Town of Southold Subwatersheds Management Plan

June 2013

Prepared for:

The Peconic Estuary Program
Suffolk County Department of Health Services
Office of Ecology
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and the
Town of Southold

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1.0 Introduction

This plan is part of the on-going efforts of the Peconic Estuary Program (PEP), operating from the Suffolk County Department Health Services' Office of Ecology, to improve water quality in the Peconic Estuary and its watersheds. In 2001, the PEP adopted a final Comprehensive Conservation and Management Plan (CCMP) that identifies four priority management issues: 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. In 2006, HW completed management plans for those four pilot subwatersheds. The development of this Subwatershed Management Plan for the Town/Jockey, Goose, and Richmond Creek Subwatersheds in the Town of Southold, along with plans for 3 other subwatersheds in the Towns of Southampton, Shelter Island, and East Hampton, continues the work of those initial projects.

1.1 Peconic Estuary Watershed Issues

The Peconic Estuary is located on the eastern end of Long Island, New York between the North and South Forks (see Figure 1-1). It is one of 28 estuaries in the National Estuary Program (NEP), administered by the United States Environmental Protection Agency (USEPA) under Sec. 320 of the Clean Water Act to protect and preserve nationally significant estuaries which are threatened by pollution, development, or overuse. The Peconic Estuary was accepted into the program as an "estuary of national significance" in 1992. 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. The region is popular for vacationing and supports a wide variety of both recreational and commercial activities and contains abundant 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).

Unfortunately, many of the tidal creeks within the Peconic Estuary, including Town, Jockey, Goose, and Richmond Creeks (see Figure 1-2), are not currently meeting water quality standards and are classified as impaired water bodies. Specifically, 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 most 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. In 2006, a Total Maximum Daily Load (TMDL) for pathogens was developed for the impaired water bodies in the estuary, and in 2007, a TMDL for nitrogen was developed. One of the sources of both pathogen and nitrogen loading to the

estuary is from stormwater runoff. High pathogen and nitrogen loads to the tidal creeks within the estuary are problematic and directly affect water quality by causing the following common issues:

- Reduction in water clarity;
- Bacteria levels in excess of acceptable levels for human contact or consumption of shellfish;
- Overabundance of nitrogen leads to over stimulation of plants and/or algae, resulting in excess plant decay and low dissolved oxygen levels during summer months. The low levels of dissolved oxygen threatens aquatic life and can result in fish kills; and
- Excess algae, plants, and decaying plant material can cause the loss of other plant species (e.g., eel grass) that are important to the aquatic ecosystem.

Within the CCMP, non-point source pollution, including stormwater runoff, is designated as the highest priority for remedial efforts. Carefully planned and implemented stormwater management practices and strategies can reduce loadings of both 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.

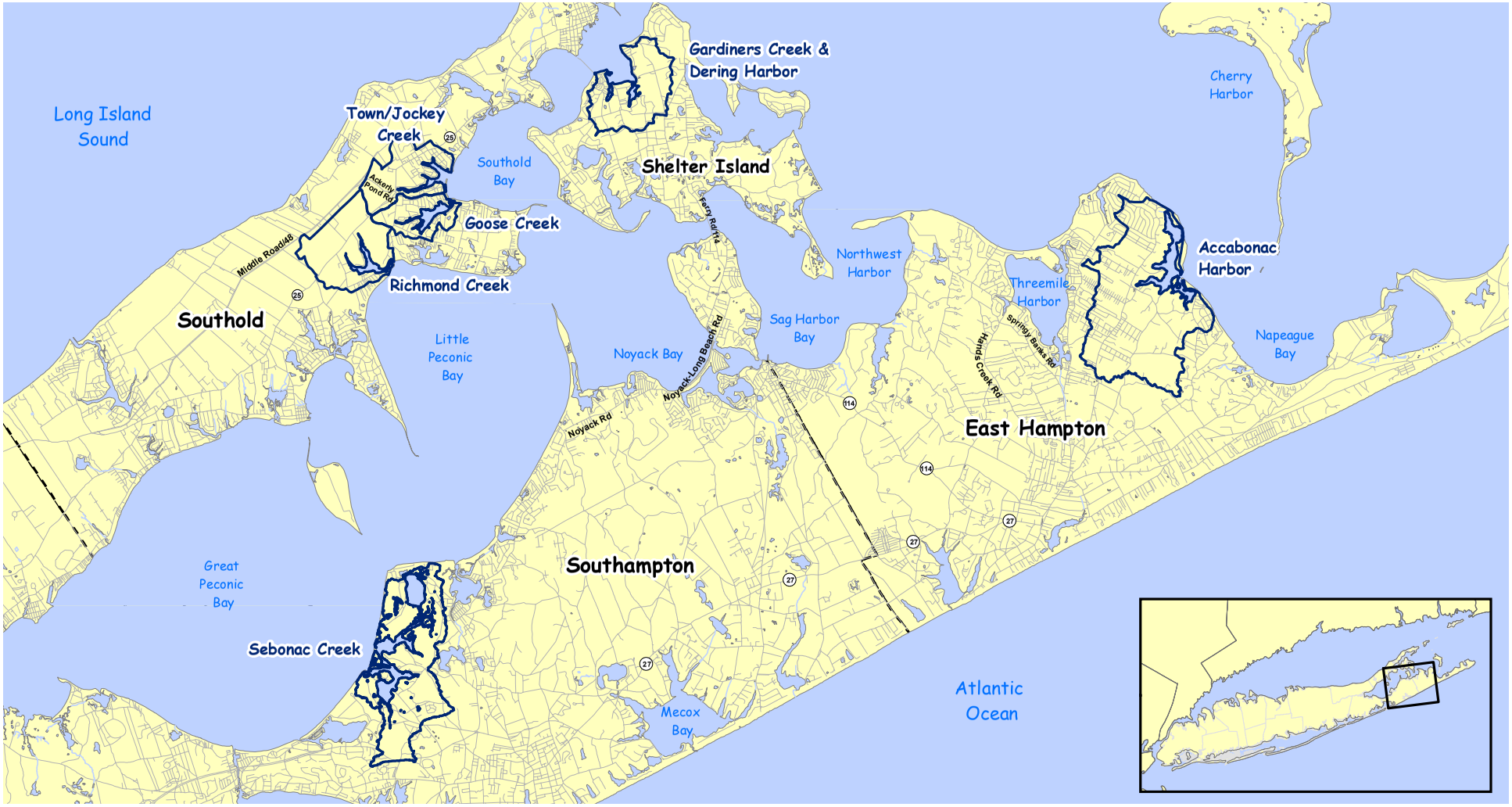
1.2 Purpose of the Plan

This plan focuses on identifying cost-effective structural and non-structural practices to reduce overall pollutant loadings (e.g., bacteria, sediment, nutrients) and runoff volume to the Southold Subwatersheds. The approach included rapid field assessment for stormwater management 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.

Caveats

The following limitations on the information presented in this plan should be considered:

- While field investigations and stakeholder meetings were conducted, the list of stormwater retrofits and restoration opportunities presented here should not be considered exhaustive.
- Project ranking is intended to inform the implementation process; actual implementation frequently occurs as other opportunities arise, and the ranking should not be viewed as an absolute sequence for implementation.
- Where planning level construction costs are provided, these costs are based upon unit cost data compiled from various sources and should be used for general planning purposes only and comparison between candidate projects.
- This document is not intended as a compliance plan for the Town of Southold's Municipal Separate Storm Sewer System (MS4) permit issued by New York's State Pollutant Discharge Elimination System (SPDES). Rather, it is intended to provide watershed-wide restoration opportunities to be implemented by not only the Town, but by PEP and/or other organizations, and private business and homeowners.



Legend

Subwatersheds Evaluated as Part of this Assessment

N W E S

Horsley Witten Group
Sustainable Environmental Solutions

The Peconic Estuary Region Vicinity and Subwatershed Context Map

Date: 6/30/2013 Figure 1.1

Legend

- Town & Jockey Creek Subwatershed
- Goose Creek Subwatershed
- Richmond Creek Subwatershed

N

2,000 Feet

Horsley Witten Group
Sustainable Environmental Solutions

Location Map
Assessed Subwatersheds
Southold, NY

Date: 6/28/2013 Figure 1.2

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2.0 Field Assessment Methodology

This chapter describes both the methodology used for the watershed assessment and the proposed recommendations to help improve the water quality of the Town/Jockey, Goose, and Richmond Creeks Subwatersheds. The proposed options range from site-specific stormwater retrofits to non-structural control measures.

2.1 Assessment Methods

In April 2011, an initial field reconnaissance was performed in the subwatersheds to identify preliminary retrofit and restoration sites. Following the site walks, a "desktop analysis" was performed for those preliminary sites, which included using GIS information from the New York State GIS database and the Town of Southold to identify soils, wetlands, other site constraints, approximate drainage areas, and any known stormwater infrastructure. This information was used to prepare field forms, aerial plans, and overall watershed maps to be used in the field to verify site conditions and finalize assessments.

The full field reconnaissance was conducted in May 2011. Field teams used the data collected from the preliminary site walks and desktop analyses, as well as information from Town staff, to assess the previously identified sites and identify any additional opportunities throughout the subwatersheds. Restoration opportunities were evaluated using watershed assessment protocols originally developed by the Center for Watershed Protection (Kitchell and Schueler, 2004; Wright et al. 2005; and Schueler et. al., 2007) and adapted by HW for application on Long Island. The completed field reconnaissance forms can be found in **Appendix B**.

Stormwater Retrofits

At each candidate location, the field teams evaluated drainage conditions, identified site constraints, and selected stormwater retrofit options with the best reported pollutant removal capability for the pollutants of concern (nitrogen, bacteria, and sediments) and have the highest runoff reduction potential. Examples include but are not limited to:

- Bioretention (or raingardens, where applicable);
- Infiltration systems;
- Permeable pavement;
- Dry swales (linear practices that contain amended soils);
- Wet swales (linear practices with emergent wet vegetation); and
- Constructed stormwater wetlands.

Vegetated infiltration and filtering practices have the best bacteria and nitrogen removal potential and were recommended where feasible based on soils and estimated groundwater elevations. In areas of high suspected groundwater, wet swales and constructed wetlands were proposed. In general, all of these practices can be adapted as necessary to several different drainage configurations including larger open areas, roadside drainage, and parking lots. Additional information and details on the design of

each of these practices can be found in the 2010 update to the New York State Stormwater Management Design Manual. In addition, the 2010 Rhode Island Stormwater Design and Installation Standards Manual is an additional resource for the design and assessment of stormwater management practices.

A preliminary ranking process was conducted to determine which of the retrofit design concepts should be further refined – the full methodology and results are included in Appendix C.

Neighborhood Assessments

A rapid watershed assessment of neighborhoods was conducted in the subwatersheds to help identify and assess a range of non-structural stormwater practices. The methodology used was adapted from the Upland Subwatershed and Site Reconnaissance (USSR), Residential Source Assessment (Wright et al., 2004). This assessment evaluates neighborhood pollution potential and weighs the importance of specific sources (e.g., evidence of pet waste, over fertilize lawn, trash and debris) with specific management strategies (e.g., pet waste management, car washing) to help target watershed education and outreach efforts. The assessment also evaluates general conditions of the street and drainage network to determine the relative importance of street sweeping and catchbasin cleanout as potential management priorities. Neighborhood assessments were conducted to help identify and document if the neighborhoods are likely to generate pollutants of concern (e.g., nitrogen, bacteria, sediment), to identify the sources common within each neighborhood, and which areas/sources should be targeted for watershed stewardship activities.

Hotspot Assessment

During the rapid watershed assessment, field teams also identified land uses that have the potential to contribute a high level of pollutants to the creeks and their tributaries, also known as stormwater hotspots. Sites were then identified as candidates for both structural and non-structural pollution prevention controls.

3.0 Town/Jockey Creek Subwatershed

This section summarizes baseline information specifically for the Town and Jockey Creek subwatershed and includes a description of the unique watershed features, a summary of existing water quality conditions, descriptions of potential stormwater retrofit sites investigated during field assessments, descriptions of sites identified as potential hot spots, and neighborhood descriptions.

3.1 Subwatershed Characteristics

The Town and Jockey Creek subwatershed is located within the Town of Southold on the south side of Long Island's North Fork. This watershed is more densely developed in comparison with others located in Southold, and includes the busy downtown area and many well established neighborhoods. The watershed is 988 acres of which 17.5% is impervious. Topography in the watershed ranges from 0 feet to 40 feet in elevation at the northern boundary. The watershed is bounded to the southwest by the Richmond Creek watershed, to the south by the Goose Creek watershed, and to the east by Southold Bay. The major roadway within the watershed is New York State Route 25 (NY 25) which runs east/west through town, serving as the main road through the center of the downtown area. A majority of the commercial businesses are along the downtown stretch of NY 25 with multiple neighborhoods located to the north (e.g., the newer developments at Jasmine Lane and Founders Village) and south (e.g., the older neighborhoods at Calves Neck Road and Founders Path).

