State Road	Town Road	Land-based Erosion/Bare Soil: See Notes. Ditch to stream. Length: 150' Width: 50' Depth: 3" to 2' Dumping Trash: Near stream (small) Easy cleanup? Yes Channel Alteration: Livestock related healing	3	1	2	6	Culvert on pond side reaching end of life. Armoring defective on one side. Erosion: shoulder. Trash. Rills. Winter plowing pushes sand in ditch.	NA
2	3	1	Silver Brook and Tapley, across from #95	Saco	Town Road		Land-based Erosion/Bare Soil: Ditch erosion, no stones	3	1	2	6	Ditch erosion, no rock (is grass) culvert. Exposed tree roots.	Needs armoring in ditch and around culverts.
2	4	1	Across from 84 Tapley Road	Saco	Agriculture		Nutrient or Bacteria Sources: Livestock/Manure	1	1	2	4	Manure pile/horse and chicken	NA
2	5	1	Across from 49 Hanson Road	Scarborough	NA		Land-based Erosion/Bare Soil: Shoulder erosion. Length: 250' Width: 15'	NA	NA	NA	NA	Winter sand into Silver Brook. Road shoulder erosion.	Possibly larger culvert.
2	6	1	NA	Scarborough	NA		NA	NA	NA	NA	NA	Culvert angled wrong. Bark slide due to tree failure.	NA
5	5	2	Culvert at Bruce Woods Private Drive on Route 22	Buxton	Driveway	Residential, State Road	Stream Culvert Crossing: Undersized. Blockage (1/2 filled). Corrugated metal pipe for drainage.	1	1	2	4	Replace existing culvert with larger culvert; Stabilize inlet and outlet with riprap	

Stroudwater River Watershed NPS Survey Data

Sector #	Site #	Map #	Location	Town	Primary Land Use	Additional Land Uses (if any)	Issues	Size/Amt. (1-3)	Pollutants (1 or 2)	Transport To (1 or 2)	Total Rating	Comments:	Recommendations:
5	6	2	Downstream Bruce Woods Drive - Concrete Structure in Ditch	Buxton	Town Road	Ditch	Dying vegetation under concrete ramp that is crossing the ditch; Result is a bare, unstable ditch.	1	1	1	3	Remove concrete ramp.	
5	7	2	Oak Ridge Drive Crossing	Buxton	Private Road	Stream Channel, Residential	Stream Culvert Crossing: Misaligned, Blockage, Undersized, Other: Submerged Upstream Side. Metal Pipe.	NA	NA	NA	NA	Also dumping in floodplain - upstream side. 1-2 pickup truck loads at least. Large size pallets, truck beds, etc. (No active erosion)	
5	8	2	Pleasant Ridge Road	Buxton	Residential		Pesticide application design - direct drainage to tributary	3	1	2	6	35 Pleasant Ridge - pesticide application sign, direct drainage to tributary	
5	9	2	Route 22 crossing adjacent to Pleasant Ridge	Buxton	State Road		Stream Culvert Crossing: Hanging (downstream), Blockage (upstream), Rusted. Metal pipe. Pool at culvert outlet.	NA	NA	NA	NA	Downstream side: also trash debris on bank from adjacent house. Upstream side: undersized - debris dam causing ponding and cascading into culvert.	
5	10	2	Route 202 Crossing	Buxton	State Road		Stream Culvert Crossing: Hanging, Undersized. Concrete Pipe.	NA	NA	NA	NA	Lots of poison ivy. Downstream - hanging, sediment deposition / quicksand in pool at outfall. Lg.	
5	11	2	Atkinson Street Crossing	Buxton	Town Road		Stream Culvert Crossing: Undersized.	NA	NA	NA	NA	Double culvert - Old: very undersized and hanging; New: undersized	
3	1	3	Map 47 inlet	Gorham	Stream Channel	Town Road	Stream Culvert Crossing: Other - Rust	NA	NA	NA	NA	Bottom of culvert slightly rusted.	NA
3	5	3	Downstream from culvert - see Map 47 (3-4)	Gorham	Stream Channel		Unusual Condition/Other: Bank undercutting.	NA	NA	NA	NA	Lacks riparian buffer on south side of stream.	NA
3	6	3	Map 46 - stream bed to northeast	Gorham	Stream Channel		Unusual Condition/Other: Bank undercutting.	3	1	2	6	Trees roots being undermined, leaning over river due to large cuts in bank. Forest thinly treed. Landslide on higher bank. (See 3-7)	NA
3	7	3	Map 46 - stream bed to northeast	Gorham	Stream Channel		Unusual Condition/Other: Bank undercutting. Landslide.	3	1	2	6	Landslide.	NA
3	8	3	Map 46 - stream bed to northeast	Gorham	NA		Dumping (Trash): Near Stream. Type: Residential, Yard Waste. Amount of trash (# pick-up loads): 1-2. Unusual Condition/Other: Landslide.	2	2	2	6	Yard trash on high bank side. Erosion and down trees. Tree and branches partially obstruct river at bend.	NA
3	10	3	Silver Brook Circle Stream Crossing	Scarborough	Stream Channel	Private Road	Stream Culvert Crossing: Misaligned. Land-based Erosion/Bare Soil: Road shoulder erosion above culverts. Unusual Condition/Other: Bank undercutting.	1	1	2	4	Three culverts, one not functioning (no feed). Middle culvert misaligned and flowing. Third culvert in line with stream flow. Trees down across up stream.	Continued erosion between road and culverts.
3	12	3	Small Pond Road, #56; small streambed	Scarborough	Private Road	Stream Channel	Unusual Condition/Other:	NA	NA	NA	NA	Extremely low flow from pond discharge.	NA

Stroudwater River Watershed NPS Survey Data

Sector #	Site #	Map #	Location	Town	Primary Land Use	Additional Land Uses (if any)	Issues	Size/Amt. (1-3)	Pollutants (1 or 2)	Transport To (1 or 2)	Total Rating	Comments:	Recommendations:
4	1	3	Upstream of Survey Map 13/80 along South Branch Stroudwater River	Gorham	Stream Channel	State Road	Unusual Condition/Other: Bank undercutting. Trees in stream/nearly blocked stream due to limbs and sediment	2	1	2	5	Undercutting led to trees down. Half of stream blocked.	NA
5	1	3	Horseshoe at edge of sector line on main stem	Gorham	Undist. Forest	Stream Channel	Fish Barrier: Debris Dam. Landslide: 40'x20'x15' along bank. Bank Undercutting	3	1	2	6	Seven trees down; Large slump in bank; Undercut from Deering Road (Surveyor Pin HP Gray #387)	
5	2	3	Large blow down - marked on map before fork	Gorham	Logging		Fish Blockage: Partial. Type of Barrier: Debris Dam.	NA	NA	NA	NA	Bank undercut whole length walked; Large blow down in floodplain	NA
5	4	3	Tributary at pole line crossing	Buxton	Stream Channel	State-Owned (Pole Line)	Stream Culvert Crossing: Undersized. Hanging. Metal sleeve. Plastic outer. 10" inner. Fish Blockage Because: Drop is too high and too shallow.	1	1	2	4	Hanging and undermined culvert; Culvert not functional	Replace culvert
6	1	3	Deering Road, Gorham, at river crossing	Gorham	Town Road		Land-based Erosion/Bare Soil: Shoulder erosion. Length: 18' Width: 10' Proximity to stream: 0-10	3	1	2	6	Road sand on shoulder above culvert. Evidence of bank erosion downstream of culvert on south side.	NA
6	2	3	NA	Gorham	Other: Open field		Land-based Erosion/Bare Soil: Large field drainage entering river Unusual Condition/Other: Bank undercutting	2	1	2	5	NA	NA
6	3	3	West of Route 114, South Street, Gorham	Gorham	Trail or path by power line		Dumping (Trash): Near Stream. Type: Residential, Tires, Construction. Easy Cleanup? Yes	1	1	1	3	NA	NA
6	4	3	Route 114/South Street (west side), north of river	Gorham	State Road	Town Road	Land-based Erosion/Bare Soil: Gully from road runoff. Length: 40 Depth: 2-3? Width: 2-5 Proximity to Stream: 0-40.	3	1	2	6	See also 6-5	Rip rap
6	5	3	Route 114/South Street, north of river	Gorham	State Road	Town Road	Stream Culvert Crossing: Blockage.	NA	NA	NA	NA	Route 114 ditch/culvert for driveway into power line ROW. Culvert is blocked on upstream side. Gully erosion (6-4) on downstream side.	NA
6	6	3	Route 114/South Street, north of river, east of highway, 452 South Street	Gorham	State Road	Town Road	Stream Culvert Crossing: Blockage. Land-based Erosion/Bare Soil: Gully erosion from culvert. Length: 50 Depth: NA Width: 2 Proximity to Stream: 0-50 Dumping (Trash): Near stream. Type of trash: Residential.	1	1	2	4	NA	NA
6	7	3	452 South Street	Gorham	State Road	Town Road, Private Road	Exposed Pipe: Metal. Purpose of pipe: hanging culvert: drainage.	1	1	2	4	See also 6-5, 6-6	NA

