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Meetinghouse Creek Watershed Management Plan

July, 2006

Prepared for:

The Peconic Estuary Program

MEETINGHOUSE CREEK
WATERSHED MANAGEMENT PLAN

July 2006

Prepared by:
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Prepared for:
Peconic Estuary Program
Suffolk County Department of Public Health Services
Office of Ecology
Riverhead, New York

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TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

FIGURES

TABLE OF CONTENTS (Cont.)

TABLES

APPENDICES

i EXECUTIVE SUMMARY

In 2001, the Peconic Estuary Program (PEP) adopted a final Comprehensive Conservation and Management Plan (CCMP) for the Peconic Estuary and its watersheds. The plan identifies four priority management areas: control of pathogens, nitrogen, toxins, and enhancement of habitat and living resources. In 2003, Horsley Witten Group (HW) completed a regional stormwater assessment and management project for the Peconic Estuary Program that focused on developing a regional, storm-event-based, pollutant loading model to help prioritize management efforts for four pilot watersheds within the greater Peconic Estuary system based on the contributions of pathogens and nitrogen from each watershed. The Meetinghouse Creek watershed in the Town of Riverhead was one of the watersheds studied, and general recommendations were made to establish remediation and preventive measures for managing stormwater.

The development of this Watershed Management Plan for the Meetinghouse Creek watershed is the next phase of that initial project. This plan focuses on improved management of stormwater pollutants, including the primary stressors (nitrogen, phosphorous, suspended solids, and bacteria) and secondary stressors (metals and hydrocarbons) that are negatively impacting Meetinghouse Creek. In addition, this plan identifies important remaining wildlife habitat areas within the Meetinghouse Creek watershed and provides guidance on which parcels are most valuable for protection of critical habitats. The planning process included a rapid field assessment for stormwater management and habitat value throughout the watershed. The stormwater assessment was used to identify likely stormwater pollutant sources as well as areas where best management practices (BMPs) could be installed to improve the management and treatment of stormwater in the watershed. Successful implementation of this plan is expected to help reduce stormwater runoff pollution; maintain or improve overall water quality conditions, shellfish harvesting capacity, eelgrass habitat, and degraded marsh areas; and protect critical open space habitat areas.

This Watershed Management Plan was developed as a pilot plan, along with three other pilot plans (Hashamomuck Pond in the Town of Southold, Reeves Bay in the Town of Southampton, and West Neck Bay in the Town of Shelter Island) to serve as a model for other areas of the Peconic Estuary system. The goal is to eventually develop targeted management plans by towns and interested groups for small embayments and watersheds throughout the larger Peconic Estuary system.

The Plan is broken down into five sections and a set of appendices covering the following major topics: an introduction and review of management objectives; a characterization of the watershed; a pollutant loading estimate under build-out conditions in the watershed; recommendations for improved programmatic stormwater management throughout the watershed; a detailed stormwater management assessment in which potential sites and BMPs are identified and conceptual designs are presented for each recommended site; and a habitat protection assessment.

Stormwater Programmatic Assessment and Recommendations

An assessment of various stormwater management programmatic opportunities in the Meetinghouse Creek watershed was performed. Regular inspections and maintenance are a top priority to ensure long-term function of the stormwater infrastructure. The review process for new and redevelopment projects could be improved by adopting a pre-approved list of effective BMPs and requiring certain site design techniques to reduce pollutant loading. In addition, several public education focus areas and programs can help improve the health of the watershed - outreach campaigns should be tailored to target the specific issues in various neighborhoods throughout the watershed including pet and waterfowl waste, as well as lawn management. Inter-municipal and agency coordination on these program recommendations can reduce costs and improve effectiveness. These programs and recommendations are discussed in more detail in Section 3.

Stormwater Assessment and Recommendations

An assessment of stormwater management and treatment in the Meetinghouse Creek watershed was performed in order to identify problem areas and potential sites for the installation of stormwater BMPs. The goal of these BMPs is to improve the removal of pollutants before the stormwater runoff reaches Meetinghouse Creek. Based on a prioritization process, six locations were selected for BMP implementation. Stormwater BMPs proposed for these sites include grass channels, bioretention systems, filter strips, sediment forebays, and infiltration basins. The goal of these BMPs at these locations is to improve the removal of nutrients, total suspended solids, and bacteria; as well as metals and hydrocarbons before the stormwater eventually reaches Meetinghouse Creek. Estimated costs for these BMPs range from $32,000 to $302,000 for design, permitting, and construction. If all six proposed BMP retrofits were implemented, the total cost is estimated at $842,000. The proposed BMPs and the methodology used to select locations and practices are described in detail in Section 4. In addition, assessments are provided that investigate nonpoint pollution sources in the upland area and recommended actions to improve watershed conditions. These are known as “Neighborhood Source Assessments,” “Hotspot Site Investigations,” “Pervious Area Assessments,” and “Streets and Storm Drains Assessments” and are also discussed in Section 4.

Habitat Assessment and Recommendations

The goal of the habitat assessments was to identify parcels of land, or portions of those parcels, that exhibited a higher relative ecological value than others. This value is based upon readily observable site attributes pertaining to wildlife habitat that could be observed during a single site visit. Parcels with high ecological value are recommended for long-term protection through conservation measures or acquisition by the town, a land trust, or another similar conservation organization.

Field assessment locations were identified based on data from aerial photographs of the watershed and geographic information system (GIS) data layers (e.g. GIS-identified wetland parcels and undeveloped parcels). Sites were selected for on-site review if they were undeveloped, primarily forested, contained upland areas with residential development potential, and were not mapped as "Protected Land" according to information provided by The Nature Conservancy (TNC) and/or Suffolk County. Once the rapid field habitat assessment was performed, the areas were prioritized based on habitat complexity criteria, level of habitat disturbance, proximity to existing development and protected area, evidence of ongoing land management activities, and observable evidence of wildlife.

One parcel in the Meetinghouse Creek watershed was identified to be the subject of a field habitat assessment. This undeveloped parcel, located on the north side of Main Street between West Lane and Edgar Avenue, was identified to be the subject of a field habitat assessment. The parcel is discussed further in Section 5.

1.0 INTRODUCTION

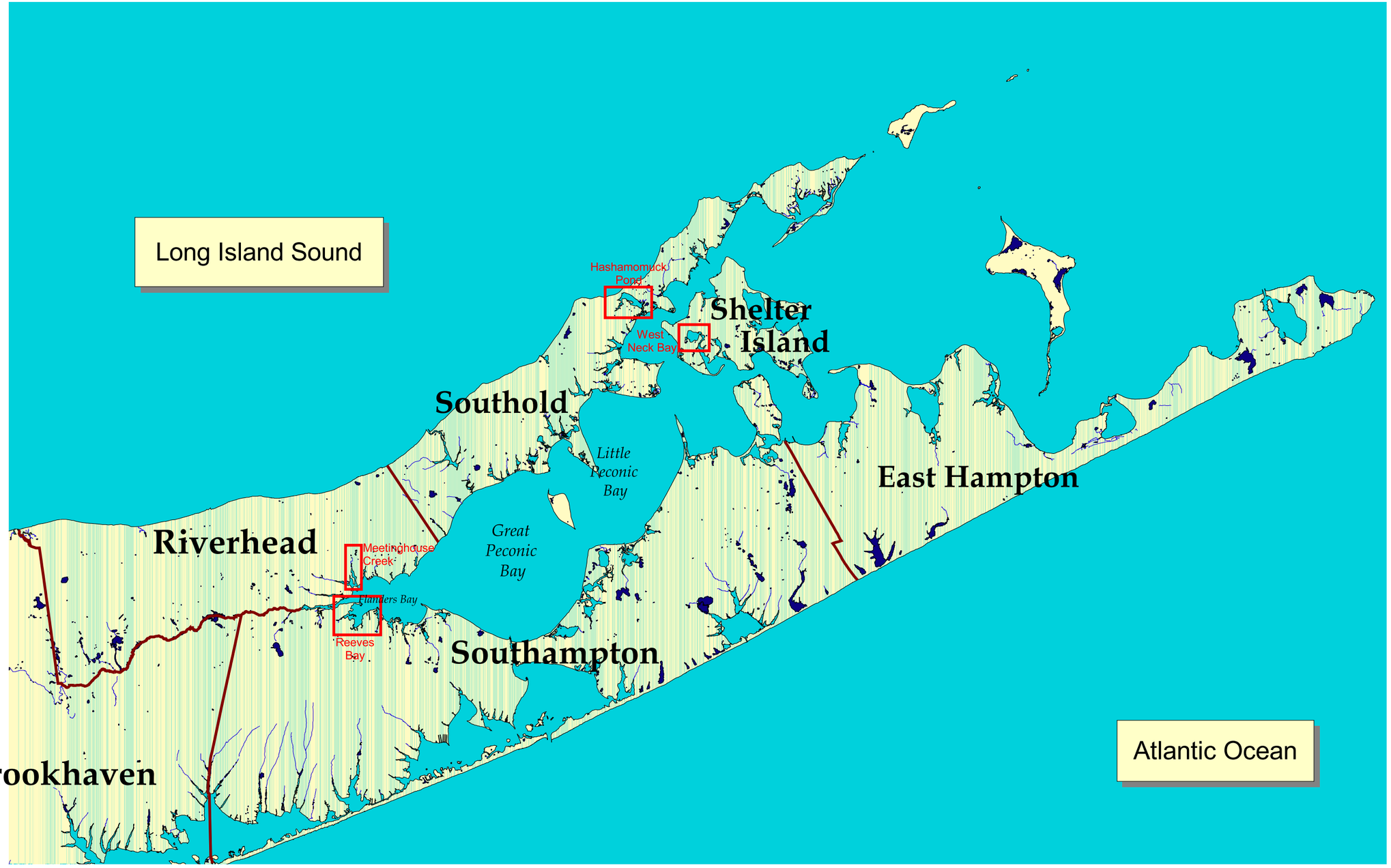
1.1 The Peconic Estuary

The Peconic Estuary is located on the eastern end of Long Island, New York between the North and South Forks. Its waters cover approximately 158,000 acres with 450 miles of shoreline and support a wide array of wildlife. There are several smaller bays recognized throughout the greater Peconic Estuary including Flanders Bay, Great Peconic Bay, Shelter Island Sound, Gardiners Bay, and Little Peconic Bay. Bordering this estuary are the towns of East Hampton, Southampton, Brookhaven, Riverhead, Southold, and Shelter Island (Figure 1-1). The region is popular for vacationing and supports a wide variety of both recreational and natural resources. Boating, swimming and sunbathing are a few of the many recreational activities that draw thousands of people to this region. Fishing and shellfishing are two of the predominant local industries that are directly dependent upon the water quality of the estuary. Economic studies of the overall Peconic Estuary region have estimated that those businesses and industries directly tied to the estuary produce upwards of $450 million of annual income within the region (PEP CCMP, 2001).

The shellfishing industry in the Peconic region has relied on abundant fisheries resources to continuously harvest several mollusk species including hard clams (littlenecks, cherrystones, and chowders), oysters and scallops. Although all of the 158,000 acres of bay floor are recognized by state agencies as shellfishing areas, the majority of yield comes from the shallower rivers and embayments that line the estuary. Estimates have varied as to how much of the bay is highly productive with figures ranging from 8,000 acres (Lewis et al., 1997) to 20,880 (PEP CCMP, 2001). The harvesting in these areas is highly concentrated due to the fact that these beds comprise only six to eighteen percent of the entire shellfishing area (Lewis et al., 1997). The clustering of these shellfish in the smaller embayments demonstrates that estuarine environments with secluded shallower areas are highly productive.

The shellfishing beds in the Peconic Estuary have been monitored for several decades by the New York State Department of Environmental Conservation (NYSDEC) in order to assess the safety of these shellfish for consumption. High levels of coliform bacteria have resulted in the closure, either periodic or year-round, of much of the more productive beds in the estuary. Coliform bacteria, specifically fecal coliform (FC), are produced in the intestinal tracts of warm-blooded animals and are present in high concentrations in their fecal matter. FC bacteria are used as an indicator for the presence of other, potentially harmful pathogens.

Efforts to lower bacterial loading to the Peconics have been ongoing for many years and have developed concurrently with federal legislation such as the Clean Water Act (CWA). In 1987, the CWA was amended to include the National Estuary Program. Under Section 320, the CWA allows individual States to nominate estuaries for funding



Legend

Watersheds Chosen for Assessment

N

0 4 Miles

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The Peconic Estuary Region Vicinity Map

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Figure 1-1

toward the development of a CCMP. Once an estuary receives funding from the National Estuary Program, the CCMP is developed to address the unique environmental needs of that specific region. Under the CCMP of the Peconic Estuary Program, activities related to shellfishing are a primary focus of ongoing research.

To date, those studies that have investigated the incidence of coliform bacteria in the Long Island region have concluded that the predominant source of this pollutant is stormwater runoff (NURP 1983). For this reason, the CCMP prepared by the Peconic Estuary Program focuses heavily upon assessing and ultimately eliminating pollutant loads that result from runoff. One section of the CCMP, the "Pathogens Management Plan," states that a primary objective is to "maintain the current status of certified (seasonally and year-round) shellfish beds and re-open uncertified beds as long as these do not conflict with the need to protect human health nor with the need to protect and enhance natural resources" (PEP 2001).

Within the CCMP, non-point source pollution, including stormwater runoff, is given the highest priority for remedial efforts. Stormwater runoff not only transports potentially high levels of bacteria to the bay, but also other pollutants that can be significant stressors, such as sediments, nutrients, hydrocarbons, and metals. Another specific priority within the CCMP is limiting nitrogen loading as excessive nitrogen loading can damage estuarine ecosystems and cause potentially harmful algal blooms. In areas where lawns and agricultural areas are regularly fertilized, stormwater runoff can deliver significant amounts of nitrogen to a receiving embayment. A well-designed stormwater management plan could therefore reduce several pollutants that potentially contribute to water quality problems simultaneously. Carefully planned and implemented strategies can successfully limit loadings of both FC bacteria and nitrogen. These strategies would therefore work to help accomplish several of the goals outlined within the Peconic CCMP including reopening shellfishing areas, reducing overall nitrogen loading, and decreasing the occurrence of brown tide.

1.2 Project Background

Horsley Witten Group (HW) completed a regional stormwater assessment and management project for the PEP in 2003 (Peconic Estuary Stormwater Assessment and Planning Tool; hereon referenced as HW, 2003). The goal of the assessment was to prioritize management efforts for four pilot watersheds within the greater Peconic Estuary system based on the contributions of pathogens and nitrogen from each subwatershed within each pilot watershed, using results from a regional, storm-event-based, pollutant loading model. The body of information previously compiled for these four watersheds was used as the starting point and baseline of information for the four pilot management plans completed as part of this project. The four pilot watersheds for which a management plan has been developed are the following:

- Hashamomuck Pond (Southold),
- West Neck Bay (Shelter Island),
- Reeves Bay (Southampton), and
- Meetinghouse Creek (Riverhead).

This Meetinghouse Creek Watershed Management Plan was developed using a rapid watershed planning approach, consisting of following three major phases:

1) A watershed assessment stage;
2) An evaluation of management strategies, including a planning level analysis of their costs and benefits; and
3) Recommendations for implementation of management actions.

This plan was developed using previous studies together with aerial photography and a geographic information system (GIS), as well as significant field reconnaissance to ground truth land use and drainage information, evaluate habitat, identify potential stormwater pollutant sources, and provide specific management recommendations. A significant effort was focused on evaluating management alternatives including structural best management practices, regulatory and land use changes, and public education. Two meetings with local watershed stakeholders and information provided by local municipalities were integral to the execution of this project.

The main focus of this plan is to improve management of stormwater-derived pollutants that are negatively impacting Meetinghouse Creek by both effectively addressing pollution prevention and implementing a variety of appropriate stormwater best management practices (BMPs) in key areas. In addition, this plan identifies important remaining wildlife habitat areas within the Meetinghouse Creek watershed and provides guidance on which parcels are most valuable for protection of critical habitats. The planning process included a rapid field assessment for stormwater management and habitat value throughout the watershed. The following goals of the Peconic Estuary CCMP will be at least partially achieved through the successful implementation of this watershed management plan.

For Pathogens:

- Maintain current level of lands available to shellfish harvesting and re-open closed shellfish beds;
- Reduce overall stormwater runoff pollution; and
- Attain a zero discharge of untreated stormwater runoff from new development.

For Nitrogen:

- Decrease total nitrogen concentration in the western estuary to 0.45 mg/L;
- Ensure that total nitrogen levels in shallow waters remain at or below 0.4 mg/L in order to maintain and improve eelgrass habitat;
- Improve or maintain existing total nitrogen levels in Flanders Bay;
- Develop a nitrogen allocation strategy for the entire estuary, with an initial goal to reduce fertilizer nitrogen loading by 10-25%;
- Ensure that there is no substantial net increase in nitrogen loading to areas east of Flanders Bay; and
- Continue to acquire open space.

For Habitat and Living Resources:

- Protect the high quality habitats in Critical Natural Resource Areas;
- Maintain current eelgrass acreage and increase acreage by 10% over 10 years;
- Maintain and increase tidal and freshwater marsh acreage, restore degraded areas; and
- Enhance shellfish resources.

For Toxins:

- Improve the quality of the ambient environment where there is evidence that human inputs of toxins impair or threaten these resources;
- Comply with hazardous waste disposal and remediation regulations;
- Decrease overall emission of toxins;
- Eliminate holdings of banned pesticides and hazardous substances;
- Decrease overall pesticide applications in the five east end towns; and
- Eliminate, to the maximum extent possible, pesticide applications on turf grass on all publicly held land.

1.3 Organization of the Plan

This Watershed Management Plan is broken down into five sections and a set of appendices. Section 2 depicts a characterization of the watershed including a land use assessment, a pollutant loading assessment, a discussion of the existing local review process for land development in the watershed, a discussion of the existing stormwater infrastructure, and a pollutant loading estimate under build-out conditions in the watershed. Section 3 presents recommendations for improved programmatic stormwater management throughout the watershed. These recommendations cover suggested modifications to the existing land development review process, possible improvements for maintenance of stormwater infrastructure, and improved stormwater management public education. This is followed in Section 4 by a subwatershed-specific stormwater management assessment in which potential sites and best management practices are identified, and conceptual designs are presented for each recommended site. Section 4 also includes assessments provided to quantify impacts from land uses with high pollutant loading potential (known as "hotspots") and the drainage systems themselves. These are known as "Neighborhood Source Assessments," "Hotspot Site Investigations," "Pervious Area Assessments," and "Streets and Storm Drains Assessments." These assessments were all performed in the field to identify other opportunities to improve watershed conditions, target outreach efforts, and reduce pollutant loads. In addition, a stormwater management site ranking system is presented, and the field reconnaissance methods are described. Section 5 presents habitat protection sites and methods used to identify and rank them. The appendices include the methodologies, the stormwater retrofit conceptual plans, the stormwater field data sheets, and the habitat field data sheets.

2.0 WATERSHED CHARACTERISTICS

2.1 Land Use Watershed Characterization

Meetinghouse Creek is located on the northern coast of Flanders Bay, adjacent to the mouth of the Peconic River (Figure 2-1). This 30-acre body of water is approximately 5 feet deep on average. The embayment that forms the mouth of Meetinghouse Creek experiences frequent boat traffic during the warmer months and provides marina facilities. At least two stormwater outfalls and two directly discharging roadways contribute stormwater flow to the embayment. Land use surrounding this embayment is primarily a mixture of low- and medium-density residential use and agricultural development (Table 2-1 and Figure 2-2). Agricultural land use covers approximately 15% of the watershed and is predominantly row-crop production. The combined residential land use (low, medium and high density residential) covers 58% of the overall watershed. The original Suffolk County land use database contained several "Vacant" parcels within this study area. The vast majority of these parcels were field checked by an NRCS agent, and land use code changes were made for the purposes of the modeling exercise.

Table 2-1. Meetinghouse Creek Watershed Existing Land Use Summary

Land Use Category	Meetinghouse Creek Area (Ac)	Meetinghouse Creek Area % of Total
Low Density Residential	108.8	35%
Medium Density Residential	68.1	22%
High Density Residential	3.0	1%
Commercial	10.0	3%
Industrial	4.0	1%
Institutional	1.5	0%
Recreation/Open Space	34.0	11%
Agriculture	45.9	15%
Vacant	2.1	1%
Transportation	31.3	10%

The New York State Department of Environmental Conservation (NYSDEC) has designated this embayment as "growing area 29" for shellfish. Meetinghouse Creek is part of the larger portion of Flanders Bay that is currently uncertified for shellfishing. Also, as required by Section 305(b) of the Clean Water Act, the NYSDEC Division of Water updated its Priority Waterbodies List (PWL) in 2002, which catalogues surface waters with known or suspected water quality problems and identifies impacts and pollution sources. Meetinghouse Creek (PWL #1701-0256) has experienced low dissolved oxygen

Legend

Meetinghouse Creek Watershed

N

Feet

1,500

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Aerial Photograph of
Meetinghouse Creek

7/6/06 ec
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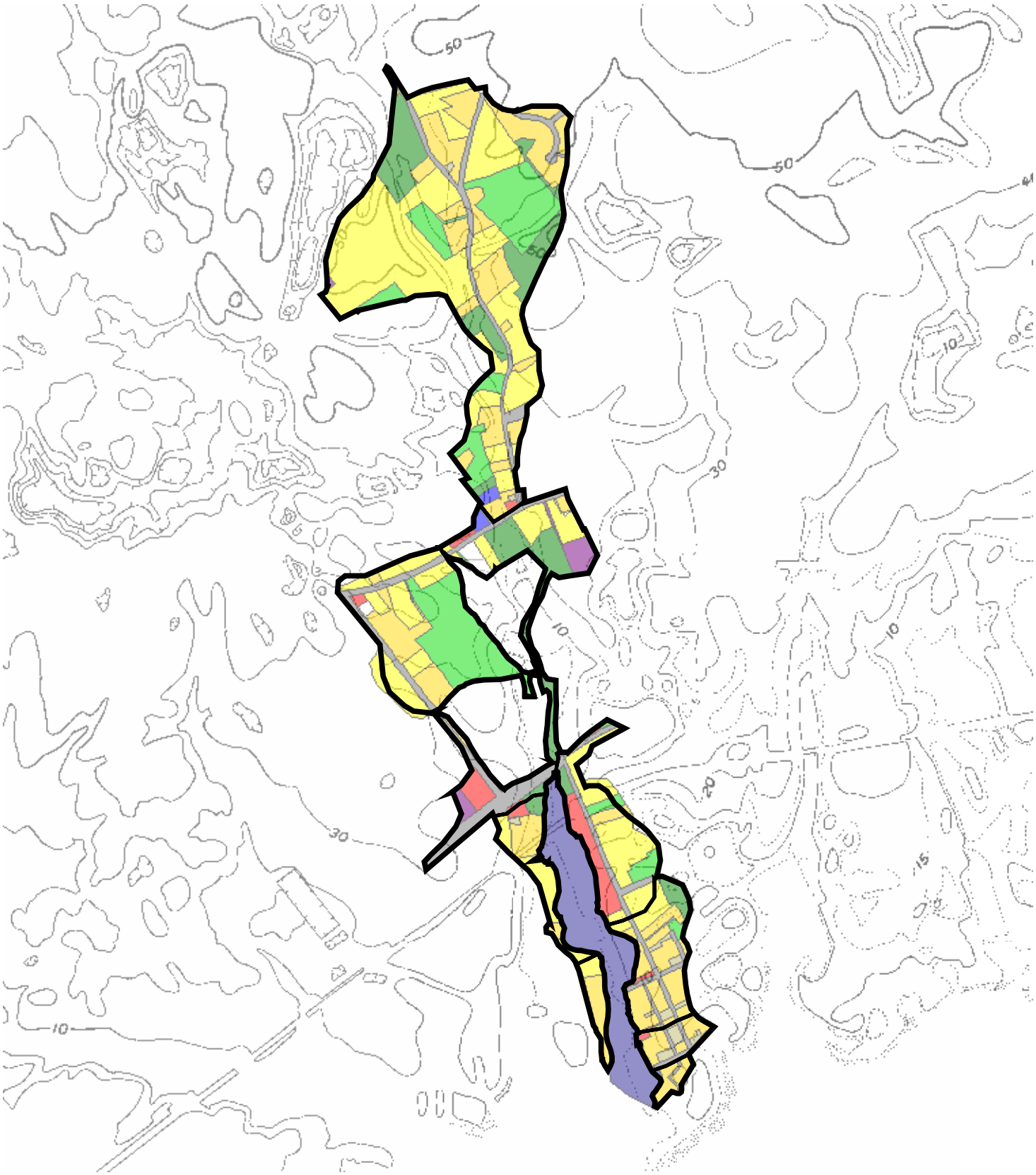
Figure 2-1



Legend

- Subwatershed Boundaries
- Low-Density Res
- Med-Density Res
- High-Density Res
- Commercial
- Institutional
- Open Space
- Agriculture
- Vacant
- Transportation
- Surface Water
- Industrial

N

1,500 Feet

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Land Use within Meetinghouse Creek

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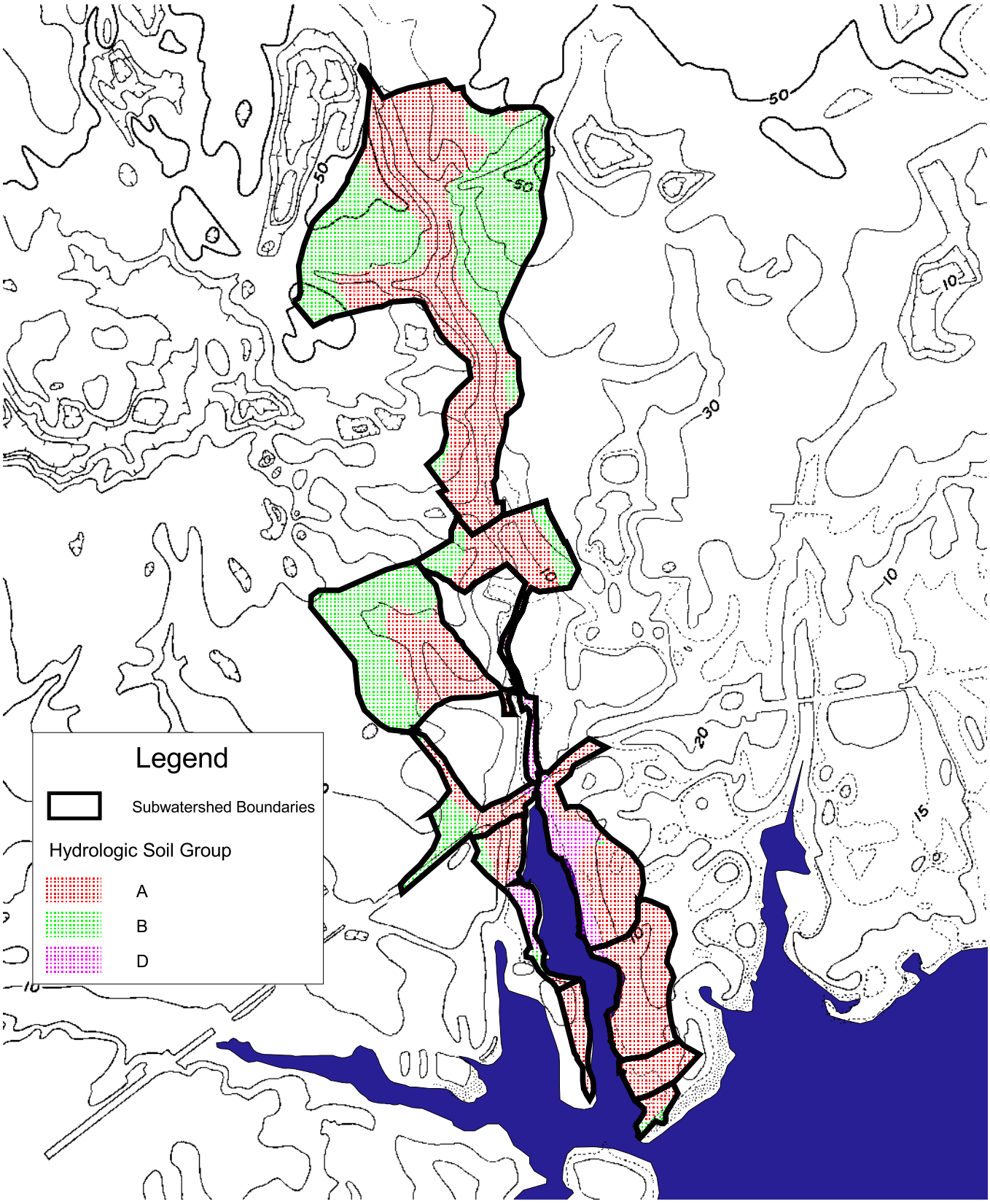
Figure 2-2



N

0 1500 Feet

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Hydrologic Soil Groups within
Meetinghouse Creek Watershed

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Figure 2-3

concentrations caused by excessive nutrient levels originating from agricultural runoff, stormwater/urban runoff, municipal discharges and boat pollution.

The hydrologic soil group distribution throughout the Meetinghouse Creek watershed is primarily type "A" and type "B" soils (Figure 2-3). Hydrologic soil groups are used to generally group different soil types based upon their relative ability to infiltrate versus runoff water. "A" soils are the most permeable and generate the least amount of stormwater runoff while "D" soils are the least permeable and generate the most runoff. Type "A" and "B" soil groups cover an almost equal area throughout the watershed (193 acres for group "A" and 218 acres for group "B") and, combined, cover approximately 85%. The tightly packed type "D" soils are generally concentrated around the shore of the embayment and cover approximately 17 acres. The overall soil profile suggests that the watershed as a whole has a significant capacity for recharge depending on the land use overlying these soils.

2.2 Pollutant Loading Assessment

In our initial study (HW, 2003), pollutant loading potential was evaluated under existing conditions in order to help prioritize areas generating higher pollutant loads and to target future management recommendations. That evaluation was conducted using an interactive model to perform two fundamental calculations: runoff volume and total pollutant load by watershed (HW, 2003). The overall Meetinghouse Creek watershed was divided into even smaller subwatershed areas for assessment based on a field survey performed by the Peconic Baykeeper. The volume of runoff is calculated in the model using the U.S. Department of Agriculture - Natural Resource Conservation Service (USDA-NRCS) TR-55 method. To determine the total pollutant load, this volume is then multiplied by a series of FC bacteria and nitrogen loading coefficients. Each coefficient is expressed as a concentration of the specified pollutant within a fixed amount of runoff that is specific to the land use categories listed in Table 2-1.

Currently, there are no available runoff sampling data for any of the subwatersheds contributing runoff to Meetinghouse Creek. As a result, HW designed the preliminary bacteria model to provide results for a range of loading values taken from scientific literature and sampling in other areas of Long Island. The values available to the user are a minimum, maximum and average value adapted from this research. Research in the area of nitrogen loading coefficients reveals a much more consistent set of values in the literature. As a result, it was not necessary to model a range of nitrogen loading coefficients.

Loading calculations were performed for the Meetinghouse Creek watershed using three target storm events: the 0.25-inch, 0.6-inch and 1.3-inch. The 0.25-inch storm was chosen to potentially isolate the first-flush effect where pollutants are preferentially concentrated in the initial flush of runoff; the 0.6-inch rain event was chosen as the mean of the precipitation data set recorded by NYSDEC in conjunction with their water quality sampling, and the 1.3-inch storm was chosen as the approximate 90^{th} percentile precipitation event, since approximately 90% of the precipitation events, according to

NYSDEC data, fall below 1.3 inches. The resulting average concentration in the embayment was calculated assuming a mean low tide depth of 5 feet, a tidal range of 3 feet, and a waterfowl population of 10. A summary of the results for the 0.6-inch precipitation event is provided below in Tables 2-2 and 2-3. A more detailed description of the loading model and associated assumptions can be found in HW's initial stormwater assessment for the Peconic Estuary (HW, 2003). Modeling results in the 2003 report are different than those presented here. Field reconnaissance revealed that a large portion of subwatershed 1 is actually disconnected from the remainder of the Meetinghouse Creek watershed, and surface water does not drain from this portion of subwatershed 1 to Meetinghouse Creek under normal conditions. Therefore, this portion of subwatershed 1 was eliminated from the model.