3.1.1. Land Use and Infrastructure

Downtown Southold is centrally located in the watershed and the most densely developed portion of the area, predominantly comprised of commercial, institutional, and medium to high density residential uses. The southern portion of the watershed includes mostly low to medium density residential parcels, many with frontage on the Creeks. The banks of both creeks are flanked with single family residential parcels, many of which are well developed and include maintained lawn space, bulkheads, and private piers. The western portion of the watershed includes agriculture and low density residential land uses. To the north, land use is diverse with some commercial, agricultural, and low to medium density residential. Table 3.1 shows a summary of the land uses in the watershed, and a land use map is included in Appendix A.

Table 3.1 Land Use Summary – Town/Jockey Creek Subwatershed

Land Use	Percent of Watershed
Low Density Residential	12%
Medium Density Residential	23.5%
High Density Residential	2%
Commercial	6.5%
Industrial	0.5%
Institutional	7%
Open Space	3.5%
Agricultural	21%
Vacant	12%
Transportation	11%

Land Use	Percent of Watershed
Utilities	0.5%
Waste Handling	0%
Surface Water	0.5%

Existing stormwater infrastructure within the watershed consists of gutter and inlet collection systems that discharge to infiltration basins, detention basins, or directly to outfalls into the creeks or adjacent wetlands. However, the Town of Southold has been working to improve water quality and remove direct discharges by replacing them with subsurface infiltration chambers. In some areas, structural devices such as oil/grit separators have been installed to intercept runoff and provide pretreatment prior to discharge (e.g., the pipe network and oil/grit separator at Youngs Avenue and Town Creek). A common practice used to manage stormwater on the town roads and at commercial properties is leaching catch basins, which are intended to collect and infiltrate runoff. However, it appears that many of the leaching catch basins, particularly on the town roads, are clogged because of high accumulations of sediment and organics. Runoff from areas of NY 25 (a State-managed road) outside of the downtown area is managed with stormwater basins (large depressions) that appear to provide detention and infiltration. Runoff from the more densely developed stretch of NY 25 that passes through the downtown area is collected and discharged to leaching catch basins or into Town and Jockey Creeks at outfalls observed in the following locations: Young's Avenue, Hobart Road, and NY 25 (near at the intersection of Main Bayview Road). At each of the State outfall locations, oil/grit separators provide pretreatment of runoff, and at Hobart Road a detention basin has also been installed. It appears that during higher intensity rain events, the leaching catch basins and conveyance systems to the outfalls are inadequate to handle runoff from NY 25, adjacent contributing properties, and the town roads. This results in overland flows along the roadways that discharge directly into the creeks, causing scouring and erosion to natural or landscaped areas.

3.1.2. Soils and Hydrology

The soils in the subwatershed are mapped by the USDA Natural Resources Conservation Services as Carver and Plymouth sands, Riverhead sandy loam, and Haven loam. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with A indicating high infiltration rates (i.e., sands and gravels) and D representing very poorly drained soils. Table 3.2 provides a breakdown of the soils found in the subwatershed. All of soils in the Town/Jockey Creek Subwatershed are classified as either A or B, signifying that infiltration is a feasible stormwater practice in this area. A map of the soil conditions is provided in Appendix A.

Table 3.2 Summary of Soil Conditions – Town/Jockey Creek Subwatershed

Soil HSG	Percent in Watershed
A	17%
B	83%
C	0%
D	0%

Depth to groundwater in the subwatershed is relatively shallow. Historical data from USGS recorded from a 50-foot deep monitoring well located near the railroad bed on Horton Lane shows that the groundwater levels in this area fluctuate between elevations of 5.2 and 6.4 feet.

3.1.3. Water Quality

To comply with the Clean Water Act, the NYSDEC compiles a Priority Waterbodies List (PWL). Town/Jockey Creek is included under PWL# 1701-0235, identified as an impaired waterbody. In 2006, a TMDL for pathogens was developed with stormwater runoff from residential lands identified as the main pollutant source. In addition, the NYSDEC has designated the Town and Jockey Creeks as "growing area 22" for shellfish, most of which is seasonally closed for shellfishing, with the headwaters of Jockey Creek being uncertified.

3.2. Field Assessment of Restoration Opportunities

This section describes the restoration opportunities identified for the subwatershed. These opportunities fall into the three assessment categories described in Chapter 2: stormwater retrofits, neighborhoods, and hotspots. The locations of the proposed restoration opportunities are shown on Figure 3.1.

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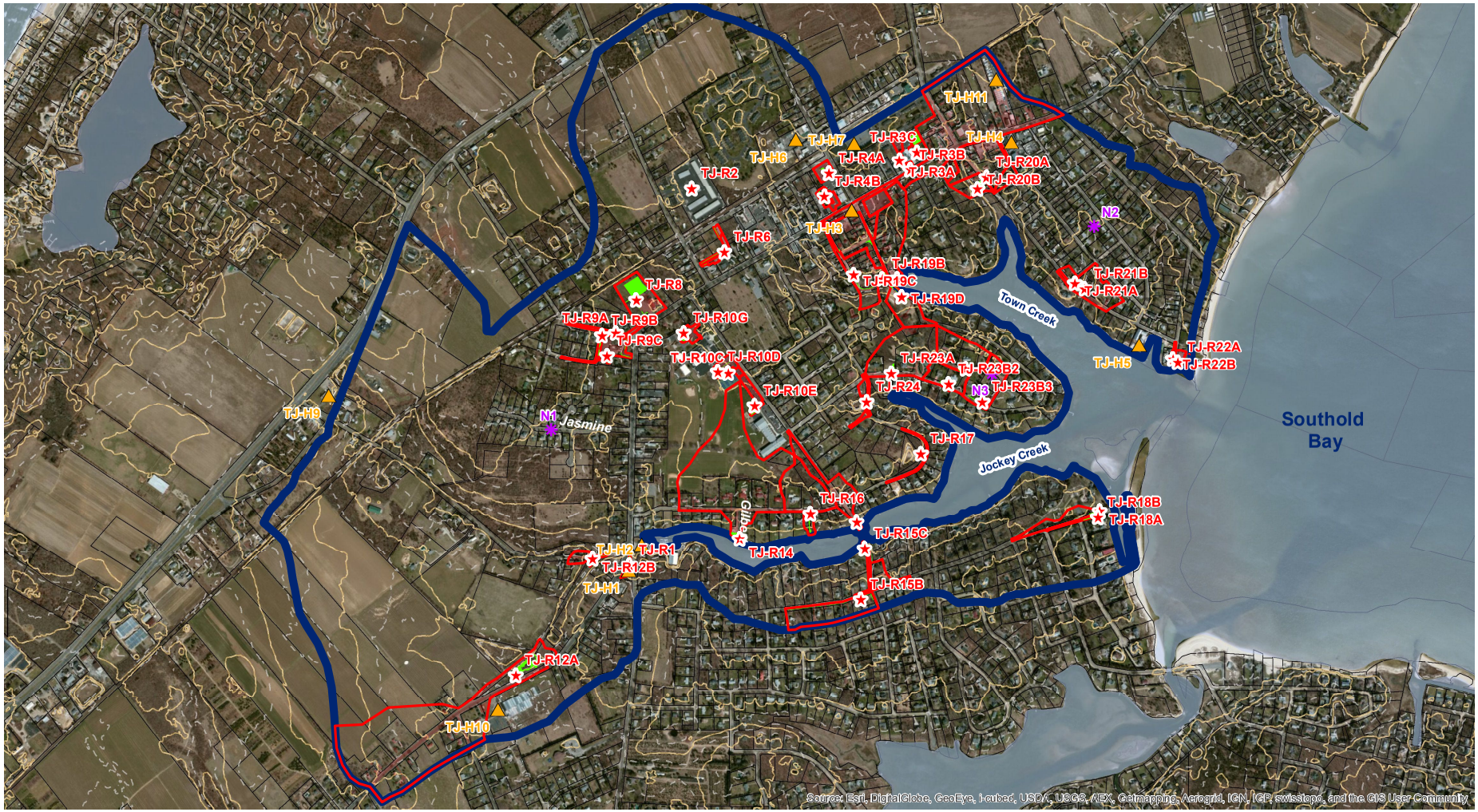

Legend

- Town & Jockey Creek Subwatershed
- Parcels
- Retrofit Sites
- Retrofit Footprint
- Retrofit Drainage Area
- Retrofit Impervious
- Hot Spots
- Neighborhoods
- Hydrography
- Hydrography
- Southold 10ft. Contours
- Southold 5ft. Contours

N

1,000 Feet

Horsley Witten Group
Sustainable Environmental Solutions

Restoration Opportunities
Town/Jockey Creek
Subwatershed
Southold, NY

Date: 7/1/2013 Figure 3.1

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3.2.1. Stormwater Retrofits

Over 38 sites were evaluated for drainage improvement and stormwater retrofit potential in the Town/Jockey Creek subwatershed. These sites were either pre-identified by project partners or during preliminary mapping analysis, or were observed by field crews during the subwatershed assessment. Table 3.3 summarizes candidate projects that were considered during the watershed planning process. A more detailed description of existing conditions and potential opportunities at these sites is provided below.

Table 3.3 Town/Jockey Creek Stormwater Retrofit Sites

Site ID/ Name	Jurisdiction	Description	Ranking
TJ-R1/ Empire Mini-Mart Gas Station (also TJ-H1)	Private	Lined vegetated swales and bioretention area	Low
TJ-R3A/ Fire Department-Exit drive	Private (Fire Department)	Pavement removal and bioswale	Med.
TJ-R3B/ Fire Department-Garage Apron	Private (Fire Department)	Bioretention	Med.
TJ-R3C/ Fire Department-entrance drive	Private (Fire Department)	Bioretention	Low
TJ-R3D/ Fire Department-parking area	Private (Fire Department)	Porous pavement	Med.
TJ-R4A/ Bank complex- Town Hall Annex-parking island	Private	Reduce pavement, bioretention areas, demonstration project	Med.
TJ-R4B/ Bank complex- Town Hall Annex (near garage)	Private	Dry swale	Med.
TJ-R6/ Town Offices	Town	Dry swales, demonstration project	High
TJ-R8/ St. Patrick's Church	Private	Porous asphalt and dry swales	Med.
TJ-9A/ Tucker Lane & NY-25	Town	"Green Street" / infiltration structure	Med.
TJ-9B/ Tucker Lane & Griswold St.	Town	Dry swales	Low
TJ-R9C/ American Legion Hall #803	Private	Re-grade and re-pave parking lot, dry swales and bioretention	Low
TJ-R10C/ Southold Jr/Sr High School –(near tennis court)	Private (School System)	Bioretention, demonstration project	High
TJ-R10D/ Southold Jr/Sr High School –(parking lot near basketball court)	Private (School System)	Bioretention, pavement reduction, demonstration project	High

Site ID/ Name	Jurisdiction	Description	Ranking
TJ-R10E/ Southold Jr/Sr High School –(near soccer field)	Private (School System)	Bioretention	High
TJ-R10G/ Southold Jr/Sr High School –(North parking/ bus area)	Private (School System)	Bioretention, demonstration project	High
TJ-R12A / Large pipe-outfall from Middle Rd into Jockey Creek, Park between Main and Lower Roads	Private (Park District)/NYDOT	Intercept road runoff to treat in constructed wetland, redirect overflow to infiltration basin	High
TJ-R12B / Intersection of Ackerly Pond and Lower Roads	Town	Bioretention and dry swale	Med.
TJ-R14/ Outfalls from Jockey Creek Rd and Gilbert Rd	Town	Remove direct outfalls, reduce pavement, dry swales, bioretention, increase buffer area	High
TJ-R15A/ Outfall at Oaklawn Ave. Bridge	County	Oil/grit separator	Low
TJ-R15B/ South side of bridge -Pine Neck Road (south Side) and Oaklawn Ave (east side)	Town	Dry swales	Low
TJ-15C/ South side of bridge- Pine Neck Road (north side of road) and Oaklawn Ave. (west side of road)	County	Bioretention	Low
TJ-R16/ Outfall from Jockey Creek Drive	Town	Terraced bioswale	High*
TJ-R17/ Outfall to Jockey Creek from Wells Avenue/ Existing infiltration basin	Town	Disconnect direct outfall to Jockey Creek, re-direct to catchbasin and existing infiltration basin	High
TJ-R18A/ End of Pine Neck Rd- Boat Ramp	Town	Modify existing BMP, new bioretention area	High*
TJ-R18B/ End of Pine Neck Rd- Boat Ramp	Town	New bioretention area	High*
TJ-R19A/ Youngs Avenue park	Private (Park District)	Pavement reduction, bioretention area, vegetated buffer	Med.
TJ-R19B/ Youngs Avenue & E. Mechanic Street	Town	Raingarden and bioretention area	Low