Stroudwater River Watershed NPS Survey Data

Sector #	Site #	Map #	Location	Town	Primary Land Use	Additional Land Uses (if any)	Issues	Size/Amt. (1-3)	Pollutants (1 or 2)	Transport To (1 or 2)	Total Rating	Comments:	Recommendations:
6	8	3	Route 114 bridge, south side, downstream	Gorham	State Road	Town Road	Land-based Erosion/Bare Soil: Gully, rill and sheet erosion. Length: 15 Depth: 1 Width: 15 Proximity to stream: 10-20	3	1	2	6	Unstabilized soil erosion along bridge abutment BR#5303 (MDOT)	NA
8	1	3	Waterhouse Road (#11/76 on map)	Gorham	Town Road	Stream Channel	Stream Culvert Crossing: Undersized, hanging. Fish Barrier: Blockage because drop is too high.	NA	NA	NA	NA		NA
6	9	4	Site 82, South Street	Gorham	State Road	Town Road	Land-based Erosion/Bare Soil: Streambank erosion. Length: 15 Depth: 1-2 Width: 5 Proximity to stream: 5	1	1	2	4	Site 82, upstream end of culvert. Downstream side of culvert OK.	NA
8	2	4	Cornucopia (#77 from map)	Gorham	Town Road	Stream Channel; Residential	Fish Barrier (not culvert): Fish blockage: Type of barrier: Other - Trees, branches. Unusual Condition/Other: Bank undercutting.	NA	NA	NA	NA		
8	3	4	Keepa Way (#84 on map)	Gorham	Private Road	Driveway, Stream Channel	Stream Culvert Crossing: Misaligned, undersized.	NA	NA	NA	NA	Culverts on both sides of road too small and misaligned.	NA
8	4	4	Weeks Road, west side	Gorham	Logging	Undist. Forest, Trail or Path	Land-based Erosion/Bare Soil: Appears to be large logging operation. Proximity to stream: 2-300.	3	1	2 (in some areas)	6		NA
8	6	4	Weeks Road, west side	Gorham	Trail or Path	Logging, Stream Channel, Undist. Forest	Land-based Erosion/Bare Soil: Inadequate silt fencing. Current Construction: Near Stream. Erosion and Sediment Control: Inadequate.	2	1	2	5	Silt fencing broken and allowing silt to flow into stream.	NA
8	7	4	Solomon Drive Crossing	Gorham	Town Road	Stream Channel	Stream Culvert Crossing: Hanging Pipe Outfall: Concrete Purpose of pipe: Unknown/Other - white water. Evidence of Discharge or Leaking: Yes, white water. Dumping (Trash): In stream. Type of trash: Residential, tires. Easy clean-up? Yes. Unusual Condition/Other: Strange Color or Smell: White water, chlorine type smell.	2	2	2	6	Water at small, hidden culvert white with chemical type smell. No source identified. Discharging into homemade retention pond.	NA
10	1	4	Across Route 114 at House #336	Gorham	State Road	Stream Channel	Stream Culvert Crossing: Misaligned and minimal blockage - Minor channel alteration due to road shoulder slumpage. Concrete exposed drainage pipe, no evidence of leakage. Dumping near stream. Road salt.	1	2	1	4		

Stroudwater River Watershed NPS Survey Data

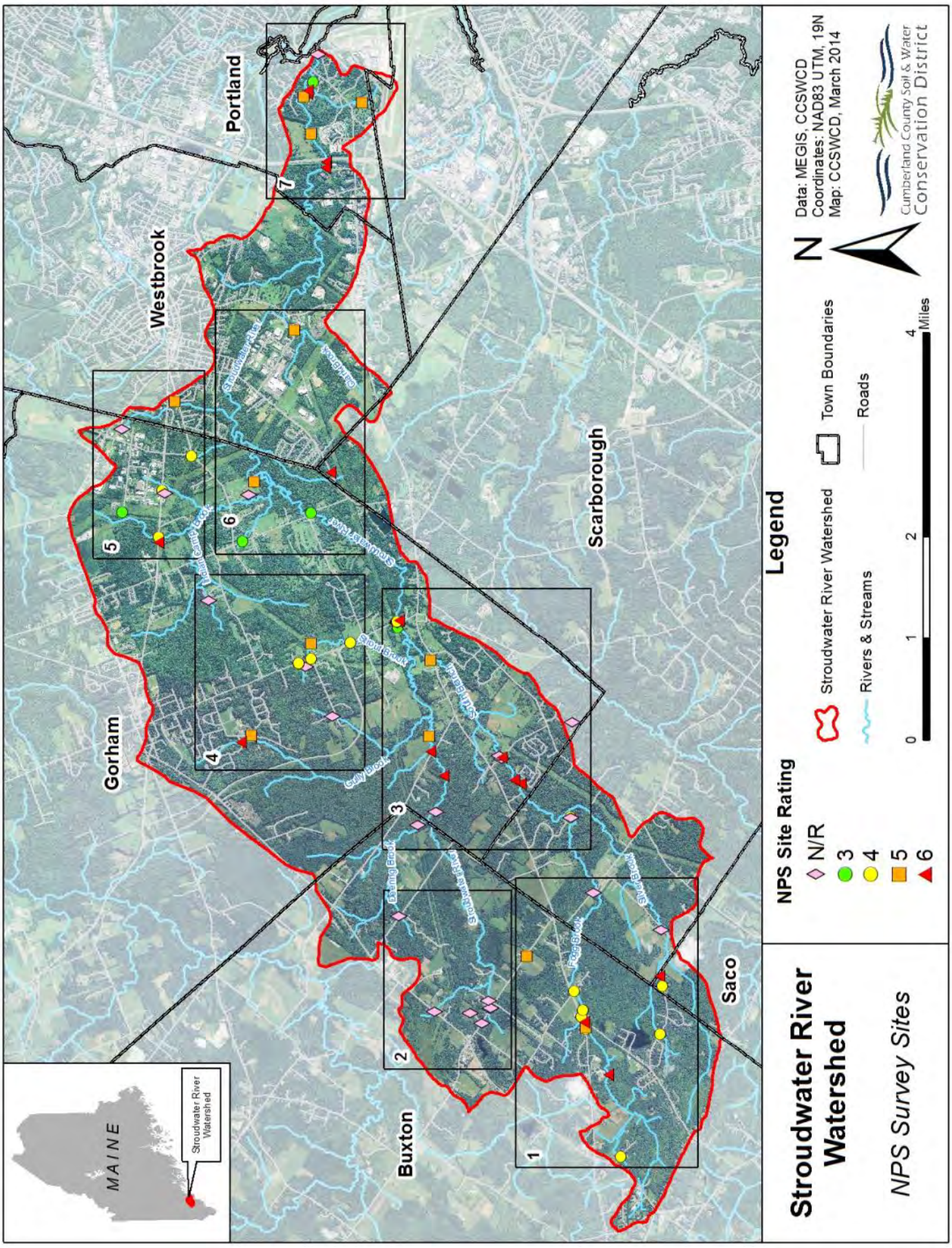
Sector #	Site #	Map #	Location	Town	Primary Land Use	Additional Land Uses (if any)	Issues	Size/Amt. (1-3)	Pollutants (1 or 2)	Transport To (1 or 2)	Total Rating	Comments:	Recommendations:
10	2	4	#336 Route 114 (South Street), #83 on survey map	Gorham	State Road		Stream Culvert Crossing: Minimal blockage. Exposed concrete drainage pipe, no evidence of leakage.	1	2	1	4	Enlarged outlet pool due to minimal blockage of stream.	
10	3	4	Directly across from Waterhouse Road on Route 114	Gorham	State Road		Stream Culvert Crossing: Hanging, blockage at inlet due to trash. Exposed 24"-30" metal drainage pipe, no evidence of leakage.	2	1	1	4	Bank slumpage and undercutting 20 ft. from culvert outlet. Hanging culvert.	
10	4	4	Power line in Sector 10 north of South Street	Gorham	Private Road (Power Line)		Stream Culvert Crossing: Misaligned at outlet. Exposed metal drainage pipe, no evidence of leakage. Channel Alteration: at inlet, serves as collector for wetlands; Outlet aims toward bank.	2	1	2	5	Silt fence left in place; Dirt road erosion	
10	9	4	Harts Way	Gorham	Town Road		Culvert outlet blocked	NA	NA	NA	NA	Not an active erosion issue yet blockage could cause erosion in future.	
11	2	5	New Portland Road	Gorham	Town Road		Exposed Pipe: Concrete. Drainage. No evidence of leakage. Adequate erosion and sediment control.	1	1	2	4	Slight slumping of bank at outlet. Undercutting on left hand corner of bank outlet.	
13	1	5	#70, Arlington and Longfellow Stream Crossing	Westbrook	Residential		Land-based Erosion: Bare Soil: Banking eroding, slumping. Length: 50 Depth: NA Width: 25 Current Construction: Near stream. How close? 30 feet. Silt fence buried and collapsed. Erosion and Sediment Control: Inadequate.	3	1	1	5	NA	Stabilize banking (vegetation). Reinstall silt fence till slope is stabilized.
13	2	5	#58, Corner of Longfellow and Lowell Street	Gorham	Town Road		Land-based Erosion/Bare Soil: Road shoulder erosion, broken pavement. Length: 10 Depth: NA Width: 10 Proximity to	1	1	2	4	NA	Armor culvert. Stabilize shoulder. Repave corner where pavement is breaking.
13	3	5	#12/78 Corner of McAdam Way and New Portland Road	Gorham	Private Road		Land-based Erosion/Bare Soil: Plow berms pushed into stream bed. Erosion from McAdam Way. Length: 20 Depth: NA Width: 20.	3	1	2	6	NA	Stabilize road surface. Plow away from stream.
13	4	5	#23 Pole (New Portland Road, near Knowles Service Corp.)	Gorham	State Road		Stream Culvert Crossing: Blockage. Dumping (Trash): In Stream and Near Stream. Type of Trash: Residential. Amount of Trash (# pickup loads): 1 Easy Clean Up? Yes.	1	1	2	4	Trash in ditches prior to culvert. Common along ditching in road.	
13	5	5	Transformer line at end of Hutcherson Drive	Gorham	Municipal/Public		Dumping (Trash): In stream. Type of Trash: Residential. Amount of trash (# pickup loads): <1 Easy clean up? Yes	1	1	1	3	Power lines and transformer station.	Dumping of trash at stream crossing - easy clean-up, less than a pick-up truck.