Table 2-2. Summary of GIS-Based Bacteria and Nitrogen Loading Model for Meetinghouse Creek Under Existing Conditions for the Mean, 0.6-Inch Precipitation Event

Subwatershed	Modified Curve Number*	Runoff Volume (liters)	Bacteria Load (millions of orgs)	Nitrogen Load (pounds)
1	86	537,900	112,780	2.89
2	80	10,480	2,110	0.05
3	92	671,774	111,480	4.58
4	94	277,341	98,820	2.04
5	85	31,440	6,930	0.14
6	84	10,811	2,630	0.05
7	90	255,632	53,760	1.47
8	84	54,416	15,390	0.28
9	87	33,428	10,990	0.18
10	87	12,991	3,740	0.07

*Modified for small storm hydrology based on research and methodology by Pitt (1987) as described in the Peconic Estuary Stormwater Assessment and Planning Tool (HW, 2003).

Table 2-3. Comparison of Average Embayment Concentrations Predicted by the Model Under Existing Conditions with Measured Concentrations in Meetinghouse Creek

Range of Wet Weather Measurements (orgs/100 mL)	Geometric Mean of Wet Weather Measurements (orgs/100 mL)	Modeled Concentration from Minimum Coefficients* (orgs/100 mL)	Modeled Concentration from Average Coefficients* (orgs/100 mL)	Modeled Concentration from Maximum Coefficients* (orgs/100 mL)
2.9 – 93	12.5	13.2	163.5	313.8

orgs = Number of Organisms
mL = Milliliters (1x10.^{3} Liters)
*Coefficients based on the minimum, average and maximum values found in literature review.

2.3 Existing Land Development Review Process

Proposed development of land in the Town of Riverhead is governed by the Code of the Town of Riverhead, New York (the Code), which includes provisions regulating the subdivision of land, development within flood hazard areas, and development within wetlands or within 150 feet a wetland. In addition, specific types of development projects that are designated Type I projects under the NY State Environmental Quality Review Act (SEQRA) and the Code are required to go through an environmental quality review process. These land development requirements of the Town of Riverhead are described in more detail below.

Projects involving the subdivision of land are required to go through a permit approval process with the Town Planning Board. Minor subdivisions are those that create two to four lots, and major subdivisions involve creation of five or more lots, or any creation of a new road or extension of municipal facilities. Wetlands and waterways within the subdivision plan must be shown on the preliminary and final permit submittals. Drainage plans or calculations are not required for minor subdivision submittals. For major subdivisions, the preliminary plat must show only the location of existing drains and culverts, and provide street profiles, drainage facilities, and storm sewers and any other necessary information so that the Highway Superintendent can determine if the rules and regulations for a public highway have been met, if applicable.

For Industrial Subdivisions, the code states that improvements must conform to the Road and Drainage Standards for the Town of Riverhead and drainage design shall be developed to contain stormwater runoff from the entire site, so as to minimize drainage facilities on individual lots. This last requirement appears to be in direct opposition to the principles of Low Impact Development, which include breaking up large drainage areas into smaller sections, and providing stormwater practices throughout the development to promote on-site infiltration close to the source of the runoff.

The Riverhead Grading Code requires that grading on a site shall not be diverted so as to overload existing drainage systems, create flooding, cause erosion, or the need for additional drainage facilities on other property, and that adequate drainage facilities for stormwater runoff shall be provided. It also requires that roof runoff shall be infiltrated using a dry well where roof runoff would otherwise cause erosion or drainage problems for adjoining properties. These codes are very general, with no specific design standards, which allows for individual interpretation.

In accordance with the Zoning Code, off-street parking areas, excluding those for single-family and two-family residences or businesses with a building area less than 600 square feet, must have “leaching pools” of a specified size to ensure onsite recharge of all rainwater. For areas larger than five acres, a recharge basin is required, and a basic sizing calculation is provided in the code.

Projects requiring construction in the flood hazard areas, as mapped by FEMA on the Flood Insurance Rate Maps for Riverhead, require a floodplain development permit, the purpose of which is to protect human health and welfare, and property. Applications are reviewed and projects are monitored by the building inspector.

In accordance with the Code and SEQRA, certain projects must complete an Environmental Quality Review process. Projects that fall into the category of Type I actions are generally required to file an environmental impact statement (EIS). Smaller projects, which fall into the Type II category, are essentially exempted from filing an EIS.

The Cluster Development code require the Planning Board to "consider" the stormwater tributary area and extent and direction of overland drainage, but gives no standards or guidelines, and the Site Plan Review requires the applicant to provide locations, specifications, and supporting calculations for stormwater structures on the Site Plan submittal. The Subdivision Regulations require the applicant to show existing drainage and wetlands on the subdivision plan, for both major and minor subdivisions. The Engineering Department provides technical review for all proposed subdivisions, and other proposed projects as requested by the permitting authority (Planning Board or Town Board). The Tidal and Freshwater Wetlands Code of the Riverhead generally requires the maintenance of a 150-foot buffer between land alteration and any tidal or freshwater wetland or drainage course, and a 75-foot buffer between those resources and any plantings or cultivation maintained using fertilizer or pesticides. It also prohibits installation of on-site wastewater systems within 150 feet of any wetland.

There is currently no specific land development control mechanism that would require a project proponent to assess or mitigate for potential nitrogen loading from stormwater runoff from a proposed project. However, revegetation of a buffer area to a wetland must be with native vegetation and without the use of fertilizers and pesticides. It is widely accepted that sources of nitrogen on a site may include septic systems, fertilizers on lawns, stormwater runoff, domesticated animals, or wildlife. Traditional on-site septic systems, even those sited properly according to code, still contribute nitrogen to the groundwater and, ultimately, to the creek.

2.4 Existing Stormwater Infrastructure and Maintenance

The existing stormwater infrastructure found in the Meetinghouse Creek watershed includes catch basins, gutters, swales, and conveyance pipes along roadways and detention basins to address stormwater in residential areas and commercial sites. According to a representative from the Highway Department, the town has no designated schedule for the maintenance of the public stormwater infrastructure. In fact, the Highway Department does not list stormwater maintenance as a service provided to the community on its website, denoting the fact that this service is not a major focus of the department. If a drainage problem is identified due to heavy rain, clogging, or other malfunction of the system, the Highway Department will tend to the problem. The

Highway Department is currently considering developing a stormwater management plan, which may include placing filters into catch basins to help filter out hydrocarbons and oil.

The Highway Department also runs a Loose Leaf Pickup service in late November and December, which allows residents to pile loose leaves along the edge of the road for public pickup. Bagged yard refuse is accepted weekly year-round through the trash collection service.

2.5 Pollutant Loading Assessment – Future, Buildout Conditions

The model developed for HW's initial stormwater assessment for the Peconic Estuary Program (HW, 2003) used the most current available GIS-based land use data. These model results therefore provide an estimate of pollutant loading to the embayment under existing conditions. As part of continued assessment of Meetinghouse Creek, HW developed an approach to examine potential changes in land use patterns based on applicable local regulations. The original nitrogen and fecal coliform bacteria loading model runs were updated to include estimates for future land development. Using the 2001 Suffolk County Land Use database as the foundation for this exercise, HW used two essential pieces of information to update the model. First, local Zoning Codes were consulted to determine the allowable uses throughout each watershed and the minimum lot sizes associated with these uses. Second, HW used wetland coverages from 1994 in conjunction with aerial imagery to determine the extent of wetlands on buildable area. The following assumptions were employed to determine buildout conditions.

1. Wetland coverages were used to eliminate portions of existing parcels that are undevelopable.
2. Minimum lot sizes from existing Zoning Codes were used to eliminate non-conforming undeveloped parcels from the future use analysis.
3. Areas identified as "open space" by the Suffolk county land use database are protected as open space and therefore not developable in the future.
4. Remaining areas of existing "Agriculture" were identified that show potential for development. These areas were cross-referenced with the Suffolk County Planning Department's *2001 Land Available for Development, Long Island Sound Study, Suffolk County North Shore Watershed Management Program.*
5. Existing aerial photography was reviewed to identify any existing features or structures that show the land as already developed. This portion of the analysis also included a qualitative assessment of whether a parcel is reasonably accessible.

After this five-step process, the remaining Agriculture use in each watershed was assumed to be developable. According to the existing Zoning Codes, the land use codes of these developable tracts were changed to their most likely future use, and the model was run again. Where significant tracts of wetland covered a portion of a developable lot, these areas were omitted from the future development profile.

Low density and medium density residential land uses are expected to increase by 18% and 33% respectively, with the majority of agricultural lands being converted to residential uses (Table 2-4).

Table 2-4. Future Change in Land Use - Meetinghouse Creek Watershed

Land Use Category	Existing Area (Ac)	Future Area (Ac)	Percent Change
Low Density Residential	108.8	128.1	18%
Medium Density Residential	68.1	90.3	33%
High Density Residential	3.0	3.0	0%
Commercial	10.0	10.2	2%
Industrial	4.0	4.0	0%
Institutional	1.5	1.4	-7%
Open Space	34.0	34.0	0%
Agriculture	45.9	4.4	-90%
Vacant	2.1	1.9	-10%
Transportation	31.3	31.3	0%

Future loading calculations were performed for the Meetinghouse Creek watershed also using the three target storm events. Similar to the original parameters, the resulting average concentration in the embayment was calculated assuming a mean low tide depth of 5 feet, a tidal range of three feet, and a waterfowl population of 10. A summary of the results for the 0.6-inch rain event is provided below in Table 2-5. Several of the subwatersheds demonstrated a decrease in both bacteria loading and nitrogen loading. Many of the agricultural lands within these subwatersheds were converted to low and medium residential uses in the buildout analysis. Since agricultural lands have a higher runoff coefficient than residential land uses, this resulted in a net decrease in runoff volume, bacteria loading and nitrogen loading to the embayment.

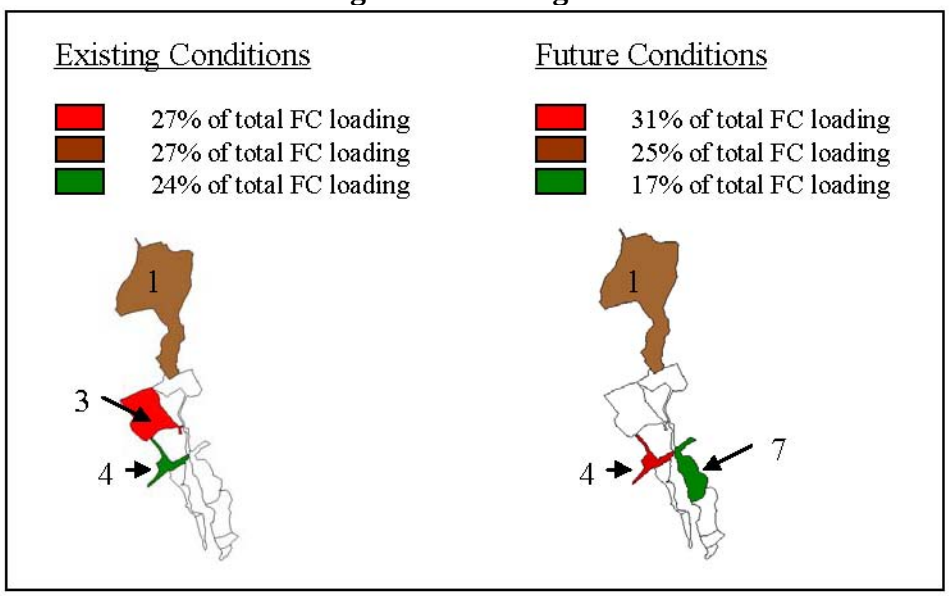
Table 2-5. Summary of GIS-Based Future Bacteria and Nitrogen Loading Model for Meetinghouse Creek for the Mean, 0.6-Inch Precipitation Event

Subwatershed	Modified Curve Number	Runoff Volume (liters)	Bacteria Load (millions of orgs)	Change in Bacteria Load from Existing (millions of orgs)	Nitrogen Load (pounds)	Change in Nitrogen Load from Existing (pounds)
1	84	328,536	79,940	-32,850	1.52	-1.37
2	80	10,716	2,180	70	0.05	0
3	86	189,466	45,900	-65,570	0.91	-3.67
4	94	275,668	98,370	-450	2.02	-0.02
5	85	31,440	6,930	0	0.14	0
6	84	10,811	2,630	0	0.05	0
7	90	254,534	53,610	-150	1.45	-0.02
8	84	54,416	15,390	0	0.28	0
9	87	33,428	10,990	0	0.18	0
10	87	12,991	3,740	0	0.07	-0.01

As part of the modeling of both existing and future conditions, HW identified the three subwatersheds that contributed the highest levels of pollution. Figure 2-4 illustrates the highest contributors of fecal coliform bacteria for both existing and future conditions. Under existing conditions the three highest contributors of bacterial loading are subwatersheds 1, 3 and 4, with subwatersheds 1 and 3 contributing relatively the same amount. Under estimated buildout conditions, subwatershed 4 is proposed to provide the highest fecal coliform loading. Subwatersheds 1 and 7 are also predicted to be significant contributers of fecal coliform.

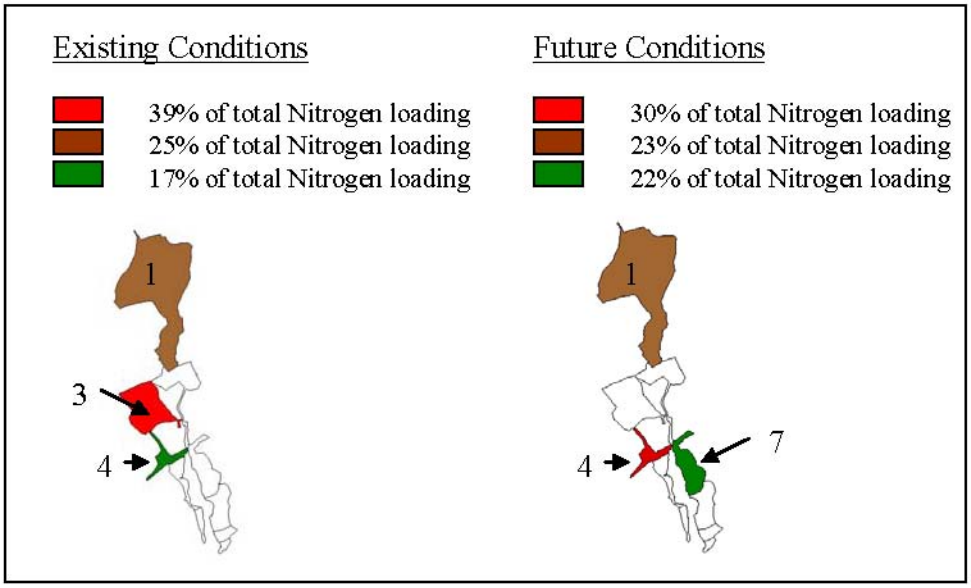
The results from the modeling of nitrogen inputs from stormwater under existing and future conditions are similar to the results for fecal coliform bacteria. As shown on Figure 2-5, under existing conditions, subwatersheds 3, 1 and 4 are the highest contributors of nitrogen, in that order. Under buildout conditions, subwatershed 3 is estimated to become less of a contributor, with subwatersheds 4, 1, and 7 providing the most nitrogen to the embayment.

Figure 2-4. Meetinghouse Creek watershed – highest priority subwatersheds for fecal coliform loading under existing and future conditions.



*The subwatershed numbers for those subwatersheds contributing the highest estimated pollutant loading are labeled in the diagram above.

Figure 2-5. Meetinghouse Creek watershed – highest priority subwatersheds for nitrogen loading under existing and future conditions.



*The subwatershed numbers for those subwatersheds contributing the highest estimated pollutant loading are labeled in the diagram above.

In order to control potential future loading from Subwatersheds 1, 3, 4, and 7 it is recommended that stormwater management controls be employed that allow for enhanced nitrogen and bacterial removals. Infiltration of stormwater runoff (with pre-treatment) from all impervious and pervious surfaces, buffers between lawns and water resources, and other best management practices (BMPs) described further in sections 3 and 4 that remove 50% of the total nitrogen and 90% of the fecal coliform can reduce future loads accordingly.

3.0 STORMWATER MANAGEMENT PROGRAMMATIC OPPORTUNITIES

3.1 Recommendations for Modifications to Land Development Review Process

The land development review process can be improved to reduce potential impacts to the water quality in the Creek by implementing the use of comprehensive and uniform stormwater standards for new development and redevelopment. These standards can be revised to include explicit stormwater treatment requirements to reduce nutrient loading as well as suspended solids, bacteria and other toxics to the groundwater and the Creek, as well as to improve erosion control. The Planning Board could use this set of standards as a uniform reference to improve consistency in stormwater design and management throughout the Peconic region. These standards could be incorporated directly into the language of the subdivision regulations or as a separate policy document that can be referenced by the subdivision regulations. This second option allows more flexibility to update the policy as technologies advance and conditions change, without having to formally update the subdivision regulations.

The standards could include a pre-approved list of appropriate stormwater best management practices, along with design guidelines for proper siting, sizing, installation and maintenance of the practices. As a starting point, specific sections of The New York State Stormwater Management Design Manual (NYS DEC, August 2003) should be referenced as the general reference for stormwater design. This manual provides a set of stormwater practices, sizing criteria and performance criteria, and describes in detail the proper design, limitations, and effectiveness of a host of practices. Those practices that are more effective than others for nitrogen and bacteria removal (e.g., bioretention and constructed wetlands are better than swales) should be promoted or required by the town versus the use of other practices. For example, some research studies have shown that catch basin inserts (proprietary BMPs gaining popularity in some areas due to easy and low-cost installation) have low removal rates for nitrogen, high maintenance burdens for communities, and should be implemented sparingly. Catch basin inserts also have not been sufficiently studied to estimate bacteria removal, but their operation characteristics are such that it is highly unlikely that bacteria will be reduced at significant levels. See Appendix A for more details and some references for these findings. BMPs with high nitrogen and bacteria removal capabilities that should be promoted include constructed wetlands, bioretention facilities, organic/sand filters, and infiltration practices.

The New York manual also provides useful landscaping and site layout techniques to reduce pollutant loading to receiving waters, which may be useful to include in the town's list of practices and standards. These site layout techniques include buffer standards for separating development from surface waters. Buffers are effective for controlling nitrogen-containing runoff from turf areas as well as discouraging nuisance geese populations.

Recommendations:

- Adopt a short, pre-approved list of BMPs effective at nitrogen and bacteria removal.
- Require appropriate landscaping and site layout techniques.

3.2 Recommendations for Maintenance of Stormwater Infrastructure

In the Town of Riverhead, ownership of stormwater infrastructure is shared by the Town and individual landowners. When a new subdivision road is constructed and accepted by the Town, the responsibility for the drainage infrastructure also passes to the Town. The drainage infrastructure that collects and treats stormwater on each individual lot is the responsibility of the landowner to inspect and maintain.

In order to function as designed over the long term, stormwater infrastructure must be maintained regularly. This is particularly important with structures designed for infiltration, such as leaching catch basins, which may receive stormwater that has not been pre-treated and therefore contains oils, greases, organic matter, and suspended sediment that can clog the system. Depending on the land use, inadequate pretreatment may allow for dissolved pollutants to enter groundwater and lead to both health and environmental threats. On individual properties, runoff from rooftops and driveways that is not properly infiltrated into dry wells or other onsite structures could back up into basements, cause nuisance puddling, and in some cases, lead to surface discharges and erosion rather than infiltration.

The following is a set of recommendations to improve the system by which maintenance is performed, and ensured, on stormwater practices and infrastructure in the Meetinghouse Creek watershed and the Town of Riverhead.

Recommendations:

- Adopt a regular municipal stormwater inspection and maintenance schedule for municipally-owned stormwater infrastructure. Regular inspections should be performed twice per year, once in the early spring, prior to the spring rains but after the winter snow melt, which transport winter sands and salts form the roads, and once in the fall after the large release of organic matter such as leaves and debris. Cleanouts of leaching catch basins and other sedimentation practices are recommended to be performed every year, but at a minimum of every 2-3 years, and on an additional as-needed basis. This will help reduce clogging of infiltration devices and sediment transport through scouring and resuspension during larger spring rains.

- Maintain a ‘working’ map of all municipally-owned stormwater practices. If maintained in a GIS or other database, the database can also be used to track when

maintenance was performed, and to document when certain structures experienced problems.

- Implement a formal highway and engineering department review and approval processes of all stormwater management designs for subdivisions and site plan review projects against a set of clearly defined design standards. This will provide consistency and among designs, bring designs up to a minimum state-of-the-art standard, and provide applicants with a design guidance. The highway and engineering departments also should formally review and approve all operations and maintenance plans for subdivisions that are planned for acceptance by the Town, and then adopt those plans into their regular inspection and maintenance schedule.

- Develop a brief Landowner's Guide for Maintenance of Stormwater Structures. This guide could focus on inspection and maintenance of on-lot stormwater practices for both residential and commercial/industrial sites. It can also describe things that local landowners can do to assist the Town in maintaining public infrastructure, such as cleaning off debris from around nearby catch basins and reporting stormwater infrastructure malfunctions and flooding problems. The Town of Riverhead already has a great Homeowner's Guide to the Environment, which includes a brief section about stormwater and drainage.
- Terminate the Loose Leaf Pickup program and require all residents to back leaves for pickup instead. Loose leaf pickup encourages residents to pile leaves along the street edge, which can cause significant clogging of the catch basins and other drainage structures. This organic debris can also contribute concentrated nutrients to the stormwater runoff, which can harm receiving waters and groundwater.

3.3 Public Education and Outreach – Recommended Focus Areas

An education and outreach campaign can be used to target specific audiences to try to positively influence human behaviors in the watershed with potential ecologic impact. At the same time, the program can reach out to a broad audience to raise awareness that land use and human activity within the watershed has a direct effect on the health and quality of the coastal resources. The theory is that if people understand the connection between their individual activities and the coastal resource, they will be more apt to alter their behavior. Many of the behaviors assessed during the field inventories discussed in Section 4 (Neighborhood Source Assessment, Streets and Storm Drain Assessment, and Hot Spot Inventory) can be positively influenced by public education. The key public education issues in the Peconic watersheds that will help address the key goals of the CCMP (see Chapter 1) are:

- waterfowl management;
- lawn management;
- pet waste management;
- stormwater management; and

- septic system maintenance.

These focus areas are described below, followed by a description of recommended education and outreach programming techniques. These techniques are intended to be a menu of possible strategies that can be employed in various combinations depending on time, budget and target watershed audience.

3.3.1 Waterfowl Management

There are a handful of methods that are used in various situations to reduce the populations of waterfowl in and around a waterbody, thereby reducing nutrient and bacteria loads to that area. These include habitat modification, frightening, exclusion, discontinuation of feeding, live capture, hunting, and egg addling. Some of these methods require changes in practices by the landowners in the area, and some require professional or third-party assistance. For example, habitat modification refers to the modification of large expanses of open grassed areas that are often mowed directly to the water's edge. These areas are attractive to waterfowl such as geese, swans and ducks that like to have a clear sight line and open access to the water. Modifying these open spaces to allow for a vegetated buffer along the water edge makes the area much less attractive to these waterfowl. A 50-foot vegetated buffer, with vegetation growth up to 3-4 feet high, makes a large impact in deterring geese and swans by breaking up the open lawn space from the open water. Creation of this buffer, however, often depends on the will of the land owner to convert mowed area to vegetated area. This is where public education comes into play.

Public education implementation tools include: mailers, television and radio advertisements, newspaper articles and signage. One common public education method is the implementation of a demonstration project. If there are publicly owned properties along the waterfront, or areas owned by a willing owner, a buffer area of open mowed lawn could be allowed to revegetate, forming at least a 50-foot wide buffer along the water's edge. Photographs and information about the former presence of waterfowl and depicting the look of the former vegetation versus the revegetated area relays important information to a wider audience about both the goal of the program as well as something that they can visualize. Signage describing the area as a waterfowl management buffer could be placed in public view, and then an explanation of the site could be presented in mailers or brochures for others to see. Often it is easier for people to implement something once they know what it will look like, and they can have reasonable expectations about whether it will be effective.

An added bonus from allowing mowed and manicured lawn areas to revegetate is that maintenance is significantly lower and less fertilizer or other lawn chemicals would be used. This leads into the next area of focus for public education in the Peconic region, which is lawn management.

Other methods of waterfowl management include live capture of the birds, egg addling, and hunting. Egg addling is a method used to control the hatching of eggs. The eggs in a

nest are shaken, making them nonviable, and then replaced in the nest. These methods require permits from the US Fish and Wildlife Service and may require state or local permits as well. In some cases, these methods may face local opposition; but in severe situations of uncontrolled waterfowl populations, a local municipality may opt for these more direct methods.

3.3.2 Lawn Management

Many Peconic area lawns are maintained over the majority of the available lot area, irrigated with potable water, and treated with fertilizers and herbicides. Some lawns consist of non-native grasses. Public education can be used to help change these practices and teach homeowners about alternative lawn care practices. Smaller lawns are easier to maintain and allow room for larger more diverse and colorful vegetation. The use of native grasses and compost folded into the soil can reduce the need for additional pesticides and herbicides and will provide a more drought-resistant groundcover, which will in turn require less irrigation. In cases where irrigation is still required or preferred, the homeowner can use a variety of methods to reduce irrigation demand, including rain barrels or cisterns to catch rooftop runoff for irrigation, or programmed irrigation systems to water their lawns only during early morning or late evening hours.

Providing this guidance to homeowners and other landowners within the watersheds requires an effective public outreach plan. This can be done through a media campaign, which could be a combined effort with the other focus areas. It could also benefit from a demonstration project site that would show other homeowners what a smaller, more natural lawn and yard with more diverse landscaping can look like. A demonstration site could be a mechanism to provide information about cost savings and time savings due to lower maintenance requirements, and to collect information about any increase in song birds, decrease in nuisance species, etc.

There are several example programs in the northeast that promote healthy and sustainable lawn management. The Rhode Island Cooperative Extension GreenShare Program (http://www.uri.edu/ce/ceec/greenshare.html) and the URI Nonpoint Education for Municipal Officials (NEMO) Healthy Landscapes program (http://www.uri.edu/ce/healthylandscapes/index.html) provide guidance on sustainable gardening and lawn maintenance to promote the use of native vegetation that is suitable for the soil and site conditions.

A program such as the Bayscapes Program in the Chesapeake Bay Watershed is a good example. This program provides guidance to homeowners and landowners within the Chesapeake Bay Watershed about developing and installing “Bayscapes,” which are landscapes other than turf that are elected to reduce irrigation demand, improve habitat, reduce non-point pollution, and reduce erosion, while also appealing to gardeners. This program uses a website (http://www.fws.gov/chesapeakebay/bayscapes.htm), fact sheets and examples to provide information.

In Westchester County, New York, the Grassroots Healthy Lawn Program was an initiative of the county government and a non-profit organization called Grassroots Environmental Education, based in Port Washington on Long Island. The goal of this initiative was to promote healthy lawn management by reducing the use of pesticides and other toxins on lawns throughout the county. The program provided training to landscapers, provided public outreach services, served as a liaison between manufacturers and retailers, and developed a list of natural lawn care product suppliers for public distribution (http://www.ghlp.org/).

3.3.3 Pet Waste Management

Pet waste can be a nuisance to the public in addition to contributing bacteria and nutrients to a water body when it gets washed off the ground surface by rain fall and stormwater runoff. For those people that have pets, picking up after your dog can also be a nuisance. However, more and more people are realizing the aesthetic and environmental health benefits of cleaning up pet waste from public areas and their own back yards, and in many communities throughout the country now there are "pooper-scooper" laws requiring people to clean up. While the idea of picking up after your dog may seem absurd at first, a few pooper-scooper signs, some pooper scooper bags, and the risk of being seen not picking up after your dog can go a long way. A media campaign can easily be created with a sense of humor to get the message across, and signage at public open spaces and along walking trails can bolster the message. Once the signage is up, people can learn a new message.

3.3.4 Stormwater Management

Homeowners and the general public in a watershed can play an important role in looking after the systems on a day-to-day basis. This is particularly true in subdivision settings, where the stormwater management practices may be slightly off the beaten track for the local Public Works Department and where some small stormwater management practices may be dispersed throughout the subdivision or even on individual lots. After all, a failure in the stormwater management system could mean a flooding situation or could create a sedimentation problem at the discharge location that directly affects local residents.

A stormwater awareness program developed and implemented through the local municipality can be a very useful tool in promoting effective and sustainable stormwater management. Mailings and inserts with local billings and other municipal communications to residents can raise awareness and inspire vigilance among local residents. Residents can help to monitor swales, leaching systems, catch basins and discharge locations to see that they are functioning properly. They can act as a first defense against failures and can report problems to the public works department. In the fall, residents can help by clearing leaves and debris from the catch basin grates and by not throwing leaves and debris into drainage swales, onto roadways, or into other stormwater pathways. In the winter, the same goes for snow that is shoveled and plowed off driveways and sidewalks. They can also help by not washing vehicles excessively often, which can use large volumes of potable water, and by not washing them in their

driveways, which can contribute phosphorus from the soap into the stormdrain system. Instead, residents should use modern commercial car washing facilities that are outfitted with a wash water collection and treatment system, and opt for environmentally friendly soaps if possible.

Residents can also install on-site retrofits to improve the stormwater management on an individual house lot. These can include installation of rain barrels to collect water from rooftops through roof leaders. Rain barrels that are properly fitted with tightly closed solid tops or a mesh screen at the top should alleviate mosquito concerns as these precautions will prevent mosquito larvae from hatching out and leaving the barrel. A rain barrel program could be established through the municipalities or a local non-profit organization, in conjunction with a rain barrel distributor, to sell rain barrels at a discounted price to community members. In addition, other on-site retrofits may include installation of a dry well to collect and infiltrate roof runoff and overflow from the rain barrels, if they have been installed. These and a number of other potential best management practices that could be used to retrofit a site are described in more detail in Section 4.4.

3.3.5 Septic System Maintenance

Septic systems require regular maintenance and inspection, and require that homeowners are actively aware of the location and operational characteristics of the system. Most systems require that the septic tank be pumped out approximately every 3-7 years (depending upon the input to the system and the size of the settling tank) to remove the solids that have accumulated over that time period.

There are many septic system maintenance additives marketed to reduce the accumulation of solids and the frequency of pumping of the septic tank. However, these additives can frequently be harmful to the system, particularly when used inappropriately, by impairing the microbial community responsible for much of a system's treatment ability, by reducing the effectiveness of the leach field, and by contributing chemical contaminants to the underlying groundwater. This is particularly important in coastal areas characterized by sandy soils where groundwater movement to receiving waters can be very rapid. A properly designed, installed, and maintained septic system should not need chemical additives to function properly. It is important for homeowners to be aware of what they put into their septic system and what the potential effects may be. Without proper maintenance, the system can lose significant treatment capacity and can clog up. This can cause a failure where the system's leach field fails to leach and the leachate breaks out at the ground surface. Alternatively, it could back up into the household. Both of these scenarios cause a public health concern as well as a threat to local water resources.