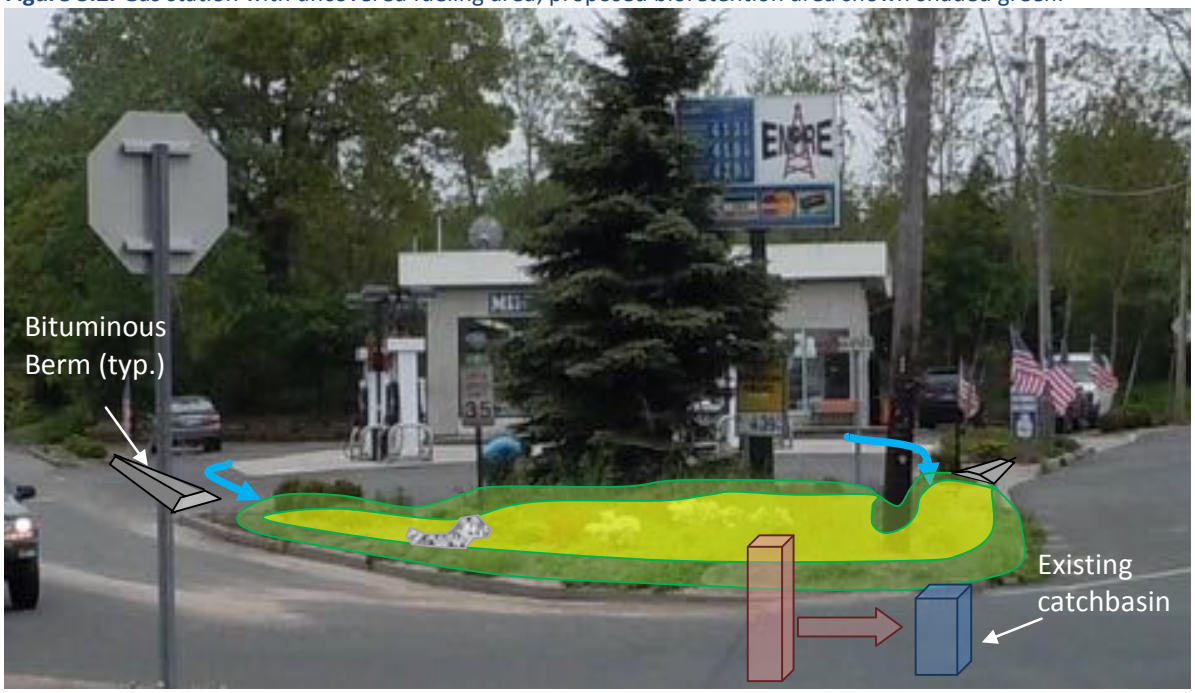
Site ID/ Name	Jurisdiction	Description	Ranking
TJ-R19C/ Mechanic Street	Town	Water quality swale	Med.
TJ-R19D/ Youngs Avenue south of culverts	Town	Dry swales	Med.
TJ-R20A/ Hobart Avenue	Town	Convert existing detention basin to a constructed wetland	Med.
TJ-R20B/ Hobart Avenue	Town	Remove pavement and direct flow to a dry swale	Low
TJ-R21A/ Hobart Road & Landon Lane	Town	Bioretention	High*
TJ-R21B/ Low point on Hobart Avenue	Town	Bioretention in road right-of-way	High*
TJ-R22A/ Founder Landing Park- Parking lot	Private (Park District)	Bioretention, reduce pavement, buffer plantings	Low
TJ-R22B/ Founder Landing Park- Terry Lane	Private (Park District)/Town	Bioretention area	Low
TJ-R23/ Hill Road Outfalls to Jockey Creek	Town	Bioretention, infiltration, bank stabilization, roof runoff disconnection	Med.
TJ-R24/ Wells Avenue outfall to Jockey Creek (near existing infiltration basin)	Town	New catchbasin and oil/grit separator, re-direct runoff to existing infiltration basin, slope stabilization	High*

**Rankings were adjusted based on the Town's local areas of concern and priorities*
Highlighted sites were selected as priorities, and their concept designs are included in Section 3.3.

Empire Mini-Mart Gas Station (TJ-R1 and TJ-H1)

The Empire Mini-Mart Gas Station is located at the intersection of NY 25 (NY DOT) and Main Bayview Roads. Currently, there is no stormwater infrastructure on site, and runoff from the site sheet flows onto the adjacent roads. This site recently went through the Site Planning process with the Town Planning Board, at which time, no additional stormwater practices were required. However, this site is a hotspot with a potential pollutant problem of medium severity because of observed sediments and a high likelihood of hydrocarbon-derived pollutants from the uncovered vehicle fueling area (see Section 3.3 for more on the hotspot inventory). The recommended BMPs for this site are **lined vegetated swales** and a **lined bioretention area** in the landscape area located on the north end of the property. The proposed bioretention area should be routed to the existing catchbasin shown in the image below for discharge of treated runoff and overflow generated in large storm events. Additionally, the vehicle fueling area should be covered to minimize the amount of runoff generated and flowing off the fuel pad, as there is a high likelihood that hydrocarbon-derived pollutants could be transported from this area by runoff. This site is private; however, the Town should work with the owners to address this important site.

Figure 3.2. Gas station with uncovered fueling area; proposed bioretention area shown shaded green.



Fire Department (TJ-R3)

Currently, stormwater runoff generated at the site is either collected/infiltrated by leaching catchbasins located in the parking area or flows offsite onto Main Road (NY 25). Stormwater treatment could be improved at this site by installing some or all of the following practices: (A) **remove pavement** and install a **bio swale** along the west side of the exit driveway; (B) a **bioretention** along the west side of the apron at the entrance to the garage bays; (C) **bioretention** along the west side of the entrance driveway; (D) replacing some of the impervious pavement with **porous asphalt** in the overflow parking area; and (E) **dumpster containment** to prevent leachate from flowing onto pavement that contributes runoff to a leaching basin. Overflow from the proposed swales and bioretention areas should be piped to existing leaching basins. This site is owned and operated by a private entity; the Town will need an easement if the Fire Department does not intend to maintain the stormwater facilities.

Figure 3.3. Area of pavement along one-way exit drive to be removed and replaced with bioswale shaded in green (left); proposed location of bioretention area shown shaded yellow (right).

Figure 3.4. Dumpster at fire station with staining on pavement from dumpster leachate (left); proposed bioretention area along west side of entrance driveway shown shaded yellow (right).

Figure 3.5. Area of pavement with leaching basins that is ideal for replacement with porous asphalt.

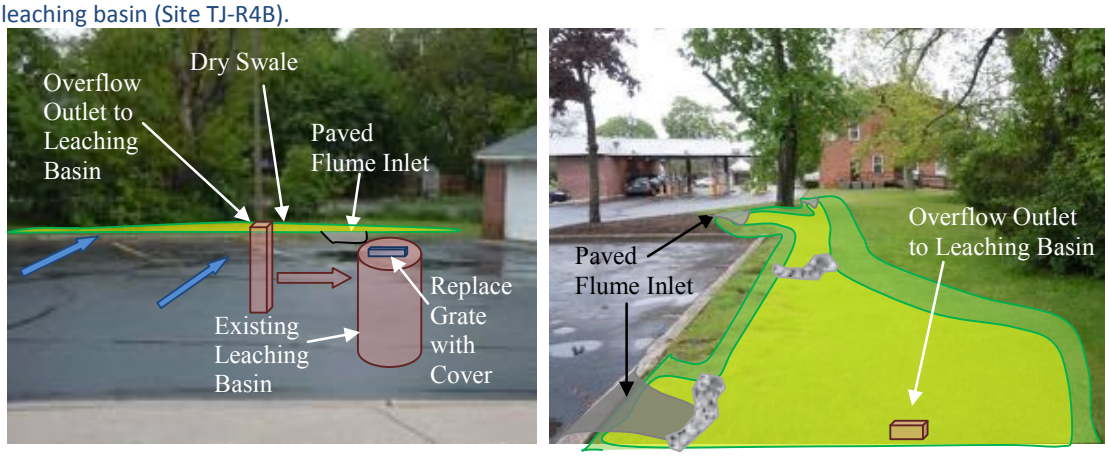
Bank Complex/Town Hall Annex (TJ-R4)

The Bank Complex /Town Hall Annex are located in downtown Southold at the intersection of Young's Avenue and Main Road (NY 25). This site is paved with stormwater infrastructure that consists of leaching catchbasins and catchbasins that discharge to subsurface infiltration chambers. The paved area is extensive with some drive aisle widths greater than 50 ft. The recommended measures for this site include **pavement reduction** and construction of BMPs that are capable of providing greater water quality treatment for nutrients, i.e., **bioretention areas** in parking islands and a **dry swale** in an area of

existing open space. Overflow from large storm events will be directed to the existing leaching basins. Additionally, since the site is home to the Town Annex building, this location is a good spot for a public education demonstration project. However, it is leased from a private entity, so the Town will need to acquire an easement here.

Figure 3.6. Parking area with excessively wide (in area identified with arrows) drive aisle and proposed bioretention area (Site TJ-R4A) shown shaded yellow (left); View from north of proposed bioretention (shaded yellow) and an additional area of pavement removal shown shaded orange (right).

Figure 3.7. Proposed dry swale in grassed area near garage, overflow from dry swale to be piped to existing leaching basin (Site TJ-R4B).



Town Hall (TJ-R6)

Town Hall is located in downtown Southold on Main Road (NY 25). Currently, stormwater infiltrates in some areas at leaching catchbasins. However, a portion of the parking area on the backside of the building and driveway does not have stormwater infrastructure. While some of the runoff generated in the impervious parking area already enters the adjacent turf area, there is evidence that runoff also continues along the edge of the driveway to the adjacent road. Areas of open space to the north of the main parking lot, and to the west of the entry drive from Traveler Road, are ideal locations for demonstration projects showing how dry swales can be used for water quality treatment. Flooding was observed in the driveway and parking area at this site; this problem could be addressed by converting the entrance roadway from Traveler Road to a one-way road with angled parking, and reducing the overall width by 10 ft. Additionally, a catchbasin inlet should be installed with the discharge pipe routed to outlet into the sediment forebay and dry swale located along the north side of the main parking area (described in greater detail below).

Three **dry swales** are proposed at this site. The first is a 100-ft long dry swale constructed along the west side of the driveway (in front of parking spaces) beginning near the driveway entrance at Traveler Road. The remainder of the west side of this entrance drive should be stabilized with a bituminous concrete berm that will aid in directing runoff to a proposed paved flume located at the intersection with the main parking area. The second proposed dry swale is located along the north side of the main parking area and extends the length of the parking toward Horton Road. Finally, since the main parking area is crowned, a third dry swale is proposed along the south side of the driveway near its intersection with Horton Road.

All of the proposed dry swales are to be vegetated with grass similar to that existing on the property. The swales will be shallow with gradual slopes that will allow the areas to be mowed as needed. The dry swales are intended to infiltrate stormwater within 24 hours following a storm event. To minimize the amount of runoff entering the swales without pretreatment, a bituminous berm is proposed along the edge of pavement adjacent to the swales with paved flume inlets spaced as needed to direct stormwater to the dry swale. The paved flumes will terminate at sediment forebays that will provide pretreatment of the runoff prior to discharge to the dry swale. The sediment forebays will need to be inspected and cleaned periodically.

The Town has indicated that there is insufficient parking in this lot, which has led to cars parking on the grass where the swales are proposed. If the Town adds more parking, reinforced turf or permeable pavers should be considered, and the swales should be installed beyond this additional parking. If no new parking spaces are proposed but parking will still be allowed on the grass, these areas should be delineated with a barrier (e.g., split rail fence) with the swales adjusted around them. The open grass area at this location appears to be sufficient to meet both parking and stormwater needs.

Figure 3.8. Main parking area behind Town Hall with proposed dry swales shown along both sides of the driveway to Horton Road to replace areas of degraded turf that is bare and eroding (left); view along driveway from Traveler Road looking toward main parking area, dry swale and area of pavement removal shown shaded (right).