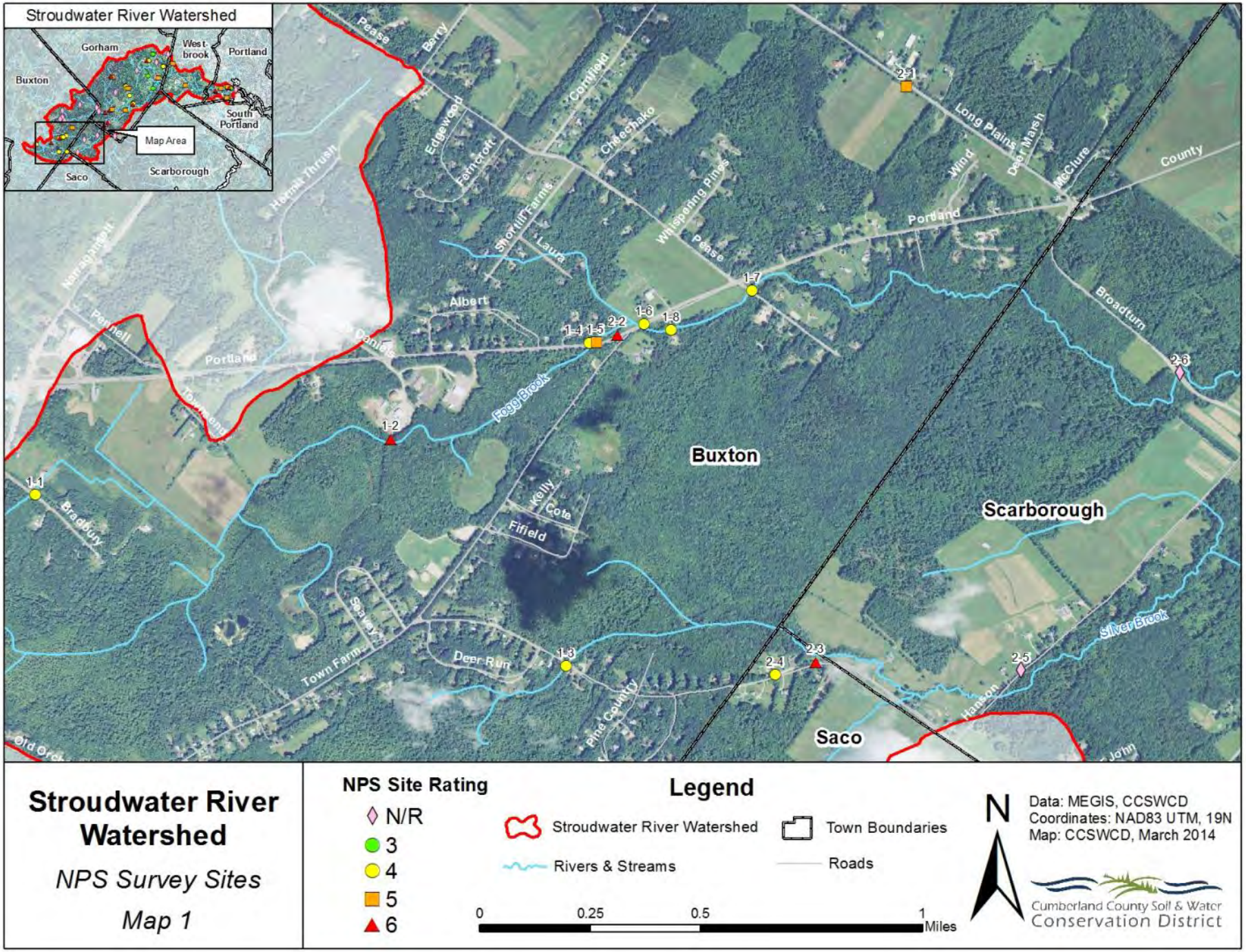
Stroudwater River Watershed NPS Survey Data

Sector #	Site #	Map #	Location	Town	Primary Land Use	Additional Land Uses (if any)	Issues	Size/Amt. (1-3)	Pollutants (1 or 2)	Transport To (1 or 2)	Total Rating	Comments:	Recommendations:
13	6	5	Lawrence Drive, near Atlantic Commons	Gorham	Commercial		Stream Culvert Crossing: Blockage.	1	1	2	NA	NA	Maintenance to remove blockage.
13	7	5	New Portland Road, Lori LN intersection	Gorham	State Road		Stream Culvert Crossing: Other - Rusted out.	2	1	2	NA	NA	Replace culvert. Realign and stabilize banking.
10	6	6	Brackett Road	Gorham	Town Road		Concrete pipe - slight bank undercutting	1	1	1	3	Slight under cutting, right bank, pre-existing. New construction bridge, arch concrete, good riprap.	
10	8	6	101 Brackett Road	Gorham	Town Road		Double culvert, well vegetated. Slight road side erosion. Wetlands. Right bank - erosion during periods of high flow. Outlet: Minor erosion, good riprap.	1	1	1	3		
12	1	6	Utility Pole #41, County Road	Scarborough	Commercial	Logging	Current Construction: Logging around wetland for construction? Erosion and Sediment Control: Inadequate.	3	1	2	6	Severe logging and clearing near brook; no trespassing signs.	Revegetate. Relocated access roads away from brook.
17	2	6	Pershing Way, off Eisenhower - Stream Crossing	Westbrook	Town Road		Stream Culvert Crossing: Hanging, blockage. Pipe horizontal outlet. Exposed pipe: Type of pipe: Concrete. Purpose of pipe: Unknown Fish Barrier: Blockage: Partial. Type of barrier: Cross pipe.	2	1	2	5	Hanging culvert. Pipe obstruction 10 feet downstream of outlet.	Culvert is deteriorating. Install new culvert (proper installation). Relocate cross pipe or maintain space below to allow flow.
13	8	6	Power line Crossing	Gorham	Other: Power lines		Channel Alteration: Straightened. Length: 200 yards	3	1	2	NA	No canopy. Stream alteration, straightening.	Difficult to remedy due to vegetation control requirements of CMP. Site itself does not suffer from erosion.
13	9	6	End of Dragonfly Road	Gorham	Residential		Dumping (Trash): Near Stream. Type of Trash: Residential, Industrial, Yard Waste, Tires. Amount of Trash (#pickup loads): 10. Easy clean up? No	2	2	1	5	Landowner dumping material on bank near river. Broken glass, furniture, plastic, wood (possibly gas and oil, and septic).	Work with landowner on both education and cleanup. Check septic system. Landowner gave permission to walk to river but not to survey property.
14	6	7	Portland Trail under I 95	Portland	State Road; Logging		Land-based Erosion/Bare Soil: Erosion under SB Turnpike bridge. Length: 25 Depth: surface Width: 25 Proximity to stream: 20	3	1	2	6	NA	NA
14	7	7	Portland Trails, end of Blueberry Lane	Portland	Town Road; Commercial; Trail or Path		Exposed Pipe: Metal. Purpose of pipe: drainage, stormwater. Evidence of discharge or leaking: Yes - Colored water.	2	2	2	6	Rust colored water. Oil slick. Pipe drains into river. Catch basin to outlet at river then another pipe.	NA
15	1	7	Portland Trails - Stroudwater Trail, near Canoe Hut	Portland	Trail or Path - Stairway. Other: Outfall ????		Exposed Pipe. Purpose of Pipe: Drainage. Land-based Erosion/Bare Soil: Along side first set of stairs. Drainage way and wall eroding. Unusual Condition: Bank undercutting.	1	1	1	3	Meaningful stream bank undercutting as you follow that upstream. Some ??? Lack buffers. Erosion along stairway may be due to bikes.	NA

Stroudwater River Watershed NPS Survey Data

Sector #	Site #	Map #	Location	Town	Primary Land Use	Additional Land Uses (if any)	Issues	Size/Amt. (1-3)	Pollutants (1 or 2)	Transport To (1 or 2)	Total Rating	Comments:	Recommendations:
15	2	7	Portland Trails - Stroudwater Trail, near wooden steps	Portland	Trail or Path		Land-based Erosion/Bare Soil: Meaningful erosion off direct trail and along steps. Length: 10 Depth: 3 Width: 3. Proximity to stream: 0	3	1	2	6	NA	NA
15	3	7	Portland Trails - Stroudwater Trail on ???? Boardwalk.	Portland	Trail or Path		Land-based Erosion/Bare Soil: Limited buffer and direct erosion into river.	2	1	2	5	NA	NA
15	4	7	Outlet pipe	Portland	Outfall		Stream Culvert Crossing: Other - Collapsed. Land-based Erosion/Bare Soil: Sediment deposition.	2	1	2	5	Two drainage ways converge and dump into river.	NA
15	5	7	Portland Trails - Stroudwater Trail near ??? From farm but downstream at I-95	Portland	Trail or Path		Stream Culvert Crossing: Other: Erosion near outlet. Land-based Erosion/Bare Soil: Erosion on banks downstream of culvert outlet. Bare soil.	2	1	2	5	NA	NA
15	8	7	Eagle Scout Bridge	Portland	Trail or Path		Land-based Erosion/Bare Soil: V-shaped drainage. Walls eroding. Length: 100 Depth: 3 Width: 4	3	1	2	6	Site location is actually between site 3 and 4 in Section 15	NA
15	9	7	Dam	Portland	Other: Dam		Fish Blockage: Unknown. Type of Barrier: Built dam. Fish blockage because: Drop is too high; too fast.	3	NA	2	NA	Dam at confluence of Fore and Stroudwater Rivers	NA

