Concord Gully Brook

Watershed Survey

Cumberland County Soil & Water Conservation District

Prepared for the Town of Freeport

March 2013

Acknowledgments

The following people and organizations were instrumental in the Concord Gully Brook Watershed Survey Project and deserve special recognition for their efforts:

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Special thanks to the Freeport Fire and Rescue for providing the Public Safety Building for the survey training and to Rod Regier for his countless hours of volunteering, local knowledge, and assistance.

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"Funding for this project, in part, was provided by the U.S. Environmental Protection Agency under Section 319 of the Clean Water Act. Section 319 grants are administered by the Maine Department of Environmental Protection in partnership with EPA."

Introduction

The Concord Gully Brook **watershed** report is intended to provide community members with strategies for helping to improve this important local resource. The report is focused on a traditional land-based watershed survey which charted impacts throughout the Concord Gully Brook watershed. Also included was a Stream Corridor survey to help gauge in-stream conditions and identify areas for restoration. Both surveys were conducted between the months of June and October, 2012.

Watershed

All the land that surrounds a waterbody that drains or sheds its water into the river through streams, ditches, directly over the ground surface or through ground water.

The purpose of the watershed survey was to identify, document, and prioritize nonpoint source pollution sites in the Concord Gully Brook watershed and recommend Best Management Practices (BMPs) that could be installed to mitigate potential problems at each of these sites. In addition, the Stream Corridor survey was conducted to identify potential areas that were negatively impacting aquatic life with issues such as degraded riparian buffers and stormwater pollution. The watershed survey teams traveled throughout the watershed documenting sediment erosion from roads, parking areas, fields, stream banks and footpaths using hand-held global positioning systems (GPS), cameras and standardized field data sheets. The Stream Corridor survey was completed by walking the brook and its tributaries, with staff and experienced volunteers documenting existing riparian conditions and problematic sites.

Polluted Runoff

Also known as Nonpoint Source (NPS) pollution - comes from many diffuse sources and is transported by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human made pollutants, finally collecting in lakes, rivers, wetlands and coastal waters.

Local volunteers and technical staff identified 45 sites from the land-based survey. These sites are potential contributors of **polluted runoff**. Given the density of residential and commercial development along the Route 1 corridor, it is likely that the Concord Gully Brook and its tributaries are being impacted by Nonpoint Source (NPS) pollution through stormwater runoff. The upper portion of the watershed is heavily developed with a high percentage of impervious cover (IC) such as buildings, sidewalks and parking areas. These areas contribute increased amounts of stormwater runoff and any pollutants that may have accumulated on these surfaces such as:

- Fertilizers, herbicides, and insecticides from commercial and residential areas;
- Oil, grease, salt, and toxic chemicals on parking areas (from cars, dumpsters and sealcoating);
- Soil erosion from improperly managed construction sites, road shoulders and eroding stream banks;
- Bacteria and nutrients from pet and animal wastes and faulty septic systems.

The Concord Gully Brook watershed is part of the larger Casco Bay watershed and has been named a Nonpoint Source Priority Watershed by the Maine Department of Environmental Protection (MDEP). MDEP designated certain watersheds as high priority in order to enable the focusing of resources to

help restore waterbodies not meeting standards or protect waterbodies considered threatened with not meeting water quality standards in the future.

Figure1. Stormwater runoff from eroding road shoulders is one way sediment can be transported into Concord Gully Brook.

Watershed Survey Purpose

The primary purpose of the Concord Gully Brook watershed survey was to identify and NPS pollution sites in the watershed for eventual remediation. The Concord Gully Brook Watershed survey will capitalize on the existing efforts and collaborative relationships with local municipal officials and landowners to help mitigate water quality issues identified by the survey. Concurrently, a watershed-based management plan is being developed for Concord Gully Brook in an effort to develop long-term solutions to improving water quality and riparian habitat.

General Watershed Characteristics

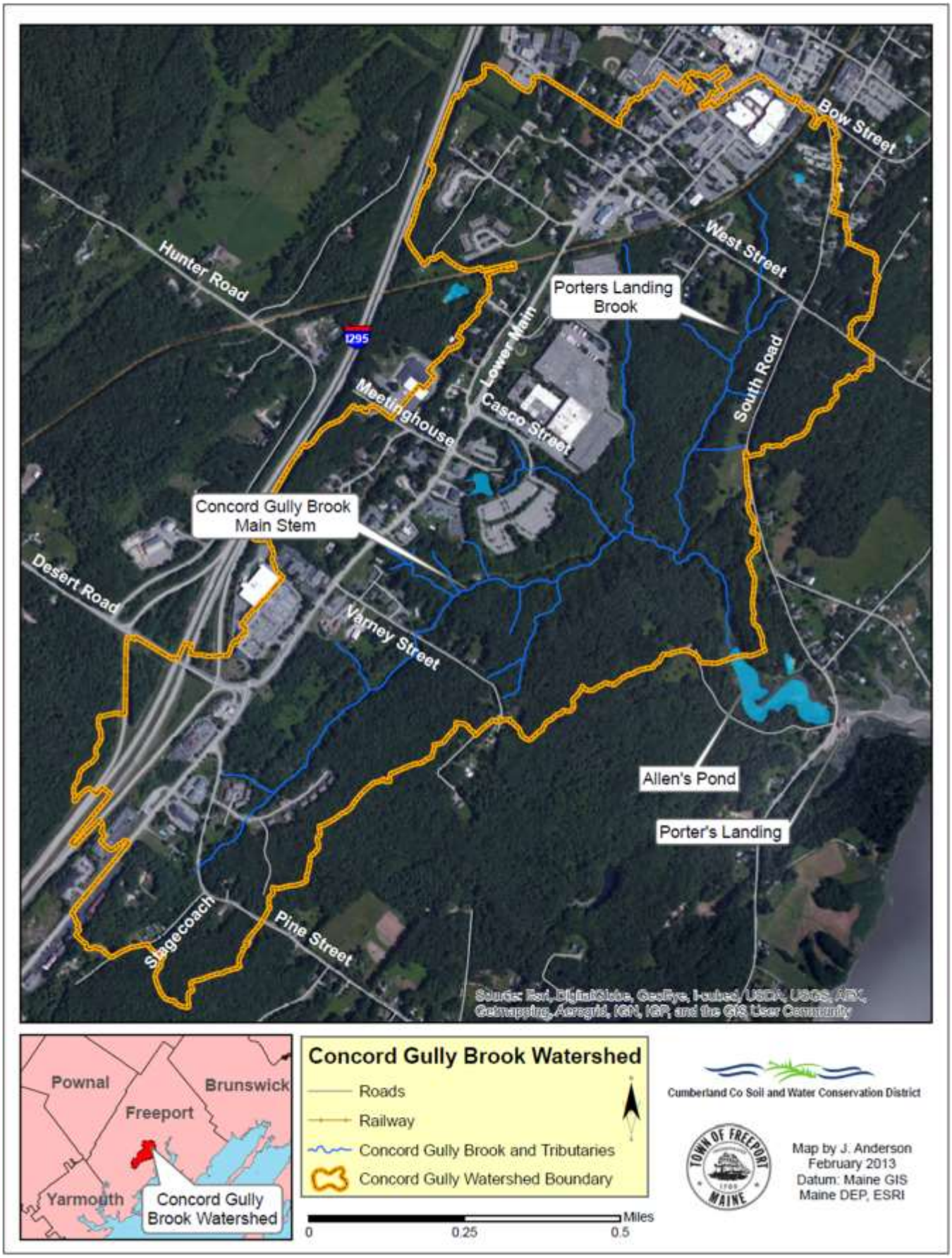
The Concord Gully Brook watershed is located in Freeport, Maine and has a watershed area of approximately 600 acres or 0.94 square miles (see Figure 2). The main stem of the Concord Gully Brook flows in a easterly direction and receives three tributary inputs before it turns southerly and outlets to Allen's Pond, a dammed wetland which discharges to the Harraseeket River at Porter's Landing. The main stem of the brook is approximately 1.5 miles long. A sanitary interceptor pipe runs parallel to the main stem for a portion of its length.

Land cover differs dramatically between the northern and southern areas. The northern reaches are significantly developed and land uses include residential, commercial, industrial, and highways and roads. Sections of Interstate 295, including a portion of the Exit 20 interchange, are part of the watershed, in addition to the L.L. Bean distribution center located on Lower Main Street. Far northeastern sections are dominated by retail shops, residences, and the Town of Freeport municipal facilities. In southern areas, land use is quite different with dense forest and canopy and a small number of landowners owning a majority of the resource. There are few structures aside from access points for trails and the sanitary sewer line.

Concord Gully Brook Water Quality

Concord Gully Brook has a statutory state water quality classification designation of Class B. According to the Integrated Water Quality Monitoring and Assessment Report, Concord Gully Brook does not meet Class B designated uses and criteria. Specifically, it is listed on the 303(d) list of impaired waters because it does not provide for aquatic life use due to stream habitat conditions (MDEP, 2011).

Figure 2. Overview of Watershed



According to the MDEP, the largest likely source contributing to the impairment is stormwater runoff from **impervious cover** (IC). The watershed of Concord Gully Brook is estimated to have 22% IC. Studies by the Maine DEP have found that in order to support Class B aquatic life, watersheds need to have the characteristics of IC of 9% (MDEP, 2010). Bacteria have been an issue in the past with documented violations, including a 2002 Cumberland County Soil and Water Conservation District report that indicated high bacteria levels. More recent testing was conducted by the Maine DEP in 2012. Staff sampled Concord Gully Brook six times for E. coli (*Escherichia coli*) bacteria from May through September, 2012. Contrary to earlier testing, the geometric mean was not exceeded (Evers and Green, 2012).

Impervious Cover (IC)

Impervious cover is any surface in the landscape that cannot effectively absorb or infiltrate rainfall. This includes driveways, roads, parking lots, rooftops, and sidewalks.

Figure 3. One example of "LID" or low impact development design is a rain garden installed at Concord Brook Condominiums. Rain gardens naturally slow down, spread out, and soak up precipitation and stormwater runoff.

With recent upgrades to the sanitary sewer line, a greater emphasis was placed on documenting land uses and stream conditions within the watershed in an effort to systematically delineate possible areas for management. The Town of Freeport has been active in addressing stormwater pollution and has instituted ordinances for development projects that include substantial stormwater management features to restrict the rate of runoff to the predeveloped rate. Since 2005, development projects have incorporated Low Impact Development (LID) designs that often included filter structures.

Why is the Water Quality at Risk?

NPS is the most common type of pollution impacting water bodies in the state. NPS pollution is found in storm water runoff from rain and snowmelt. During and after storms and spring thaws, stormwater can wash sediment, road salt, fertilizers and other toxins into rivers and lakes from the surrounding landscape.

The signs of stress exhibited by the Concord Gully Brook are most likely the result of polluted runoff that flows into the Brook from its surrounding watershed. The development pressure throughout the northern watershed is an anticipated source of this stress. Similar efforts are being made in South Portland, Portland, Biddeford, and Sanford. Though each town or city may differ in locale, they all share impaired streams within their district and the difficult task of restoring them. This comprehensive survey of the watershed identifies and prioritizes sources of pollution impacting the

Concord Gully Brook in order so that a watershed management plan can outline steps for remediation.