A public mailing from the municipality can promote septic system maintenance by reminding residents of maintenance needs. The New York Onsite Wastewater Training Network at the State University of New York at Delhi provides trainings throughout the state and is a wealth of information about septic systems, including proper siting, design

and maintenance. While that program's training is geared primarily at engineers and practitioners, the New York State Department of Health website provides information and a printable pamphlet aimed at residents that describes proper septic system operation and maintenance. This pamphlet could be updated to include references to local water resources and connect the need for septic system maintenance to the local resources that may be threatened or experiencing poor water quality. The Rhode Island Cooperative Extension has developed a number of helpful fact sheets aimed at homeowners with information about septic system maintenance, ways to prolong the life of the system, ways to upgrade the system to provide better treatment, the effects of additives, and other useful information.

The Suffolk County Department of Health Services has also produced a brochure entitled, "Home Sewage Disposal Systems in Suffolk County," which describes a septic tank and cesspool system that is typical of Suffolk County. This brochure, last updated in 2004, could be improved upon at the county or local level to provide additional information about how to upgrade or improve on-site wastewater treatment through innovative wastewater design. This would be useful for homeowners, especially those with aging systems (25-30 years old) and in need of significant repair or replacement.

3.4 Public Education and Outreach – Recommended Programs

The following provides a menu of activities that could be undertaken as part of a watershed-wide or town-wide outreach and education program to address the environmental health of the coastal water resources of the Peconic Estuary. These activities are designed so that they could focus on one or a combination of the five areas discussed above. These activities could be implemented by each municipality, in conjunction with the Peconic Estuary Program, Suffolk County, homeowners' associations, local schools, or other active citizens groups.

3.4.1 Watershed Awareness Day

Hold a watershed awareness day, perhaps associated with an Earth Day program. The towns and/or villages in the watershed could organize a watershed awareness day to take place along the shore or at an open space within the watershed. This could include educational booths, games related to water quality, demonstrations of innovative technologies, sales of rain barrels and native grass seed, a swim or kayak race, a road race through the watershed, and/or an afternoon or evening clambake. This is a great way to get people outside, making the visual and experiential connection between the coast they love and the watershed in which they live and play.

3.4.2 Media Campaigns

A host of media campaigns could be developed with specific messages regarding applicable management strategies such as residential septic system maintenance, repair or replacement; residential fertilizer management; shoreline vegetation management; car washing; or pet waste management. These campaigns can include fliers and brochures to be distributed at community events or mailed out with utility bills, as well as posters to be

distributed and posted in municipal offices, public libraries, schools, and other highly visible areas. Articles, or a series of articles, can be developed for the local newspaper to focus people on watershed management. Television advertisements or stories on local television stations or the local cable access stations can be devoted to homeowner activities that impact the watershed. Brochures related to pet waste clean up could be handed out with dog licenses and distributed by local veterinarians. These efforts could be tied to the public outreach and education requirements of the State Pollutant Discharge Elimination System (SPDES) permits that may be required for some municipalities regulated as separate storm sewer system communities.

3.4.3 Institution of an "Adopt-a-Watershed" Organization

Such an organization would be tasked with cleaning up litter, monitoring storm drain outfalls, or promoting watershed stewardship. This type of organization can make a big difference just by being aware of the activities within the watershed and along the pond shores. Monitoring of storm drain outfalls can be done with the use of simple water quality kits in conjunction with observations. This activity serves as education, but also as a means to gauge any significant changes that may be occurring in the watershed. This is also a great way to get children involved.

3.4.4 Demonstration Projects

Projects that can be used to illustrate a vegetated buffer, alternative stormwater management techniques, or a low-maintenance lawn can be invaluable in an education campaign. These are typically done on publicly-owned land or on a private individual lot, if there is an enthusiastic and willing home owner. Demonstration projects are helpful because they allow people to see a work in progress and a finished product, so they can know what to expect and they can evaluate the outcome realistically. They can also involve members of the general public in the planning and implementation of the demonstration project, which serves as a great educational experience. Once a project has been undertaken, the development and implementation phases can be documented in photographs which can be used in mailers, brochures, posters, and a media campaign. They can serve as a centerpiece for a local news story as well. Signage about the project can be placed at the edge of the site to catch the attention of passersby and provide educational information and a place to go for more information to anyone who is interested.

One example of a successful demonstration project took place at Long Lake in Littleton, MA. Long Lake was in a deteriorated state due to nutrient loading from nonpoint source pollution. The town used a grant to work with a consultant to retrofit a portion of the Long Lake watershed by installing rain gardens, grassed swales, rain barrels and a constructed wetland park with walkways for the public to enjoy the area and learn about the stormwater management practices. A description of the project, with project design information and photographs, is posted on the state Executive Office of Environmental Affairs website and serves to inform other interested people about the project.

3.4.5 Watershed Clean-up Days

A community or community organization can coordinate a watershed clean-up day to bring volunteers together to pick up litter and solid waste debris throughout the watershed. These events can be fun, and allow people to see water bodies and areas of the watershed that they may not be familiar with. They help to give people a sense of ownership and stewardship for the watershed beyond the single clean-up event.

3.4.6 School Watershed Science Programs

Science and humanities programs in local schools can help to educate young people on the various themes of watershed management, and the connection between human land uses and the water quality in the Peconic Estuary. Hands-on school programs related to the environment may include water quality monitoring, gardening, recycling, and composting. These programs can serve as a terrific vehicle to teach students about watershed management and stewardship.

3.5 Summary of Programmatic Recommendations

While this section introduced several programmatic opportunities, regular inspections and maintenance of the stormwater infrastructure should be the top priority. Without a long-term inspection/maintenance program in place, any new or existing stormwater BMPs implemented in the watershed will eventually lose effectiveness over time. Even the best BMPs are only as effective as their maintenance plan. Next, the review process for new and redevelopment could be amended to require developers to utilize specific BMPs and alternative site design techniques right from the beginning of a development project, reducing potential water quality impacts. Finally, the various public education focus areas and programs presented above can be very effective in improving the health of the watershed. No one outreach campaign will be effective for all neighborhoods – they should be tailored to target the specific issues in various areas throughout the watershed based on demographics, density, age of the neighborhood, current lawn care methods, etc. Older, more established neighborhoods with mature trees and smaller yards tend to have a lower impact on water quality than new subdivisions with large, cleared lots and highly manicured yards, and different outreach programs would be needed for each.

Programmatic costs can pose a problem for some communities. One way to reduce these costs and improve program effectiveness is to pool resources with other municipalities and agencies. Such coordination could be useful for purchasing shared maintenance equipment such as street sweepers and implementing area-wide educational campaigns.

4.0 STORMWATER MANAGEMENT ASSESSMENT

This stormwater management assessment addresses stormwater runoff as a source of pollutant loading in the Meetinghouse Creek watershed and helps to identify problem areas and potential areas for the installation of stormwater best management practices (BMPs) to reduce the load of stormwater pollutants to the creek. The results of this assessment are then used to recommend site specific stormwater management implementation projects in key locations throughout the watershed. By identifying and prioritizing the most cost-effective retrofit and public outreach opportunities, the town has a reasonable set of specific management options to help achieve many of the goals stated in the CCMP. Successful implementation of the identified opportunities is expected to help reduce stormwater runoff pollution, improve overall water quality conditions, and maintain or improve critical habitat areas.

The existing stormwater management program in the Meetinghouse Creek watershed mainly consists of infiltrating catch basins and storm drains along roadways, as well as detention ponds in subdivisions. Based on this watershed assessment, proposed stormwater BMPs were selected to retrofit the existing drainage system to better manage and treat stormwater before it reaches Meetinghouse Creek.

Potential pollutants and restoration sites for upland areas were also investigated at the same time using the Unified Subwatershed and Site Reconnaissance (USSR) procedure, described in Section 4.7. These upland areas can have significant impacts to the water quality of the receiving bodies. The USSR assessments can identify non-point pollutants of concern for different areas, which can help direct public education efforts and community action, as described in Section 3.

4.1 Assessment Methodology

Results from the "Peconic Estuary Stormwater Assessment and Planning Tool" (HW, 2003) were used in the stormwater management assessment to help direct investigation to the areas where pollutant loading was the greatest. The discreet drainage areas with all the identified drainage structures and outlets within the watershed were overlaid onto the orthophotographs of the area. This provided an opportunity to pre-select sites for investigation based on outlet locations and areas that are open (space for BMPs), publicly owned, and/or untouched (natural wooded land). The watershed and subwatersheds are shown and labeled in Figure 4.1.

A rapid and focused field reconnaissance effort in the Meetinghouse Creek watershed was conducted. Reconnaissance inventory forms were filled out at each site location. These forms were later used to rank sites, highlight potential hotspot locations, assess varying types of neighborhoods and large pervious areas, and inventory various streets and storm drains. For example, if there were evidence of too much lawn maintenance in an area, the recommended actions would include a targeted public education campaign or collaboration with local landscaping companies. If there were many hotspots in a

Legend

- Meetinghouse Creek Watershed Outline
- Meetinghouse Creek Subwatersheds
- Area Not Included

* Source: Aerial Photo, NYS Office of Cyber Security & Critical Infrastructure Coordination, Spring 2004

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Drainage Area and Subwatershed Map
Meetinghouse Creek Watershed
Town of Riverhead

3/17/06 mw
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Figure 4-1

watershed, site specific investigations and potential clean-ups would be recommended. All of the investigated sites were numbered accordingly and discussed in this report. See Figure 4-2 for the site locations. A Watershed Assessment Guide has been included in Appendix B, which includes more details on how to conduct a watershed assessment.

4.2 Storm Drainage Assessment and Mapping

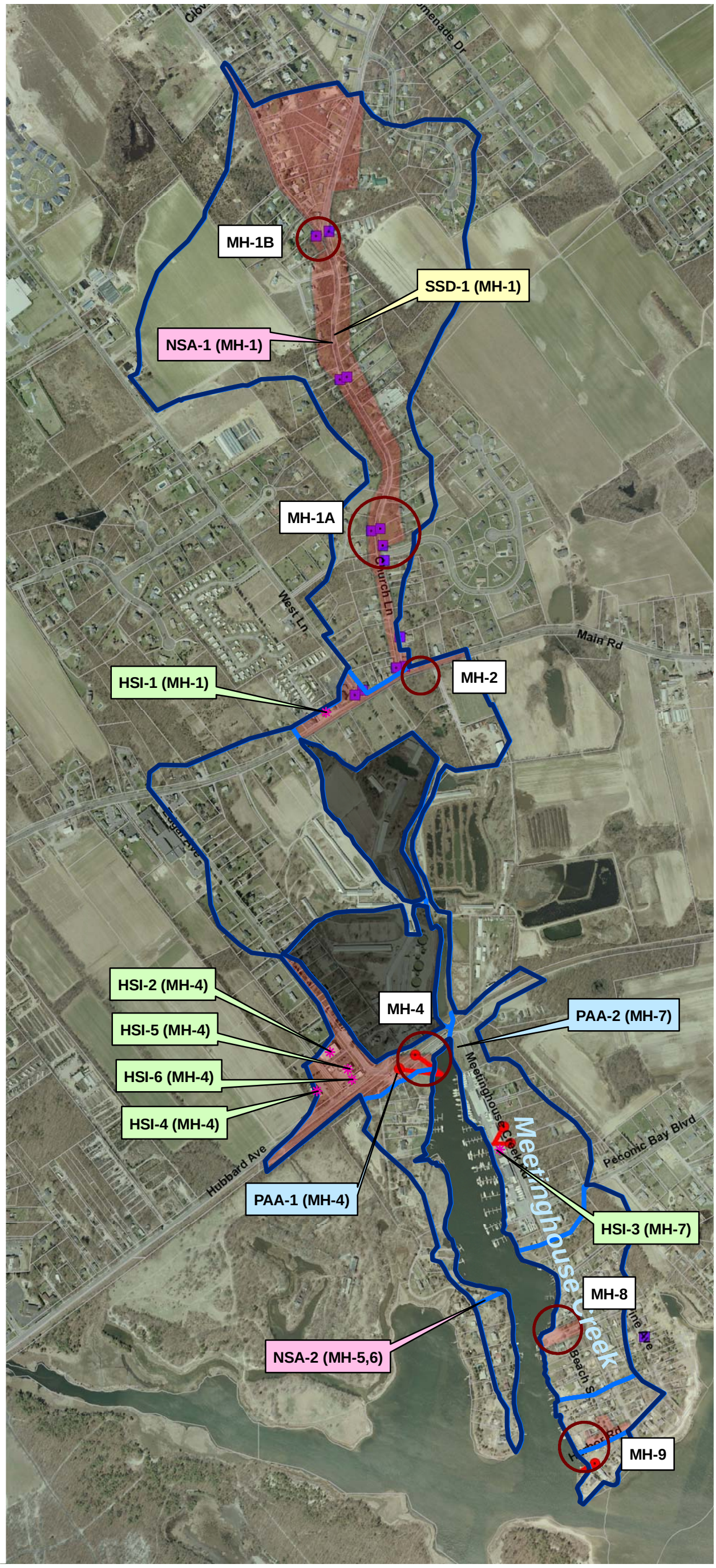
Preliminary drainage areas were first delineated through the use of topographic maps. Topographic maps allow for a reasonable watershed delineation under natural conditions. However, construction of impervious surfaces, the use of stormdrain systems, and grading of land surfaces to accommodate different site designs can significantly alter the overall size and shape of the watershed. Due to these factors, a field survey is required for accurate drainage delineation. In an effort for a more accurate drainage delineation, the Peconic Baykeeper was subcontracted to perform field survey delineations for the four priority embayments within the Peconic region (West Neck Bay, Hashamomuck Pond, Reeves Bay, and Meetinghouse Creek). These delineations included discreet watersheds that were determined through a combination of natural topography and observed structural drainage. The field surveys conducted by the Peconic Baykeeper were then digitized into GIS and overlaid onto basemaps provided by the Peconic Estuary Program (PEP). The storm drainage investigation and mapping exercise were conducted in 2000, and the results of that program were used in this stormwater management assessment.

4.3 Potential Sites and Best Management Practices Selection

Prior to the field visits for the stormwater assessment, HW reviewed the existing stormwater assessment data (HW, 2003) and identified potential locations for the installation of stormwater BMPs based on land use, parcel ownership (publicly-owned land was targeted as a priority), outfall locations, potential conflicts with existing utilities, effective stormwater capture area, and pollutant source locations.

A stormwater field reconnaissance team then investigated all potential BMP locations. In addition to the stormwater field team, a habitat protection field team was deployed at the same time to identify potential habitat protection locations in the watershed (discussed in more detail in Section 5.0 of this report). All field work was conducted the week of September 12, 2005.

Six sites were selected from the potential locations for further stormwater investigations based on field assessments of site conditions, physical constraints, and retrofit feasibility (see Table 4-1). Sites were selected in subwatersheds 1, 2, 4, 8, and 9, and the results of the in-depth investigations are described in Section 4.6. For each site, detailed field notes, inventory forms, and photos were collected and can be found in Appendix D.



Legend

- Meetinghouse Creek Watershed
- Meetinghouse Creek Subwatersheds
- Area Not Included
- Hot Spots
- Drywells
- Outfalls
- Stormdrain Conveyance Systems
- Parcels
- Proposed BMP Locations
- Proposed BMP Drainage Areas
- MH-1A — Proposed BMP Drainage Area ID
- NSA — Neighborhood Source Assessment
- HSI — Hotspot Inventory
- PAA — Pervious Area Assessment
- SSD — Streets and Storm Drains

* Source: Aerial Photo, NYS Office of Cyber Security & Critical Infrastructure Coordination, Spring 2004

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Field Inventory Locations Meetinghouse Creek Watershed Town of Riverhead

3/21/06 mw
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Figure 4-2

Table 4-1. Summary of Proposed Best Management Practices for the Meetinghouse Creek Stormwater Drainage Area, Riverhead, New York

BMP Site #	Location[1]	BMP Concept	D.A. captured		BMP Design Criteria[2]	BMP	Estimated Pollutant Removal Efficiency (%)						Estimated Costs (for Planning Purposes only)			
			Total Area (ac)	Imp. Area (ac)			*Fecal Coli.*[3]	*Total N*[3]	*Total P*[3]	*TSS*[4]	*Metals*[4] *(Cd, Cu, Pb, Zn)*	*Hydro-carbons*[4]	*Capital Cost*	*Design, Permitting, Contingency*[5]	*Total*	*Annual Routine Maintenance*[6]
MH-1A	88 Church Ln.	Sediment forebay to pretreat surface drainage, and then discharge into a proposed infiltration basin, designed to infiltrate up to the 10-year design storm.	14.9	2.9	Treatment for the 90% of average annual stormwater runoff volume.	Sediment Forebay and Infiltration Basin	65-98	33-51	51-70	80-95	24-99	ND-83	$232,000	$70,000	$302,000	3% - 10%
MH-1B	299 Church Ln.	Grass channel to pre-treat and convey surface drainage from roadway to a sediment forebay for further pretreatment prior to discharge into a proposed infiltration basin, designed to infiltrate a 0.5" storm.	17.2	2.9	Treatment for the 90% of average annual stormwater runoff volume.	Grass Channel, Sediment Forebay, Infiltration Basin	0-98	ND-51	9-70	80-95	24-99	ND-83	$115,000	$35,000	$150,000	3% - 10%
MH-2	Section 067-Parcel 26.1	Sediment forebay to pre-treat surface drainage prior to discharge into existing wetland.	5.6	3.3	Treatment for the 90% of average annual stormwater runoff volume.	Sediment Forebay	65	33	51	80	24-73	83	$72,000	$22,000	$94,000	3% - 6%
MH-4	Meetinghouse Creek Park, Hubbard Ave.	Grass channel to pre-treat and convey surface drainage from roadway to a bioretention system.	11.4	4.1	Treatment for the 90% of average annual stormwater runoff volume.	Grass Channel, Bioretention System	0-98	ND-70	9-75	80-99	42-99	62	$166,000	$50,000	$216,000	5% - 7%
MH-8	End of Cedar St.	Grass channel to pre-treat and convey surface drainage from roadway and parking area to a bioretention system with a grass filter strip, as well as a sediment forebay to pre-treat surface water before discharge into Meetinghouse Creek.	1.0	0.4	Treatment for the 90% of average annual stormwater runoff volume.	Grass Channel, Grass Filter Strip, Sediment Forebay, Bioretention System	ND-98	ND-70	9-75	69-99	17-99	ND-83	$25,000	$7,000	$32,000	5% - 7%
MH-9	End of Harbor Rd.	Grass channel to pre-treat and convey surface drainage from roadway and parking area to a bioretention system with a grass filter strip.	1.1	0.5	Treatment for the 90% of average annual stormwater runoff volume.	Grass Channel, Grass Filter Strip, Bioretention System	ND-98	ND-70	9-75	69-99	17-99	ND-62	$37,000	$11,000	$48,000	5% - 7%

D.A. = Drainage Area

1 Note: Site #'s refer to preselected sites. Based upon actual field visits, some sites were removed from further consideration.
2 Note: Because this project is a retrofit of an existing stormwater system and is not being developed as the direct result of a new construction project, the proposed BMPs are not subject to the full suite of stormwater management standards in the New York Stormwater Management Design Manual.
3 Source: Center for Watershed Protection. 1998. Cost and Benefits of Storm Water BMPs, Final Report 9/14/98. Prepared for: Parsons Engineering Science under EPA Contract 68-C6-0001. WA 2-15. Task 6.
4 Source: Schueler, T. 1997. Comparative Removal Capability of Urban BMPs: A Reanalysis. Watershed Protection Techniques, 2(4): 515-520.
5 Note: This cost is estimated to be 30% of the Capital Cost. Source: Center for Watershed Protection. 1998. Cost and Benefits of Storm Water BMPs, Final Report 9/14/98. Prepared for: Parsons Engineering Science under EPA Contract 68-C6-0001. WA 2-15. Task 6.

4.4 Description of Proposed Best Management Practices

The potential BMPs considered for each of the candidate locations were selected and designed with the goal of improving the overall water quality of the stormwater discharging to the subject watersheds of the Peconic Estuary. The primary pollutants of concern for this area are nitrogen and bacteria. However, the effectiveness for structural BMPs to remove bacteria is limited; controlling the source of bacteria through public education is arguably the most effective method for bacteria reduction. Thus, the most appropriate and effective BMPs were selected for each retrofit location with an emphasis on nitrogen removal. If a particular BMP that has high nitrogen removal capability was not feasible due to site constraints, alternative BMPs were considered to provide removal for other types of stormwater pollutants such as total suspended solids (TSS), metals or hydrocarbons.

Based on the New York State Stormwater Management Design Manual (NYSSMDM), potential BMPs were sized to capture and treat 90% of the average annual stormwater runoff volume (Water Quality Volume, WQ_v). As a result, potential BMPs were sized to capture and treat the 1.2-inch storm event runoff from the contributing impervious areas to the maximum extent practicable. However, because this watershed management plan is proposing retrofits to the existing stormwater system, site constraints sometimes limited the available area for BMP construction, and the proposed BMPs at certain locations were, therefore, sized smaller than the WQ_v. Catch basin inserts were not considered due to their low removal rates for nitrogen and bacteria and high maintenance burdens. See Appendix A for more information on catch basin inserts.

All BMP recommendations occur under the conservative assumption that no other BMP is being implemented simultaneously. The pollutant removal efficiency estimated for each BMP is based on the assumption that each BMP is implemented independently of all others. However, it is recommended that a combination of BMPs be implemented jointly to address as large an area as possible within the study area to achieve a greater cumulative pollutant reduction at the outfall.

The BMPs proposed for the Meetinghouse Creek watershed include bioretention systems, grass channels, filter strips, sediment forebays, and infiltration basins. See Appendix C for a detailed description of each, including schematics, design guidelines, and maintenance requirements.

4.5 Retrofit Ranking System

Watershed planning recommendations generally come in two categories: (1) regulatory and programmatic actions or (2) restoration and protection projects. Regulatory and programmatic actions include changes to local codes, ordinances and programs that are derived from an audit of local government capacity to protect the watershed. Examples of regulatory actions include adopting a stream buffer ordinance, encouraging or dictating conservation-oriented design of land development projects, and establishing stringent

stormwater criteria. Hiring watershed coordinators, erosion and sediment control (ESC) inspectors, and executing a municipal street sweeping program are considered programmatic actions. Priority protection and restoration projects require implementation of important on-the-ground projects. Protection objectives generally involve land acquisition or applying conservation easements. Restoration projects include stream restoration, stormwater retrofits, and riparian reforestation, etc.

Since most communities will not be able to implement all the recommended actions or projects identified, it is important to go through a ranking process to identify priority sites. Not all recommendations are equal when it comes to implementation. Some recommendations, such as regulatory changes or land acquisition, may be more time sensitive than restoration projects, particularly in areas expecting significant development pressures in the short-term. Many large-scale stormwater retrofit projects require detailed planning and permitting which takes time, while buffer planting or trash cleanups are easy projects that can be completed in a few days.

Ranking candidate projects allows restoration sites to be compared together on a common basis to find the most cost-effective and feasible projects in the watershed. One of the key decisions in project ranking is whether to evaluate similar projects with the same basic purpose (e.g., stormwater retrofits vs. shoreline erosion control) or evaluate all different types of projects together; there are pros and cons to each approach. In general, it is probably preferable to assess all groups of projects at the same time, as long as the ranking factors can be arranged to compare the relative merits of each project. In this case, however, since the primary focus of this project is to evaluate stormwater management implementation, we compared stormwater retrofits in the ranking system.

Each selected site was ranked based on a Retrofit Ranking System. The proposed retrofit ranking system includes the following major factors:

1. Pollutant Removal Potential
   - Impervious area treated
   - Percent of water quality target volume treated
   - Pollutant load reduction
2. Project cost
3. Implementation feasibility based on ownership, wetland impact/permitting, access, maintenance, and utilities
4. Supplemental benefits such as habitat and public benefit

The ranking is based on a 100-point scoring system. The basic concept is to evaluate the relative merit of proposed retrofit sites by assigning points to a site based on its ability to meet various criteria under each of the four major factors cited above. Summing the assigned points for each of the factors gives an overall site score. Sites with the highest score represent the best overall candidates for implementation from a stormwater management vantage point.

The ranking system places an emphasis on (by weighting more heavily) the pollutant reduction potential. Specifically, 45% of the total points have been allocated to this category (impervious area treated, water quality volumes treated, and pollutant reduction). Another 45% of the points have been allocated to project cost and implementation. The cost estimates are based on a combination of compiled data in "Costs and Benefits of Stormwater BMPs" (Center for Watershed Protection, 1998) and best professional judgment based on experience. The exact costs will vary from these estimates based on final engineering design, permitting and contingencies. Design, permitting and contingency costs can be generally estimated at approximately 30-35% of the base construction costs (CWP, 1998). The remaining 10% of the points is divided between supplemental environmental and public benefits.

The rationale for the emphasis on the area and volume of water treated as well as the cost and feasibility of a project is two-fold. First, one goal of the retrofit approach is to manage a large percentage of the untreated impervious area runoff, in order to maximize water quality benefits to receiving waters. Therefore, those retrofit sites that are able to capture and effectively treat a larger area of impervious surface are deemed to be more important and valuable and thus assigned higher point values. Second, the feasibility of a proposed retrofit, in terms of both cost and implementation is important. Simply put, there are frequently "fatal flaws" for proposed retrofits in the form of capital costs, utility conflicts, private ownership, and access (to name a few). There is little point in proceeding with a retrofit design concept if there is a high probability that an existing constraint cannot be overcome. Therefore, proposed retrofits where these types of constraints are minimal or non-existent will be awarded higher point values. Specifics of the ranking are included in Table 4-2 and results are summarized in Section 4.6 below.

4.6 Investigated Sites and Selected BMP Descriptions

The following are descriptions of the six selected BMP sites identified in the Meetinghouse Creek watershed. Figure 4-2 illustrates the locations of the potential BMP sites. Inventory forms, detailed sketches, maps, site photos, and conceptual design plans, and calculations for each site are provided in Appendix D. BMPs were chosen to match site characteristics with recommended design criteria. The main characteristics that determine the type of BMP chosen include depth to groundwater, watershed area, available land space, and drainage system or other infrastructure constraints. The primary pollutant of concern for this study is nitrogen; however, at a selected site, if a particular BMP that has high nitrogen removal is not feasible due to site constraints, alternative BMPs were considered to provide removal for other types of stormwater pollutants.

Table 4-2. Meetinghouse Creek Retrofit Ranking Summary

Stormwater Retrofit Technical Feasibility	Site 1A 88 Church Ln.	Site 4 Meetinghouse Creek Park, Hubbard Ave.	Site 2 Section 067-Parcel 26.1	Site 9 End of Harbor Rd.	Site 1B 299 Church Ln.	Site 8 End of Cedar St.
1a. Impervious Area Treated $=A_{site}/A_{total}$ *30	6.08	8.69	7.10	1.06	6.22	0.85
1b. % of Water Quality Volume Treated $= WQV_{req}/WQV_{design}$ *7.5	31.25	3.75	7.50	3.13	3.13	7.50
1c. Pollutant Load Reduction Based on type of facility and ability to remove total nitrogen (eff. *7.5)	4.95	4.88	2.48	4.88	4.95	3.68
1. Pollutant Removal Potential (Total Possible Points 45)	**42**	**17**	**17**	**9**	**14**	**12**
2. Project Cost (Total Possible Points 15)	**1**	**8**	**11**	**2**	**8**	**4**
3a. Ownership Private Land = 0, Public Land = 15	10	10	15	15	5	5
3b. Wetland Impact / Permiting Yes = 0, No = 5	5	5	0	3	5	5
3b. Access Poor = 0, Good = 3	3	3	2	3	2	3
3c. Maintenance High = 0, Low = 3	1	1	2	1	2	1
3d. Utilities Major = 0, No Impacts = 4	2	4	2	4	2	4
3. Implementation (Total Possible Points 30)	**21**	**23**	**21**	**26**	**16**	**18**
4a. Habitat Provides = 5, Does Not Provide = 0	0	5	0	5	0	5
4b. Public Benefit Benefits another habitat = 1 Public/Education Program = 2 Constructed or Maintaned by Volunteers = 1 No Permenent Loss of Recreational Features = 1	4	5	4	3	3	2
4. Supplemental Benefits (Total Possible Points 10)	**4**	**10**	**4**	**8**	**3**	**7**
Total Score (Maximum Score = 100)	**68**	**58**	**53**	**45**	**41**	**41**
	Highest Ranking					**Lowest Ranking**

4.6.1 Site MH-1A – 88 Church Lane

Site MH-1A is located at a low-lying area along Church Lane, in the front yard of a privately-owned residential property. This drainage area consists of 15.1 acres, of which 19% is estimated as impervious, mostly from Church Lane. This area along Church Lane frequently floods, sometimes to the extent that the road has to be closed to traffic. Church Lane follows the path of what used to be a stream valley meandering down to the wetland at Site MH-2, which forms the headwaters of Meetinghouse Creek. When it rains, water naturally flows down the road and collects near this site. Infiltrating catch basins all along Church Lane were clogged with sediment and debris basin upon field observation.

The concept for this site consists of infiltrating the runoff from up to the 10-year design storm in an infiltration basin on private property, not only to provide water quality treatment but also to help decrease the flooding problems along the road. Pretreatment would be provided by a sediment forebay. The main constraint for this site is the fact that it is located on private property and will require an easement. A conceptual design plan was prepared for this site and is included in Appendix D-1.

Site MH-1A ranked first overall even with the easement issue. The major factors that contributed to this rank were the pollutant removal potential, easy access, and large public benefit. An infiltration basin is the most appropriate BMP to provide water quality treatment and water quantity storage given the site's sandy soils and natural bowl-shaped topography at a low point along Church Lane.

4.6.2 Site MH-1B – 299 Church Lane

Site MH-1B is located at a low-lying area at the intersection of Phillips Lane and Church Lane, in the front yard of a privately-owned residential property. This drainage area is upstream from Site MH-1A and consists of 17.3 acres, of which 17% is estimated as impervious.

The concept for this site consists of infiltrating the runoff from a 0.5-inch storm event in a low-lying, wooded area on private property. The sandy soils in this area have a high infiltration rate. The existing trees would remain, so no additional volume would be created by excavating. Pretreatment would be provided by a sediment forebay with a low-flow diversion spillway into the infiltration area. Runoff from storms having greater than 0.5 inches of rain will be directed back to Church Lane. Site MH-1B ranked fifth overall. The main constraint at this privately-owned site is that an easement would be required. In addition, the pollution removal capacity is low due to space constraints which reduce the volume of runoff that can be treated. A conceptual design plan was prepared for this site and is included in Appendix D-2.

4.6.3 Site MH-2 – Main Rd (Section 067-Parcel 26.1)

Site MH-2 is located at a large wetland area that forms the headwaters to Meetinghouse Creek. The wetland vegetation is dominated by invasive species. The drainage area consists of 5.6 acres of which 60% is estimated as impervious. The majority of

impervious surfaces draining to the site are Main Road, a high traffic highway, and the southern end of Church Lane.

A large sediment forebay is proposed for this site to prevent the existing wetland from sedimentation. The existing outlet structure will be retrofitted with a flow-splitting device, directing the water quality volume into the sediment forebay. Flow from larger storms will directly enter the wetland. In addition, additional storm sewer is proposed to capture runoff from the Church Lane area that floods frequently. A conceptual design plan was prepared for this site and is included in Appendix D-3.

Site MH-2 ranked third overall. The major factors that contributed to this rank were that the site is on public property and the proposed BMP can treat the full WQ_v. One hurdle to implementation will be getting a permit for work within a wetland.