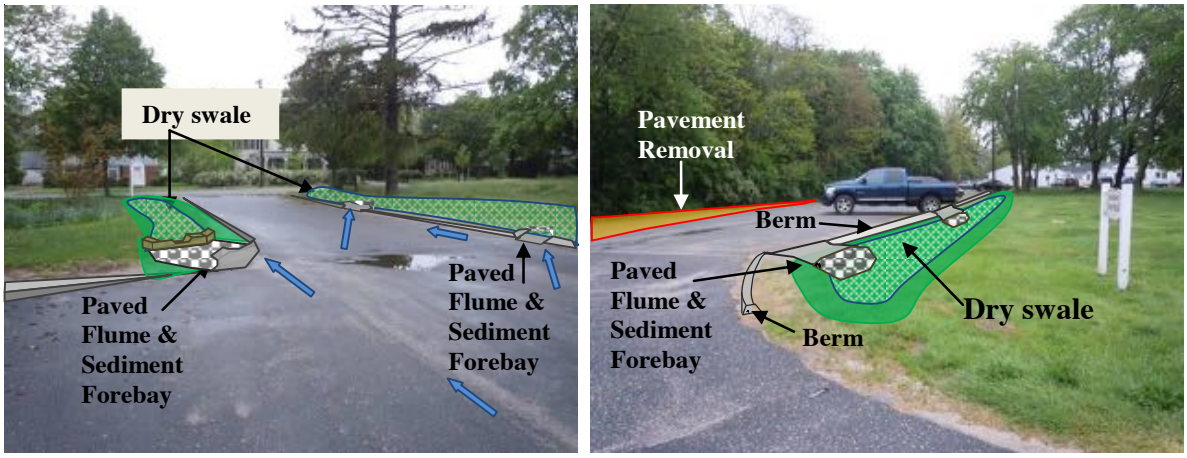
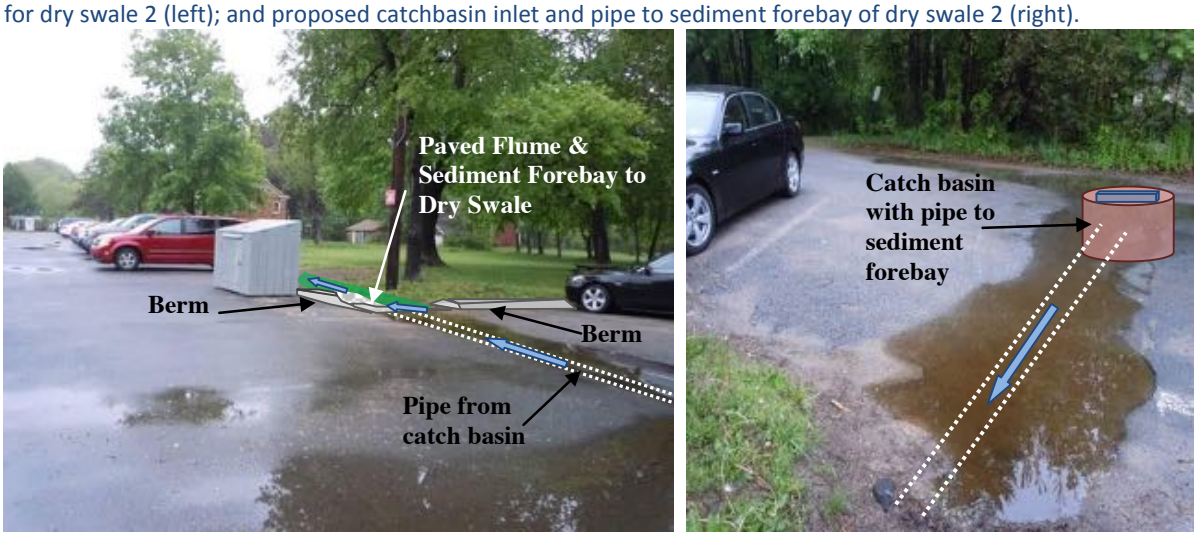


Figure 3.9. Flooding at intersection of driveway from Traveler Road and the main parking area, paved flume inlet for dry swale 2 (left); and proposed catchbasin inlet and pipe to sediment forebay of dry swale 2 (right).



St. Patrick's Church (TJ-R8)

St. Patrick's Church is located in downtown Southold on NY 25. The site includes a church, rectory building, and large parking area to accommodate church services and events. This private site currently has an undersized leaching catchbasin, and the flat parking area ponds during storm events. Since the parking area is flat and used infrequently, the rear portion of the parking area is ideal for pavement replacement with **porous asphalt**. **Dry swales** should be constructed adjacent to the driveway and front half of the parking lot for treatment of runoff from these areas. Additionally, downspouts from the building roofs should be redirected to **raingardens**, infiltrative planters, or pervious areas to disconnect the "cleaner" roof runoff from the impervious pavement. The church could sign a memorandum of agreement (MOA) with the Town to help them maintain (e.g., sweep the porous asphalt) this site if possible.

Figure 3.10. St. Patrick's Church proposed area of porous asphalt to replace clogged leaching catchbasin, and dry swales adjacent to driveway and front parking area.

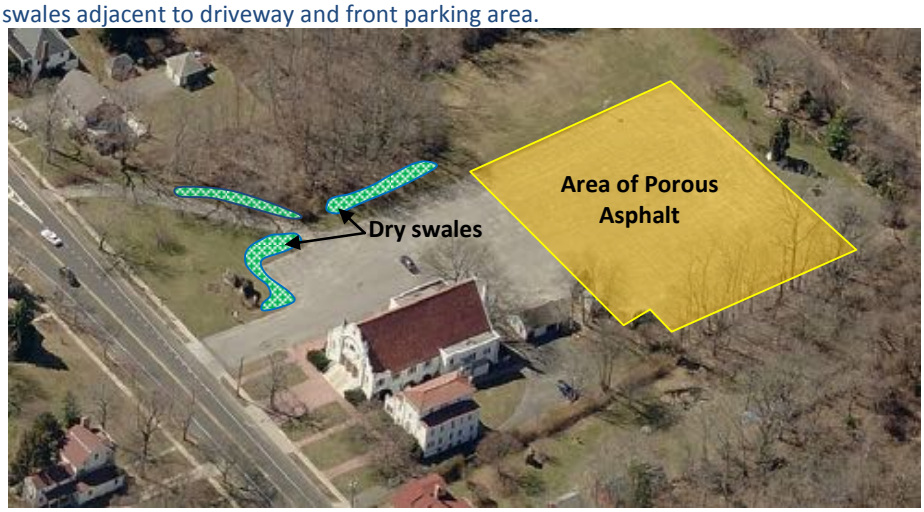


Figure 3.11. Front parking area at St. Patrick's Church (left & above); rear parking area (right)

Tuckers Lane, Griswold Street, and American Legion Hall #803 (TJ-R9A, TJ-R9B, TJ-R9C)

At the intersection of Tuckers Lane and NY 25, there is a clogged leaching basin that causes roadway flooding issues. The clogged leaching catchbasin should be upgraded with a system that can provide water quality treatment prior to infiltration. To correct the flooding issue and provide water quality treatment of the runoff, we recommend a "**green streets**" type stormwater management practice that consists of "bumpout" bioretention cells (see Figure 3.13). The bumpouts (TJ-R9A) could be located between the edge of pavement and the sidewalk, and should include a sediment forebay at the inlet for pretreatment as well as a treatment area that includes soil media for filtering the runoff prior to discharge to a functioning infiltration structure.

Figure 3.12. Area of flooding at intersection of NY 25 and Tucker Road

Figure 3.13. Proposed green street planter shown shaded (left and middle), example of a similar green street application (right).

TJ-9B

Currently, stormwater runoff from Griswold Street and Tucker Lane is directed to clogged leaching catchbasins, where it ponds and flows into the parking lot for the American Legion Hall. The concept for this site is to install **dry swales** in the open ROW, with overflows directed into leaching catchbasins.

Figure 3.14. Proposed dry swales located within road layout on Griswold Street and Tucker Lane

TJ-9C- American Legion Hall Parking Lot and Driveway

Currently, stormwater infrastructure at this site consists of leaching catchbasins, and the pavement on both the driveway and parking area is in need of repair. Prior to repaving the parking lot, the area should be re-graded to direct runoff to a large open area located to the north of the building that is ideal for installation of a **bioretention area**. The bioretention area will provide greater water quality treatment than the leaching catchbasins. To treat runoff from the driveway at the front of the building, shallow **dry swales** should be installed that are sized for the water quality volume. Easements would be

required on this private property if the Town were to construct and maintain these proposed practices rather than the property owners.

Figure 3.15. Proposed dry swales located along the driveway (top), and proposed bioretention area at rear parking lot (bottom).

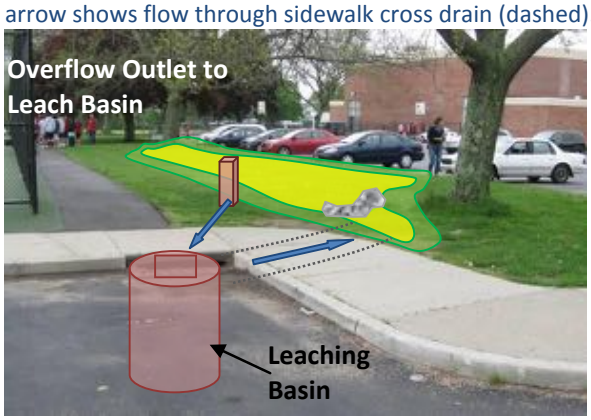
Southold JR/ SR High School (TJ-R10)

Southold High School is located to the north of Jockey Creek. The school system is a private entity not associated with the Town. Currently, leaching catchbasins collect and infiltrate stormwater runoff generated by the large impervious parking areas at the site. Multiple sites throughout the school campus are ideal for the implementation of demonstration projects to educate the community on the use of BMPs for water quality treatment prior to infiltration. In addition, non-structural pollution prevention practices such as street sweeping should be performed at all parking areas on site, as noticeable build up of sediment was observed in most areas. Below are descriptions of four proposed structural practices:

TJ-R-10C

Proposed improvements to stormwater treatment in the parking area parallel to Oaklawn Avenue and adjacent to the tennis court include: covering the existing leaching catchbasin in the parking area, installing a **bioretention basin** next to the northern corner of the tennis courts, and re-directing runoff to the basin through the sidewalk by installing a concrete sidewalk cross drain. Overflow during large storm events from the bioretention basin should be piped to the existing leaching basin for infiltration.

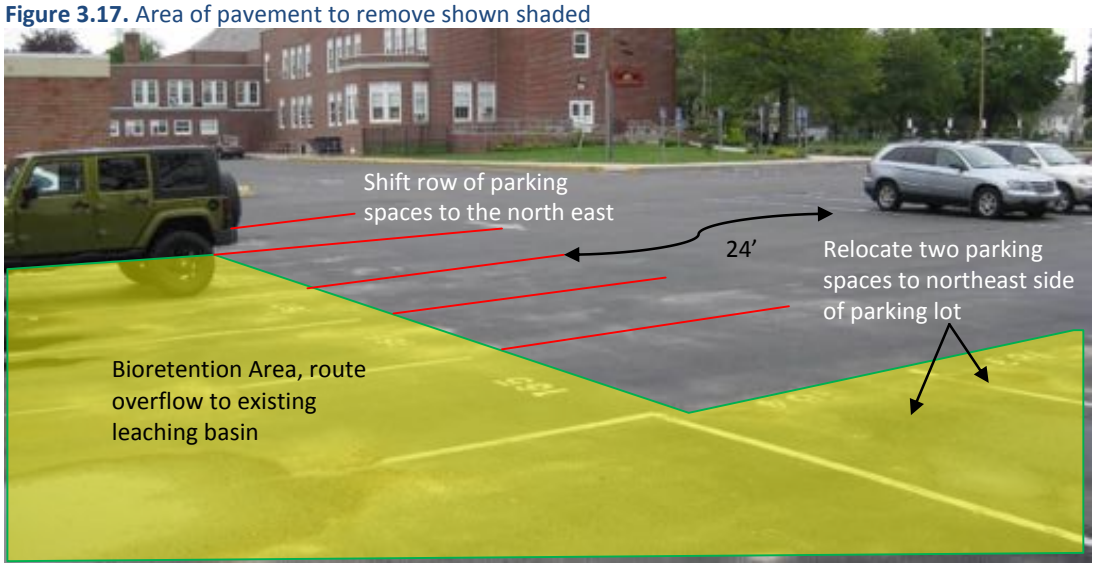
Figure 3.16. Proposed bioretention basin (shaded yellow), arrow shows flow through sidewalk cross drain (dashed).



TJ-R-10D

Proposed improvements include **removal of excess pavement** from the corner of the parking lot that is not used for parking and shifting a row of parking to the northeast to make room for a **bioretention basin**. The existing parking spaces lost as a result of shifting a row of parking can be re-located on the northeast end of the parking rows located in the center of the lot. The center parking rows can be expanded by reducing the width of the aisle located northeast of these parking spaces. A piped connection between the bioretention basin the existing leaching basin at the back of the basketball court should be installed for overflow during large storm events.