Why should we protect Concord Gully Brook?

The Town of Freeport, being regulated under the Municipal Separate Storm Sewer (MS4) Stormwater Permit program, is required to address such impairments as part of their Stormwater Management Program Plan (SWMP). The SWMP documents the control measures and conditions that Freeport must establish to meet the terms and conditions of their MS4 General Permit. MS4 communities that discharge stormwater near an "impaired water" for which there is a designated total maximum daily load (TMDL) allocation for stormwater sources must meet special conditions. In the instance of Concord Gully Brook, both the watershed survey and a watershed management plan are being developed in an effort to meet those conditions.

Figure 4. Woman and a girl clamming at low tide on the Harraseeket River near the Pettengill farm not far from South Street, circa 1920.
Maine Memory Network, Freeport Historical Society; 2013

Further, the Harraseeket River has some of the most productive clam flats in the area. In 2005, the Maine Department of Marine Resources recommended permanently closing nearly a mile of river to clamming due to NPS pollution, proximity to failing septic systems, and wastewater treatment plant discharges from the Freeport Waste Water Treatment plant. With conveyance and treatment upgrades by the sewer district and the incorporation of measures such as LID actions for new projects, the area has seen improved water quality; however problems still persist. In the Casco Bay Estuary Partnership report, "*Expanding and Sustaining the Shellfisheries of Casco Bay 2011*", many shellfish areas classified as prohibited are the result of NPS pollution (Casco Bay Estuary Partnership, 2012, p.2).

Land Based Watershed Survey Methodology

Prior to the surveys, a steering committee was assembled of local partners. A news article was published in *The Forecaster* and information was also placed on the Cumberland County Soil and Water Conservation District website. The Town provided a list of all watershed residents who were then notified about the survey by postcard. Residents had the opportunity for landowners exclude their property from the survey. The Concord Gully Brook watershed was divided into 5 sectors (Figure 5) to provide an approximately equal number of potential polluted runoff sites in each sector.

The watershed boundary, as well as the stream channel and tributaries locations were ground-truthed and updated by MDEP staff. Originally, the Brook's watershed included Allen's Pond, but a decision by

the MDEP to exclude it was based on the boundary of the free-flowing portion of Concord Gully Brook. For the watershed management plan, the watershed boundary of the pond/wetland system will be considered to help guide protection of shellfishing grounds and estuary habitat.

The land-based survey methods followed those outlined in Maine DEP's publication, *A Citizen's Guide to Basic Watershed, Habitat and Geomorphology Surveys in Stream and River Watersheds, Volume 1.* Data sheets collected information such as land use, description of impact, GIS location, address, and map and lot numbers. Impacts were ranked based on size of area, pollutants involved, and proximity to the stream (direct or limited flow). Sites were rated with a high, medium or low ranking according to the size of the problem. Pollutants were based on the presence of single or multiple pollutants. The transport of pollutants was ranked on whether it had limited or direct flow to the river (Table 1). The highest ranking was chosen from each section and then totaled to provide an overall ranking for each site. High impacts were represented by scores over 6, medium impacts 4-5, and low impacts below 3. The survey field data collection sheet is located in Appendix A.

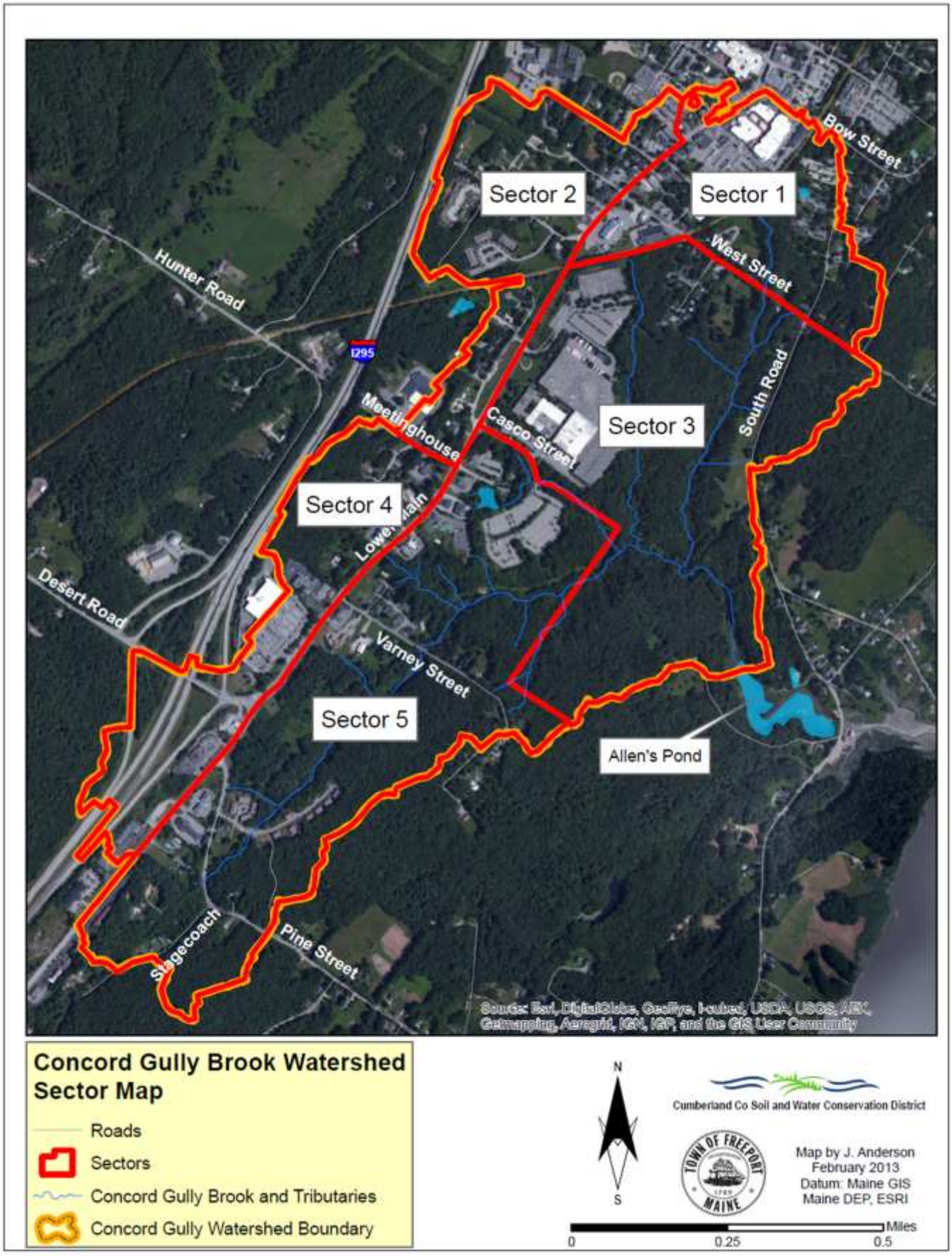
Volunteers were an instrumental part of the watershed survey and were contacted by Steering Committee members and technical staff. Prior to the watershed survey, volunteers received two hours of classroom training on field survey techniques to identify various sources of polluted runoff.

On June 8th, 2012, five survey teams traveled throughout the watershed documenting polluted runoff from roads, parking areas, fields, stream banks and footpaths using hand-held GPS, cameras and the standardized field data sheets. To ensure accurate data collection, technical staff members served as leaders for each team. A total of 45 sites were identified by the survey teams. A complete listing of impact sites and details are found in Appendix B.

Table 1. Ranking of Impacts

Size of Problem			Pollutants Present		Transport to River	
Small	1	less than 100sqft	Single	1	Limited	1
Medium	2	100-400sqft	Multiple	2	Direct Flow	2
Large	3	more than 400sqft				

Figure 5. Watershed Sectors



Stream Corridor Survey Methodology

CSWCD worked closely with the Maine DEP to conduct a Level 1 Stream Corridor survey assessment. The methodology used the MDEP publication, *A Citizen's Guide to Basic Watershed, Habitat and Geomorphology Surveys in Stream and River Watersheds, Volume 1*. Stream Corridor Surveys are stream surveys done by walking along and in-stream while making observations about stream channel, bank, and riparian (stream side) characteristics and conditions. The purpose is to become familiar with the stream and to determine whether pollution, habitat, or geomorphological problems exist. The four main objectives of the survey are to provide:

1. A list of observable environmental problems present within the stream system and along its riparian corridor;
2. Sufficient data on each problem in order to make a preliminary determination of both the severity and correctibility of each problem;
3. Sufficient data to prioritize restoration efforts; and,
4. A quick assessment of both in- and near-stream habitat conditions to make comparisons among the conditions of different stream segments

The Stream Corridor survey is not meant to replace a full geomorphic assessment of Concord Gully Brook, only to identify areas and reaches that could be developed further for restoration possibilities. Measurements of stream temperature, flow and macroinvertabrates were not included for this survey.

The survey was completed by walking the brook and its tributaries, with CCSWCD and Maine DEP staff assisted by a small number of volunteers. CCSWCD and MDEP staff revised the original scope of the survey by conducting all assessment in-field rather than assigning individual stream reaches to groups and technical leaders. This decision was made in part by the small size of the watershed and short length of reaches. In-stream field assessments were entered into datasheets, and potential remediation sites were noted in a summary report and on GIS maps.

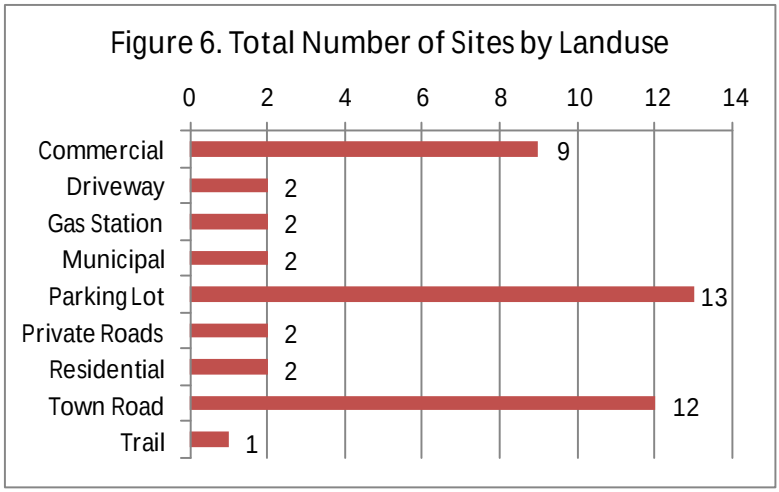
Summary of Watershed Survey Findings

Volunteers and technical staff identified 46 impact sites in the Concord Gully Brook watershed that are currently impacting or have the potential to impact water quality. Of the 45 sites identified, 2 were recorded as high impact, 24 medium impact, and 19 low impact (see Figure 7 for a map of impact sites).