4.6.4 Site MH-4 – Meetinghouse Creek Park

Site MH-4 is located adjacent to Meetinghouse Creek Park. The drainage area consists of 11.4 acres, of which 36% is estimated to be impervious. The existing parking lot at the park collects large quantities of sediment from the upstream drainage area, clogging the infiltrating catch basins, and causing runoff to overtop the parking lot into the Meetinghouse Creek, eroding and undercutting structures along the way.

A large bioretention area is proposed in the adjacent, undeveloped property owned by Crescent Duck Farm. Pretreatment is provided by a water quality swale along Hubbard Road. The bioretention facility will overflow into a structure outletting to the creek. A conceptual design plan was prepared for this site and is included in Appendix D-4.

Site MH-4 ranked second overall. The major factors contributing to this rank were that the site is highly visible to the public and has easy access for construction and maintenance, the proposed BMPs have a high pollutant removal capacity and provide wildlife habitat, and the associated costs for the site are relatively low. An easement will have to be secured from the duck farm to implement this project.

4.6.5 Site MH-8 – End of Cedar Street

Site MH-8 is located at a private boat launch at the end of Cedar Street. The drainage area consists of 1.05 acres, 38% of which is estimated to be impervious.

A bioretention facility was proposed for this site, in the area just east of the boat launch. Pretreatment is provided by a water quality swale along Cedar Street and Beach Street, as well as a grass filter strip for the direct runoff from the road. Overflow from this structure will discharge via a riprap spillway to the creek. In addition, a sediment forebay was proposed for parking lot runoff draining to the wetland vegetation on the west edge of the site. A conceptual design plan was prepared for this site and is included in Appendix D-5.

Site MH-8 ranked last (sixth) overall, mainly due to private ownership and small drainage area treated.

4.6.6 Site MH-9 – End of Harbor Road

Site MH-9 is located at the end of Harbor Road. The drainage area consists of 1.1 acres, of which 45% is estimated to be impervious. This site is located within the public right-of-way associated with Harbor Road. People park their cars in this area and walk their dogs here, as identified during field observations. Presently, runoff flows down an eroded gully into wetland vegetation along Meetinghouse Creek.

A bioretention facility sized for a 0.5-inch rainfall was proposed for this site, in the gravel area between the end of the paved road and the wetland vegetation along the creek. Pretreatment is provided by a water quality swale along Harbor road, as well as a grass filter strip for the direct runoff from the road. Overflow from this structure will discharge via a riprap spillway to the creek. Signage could be installed in this area reminding dog owners to pick up after their pets. A conceptual design plan was prepared for this site and is included in Appendix D-6.

Site MH-9 ranked fourth overall. There is great access to this public area for construction and maintenance. However, the major constraints for this site are the limited pollution removal based on space limitations and the possible impacts to adjacent wetland.

4.7 Unified Subwatershed and Site Reconnaissance

The Unified Subwatershed and Site Reconnaissance (USSR) procedure was created by the Center for Watershed Protection (2004). The USSR is a rapid field survey that helps identify potential pollution sources and restoration opportunities in the upland areas of a watershed. It is a fast and economical approach to characterizing pollutant contributions over a wide range of urban conditions and identifying stakeholders that can help with the restoration planning process. By performing the USSR, water managers can gain a greater understanding of the issues facing a watershed. The USSR is comprised of four major components: Neighborhood Source Assessments, Hotspot Site Investigations, Pervious Area Assessments, and Streets and Storm Drains. A separate field form is used for each assessment component.

The USSR approach was used in the Meetinghouse Creek watershed as a part of the watershed assessment field reconnaissance. The data collected on the upland areas of the watershed helped identify potential pollution sources that were not apparent from GIS data analyses, and in general, helped to characterize the watershed as a whole. This data framework will help target effective homeowner and commercial education programs, as well as future restoration projects. In addition, this information forms a baseline to which future assessments can be compared in order to determine rate of change in the watershed (i.e., where pollution problems have increased over time or where education programs have been successful in modifying certain behaviors).

In general, the neighborhoods in the watershed have medium to high lawn management characteristics, meaning that they are most likely a significant source of nitrogen. A targeted public education campaign on low-impact lawn care in the watershed is recommended, as well as on-site retrofits such as rain gardens. There were several hotspots identified, and two pervious areas were assessed. The leaching pits investigated were clogged and in need of maintenance. Street sweeping and more frequent clean-outs are recommended. More information on the USSR results is found in the following sections, which summarize each component of the USSR and describe the specific sites assessed in the Meetinghouse Creek watershed. See the Field Inventory Locations Map (Figure 4-2) for the locations of each assessment.

4.7.1 Neighborhood Source Assessment (NSA)

The NSA is used to evaluate pollutant-generating behaviors in individual neighborhoods and identify potential restoration opportunities. Field forms are completed on topics including neighborhood characterization; yard and lawn conditions; driveways, sidewalks, and curbs; rooftops; common areas; and initial neighborhood assessment and recommendations. Three lots are chosen at random to provide an average sample for the neighborhood. At the end of the assessment, a pollution severity index is assigned, and the overall restoration potential is assessed for each neighborhood. Three neighborhoods were analyzed in the Meetinghouse Creek vicinity (Figure 4-2) and are summarized below. Please see Appendix E for the completed NSA field forms and site photos.

NSA-1

NSA-1 is located in subwatershed MH-1 along Church Lane in the northern portion of the watershed. The neighborhood is 10-15 acres and is comprised of ¼- to ½-acre lots of single-family homes with no sewer service. The neighborhood is approximately 30-40 years old, with no sidewalks and no common open space. Seventy-five percent of lawns have medium to low turf management, and large, mature trees line Church Lane and shade yards. However, several sprinklers were observed at full force in the middle of a hot day, with some overlap onto driveways and the road. The neighborhood's stormwater is directed to Church Lane, which acts as a channel with asphalt berms keeping runoff in the road. Catch basins and leaching pits along the road are almost completely clogged, reducing treatment and volume capacity.

The pollution severity index for NSA-1 was high, while the restoration opportunity index was moderate. Recommended actions include better lawn/landscaping practices, catch basin maintenance, and stormwater management retrofits (see BMP sites MH-1A and MH-1B in Sections 4.6.1 and 4.6.2).

NSA-2

NSA-2 is located in subwatersheds MH-5 and -6 along a private road in the low-lying, southwestern portion of the watershed along the creek. The neighborhood is approximately 15 acres in size and is comprised of ¼-acre lots of single-family homes

with no sewer service. The neighborhood is roughly 80 years old, with mostly gravel/dirt driveways, no sidewalks, and no common open space. Almost 99% of lawns have low turf management, and large, mature trees shade yards. Old cars and household trash were observed in 10% of the yards. In general, this neighborhood is not a high pollutant source for the creek. Most of the shoreline in NSA-2 is natural vegetation. Septic systems may be a problem due to the age of the neighborhood and proximity to the creek.

The pollution severity index for NSA-2 was moderate, while the restoration opportunity index was low. Recommended actions include trash management and septic system inspections.

4.7.2 Hotspot Site Investigation (HSI)

Stormwater hotspots are land uses or activities that produce runoff with relatively high concentrations of pollutants. There are two types of hotspots: those regulated by Federal or State law and those that are unregulated. The following land uses and activities are considered stormwater hotspots as listed in the New York State Stormwater Management Design Manual (2003):

- Vehicle salvage yards and recycling facilities*
- Vehicle fueling stations
- Vehicle service and maintenance facilities
- Vehicle and equipment cleaning facilities*
- Fleet storage areas (bus, truck, etc.)*
- Industrial sites*
- Marinas (service and maintenance)*
- Outdoor liquid container storage
- Outdoor loading/unloading facilities
- Public works storage areas
- Facilities that generate or store hazardous materials*
- Commercial container nurseries
- Other land uses and activities as designated by an appropriate review authority

* indicates that the land use/activity is currently regulated

The HSI creates an inventory of storm water hotspots, including regulated and non-regulated sites, and assesses the severity of each hotspot with regard to its potential to generate storm water runoff or illicit discharges. The HSI is also used to propose appropriate follow-up actions for each hotspot, including recommendation for rapid enforcement and the feasibility of onsite stormwater retrofits. Field forms are completed on topics including site data and basic classification, vehicle operations, outdoor materials, waste management, physical plant, turf/landscaping areas, stormwater infrastructure, and initial hotspot status-index results. Hotspot status for each site is broken down into four categories: not a hotspot, potential hotspot, confirmed hotspot, and severe hotspot.

Six hotspot sites were identified in the Meetinghouse Creek watershed (Figure 4-2) and are summarized below. Please see Appendix E for the completed NSA field forms and site photos.

HSI-1

The first hotspot site was identified in subwatershed MH-2 off Main Road. Superior Food Mart is a gas station/convenience store with uncovered fueling and loading/unloading areas, dumpster with no lid, and vehicles that are repaired/stored outdoors. The parking areas are paved and clean, and no trees or grass are present. HSI-1 ranks as a potential hotspot, and a follow-up, onsite inspection is recommended as well as a review of their storm water pollution prevention plan.

HSI-2

Lighthouse Marine Supply is a boat and marine part supply store along Edgar Avenue in subwatershed MH-4. No vehicle operations were present at this site, and no materials are stored outdoors. Uncovered waste containers were observed, and the paved parking area was in good condition but slightly stained. Turf grass and trees were present, but there was no evidence of non-target irrigation. A private storm drain is located at the facility, and the gutters were clean of sediment, organic material, and litter. This site is a potential hotspot, and a follow-up, onsite inspection is recommended as well as a review of their storm water pollution prevention plan. In addition, this store could be included in future education efforts.

HSI-3

Larry's Lighthouse Marina is located on Meetinghouse Creek Road in subwatershed MH-7. This marina stores, maintains, fuels, paints, washes, and sells boats. Uncovered fueling areas are present right next to the creek. Uncovered waste containers were observed, but runoff from these areas is directed to onsite leaching pits. Very minimal landscaped areas were observed. The paved and gravel parking areas were in good condition with no stains.

While this site is a potential hotspot, in general, this marina was in good shape. Stormwater from downspouts could be captured and directed to rain gardens, and leaching pits should be cleaned out. Owners are extremely cooperative and very interested in the health of the watershed. They are concerned about water quality issues and would like to have a contact number for when pollution is observed in the creek. It is recommended that this marina continues to be included in future education and watershed planning efforts.

HSI-4

Elrich Auto Body is located on Hubbard Avenue in subwatershed MH-4. Vehicles are repaired, painted, and stored onsite. Outdoor storage area has no cover, nor does the dumpster. The gravel parking area is clean and unstained, but downspouts are directly connected to storm drains. Highly managed turf is present, with evidence of permanent irrigation draining to the storm drain system. This site is a potential hotspot, and a follow-up, onsite inspection is recommended as well as a review of their storm water pollution prevention plan. In addition, this store could be included in future education efforts.

HSI-5

The fifth hotspot inventory performed was for Storms Motors, Inc., an auto parts store along Edgar Avenue in subwatershed MH-4. No vehicle operations or outdoor materials are present at this site. The building and paved/gravel parking areas are clean and in good condition. Downspouts discharge directly to impervious areas, and turf areas are highly managed and irrigated. Catch basins are located onsite, and they were clean of sediment, organic material, or litter. This site was not found to be a hotspot, but it is recommended that the owners be included in future education efforts on redirecting downspouts and reducing turf management.

HSI-6

Klatt Sheet Metal was the last HSI performed in Meetinghouse Creek Watershed. This business is located on Hubbard Avenue in subwatershed MH-4. Two to four fleet vehicles are stored onsite, and an uncovered dumpster was observed. Building and gravel parking area was in good condition and clean. Turf had medium management status, and there was evidence of permanent irrigation. This site is a potential hotspot, and a follow-up, onsite inspection is recommended as well as a review of their storm water pollution prevention plan.

4.7.3 Pervious Area Assessment (PAA)

The PAA evaluates the existing condition of natural area remnants and open spaces, identifies their potential management needs, and also helps to determine the reforestation opportunities for large pervious areas. Field forms are completed on topics including parcel description, current vegetative cover, impacts, and initial recommendations.

Two pervious areas were assessed in the Meetinghouse Creek watershed (Figure 4.2) and are summarized below. Please see Appendix E for the completed NSA field forms and site photos.

PAA-1

The first pervious area assessed is located next to the Meetinghouse Creek Park along Hubbard Avenue in subwatershed MH-4 and is owned by Crescent Duck Farm. The

property is a little less than 2 acres and borders the wetland vegetation along Meetinghouse Creek. The site has 90% herbaceous cover, with 10% tree and shrub cover. The area is mowed infrequently, and the invasive species Japanese knotweed has taken over most of the site. The site receives full sun and has great foot, vehicle, and heavy equipment access.

The initial recommendation is to use a portion of this site as a bioretention facility (see BMP MH-4, Section 4.6.4). The remainder of the site is a good candidate for reforestation with little site preparation. This is a great location for public education with signage due to its proximity to a town park and easy access.

PAA-2

This site is located along Meetinghouse Creek north of Larry's Lighthouse Marina along Meetinghouse Creek Avenue in subwatershed MH-7. This area is approximately one acre of turf and wetland vegetation owned by residents that live across the street. There is foot, vehicle and heavy equipment access to this site. The wetland vegetation is 100% comprised of the invasive species *Phragmites australis*. The site is mowed infrequently and receives full sun. The initial recommendation is to remove the invasive species and allow the site to naturally regenerate and/or plant native species in this area.

4.7.4 Streets and Storm Drains (SSD)

The SSD estimates the severity of pollutant buildup on roads and within storm drain systems and rates the practicability of four municipal maintenance strategies (street sweeping, storm drain stenciling, catch basin cleanouts, and parking lot retrofits). SSD assessments are usually associated with either NSA or HSI sites. Field forms are completed on topics including location, street conditions, storm drain inlets and catch basins, non-residential parking lots, and municipal pollutant reduction strategies. One to two catch basins are analyzed per NSA/HSI.

One storm drain was assessed in the Meetinghouse Creek watershed (Figure 4-2) and is summarized below. Please see Appendix E for the completed SSD field form and site photos.

SSD-1

A storm drain associated with neighborhood source area NSA-1 was assessed. This storm drain is comprised of enclosed storm drains leading to leaching pits, and is located along Church Lane in subwatershed MH-1. No parking is permitted along this collector street, and the pavement is in good condition. However, the catch basins are almost completely filled, mostly with sediment, but some organic material and litter was present, also. Oil/grease was observed in one of the sampled catch basins.

Catch basins and leaching pits along Church Lane are all clogged with sediment and debris. The road has approximately 1-2 foot asphalt berms on either side, creating a

somewhat contained channel for stormwater. This road floods frequently, which is exacerbated by the clogged leaching pits. See BMPs MH-1A and MH-1B for recommendations in this area (Sections 4.6.1 and 4.6.2). In addition, street sweeping and catch basin clean-outs are highly feasible pollution prevention strategies for this area.

5.0 HABITAT PROTECTION OPPORTUNITIES

HW identified and observed conditions at one area of undeveloped land within the Meetinghouse Creek watershed and evaluated this area for existing habitat attributes. This area, which is within only one of the Meetinghouse Creek subwatersheds, is comprised of one parcel of land. A general description of each habitat with respect to observed land and water features and current status according to the different mapping resources that HW utilized as part of the assessment is provided below. The information collected enabled us to provide a suggested ranking of these parcels and provide a rationale for acquisition priority. Figure 5-1 shows the location of the potential habitat site investigated, and Table 5-1 provides a summary of site observations and information collected from conservation mapping. The area is identified by parcel ID number from the Suffolk County GIS parcel layer and grouped by subwatershed.

Parcel 5502 (Subwatershed MH3)

This 7.3-acre parcel, which is located on the north side of Main Street between West Lane and Edgar Avenue, is undeveloped and was likely in agricultural use at one time. The southern portion of the property is mapped within subwatershed MH-3. This parcel is identified as Developed but Subdividible and is a Community Preservation Fund Parcel. The parcel does not abut water or wetland habitat and it is not within the 1000-foot Shoreline Buffer boundary. The land within the watershed is part forested, part scrub-shrub, and part meadow. Invasive plants are present in relatively significant amounts in all plant layers and include Norway maple (*Acer platanoides*), locust (*Robinia* sp.), Japanese knotweed (*Polygonum cuspidatum*), Morrow's honeysuckle (*Lonicera morrowii*) among others.

Development potential for this parcel could be considered relatively high due to its location, the ease of access to available upland from the main road, and lack of/limited environmental constraints, such as wetlands. The parcel within the watershed is ranked lower than others due to its relatively small size and proximity to developed and agricultural land, its distance from water, wetlands, or otherwise protected land, and the presence of invasive-dominant plant communities. For these reasons, acquisition priority for this parcel should probably be lower than most other parcels. In addition, this parcel is not highlighted as a protection priority in the PEP Critical Lands Protection Plan.

Parcel 5502
Rank Within Watershed: 1st (out of 1)
Overall Rank: 13th (out of 13)

Extent of Figure - Habitat 4

MH-1
MH-2
MH-3
MH-4
MH-5
MH-6
MH-7
MH-8
MH-9
MH-10

West Ln
Church Ln
Edgar Ave
Hubbard Ave
Meetinghouse Creek Rd
Peconic Bay Blvd
Pine Ave
Beach St
Harbor Rd

Superior Food Mart
Storms Motors
Lighthouse Marine Supply
Hans Klat
Larry's Lighthouse Marina
Elrich Auto Body

Legend

- Hot Spots
- Habitat Assessment Areas
- Subwatersheds with ID Number
- Parcels
- Transportation
- Surface Water
- Streams

N

600 Feet

Horsley Witten Group
phone: 508-833-6600
www.horsleywitten.com

Habitat Assessment
Meetinghouse Creek
Subwatersheds

2/6/06 EC
J:\4094 Peconic Bay Estuary\GIS\PDFs\meetinghouse_habitat.mxd

Figure 5-1

TABLE 5-1 PARCEL SUMMARY TABLE – MEETINGHOUSE CREEK

							Land Use, Location, and Conservation Information for Parcel(s) (Mapping Source: The Nature Conservancy - Long Island)													
Parcel(s) Identifier	**Subwatershed Identifier(s)**	**Relative Size of Entire Parcel(s)**	**Approx. % of Parcel(s) Area within Watershed**	**Abuts Relatively Dense or is Isolated by Residential Development**	**Abuts Significantly Large Parcel of Protected Land**	**Directly Abuts Water**	**Vacant Land**	**Developed and Agricultural Land**	**Developed but Subdividible Land**	**Priority Vacant Land**	**Priority Developed, Subdividible Land**	**Parcel is Within PEP CNR Boundary**	**CPF Parcel(s)**	**All or Majority of Parcel is Within 1000' Shoreline Buffer**	**Habitat Types Present within Watershed Boundary**	**Approximate % of Wetland Habitat within Subwatershed**	**Approximate % of Upland Habitat within Subwatershed**	**Significant Amounts of Invasive Plant Species**	**Development Potential w/in Watershed Portion**	**In-watershed Rank based upon Observed Habitat Attributes**	**Comments (more comprehensive discussion of each assessed area is attached)**
5502	MH3	small	100					●	●				●		TFo, TSS	0	100	●	high	**1**	Only a small portion of parcel is mapped within subwatershed

Key to abbreviations: PFo (Palustrine Forested), PSS (Palustrine Scrub-shrub), PEM (Palustrine Emergent Marsh), Phrag-PEM (*Phragmites*-dominant emergent marsh), TFo (Terrestrial Forested), TSS (Terrestrial Scrub-Shrub), OMdw (Open Meadow), SM (Salt Marsh), SL (Shoreline), PVP (Potential Vernal Pool), Agri (Areas actively managed for agricultural use), Stm (Stream), CBank (Coastal Embankment)

6.0 REFERENCES

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APPENDIX A

Catch Basin Insert – Performance Data

CATCH BASIN INSERT – PERFORMANCE DATA

Catch basin inserts are attractive retrofit BMPs to some communities due to their relatively easy and low-cost installation. However, in the end, their cost effectiveness is determined by their water quality benefit and the maintenance frequency required. Studies have demonstrated that for many applications, frequent maintenance is necessary to prevent clogging and stormwater flows bypassing the BMP, as well as the resuspension of previously captured material. In addition, the water quality treatment provided is variable, and typically, much lower than many other BMPs. The table below shows removal data from three different studies on a variety of catch basin inserts available on the market. Total suspended solids (TSS) removal varies from 3-82%, with generally lower removals of nutrients. Bacteria removals were not tested as a part of these studies.

Selection of inserts should take into account many factors, such as: predicted flow rates, pollutants of concern, predicted pollutant concentrations, sediment particle size distribution, maintenance requirements, maintenance capability, and the current design of the inserts. Catch basin inserts are not practical for large drainage areas or for areas with high levels of organic debris. Public education and outreach regarding illegal dumping into storm drains could decrease maintenance requirements for these BMPs and help avoid clogging and any subsequent flooding. In addition, regular scheduled inspections and maintenance could result in more effective removals.

Technology	Pollutant Removals (%)					
	TSS	Nitrogen			Total Phosphorus	Bacteria
		TKN	*Nitrate*	*Nitrite*		
StormFilter® with Perlite Filter Media [1] Stormwater Mangement, Inc.	50	24	-13	36	50	ND
Hydro-Kleen™ Filtration System [1] Hydro Compliance Management, Inc.	46-75	0*	0*	0*	0*	ND
Vortechs® System, Model 1000 [1] Vortechnics, Inc.	35	ND	ND	ND	21	ND
CrystalStream™ Water Quality Vault Model 1056 [1] Practical Best Management of Georgia, Inc.	21	13	25	50**	40	ND
Arkal Pressurized Stormwater Filtration System [1] Zeta Technology, Inc.	82	26	-76	-76	55	ND
AbTech Ultra Urban Filter[2] AbTech Industries	45	ND	ND	ND	ND	ND
AquaShield™ [2] AquaShield, Inc.	10	ND	ND	ND	ND	ND
DrainPac™ [2] GeoMarine, Inc.	22	ND	ND	ND	ND	ND
HydroCartridge™ [2] PacTec, Inc.	40	ND	ND	ND	ND	ND
StreamGuard™ [3] Bowhead Manufacturing Co. LLC	3	ND	ND	ND	ND	ND
FossilFilter™ [3] KriStar Enterprises, Inc.	14	ND	ND	ND	ND	ND

ND = No data
* Study indicated that technology was "ineffective" at removal of these constituents
**Study indicated that removal rate may not be accurate due to low influent concentrations

[1] US EPA - Environmental Technology Verification Program for Stormwater Source-Area Treatment Devices http://www.epa.gov/etv/verifications/vcenter9-9.html Studies completed between 2003-2005.
[2] Civil Engineering Research Foundation's Verification Report of the Low-cost Stormwater BMP Study http://www.mackblackwell.org/research/finals/arc2018/MBTC%202018.htm#_Toc53367774
[3] CalTrans BMP Retrofit Pilot Program, Chapter 11 Drain Inlet Inserts, January 2004. http://www.dot.ca.gov/hq/env/stormwater/

APPENDIX B

Watershed Assessment Guide

Watershed Assessment Guide:

A Handbook for Water Managers in the Peconic Estuary Region

1.0 Introduction

The Peconic Estuary is located on the east end of Long Island, New York. This ecosystem has been designated by U.S. Environmental Protection Agency as an "Estuary of National Significance." Development pressures in an area typically characterized by open space and agriculture are forcing water managers to plan wisely now in order to preserve and enhance the water quality and wildlife habitat of the estuary.

Watershed assessments should be performed in order to plan effectively. A watershed assessment addresses pollutant loading sources and restoration opportunities within subject watersheds. The assessment has four main elements: data preparation, field reconnaissance, restoration prioritization, and watershed plan development.

2.0 Data Preparation

Thorough data preparation and review of existing conditions can save time out in the field later on. Watershed managers should gather as much information as possible about the area of concern. Geographic Information System (GIS) data are extremely helpful in a watershed assessment. GIS data layers and water quality data are available for the Peconic Estuary region through the development of the regional stormwater project[1]. Available data include coastline boundaries, topographical contours, critical habitats, existing land use, water quality parameters monitored through the Peconic Estuary Program (PEP), shellfish habitat and closings, and field-identified stormwater discharge locations. In addition to these data, zoning maps, ordinances and regulations for each town within a study area; aerial photography; analysis of aerial photos by US Fish and Wildlife Service (USFWS) for eelgrass beds, macroalgae and shoreline hardening extent; population data; information on swimming beach water quality and closures; number of boats utilizing the embayment from the Vessels Waste No Discharge Zone application to the US Environmental Protection Agency (USEPA); and other studies related to the water quality, hydrology, habitat, flushing, etc., specific to the particular embayment may also be collected and reviewed.

Based on the above data collection effort, drainage basins (watersheds) can be identified for the receiving body of concern, as well as discreet drainage areas (subwatersheds) within the drainage basins. Sites for further investigations can be pre-selected based on outlet locations, available open space (space for retrofits), public ownership, and/or undisturbed lands (i.e., natural wooded land). Once all sites have been pre-selected, a field reconnaissance can be initiated. A field reconnaissance serves many purposes such as verifying existing condition information,

[1]Peconic Estuary Stormwater Assessment and Planning Tool. Horsley Witten Group, October 2003. Prepared for Peconic Estuary Program.

conducting formal investigations for stormwater retrofits, potential pollution sources and restoration opportunities in upland areas, and inventorying potential habitat protection areas. Depending on the breadth of the watershed assessment scope, all or some of these investigations can be included in the field reconnaissance.

Prior to any field work, reconnaissance teams should be prepared with the right tools, forms and maps necessary for the assessment. A checklist should be prepared. **Table 1** includes a sample checklist used in a previous field reconnaissance.

Table 1. Example of Field Reconnaissance Checklist

Watershed Stormwater Retrofit and Upland Non-point Source Assessment

Equipment/Data Needs

- ☐ Watershed Maps (Aerial photography, soils, land use, street maps, USGS quads, habitat maps)
- ☐ 1 digital camera per team
- ☐ 1 calculator per team
- ☐ Field forms, clipboard (waterproof, if possible), pencils (waterproof, if possible)
- ☐ 1 pry bar per team (to pop Manhole/Catch Basin rims)
- ☐ 1 screwdriver per team (to help pop Manhole/Catch Basin rims and assess soil compaction)
- ☐ 1 flashlight per team
- ☐ 1 pair of binoculars per team
- ☐ 1 tape measure per team (25 ft ok, 100 ft, if available)
- ☐ Safety equipment (first aid kit, sun screen, insect repellent)
- ☐ Snacks, water bottle
- ☐ Rain gear (plus umbrella for covering camera/field forms)
- ☐ Authorization letter from client (describes nature of project for potential access to properties)
- ☐ Parking display cards (for dashboards of vehicles)
- ☐ 1 pair of water boots per team (for shallow water access)
- ☐ Cell phones with team member #s (plus client, other local government contacts)
- ☐ Personal items (appropriate clothing, sunglasses, hat, gloves, etc)

3.0 Field Reconnaissance

Field reconnaissance is a must when performing a watershed assessment. The data gathered in the office must be field-verified. For example, there may be physical constraints at a site that appeared promising for restoration on GIS, but the data were either outdated or incomplete. Only out in the field can a manager get the full picture of an area. In addition, local residents

met in the field may be able to provide additional information about a site that could sway the ranking of a project.

3.1 Stormwater Retrofit Reconnaissance Inventory

The goal of a stormwater outfall and retrofit inventory is to determine potential stormwater best management practice (BMP) retrofits in a watershed to better manage and treat stormwater runoff before it enters the receiving waters. Potential locations for the installation of stormwater BMPs should be pre-selected based on land use, parcel ownership (publicly-owned land simplifies implementation), potential conflicts with existing utilities, effective stormwater capture area, and pollutant source locations. Examples of BMPs include the following: sediment forebays, water quality swales (dry or wet), bioretention systems, constructed wetlands, infiltration basins, etc. A field crew shall visit and evaluate each site and fill out separate field forms for each potential BMP retrofit. A sample field form is included in the attachment.

Data collected in the field and compiled afterwards should include the inventory forms, detailed sketches of the site, several site photos, conceptual design plans, and calculations for each site. BMPs should be chosen based on site characteristics that match BMP design criteria. Some characteristics that determine the type of BMP chosen include depth to groundwater, watershed area, available land space, and drainage system or other infrastructure constraints. The pollutants of concern for the study may vary by watershed and could include nitrogen, phosphorus, total suspended solids (TSS), bacteria, metals or hydrocarbons.

The results of this assessment are then used to recommend site specific stormwater management implementation projects in key locations throughout the watersheds.

3.2 Unified Subwatershed and Site Reconnaissance

The Unified Subwatershed and Site Reconnaissance (USSR) procedure was prepared by the Center for Watershed Protection (2004). The USSR is a rapid field survey that helps identify potential pollution sources and restoration opportunities in the upland areas of a watershed. It is a fast and economical approach to characterizing pollutant contributions over a wide range of urban conditions and identifying stakeholders that can help with the restoration planning process. By performing the USSR, water managers can gain a greater understanding of the issues facing a watershed. The data collected on the upland areas of a watershed help to identify potential pollution sources that are not apparent from GIS data analyses, and in general, to characterize the watershed as a whole. This data framework will help managers target effective homeowner and commercial education programs, as well as future restoration projects. In addition, this information forms a baseline to which future assessments can be compared in order to determine rate of change in the watershed (i.e., where pollution problems have increased over time or where education programs have been successful in modifying certain behaviors).

The USSR is comprised of four major components: Neighborhood Source Assessments, Hotspot Site Investigations, Pervious Area Assessments, and Streets and Storm Drains. Separate field forms are used for each assessment component, which are included in the attachment.

Neighborhood Source Assessment (NSA)
The NSA is used to evaluate pollutant-generating behaviors in individual neighborhoods and identify potential restoration opportunities. Field forms are completed on topics including neighborhood characterization; yard and lawn conditions; driveways, sidewalks, and curbs; rooftops; common areas; and initial neighborhood assessment and recommendations. Three lots are chosen at random to provide an average sample for the neighborhood. At the end of the assessment, a pollution severity index is assigned, and the overall restoration potential is assessed for each neighborhood.

Hotspot Site Investigation (HSI)
Stormwater hotspots are land uses or activities that produce higher concentrations of pollutants. There are two types of hotspots, those regulated by federal or state law and those that are unregulated. The following land uses and activities are considered stormwater hotspots as listed in the New York State Stormwater Management Design Manual (2003):

- Vehicle salvage yards and recycling facilities*
- Vehicle fueling stations
- Vehicle service and maintenance facilities
- Vehicle and equipment cleaning facilities*
- Fleet storage areas (bus, truck, etc.)*
- Industrial sites*
- Marinas (service and maintenance)*
- Outdoor liquid container storage
- Outdoor loading/unloading facilities
- Public works storage areas
- Facilities that generate or store hazardous materials*
- Commercial container nurseries
- Other land uses and activities as designated by an appropriate review authority

* indicates that the land use/activity is currently regulated

The HSI creates an inventory of storm water hotspots, including regulated and non-regulated sites, and assesses the severity of each hotspot with regard to its potential to generate storm water runoff or illicit discharges. The HSI is also used to propose appropriate follow-up actions for each hotspot, including recommendation for rapid enforcement and the feasibility of onsite stormwater retrofits. Field forms are completed on topics including site data and basic classification, vehicle operations, outdoor materials, waste management, physical plant, turf/landscaping areas, stormwater infrastructure, and initial hotspot status-index results. Hotspot status for each site is broken down into four categories: not a hotspot, potential hotspot, confirmed hotspot, and severe hotspot.

Pervious Area Assessment (PAA)
The PAA evaluates the existing condition of natural area remnants and open spaces, identify their potential management needs, and also helps to determine the reforestation opportunities for large pervious areas. Field forms are completed on topics including parcel description, current vegetative cover, impacts, and initial recommendations.