Figure 3.17. Area of pavement to remove shown shaded



TJ-R-10E

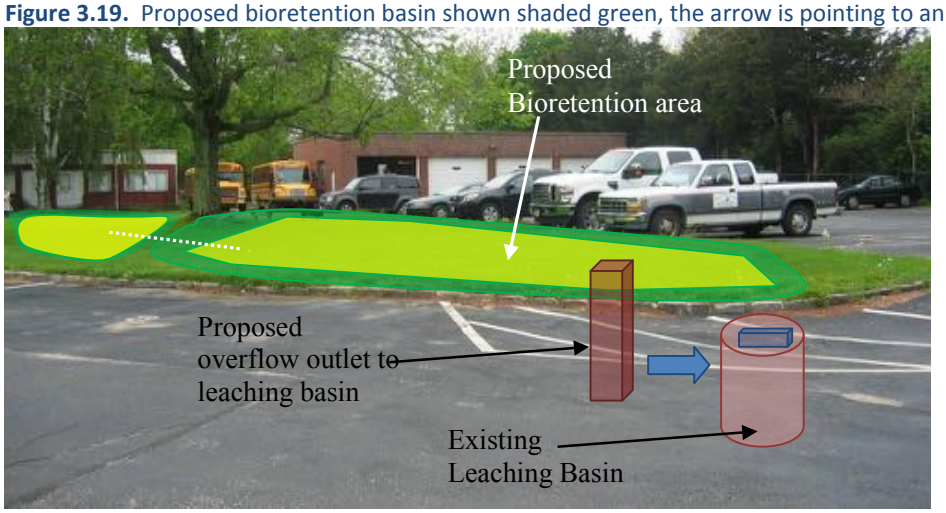
Proposed improvements at the parking lot near the soccer field include installing a **bioretention area** near the existing leaching basin, and re-directing small storm events from an existing leaching catchbasin to the new bioretention area for water quality treatment.

Figure 3.18. Parking area and sidewalk adjacent to parking area, existing leaching catchbasin noted by arrow (left); leaching catchbasin and proposed bioretention (right).

TJ-R-10G

Proposed improvements at the parking area/bus drop off area located to the north of the school include capping the existing leaching catchbasin and re-directing runoff with paved flumes to a **bioretention basin**. The bioretention basin is to be constructed in a parking island located in the middle of the parking area. Overflow from the bioretention basin should be piped to the existing leaching basin.

Figure 3.19. Proposed bioretention basin shown shaded green, the arrow is pointing to an existing leaching basin.



NY 25 Outfall at Jockey Creek (TJ-R12A and TJ-R12B)

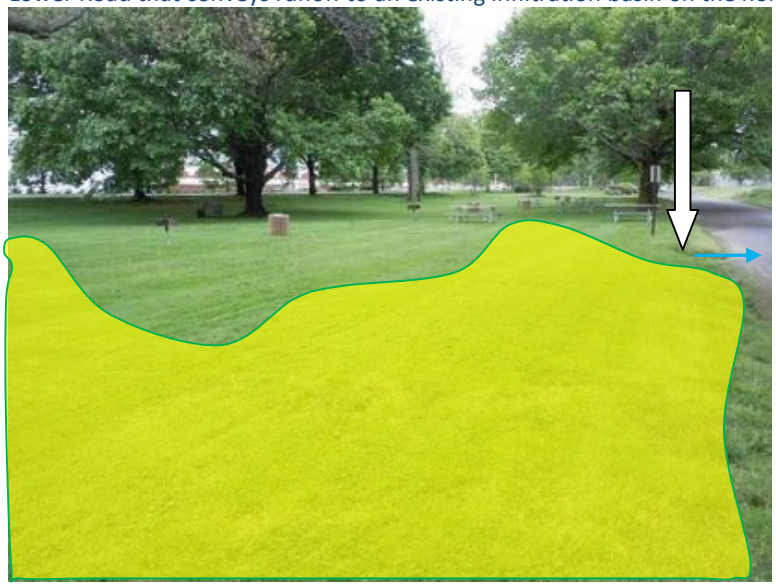
The outfall into Jockey Creek from NY 25 is a 5-ft diameter CMP pipe that receives runoff from a large drainage area that is approximately 13 acres. Since sufficient space is not available at the outfall to treat runoff prior to discharge with a single practice, efforts should be made to reduce runoff closer to the source. The two potential retrofits described below are proposed to reduce the amount of untreated runoff from entering Jockey Creek at the NY 25 outfall, which is under NYDOT jurisdiction.

Figure 3.20. Five-foot diameter outfall from NY 25 below arrow (left), observed film (potential pollutants) in Jockey Creek below outfall, and 12 inch diameter outfall from adjacent property is indicated by arrow (right).

Park between NY 25 and Lower Roads (TJ-R-12A)

The town park (owned and operated by the park district) located between NY 25 (Main Road) and Lower road is an ideal location for installation of a **constructed wetland** to treat runoff from NY 25. The proposed constructed wetland will provide water quality treatment of the road runoff in the park, and then convey overflow to an existing infiltration basin adjacent to Lower Road. This practice will re-direct a considerable amount of runoff away from the outfall to a management system that can provide water quality (in the constructed wetland) and recharge (in infiltration basin) rather than conveyance to the Jockey Creek outfall. The infiltration basin on the north side of Lower Road will need to be assessed to ensure that it can accommodate infiltration of the increased flow.

Figure 3.21. Proposed constructed wetland shown shaded, arrow indicates location of existing catchbasin in Lower Road that conveys runoff to an existing infiltration basin on the north side of Lower Road.



Lower Road and Ackerly Pond Lane (TJ-R-12B)

Along Lower Road, multiple leaching catchbasins appear to be clogged, and a direct CMP outfall to the wetland north of Ackerly Pond Lane was found near the intersection of the two roads. This wetland is connected by a culvert to the NY25 outfall. A shallow **bioretention area** is proposed in an existing green area located at the intersection of Lower Road and Ackerly Pond Lane to provide water quality treatment of runoff from these roads, as well as a **dry swale** on the north side of the road. Overflow structures in both the bioretention area and the dry swale will be convey runoff from large storm events to the wetland via the existing outfall.

Figure 3.22. Culvert from Ackerly Pond Lane wetland to NY 25 outfall (left); CMP outfall pipe (indicated by arrow) from Ackerly Pond Lane to wetland (middle), view of Ackerly Pond Lane looking west from outfall pipe; proposed shallow bioretention shown shaded on left and dry swale shaded on right, arrows indicate stormwater flow direction (right).

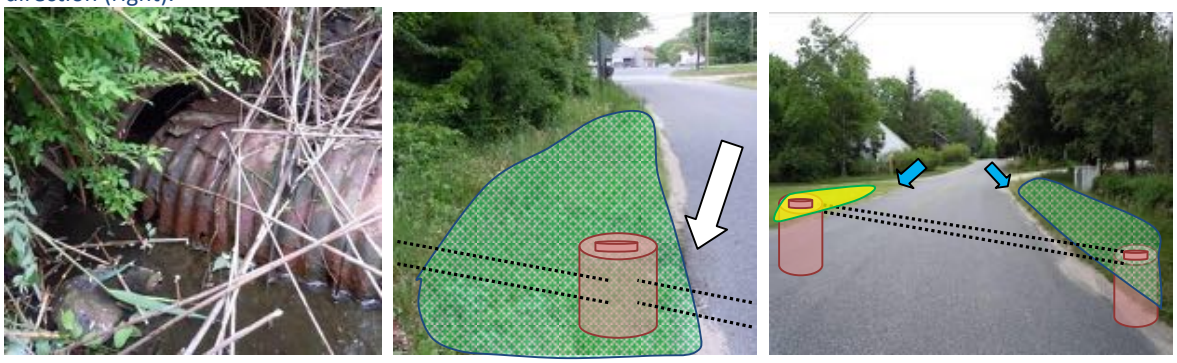
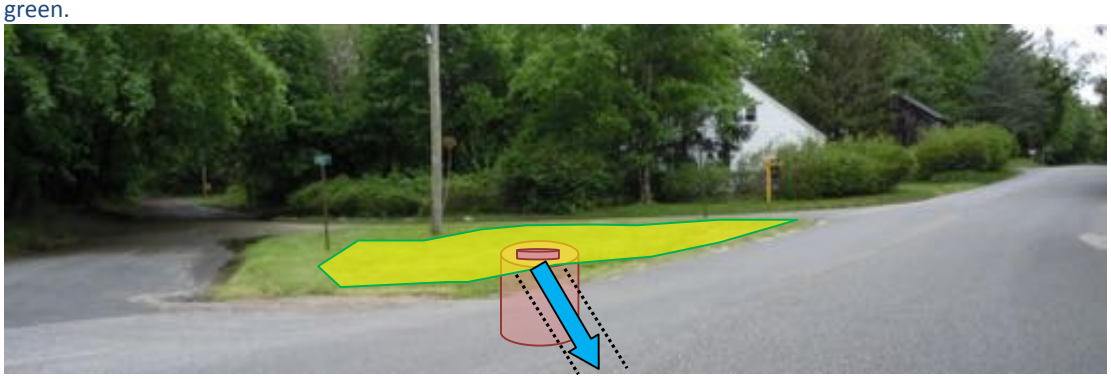


Figure 3.23. Proposed bioretention area at intersection of Lower Road and Ackerly Pond Lane shown shaded green.



Gilbert Road (TJ-R-14)

Gilbert Road is a dead-end road located off Jockey Creek Drive that terminates near the bank of Jockey Creek. At the end of Gilbert Road are three direct outfall pipes that receive runoff generated from impervious areas that include a portion of Jockey Creek Drive and all of Gilbert Road. The paved road is wide with ample space for vehicles to park and turn around. This is an ideal location for **pavement reduction**, **enhancement of the buffer** to the creek, and construction of **dry swales and bioretention area** for water quality treatment and infiltration of runoff. Due to the large size of this drainage area, multiple practices are necessary to provide adequate water quality treatment of runoff. Two areas along the south side of Jockey Creek Drive near its intersection with Gilbert Road are ideal for construction of dry swales to provide some of the required water quality treatment for runoff contributed by Jockey Creek Drive. The proposed dry swales are approximately eight feet wide and

located in the road layout. They are shallow with gentle slopes and vegetated with grass similar to the adjacent properties. They will be low maintenance requiring periodic mowing, and should drain within the 24-hour period following a storm event. Due to limited space available in the right-of-way, the dry swales cannot provide 100% water quality treatment. Therefore, runoff in excess of the capacity of the dry swales will overflow to practices proposed at the end of Gilbert Road.

At the end of Gilbert Road, a grass channel, sediment forebay, and two-cell bioretention area are proposed to provide treatment of runoff generated on Gilbert road and the overflow from the dry swales. The grass channel is proposed adjacent to the parking area to re-direct runoff around the parking spaces to a pretreatment sediment forebay that discharges into the bioretention area. The bioretention area is proposed as two cells to provide space for public benches and educational signage describing the function and benefit of the stormwater management practices. Additionally, since the paved area at the end of this road is quite large, some pavement removal is proposed; however, space for seven (9 ft x 20 ft) parking spaces is to remain. Areas of pavement removal that are not replaced by one of the proposed stormwater practices should be re-vegetated.

To reduce runoff further, residents of the neighborhood should disconnect roof runoff from impervious areas by redirecting downspouts into rain gardens or pervious lawn/landscaped space. Finally, the neighboring landscapes include high maintenance lawns right up to the bank of the creek; an improved buffer between the lawns and creek should be created by re-vegetating some of the lawn area with native plants. Enhancement of the creek buffer will help reduce bacteria contribution by deterring geese from the area and minimize nutrients by reducing fertilizer use in close proximity to the creek.

Figure 3.24. Dry swales (shown shaded green) along the south side of Jockey Creek Drive to the east (right) and west (left) of the Gilbert Road intersection. The blue arrows indicate runoff flow conditions.

Figure 3.25. Gilbert Road parking area with arrows pointing to existing direct outfalls (left), Neighboring yard with lawn right up to creek (middle), and goose and sediment observed in front of existing direct outfall pipe (right).

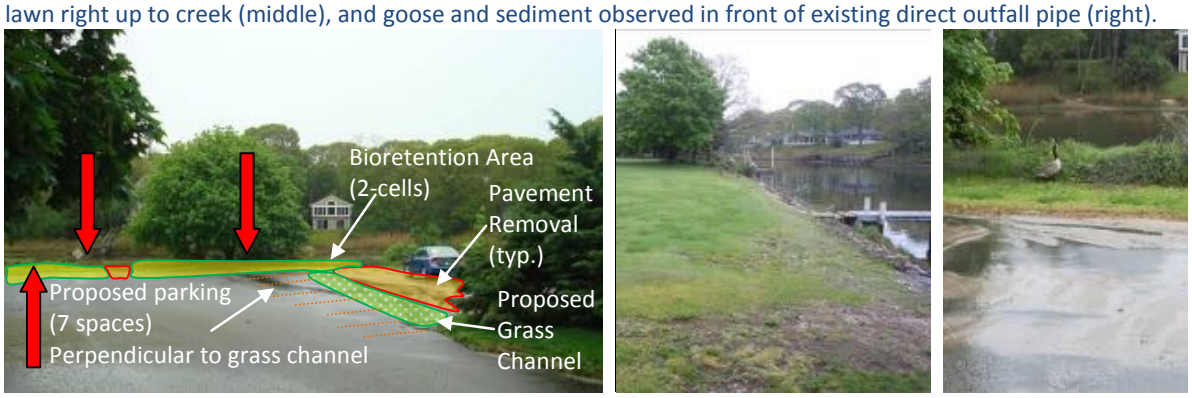


Figure 3.26. One of the three outfalls (left), and downspout at residence directly connected to walkway and driveway (right).