22 of the sites were documented as sediment erosion sites with 14 of those considered high and medium impact. Of the 22 sediment erosion sites, only 2 were considered a high impact and a majority of the medium impact sites listed for sediment erosion were found to have minimal sediment transport to the Brook. The data suggests that sediment erosion from land use is not a major factor for impairment. Further, in the fall of 2012, the Town of Freeport corrected a number of medium impact erosion sites when they reconstructed sections of South Street.

When discussing sites identified as impacting Concord Gully Brook, one significant detail comes to light. Parking lots accounted for 28% of total impact sites yet, only 4 of the 13 sites were found to be related

to soil erosion. In most instances, winter sand from plowing, dumpster leakage, unmaintained catch basins, and seal coating rolled over storm drains were common reasons for documentation.



These findings suggest that sediment erosion from land use is not necessarily a driving force when considering stream impairments. However, the watershed survey illuminated the many pathways other pollutants such as road salt, petroleum products, and pesticides can find their way into the stormwater system and Concord Gully Brook. Nine different land use categories were identified with varying degrees of impact and illustrating this aspect (see Figure 6). The survey was instrumental in gaining insight of land use within the watershed, creating awareness regarding the health of Concord Gully Brook, and filling data gaps to help prioritize areas for restoration.

Key Findings:

- ◊ Parking lots and roads account for 55% of total impacts (25).
- ◊ Residential sites account for only 4% (2).
- ◊ Sediment transport from land use is minimal.
- ◊ Impacts are concentrated along Route 1 and the commercial district.
- ◊ Southern portions of the watershed are well vegetated with dense forest cover.

Table 2 Land Use and Impact

Land Use	High Impact	Medium Impact	Low Impact	Total
Commercial	1	4	4	**9**
Driveway		1	1	**2**
Gas Station			2	**2**
Municipal/public		1	1	**2**
Parking Lot		8	5	**13**
Private Road		2		**2**
Residential		1	1	**2**
Town Road	1	6	5	**12**
Trail/Path		1	0	**1**
Total	**2**	**24**	**19**	**45**

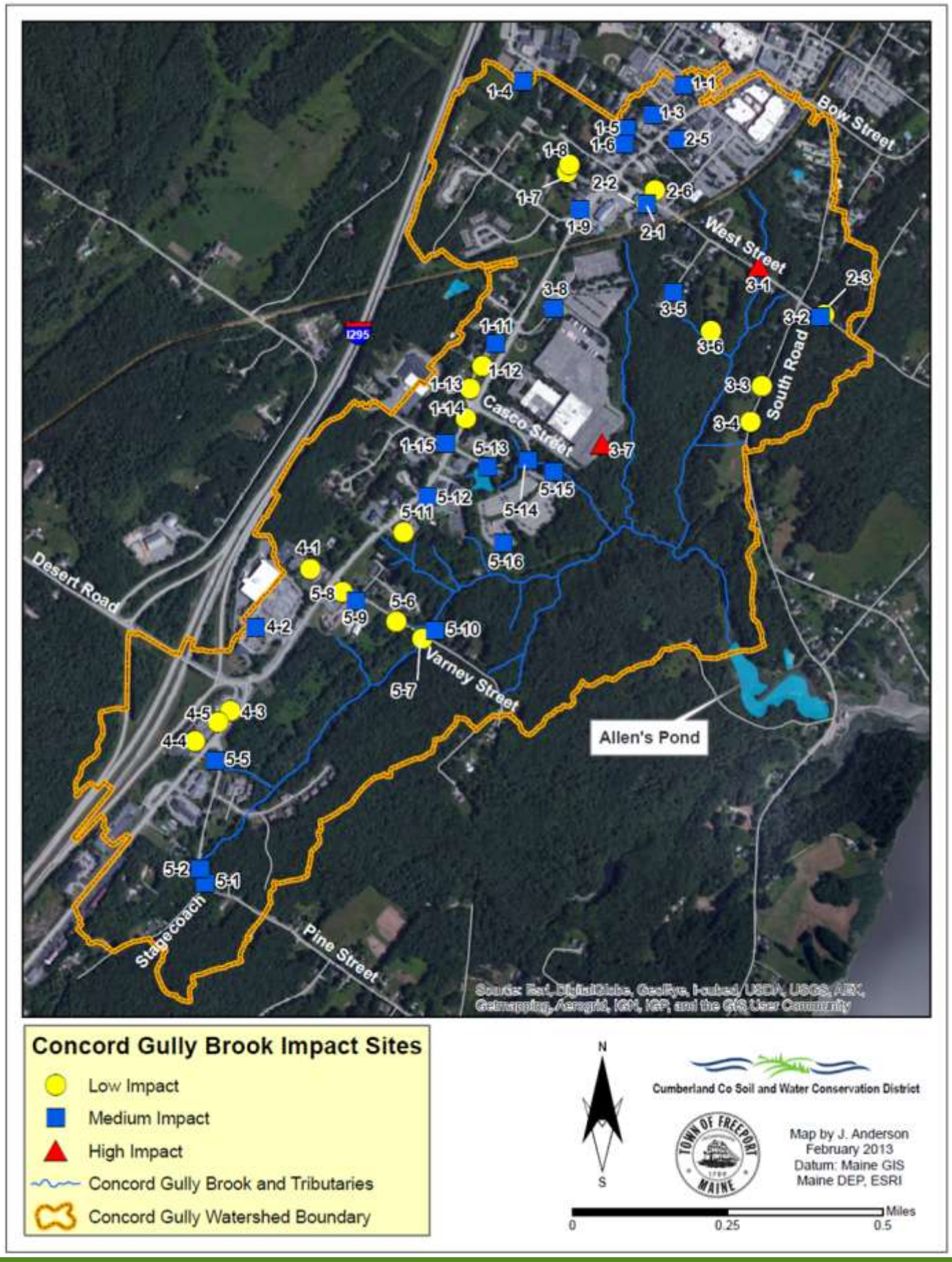
Table 2 represents sites in each land use category as well as their impact rating. Most sites were determined to have a medium impact to the Brook (24 total), but the cumulative impact of all sites is what can have a significant effect on water quality.

Table 3 calculates pollutant load from soil and phosphorus export per year for each high and medium impact site. Sites such as parking areas which were documented for impacts such as sealcoating over catch basins were not considered for pollutant load reporting as they did not fit the criteria (mentioned previously). Going forward, it is advisable to include these impacts and possible maintenance modifications as part of the management plan when addressing stream toxicity and NPS pollution.

Table 3. Total Soil Loss From High and Medium Impact Sites				
Site	Location	Soil load tons/year	Phosphorus load lbs/year	Impact
3-1	West St @ culvert crossing	0.44	0.37	High
3-7	Behind L.L. Bean distibution center	1.03	0.88	High
1-5	Holbrook Street	0.11	0.09	Medium
1-11	Independence Road catch basin	0.34	0.29	Medium
1-15	Corner of Meetinghouse Road and Route 1	0.38	0.32	Medium
2-1	West St above cemetary	0.29	0.25	Medium
3-2	Top of Torrey Hill Range Road	0.22	0.19	Medium
3-5	End of Cottage Street where pavement ends	0.25	0.21	Medium
5-1	Pine St across from Stagecoach Road	0.19	0.16	Medium
5-2	Pine St across from Stagecoach Road	0.33	0.28	Medium
5-5	Corner of Pine St and Route 1	0.42	0.36	Medium
5-10	Culvert crossing @ Varney Road	0.54	0.46	Medium
5-13	Concord Road with empty buildings	0.65	0.56	Medium
5-15	Trail behind L.L. Bean distribution center	0.54	0.46	Medium
	Totals	5.73	4.87	

Figure 7. High impact sites 3-1 (left) and 3-7. Both sites contain perched culverts and experience flash flows of NPS stormwater which results in severe bank scour. Site 3-1 also has a large population of Japanese Knotweed, an invasive species.

Figure 8. Overview of Impact Sites



Potential Structural Retrofit Sites

While the Town of Freeport has been requiring new development to manage stormwater on-site, much of the older developments and stormwater infrastructure had been constructed before stormwater management was required or modern criteria were established. Retrofits include new installations or upgrades to existing BMPs where there is a lack of adequate stormwater treatment. Stormwater retrofit goals may include the correction of prior design or performance efficiencies, flood mitigation, disconnecting impervious areas, improving recharge and infiltration performance, and supporting stream restoration activities. In other cases, it may incorporate maintenance regimes such as parking lot sweeping and revegetating bare areas in the spring. While all retrofit sites are unique and no single solution fits all, in general, preferred practices are those that reduce stormwater runoff volume while also providing water quality benefits such as treatment and groundwater recharge. A map of potential sites is provided in Appendix C.

Seven areas should be considered more closely for retrofit opportunities. These areas stretch the length of the watershed and all have multiple issues impacting water quality. Usually some kind of practice can be installed in almost any situation. Fiscal restraints, pollutant removal capability, and watershed capture area must all be carefully weighed when considering options and feasibility of implementation.

Figure 9a (upstream) and 9b (downstream) showing contrasts of inlet and outlet of culvert area.

1. Site 3-1; West Street Culvert Crossing

At the culvert crossing on West Street, south of Woodlawn Cemetery, Porter's Landing Brook transitions from a narrow and shallow brook with a broad floodplain to a deep ravine with undercut banks. The culvert is undersized and has been slip-lined, a common and practical treatment of installing a thermoplastic (polyethylene) liner inside a deteriorating culvert. The upstream portion has a moderately sized floodplain and winding brook. The tributary watershed has high IC (Depot Street parking area as one example), resulting in flash flows during heavy rain events. The undersized culvert creates a pressure washer effect on the outlet side (Figure 9b). Notice the bank scour to the left of the number card. NPS stormwater also enters from West Street and Torre Hill Road, eroding existing ditching and depositing directly to the brook. Compounding issues on site is an established patch of Japanese Knotweed (*Polygonum cuspidatum*), a highly aggressive invasive species that contractors should be

aware of before disturbing soils or transporting soils offsite. The Depot Street parking area should also be considered as part of the potential retrofit. Since this area contributes significant NPS stormwater to the tributary, there may be opportunities onsite to mitigate the volume and possibilities for treatment.

2. Site 3-7; South of the L.L. Bean Distribution Center near Casco Street

This site is located south of the Distribution Center off Casco Road. It is directly behind the building on a paved way that tractor-trailer trucks use as access for loading bays on the opposite side of the building. The site is experiencing bank collapse opposite the culvert outlet. A 20 foot by 35 foot section of bank is void of vegetation with soil eroding into an intermittent stream which flows directly to Tributary D, Reach C1 (Figure 10a and 10b). The culvert is stable with vegetation and riprap armoring the bank. The issue seems to be similar to the West Street site, 3-1, where, during severe rain events, the flash flow of NPS stormwater overwhelms the system. This creates high volume and velocity at the culvert outlet. With Suffield silt loam soils and 25 to 45 percent slopes; the bank erodes readily once the site is disturbed. There are a number of stormwater BMPs located on site including the culvert outlets and detention basin south of the parking area to the east of the Distribution Center. There may be other opportunities on-site to improve efficiencies of the original designs to improve capacity and treatment.

Figures 10a and 10b; Site 3-7. Eroded banking opposite culvert outlet behind L.L. Bean Distribution Center.