Streets and Storm Drains (SSD)
The SSD estimates the severity of pollutant buildup on roads and within storm drain systems and rates the practicability of four municipal maintenance strategies. SSD assessments are usually associated with either NSA or HSI sites. Field forms are completed on topics including location, street conditions, storm drain inlets and catch basins, non-residential parking lots, and municipal pollutant reduction strategies.

The results of these investigations are used to target specific watershed actions that may include public education, regulatory code reform, and/or targeted inspections.

3.3 Habitat Reconnaissance Inventory

Areas should be selected for on-site review if they are undeveloped, primarily forested, appear to contain a significant amount of upland with residential development potential, and are not mapped as "Protected Land" according to existing information provided by The Nature Conservancy (TNC) and/or Suffolk County. These areas can be either stand-alone properties or areas comprised of a number of abutting properties. Field assessments should generally only occur within the portions that are mapped within the subwatershed boundary of concern. In certain instances, you may discover that development is underway on selected parcels; and therefore, an on-site assessment of habitat features should not be performed. In addition, if an area is posted with "No Trespassing" signs, the area should not be entered for assessment without prior premission.

The field data should constitute the answers to habitat assessment questions and other observations. Some attributes to consider for assessing watershed habitat include the following:

1) Habitat complexity
- number of plant layers,
- condition of plant layer coverage,
- spatial pattern of shrubs and/or trees,
- number of cover types in each plant layer,
- ratio of cover types,
- degree of cover type interspersion,
- the presence of undesirable species,
- percent open water,
- degree of vegetation/water interspersion,
- shape of the wetland/upland edge, and
- wildlife attractors

2) Features which reduce habitat value
- disturbance of wildlife habitat
- observable contamination

In addition to the above, other habitat attributes to consider include:

- the proximity of the subject area to residential or commercial development;

- the proximity of the subject area to protected land;
- evidence of land management activities (such as mowing and debris disposal); and
- wildlife species or wildlife habitat use evidence encountered.

4.0 Prioritizing Restoration Options

Watershed recommendations generally come in two categories: (1) regulatory and programmatic actions, or (2) as restoration and protection projects. Regulatory and programmatic actions include changes to local codes, ordinances and programs that are derived from the audit of local government capacity to protect the watershed. Examples of regulatory actions include adopting a stream buffer ordinance, encouraging conservation-oriented design of land development project, and establishing stringent stormwater criteria. Hiring watershed coordinators, ESC inspectors, or building a municipal street sweeping program are considered programmatic actions. Priority protection and restoration projects require implementation of priority, on-the-ground projects. Protection objectives generally involve land acquisition or applying conservation easements. Restoration projects include stream restoration, stormwater retrofits, and riparian reforestation, etc.

Since most communities will not be able to implement all the recommended actions or projects identified, it is important to go through a ranking process to identify priority sites. Not all recommendations are equal when it comes to implementation. Some recommendations, such as regulatory changes or land acquisition, may be more time sensitive than restoration projects, particularly in areas expecting significant development pressures in the short-term. Many large-scale stormwater retrofit or stream restoration projects require detailed planning and permitting which takes time, while buffer planting or trash cleanups are easy projects that can be completed in a few days.

Project ranking allows restoration projects to be compared together on a common basis to find the most cost-effective and feasible projects in the watershed. One of the key decisions in project ranking is whether to evaluate projects within the same group (e.g., stormwater retrofits) or evaluate all different types of projects together. There are pros and cons to each approach. In general, it is preferable to assess all groups of projects at the same time, as long as the ranking factors are compatible among the groups.

A proposed retrofit ranking system could include the following major factors:

1. Pollutant Removal Potential
   - Impervious area treated
   - Percent of water quality target volume treated
   - Pollutant load reduction
2. Project cost
3. Implementation feasibility based on ownership, wetland impact/permitting, access, maintenance, and utilities
4. Supplemental benefits such as habitat and public benefit

Ranking systems can vary by watershed based on what the specific needs are. The basic concept is to evaluate the relative merit of proposed retrofit sites by assigning points to a site based on its

ability to meet various criteria under each of the four major factors cited above. A ranking system can place an emphasis on (by weighting more heavily) a particular factor. For example, if the pollutant removal potential is most important, a larger percentage of the total points can be allocated to that category. Summing the assigned points for each of the factors gives an overall site score. Sites with the highest score represent the best overall candidates for implementation from a stormwater management vantage point.

The cost estimates can be based on a combination of compiled data in "Costs and Benefits of Stormwater BMPs" (Center for Watershed Protection, 1998) and best professional judgment based on experience. The cost estimate found in the CWP 1998 resource should be modified to account for elapsed time plus the incurred cost of implementing retrofits versus new construction. This provides for a more realistic, if not more conservative, cost estimate. The exact costs will vary from these estimates based on final engineering design, permitting and contingencies. Design, permitting and contingency costs can be generally estimated at approximately 30-35% of the base construction costs (CWP, 1998).

5.0 Watershed Plan Development

Once the restoration projects have been ranked, the above information should be compiled into a watershed plan, complete with all the relevant maps, forms, and other collected data. This plan can be used to justify specific improvement projects and should be updated if additional information becomes available or if priorities change. A good watershed plan is an excellent reference to have in order to select appropriate improvement projects when funding becomes available. It also will contain much of the supporting data and rationale necessary to secure grant funding with specific guidelines. The completion of an effective watershed plan indicates that a community or organization has thought through its watershed and strengths, weakness, and priorities and is prepared to move forward with organized corrective activities.

Attachment: Field Forms

1. Stormwater Retrofit Reconnaissance Inventory
2. Neighborhood Source Assessment
3. Hotspot Site Investigation
4. Pervious Area Assessment
5. Streets and Storm Drains

Stormwater Retrofit Reconnaissance Inventory

1. Site Number: _____

2. Location (Address and/or Parcel ID) _____

3. Description (preliminary assessment of most likely retrofit-quality, quantity, or both):

_____

_____

4. Unique elements of retrofit (e.g., method of conveyance or stormwater diversion):

_____

_____

5. Date of Preliminary Survey: _____

6. Property Ownership (public or private): _____

7. Drainage Area: _____

8. Approximate imperviousness (%): _____

9. Adjacent Land Use (Possible conflicts): _____

_____

_____

10. Conflicts with Existing Utilities: _____

_____

_____

11. Construction and Maintenance Access:

_____

_____

_____

12. Wetlands Present? ☐ Yes ☐ No

If yes, describe: _____

_____

_____

13. Retrofit Volume Computations: _____

_____

_____

_____

_____

14. Photo #_____

15. Additional Notes and/or Sketch Information:

16. Site Candidate for Further Investigation: ☐ Yes ☐ No

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) <⅛ ⅛ ¼ ⅓ ⅓ acre ☐ Multifamily (Apts, Townhomes, Condos)

☐ Single Family Detached <¼ ¼ ½ 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

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:

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 ☐ Boats ☐ Other: _____	
B2. Approximate number of vehicles:	
B3. Vehicle activities (circle all that apply): Maintained Repaired Recycled Fueled Washed Painted 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)

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:

Pervious Area Assessment **PAA**

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

A. PARCEL DESCRIPTION

Size: ___acre(s) Access to site (*check all that apply)*: ☐ Foot access ☐ Vehicle access ☐ Heavy equipment access
Ownership: ☐ Private ☐ Public Current Management: ☐ School ☐ Park ☐ Right-of-way ☐ Vacant land
☐ Other (please describe) _____
Contact Information: _____
Connected to other pervious area? ☐ Y ☐ N If yes, what type? ☐ Forest ☐ Wetland ☐ Other _____
Estimated size of connected pervious area: ____ acre(s) Record Unique Site ID of connected fragment: _____

PART I. NATURAL AREA REMNANT

FOREST

B. CURRENT VEGETATIVE COVER

B1. Percent of forest with the following canopy coverage:
Open _____% Partly shaded _____% Shaded _____%
**Note – these should total 100%*
B2. Dominant tree species: _____
_____
B3. Understory species: _____
_____
B4. Are invasive species present? ☐ Y ☐ N
☐ Unknown
If yes, % of forest with invasives: _____
Species: _____

C. FOREST IMPACTS

C1. Observed Impacts (*check all that apply*): ☐ Animals
☐ Clearing/encroachment ☐ Trash and dumping ☐
Storm water runoff ☐ Other

D. NOTES

WETLAND

B. CURRENT VEGETATIVE COVER

B1. % of wetland with following vegetative zones:
Aquatic: _____
Emergent: _____
Forested: _____
**Note – these should total 100%*
B2. Dominant species: _____
_____
B3. Are invasive species present? ☐ Y ☐ N
☐ Unknown
If yes, % of wetland with invasives: _____
Species: _____

C. WETLAND IMPACTS

C1. Observed Impacts (*check all that apply*): ☐ Animals
☐ Clearing/encroachment ☐ Trash and dumping ☐
Storm water runoff ☐ Hydrologic impacts ☐ Other

D. NOTES

E. INITIAL RECOMMENDATION

☐ Good candidate for conservation/protection
☐ Potential restoration candidate
☐ Poor restoration or conservation candidate

PART II. OPEN PERVIOUS AREAS

A. CURRENT VEGETATIVE COVER

A1. Percent of assessed surface with:
Turf _____% Other Herbaceous _____% None (bare soil) _____% Trees _____% Shrubs ____ % Other _____%
(please describe): _____ **Note – these should total 100%*

A2. Turf: Height: _____ inches Apparent Mowing Frequency: ☐ Frequent ☐ Infrequent ☐ No-Mow ☐ Unknown
Condition (*check all that apply*): ☐ Thick/Dense ☐ Thin/Sparse ☐ Clumpy/Bunchy ☐ Continuous Cover

A3. Thickness of organic matter at surface: _____ inches

A4. Are invasive species present? ☐ Y ☐ N ☐ Unknown If yes, % of site with invasives: _____
Species:_____

B. IMPACTS

B1. Observed Impacts (*check all that apply*): ☐ Soil Compaction ☐ Erosion ☐ Trash and Dumping
☐ Poor Vegetative Health ☐ Other (describe): _____

C. REFORESTATION CONSTRAINTS

C1. Sun exposure: ☐ Full sun ☐ Partial sun ☐ Shade ☐ Unknown

C2. Nearby water source? ☐ Y ☐ N ☐ Unknown

C3. Other constraints: ☐ Overhead wires ☐ Underground Utilities ☐ Pavement ☐ Buildings
☐ Other (please describe): _____

D. NOTES

E. INITIAL RECOMMENDATION

☐ Good candidate for natural regeneration
☐ May be reforested with minimal site preparation
☐ May be reforested with extensive site preparation
☐ Poor reforestation or regeneration site

PART III. SKETCH

WATERSHED:	**SUBWATERSHED:**	**UNIQUE SITE ID:**
DATE: ___/___/_____	**ASSESSED BY:**	**CAMERA ID:**
MAP GRID	**RAIN IN LAST 24 HOURS** ☐ Y ☐ N	**PIC #**

A. LOCATION

A1. Street names or neighborhood surveyed:
_____

A2. Adjacent land use: ☐ Residential ☐ Commercial ☐ Industrial ☐ Institutional ☐ Municipal ☐ Transport-Related

A3. Corresponding HSI or NSA field sheet? If so, circle HSI or NSA and record its Unique Site ID here _____

B. STREET CONDITIONS

B1. Road Type: ☐ Arterial ☐ Collector ☐ Local ☐ Alley ☐ Other: _____

B2. Condition of Pavement: ☐ New ☐ Good ☐ Cracked ☐ Broken

B3. Is on-street parking permitted ☐ Y ☐ N If yes, approximate number of cars per block: _____

B4. Are large cul-de-sacs present? ☐ Y ☐ N

B5. Is trash present in curb and gutter? If so, use the index to the right to record amount.	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

C. STORM DRAIN INLETS AND CATCH BASINS

C1. Type of storm drain conveyance: ☐ open ☐ enclosed ☐ mixed

C2. Percentage of inlets with catch basin storage: _____ ☐ N/A

Sample 1-2 catch basins per NSA/HSI	**C3.** Catch basin #1	**C4.** Catch basin #2
Latitude	___° ___' ___"	___° ___' ___"
Longitude	___° ___' ___"	___° ___' ___"
LMK #		
Picture #		
Current Condition	☐ Wet ☐ Dry	☐ Wet ☐ Dry
Condition of Inlet	☐ Clear ☐ Obstructed	☐ Clear ☐ Obstructed
Litter Accumulation	☐ Y ☐ N	☐ Y ☐ N
Organics Accumulation	☐ Y ☐ N	☐ Y ☐ N
Sediment Accumulation	☐ Y ☐ N	☐ Y ☐ N
Sediment Depth (in feet)	_____ ft.	_____ ft.
Water Depth	_____ ft.	_____ ft.
Evidence of oil and grease	☐ Y ☐ N	☐ Y ☐ N
Sulfur smell	☐ Y ☐ N	☐ Y ☐ N
Accessible to vacuum truck	☐ Y ☐ N	☐ Y ☐ N

D. NON-RESIDENTIAL PARKING LOT (>2 acres)

D1. Approximate size: _____ acres

D2. Lot Utilization: ☐ Full ☐ About half full ☐ Empty

D3. Overall condition of Pavement: ☐ Smooth (no cracks) ☐ Medium (few cracks) ☐ Rough (many cracks) ☐ Very Rough (numerous cracks and depressions)

D4. Is lot served by a storm water treatment practice? ☐ Y ☐ N If yes, describe: _____

D5. On-site retrofit potential: ☐ Excellent ☐ Good ☐ Poor

E. MUNICIPAL POLLUTANT REDUCTION STRATEGIES

E1. Degree of pollutant accumulation in the system: ☐ High ☐ Medium ☐ Low ☐ None

E2. Rate the feasibility of the following pollution prevention strategies:

Street Sweeping:	☐ High	☐ Moderate	☐ Low
Storm Drain Stenciling:	☐ High	☐ Moderate	☐ Low
Catch Basin Clean-outs:	☐ High	☐ Moderate	☐ Low
Parking Lot Retrofit Potential:	☐ High	☐ Moderate	☐ Low

CATCH BASIN SKETCHES

#1

#2

Notes:

APPENDIX C

Description of Proposed Best Management Practices

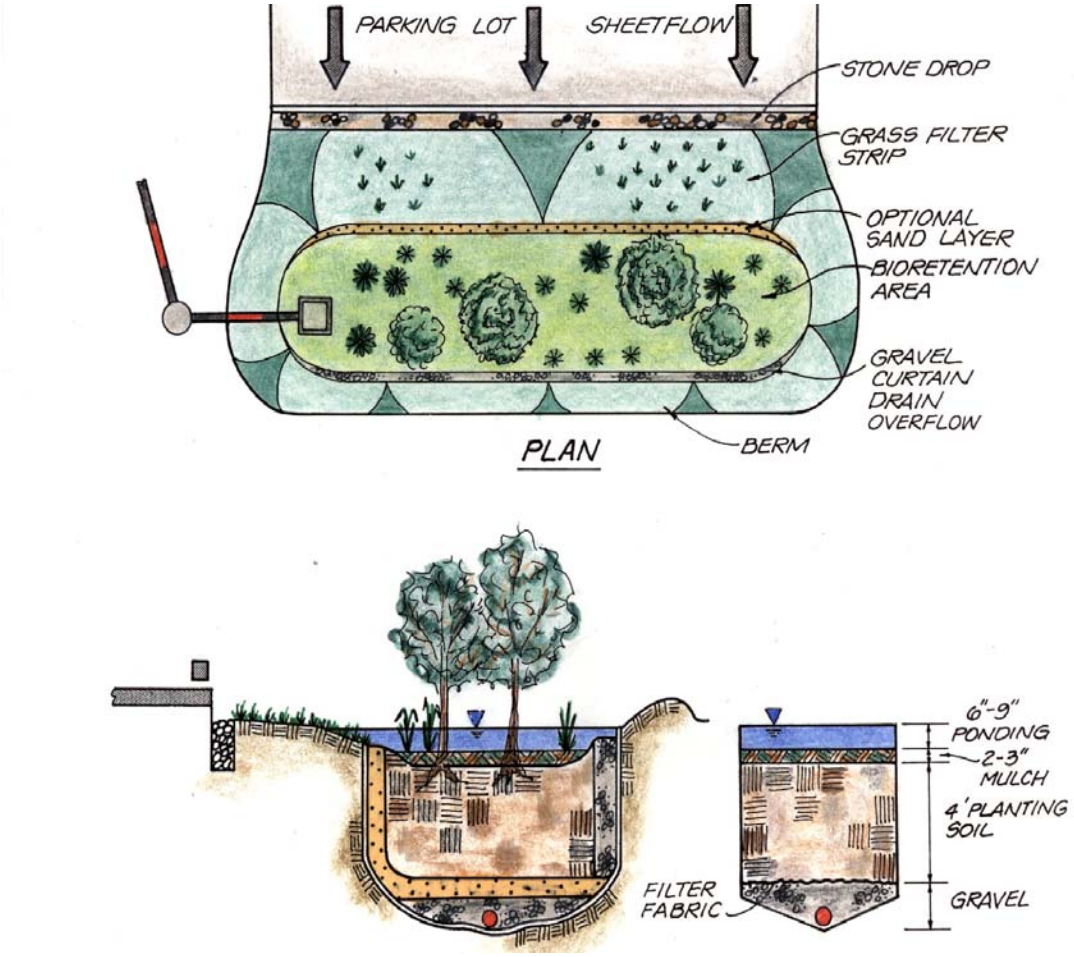
DESCRIPTION OF PROPOSED BEST MANAGEMENT PRACTICES

The best management practices proposed for implementation at sites in the Meetinghouse Creek watershed include bioretention systems, grass channels, filter strips, sediment forebays, and infiltration basins. A detailed description of each is included below.

1. Bioretention System

The bioretention system (also referred to as a "rain garden" or a "biofilter") is a stormwater management practice to manage and treat stormwater runoff using a conditioned soil bed and planting materials to filter runoff stored within a shallow depression. The method combines physical filtering and adsorption with bio-geochemical processes to remove pollutants. The system consists of an inflow component, a pretreatment element, an overflow structure, a shallow ponding area (less than 6" deep), a surface organic layer of mulch, a planting soil bed, plant materials, and an underdrain system to convey treated runoff to a downstream facility (see Figure C-1).

Figure C-1: Schematic of a Bioretention System (Claytor & Schueler, 1996)



Bioretention facility surface areas are typically sized at a ratio of 5% of the impervious area draining to the facility to capture, manage, and treat runoff from the 1.2-inch precipitation event (Claytor & Schueler, 1996). Pretreatment for bioretention consists of a grass channel or grass filter strip, a gravel diaphragm / stone drop, and a mulch layer. In addition, there are several physical geometry recommendations that should be considered in the layout and design of bioretention facilities. Suggested design guidance is included in Table C-1.

Bioretention facilities are cost-effective measures designed to help meet many of the management objectives of watershed protection. Because these practices are proportional to the percentage of impervious area, the cost is relatively constant with drainage area. Unlike retention ponds and constructed stormwater wetlands, whose cost decreases with increasing drainage area, bioretention does not benefit from economies of scale. Typical capital construction costs are in the range of approximately $7 to $8 per cubic foot of storage. Annual maintenance cost is approximately 5 to 7% of capital construction costs or in the range of $900 to $1,000 per impervious acre treated.

Table C-1. Design Guidance for a Bioretention System

Design Guidance	
Minimum width	10 feet
Minimum length	15 feet
Length to width ratio	2:1
Maximum ponding depth	6 inches
Planting soil depth	4 feet
Underdrain system	6" pipe in 8" gravel bed
Plant spacing	trees* at 10-foot centers; shrubs* at 5-foot centers; herbaceous materials* at 1- to 2-foot centers

*See the Native Plant Guide (Table H.5) in the New York State Stormwater Management Design Manual for particular native plant species that work well in bioretention systems.

Inspections are an integral part of system maintenance. During the six months immediately after construction, bioretention facilities should be inspected at least twice or more following precipitation events of at least 0.5 inch to ensure that the system is functioning properly. Thereafter, inspections should be conducted on an annual basis and after storm events of greater than or equal to the water quality storm event. Minor soil erosion gullies should be repaired when they occur. Pruning or replacement of woody vegetation should occur when dead or dying vegetation is observed. Separation of herbaceous vegetation root stock should occur when over-crowding is observed, or approximately once every 3 years. The mulch layer should also be replenished (to the original design depth) every other year as directed by inspection reports. The previous mulch layer would be removed, and properly disposed of, or roto-tilled into the soil

surface. If at least 50% vegetation coverage is not established after two years, a reinforcement planting should be performed. If the surface of the bioretention system becomes clogged to the point that standing water is observed on the surface 48 hours after precipitation events, the surface should be roto-tilled or cultivated to breakup any hard-packed sediment, and then revegetated.

2. Grass Channel

Grass drainage channels (also commonly referred to as swales) are proposed for conveyance and pretreatment use (Figure C-2). Grassed drainage channels accent the natural landscape, break up impervious areas, and are appropriate alternatives to curb and gutter systems. They are best suited to treat runoff from lower density areas and roadways. They are often used in combination with other stormwater management practices as a part of the runoff conveyance system to provide pre-treatment. They are designed for water quality treatment and provide limited infiltration to groundwater.

The design criteria for grass channels are similar to dry swales (see Table C-2). However, the costs to construct grass channels are much lower because the prepared soil and underdrain system are not part of the design. Grass channels have an estimated cost of $0.50 per cubic foot (based on cost per square foot, and assuming 6 inches of storage in the filter) (SWRPC, 1991). The annual maintenance cost can range from 5 to 7 % of the construction cost (SWRPC, 1991).

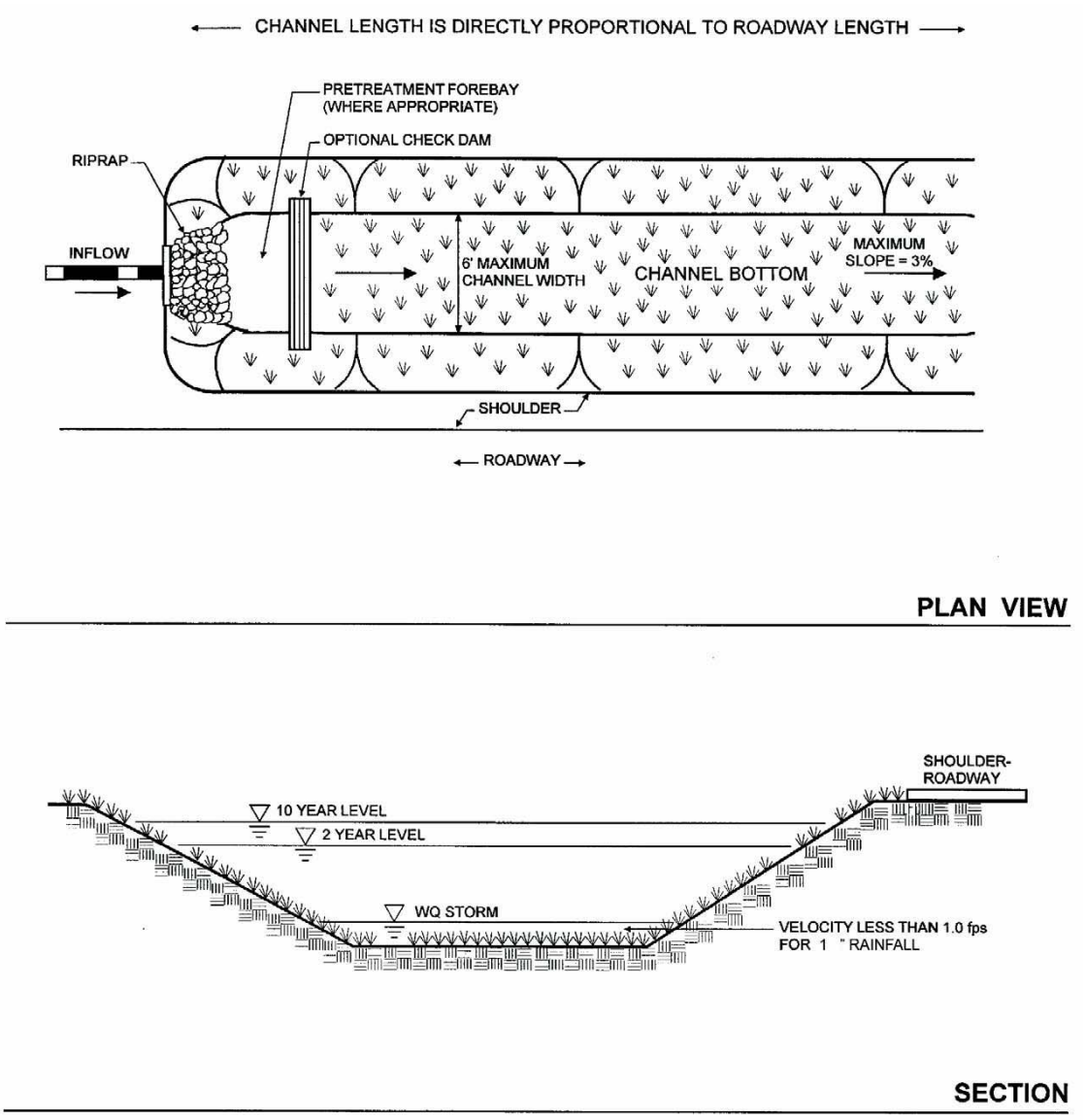
Similar to dry swales, the lifetime of grass channels is directly proportional to the maintenance frequency. The maintenance objective for this practice includes preserving or retaining the hydraulic and removal efficiency of the channel and maintaining a dense, healthy grass cover. The following activities are recommended on an annual basis or as needed:

- Mowing and litter and debris removal
- Stabilization of eroded side slopes and bottom
- Nutrient and pesticide use management
- Dethatching swale bottom and removal of thatching
- Discing or aeration of swale bottom

Table C-2: Design Criteria for Grass Channels (Claytor and Schueler, 1996)

Design Criteria	
Bottom Width	2 feet minimum, 6 feet maximum, widths up to 12 feet are allowable if a dividing berm or structure is used
Side Slopes	3:1 or flatter
Longitudinal Slope	1.0% minimum, 4.0% maximum
Flow Depth and Capacity	4 inch for water quality treatment
Flow Velocity	1.0 fps for water quality treatment, 4.0 to 5.0 fps for 2 year storm, 7.0 fps for 10-year storm
Length	Length necessary for 10-minute residence time

Figure C-2: Schematic of a Grassed Channel (Vermont Agency of Natural Resources, 2002)



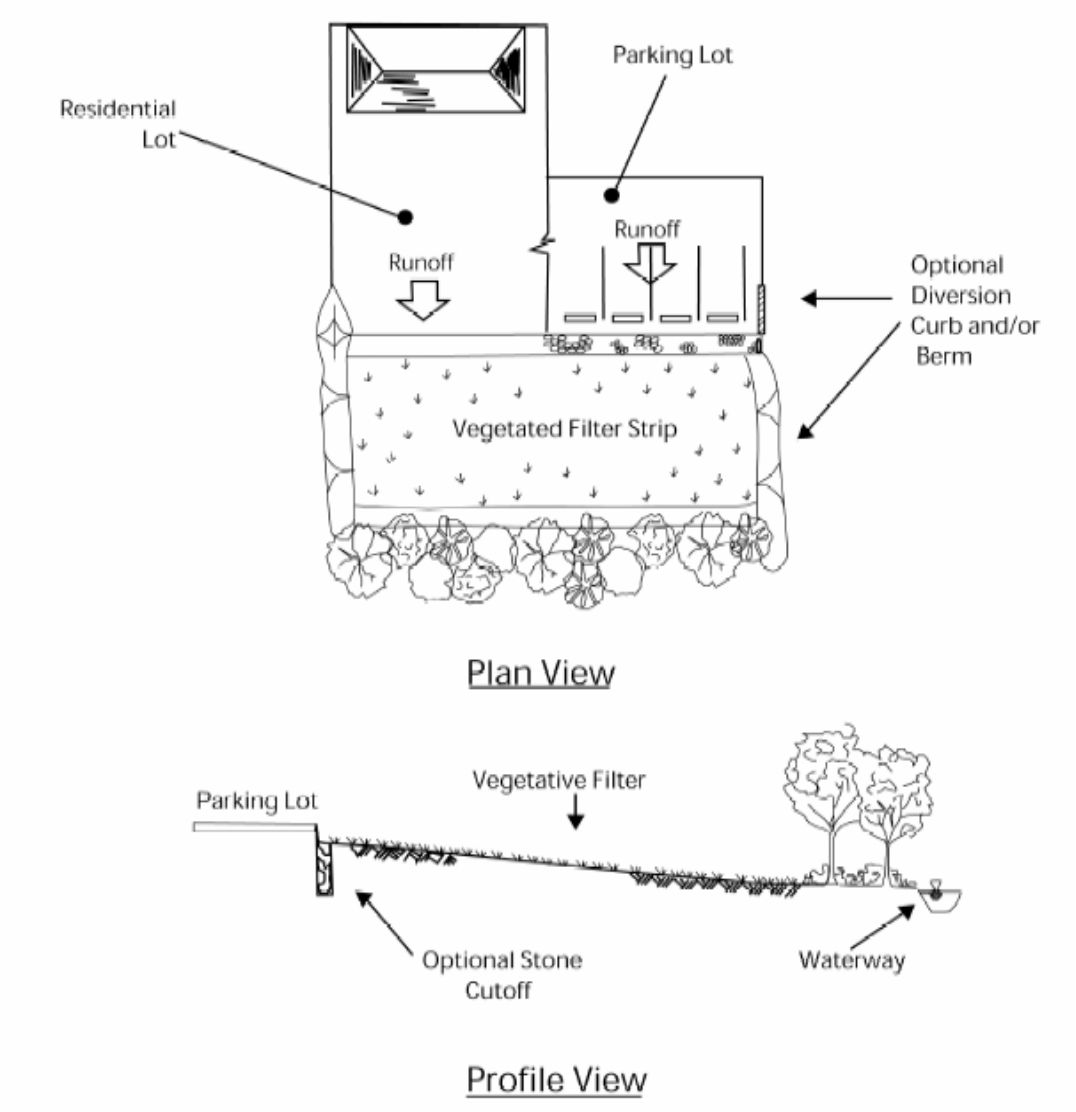
Grass channels should be inspected on an annual basis and just after storms of greater than or equal to the water quality storm event. Both the structural and vegetative components should be inspected and repaired. When sediment accumulates to a depth of approximately 3 inches, it should be removed, and the swale should be reconfigured to its original dimensions. The grass in the channel should be mowed at least 4 times during the growing season. If the surface of the grass channel becomes clogged to the point that standing water is observed on the surface 48 hours after precipitation events, the bottom should be roto-tilled or cultivated to break up any hard-packed sediment, and then reseeded. Trash and debris should be removed and properly disposed of.

3. Filter Strip

A vegetative filter (Figure C-3) can be effective only where the runoff entering and flowing through the strip remains as sheet flow and does not concentrate. Vegetated filter strips are limited due to this requirement. The area used for the filter strip itself must be mildly sloped and uniformly graded to maintain sheet flow or, in the case of indigenous areas, have surface features that retard, pond, and/or disperse runoff generally over the entire filter width. Second, the drainage area to the strip must also be uniformly graded and have a relatively horizontal downstream edge where it meets the upstream end of the filter strip.