Oaklawn Avenue outfalls at Jockey Creek bridge (TJ-R15)

Currently, runoff generated and collected in catchbasins along Oaklawn Avenue near the County-owned Jockey Creek Bridge is discharged into the creek through County-owned outfalls located in the bulkhead on the north and south sides of the creek below the bridge. Adequate space is not available near the bridge to the north or south for installation of a single practice near each outfall to treat runoff prior to discharge. Therefore, multiple practices are proposed upgradient of the bridge in places where space is available. In addition, the Town should encourage property owners in this area to disconnect roof runoff from impervious surfaces by re-directing downspouts to landscaped areas or rain gardens. Below are descriptions of the proposed practices to treat runoff prior to discharge at each of the outfalls.

TJ-R15A (outfall on north side of bridge)

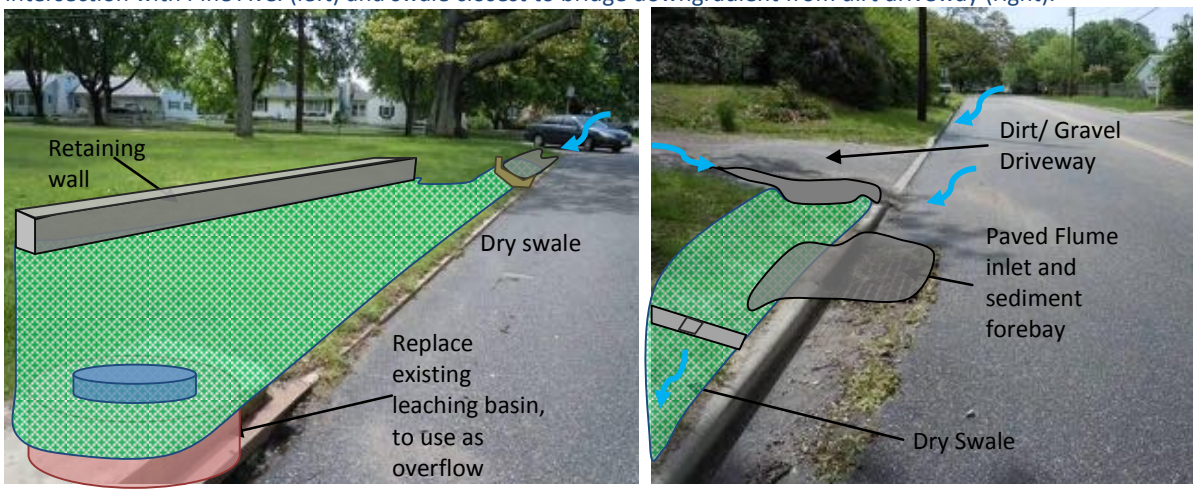
The drainage area contributing runoff to the outfall on the north side of the bridge is large and includes impervious areas such as the west side of Oaklawn Avenue between the Jockey Creek Bridge and the Southold School Complex, as well as the Southern half of Wells Avenue. Options for providing stormwater treatment prior to discharge in this area are limited due to existing vegetation and the grades adjacent to the roadway. Since there does not appear to be sufficient space available for siting practices to provide water quality treatment for bacteria and nitrogen, it is recommended that at a minimum the runoff receive some pretreatment prior to discharge for sediment and TSS removal. This can be accomplished by installing a **pretreatment device** (e.g., oil/grit separator) next to the existing catchbasin near the bridge. It should be installed with a diversion structure for bypassing overflow in large storm events. The discharge outlet from the pretreatment device and diversion structure should be piped to the existing County-owned outfall pipe.

Figure 3.27. Catchbasin on east side of road near bridge (left). Limited space and mature trees in the right-of-way reduce the feasibility of using a swale system for the large drainage area (right).

TJ-R15B (outfall on south side of bridge)

The east side of Oaklawn Avenue directly discharges via an outfall at the bridge to Jockey Creek. The infrastructure along Oaklawn Avenue includes a curb and gutter type system with double grate catchbasins that collect and convey runoff to the outfall. Adjacent to one of the catchbasins is an eroding gravel/dirt driveway that is contributing sediment load to the creek. There is not a lot of space available for stormwater practices; however, north of the gravel/dirt driveway there is space for a **dry swale**. This dry swale should include paved flume inlets and a sediment forebay prior to the dry swale for collection and pretreatment of runoff. The overflow outlet device in the dry swale should be directed to the existing pipe network for conveyance of treated stormwater and overflow in large storm events to the outfall. In addition, upgradient of the driveway, there is a clogged leaching catchbasin that is adjacent to an area of lawn that is within the road layout. This area could also be used for installation of a **dry swale** for treatment of surface runoff generated on Oaklawn Avenue. The installation of dry swales in these two locations will provide both water quality treatment for nitrogen and bacteria and infiltration of runoff. Infiltration of runoff will reduce the amount of stormwater conveyed to the outfall.

Figure 3.28. Proposed swale systems in the right-of-way on Oaklawn Ave in two locations: southern swale near intersection with Pine Ave. (left) and swale closest to bridge downgradient from dirt driveway (right).



Additionally, the south side of Pine Neck Road contributes runoff to a leaching catchbasin that is located at the intersection of Pine Neck and Oaklawn Roads. Since the leaching catchbasin is clogged, it is recommended that runoff in this area instead be managed utilizing **dry swales and a leaching basin**. There is space available along most of the south side of Pine Neck Road for construction of dry swales. The dry swales should be designed to manage the water quality volume, have paved flume inlets with sediment forebays, and an underdrain system with overflow outlet device to direct runoff to subsurface infiltration structures. These practices will provide water quality treatment for both nitrogen and bacteria. Since runoff will receive pretreatment at easily accessible and maintainable sediment forebays prior to infiltration, general maintenance activities will be simplified which should improve the overall longevity and function of the infiltration practice in comparison to the existing leaching catchbasin.

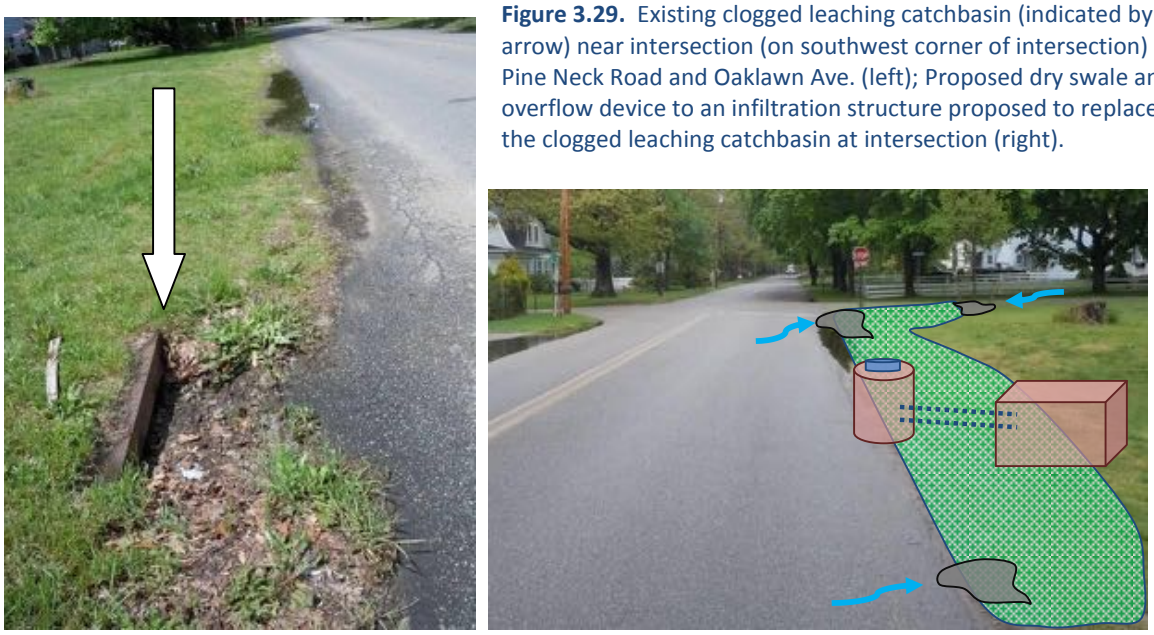
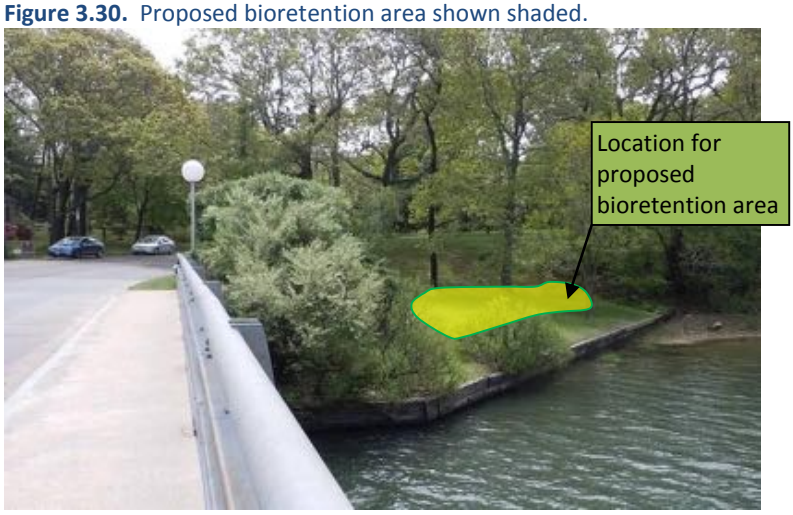


Figure 3.29. Existing clogged leaching catchbasin (indicated by arrow) near intersection (on southwest corner of intersection) of Pine Neck Road and Oaklawn Ave. (left); Proposed dry swale and overflow device to an infiltration structure proposed to replace the clogged leaching catchbasin at intersection (right).

TJ-R15C (outfall on south side of bridge-west side of Oaklawn and north side of Pine Neck Road)

A bioretention area is proposed to treat the water quality of runoff generated along the western side of Oaklawn Avenue and the northern side of Pine Neck Road prior to discharge via the existing outfall on the south side of the bridge. An area of open space located just southwest of the bridge near the existing bulkhead is ideal for installation of the **bioretention area**.

Figure 3.30. Proposed bioretention area shown shaded.



Jockey Creek Drive (TJ-R16)

Jockey Creek Drive is located along the northern shores of Jockey Creek. A catchbasin located on Jockey Creek Drive adjacent to house #1710 and #1850 was observed with an outfall up-gradient of the creek. Currently, the outfall from this catchbasin appears to be partially obstructed, and during storm events, the roadway ponds. Additionally, due to erosive flows, a channel has formed through the natural landscape down-gradient of the 12-inch diameter CMP pipe outfall. This site is an ideal location for repairing or replacing the outfall pipe and installing a **terraced bioswale** that could provide non-erosive conveyance and treatment of road runoff prior to discharge to the creek. The drainage easement may need to be adjusted and/or enlarged in this area to encompass the extent of this retrofit.

Figure 3.31. Inlet on Jockey Drive (left), outfall (middle), scoured channel from outfall to creek (right).

Wells Avenue (TJ-R17)

Located on Wells Avenue between the sixth and seventh parcels (as measured on the south side of the road beginning at the intersection of Wells Avenue and Oaklawn Avenue) is a catchbasin that appears to have a six-inch diameter outfall pipe to Jockey Creek. Runoff from the southern portion of the road

contributing to this direct Jockey Creek outfall should be redirected to the **existing infiltration basin** located to the north of the road. A new catchbasin should be installed with a pipe that crosses the road to convey runoff to the existing catchbasin located on the northern side of Wells Avenue, which discharges to the infiltration basin. This is a relatively easy retrofit, and it appears that this large infiltration basin is of sufficient size to handle the additional runoff generated on the southern half of the road. However, the existing outfall should be maintained and utilized as an overflow during large storm events to prevent road flooding. As an additional part of this project, the infiltration basin should be maintained and improved, including activities such as cleaning and increasing the size of the sediment forebay for easier and more effective maintenance, enhancing vegetation in the basin to improve water quality treatment, and stabilizing the steep sidewalls of the basin (see pictures below).