3. Site 5-13; Mallet Avenue

At the southern end of Mallet Avenue, the road splits off into two driveways with residential buildings. NPS stormwater flows down Mallet Avenue from Lower Main Street and adjacent commercial properties. The roadbed is fractured and fatigued. There is little or no ditching (Figure 10). There may be opportunities to improve existing BMPs such as an unmaintained detention area in the upper parking lot in addition to improvements such ditching and turnouts into vegetation.

Figure 11; Site 5-13. Mallet Avenue
ends here, but NPS stormwater flow continues and has eroded a gully which leads directly to Tributary C.

4. Site 5-16; Salt and Sand Shed at L.L. Bean Parking Facility

The site of the salt and sand shed at the rear of the parking area (located off of Casco Street) should be considered for relocation. The shed is covered which reduces leaching of salt from the stockpile, but the area itself is situated in proximity to catch basins which ultimately outlet to the main stem of the Concord Gully Brook. Any leaching or spill of material during plowing activities will place the spoils in the vicinity of the catch basins which can be directly transported by NPS stormwater to the catch basins.

5. Site 5-6, 5-7, 5-10; Varney Road Culvert Crossing

The culvert crossing at Varney Road is relatively new. The site was reconstructed following the breach and eventual failure of the road section in 2009. While the site appears stable, improvements can be made on the road itself. There is considerable space to incorporate BMPs in ditching and turnouts. These actions could divert NPS stormwater flowing down Varney Street into vegetation prior to entering the brook. Costs could be relatively low and maintenance minimal with benefits such as stormwater reduction and treatment. The invasive species Japanese Knotweed is also prevalent here in addition to multiflora rose (*Rosa multiflora*) and Japanese barberry (*Berberis thunbergii*). Again, any soil disturbance should take into account these invasive species before transporting soil off or onsite.

Figure 12. Eroding road shoulder at culvert crossing on Varney Road.

6. Site 5-5, Stream Crossing at Intersection of Pine Street and Route 1

The intersection of Pine Street and Route 1 sees considerable activity due to its proximity to I295 and the interchange area. Landuse here includes mixed commercial with a gas station, numerous hotels and a condominium complex all in the vicinity of the headwaters of the mainstem of Concord Gully Brook. The Maine Department of Transportation (MDOT) reconstructed areas of the road and shoulder in 2012 (Figure 13). The intersection area has the potential to act as a larger treatment site, accepting NPS stormwater from Route 1 and Pine Street. This area is highly visible and may also benefit the town by providing an education opportunity for water quality efforts. Again, Japanese Knotweed is prevalent on the banks of the brook and along the road shoulder closest to the stream.

Figure 13. Bare shoulders from recent construction by MDOT with headwaters of Concord Gully Brook to the right of surveyors.

7. Sites 5-1 and 5-2; Intersection of Stagecoach Road and Pine Street

This area is located in the headwaters of the mainstem of Concord Gully Brook. The roadbed itself is stable but the shoulders are bare and the pavement is fractured at edges in some areas. NPS stormwater flow can be significant during heavy rain events which adds to the deterioration of the road shoulders (Figures 14a and 14b). Erosion of sediment from the shoulder is being deposited directly into Concord Gully Brook. Like the Varney Road culvert crossing, there is space and opportunity for BMPs that incorporate ditch turn-outs into vegetation, revegetation of road shoulders to reduce the amount of bare soil, and reinforcing areas susceptible to flash flows with riprap or other suitable materials.

Figures 14a and 14b. Eroded sediment being deposited directly into the headwater streams of Concord Gully Brook and deteriorating road shoulders at pavement edge.

Summary of Stream Corridor Survey Findings

Results and Discussion are broken down by groupings of stream reaches that were surveyed by the CCSWCD and MDEP staff with assistance from volunteers. Those tributaries and reaches included (see Figure 10):

- Mainstem of Concord Gully Brook ("M"): Reaches "A1a, A1, A2, A3, and A4"
- Tributary "A" (Porter's Landing Brook): Reach "B1"
- Tributary "B": Reaches "C1 and C2"
- Tributary "C": Reaches "D1 and D2"

Please note that these techniques are conducted fairly rapidly, and in a mostly qualitative (as opposed to quantitative) manner, so the results contained in this report should be viewed as a first-cut, screening level of information. More intensive, quantitative study of the stream's condition may be necessary. Maps of potential restoration areas and aerial photograph images showing reach locations and nearby land cover are contained in Appendix D.

Local Land Use and Stream Conditions

Upstream urban land uses in the Concord Gully Brook watershed are markedly impacting the Brook and its tributaries. The primary forces at work are degradation and aggradation. Large areas of IC, such as the retail area of Lower Main Street, contribute larger volumes of stormwater runoff to a given stream section. IC prevents rainwater from slowly infiltrating into the ground and instead cause it to flow quickly over these hard surfaces, picking up pollutants such as metals and hydrocarbons from automobiles, eroded soil and winter sand from roads and parking lots, and fertilizers and pesticides from lawn care. These stream sections are generally "flashier" giving stormwater extra energy to move sediment

Figure 15. Effects of stormwater flashes from impervious surfaces following rain events. The resulting large volume and high energy flow can erode substrate and bank materials, destabilizing and destroying aquatic habitats within the stream and riparian area. Toxins contained within the stormwater can further stress organisms and ultimately threaten downstream habitats such as clam flats and estuaries. These photos are taken upstream on Tributary "B" during the 2012 season, before a rain event and after saturation.

Figure 16. Concord Gully Brook and Tributaries

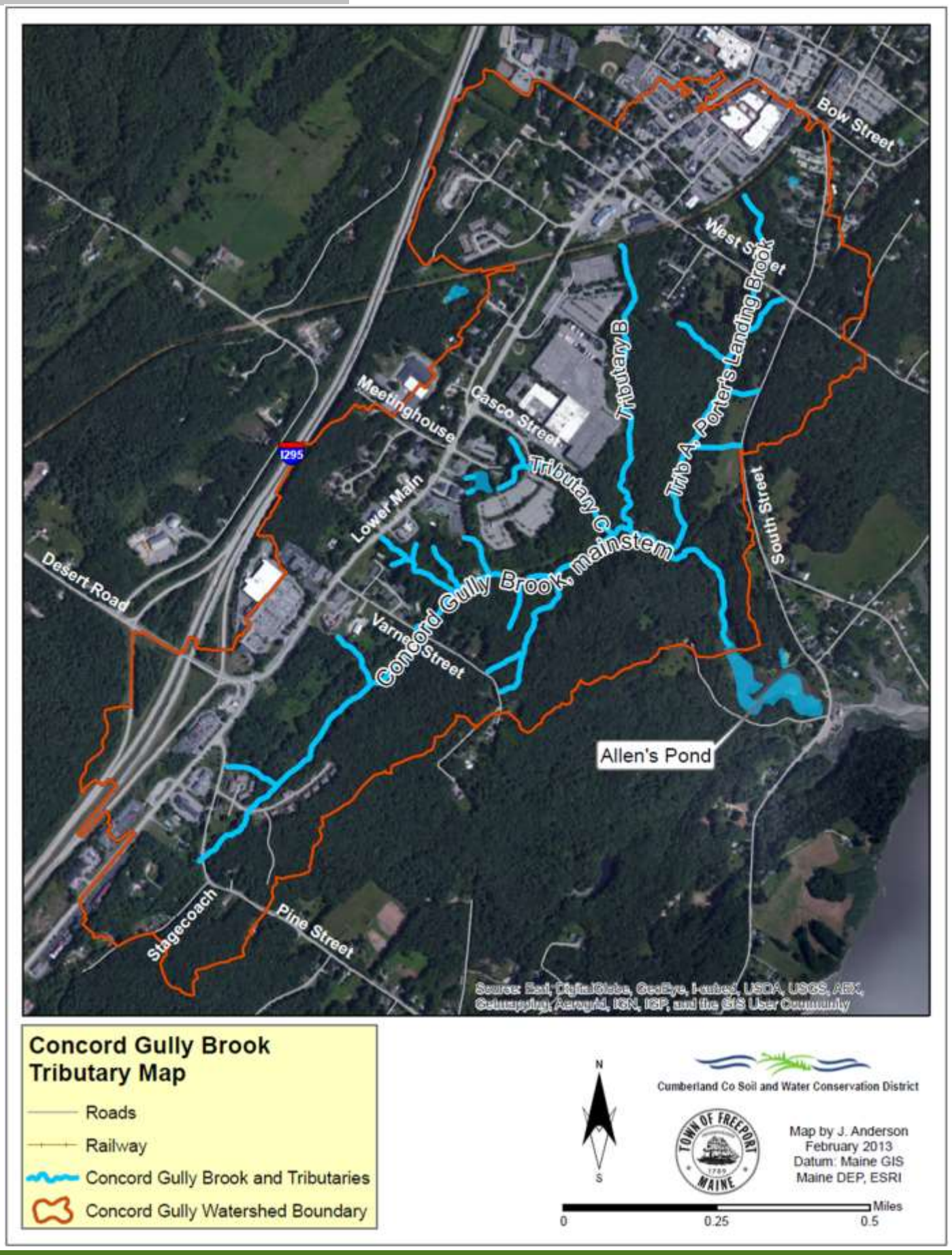
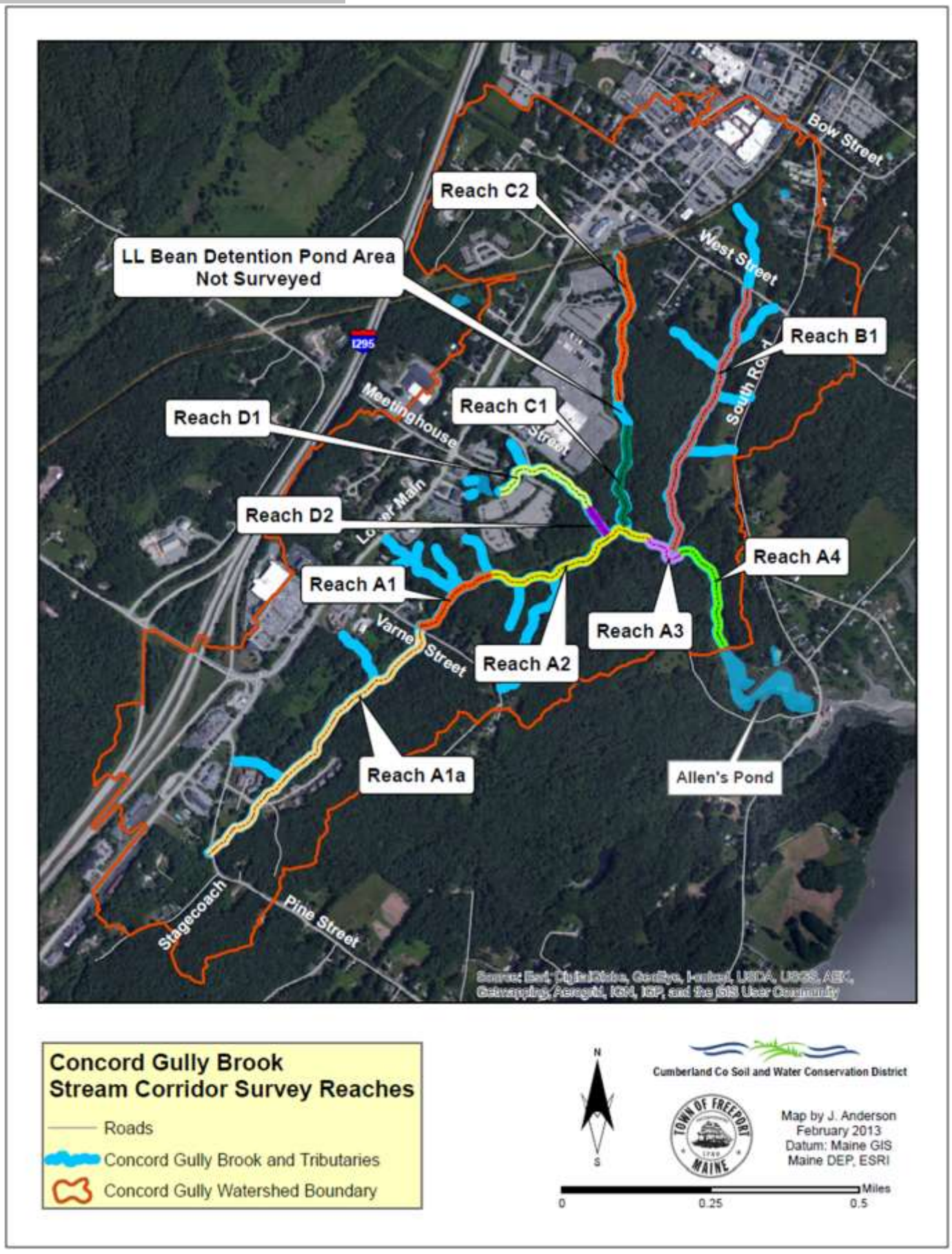