The vegetation in all filter strips must be dense and remain healthy and, in the case of planted or indigenous woods, have an effective mulch or duff layer. In addition, a vegetated filter strip must have a maintenance plan and be protected by an easement,

Figure C-3: Schematic of a Vegetated Filter Strip
(Claytor and Schueler, 1996)



deed restriction, or other legal measure that guarantees its existence and effectiveness in the future. Depending upon their TSS removal rate, vegetated filter strips can be used separately or in conjunction with other stormwater quality practices to achieve an overall pollutant removal goal. The general design of vegetated filter strips takes into consideration the following design criteria (Table C-5):

Table C-3: Design Criteria for Vegetated Filter Strips (Claytor & Schueler, 1996)

Design Criteria	
Sizing Criteria	Area of filter generally equal to contributing drainage area. Minimum length = 25 feet
Slope	Minimum slope = 2.0% Maximum slope = 6.0%
Treatment Drainage Area	Maximum overland flow lengths: Pervious surfaces = 150 feet Impervious surfaces = 75 feet

Filter strips are similar to grass channels in costs because there is no prepared soil and underdrain system as part of the design. The estimated cost of filter strips for the purpose of this report is the same as for grass channels of $0.50 per cubic foot (SWRPC, 1991). The annual maintenance cost can range from 5 to 7 % of the construction cost (SWRPC, 1991).

Similar to grass channels, the life of filter strips are directly proportional to the maintenance frequency. The maintenance objective for this practice includes preserving or retaining the hydraulic and removal efficiency of the filter strip and maintaining a dense, healthy grass cover. The following activities are recommended on an annual basis or as needed:

- Mowing and litter and debris removal
- Nutrient and pesticide use management
- Dethatching flter strip area and removal of thatching
- Discing or aeration of filter strip area

Every five years removal of sediment to restore infiltration rate and seeding or sodding to restore ground cover are recommended.

Filter strips should be inspected on an annual basis and just after storms of greater than or equal to the water quality storm event. The grass should be mowed at least 4 times during the growing season. Trash and debris should be removed and properly disposed of.

4. Sediment Forebay

A sediment forebay is an excavated pit designed to slow incoming stormwater runoff and settle suspended solids. It is primarily used to pretreat stormwater before continuing to the primary water quality and quantity control BMP, typically stormwater basins and wetlands. Frequent cleaning and inspection is essential to the effectiveness of this BMP.

Sediment forebays rely primarily on settling for pollutant removal. Pollutants are only removed when the sediments forebays are cleaned out.

The design criteria for sediment forebays should incorporate design features to make maintenance accessible and easy. They should not be any deeper than 3 to 6 feet with side slopes not steeper that 3:1. A sediment depth marker makes inspection simple and identifies when sediment removal is due.

Sediment forebays usually are incorporated into stormwater wetland costs. For this project, sediment forebays were proposed for pretreatment of stormwater prior to existing wetlands. The general cost would be similar to stormwater wetlands minus any planting costs, however for the purpose of this report and maintaining a conservative cost estimate, sediment forebays were estimated with the same costs as for constructed wetlands. This includes costs for clearing and grubbing, erosion and sediment control, excavating, grading, and staking. Typical unit base costs for stormwater wetlands range from $1.20 to $2.50 per cubic foot (CWP, 1998). Maintenance costs for wetlands are estimated at 2% per year of the construction costs (CWP, 1998).

Maintenance is essential for proper operation of sediment forebays. Sediment forebays require routine sediment removal annually.

5. Infiltration Basin

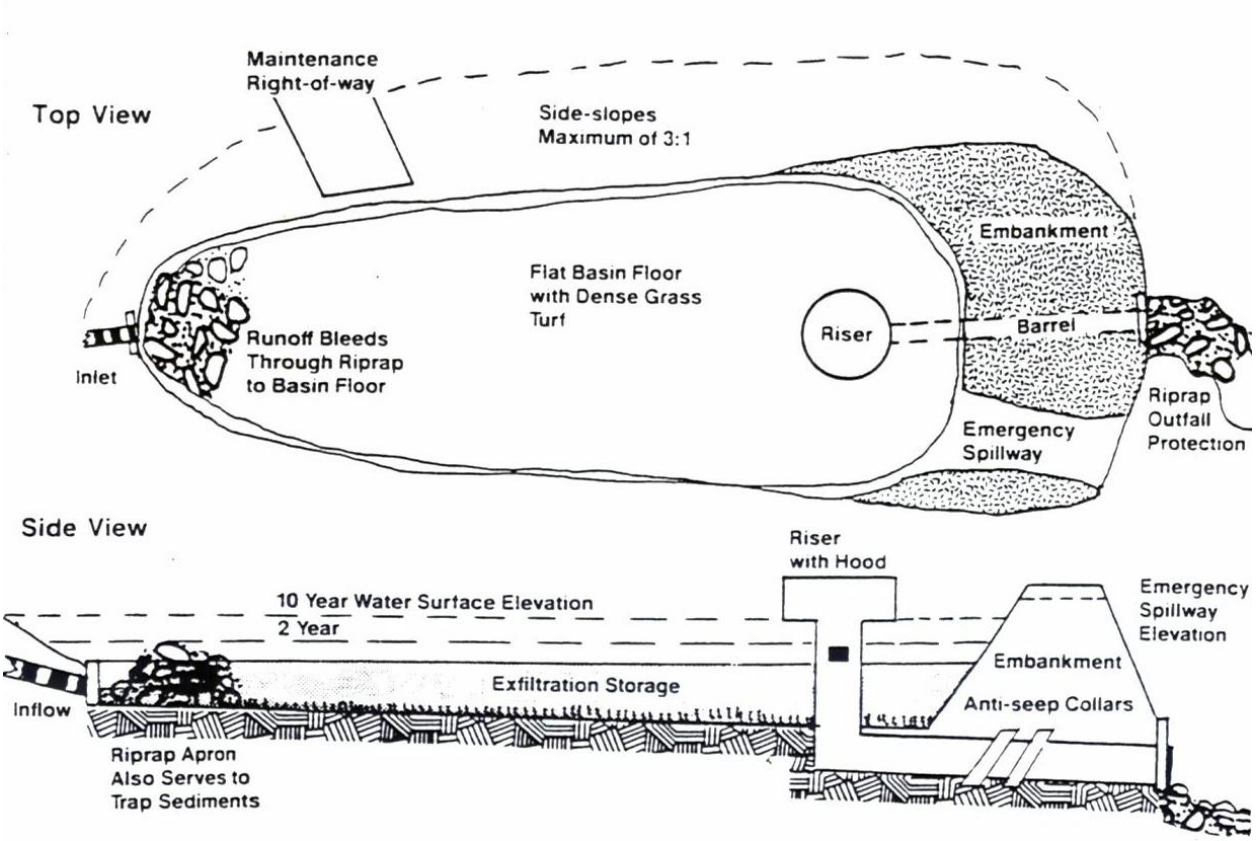
Infiltration basins are stormwater runoff impoundments that are constructed over permeable soils. Pretreatment and regular maintenance is critical to the successful operation of infiltration basins. Runoff from the design storm is stored until it exfiltrates through the soil of the basin floor.

Infiltration basins should be inspected annually to ensure that design infiltration rates are being met. If sediment or organic debris build-up has limited the infiltration capabilities to below the design rate, the top 6 inches will be removed and the surface roto-tilled to a depth of 12 inches. The basin bottom shall be restored according to original design specifications. Infiltration basins will not be used as temporary sediment traps during construction activities. Heavy equipment will not be allowed to operate on the surface location where the infiltration systems are planned because soil compaction would adversely impact their long-term performance. Diversion berms and/or staked silt fence shall be utilized around the perimeter of the infiltration systems during construction. All excavated materials from the area should be removed and disposed of in an approved location.

The estimated costs for infiltration basins are similar to stormwater wetlands including permitting, design, construction, and maintenance costs. Permitting, design and contingency costs are estimated at 25% of the construction costs (EPA, 1999). For the purpose of this report, the estimated costs for stormwater wetlands will be used. This includes costs for clearing and grubbing, erosion and sediment control, excavating, grading, staking, and planting. Typical unit base costs for stormwater wetlands range

from $1.20 to $2.50 per cubic foot (CWP, 1998). Maintenance costs for wetlands are estimated at 2 % per year of the construction costs (CWP, 1998).

Figure C-4: Schematic of an infiltration basin (Schueler, 1987)



APPENDIX D

Selected BMP Sites

APPENDIX D-1

Subwatershed MH-1A

Peconic Bay Estuary Stormwater Retrofit Reconnaissance Inventory

1. Site Number: MH-1A

2. Location (Address and/or Parcel ID) 88 Church Ln.

3. Description (preliminary assessment of most likely retrofit-quality, quantity, or both):
Water quality and quantity retrofit. Existing condition: low-lying front lawns along Church Ln. flood and retain water due to road-side curbing upstream.

4. Unique elements of retrofit (e.g., method of conveyance or stormwater diversion):
Divert roadway runoff into northern lawn area (forebay) for sediment removal before infiltrating runoff in a basin in the southern lawn area. Water quality swales could also be installed along the eastern side of Church Lane for additional pretreatment.

5. Date of Preliminary Survey: 9/12/05

6. Property Ownership (public or private): Private residential lot used as rental

7. Drainage Area: 15.1 acres

8. Approximate imperviousness (%): 19% (2.9 acres)

9. Adjacent Land Use (Possible conflicts): Private residential lots and public right-of-way

10. Conflicts with Existing Utilities: Aboveground power, communications. Underground water line.

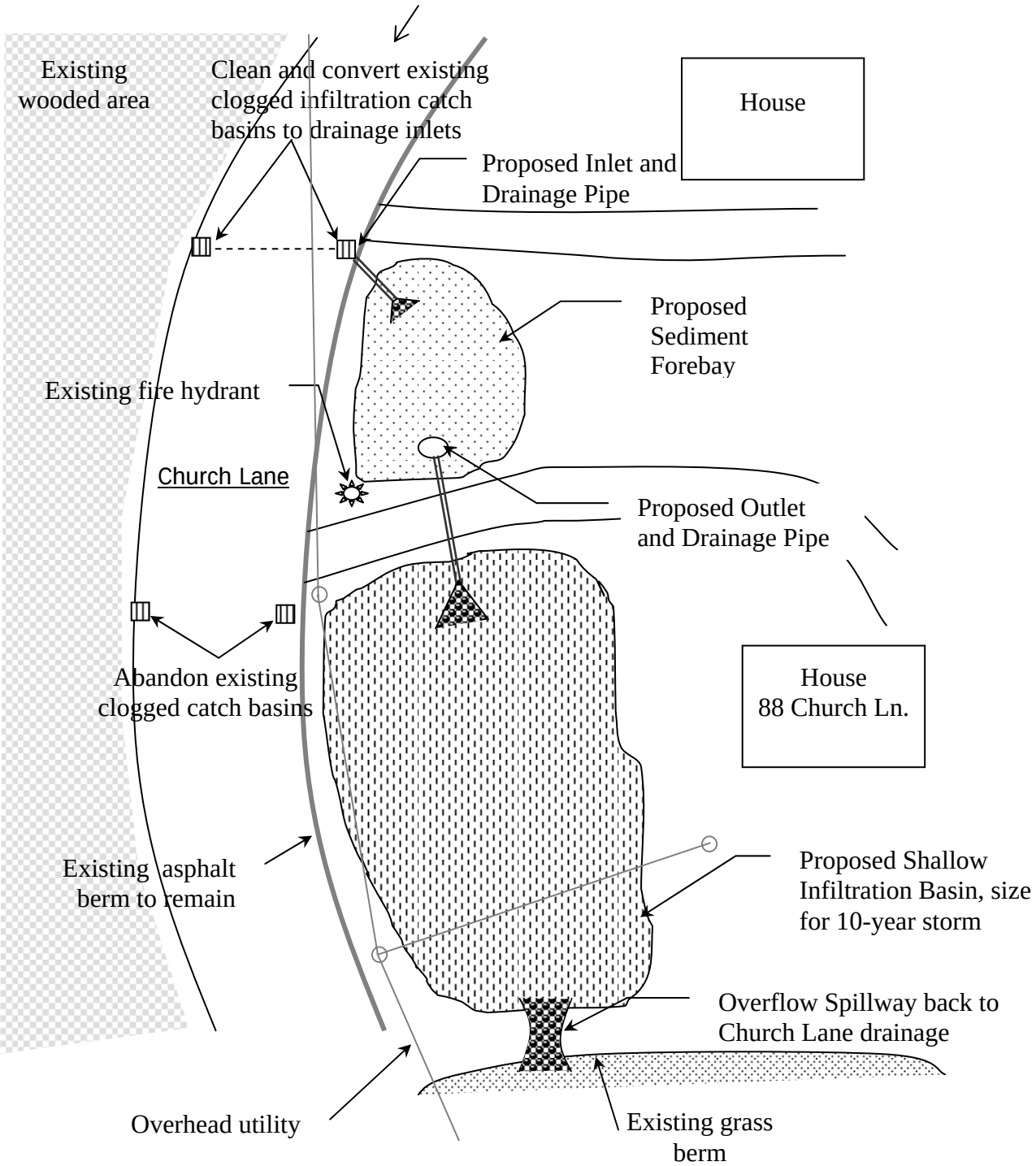
11. Construction and Maintenance Access:
Good access from Church Ln. and private driveways.

12. Wetlands Present? ☐ Yes ☑ No
If yes, describe:

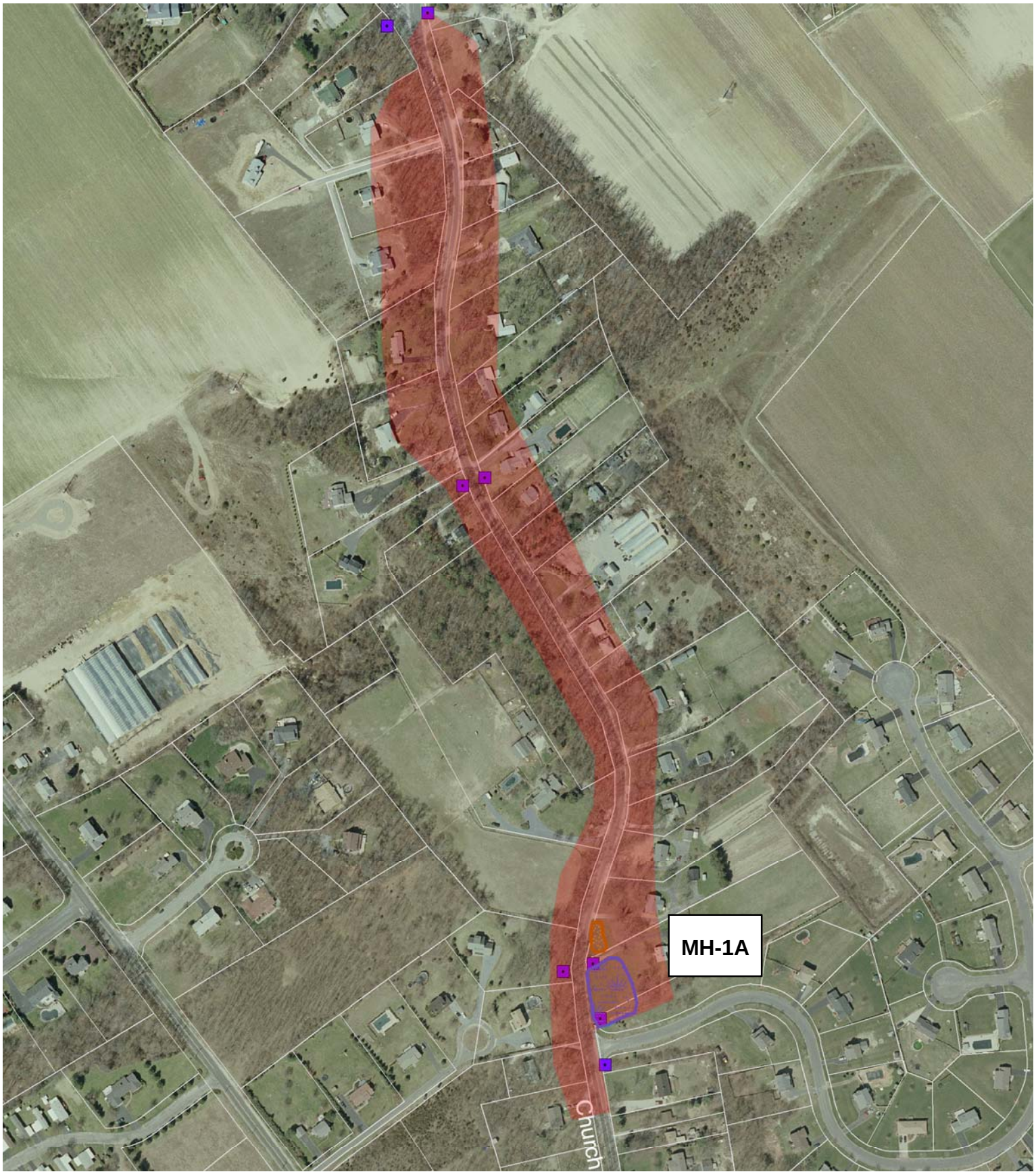
13. Retrofit Volume Computations: 90% Rule: WQV = [(P)(Rv)(A)]/12
Rv = 0.05+0.009(I)
WQV = [(P)(0.05+0.009(I))(A)]/12
WQV =[(1.2")(0.05+0.009(19))(15.1)]/12
WQV = 0.33 acre-ft ≅ 14,344 cf
Size infiltration basin for 10-yr storm (5.0"), see drainage calculations for more detail

14. Photo # MH1a-N, MH1a-S, MH1a-E

15. Additional Notes and/or Sketch Information:



16. Site Candidate for Further Investigation: ☑ Yes ☐ No



Legend

- Drainage Area to BMP
- Sediment Forebay
- Infiltration Basin
- Parcels
- Drywells
- MH-1A Site Location

* Source: Aerial Photo, NYS Office of Cyber Security & Critical Infrastructure Coordination, Spring 2004

N

325 Feet

Horsley Witten Group
phone: 508-833-6600
www.horsleywitten.com

BMP Sites - Site MH-1A
Meetinghouse Creek Watershed
Town of Riverhead

7/6/06 MW
J:\4094 Peconic Bay Estuary\GIS\BMP_Sites\MH-1A.mxd

Figure D-1

Meetinghouse Creek

MH-1A Development Entrance

MH-1A Development Entrance

MH-1A East

MH-1A South

MH-1A North

APPENDIX D-2

Subwatershed MH-1B

1. Site Number: MH-1B

2. Location (Address and/or Parcel ID) 299 Church Ln, near fork of Phillips and Church Ln

3. Description (preliminary assessment of most likely retrofit-quality, quantity, or both):
Water quality and quantity retrofit. Existing condition: bowl-shaped, wooded front lawn along Church Ln. currently cut off from runoff by road-side curb/berm. House high up on slope.

4. Unique elements of retrofit (e.g., method of conveyance or stormwater diversion):
Divert road runoff via grass channels into low area for treatment (sediment forebay), storage and infiltration (infiltration basin). Soil is highly pervious. Few trees will have to be removed.

5. Date of Preliminary Survey: 9/12/05

6. Property Ownership (public or private): Private ownership, wooded front yard

7. Drainage Area: 17.25 acres

8. Approximate imperviousness (%): 17% (2.92 acres)

9. Adjacent Land Use (Possible conflicts): Private yards and public right-of-way

10. Conflicts with Existing Utilities: Aboveground utilities as well as water

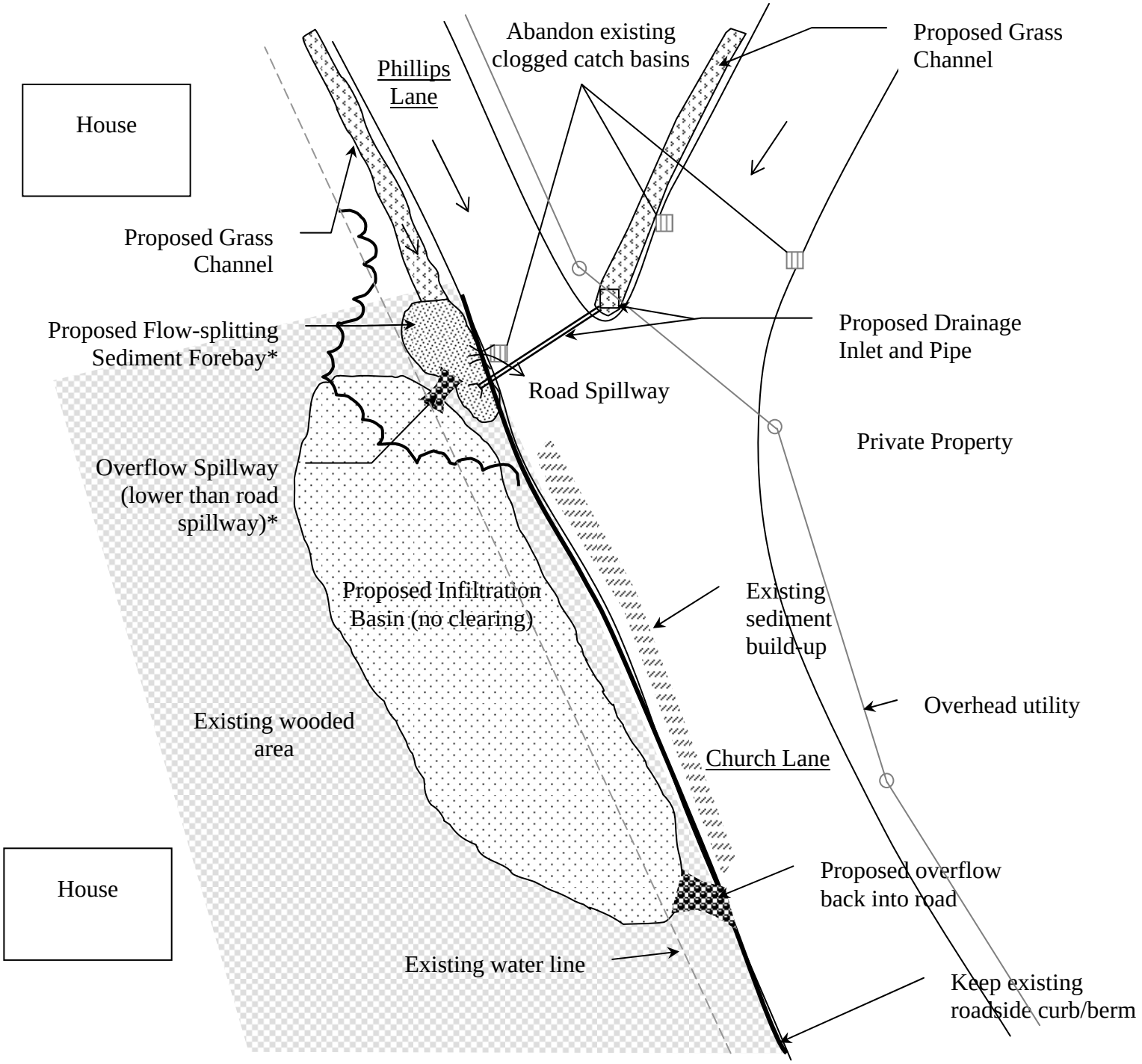
11. Construction and Maintenance Access:
Good access along Church Lane for construction and maintenance. Separated from nearby houses by large slope and many trees.

12. Wetlands Present? ☐ Yes ☑ No
If yes, describe:

13. Retrofit Volume Computations: 90% Rule: WQV = [(P)(Rv)(A)]/12
Rv = 0.05+0.009(I)
WQV = [(P)(0.05+0.009(I))(A)]/12
WQV = [(1.2")(0.05+0.009(17))(17.2)]/12
WQV = 0.349 acre-ft ≅ 15,209 cf

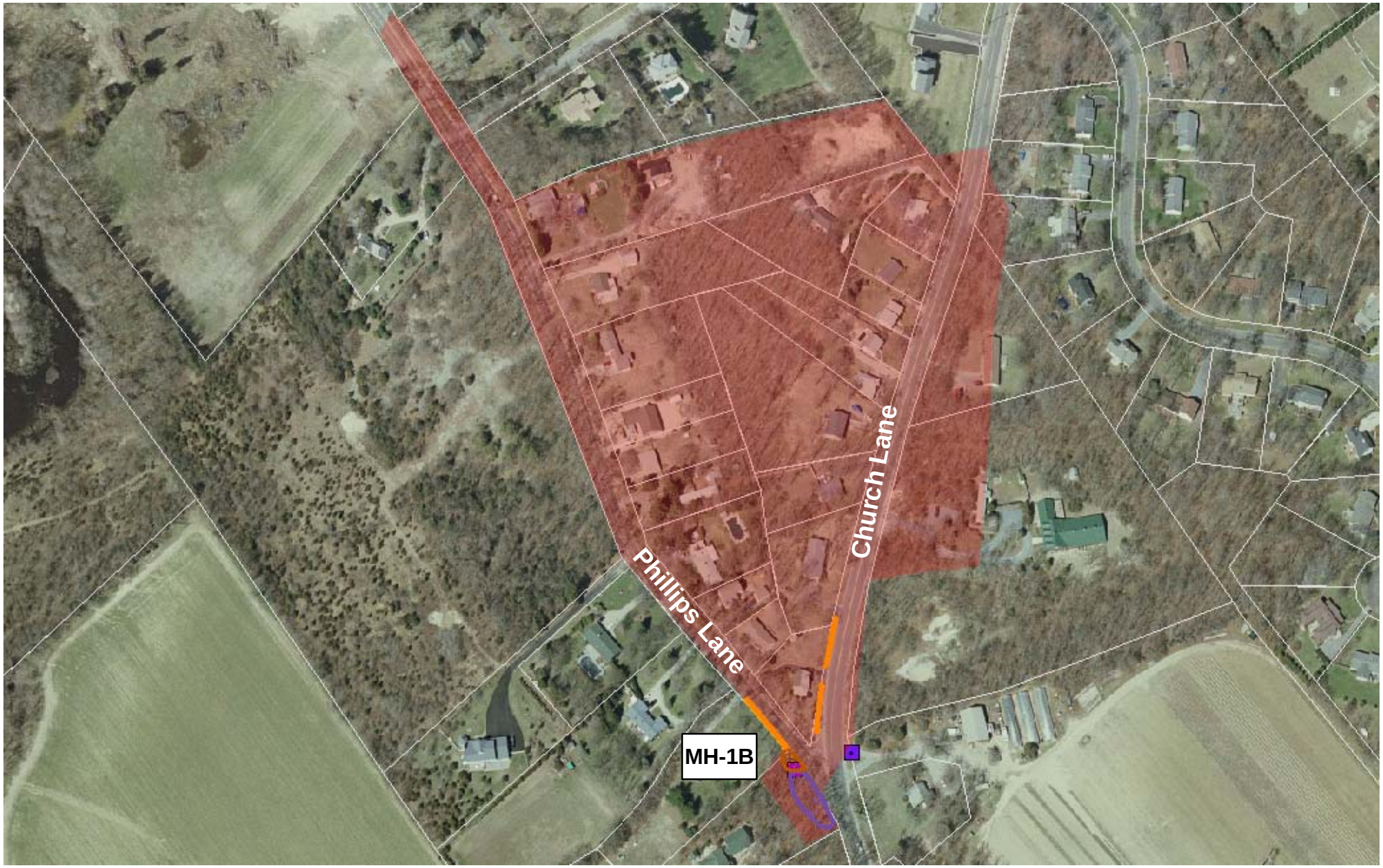
14. Photo # MH1b-NW, MH1b-W, MH1b-SW

15. Additional Notes and/or Sketch Information:



* Spillway to infiltration basin sized for 0.5" storm before overflow back into Church Lane drainage.

16. Site Candidate for Further Investigation: ☑ Yes ☐ No



Legend

- Drainage Area to BMPs
- Grass Channels
- Sediment Forebay
- Infiltration Basin
- Parcels
- Drywells
- MH-1B Site Location

* Source: Aerial Photo, NYS Office of Cyber Security & Critical Infrastructure Coordination, Spring 2004

N

240 Feet

Horsley Witten Group
phone: 508-833-6600
www.horsleywitten.com

BMP Sites - Site MH-1B
Meetinghouse Creek Watershed
Town of Riverhead

7/6/06 MW
J:\4094 Peconic Bay Estuary\GIS\BMP_Sites\MH-1B.mxd

Figure D-2

Meetinghouse Creek

MH-1B Northwest

MH-1B South

MH-1B Southwest

APPENDIX D-3

Subwatershed MH-2

1. Site Number: MH-2

2. Location (Address and/or Parcel ID) Section 067-Parcel 26.1, wetland south of Main St.

3. Description (preliminary assessment of most likely retrofit-quality, quantity, or both):
Water quality retrofit. Existing condition - large wetland area dominated by invasive species. Outlet from Main St. discharges to sediment-filled depression. Headwaters for Meetinghouse Creek.

4. Unique elements of retrofit (e.g., method of conveyance or stormwater diversion):
Improve conveyance to divert more runoff from MH-1 and Main St. into wetland for storage and treatment, and to help revitalize wetland. Improve wetland biodiversity by creating constructed wetland and removing invasives. Create off-line sediment forebay to remove sediment from smaller storms. Good opportunity for public education with appropriate signage.

5. Date of Preliminary Survey: 9/12/05

6. Property Ownership (public or private): Public – town-owned wetland

7. Drainage Area: 5.6 acres

8. Approximate imperviousness (%): 60% (3.3 acres)

9. Adjacent Land Use (Possible conflicts): Cemetery, duck farm, commercial

10. Conflicts with Existing Utilities: Aboveground utilities, water

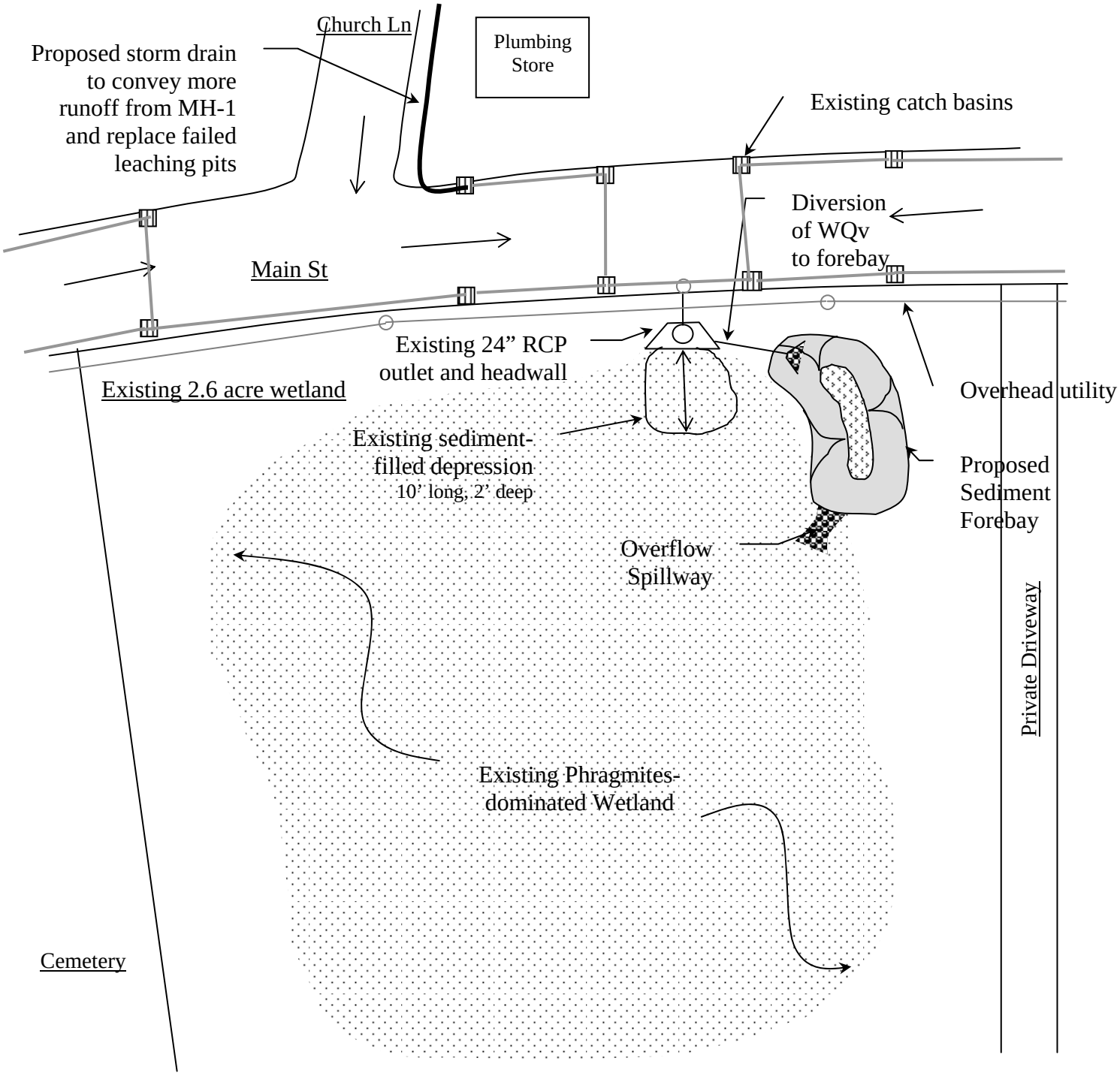
11. Construction and Maintenance Access:
Good access for the outlet – close to street. More difficult to get to the full extent of the wetland – currently, the vegetation is quite thick.