Figure 3.32. Catchbasin inlet on north side of Wells Avenue (top left); Inlet on south side of Wells Avenue (top right); Inlet pipe at infiltration basin (bottom left); and infiltration basin (bottom right).

Pine Neck Road (TJ-R18A & TJ-R18B)

The Town boat ramp on Pine Neck Road is located near the mouth of Town and Jockey Creeks. Since Pine Neck Road is crowned, stormwater runoff accumulates along both the northern and southern edges of the road. On the northern side of the road, runoff is directed to an existing infiltration trench. Runoff from the southern side of the road sheet flows into a channel that has eroded along the edge of the road and boat ramp and discharges into the creek. The area along the edge of the road between the

proposed bioretention areas and the boat ramp on both sides of Pine Neck Road should be stabilized to minimize erosion and future sediment deposits to creek.

Pine Neck Road (TJ-R18A)

The treatment of runoff generated along the northern side of Pine Neck Road can be further improved by retrofitting the existing stone infiltration trench with a **paved flume, sediment forebay, and a vegetated bioretention area**. The existing leaching catchbasin can be re-used (if in good condition) or replaced for any overflow from the bioretention during large storm events.

Pine Neck Road (TJ-R18B)

Currently, a leaching catch basin near the intersection of Pine Neck Road and Kimberly Way infiltrates runoff contributed from the south side of Pine Neck Road. To improve water quality treatment and reduce erosion down gradient of the leaching catchbasin, a **bioretention area** is proposed along the south side of Pine Neck Road near the boat ramp. A paved flume and culvert are proposed to convey runoff from the existing leaching catchbasin under Kimberly Way to the proposed bioretention area.

Figure 3.33. Proposed bioretention (TJ-R18B) along south side of Pine Neck Road (left); eroded channel along the southern edge of the road (middle); and existing BMP (TJ-R18A) to be retrofitted (right).

Youngs Avenue and Mechanic Street (TJ-R19 A, B, C, & D)

TJ-R-19A

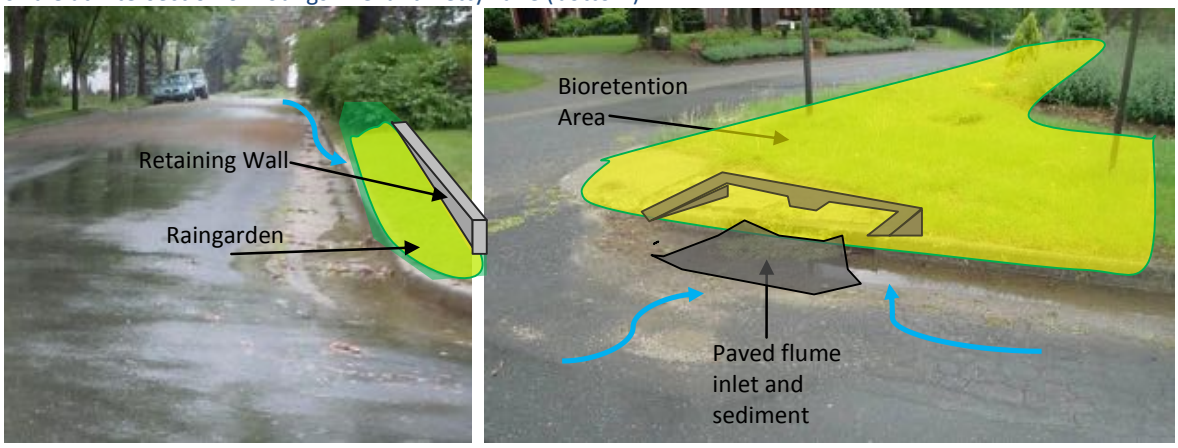
The park located at the end of Youngs Avenue at Town Creek is a good location for a public education/ demonstration project that could include installation of **bioretention area and buffer restoration plantings**. Currently during storm events, the park is inundated with runoff from NY 25 and Youngs Avenue, as well as runoff generated on site. This occurs because catchbasins in the roads upgradient of the site are unable to effectively capture runoff in higher intensity storm events. These conditions result in flooding at the park that overflows into the creek, carrying with it sediment, organics, and other potential pollutants. The south side of the park is an ideal location for installation of a bioretention area with a sediment forebay. The mulched landscape bed adjacent to the bulkhead (shown below) should be replaced with buffer plantings to better stabilize the area behind the bulkhead. Additionally, the dumpster should be relocated to the north side of the lot, away from the bulkhead and areas of the park that frequently flood. The park is owned and operated by the park district; the Town will need to obtain a drainage easement to construct and maintain any practices on this private property.

Figure 3.34. Runoff flowing down Youngs Avenue from NY 25 (upper left). Parking area and runoff from Youngs Avenue flows directly into Town Creek (upper right), and proposed bioretention area in park (bottom).

TJ-R-19B

To address surface runoff generated along portions of Mechanic Street, East Mechanic Street, and Youngs Avenue, installation of a raingarden, bioretention area, and water quality swale is recommended. The raingarden is proposed at the intersection of Mechanic and East Mechanic Streets, the bioretention is at the intersection of Youngs Avenue and East Mechanic Street, and the water quality swale is at the intersection of Youngs Avenue and Petty Lane. Additionally, because this area is well developed with limited space available for implementation of stormwater treatment practices, the Town should encourage property owners to re-direct roof downspouts to raingardens or pervious areas on their lots to reduce runoff to the street.

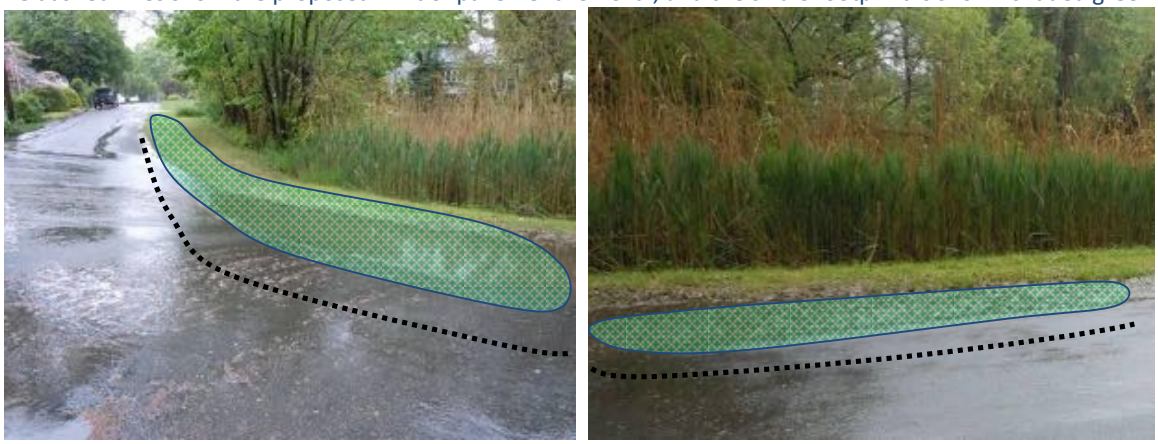
Figure 3.35. Proposed raingarden at corner of Mechanic Street and East Mechanic Street (left), proposed bioretention area at intersection of Youngs Ave. and East Mechanic Street (right), and proposed water quality swale at intersection of Youngs Ave. and Petty Lane (bottom).



TJ-R-19C

Mechanic Street is a good location for **pavement removal** and installation of a **water quality swale** between the edge of pavement and the wetland. This would provide water quality treatment prior to discharge into the wetland. In addition, the 15-inch culvert between the Mechanic Street wetland and the Youngs Avenue wetland and the two 18-inch culverts connecting Youngs Avenue to Town Creek should be inspected and maintained as needed to ensure maximum flushing.

Figure 3.36. Runoff transporting sediment and organics along Mechanics Street flows to the adjacent wetland. The dashed lines show the proposed limit of pavement removal, and the swale footprint is shown shaded green.



TJ-R-19D

Dry swales are proposed to provide treatment for runoff that is generated along Youngs Avenue on the south side of the culvert under the road. The swales should be constructed in open space located in the ROW on both sides of Youngs Avenue in this area (see Figure 3.35). The swales should have a reinforced spillway for overflow to open space adjacent to the wetland in storm events that exceed the water quality volume. This practice will provide water quality treatment of runoff prior to discharge to the creek. Currently, this runoff is directly discharging to the creek without any treatment.

Figure 3.37. Proposed dry swales along Youngs Ave. on south side of culvert under road (left), and existing culverts under Youngs Ave. (bottom right).

Hobart Avenue Detention Basin and Outfall (TJ-R20A)

The Hobart Avenue wet pond/detention basin receives runoff from NY 25 and Hobart Avenue. This site was retrofitted in the 1990s with EPA funding. Pollutant removal capabilities of the existing wet pond/ detention basin could be improved by adding a **pretreatment forebay** and further retrofitting the basin to function more as a **shallow constructed wetland**. The elevation of the outlet structure should also be raised to provide greater storage, and tidal flap gates should be installed. To proceed with this project, potential permitting obstacles should be investigated, such as ensuring that the detention basin is not

considered a natural wetland. To reduce runoff contributing to the practices, the Town should encourage property owners to direct roof downspouts to landscaped areas or rain gardens. Additionally, runoff from the large commercial parking area that is part of the car dealership on NY 25 (Mullen Motors) should be managed and treated on site.

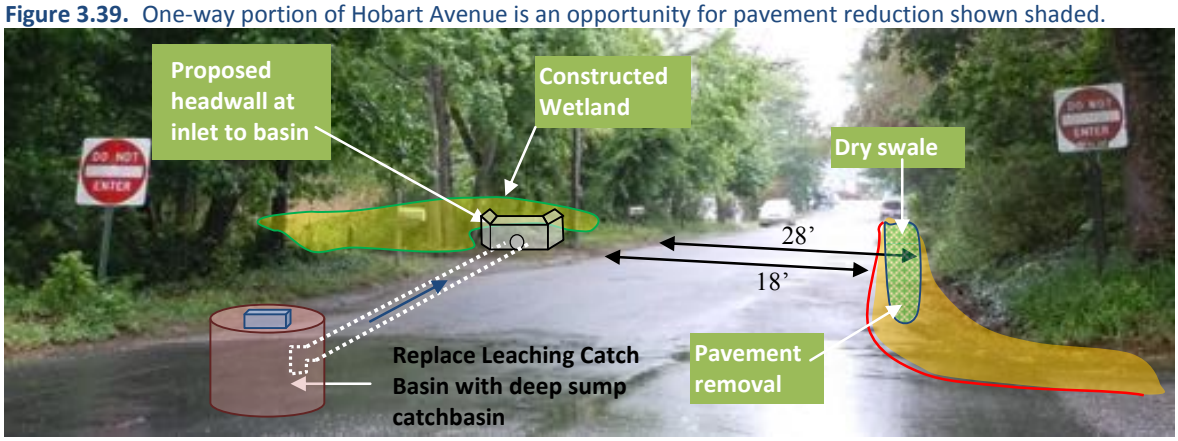
Hobart Avenue Detention Basin and Outfall (TJ-R20B)

To further improve water quality and reduce quantity of runoff conveyed to the constructed wetland (TJ-R20A), both **pavement removal** and **dry swales** are proposed along Hobart Avenue. Currently, Hobart Avenue is a one-way road from NY 25 to its intersection with Korn Road, and is 28 feet wide. It is proposed that excess pavement (approximately ten feet) along the north side of the road should be removed and replaced with dry swales that can provide water quality treatment. The dry swales should be sized to treat the water quality volume with overflow outlets routed to the existing infrastructure in the road.

Additionally, a clogged leaching catchbasin located adjacent to the detention basin outlet on Hobart Avenue should be addressed. This leaching catchbasin receives runoff generated on Korn and Hobart Roads, and due to its current condition, runoff appears to overflow the structure and spill into the wetland. This inlet should be replaced by a deep sump catchbasin with a hooded outlet pipe that is routed to the nearby retrofitted detention basin.

Figure 3.38. Hobart Avenue detention basin (left) and outlet pipe (right).