Figure 17. Stream Corridor Reaches



causing the stream channel to cut deeper and wider, a process known as degradation. Degradation is also associated with undermining the root mass of trees and other vegetation causing bank collapse. Porter's Landing Brook (Tributary "A", Reach B1) is a good example and the manner by which a stream cuts into the land, undermining the root mass of trees and other vegetation causing bank collapse and erosion of soil into stream (see Figure 20). These high-energy flows can erode substrate and bank materials, destabilize the physical structure of aquatic habitats within the stream and riparian area, destroy resident aquatic organisms, and kill eggs incubating in the benthic environment (EPA, 2012).

Aggragation is the deposition of sediment once the river lacks the capacity to transport it. When the upstream sediment load and/or size of sediment exceeds the transport capacity of the channel, the sediment settles out causing siltation in pools, mid-channel bars, embedded cobbles, and fresh sediment in overbank zones (Figure 18). Excess sediment in the system can result in accelerated bank erosion and streams that are shallow and overly wide. These changes can lead to increased temperatures that negatively affect aquatic species. Excess sediment load tends to convert meandering streams with pool-riffle complexes into long homogeneous runs. This subsequent loss of stream bed diversity can adversely affect many populations of aquatic organisms (Michigan DNR, 2012).

Figure 18. A good example of aggradation with deposition of sediment (point bar behind surveyor) and mid-channel bar underfoot. This occurs on the main stem of Concord Gully Brook prior to its outlet to Allen's Pond.

Potential Stream Restoration

One area that should be prioritized for further study and possible restoration is the old electric trolley crossing south of Casco Road and the sanitary sewer line. In August, 2008, the Varney Road culvert crossing failed sending a large section of road and bank downstream in a massive rush of floodwater. Asphalt, twisted culverts, and riprap can be seen several hundred yards downstream. Floodwaters overwhelmed an old concrete culvert that served as the crossing for the Brunswick and Freeport line of the Androscoggin and Kennebec Railway. The line was opened in 1902 and provided freight and express operations as it was connected with the trackage of the Portland Railroad Company. Operations over the entire line between Brunswick and Yarmouth were abandoned in 1929 but the rail bed is still evident in areas (Collections of the Seashore Trolley Museum, 2013). At this crossing, a large section of railway bed has

Figure 19. Inscription on old concrete culvert reading "H.M 11.20.13", presumably November 20th, 1913.

been eroded away with a cut-face bank slope reaching 20' high on either side. The existing concrete culvert is no longer active and the thalweg (the line of the streambed that defines its deepest channel) has realigned north and now cuts into the banking causing further failure of the wall (Figure 20).

A second area is Tributary "A", Reach B1, which is locally known as Porter's Landing Brook. High-energy stormwater flows contribute to substantial degradation and instability to the system. The combination of high volume flows, Belgrade very fine sandy loam and Buxton silt loam soils on steep grades, and proximity to lower reaches of the mainstem of Concord Gully Brook, makes this tributary especially vulnerable to impacts and also has the ability to severely impact areas downstream with heavy sediment loads and NPS pollution (Figure 20).

A third area is the double culvert south of the confluence with Porter's Landing Brook at the crossing of the sanitary sewer line. Here, the culvert area is characterized by high-energy flows which create channel scour and deterioration and prohibit fish and habitat movement. Three factors are present at this location:

- Perched culverts with excess drop at the outlet.
- Improperly sized culverts that create high water velocity and turbulence.
- Debris accumulation at the culvert inlet.

While upstream influences such as IC and high energy flows are continually altering stream channel structure and adversely influencing aquatic habitat, there remains extensive woodland and an unfragmented habitat block in the lower watershed. For the protection and improvement of the Concord Gully Brook watershed, it is critical to maintain these areas for the stream's future health and it's ability to absorb the pressures of ex-

Figure 19. Potential restoration site on the mainstem of Concord Gully Brook. The old crossing of the Brunswick and Freeport line of the Androscoggin and Kennebec Electric Railway has been eroded away with significant soil loss. The concrete culvert is to the right of the surveyor.

Figure 20. A second restoration area is Porter's Landing Brook, (Tributary "A"). This reach sees substantial degradation due to heavy stormwater flows and steep grades.

Figure 21. Double culverts at sanitary sewer line crossing on the mainstem of Concord Gully Brook.

isting and future land use (see Appendix D for a map of potential restoration sites).

Concord Gully Brook Reach Characteristics

Concord Gully Brook Mainstem Reach A1b

Figure 22. Typical stretch of Reach A1b

This reach of the mainstem begins in the Pine Street/Concord Brook Condominium area and part of the headwaters. The reach extends to the west side of the Varney Road culvert and flows through a wide valley and floodplain. The local surficial geology is glaciomarine. Soils are Scantic silt loam with slopes ranging from 0-8%. Land use includes paved roads, residential and subdivision development (Concord Brook Condominiums), and woodland. The stream has a narrow and shallow channel (average 3 foot width) with deadwater and runs typically less than 1 foot deep. The stream bottom is predominantly silt/clay/mud with fine pea and coarse gravel. Large woody debris is plentiful along with naturally occurring in-stream organic material. The stream is clear with no odor. The stream bank is undercut suggesting degradation with garbage/debris found in and adjacent to the stream. Evidence of amphibians and mammals was found in the vicinity of the stream with potential barriers for migration found in the culvert areas of Concord Brook Condominium and Varney Road. This section of stream is 75% shaded with dense vegetation extending beyond 75 feet of the stream bank.

Concord Gully Brook Mainstem Reach A1

Figure 23. Typical stretch of Reach A1, with point bar deposition containing asphalt 600 feet east of Varney Road culvert crossing.

This reach begins at the outlet (east) side of the Varney Road culvert and flows over bedrock for 60 feet before transitioning into stream channel. The local surficial geology is glaciomarine. Soils are Scantic silt loam with slopes ranging from 0-8%. Land use includes paved roads, residential development, and woodland. The stream has a narrow and shallow channel (average 10 foot width) with pools, riffles and runs typically less than 1 foot deep. The distance between pools is 150 feet and the stream bottom is predominantly silt/clay/mud with a greater concentration of coarse gravel, cobble, and boulder (including asphalt from the culvert failure in 2008). Gravel, cobble, and boulders are 50% embedded. Large woody debris is plenti-

ful along with occasional naturally occurring organic material in-stream. The stream is clear with no odor. The stream bank is undercut suggesting degradation with downstream portions showing aggradation with point bars and mid-channel bars. Garbage/debris found in and adjacent to the stream, some debris associated with the culvert failure. Evidence of amphibians and mammals was found in the vicinity of the stream with potential barriers for migration found in the culvert areas of Varney Road (bedrock and culvert) and woody debris. This section of stream is 75% shaded with dense vegetation extending beyond 75 feet of stream bank. The entire reach including the potential restoration project at the old trolley crossing should be further examined.

Concord Gully Brook Mainstem Reach A2

Figure 24. Typical stretch of Reach A2 with natural barrier and aggradation.

This reach begins at the east side of the trolley crossing and flows over bedrock for 20 feet before transitioning into stream channel. The local surficial geology is glaciomarine. Soils are Scantic silt loam and Deerfield sandy loam with slopes ranging from 0-8%. Land use includes paved roads, residential and multi-family development, construction (road repair), and woodland. The stream has a narrow and shallow channel (average 10 foot width) with pools and riffles typically less than 1 foot deep. The distance between pools is 20 feet and the stream bottom is predominantly fine pea gravel with silt/clay/mud cobble at lower densities. Gravel, cobble, and boulders are somewhat (2-25%) embedded. Large woody debris is plentiful along with occasional naturally occurring organic material in-stream. The stream is clear with no odor. The stream bank is undercut with rootwads and overhanging vegetation suggesting degradation with downstream portions showing aggradation with point bars and mid-channel bars. Garbage/debris found in and adjacent to the stream (including silt fence presumably left over from the upgrades to the sanitary sewer line). Evidence of amphibians and mammals were found in the vicinity of the stream with potential barriers for migration found in presence of large woody debris collapsed across stream. This section of stream is 75% shaded with dense vegetation extending beyond 75 feet of the stream bank.

Concord Gully Brook Mainstem Reach A3

This reach begins at the section of sanitary sewer line closest to stream bank. It ends at the double culvert south of Porter's Landing Brook confluence. The local surficial geology is glaciomarine. Soils are Scantic silt loam and Deerfield sandy loam with slopes ranging from 0-8%. Land use includes commercial (parking area of L.L. Bean distribution center (Casco Road), residential, construction (road repair), and woodland. The stream has a narrow and shallow channel (average 12 foot width) with pools, riffles and runs typically less than 1 foot deep. The distance between pools is 30 feet and the stream bottom is predominantly fine pea gravel with silt/clay/mud cobble at lower densities. Gravel, cobble, and boul-

ders are somewhat (2-25%) embedded. Large woody debris is plentiful along with occasional naturally occurring organic material in-stream. The stream is clear with no odor. The stream bank is undercut with rootwads and overhanging vegetation suggesting degradation with significant portions showing aggradation with a widened channel and continuous homogenous runs. Minimal garbage/debris found in and adjacent to stream. Evidence of amphibians and mammals were found in the vicinity of the stream with potential barriers for migration found in presence of large woody debris collapsed across stream. This section of stream is 50% shaded with dense vegetation extending beyond 75 feet of stream bank in some areas. Stream banking in proximity sanitary sewer is mowed annually and portions, though sparse, are vegetated but lack canopy shade.