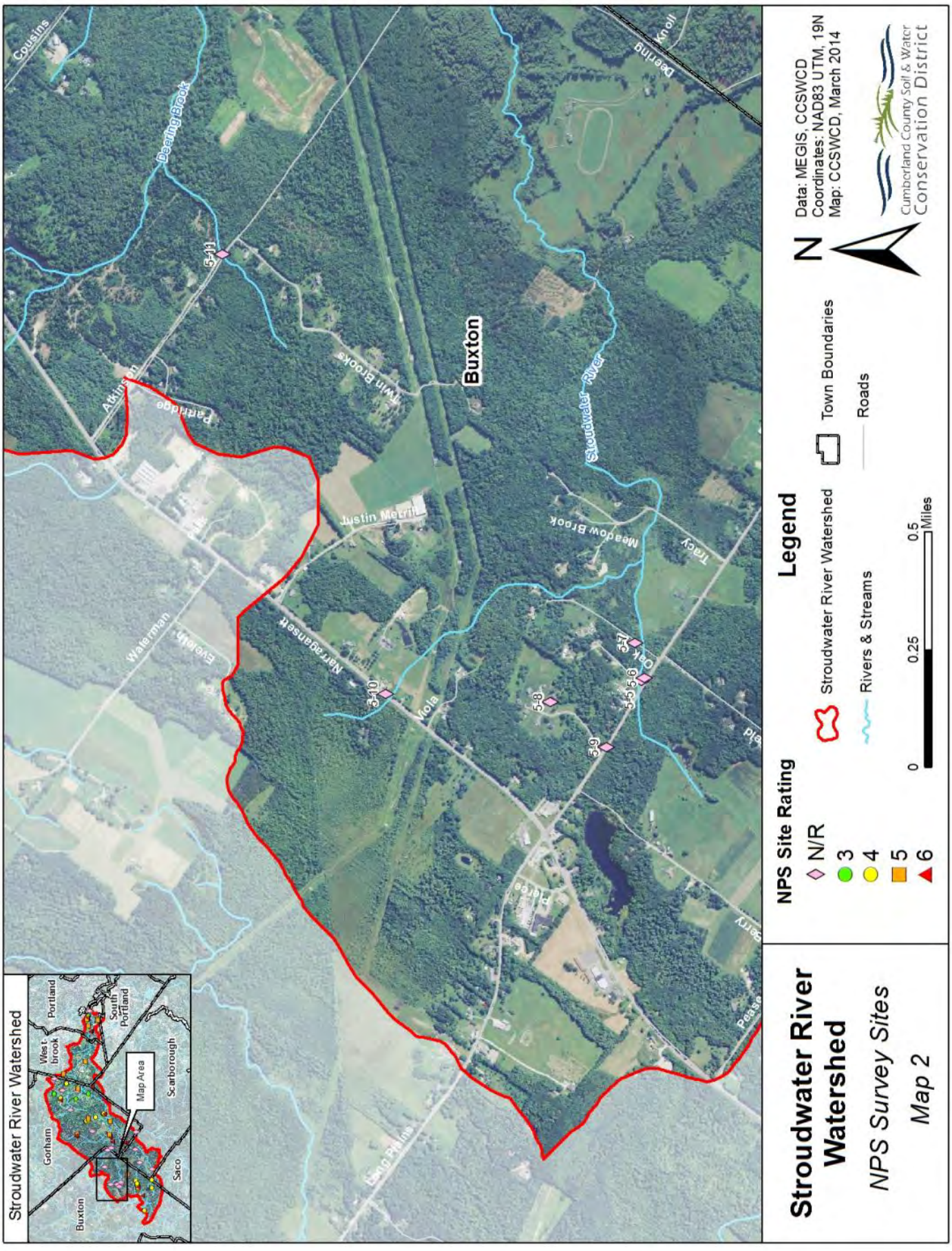

Portland
Westbrook
Gorham
Scarborough
Buxton
Saco
MAINE
Stroudwater River Watershed
Stroudwater River Watershed
NPS Survey Sites
Legend
Stroudwater River Watershed
Town Boundaries
Rivers & Streams
Roads
NPS Site Rating
N/R
3
4
5
6
0
1
2
4
Miles
N
Data: MEGIS, CCSWCD
Coordinates: NAD83 UTM, 19N
Map: CCSWCD, March 2014
Cumberland County Soil & Water
Conservation District

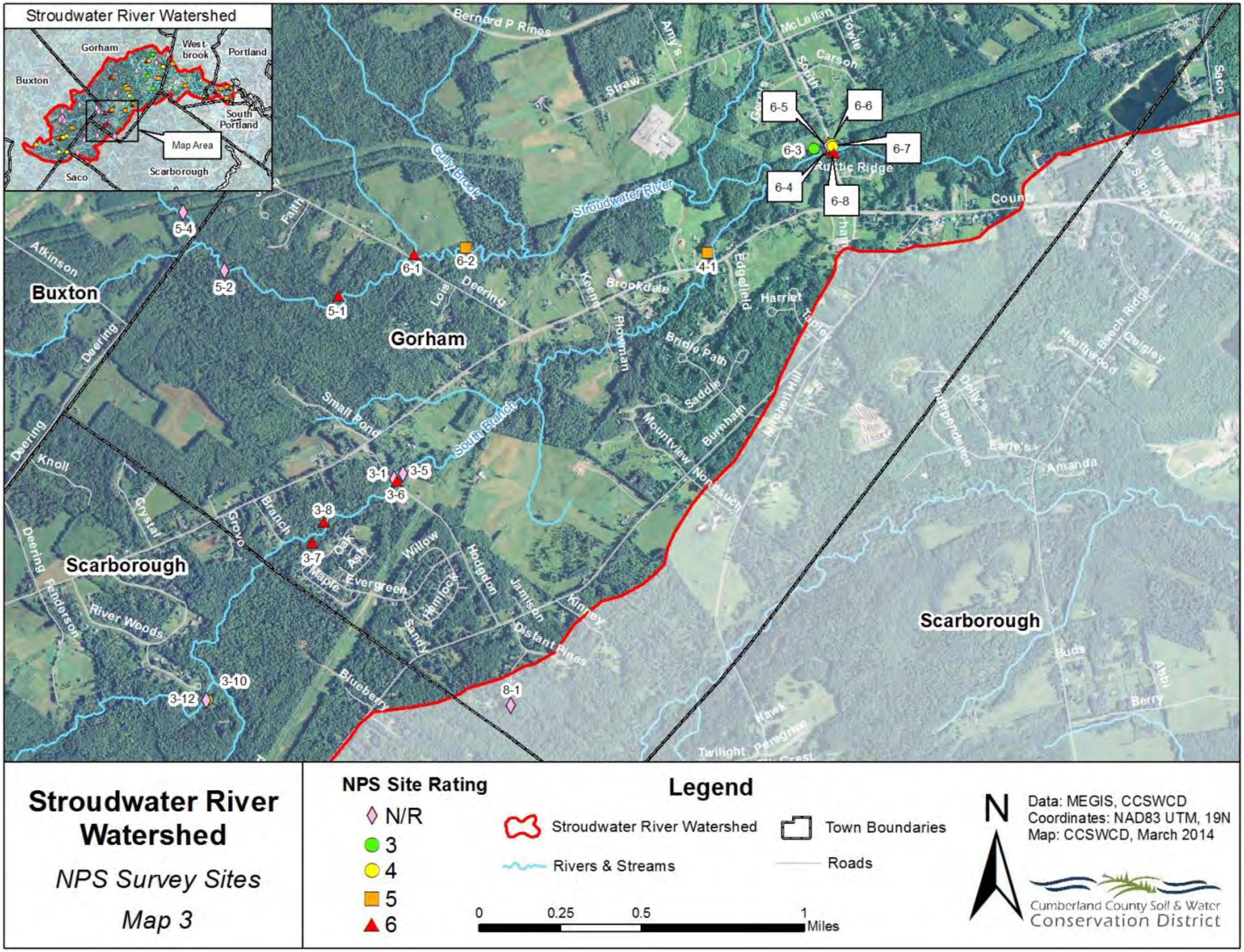


Stroudwater River Watershed

NPS Survey Sites

Map 1

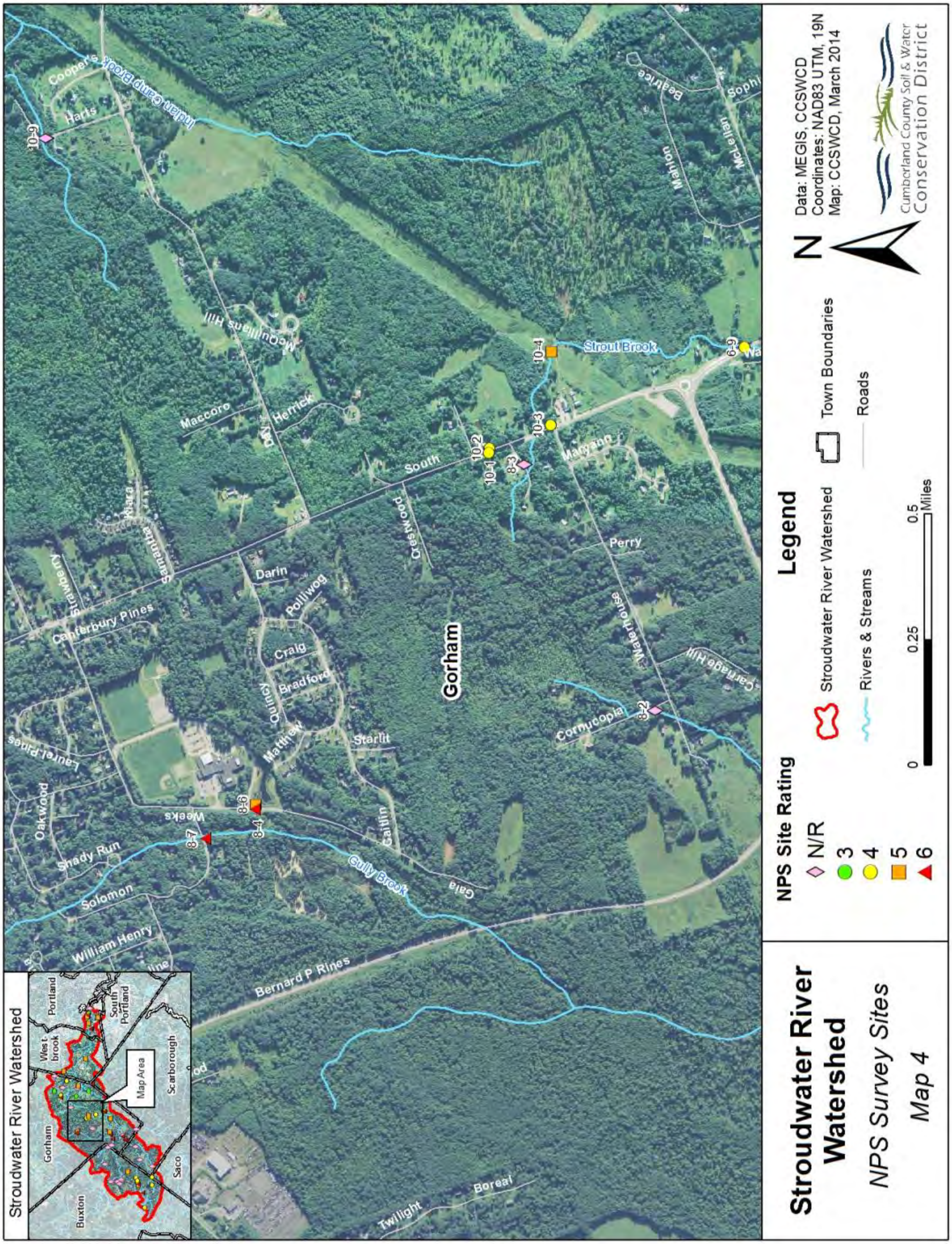

Stroudwater River Watershed
Portland
West brook
South Portland
Scarborough
Gorham
Saco
Buxton
Map Area
Stroudwater River Watershed
NPS Survey Sites
Map 2
Legend
Stroudwater River Watershed
Rivers & Streams
Town Boundaries
Roads
NPS Site Rating
N/R
3
4
5
6
0
0.25
0.5
Miles
N
Data: MEGIS, CCSWCD
Coordinates: NAD83 UTM, 19N
Map: CCSWCD, March 2014
Cumberland County Soil & Water Conservation District
Buxton
Pearl Brook
Twin Brooks
Stroudwater River
Meadow Brook
Justin Merrill
Narragansett
Mola
Oak
Tracy
Waterman
Everett
Partridge
Atkinson
Cousins
Deering
Knoll
Long Plains
Pease
5-11
5-10
5-8
5-9
5-5
5-6
5-7