12. Wetlands Present? ☑ Yes ☐ No
If yes, describe: Large area, thickly vegetated/forested with invasive species eg. phragmites

13. Retrofit Volume Computations: 90% Rule: WQV = [(P)(Rv)(A)]/12
Rv = 0.05+0.009(I)
WQV = [(P)(0.05+0.009(I))(A)]/12
WQV =[(1.2")(0.05+0.009(60))(5.6)]/12
WQV = 0.33 acre-ft ≅ 14,344 cf

14. Photo # MH2-inlets, MH2-outlet, MH2-jewelweed, MH2-hibiscus, MH2-phragmites

15. Additional Notes and/or Sketch Information:



16. Site Candidate for Further Investigation: ☑ Yes ☐ No

Legend

- Drainage Area to BMP
- Sediment Forebay
- Parcels
- Drywells
- MH-2 Site Location

* Source: Aerial Photo, NYS Office of Cyber Security & Critical Infrastructure Coordination, Spring 2004

N

250 Feet

Horsley Witten Group
phone: 508-833-6600
www.horsleywitten.com

BMP Sites - Site MH-2
Meetinghouse Creek Watershed
Town of Riverhead

7/6/06 MW
J:\4094 Peconic Bay Estuary\GIS\BMP_Sites\MH-2.mxd

Figure D-3

Meetinghouse Creek

MH-2 Inlet

MH-2 Outlet

APPENDIX D-4

Subwatershed MH-4

Peconic Bay Estuary Stormwater Retrofit Reconnaissance Inventory

1. Site Number: MH-4

2. Location (Address and/or Parcel ID) Meetinghouse Creek Park – Parcel 41

3. Description (preliminary assessment of most likely retrofit-quality, quantity, or both):
Water quality retrofit. Existing Condition – large amounts of sediment from stormwater runoff from Hubbard Avenue has clogged leaching catch basins and built up on the parking lot.

4. Unique elements of retrofit (e.g., method of conveyance or stormwater diversion):

Roadway grass channel along Hubbard Ave. to a bioretention system.

5. Date of Preliminary Survey: 9/13/05

6. Property Ownership (public or private): Public – Town of Riverhead Park, Hubbard Ave. right-of-way and Private – Duck Farm owns adjacent vacant lot

7. Drainage Area: 11.4 acres

8. Approximate imperviousness (%): 36.0% (4.1 acres)

9. Adjacent Land Use (Possible conflicts): Railroad, duck farm property, marina

10. Conflicts with Existing Utilities: aboveground utilities, underground water

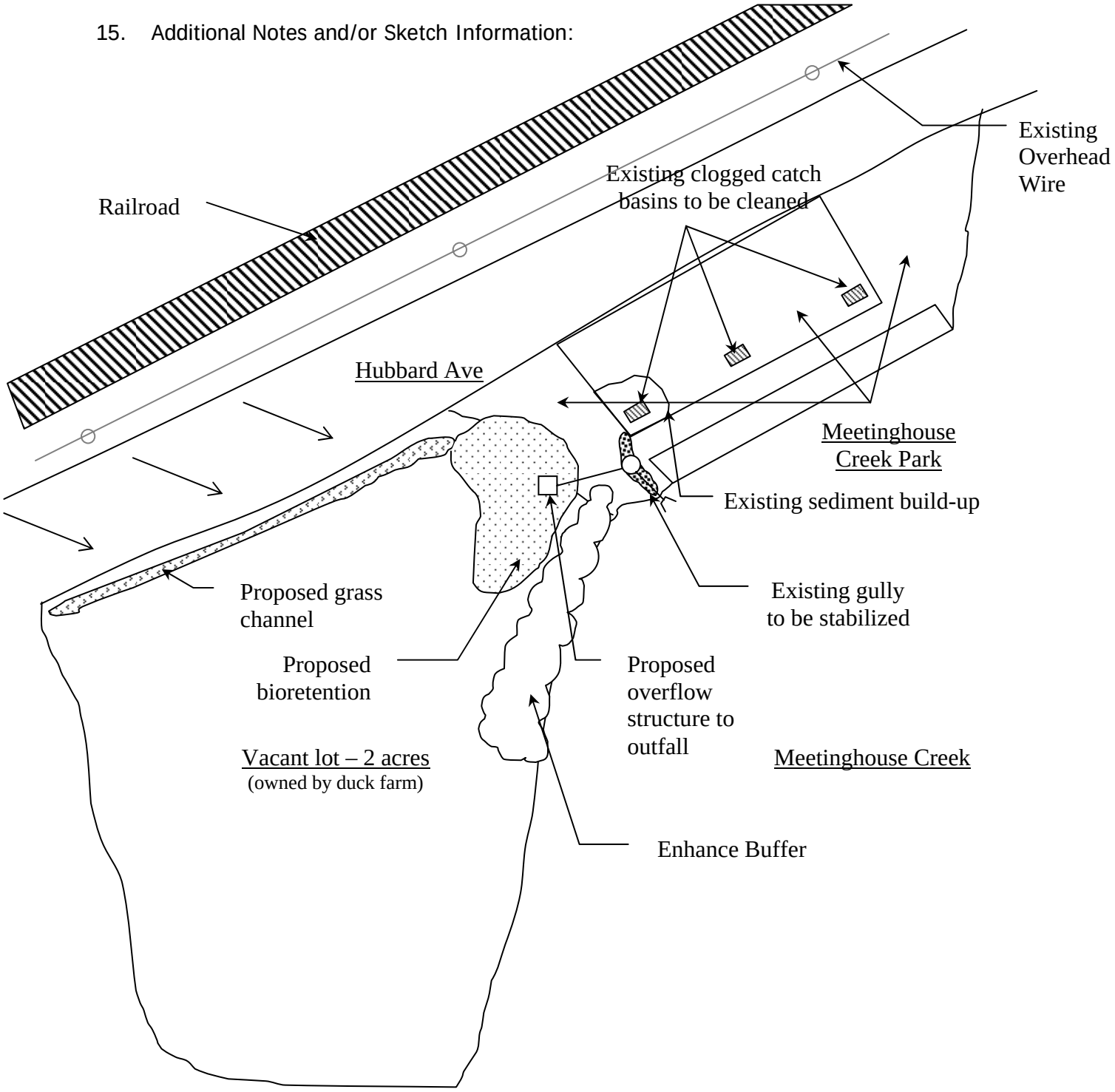
11. Construction and Maintenance Access:
Good access along Hubbard Ave. and in park

12. Wetlands Present? ☑ Yes ☐ No
If yes, describe: Bordering wetland vegetation along shore of Meetinghouse Creek

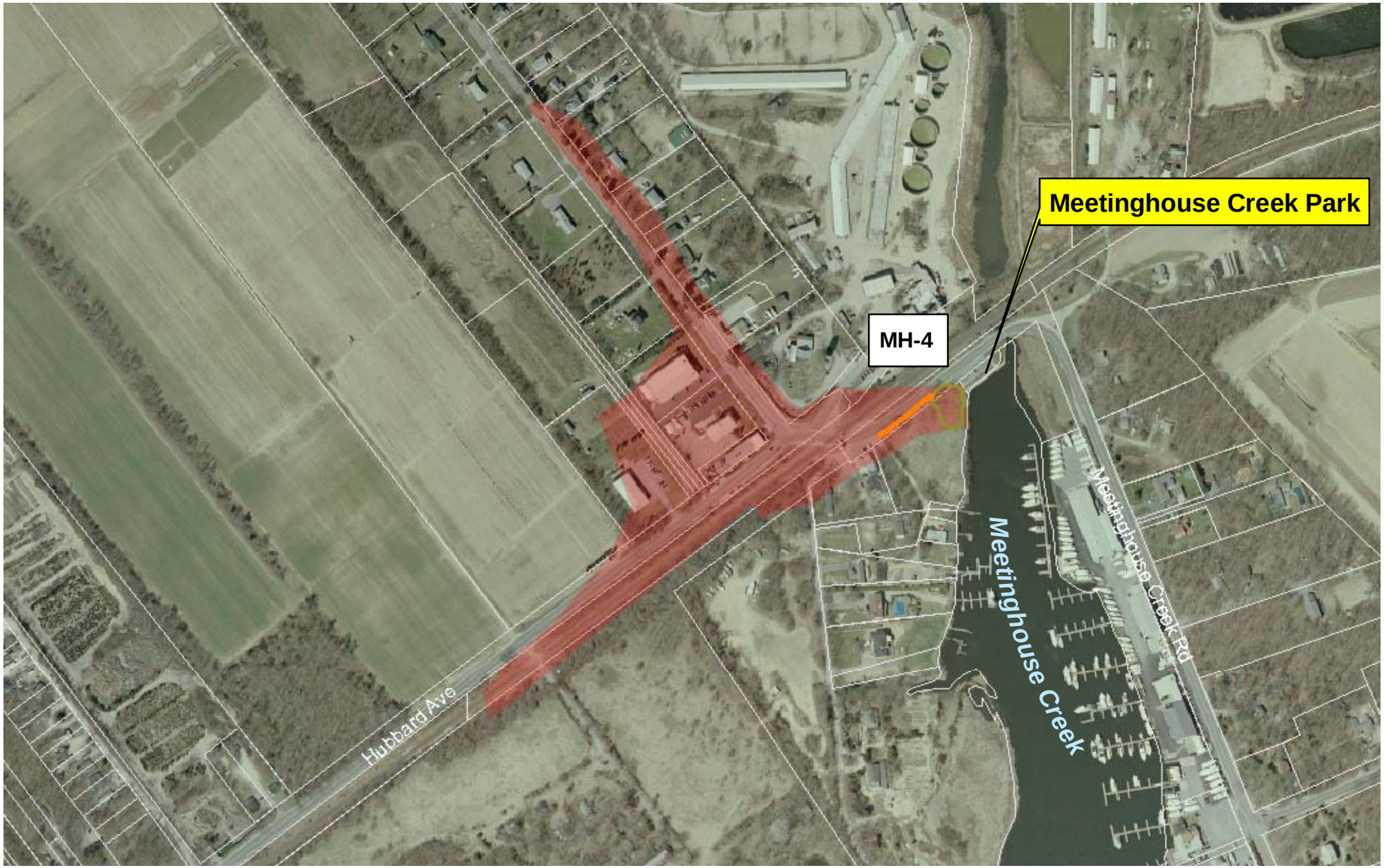
13. Retrofit Volume Computations 90% Rule: WQV = [(P)(Rv)(A)]/12
Rv = 0.05+0.009(I)
WQV = [(P)(0.05+0.009(I))(A)]/12
WQV = [(1.2")(0.05+0.009(36))(11.4)]/12
WQV = 0.426 acre-ft ≅ 18,572 cf

14. Photo # MH4-parksign, MH4-parkinglot_inlets, MH4-sediment, MH4-gully, MH4-manhole_erosion, MH4-sidewalkerosion, MH4-retainingwall_erosion, MH4-roadway, MH4-W

15. Additional Notes and/or Sketch Information:



16. Site Candidate for Further Investigation: ☑ Yes ☐ No



Legend

- Drainage Area to BMPs
- Bioretention
- Grass Channels
- Parcels
- MH-4 Site Location

* Source: Aerial Photo, NYS Office of Cyber Security & Critical Infrastructure Coordination, Spring 2004

N

370 Feet

Horsley Witten Group
phone: 508-833-6600
www.horsleywitten.com

BMP Sites - Site MH-4
Meetinghouse Creek Watershed
Town of Riverhead

5/1/06 MW
J:\4094 Peconic Bay Estuary\GIS\BMP_Sites\MH-4.mxd

Figure D-4

Meetinghouse Creek

MH-4 Gully

MH-4 Parking Lot Inlet

MH-4 Manhole Erosion

MH-4 Retaining Wall Erosion

Meetinghouse Creek

MH-4 Roadway

MH-4 Sidewalk Erosion

MH-4 Sediment

MH-4 West

APPENDIX D-5

Subwatershed MH-8

1. Site Number: MH-8

2. Location (Address and/or Parcel ID) End of Cedar St., near Section 113–Parcel 12

3. Description (preliminary assessment of most likely retrofit-quality, quantity, or both):
Water quality retrofit. Existing condition – Parking area for private boat launch and docks. Runoff currently flows down Cedar St., across dirt parking area, through a vegetated area and into the creek.

4. Unique elements of retrofit (e.g., method of conveyance or stormwater diversion):
Roadway grass channel to a bioretention system with grass filter strip in parking lot. Create runoff diversion to prevent water from flowing down boat ramp. Sediment forebay in parking lot near wetland vegetation.

5. Date of Preliminary Survey: 9/13/05

6. Property Ownership (public or private): Private boat launch – public right-of-way

7. Drainage Area: 1 acre

8. Approximate imperviousness (%): 38% (0.4 acres)

9. Adjacent Land Use (Possible conflicts): Private lots on both sides of the street

10. Conflicts with Existing Utilities: Aboveground utilities

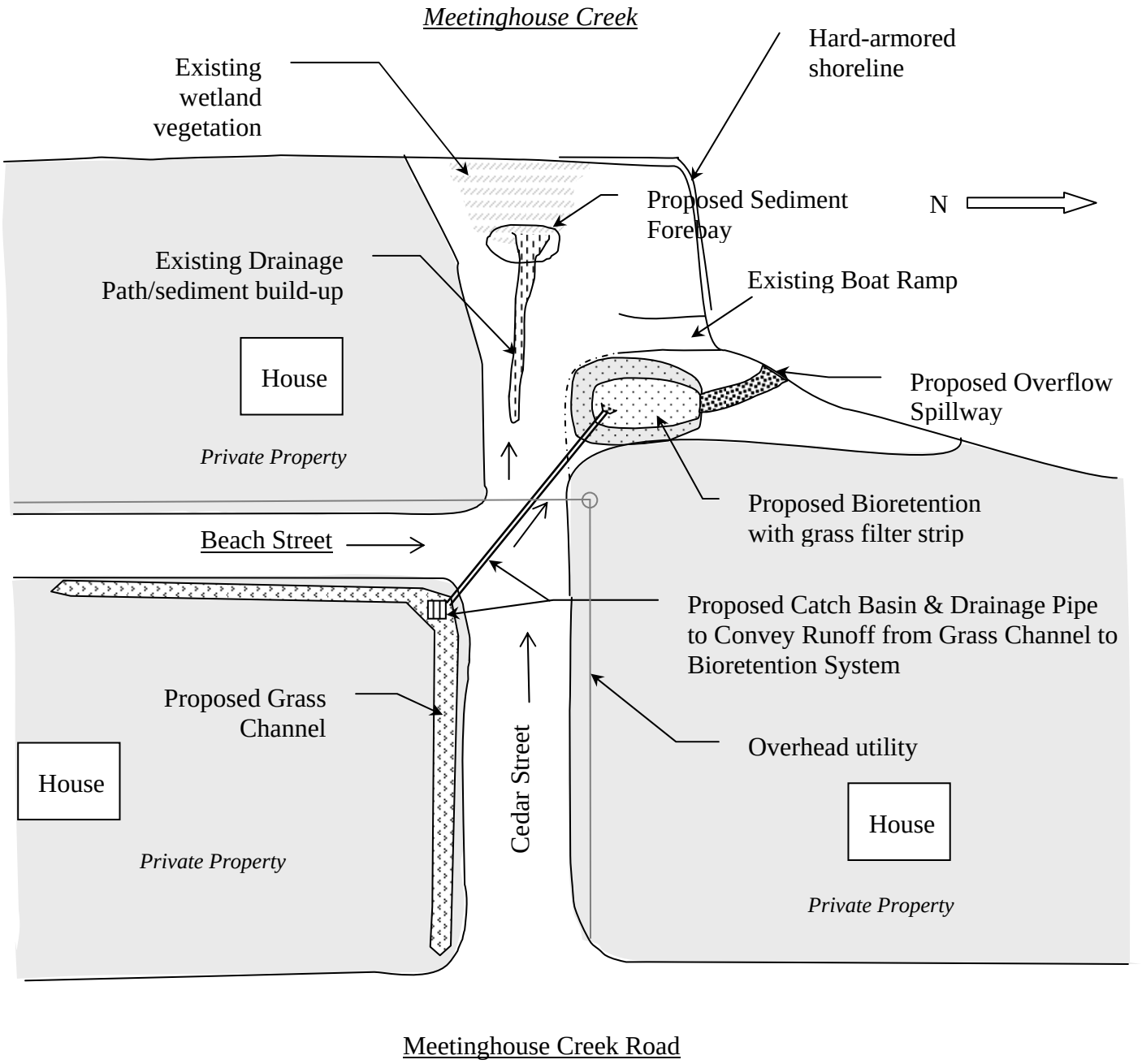
11. Construction and Maintenance Access:
Large parking area and public road for access

12. Wetlands Present? ☑ Yes ☐ No
If yes, describe: Small area of wetland vegetation

13. Retrofit Volume Computations: 90% Rule: WQV = [(P)(Rv)(A)]/12
Rv = 0.05+0.009(I)
WQV = [(P)(0.05+0.009(I))(A)]/12
WQV = [(1.2")(0.05+0.009(38))(1)]/12
WQV = 0.039 acre-ft ≅ 1708 cf

14. Photo # MH8-N, MH8-W

15. Additional Notes and/or Sketch Information:



16. Site Candidate for Further Investigation: ☑ Yes ☐ No

Legend

- Drainage Area to BMPs
- Parcels
- Grass Filter Strip
- Sediment Forebay
- Grass Channels
- MH-8 Site Location

* Source: Aerial Photo, NYS Office of Cyber Security & Critical Infrastructure Coordination, Spring 2004

N

60 Feet

Horsley Witten Group
phone: 508-833-6600
www.horsleywitten.com

BMP Sites - Site MH-8
Meetinghouse Creek Watershed
Town of Riverhead

7/6/06 MW
J:\4094 Peconic Bay Estuary\GIS\BMP_Sites\MH-8.mxd

Figure D-5

Meetinghouse Creek

MH-8 North

MH-8 West

APPENDIX D-6

Subwatershed MH-9

1. Site Number: MH-9

2. Location (Address and/or Parcel ID) End of Harbor Rd.

3. Description (preliminary assessment of most likely retrofit-quality, quantity, or both):
Water quality retrofit. Existing condition – end of road is a gravel area that may be used for parking access to the creek. Stormwater runoff has created a gully along south end of gravel. Evidence of pet waste.

4. Unique elements of retrofit (e.g., method of conveyance or stormwater diversion):
Roadway grass channel to a bioretention system. Homeowner education and signage installed in the area on proper pet waste disposal.

5. Date of Preliminary Survey: 9/13/05

6. Property Ownership (public or private): Public Right-of-way

7. Drainage Area: 1.1 acres

8. Approximate imperviousness (%): 45% (0.50 acres)

9. Adjacent Land Use (Possible conflicts): private lots on both sides, tidal influence

10. Conflicts with Existing Utilities: None visible

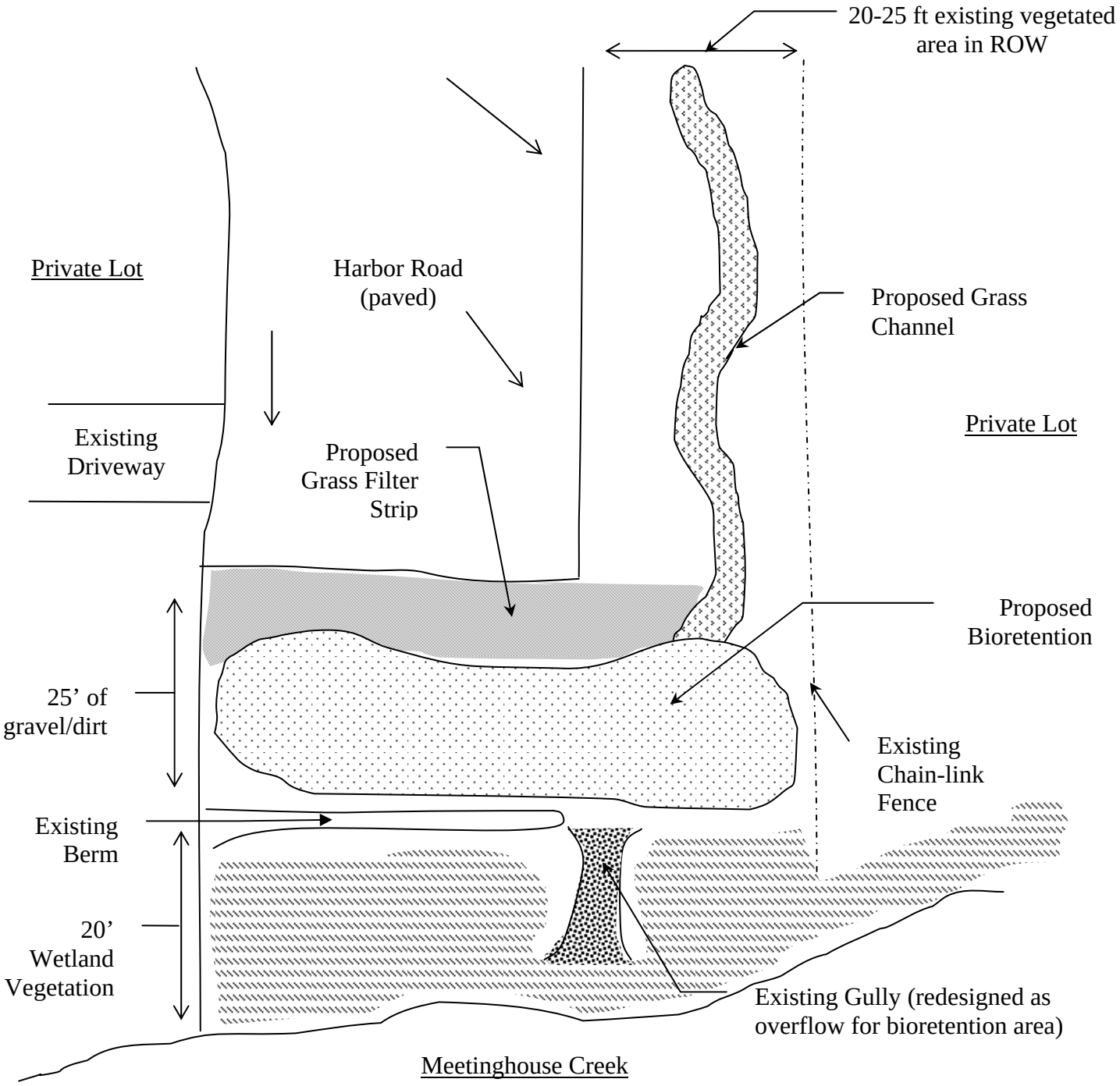
11. Construction and Maintenance Access:
Great access from road for construction and continued maintenance.

12. Wetlands Present? ☑ Yes ☐ No
If yes, describe: Wetland vegetation along creek forms a good filter strip that should be preserved/enhanced.

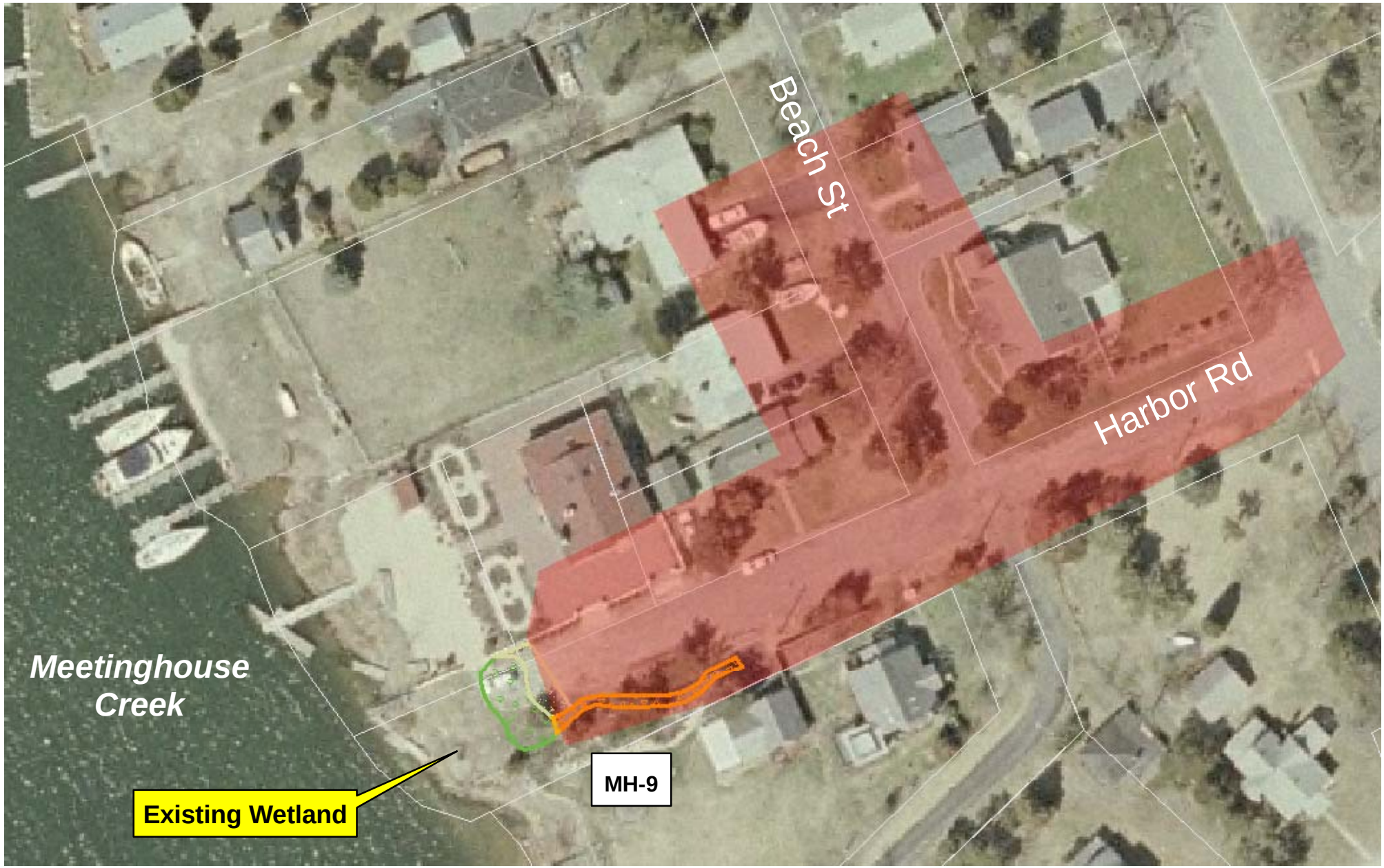
13. Retrofit Volume Computations: 90% Rule: WQV = [(P)(Rv)(A)]/12
Rv = 0.05+0.009(I)
WQV = [(P)(0.05+0.009(I))(A)]/12
WQV = [(1.2")(0.05+0.009(45))(1.1)]/12
WQV = 0.05 acre-ft ≅ 2,180 cf

14. Photo # MH9-E, MH9-W, MH9-gully, MH9-gully2, MH9-roadside_veg

15. Additional Notes and/or Sketch Information:



16. Site Candidate for Further Investigation: ☑ Yes ☐ No



Legend

- Drainage Area to BMPs
- Bioretention
- Grass Channels
- Grass Filter Strip
- Parcels
- MH-9 — Site Location

✱ Source: Aerial Photo, NYS Office of Cyber Security & Critical Infrastructure Coordination, Spring 2004

N

60 Feet

Horsley Witten Group
phone: 508-833-6600
www.horsleywitten.com

BMP Sites - Site MH-9
Meetinghouse Creek Watershed
Town of Riverhead

7/6/06 MW
J:\4094 Peconic Bay Estuary\GIS\BMP_Sites\MH-9.mxd

Figure D-6

Meetinghouse Creek

MH-9 East

MH-9 Roadside Vegetation

MH-9 West

MH-9 Gully 1

MH-9 Gully 2

APPENDIX E

Unified Subwatershed and Site Reconnaissance

Neighborhood Source Assessment **NSA**

Watershed: Meetinghouse Creek	**Subwatershed:** MH-1	**Unique Site ID:** MH-1-2-NSA1	
Date: 09/12/05	**Assessed By:** M.L.W. & N.E.K.	**Camera ID:**	**Pic#:** 30

A. Neighborhood Characterization

Neighborhood/Subdivision Name: Church Lane — Neighborhood Area (acres) 10-15

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) <⅛ ⅛ ¼ ⅓ ½ acre ☐ Multifamily (Apts, Townhomes, Condos)

☒ Single Family Detached <¼ (¼ ½) 1 >1 acre ☐ Mobile Home Park

Estimated Age of Neighborhood: 30-40 years	Percent of Homes with Garages: 70 % With Basements 100 %	**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	20		
B2. % of lot with grass cover	60		●
B3. % of lot with landscaping (e.g., mulched bed areas)	20		◆
B4. % of lot with bare soil	0		○
**Note: B1 through B4 must total 100%*			
B5. % of lot with forest canopy	30-40		◇
B6. Evidence of permanent irrigation or "non-target" irrigation	10-20		○
B7. Proportion of *total neighborhood* turf lawns with following management status:	High: 25		●
	Med: 25		
	Low: 50		
B8. Outdoor swimming pools? ☐Y ☐N ☒ Can't Tell Estimated # NA			○
B9. Junk or trash in yards? ☐ Y ☒ N ☐ Can't Tell			○
C. Driveways, Sidewalks, and Curbs			
C1. % of driveways that are impervious ☐ N/A	90	Most are paved	
C2. Driveway Condition ☐ Clean ☐ Stained ☐ Dirty ☒ Breaking up ☑ Dirt			●
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: ***Soft grading, no curbs***			
☐ 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

D. Rooftops			
D1. Downspouts are directly connected to storm drains or sanitary sewer	0%		◇ ○
D2. Downspouts are directed to impervious surface	50%		
D3. Downspouts discharge to pervious area	50%		
D4. Downspouts discharge to a cistern, rain barrel, etc.	0%		
**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 flooding			●

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) Catch basin maintenance

See photo of watering in the middle of the day

Describe Recommended Actions:

This neighborhood's stormwater is directed to Church Lane which acts as a channel with asphalt berms. Leaching pits along road are clogged and can't hold the volume. See BMP forms MH1A and MH1B for further suggestions.