Figure 25. Typical stretch of Reach A3 with continuous runs, bank widening, and aggradation (notice mid-channel bar in background).

Concord Gully Brook Mainstem Reach A4

This reach begins at the outlet of the double culverts south of Porter's Landing Brook confluence and ends at the start of Allen's Pond and associated wetlands. The local surficial geology is glaciomarine. Soils are Scantic silt loam and Buxton silt loam with slopes ranging from 0-8%. Land use includes residential, construction (road repair), and woodland. The stream has a narrow and deep channel (average 10 foot width) with pools, riffles and runs typically less than 1 foot deep and 2 pools over 2 feet deep. The distance between pools is 20 feet and the stream bottom is predominantly fine pea gravel with silt/clay/mud and coarse gravel and cobble at lower densities. Gravel, cobble, and boulders are not (0-5%) embedded. Large woody debris is scarce yet naturally occurring organic material in-stream is plentiful. The stream is clear with no odor. The stream bank is vertical and undercut with overhanging vegetation suggesting degradation, yet, as with other reaches, significant portions show aggradation with a widened channel and a significant number of point and mid-channel bars. No garbage/debris was found in or adjacent to stream. Evidence of amphibians and mammals were found in the vicinity of the stream with potential barriers for migration found in presence of limited large woody debris collapsed across stream. This section of stream is 25% shaded with dense vegetation extending beyond 75 feet of stream

Figure 26. Typical stretch of Reach A4 as it enters the Allen's Pond wetland complex. Larger canopy gives way to shrubs and grasses with significant sediment deposition on point bars.

bank. As the stream outlets to Allen's Pond, the absence of larger trees and canopy gives way to smaller bushes and shrubs more typical of the wetland vegetation.

Figure 27. Typical stretch of Reach B1 downstream from West Street crossing. Significant stormwater flows are continually undermining banks, widening stream width, and lowering the elevation of the streambed.

Tributary "A" (Porter's Landing Brook), Reach B1

This reach begins at the culvert outlet on West Street just below Woodlawn Cemetery. It ends at the culvert inlet prior to the confluence with the mainstem of Concord Gully Brook. The local surficial geology is glaciomarine. Soils are Belgrade very fine sandy loam and Buxton silt loam with slopes ranging from 0-15%. Land use includes commercial, residential, and woodland. The stream has a narrow and shallow channel (average 12 foot width). Pools, riffles and runs are typically less than 1 foot deep with 2 pools over 2 feet deep. The distance between pools is 40 feet and the stream bottom is predominantly coarse gravel and cobble with fine pea gravel with silt/clay/mud cobble at lower densities. Gravel, cobble, and boulders are somewhat (2-25%) embedded. Large woody debris is plentiful along with occasional naturally occurring organic material in-stream. The stream is clear with no odor. The stream bank is severely undercut with rootwads and overhanging vegetation and significant portions showing degradation with increased bank height, steep bank angles through most of reach; and absence of bar features. Garbage/debris found in and adjacent to stream is minimal. Evidence of amphibians and mammals were found in the vicinity of the stream with potential barriers for migration found in presence of large woody debris collapsed across stream. This section of stream is 75% shaded with dense vegetation extending beyond 75 feet of the stream bank. Porter's Landing Brook has a history of being utilized for drainage and sewage going back to the early 1900s when flowage rights were purchased by the A.W. Shaw Shoe Company (R. Regier, 2012, p.2). This reach is showing signs of substantial stormwater inputs and is unable to absorb the high-energy flows. The watershed for this tributary should be further studied to mitigate the high input of stormwater and also explore potential restoration actions to alleviate bank collapse and overall stream degradation.

Figure 28. An interesting phenomenon of Reach C1 is the fluvial erosion into the glacial marine clay creating "potholes" in the substrate. The depth of the stream is 1.5' at this location.

Tributary "B", Reach C1

This reach begins at the Tributary "B" outlet to the mainstem of Concord Gully Brook and heads upstream to the culvert outlet of the detention pond adja-

cent to the L.L. Bean distribution center. The local surficial geology is glaciomarine. Soils are Suffield sandy loam with slopes ranging from 8-25%. Land use includes commercial parking, paved roads, residential and multi-family development, and woodland. The stream has a narrow and shallow channel (average 8 foot width) with pools and riffles typically less than 1 foot deep with one pool over 2 feet deep. The distance between pools is 80 feet and the stream bottom is predominantly fine pea gravel with silt/clay/mud cobble with gravel, cobble, and boulders at lower densities and somewhat (2-25%) embedded. Large woody debris is plentiful along with occasional naturally occurring organic material in-stream. The stream is clear with no odor. The stream bank is undercut with rootwads and overhanging vegetation. Downstream portions show aggradation with mid-channel bars. Minimal garbage/debris is found in and adjacent to stream . Evidence of amphibians and mammals was found in the vicinity of the stream with potential barriers for migration centered around the culvert at the base of the detention pond, the chain link fencing surrounding the pond, and the presence of large woody debris collapsed across stream. This section of stream is 75% shaded with dense vegetation extending beyond 75 feet of stream bank. Upstream of the reach is a 200 foot X 100 foot detention basin, part of the L.L. Bean stormwater permit program. This detention area was not included in the survey.

Figure 29. Typical stretch of Reach C2, wooded sections with substantial sediment deposition in foreground.

Tributary "B", Reach C2

This reach continues after the detention pond and heads upstream to the culvert outlet south of the Freeport Public Safety Building (which is the head of stream). The local surficial geology is glaciomarine. Soils are Suffield sandy loam with slopes ranging from 8-25%. Land use includes commercial parking, paved roads, residential and multi-family development, and woodland. The stream has a narrow and shallow channel (average 8 foot width) with pools and riffles typically less than 1 foot deep with one pool over 2 feet deep. The distance between pools is 60 feet and the stream bottom is predominantly silt/clay/mud with sand and fine pea gravel at lower densities. Cobble and boulders are somewhat (2-25%) embedded. Large woody debris is plentiful along with occasional naturally occurring organic material found in-stream. The stream is clear with no odor. The stream bank is undercut with rootwads and overhanging vegetation, and downstream portions showing aggradation with mid-channel bars. Minimal garbage/debris is found in and adjacent to the stream . Evidence of amphibians and mammals were found in the vicinity of the stream with potential barriers for migration located at the culvert at the detention pond, chain link fencing around the pond, and large woody debris collapsed across stream. This section of stream is 75% shaded with dense vegetation extending beyond 75 feet of the stream bank. Reach C2 is stable when compared with other reaches within the network of tributaries. It is heavily influenced by stormwater structures related to the L.L. Bean complex and any further research should be focused on mitigating stormwater inputs.

Tributary "C", Reach D1

Figure 30. Typical stretch of Reach D1, wooded sections along the hiking trail connected to L.L. Bean facilities.

This reach begins in the detention pond north of the parking area for the L.L. Bean distribution center west of Casco Road. The reach extends to sanitary sewer line crossing. The local surficial geology is glaciomarine. Soils are Suffield sandy loam with slopes ranging from 8-25%. Land use includes paved parking areas and roads, hiking trails, and woodland. The stream has a narrow and shallow channel (average 9 foot width) with runs typically less than 1 foot deep. The stream bottom is predominantly silt/clay/mud with fine pea and coarse gravel. Large woody debris is plentiful along with naturally occurring organic material in-stream. The stream is clear with no odor. The stream bank is undercut with garbage/debris found in and adjacent to the stream. Evidence of amphibians and mammals was found in the vicinity of the stream with potential barriers for migration found in the culvert areas of bridging for Casco Road and the culvert. A number of discharge pipes are located within the bridge area. This section of stream is 50% shaded with dense vegetation extending 75 feet beyond the stream bank. Though there are a number of discharge pipes which outlet to the stream, the overall appearance of the reach suggests stability but could benefit from stormwater mitigation efforts in the upper watershed.

Tributary "C", Reach D2

Figure 31. Cut-off channel within Reach D1, with slumping of banking prior to return to stream channel.

Reach D2 begins in the outlet of the culvert over the sanitary sewer line. The reach extends to the outlet into the mainstem of Concord Gully Brook. The local surficial geology is glaciomarine. Soils are Suffield sandy loam with slopes ranging from 8-25%. Land use includes paved parking areas and roads, hiking trails, and woodland. The stream has a narrow and shallow channel (average 5 foot width) with runs typically less than 1 foot deep. The stream bottom is predominantly silt/clay/mud with fine pea and coarse gravel. There is little large woody debris and naturally occurring organic material is occasional. The stream is clear with no odor. The stream bank is undercut with garbage/debris found in and adjacent to stream. Evidence of amphibians and mammals was found in the vicinity of the stream with potential barriers for migration found in the culvert areas of bridging for Casco Road and the culvert. A number of discharge pipes are located within the bridge area. This section of stream is 50% shaded with dense vegetation extending 75 feet beyond the stream bank.

Roads

Town and private roads accounted for 15 of the total 46 sites. The Town of Freeport has been active replacing culverts and repairing ditching, especially on South Street, but roads can be a huge impact to Concord Gully Brook. Most road issues need expertise and often have a moderate to significant cost associated with them.

Common Problems Identified:	Recommended Solutions:
◊ Unstable culvert inlets/outlets	◊ Clean out culverts and armor inlets/outlets with riprap
◊ Road shoulder erosion	◊ Re-grade, vegetate to stabilize shoulders
◊ Unstable ditching/erosion	◊ Clean, re-shape and stabilize ditches
◊ Clogged or rusted culverts	◊ Clean out and/or replace

Parking Lots

13 sites were associated with parking areas. Of these sites, only 3 were classified as erosion sites. The majority were the result of winter sand accumulated on the parking area, sealcoating over catch basins, or unmaintained ditching and culverts. It is very difficult to estimate the impact of these sources of pollution, but the cumulative effect of these numerous and large areas can send a multitude of pollutants to the Brook in a hurry.

Common Problems Identified:

◊ Winter sand filling catch basins

◊ Sealcoating near catch basins and wetland areas

◊ Excessively green grass and athletic fields

◊ Bare soils

◊ Leaking dumpsters

Recommended Solutions:

◊ Remove winter sand sweep monthly or as needed

◊ Use sealcoating that contain no coal tar or polycyclic aromatic hydrocarbons (PAHs)

◊ Use fertilizers and pesticides minimally or not all , look for labels that contain no phosphorous

◊ Keep bare soils covered with vegetation, mulch, or grass

◊ Place dumpsters away from catch basin inlets

Maintained parking areas are more attractive to potential customers and cost less in the long-run to maintain. Catch basins and stormwater can lead straight to Concord Gully Brook dumping a multitude of pollutants which can ultimately end up in Casco Bay.

Residential

With only 2 sites documented as erosion sites, residential areas can contribute more than soil. Other pollutants such as fertilizers, pesticides, garbage, and gas and oil can be washed into Concord Gully Brook by stormwater or NPS pollution. There are many ways to help without even leaving your house.