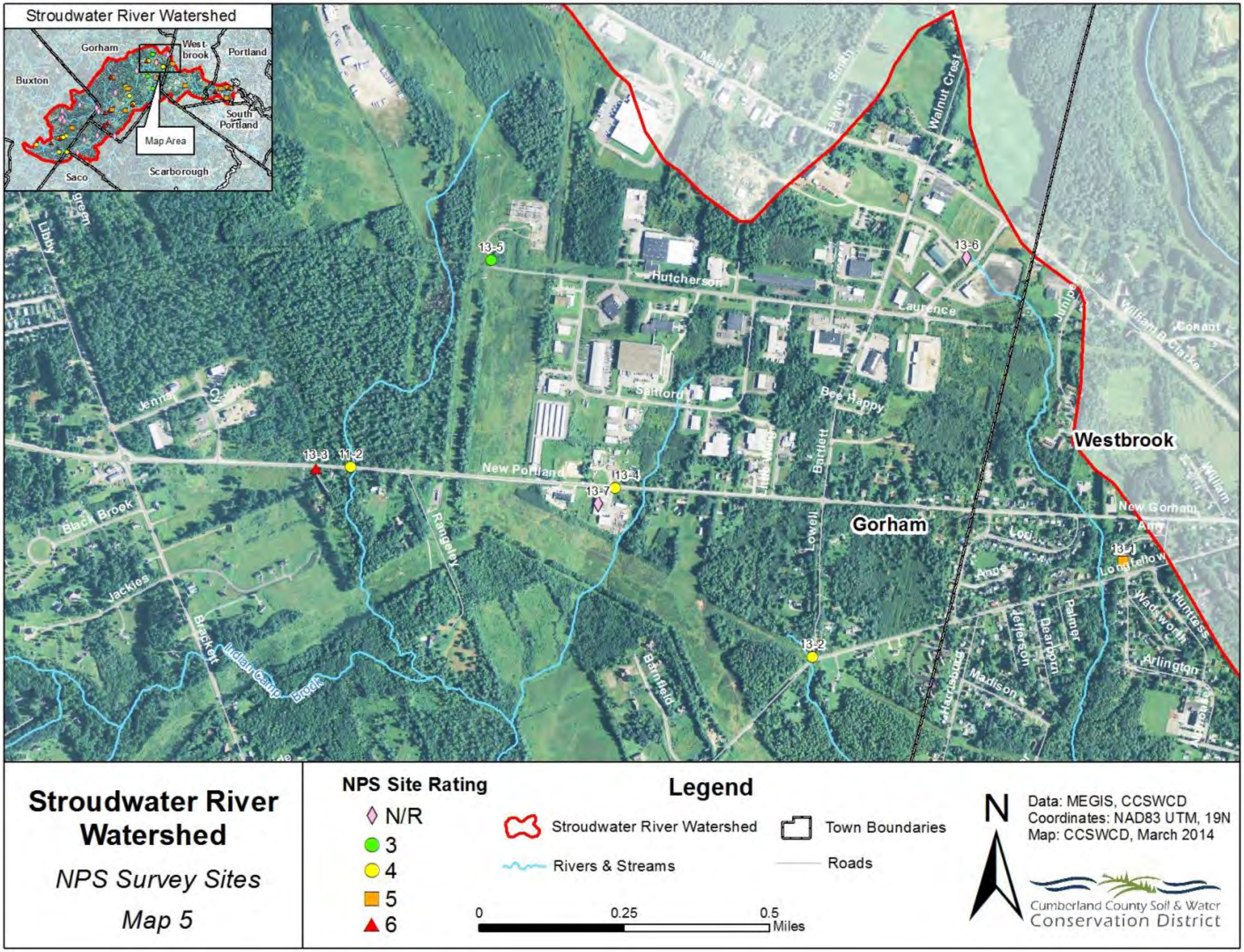


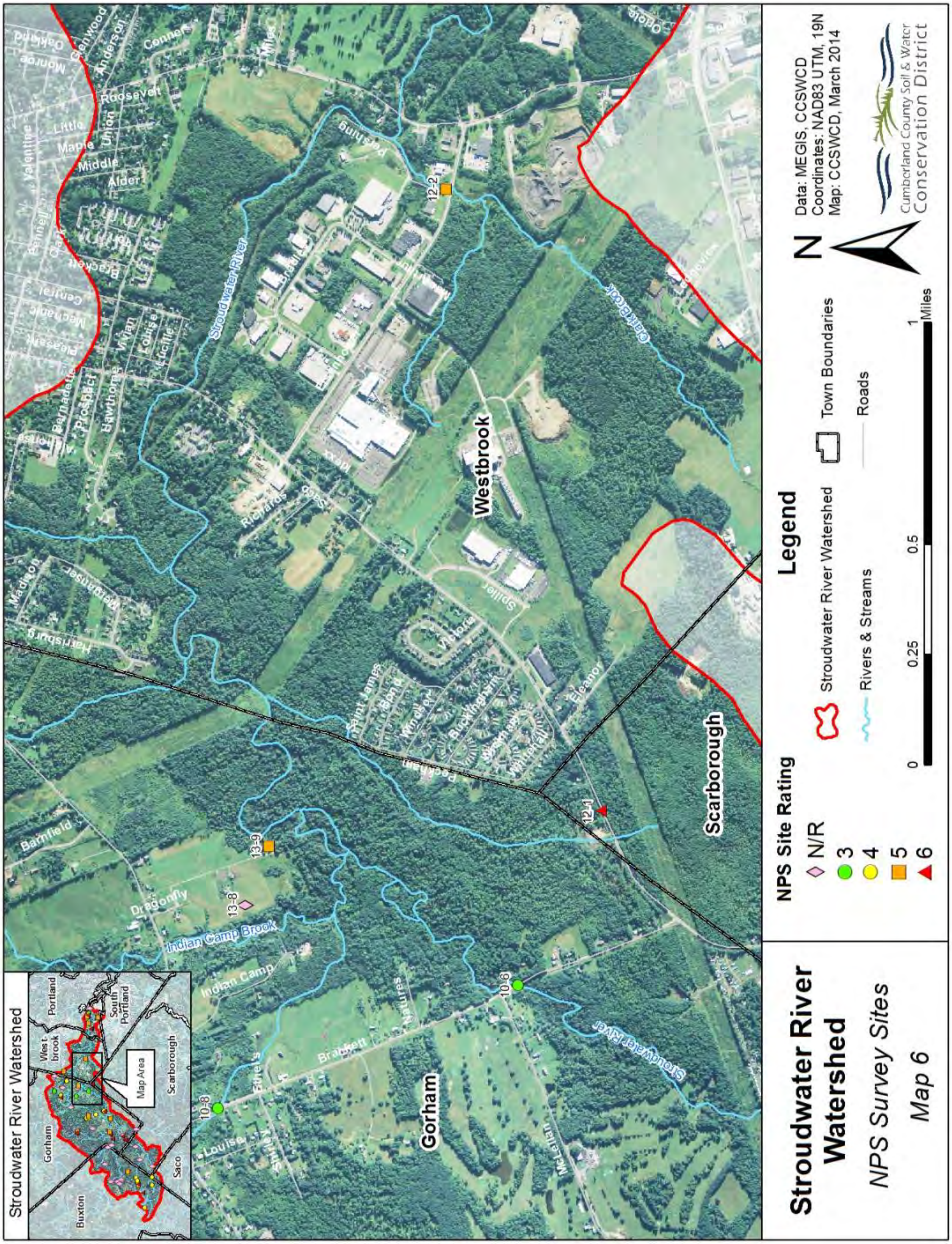
Stroudwater River Watershed

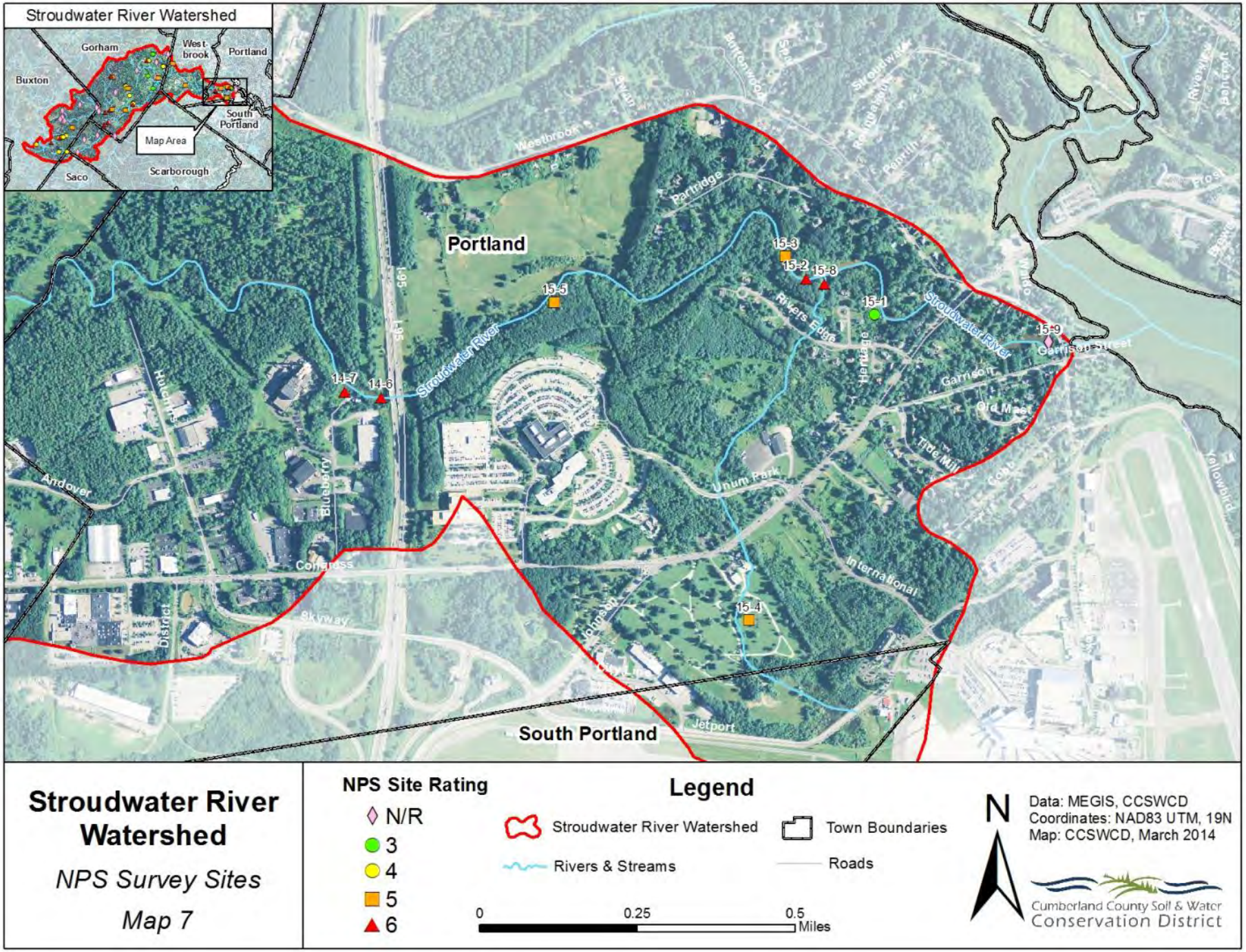
NPS Survey Sites

Map 3


Stroudwater River Watershed
NPS Survey Sites
Map 4
NPS Site Rating
N/R
3
4
5
6
Legend
Stroudwater River Watershed
Rivers & Streams
Town Boundaries
Roads
0
0.25
0.5
Miles
N
Data: MEGIS, CCSWCD
Coordinates: NAD83 UTM, 19N
Map: CCSWCD, March 2014
Cumberland County Soil & Water Conservation District
Stroudwater River Watershed
Map Area
Gorham
Westbrook
Portland
South Portland
Scarborough
Buxton
Saco
Gully Brook
Strout Brook
Indian Camp Brook
10-9
10-4
6-9
10-3
10-2
10-1
8-3
8-2
8-6
8-4
8-7
Cooper's
Harts
Beatrice
Mahon
McLellan
McQuillans Hill
Maccoro
Day
Herrick
South
Crestwood
Maryann
Perry
Waterhouse
Carriage Hill
Cornucopia
Darin
Polliwog
Craig
Bradford
Quincy
Matthew
Starlit
Strawberry
Samantha
Canterbury Pines
Laurel Pines
Oakwood
Weeks
Shady Run
Caitlin
Solomon
Gala
William Henry
Bernard P Rines
Twilight
Boreal


Stroudwater River Watershed
Gorham
West brook
Portland
Buxton
South Portland
Map Area
Saco
Scarborough
Libby
Main
Smith
Walnut Crest
Hutcherson
Laurence
Juniper
William B Clarke
Conant
Westbrook
William
Jenna
Safford
Bee Happy
Bartlett
New Portland
Rangeley
Black Brook
Jackies
Brackett
Indian Camp Brook
Barnfield
Lowell
Gorham
New Gorham
Longfellow
Anne
Jefferson
Dearborn
Palmer
Wadsworth
Huntress
Arlington
Madison
Harrisburg
13-5
13-6
13-3
11-2
13-4
13-7
13-2
13-1
Stroudwater River Watershed
NPS Survey Sites
Map 5
NPS Site Rating
N/R
3
4
5
6
Legend
Stroudwater River Watershed
Town Boundaries
Rivers & Streams
Roads
0
0.25
0.5
Miles
N
Data: MEGIS, CCSWCD
Coordinates: NAD83 UTM, 19N
Map: CCSWCD, March 2014
Cumberland County Soil & Water
Conservation District


Stroudwater River Watershed
NPS Survey Sites
Map 6
Legend
NPS Site Rating
N/R
3
4
5
6
Stroudwater River Watershed
Rivers & Streams
Town Boundaries
Roads
0
0.25
0.5
1
Miles
Data: MEGIS, CCSWCD
Coordinates: NAD83 UTM, 19N
Map: CCSWCD, March 2014
Cumberland County Soil & Water Conservation District
Westbrook
Scarborough
Gorham
Stroudwater River
Indian Camp Brook
12-2
12-1
13-9
13-8
10-6
10-8
Stroudwater River Watershed
Map Area



Stroudwater River Watershed

NPS Survey Sites

Map 7

Appendix B.1. Hotspot Site Investigation Datasheet

Hotspot Site Investigation **HSI**

WATERSHED:	SUBWATERSHED:	UNIQUE SITE ID:	
DATE: ___/___/___	ASSESSED BY:	CAMERA ID:	PIC#:
MAP GRID:	LAT ___°___'___" LONG ___°___'___"		LMK #

A. SITE DATA AND BASIC CLASSIFICATION

Name and Address: _____

_____

_____

SIC code (if available): _____

NPDES Status: ☐ Regulated ☐ Unregulated ☐ Unknown

Category: ☐ Commercial ☐ Industrial ☐ Institutional ☐ Municipal ☐ Transport-Related

Miscellaneous ☐ Golf Course ☐ Marina ☐ Animal Facility

Basic Description of Operation: _____