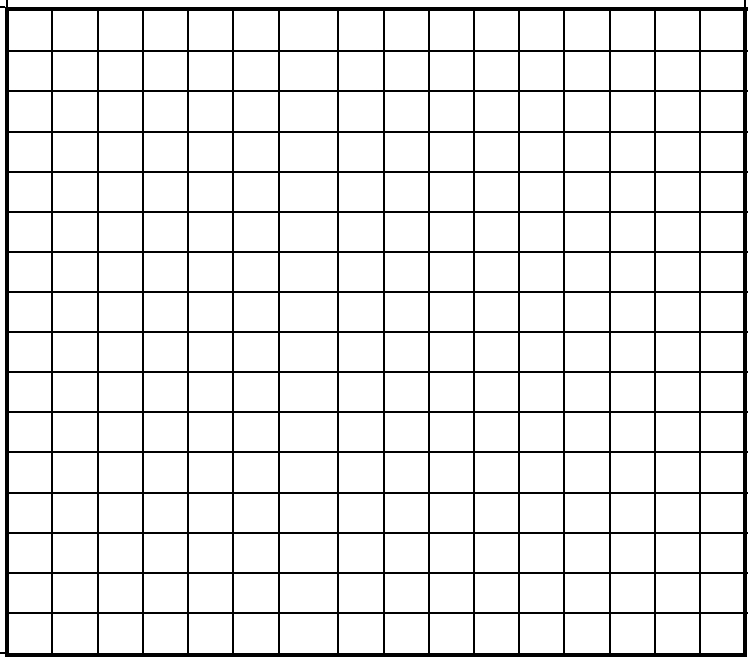
Initial Assessment

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:

Neighborhood Source Assessment **NSA**

Watershed: Meetinghouse Creek	**Subwatershed:** MH-5 & MH-6	**Unique Site ID:** MH-5-NSA	
Date: 09/13/05	**Assessed By:** M.L.W. & N.E.K.	**Camera ID:**	**Pic#:**

A. Neighborhood Characterization

Neighborhood/Subdivision Name: Private road south of deli — Neighborhood Area (acres) 15

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) <⅛ ⅛ ¼ ⅓ ⅓ acre ☐ Multifamily (Apts, Townhomes, Condos)

☒ Single Family Detached (<¼) ½ 1 >1 acre ☐ Mobile Home Park

Estimated Age of Neighborhood: 80 years	Percent of Homes with Garages: 25 % With Basements 0 %	**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	15-20		
B2. % of lot with grass cover	15		○
B3. % of lot with landscaping (e.g., mulched bed areas)	60	Not mulched, trees	◇
B4. % of lot with bare soil	5		○
**Note: B1 through B4 must total 100%*			
B5. % of lot with forest canopy	50		◇
B6. Evidence of permanent irrigation or "non-target" irrigation	0-5		○
B7. Proportion of *total neighborhood* turf lawns with following management status:	High: 1-2	Some manicured lawns	○
	Med:		
	Low: 99		
B8. Outdoor swimming pools? ☐Y ☒N ☐ Can't Tell Estimated # 0			○
B9. Junk or trash in yards? ☒ Y ☐ N ☐ Can't Tell	10	Old cars, household trash	●
C. Driveways, Sidewalks, and Curbs			
C1. % of driveways that are impervious ☐ N/A	90	Gravel or dirt	
C2. Driveway Condition ☒ Clean ☐ Stained ☐ Dirty ☐ Breaking up ☑ Dirt			○
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: Soft grading, no curbs			
☐ 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

D. Rooftops			
D1. Downspouts are directly connected to storm drains or sanitary sewer	0%		◇ ○
D2. Downspouts are directed to impervious surface	10%		
D3. Downspouts discharge to pervious area	90%		
D4. Downspouts discharge to a cistern, rain barrel, etc.	0%		
**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) Trash management

Describe Recommended Actions:

Not really a problem. Most of the shoreline here is natural vegetation, and most yards have a lot of trees. Septic systems may be a problem since many of the homes are older.

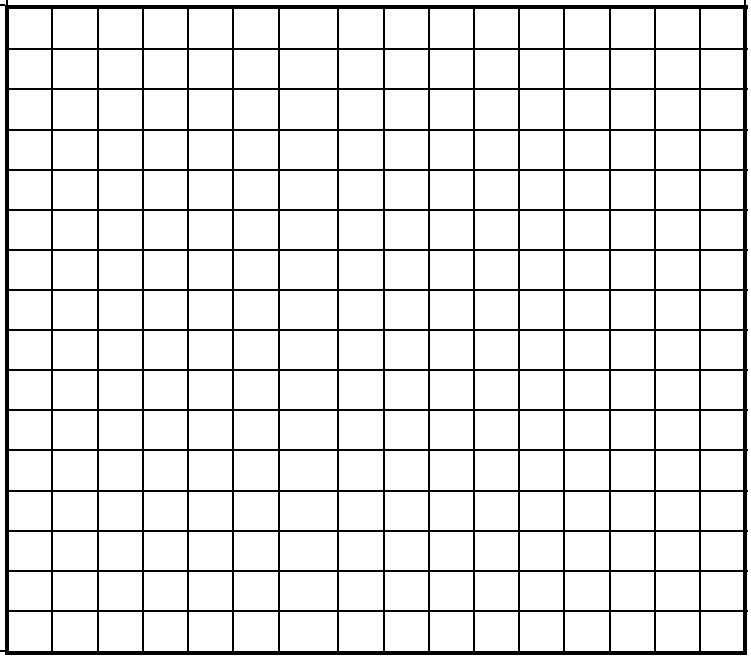
Initial Assessment

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:

Hotspot Site Investigation **HSI**

Watershed: Meetinghouse Creek	**Subwatershed:** MH-4		**Unique Site ID:** MH4-HS3
Date: 09/13/05	**Assessed By:** NEK	**Camera ID:**	**Pic#:**
Map Grid:	**Lat** ___°_____'_____" **Long** ___°_____'___"		**LMK #**

A. Site Data and Basic Classification

Name and Address: Storms Motors

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:

Auto part sale

	INDEX*
B. Vehicle Operations ☒ **N/A** *(Skip to part C)*	**Observed Pollution Source?** ☐
B1. Types of vehicles: ☐ Fleet vehicles ☐ School buses ☐ Boats ☐ Other: _____	
B2. Approximate number of vehicles: _____	
B3. Vehicle activities *(circle all that apply)*: Maintained Repaired Recycled Fueled Washed Painted 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: 15 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)

E2. Parking Lot: Approximate age 5 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 5% Turf grass 25 % Landscaping 10% 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: catch basins ○

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:

Hotspot Site Investigation **HSI**

Watershed: Meetinghouse Creek	**Subwatershed:** MH-4		**Unique Site ID:** MH-4-HSI
Date: 09/13/05	**Assessed By:** NEK	**Camera ID:**	**Pic#:**
Map Grid:	**Lat** ___°_____'_____" **Long** ___°_____'____"		**LMK #**

A. Site Data and Basic Classification

Name and Address: Elrich Auto Body

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: Collision Repair

	INDEX*
B. Vehicle Operations ☐ **N/A** *(Skip to part C)*	**Observed Pollution Source?** ☐
B1. Types of vehicles: ☐ Fleet vehicles ☐ School buses ☐ Boat: ☒ Other: Auto	
B2. Approximate number of vehicles: 20	
B3. Vehicle activities *(circle all that apply)*: Maintained Repaired Recycled Fueled Washed Painted 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: 15 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)

E2. Parking Lot: Approximate age 15 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 5% Turf grass 50 % Landscaping 15% Bare Soil 0% — ○

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:

Hotspot Site Investigation **HSI**

Watershed: Meetinghouse Creek	**Subwatershed:** MH-7		**Unique Site ID:** MH-7-HSI
Date: 09/14/05	**Assessed By:** EW/MW	**Camera ID:**	**Pic#:**
Map Grid:	**Lat** ___°_____'_____" **Long** ___°_____'___"		**LMK #**

A. Site Data and Basic Classification

Name and Address: Larry's Lighthouse Marina, 229 Meetinghouse Creek Road

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: Marina – stores, maintains, washes and sells boats

	INDEX*
B. Vehicle Operations ☐ **N/A** *(Skip to part C)*	**Observed Pollution Source?** ☐
B1. Types of vehicles: ☐ Fleet vehicles ☐ School buses ☒ Boats ☐ Other:	
B2. Approximate number of vehicles: 150	
B3. Vehicle activities *(circle all that apply)*: (Maintained) (Repaired) Recycled (Fueled) (Washed) (Painted) (Stored)	●
B4. Are vehicles stored and/or repaired outside? ☒ Y ☒ N ☐ Can't Tell ***Some boats are for sale and stored out*** Are these vehicles lacking runoff diversion methods? ☐ Y ☒ N ☐ Can't Tell ***outside, runoff directed to LP's***	○
B5. Is there evidence of spills/leakage from vehicles? ☐ Y ☒ N ☐ Can't Tell	○
B6. Are uncovered outdoor fueling areas present? ☒ Y ☐ N ☐	●
B7. Are fueling areas directly connected to storm drains? ☒ Y ☐ N ☐ Can't Tell Can't Tell ***right next to water***	●
B8. Are vehicles washed outdoors? ☒ Y ☐ N ☐ Can't Tell ***gravel area, some*** Does the area where vehicles are washed discharge to the storm drain? ☐ Y ☐ N ☐ Can't Tell ***erosion near creek***	●
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: 10-20 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)

E2. Parking Lot: Approximate age 5 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 0% Turf grass 0 % Landscaping 2% Bare Soil 1% ○

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: Leaching Pits ○

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

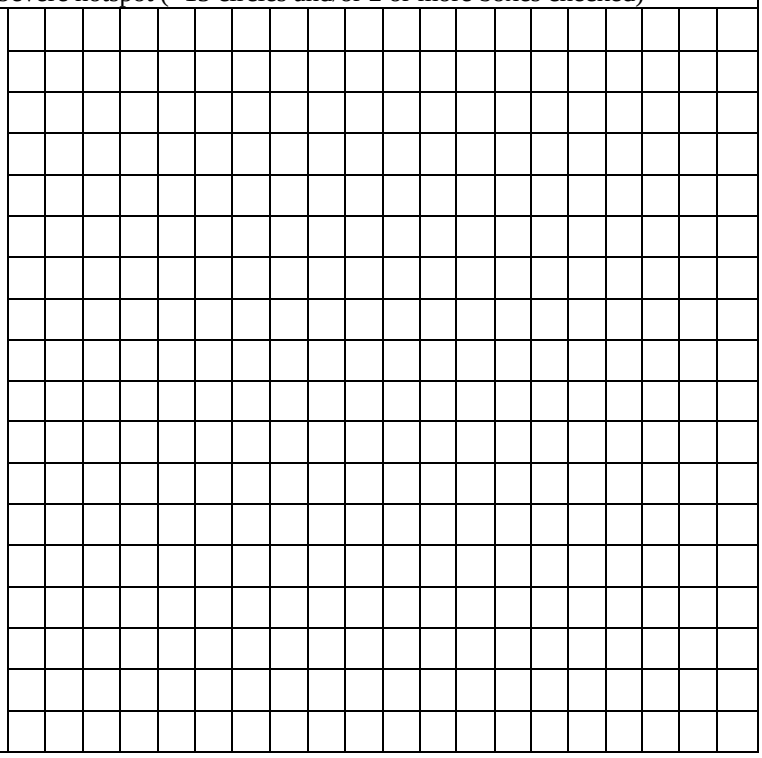
G3. Catch basin inspection – Record SSD Unique Site ID here: _____ Condition: ☐ Dirty ☐ Clean

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: In general, this marina was in really good shape. Stormwater from downspouts should be captured, Leaching Pits should be cleaned out and the dumpster should have a lid. Owners are very cooperative and would be interested in doing the right thing. Owner would like a contact number to call when he sees pollution in creek.



Watershed: Meetinghouse Creek	**Subwatershed:** MH-4	**Unique Site ID:** MH-4-HS4
Date: 09/13/05	**Assessed By:**	**Camera ID:** / **Pic#:**
Map Grid:	**Lat** ___°_____'_____" **Long** ___°_____'____"	**LMK #**

A. Site Data and Basic Classification

Name and Address: Lighthouse Marine Supply

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: Boat and Marine part supply

	INDEX*
B. Vehicle Operations ☒ **N/A** *(Skip to part C)*	**Observed Pollution Source?** ☐
B1. Types of vehicles: ☐ Fleet vehicles ☐ School buses ☐ Boats ☐ Other: _____	
B2. Approximate number of vehicles: _____	
B3. Vehicle activities *(circle all that apply)*: Maintained Repaired Recycled Fueled Washed Painted 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: 15 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)

E2. Parking Lot: Approximate age 5 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 10% Turf grass 30% Landscaping 5% 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:

Hotspot Site Investigation **HSI**

Watershed: Meetinghouse Creek	**Subwatershed:** MH-2		**Unique Site ID:** MH-2-HSI
Date: 09/13/05	**Assessed By:** NK	**Camera ID:**	**Pic#:**
Map Grid:	**Lat** ___°_____'_____" **Long** ___°_____'___"		**LMK #**

A. Site Data and Basic Classification

Name and Address: Superior Food Mart
Main Road
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:
Gas Station, Convenience store

	INDEX*
B. Vehicle Operations ☐ **N/A** *(Skip to part C)*	**Observed Pollution Source?** ☐
B1. Types of vehicles: ☐ Fleet vehicles ☐ School buses ☐ Boats ☒ Other: Auto repair	
B2. Approximate number of vehicles: 5	
B3. Vehicle activities *(circle all that apply)*: Maintained Repaired Recycled Fueled Washed Painted 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: 30-40 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)

E2. Parking Lot: Approximate age 10 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 0 % Turf grass 0 % Landscaping 2 % Bare Soil 0 %

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	***No Gutters***
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:

Hotspot Site Investigation **HSI**

Watershed: Meetinghouse Creek	**Subwatershed:** MH-4		**Unique Site ID:** MH-4-HS2
Date: 09/13/05	**Assessed By:** NEK	**Camera ID:**	**Pic#:**
Map Grid:	**Lat** ___°_____'_____" **Long** ___°_____'___"		**LMK #**

A. Site Data and Basic Classification

Name and Address: Hans Klat

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:

Sheet metal work

	INDEX*
B. Vehicle Operations ☐ **N/A** *(Skip to part C)*	**Observed Pollution Source?** ☐
B1. Types of vehicles: ☒ Fleet vehicles ☐ School buses ☐ Boats ☐ Other: _____	
B2. Approximate number of vehicles: 2-4	
B3. Vehicle activities *(circle all that apply)*: Maintained Repaired Recycled Fueled Washed Painted (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: 10 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)

E2. Parking Lot: Approximate age 10 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 5% Turf grass 50 % Landscaping 20% Bare Soil 0%

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:

Pervious Area Assessment **PAA**

Watershed: MH	**Subwatershed:** MH-4	**Unique Site ID:** MH-4	
Date: 9/13/05	**Assessed By:** MLW	**Camera ID:**	**Pic #:**
Map Grid:	**Lat** ___°_____'_____" **Long** ___°_____'_____"		**LMK #**

A. Parcel Description

Size: ≤2acre(s) Access to site (*check all that apply)*: ☒ Foot access ☒ Vehicle access ☒ Heavy equipment access
Ownership: ☒ Private ☐ Public Current Management: ☐ School ☐ Park ☐ Right-of-way ☐ Vacant land ☐ Other (please describe)Owned by duck farm (word of mouth)
Contact Information: _____
Connected to other pervious area? ☒ Y ☐ N If yes, what type? ☐ Forest ☒ Wetland ☐ Other Bord. veg. wetland
Estimated size of connected pervious area: 0.25 acre(s) Record Unique Site ID of connected fragment: _____

PART I. NATURAL AREA REMNANT

FOREST

B. Current Vegetative Cover

B1. Percent of forest with the following canopy coverage:
Open _____% Partly shaded _____% Shaded _____%
**Note – these should total 100%*
B2. Dominant tree species: _____
_____
B3. Understory species: _____
_____
B4. Are invasive species present? ☐ Y ☐ N ☐ Unknown
If yes, % of forest with invasives: _____
Species: _____

C. Forest Impacts

C1. Observed Impacts (*check all that apply*): ☐ Animals ☐ Clearing/encroachment ☐ Trash and dumping ☐ Storm water runoff ☐ Other

D. Notes

WETLAND

B. Current Vegetative Cover

B1. % of wetland with following vegetative zones:
Aquatic: _____
Emergent: _____
Forested: _____
**Note – these should total 100%*
B2. Dominant species: _____
_____
B3. Are invasive species present? ☐ Y ☐ N ☐ Unknown
If yes, % of wetland with invasives: _____
Species: _____

C. Wetland Impacts

C1. Observed Impacts (*check all that apply*): ☐ Animals ☐ Clearing/encroachment ☐ Trash and dumping ☐ Storm water runoff ☐ Hydrologic impacts ☐ Other

D. Notes

E. Initial Recommendation

☐ Good candidate for conservation/protection
☐ Potential restoration candidate
☐ Poor restoration or conservation candidate

PART II. OPEN PERVIOUS AREAS

A. Current Vegetative Cover

A1. Percent of assessed surface with:
Turf 0% Other Herbaceous 90% None (bare soil) 0% Trees 5% Shrubs 5 % Other 0%
(please describe): Locust (black) **Note – these should total 100%*

A2. Turf: Height: 6-8 inches Apparent Mowing Frequency: ☐ Frequent ☒ Infrequent ☐ No-Mow ☐ Unknown
Condition (*check all that apply*): ☒ Thick/Dense ☐ Thin/Sparse ☐ Clumpy/Bunchy ☒ Continuous Cover

A3. Thickness of organic matter at surface: 0 inches

A4. Are invasive species present? ☒ Y ☐ N ☐ Unknown If yes, % of site with invasives: 25-30
Species: Japanese knotweed, 3' tall

B. Impacts

B1. Observed Impacts (*check all that apply*): ☐ Soil Compaction ☐ Erosion ☒ Trash and Dumping ***(small amt.)***
☐ Poor Vegetative Health ☐ Other (describe): _____

C. Reforestation Constraints

C1. Sun exposure: ☒ Full sun ☐ Partial sun ☐ Shade ☐ Unknown

C2. Nearby water source? ☒ Y ☐ N ☐ Unknown ***(Meetinghouse Creek)***

C3. Other constraints: ☐ Overhead wires ☐ Underground Utilities ☐ Pavement ☐ Buildings
☐ Other (please describe): none

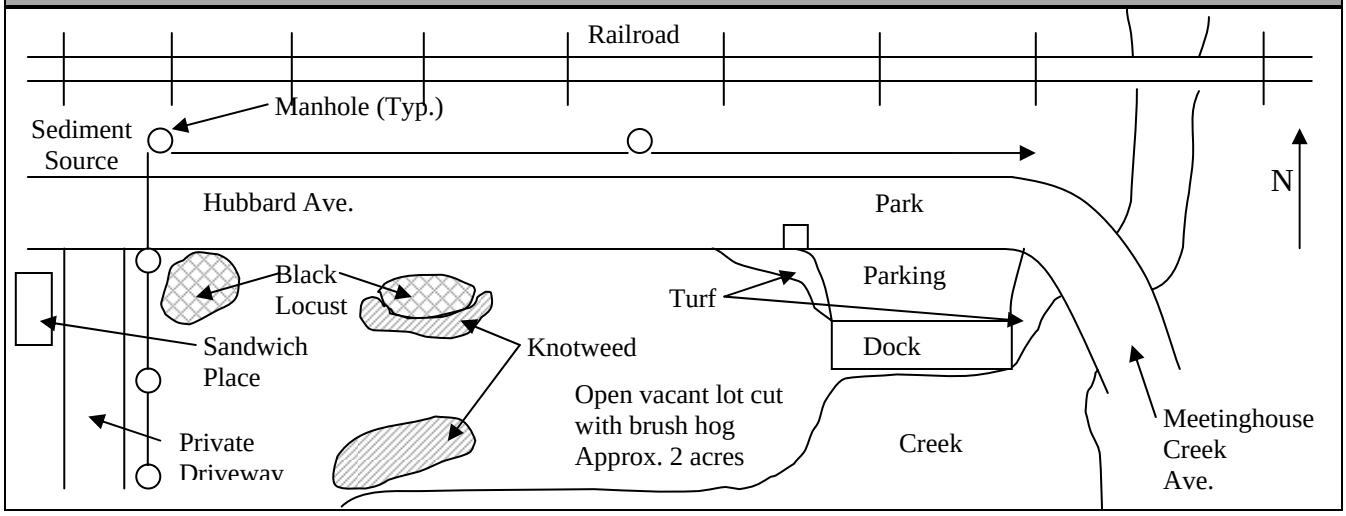
D. Notes

Possible to use this site as bioretention area (see BMP form MH-4). Soil appears sandy, possibly fill.

E. Initial Recommendation

☐ Good candidate for natural regeneration
☒ May be reforested with minimal site preparation
☐ May be reforested with extensive site preparation
☐ Poor reforestation or regeneration site

PART III. SKETCH



Pervious Area Assessment **PAA**

Watershed: Meetinghouse	**Subwatershed:** MH-7	**Unique Site ID:** MH-7-PAA	
Date: 09/13/05	**Assessed By:** NEK	**Camera ID:**	**Pic #:**
Map Grid:	**Lat** ___°_____'_____" **Long** ___°_____'_____"		**LMK #**

A. Parcel Description

Size: 1 acre(s) Access to site (*check all that apply)*: ☒ Foot access ☒ Vehicle access ☒ Heavy equipment access
Ownership: ☒ Private ☐ Public Current Management: ☐ School ☐ Park ☐ Right-of-way ☒ Vacant land
☐ Other (please describe) _____
Contact Information: Owned by residents that live across the street
Connected to other pervious area? ☐ Y ☒ N If yes, what type? ☐ Forest ☐ Wetland ☐ Other _____
Estimated size of connected pervious area: ____ acre(s) Record Unique Site ID of connected fragment: _____

PART I. NATURAL AREA REMNANT

FOREST

B. Current Vegetative Cover N/A

B1. Percent of forest with the following canopy coverage:
Open ___% Partly shaded _____% Shaded _____%
**Note – these should total 100%*
B2. Dominant tree species: _____

_____

B3. Understory species: grass

_____

B4. Are invasive species present? ☐ Y ☐ N
☐ Unknown
If yes, % of forest with invasives: _____
Species: _____

C. Forest Impacts

C1. Observed Impacts (*check all that apply*): ☐ Animals ☐ Clearing/encroachment ☐ Trash and dumping ☐ Storm water runoff ☐ Other

D. Notes

WETLAND

B. Current Vegetative Cover N/A

B1. % of wetland with following vegetative zones:
Aquatic: _____
Emergent:_____
Forested: _____
**Note – these should total 100%*
B2. Dominant species: _____

_____

B3. Are invasive species present? ☐ Y ☐ N
☐ Unknown
If yes, % of wetland with invasives: _____
Species: _____

C. Wetland Impacts

C1. Observed Impacts (*check all that apply*): ☐ Animals ☐ Clearing/encroachment ☐ Trash and dumping ☐ Storm water runoff ☐ Hydrologic impacts ☐ Other

D. Notes

E. Initial Recommendation

☐ Good candidate for conservation/protection
☐ Potential restoration candidate
☐ Poor restoration or conservation candidate

PART II. OPEN PERVIOUS AREAS

A. Current Vegetative Cover

A1. Percent of assessed surface with:
Turf 70% Other Herbaceous 30% None (bare soil) _____% Trees _____% Shrubs ____ % Other _____%
(please describe): _____ **Note – these should total 100%*

A2. Turf: Height:0-4 inches Apparent Mowing Frequency: ☐ Frequent ☒ Infrequent ☐ No-Mow ☐ Unknown
Condition (*check all that apply*): ☐ Thick/Dense ☐ Thin/Sparse ☒ Clumpy/Bunchy ☐ Continuous Cover

A3. Thickness of organic matter at surface: _____ inches

A4. Are invasive species present? ☒ Y ☐ N ☐ Unknown If yes, % of site with invasives: 30%
Species: Phragmites

B. Impacts

B1. Observed Impacts (*check all that apply*): ☐ Soil Compaction ☐ Erosion ☐ Trash and Dumping
☒ Poor Vegetative Health ☐ Other (describe): _____

C. Reforestation Constraints

C1. Sun exposure: ☒ Full sun ☐ Partial sun ☐ Shade ☐ Unknown

C2. Nearby water source? ☒ Y ☐ N ☐ Unknown

C3. Other constraints: ☐ Overhead wires ☐ Underground Utilities ☐ Pavement ☐ Buildings
☐ Other (please describe): _____

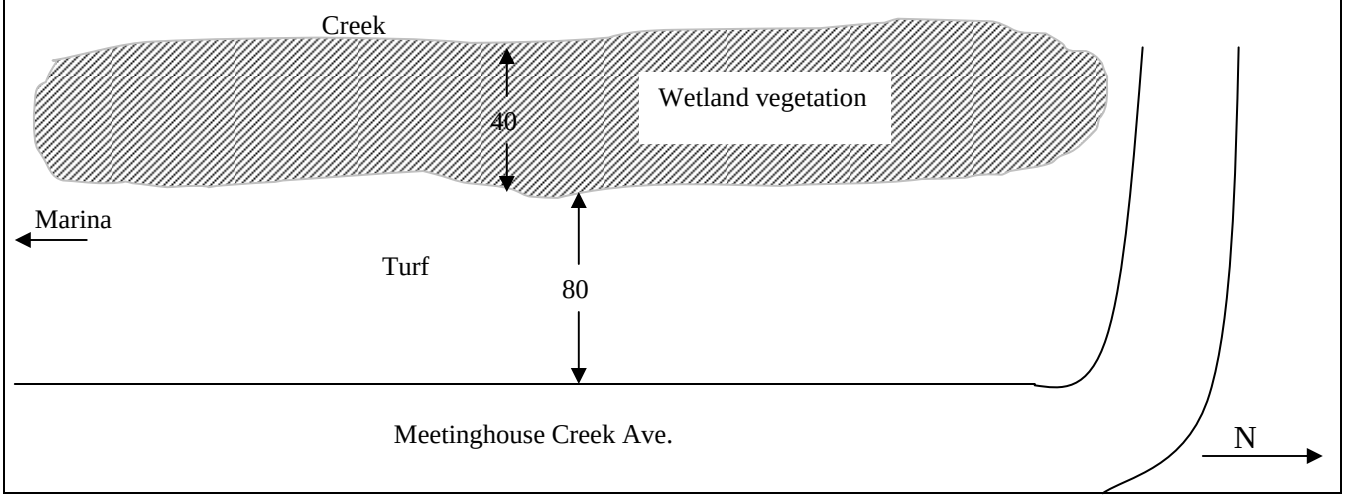
D. Notes

Soil appears sandy and highly pervious on most of the site. Could be all fill.

E. Initial Recommendation

☒ Good candidate for natural regeneration
☐ May be reforested with minimal site preparation
☐ May be reforested with extensive site preparation
☐ Poor reforestation or regeneration site

PART III. SKETCH



Watershed: MH	**Subwatershed:** MH-1	**Unique Site ID:** MH-1-SSD1
Date: 09/12/05	**Assessed By:** NEK	**Camera ID:**
Map Grid	**Rain in Last 24 Hours** ☐ Y ☒ N	**Pic #**

A. Location

A1. Street names or neighborhood surveyed: Church Lane

A2. Adjacent land use: ☒ Residential ☐ Commercial ☐ Industrial ☐ Institutional ☐ Municipal ☐ Transport-Related

A3. Corresponding HSI or NSA field sheet? If so, circle HSI or NSA and record its Unique Site ID here MH-1-NSA2

B. Street Conditions

B1. Road Type: ☐ Arterial ☒ Collector ☐ Local ☐ Alley ☐ Other: _____

B2. Condition of Pavement: ☐ New ☒ Good ☐ Cracked ☐ Broken

B3. Is on-street parking permitted ☐ Y ☒ N If yes, approximate number of cars per block: _____

B4. Are large cul-de-sacs present? ☐ Y ☒ N

B5. Is trash present in curb and gutter? If so, use the index to the right to record amount.	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

C. Storm Drain Inlets and Catch Basins

C1. Type of storm drain conveyance: ☐ open ☒ enclosed ☐ mixed ***to leaching pits***

C2. Percentage of inlets with catch basin storage: 100% ☐ N/A

Sample 1-2 catch basins per NSA/HSI	**C3.** Catch basin #1	**C4.** Catch basin #2
Latitude	___°____'____"	___°____'____"
Longitude	___°____'____"	___°____'____"
LMK #		
Picture #		
Current Condition	☒ Wet ☐ Dry	☐ Wet ☒ Dry
Condition of Inlet	☐ Clear ☒ Obstructed	☐ Clear ☒ Obstructed
Litter Accumulation	☒ Y ☐ N	☐ Y ☒ N
Organics Accumulation	☒ Y ☐ N	☒ Y ☐ N
Sediment Accumulation	☒ Y ☐ N	☒ Y ☐ N
Sediment Depth (in feet)	Couldn't tell	Couldn't tell, almost up to grate
Water Depth	Couldn't tell	___NA_____ ft.
Evidence of oil and grease	☒ Y ☐ N	☐ Y ☒ N
Sulfur smell	☐ Y ☒ N	☐ Y ☒ N
Accessible to vacuum truck	☒ Y ☐ N	☒ Y ☐ N

D. Non-Residential Parking Lot (>2 acres)

D1. Approximate size: _____ acres

D2. Lot Utilization: ☐ Full ☐ About half full ☐ Empty

D3. Overall condition of Pavement: ☐ Smooth (no cracks) ☐ Medium (few cracks) ☐ Rough (many cracks) ☐ Very Rough (numerous cracks and depressions)

D4. Is lot served by a storm water treatment practice? ☐ Y ☐ N If yes, describe: _____

D5. On-site retrofit potential: ☐ Excellent ☐ Good ☐ Poor

E. Municipal Pollutant Reduction Strategies

E1. Degree of pollutant accumulation in the system: ☒ High ☐ Medium ☐ Low ☐ None

E2. Rate the feasibility of the following pollution prevention strategies:

Street Sweeping:	☒ High	☐ Moderate	☐ Low
Storm Drain Stenciling:	☐ High	☐ Moderate	☒ Low
Catch Basin Clean-outs:	☒ High	☐ Moderate	☐ Low
Parking Lot Retrofit Potential:	☐ High	☐ Moderate	☐ Low NA

Catch Basin Sketches

#1

#2

Notes:

Leaching pits down this street are all clogged with sediment and debris. The road has approximately 1-2 foot asphalt berms on either side creating a somewhat contained channel for stormwater. This road floods frequently which is exacerbated by clogged leaching pits. See BMP forms for recommendations in this area.

Meetinghouse Creek

NSA-1 (MH-1)

HSI-3 (MH7) Downspout 1

NSA-1 (MH-1) Sprinkler

HSI-3 (MH7) Downspout 2

HSI-1 (MH1)

HSI-3 (MH7) Dumpster 1

HSI-3 (MH7) Erosion

HSI-3 (MH7) Roadway

HSI-3 (MH7) Maintenance Building

HSI-3 (MH7) Storage Building 1

HSI-3 (MH7) Road Outlet

Meetinghouse Creek

HSI-3 (MH7) Storage Building 2

HSI-3 (MH7) Wash Area

HSI-3 (MH7) Underground Storage Tank

PAA-1 (MH-4) East

PAA-1 (MH-4) Northeast

Meetinghouse Creek

PAA-1 (MH-4) Southeast

PAA-2 (MH-7)

PAA-2 (MH-7) Shore