Common Problems Identified:

- ◊ Slight or moderate surface erosion
- ◊ Bare or sparsely vegetated soil
- ◊ Lack of vegetated buffer along stream edge
- ◊ Roof runoff causing erosion
- ◊ Trash and toxic materials

Recommended Solutions:

- ◊ Seed and mulch bare soil, use fertilizers and pesticides sparingly or not at all
- ◊ Plant a buffer of native gardens to keep stormwater out of the Brook
- ◊ Install drip line trench install a rain barrel to capture it and water you garden
- ◊ Dispose of toxic materials at hazardous waste drop off days at the municipal transfer station

It's the cumulative impact of all the sites that can cause water quality to decline.

Riparian Corridor Survey

Types of data collected:

- Approximate width of the river
- Vegetation Type
- Type of land use
- Wildlife present
- Approximate percentage of shade over river

What's so important about shade, you might ask?

Trees not only provide shade but nutrients and organic material for small organisms to eat. Trees also stabilize the soil along the banks and provide wildlife habitat. Shade trees also help keep water temperatures cooler and protect water quality by acting as natural filters. The photos on this page are examples of shade cover. For a river or stream to be fully shaded it would also need to be very narrow as the two bottom photos show.

Next Steps ~ Where do we go from here

There are no short-term answers or quick fixes for Concord Gully Brook but there are many avenues and opportunities that can be acted upon to address concerns and issues with the health of the Brook and the watershed. Below are suggestions for next steps.

Town of Freeport

⇒ Work with CCSWCD to develop the Concord Gully Watershed Management Plan utilizing the findings of the survey develop to long-term goals and outcomes. Apply for grant funding to address the highest water quality impact sites. (Spring 2013)

⇒ Explore education and outreach opportunities for watershed residents on the impacts to water quality and basic conservation practices that can be implemented. (Ongoing)

⇒ Promote training for town boards, commissions, and other decision-makers.

⇒ Maintain list of watershed problem sites by adding new sites as they are found and removing sites as they get fixed. (Ongoing)

⇒ Further develop partnerships with stakeholders to create consensus on actions going forward.

⇒ Conduct regular maintenance on town roads in the watershed, and fix town road problems identified in this survey. (Ongoing)

⇒ Remove excess winter sand from roadways promptly. (Spring)

⇒ Promote training for road crews. (Ongoing)

⇒ Continue strong enforcement of Shoreland Zoning Ordinances and the Erosion and Sediment Control Law to ensure protection of the Concord Gully Brook (Ongoing)

Individual Citizens

⇒ Prevent polluted runoff from washing into the river. Collect runoff in depressions or divert flow to vegetated areas for infiltration. Call CCSWCD for advice.

⇒ Minimize the amount of cleared land and road surfaces on your property.

⇒ Establish no mow zones, reduce raking and encourage native plants.

⇒ Vegetate and mulch bare areas.

⇒ Check with your local Code Enforcement Office before cutting vegetation within 250 feet of the shore.

⇒ Maintain septic systems. Pump septic tanks (every 2-3 years/year round; 4-5 years if seasonal), and upgrade marginal systems.

Permitting ABC's

Protection of the Concord Gully Brook Watershed is ensured through the good will of residents around the river and through laws and ordinances created and enforced by the State and Towns.

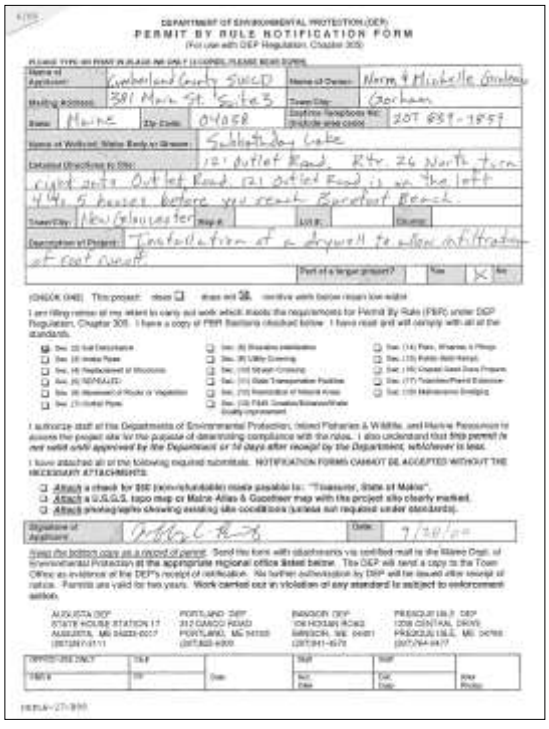
How do you know when you need a permit?

- Construction, clearing of vegetation and soil movement within 250 feet of a river shore falls under the Shoreland Zoning Act, which is administered by the Towns through the Code Enforcement Officer and the Planning Board.

- Soil disturbance within 75 feet of the lake, river or stream also falls under the Natural Resources Protection Act, which is administered by the DEP.
- To ensure that permits for projects that will not result in significant disturbance are processed swiftly, the DEP has established a streamlined permit process called **Permit by Rule**. Only certain types of projects will qualify for a Permit by Rule and if the criteria is not met, then an individual permit will be needed. These one page forms (shown below) are simple to fill out and allow the DEP to quickly review the project.

> *The Natural Resources Protection Act seeks to establish reasonable regulation in order to assure responsible development that does not harm* ***Maine's precious natural systems.***
>
> ~from Protecting Maine's natural Resources, Volume 1, DEP 1996

The project partners encourage you to contact the DEP and Town Code Enforcement Officer if you have any plans to construct or relocate a structure, clear vegetation, create a new path or driveway, stabilize a shoreline or otherwise disturb the soil on your property. Even if projects are planned with the intent of enhancing the environment—such as installing some of the practices mentioned in this report –contact the DEP and Town to be sure.



DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP)

PERMIT BY RULE NOTIFICATION FORM

(For use with DEP Regulation, Chapter 305)

How to apply for Permit by Rule with DEP:

1. Fill out a notification form before completing any work on the ground. Forms are available from your town code enforcement officer or the Maine DEP offices in Portland or Augusta.

2. The permit will be reviewed by DEP within 14 days. If you do not hear from DEP within 14 days, you can assume your permit is approved and you can proceed with work on the project. If you bring the permit directly to a DEP office, you could get your permit approved immediately.

3. Follow the proper standards for keeping soil erosion to a minimum during construction, such as installing silt fence. It is important that you obtain a copy of the standards so you will be familiar with the law's requirements.

Appendix A

Watershed Field Survey Sheet

2012 Concord Gully Brook Watershed Survey

Sector & Site_____ Date _____Surveyor Initials _____

Location (house #, road, utility pole #) _____Landowner Name _____

Tax Map & Lot _____ Talked to Landowner? _____# Photos Taken _____

GPS Coordinates in Lat/Long

□□.□□□□□° □□.□□□□□°

Land Use/Activity *Circle only ONE*	**Description** *Circle ALL that apply*	
State Road	**Soil Erosion/Sediment**	**Buffer**
Town Road	Bare soil/fields	Inadequate buffer
Private Road	Stockpiled soil	Poor/degraded buffer
Driveway	Unstable Construction	Invasive species present
Residential	Road Surface Erosion	**Impacts to Stream Temperature**
Commercial	Road Shoulder/ditch	Lack of Stream shading
Municipal/Public	Unstable Culvert	Riprap on streambanks
Beach/Boat Access	Livestock access to stream	Drainage from paved area
Recreational	**Bacteria/Nutrients**	Drainage from dams/ponds
Trail or Path	Pet waste	**Culverts/Crossings**
Logging	Livestock manure	Misaligned
Agriculture	Waterfowl	Hanging—no fish passage
Construction Site	Septic/sewer system	Beaver Dam/blockage
Industrial	Lawn fertilizer flags	Slip lined culvert
Gravel pit/mining	Lawn clippings at stream	**Stream Channel**
Stream Channel	Seagull hangout	Channel straightened
Gas Station	**Toxics**	Bank/channel downcutting
Parking Lot	Traffic Backup	Streambank erosion/failure
	Stains at storm drains	Trash
	Parking lot drainage	Sediment build up
	Industrial/Commercial activities	Floodplain filled in
	Dumpster runoff/juice	Remains of old-log drive dam

Impact - circle one from each column

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

Additional Comments:

Appendix B

Survey Data Sheets

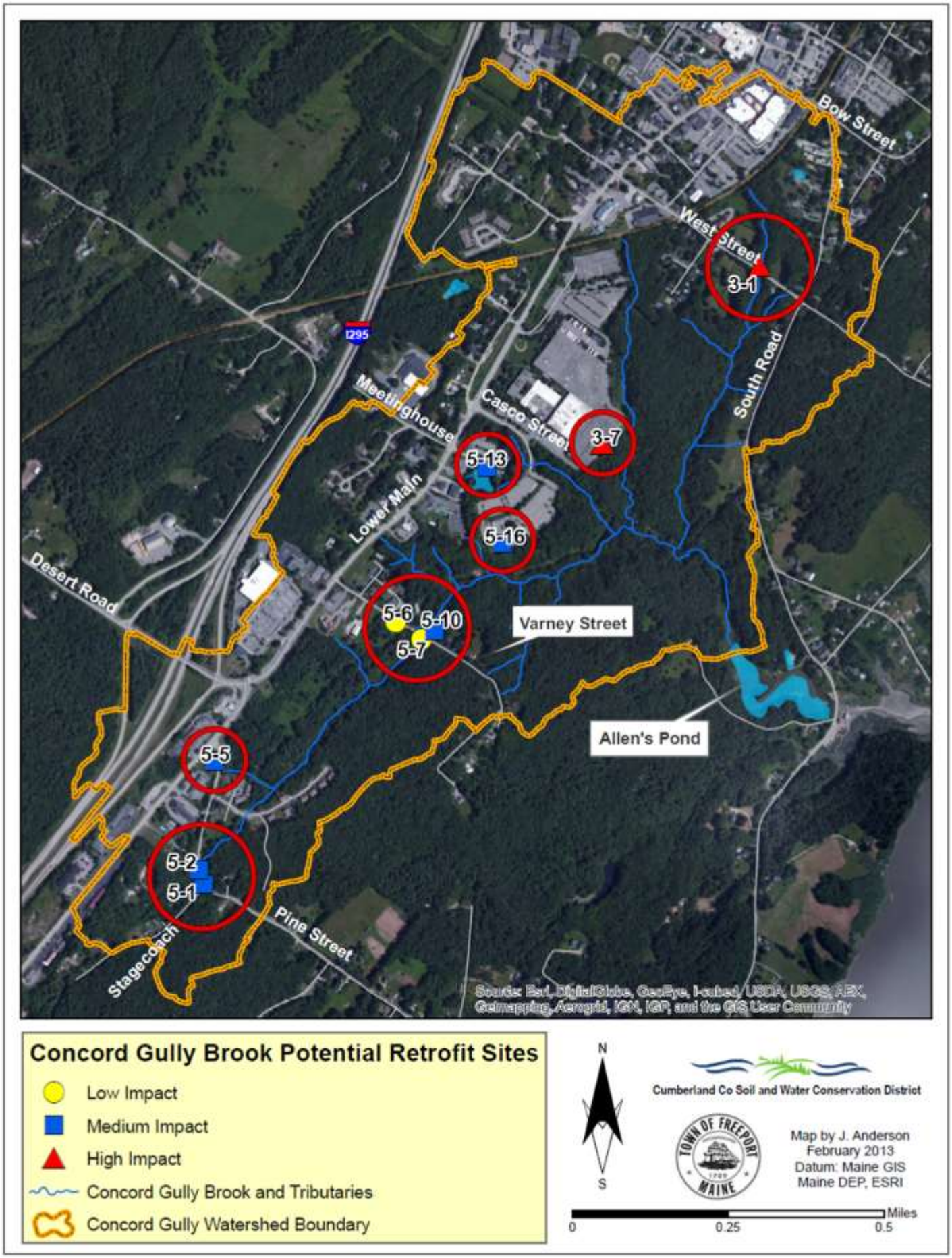
MapID	Tax Map & Lot	Land Use	Description of Problem	Estimated Size of Impact: 1 =Small 2=medium 3=large	Number of Pollutants 1= single 2= multiple	Transport to Stream 1=limited 2=direct Flow	Impact Score	Severity
3-1	Town Road	Town Road	Road surface erosion, Unstable culvert, poor/degraded buffer, invasive species present, Hanging - no fish passage, Beaver Dam/blockage, Slip lined culvert	3	2	2	7	High
3-2	Town Road	Town Road	Road shoulder/ditch	3	1	1	5	Medium
3-3	20095000	Town Road	Road shoulder/ditch, Unstable culvert	1	1	1	3	Low
3-4	209500000	Town Road	Road shoulder/ditch, Unstable culvert	1	1	1	3	Low
3-5	ROW	Private Road	Road Surface Erosion	2	1	1	4	Medium
3-6	Cemetary	Municipal/Public	Bare soil/fields, Road surface erosion	1	1	1	3	Low
3-7	020098ETC000	Commercial	Bare soil/fields, Unstable culvert	3	1	2	6	High
3-8	020098ETC000	Parking Lot	Bare soil/fields, Parking lot drainage	2	1	2	5	Medium
4-1	8001000000	Residential	Bare soil/fields, Road Shoulder/ditch	1	1	1	3	Low
4-2	7004000000	Parking Lot	Toxics: Seal coating over catch basin	3	1	1	5	Medium
4-3	22029000000	Gas Station	Toxics: Pesticides	1	1	1	3	Low
4-4	22029000000	Gas Station	Bare soil/fields	1	1	1	3	Low
4-5	022029B000	Parking Lot	Bare soil/fields	1	1	1	3	Low