	INDEX*
B. VEHICLE OPERATIONS ☐ **N/A** *(Skip to part C)*	**Observed Pollution Source?** ___
B1. Types of vehicles: ☐ Fleet vehicles ☐ School buses ☐ Other: _____	
B2. Approximate number of vehicles: _____	
B3. Vehicle activities *(circle all that apply)*: Maintained Repaired Recycled Fueled Washed Stored	○
B4. Are vehicles stored and/or repaired outside? ☐ Y ☐ N ☐ Can't Tell Are these vehicles lacking runoff diversion methods? ☐ Y ☐ N ☐ Can't Tell	○
B5. Is there evidence of spills/leakage from vehicles? ☐ Y ☐ N ☐ Can't Tell	○
B6. Are uncovered outdoor fueling areas present? ☐ Y ☐ N ☐ Can't Tell	○
B7. Are fueling areas directly connected to storm drains? ☐ Y ☐ N ☐ Can't Tell	○
B8. Are vehicles washed outdoors? ☐ Y ☐ N ☐ Can't Tell Does the area where vehicles are washed discharge to the storm drain? ☐ Y ☐ N ☐ Can't Tell	○
C. OUTDOOR MATERIALS ☐ **N/A** *(Skip to part D)*	**Observed Pollution Source?** ___
C1. Are loading/unloading operations present? ☐ Y ☐ N ☐ Can't Tell If yes, are they uncovered *and* draining towards a storm drain inlet? ☐ Y ☐ N ☐ Can't Tell	○
C2. Are materials stored outside? ☐ Y ☐ N ☐ Can't Tell If yes, are they ☐ Liquid ☐ Solid Description: _____ Where are they stored? ☐ grass/dirt area ☐ concrete/asphalt ☐ bermed area	○
C3. Is the storage area directly or indirectly connected to storm drain (circle one)? ☐ Y ☐ N ☐ Can't Tell	○
C4. Is staining or discoloration around the area visible? ☐ Y ☐ N ☐ Can't Tell	○
C5. Does outdoor storage area lack a cover? ☐ Y ☐ N ☐ Can't Tell	○
C6. Are liquid materials stored *without* secondary containment? ☐ Y ☐ N ☐ Can't Tell	○
C7. Are storage containers missing labels or in poor condition (rusting)? ☐ Y ☐ N ☐ Can't Tell	○
D. WASTE MANAGEMENT ☐ **N/A** *(Skip to part E)*	**Observed Pollution Source?** ___
D1. Type of waste *(check all that apply)*: ☐ Garbage ☐ Construction materials ☐ Hazardous materials	○
D2. Dumpster condition (*check all that apply*): ☐ No cover/Lid is open ☐ Damaged/poor condition ☐ Leaking or evidence of leakage (stains on ground) ☐ Overflowing	○
D3. Is the dumpster located near a storm drain inlet? ☐ Y ☐ N ☐ Can't Tell If yes, are runoff diversion methods (berms, curbs) lacking? ☐ Y ☐ N ☐ Can't Tell	○
E. PHYSICAL PLANT ☐ **N/A** *(Skip to part F)*	**Observed Pollution Source?**
E1. Building: Approximate age: _____ yrs. Condition of surfaces: ☐ Clean ☐ Stained ☐ Dirty ☐ Damaged Evidence that maintenance results in discharge to storm drains (staining/discoloration)? ☐ Y ☐ N ☐ Don't know	○ ○

*Index: ○ denotes potential pollution source; ___ denotes confirmed polluter (evidence was seen)

A-5 *Urban Subwatershed Restoration Manual*

E2. Parking Lot: Approximate age _____ yrs. Condition: ☐ Clean ☐ Stained ☐ Dirty ☐ Breaking up
Surface material ☐ Paved/Concrete ☐ Gravel ☐ Permeable ☐ Don't know