MapID	Tax Map & Lot	Land Use	Description of Problem	Estimated Size of Impact: 1 =Small 2=medium 3=large	Number of Pollutants 1= single 2= multiple	Transport to Stream 1=limited 2=direct Flow	Impact Score	Severity
3-1	Town Road	Town Road	Road surface erosion, Unstable culvert, poor/degraded buffer, invasive species present, Hanging - no fish passage, Beaver Dam/blockage, Slip lined culvert	3	2	2	7	High
3-2	Town Road	Town Road	Road shoulder/ditch	3	1	1	5	Medium
3-3	20095000	Town Road	Road shoulder/ditch, Unstable culvert	1	1	1	3	Low
3-4	209500000	Town Road	Road shoulder/ditch, Unstable culvert	1	1	1	3	Low
3-5	ROW	Private Road	Road Surface Erosion	2	1	1	4	Medium
3-6	Cemetary	Municipal/Public	Bare soil/fields, Road surface erosion	1	1	1	3	Low
3-7	020098ETC000	Commercial	Bare soil/fields, Unstable culvert	3	1	2	6	High
3-8	020098ETC000	Parking Lot	Bare soil/fields, Parking lot drainage	2	1	2	5	Medium
4-1	8001000000	Residential	Bare soil/fields, Road Shoulder/ditch	1	1	1	3	Low
4-2	7004000000	Parking Lot	Toxics: Seal coating over catch basin	3	1	1	5	Medium
4-3	22029000000	Gas Station	Toxics: Pesticides	1	1	1	3	Low
4-4	22029000000	Gas Station	Bare soil/fields	1	1	1	3	Low
4-5	022029B000	Parking Lot	Bare soil/fields	1	1	1	3	Low

MapID	Tax Map & Lot	Land Use	Description of Problem	Estimated Size of Impact: 1 =Small 2=medium 3=large	Number of Pollutants 1= single 2= multiple	Transport to Stream 1=limited 2=direct Flow	Impact Score	Severity
3-1	Town Road	Town Road	Road surface erosion, Unstable culvert, poor/degraded buffer, invasive species present, Hanging - no fish passage, Beaver Dam/blockage, Slip lined culvert	3	2	2	7	High
3-2	Town Road	Town Road	Road shoulder/ditch	3	1	1	5	Medium
3-3	20095000	Town Road	Road shoulder/ditch, Unstable culvert	1	1	1	3	Low
3-4	209500000	Town Road	Road shoulder/ditch, Unstable culvert	1	1	1	3	Low
3-5	ROW	Private Road	Road Surface Erosion	2	1	1	4	Medium
3-6	Cemetary	Municipal/Public	Bare soil/fields, Road surface erosion	1	1	1	3	Low
3-7	020098ETC000	Commercial	Bare soil/fields, Unstable culvert	3	1	2	6	High
3-8	020098ETC000	Parking Lot	Bare soil/fields, Parking lot drainage	2	1	2	5	Medium
4-1	8001000000	Residential	Bare soil/fields, Road Shoulder/ditch	1	1	1	3	Low
4-2	7004000000	Parking Lot	Toxics: Seal coating over catch basin	3	1	1	5	Medium
4-3	22029000000	Gas Station	Toxics: Pesticides	1	1	1	3	Low
4-4	22029000000	Gas Station	Bare soil/fields	1	1	1	3	Low
4-5	022029B000	Parking Lot	Bare soil/fields	1	1	1	3	Low

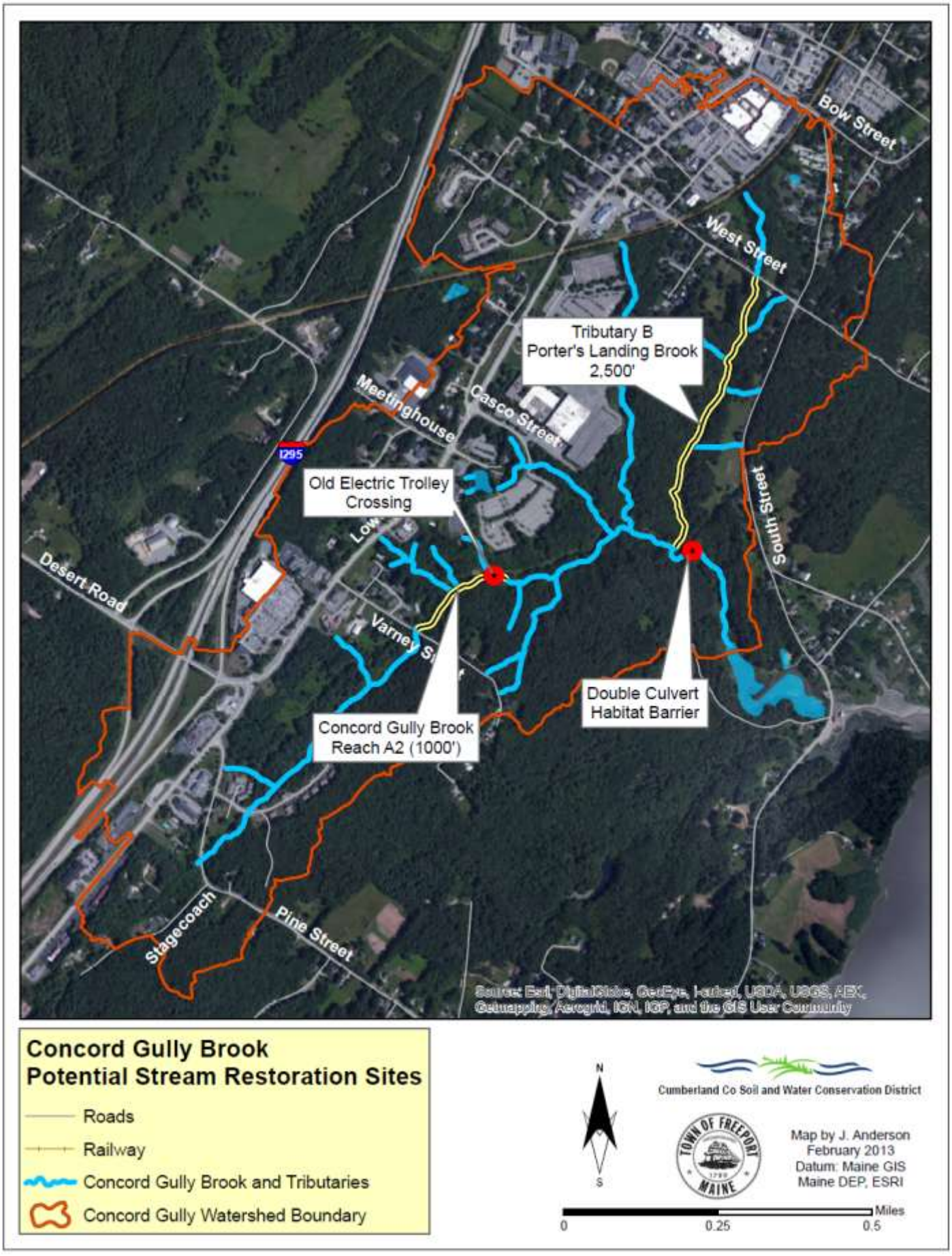
Appendix C

Potential Structural Retrofit Sites


Bow Street
West Street
3-1
I295
Meetinghouse
Casco Street
3-7
South Road
5-13
Lower Main
5-16
Desert Road
5-6
5-10
5-7
Varney Street
Allen's Pond
5-5
5-2
5-1
Pine Street
Stagecoach
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community
Concord Gully Brook Potential Retrofit Sites
Low Impact
Medium Impact
High Impact
Concord Gully Brook and Tributaries
Concord Gully Watershed Boundary
N
S
Cumberland Co Soil and Water Conservation District
TOWN OF FREEPORT MAINE
Map by J. Anderson
February 2013
Datum: Maine GIS
Maine DEP, ESRI
0
0.25
0.5
Miles

Appendix D

Potential Stream Restoration Sites


Bow Street
West Street
Tributary B
Porter's Landing Brook
2,500'
Meetinghouse
Casco Street
I295
Old Electric Trolley
Crossing
South Street
Desert Road
Varney
Double Culvert
Habitat Barrier
Concord Gully Brook
Reach A2 (1000')
Stagecoach
Pine Street
Concord Gully Brook
Potential Stream Restoration Sites
Roads
Railway
Concord Gully Brook and Tributaries
Concord Gully Watershed Boundary
N
S
Cumberland Co Soil and Water Conservation District
TOWN OF FREEPORT MAINE
Map by J. Anderson
February 2013
Datum: Maine GIS
Maine DEP, ESRI
Miles
0
0.25
0.5

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