E3. Do downspouts discharge to impervious surface? ☐ Y ☐ N ☐ Don't know ☐ None visible
Are downspouts directly connected to storm drains? ☐ Y ☐ N ☐ Don't know

E4. Evidence of poor cleaning practices for construction activities (stains leading to storm drain)? ☐ Y ☐ N ☐ Can't Tell

F. TURF/LANDSCAPING AREAS ☐ **N/A** *(skip to part G)* **Observed Pollution Source?**

F1. % of site with: Forest canopy ___% Turf grass ___% Landscaping ___% Bare Soil ___%

F2. Rate the turf management status: ☐ High ☐ Medium ☐ Low

F3. Evidence of permanent irrigation or "non-target" irrigation ☐ Y ☐ N ☐ Can't Tell

F4. Do landscaped areas drain to the storm drain system? ☐ Y ☐ N ☐ Can't Tell

F5. Do landscape plants accumulate organic matter (leaves, grass clippings) on adjacent impervious surface? ☐ Y ☐ N ☐ Can't Tell

G. STORM WATER INFRASTRUCTURE ☐ **N/A** *(skip to part H)* **Observed Pollution Source?**

G1. Are storm water treatment practices present? ☐ Y ☐ N ☐ Unknown If yes, please describe: _____

G2. Are private storm drains located at the facility? ☐ Y ☐ N ☐ Unknown
Is trash present in gutters leading to storm drains? If so, complete the index below.

Index Rating for Accumulation in Gutters

	Clean				Filthy
Sediment	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Organic material	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Litter	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

G3. Catch basin inspection – Record SSD Unique Site ID here: _____ Condition: ☐ Dirty ☐ Clean

H. INITIAL HOTSPOT STATUS - INDEX RESULTS

☐ Not a hotspot (fewer than 5 circles and no boxes checked) ☐ Potential hotspot (5 to 10 circles but no boxes checked)
☐ Confirmed hotspot (10 to 15 circles and/or 1 box checked) ☐ Severe hotspot (>15 circles and/or 2 or more boxes checked)

Follow-up Action:
- ☐ Refer for immediate enforcement
- ☐ Suggest follow-up on-site inspection
- ☐ Test for illicit discharge
- ☐ Include in future education effort
- ☐ Check to see if hotspot is an NPDES non-filer
- ☐ Onsite non-residential retrofit
- ☐ Pervious area restoration; complete PAA sheet and record Unique Site ID here: _____
- ☐ Schedule a review of storm water pollution prevention plan

Notes:

Appendix B.2. Neighborhood Source Assessment Datasheet

Neighborhood Source Assessment **NSA**

WATERSHED:	SUBWATERSHED:	UNIQUE SITE ID:	
DATE: ___/___/____	ASSESSED BY:	CAMERA ID:	PIC#:

A. NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: _____ Neighborhood Area (acres) _____

If unknown, address (or streets) surveyed:

_____

Homeowners Association? ☐ Y ☐ N ☐ Unknown If yes, name and contact information: _____

Residential *(circle average single family lot size):*

☐ Single Family Attached (Duplexes, Row Homes) <1/8 1/8 1/4 1/3 1/2 acre ☐ Multifamily (Apts, Townhomes, Condos)

☐ Single Family Detached <1/4 1/4 1/2 1 >1 acre ☐ Mobile Home Park

Estimated Age of Neighborhood: _____ years	Percent of Homes with Garages: ____% With Basements ____%	INDEX*
Sewer Service? ☐ Y ☐ N		○
Index of Infill, Redevelopment, and Remodeling ☐ No Evidence ☐ <5% of units ☐ 5-10% ☐ >10%		○

Record percent observed for each of the following indicators, depending on applicability and/or site complexity	Percentage	Comments/Notes	
B. YARD AND LAWN CONDITIONS			
B1. % of lot with impervious cover			
B2. % of lot with grass cover			○
B3. % of lot with landscaping (e.g., mulched bed areas)			◇
B4. % of lot with bare soil			○
**Note: B1 through B4 must total 100%*			
B5. % of lot with forest canopy			◇
B6. Evidence of permanent irrigation or "non-target" irrigation			○
B7. Proportion of *total neighborhood* turf lawns with following management status:	High: ___		○
	Med: ___		
	Low: ___		
B8. Outdoor swimming pools? ☐Y ☐N ☐ Can't Tell Estimated # ___			○
B9. Junk or trash in yards? ☐ Y ☐ N ☐ Can't Tell			○
C. DRIVEWAYS, SIDEWALKS, AND CURBS			
C1. % of driveways that are impervious ☐ N/A			
C2. Driveway Condition ☐ Clean ☐ Stained ☐ Dirty ☐ Breaking up			○
C3. Are sidewalks present? ☐ Y ☐ N If yes, are they on one side of street ☐ or along both sides ☐			
☐ Spotless ☐ Covered with lawn clippings/leaves ☐ Receiving 'non-target' irrigation			○
What is the distance between the sidewalk and street? _____ ft.			◇
Is pet waste present in this area? ☐ Y ☐ N ☐ N/A			○
C4. Is curb and gutter present? ☐ Y ☐ N If yes, check all that apply:			
☐ Clean and Dry ☐ Flowing or standing water ☐ Long-term car parking ☐ Sediment			○
☐ Organic matter, leaves, lawn clippings ☐ Trash, litter, or debris ☐ Overhead tree canopy			◇

* INDEX: ○ denotes potential pollution source; ◇ denotes a neighborhood restoration opportunity

A-3 *Urban Subwatershed Restoration Manual*

Neighborhood Source Assessment **NSA**

D. ROOFTOPS			
D1. Downspouts are directly connected to storm drains or sanitary sewer			◇ ○
D2. Downspouts are directed to impervious surface			
D3. Downspouts discharge to pervious area			
D4. Downspouts discharge to a cistern, rain barrel, etc.			
**Note: C1 through C4 should total 100%*			
D5. Lawn area present downgradient of leader for rain garden? ☐ Y ☐ N			◇
E. COMMON AREAS			
E1. Storm drain inlets? ☐ Y ☐ N If yes, are they stenciled? ☐ Y ☐ N Condition: ☐ Clean ☐ Dirty			◇
Catch basins inspected? ☐ Y ☐ N If yes, include Unique Site ID from SSD sheet: _____			○
E2. Storm water pond? ☐ Y ☐ N Is it a ☐ wet pond or ☐ dry pond? Is it overgrown? ☐ Y ☐ N What is the estimated pond area? ☐ <1 acre ☐ about 1 acre ☐ > 1 acre			◇
E3. Open Space? ☐ Y ☐ N If yes, is pet waste present? ☐ Y ☐ N dumping? ☐ Y ☐ N			○
Buffers/floodplain present: ☐ Y ☐ N If yes, is encroachment evident? ☐ Y ☐ N			
F. INITIAL NEIGHBORHOOD ASSESSMENT AND RECOMMENDATIONS			
Based on field observations, this neighborhood has significant indicators for the following: *(check all that apply)* ☐ Nutrients ☐ Oil and Grease ☐ Trash/Litter ☐ Bacteria ☐ Sediment ☐ Other _____			○

Recommended Actions

Specific Action

- ☐ Onsite retrofit potential?
- ☐ Better lawn/landscaping practice?
- ☐ Better management of common space?
- ☐ Pond retrofit?
- ☐ Multi-family Parking Lot Retrofit?
- ☐ Other action(s) _____

Describe Recommended Actions:

Initial Assessment

NSA Pollution Severity Index

- ☐ Severe (More than 10 circles checked)
- ☐ High (5 to 10 circles checked)
- ☐ Moderate (Fewer than 5 circles checked)
- ☐ None (No circles checked)

Neighborhood Restoration Opportunity Index

- ☐ High (More than 5 diamonds checked)
- ☐ Moderate (3-5 diamonds checked)
- ☐ Low (Fewer than 3 diamonds checked)

NOTES:

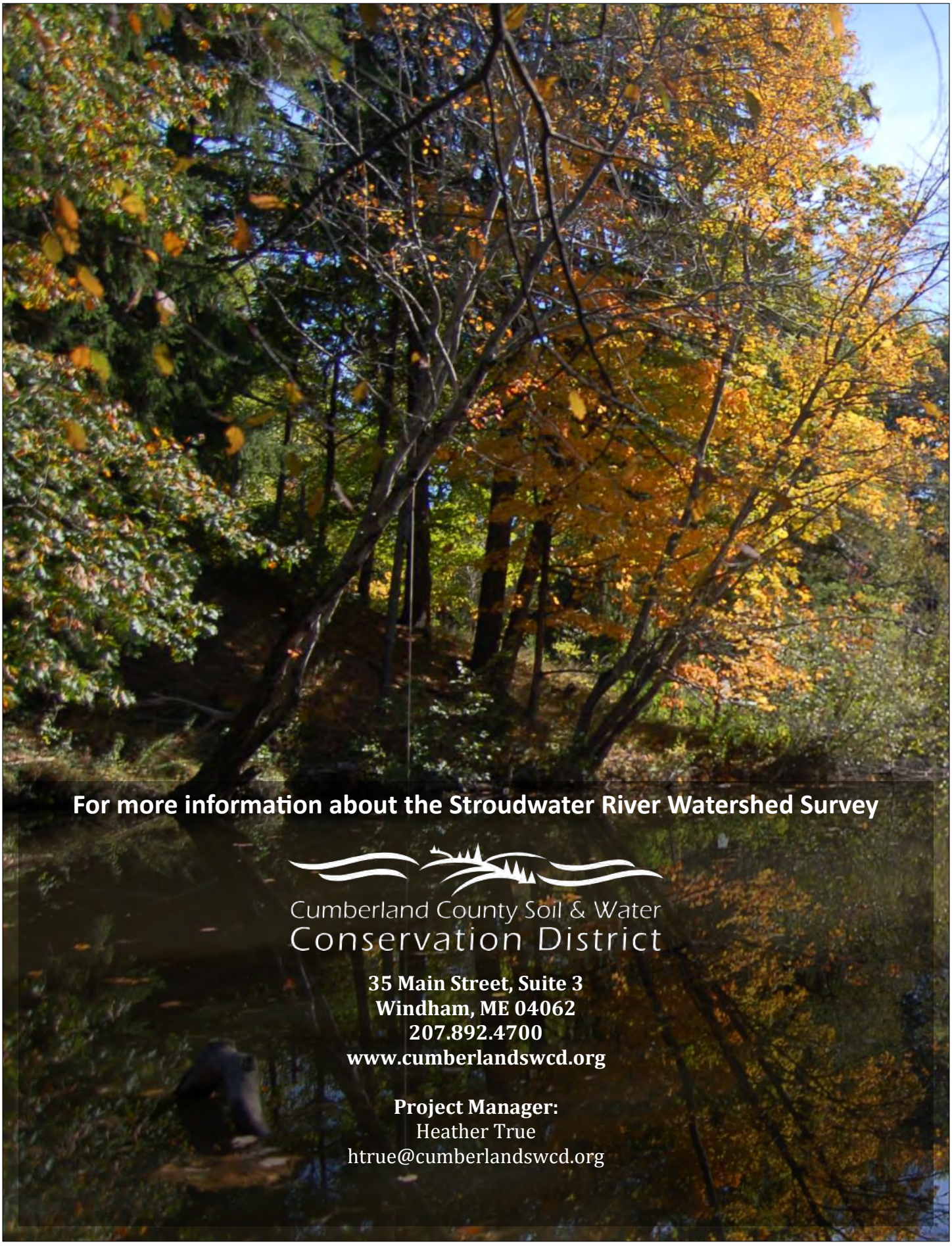
Appendix B.2. Neighborhood Source Assessment Summary

Neighborhood Source Assessment Summary

Neighborhood	Location	Neighborhood Characterization	Yard and Lawn Conditions	Driveways, Sidewalks, and Curbs	Rooftops	Common Areas	Pollutants of Significance	NSA Pollution Severity Index	Neighborhood Restoration Opportunity Index	Recommendations
Stroudwater Heights Condominiums - Westbrook	345 Saco Street	Condos, 10 buildings, 44 units, about 8 years old, garages, no basements	40% impervious, 10% grass, 50% forest / forest canopy; high turf lawn management	Paved, impervious driveways, clean	50% downspouts to impervious surface, 50% downspouts to pervious area, area available for rain gardens	clean storm drain inlets, not stenciled; no open space	nutrients, untreated impervious runoff	moderate	moderate	collect roof runoff and direct into created rain gardens; consider adding porous pavement in places; review association's lawn care treatment procedures
Hawthorne - Westbrook	Hawthorne Street	1-acre single family lots, approx. 11 year old houses, 87% garages, 100% basements	40% impervious, 55% grass, 5% landscaped, less than 5% forest canopy; 20% of lots have high turf lawn mgmt., 80% have medium	Paved, impervious driveways, clean (about three recently seal coated)	50% downspouts to impervious surface, 50% downspouts to pervious area, area available for rain gardens	storm drain inlets present, no open space	nutrients	moderate	moderate	could use more native plantings and less lawn; divert roof runoff into vegetation, reduce sealcoating
River's Edge - Portland	River's Edge Drive, Captain's Landing, Heritage Court	1/2-acre single family lots, approx. 8 year old houses, 100% with garages and basements	50% impervious, 40% grass, 10% landscaped, less than 5% forest canopy; 30% of lots have high turf lawn mgmt., 70% have medium	Paved, impervious driveways, clean	50% downspouts to impervious surface, 50% downspouts to pervious area, area available for rain gardens	clean storm drain inlets, not stenciled; no open space	nutrients	moderate	moderate	lawn care for water quality protection - YardScaping with use of rain gardens
Partridge - Portland	Partridge Road, Partridge Circle	1-acre single family lots, approx. 37 year old houses, 85% garages, 95% basements	30% impervious, 60% grass, 10% landscaped, 33% forest canopy; 40% of lots have high turf lawn mgmt., 60% have medium (Lawn Dawg and pesticide application signs observed)	Paved, impervious driveways, clean	40% downspouts to impervious surface, 60% downspouts to pervious area, area available for rain gardens	no storm drain inlets (only one curb gutter drainage catch basin); no open space	nutrients	moderate	moderate	lawn care for water quality protection - YardScaping with use of rain gardens
*Garrison - Portland	Garrison Street, Old Mast Road, Tide Mill Road	1/2-acre single family lots, approx. 42 year old houses, 94% garages and 98% basements	50% impervious, 40% grass, 10% landscaped, 15% forest canopy; 40% of lots have high turf lawn mgmt., 60% have medium	Paved, impervious driveways, clean	50% downspouts to impervious surface, 50% downspouts to pervious area, area available for rain gardens	clean storm drain inlets, not stenciled; no open space	nutrients	moderate	moderate	lawn care for water quality protection - YardScaping with use of rain gardens; many driveways have been seal coated - outreach on effects of sealcoating recommended; Work with City to educate on sealcoating of cracks in roadways
*The three streets is this neighborhood are different from one another. Garrison: older, no curb or sidewalks, more tree canopy and less lawn, no catch basins; Old Mast: more manicured lawns and impervious surfaces, seal coated driveways; Tide Mill: very little canopy cover, lots of lawn, larger house which equals more impervious cover; All three streets: lots of sealcoating of cracks in roadway										
Vivian, Louise, Lucille - Westbrook	Vivian Street, Louise Street, Lucille Street, Olive Street	1/3-acre single family lots, approx. 49 year old houses, 61% garages, 100% basements	45% impervious, 45% grass, 5% landscaped, 5% bare soil along driveways, bare soil along curbs); 50% forest canopy; 10% of lots have high turf lawn mgmt., 80% medium, 10% low	About 95% impervious paved (3 gravel driveways)	20% downspouts to impervious surface, 80% downspouts to pervious area, only small areas available for rain gardens	storm drain inlets present, not stenciled; no open space	nutrients, sediment	high	moderate	pave gravel driveways; reseed bare soil along curbing (City); check with City about schedule for cleaning out catch basins

Neighborhood Source Assessment Summary

Neighborhood	Location	Neighborhood Characterization	Yard and Lawn Conditions	Driveways, Sidewalks, and Curbs	Rooftops	Common Areas	Pollutants of Significance	NSA Pollution Severity Index	Neighborhood Restoration Opportunity Index	Recommendations
Oriole, Finch, Cardinal - Westbrook	Oriole Street, Finch Street, Cardinal Street	1/3-acre single family lots, approx. 51 year old houses, 62% garages, 100% basements	50% impervious, 45% grass, 5% landscaped; 25% forest canopy; 10% of lots have high turf lawn mgmt., 80% medium, 10% have low	Paved, impervious driveways, clean (some have been seal coated)	10% downspouts to impervious surface, 90% downspouts to pervious area, very little room for rain gardens	old catch basins (cracking along edges), storm drain inlets not stenciled, no open space	nutrients, sediment, potentially failing catch basins	moderate	low	accumulated sediment (likely from snow banks) at end of Cardinal Street needs to be swept; City needs to inspect catch basins and clean out and repair as needed
Gadwall Court - Westbrook	125 Harrisburg Avenue	Condos, about 5 years old, all with basements and garages	50% impervious, 50% grass, less than 1% landscaped; less than 5% forest canopy; 100% of lots have high turf lawn mgmt.	Paved, impervious driveways, clean	All downspouts appear to lead into crushed stone trenches/drywells, very small areas for rain gardens	clean storm drain inlets, not stenciled; no open space; unknown if storm water pond is present	nutrients	moderate	moderate	work with condo association on lawn care treatment methods; possibility of directing downspouts into created rain gardens
Harrisburg - Westbrook	Harrisburg Avenue, Merganser Street, Madison Street, Wigeon Lane	1/2-acre single family lots, approximately 23 years old, 31% garages, 100% basements, one house under construction	40% impervious, 60% grass, less than 1% landscaping; less than 5% forest canopy; 15% of lots have high turf lawn mgmt., 85% have medium	Paved, impervious driveways, clean	30% downspouts to impervious surface, 70% to pervious area, area available for rain gardens	clean storm drain inlets, not stenciled; no open space	nutrients	moderate	moderate	YardScaping, rain gardens, planting native vegetation
Victoria - Westbrook	Victoria Drive	1/3-acre single family lots, approx. 7 year old, 100% with garages and basements, new lawns at about three houses	70% impervious, 30% grass, less than 1% landscaping; 60% of lots have high turf lawn mgmt., 40% have medium; about five swimming pools	Paved, impervious driveways, clean	80% downspouts to impervious surface, 20% to pervious area, area available for rain gardens	storm drain inlets present, not stenciled; no open space, about 1-acre wet pond present	nutrients	moderate	moderate	needs YardScaping and encouragement of native plants installed and rain gardens for roof runoff; many house lack gutters yet they would work well
Hamlet Manufactured Home Community - Westbrook	655 Saco Street: Windsor Drive, Wickham Street, Buckingham Drive, Whitehall Way, Peckham Street, Bond Street, St. James Street	about 30 year old mobile park home park	50% imperious, 40% grass, 10% landscaping; 80% forest canopy; 5% of lots have high turf lawn mgmt., 95% have medium	Paved, impervious driveways, clean	50% downspouts to impervious surface, 50% to pervious area, most homes have no gutters, no room for rain gardens	clean storm drain inlets, not stenciled; open space	oil and grease, sediment	moderate	low	recommendations: better management of common space - open space/common space is being used as a stone pit and camper/boat/RV storage; road has been recently repaved, sediment berm exists along edge of road and around catch basin near common space



For more information about the Stroudwater River Watershed Survey

Cumberland County Soil & Water
Conservation District

35 Main Street, Suite 3
Windham, ME 04062
207.892.4700
www.cumberlandswcd.org

Project Manager:
Heather True
htrue@cumberlandswcd.org

Photo credit: Jeff McDonald

Cumberland County Soil & Water
Conservation District

35 Main Street, Suite 3
Windham, ME 04062
207.892.4700
www.cumberlandswcd.org