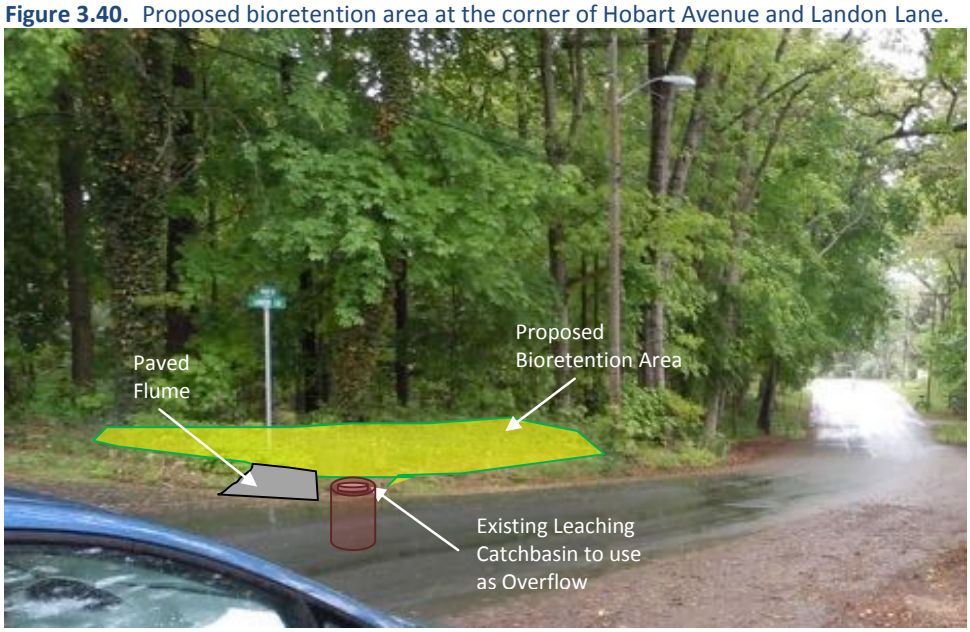
Figure 3.39. One-way portion of Hobart Avenue is an opportunity for pavement reduction shown shaded.



Hobart Avenue near Landon Lane (TJ-R21A)

This site is located at the corner of Hobart Avenue and Landon Lane where there is an open grassy area. There is an existing leaching catchbasin at this corner that receives runoff from a portion of Hobart Avenue (the road is crowned) and all of Landon Lane up to the first driveway. The proposed retrofit for this site is to construct a paved flume to direct runoff into a **bioretention area**, with overflows from large storm events directed into the existing leaching catchbasin. This site will not only provide water quality treatment and enhanced recharge, but it will also reduce flooding issues at the low point on Hobart Avenue (see site TJ-R21B).

Figure 3.40. Proposed bioretention area at the corner of Hobart Avenue and Landon Lane.



Hobart Avenue Low Point (TJ-R21B)

This site is located at a low point in Hobart Avenue adjacent to a wetland and Town Creek. This area is at a relatively low elevation, and the infiltration capabilities of the existing leaching catchbasin may be limited due to high groundwater. The north side of the road at this site is a good candidate for a **bioretention area** within the right-of-way, but an easement will be required if the practice is sized for the optimal treatment volume, and a wetland delineation should be performed to ensure no construction occurs within a wetland resource. A catchbasin on the south side of the road and a paved flume should be constructed to direct runoff into the bioretention area, with overflows from large storm events directed into the existing leaching catchbasin. The leaching catchbasin here has major buildup of sediment and organics most likely resulting from nearby dumping of yard waste and upgradient development activities. This catchbasin should be maintained, and areas contributing sediment should be stabilized using proper erosion and sediment control measures.

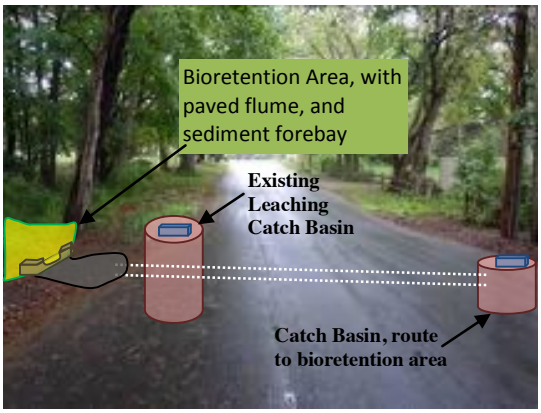


Figure 3.41. Hobart Avenue view looking southeast, showing proposed retrofit (left); clogged leaching catchbasin (middle); and sediment and organics from construction site upgradient of leaching catchbasin without proper erosion and sediment control measures in place (right).

Founders Landing Park (TJ-R22)

Founders Landing Park (park district) and the Town boat ramp are located at the end of Terry Lane near the mouth of Town Creek. Currently, runoff at this site flows to two leaching catchbasins located near the town boat ramp. These leaching catchbasins were recently installed, and the boat ramp was raised, to improve water quality conditions at this site. This was an improvement over prior conditions when runoff flowed directly into the water with no management. However, the leaching catchbasins are clogged due to high sediment load and high groundwater. Because this site is a park, it is a good location for a demonstration project. The area between the parking area and Terry Lane is ideal for **pavement reduction** and the installation of a **bioretention area** to treat runoff from the parking area (TJ-R22A), and a **bioretention area** could be placed along the west side of Terry Lane up-gradient of the boat ramp to treat runoff from the road as an upgrade to the clogged leaching basins (TJ-R22B). It appears that there are also opportunities at site TJ-R22A to provide **improved buffer plantings** adjacent to the bulkhead near the boat ramp and reduce runoff by removing pavement.

Figure 3.42. Proposed bioretention area (TJ-22A shown shaded) for runoff from parking lot at Founders Landing Park and the east side of Terry Lane; arrows indicate runoff flow patterns.

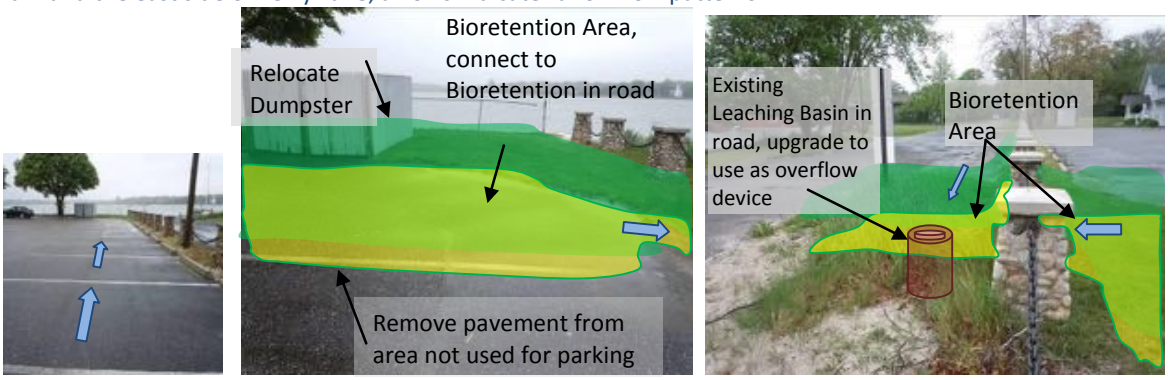
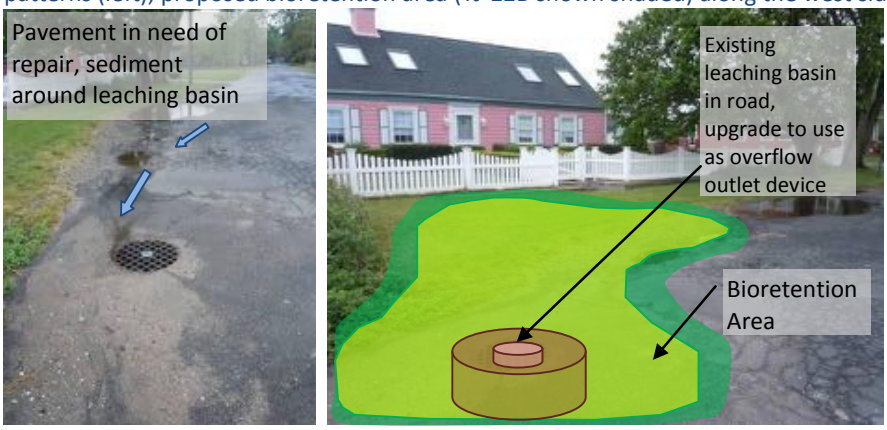


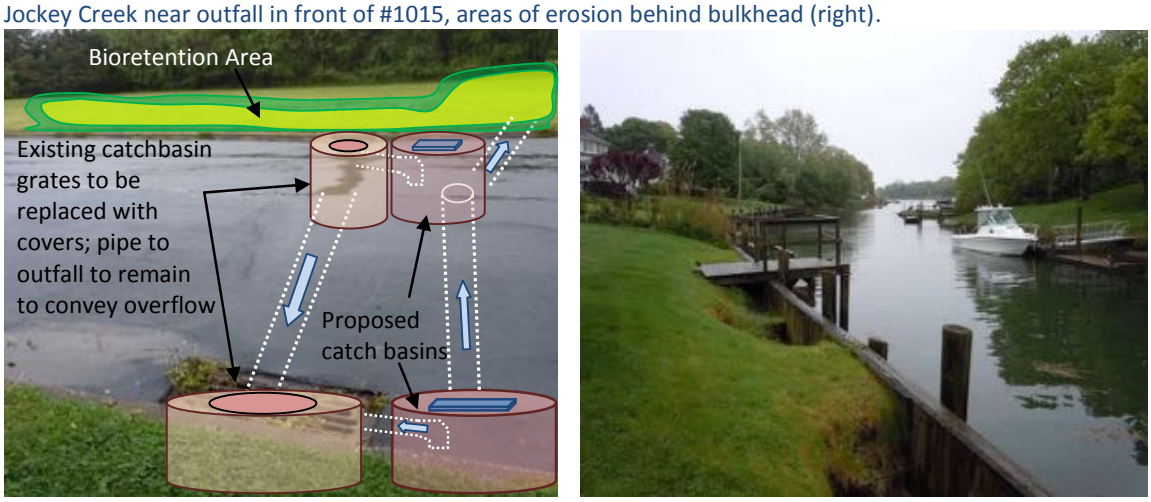
Figure 3.43. Existing condition of pavement and leaching catchbasin on Terry Lane, arrows indicate runoff flow patterns (left); proposed bioretention area (TJ-22B shown shaded) along the west side of Terry Lane.



Hill Road Outfall- Near House #1015 Hill Road –west (TJ-R23A)

During the field reconnaissance, it appeared as though there was a direct outfall into Jockey Creek near house #1015 Hill Road-west that receives runoff from two catchbasins located on Hill Road-west; however, information from the Town indicates that the catchbasins only discharge to leaching chambers in the open space located on the north side of the road. The catchbasins should be further investigated to confirm whether or not a direct outfall exists. The proposed upgrade to this site is to construct a **bioretention area** for water quality treatment before discharging to the existing leaching chambers. If there is an existing outfall, two new catchbasins should be installed adjacent to the existing catchbasins (which should be covered) to route runoff from small storm events to the proposed bioretention area and leaching chambers, while stormwater from large events continues to discharge via the outfall. If there is not direct discharge, the existing catchbasins should be modified to discharge runoff from small storm events into the bioretention area while stormwater from large events continues to discharge to leaching chambers. Additionally, **fill and plantings** should be placed behind the bulkhead to deter waterfowl and stabilize the bank, reducing direct sediment inputs into the creek in this location.

Figure 3.44. Proposed retrofit to Inlets on Hill Road –West, assuming there is a direct outfall at this location (left); Jockey Creek near outfall in front of #1015, areas of erosion behind bulkhead (right).



Hill Road Outfall- Near House #575 Hill Road (TJ-R23B)

A direct outfall into Jockey Creek is located on the banks of Jockey Creek in front of house #575 Hill Road. The outfall pipe is a 12-inch diameter CMP that is in poor condition and in need of repair or replacement. Two catchbasins located in Hill Road convey runoff from the paved roadway to the outfall. At each of the catchbasins, there is lawn area that could be replaced with a **raingarden** and **dry swale** to treat runoff generated by the paved road prior to discharge to the outfall. If work is required beyond the existing right-of-way, easements will be required.

Figure 3.45. Outfall at #575 Hill Road (left); Inlet on south side of Hill Road with proposed raingarden and dry swale shown shaded green (center and right).

Wells Avenue (TJ-R24)

The east side of a portion of Wells Avenue is collected in two catchbasins that convey stormwater to an 18-inch diameter CMP pipe that discharges to Jockey Creek. This runoff should be re-directed to the **existing infiltration basin** located on the west side of the road for water quality treatment. This can be

accomplished by retrofitting the existing catchbasin on the east side of the road with an outlet pipe to convey runoff to a proposed **oil/grit separator** and **deep sump catchbasin** installed adjacent to the infiltration basin. This concept will provide pretreatment to the road runoff prior to discharge to the basin, replacing the two existing 18-inch diameter inlet pipes. An overflow outlet should be installed at the oil/grit separator to divert runoff from large storm events to the existing outfall. The infiltration basin should be assessed to ensure that it has capacity for this extra runoff during small storm events, and any **slope erosion issues** in the basin should be stabilized.

Figure 3.46. Proposed retrofit concept shown below. The Wells Avenue inlet that discharges to Jockey Creek (on the right side of road in picture); inlet pipes that discharge to infiltration basin (on left side of road in picture).

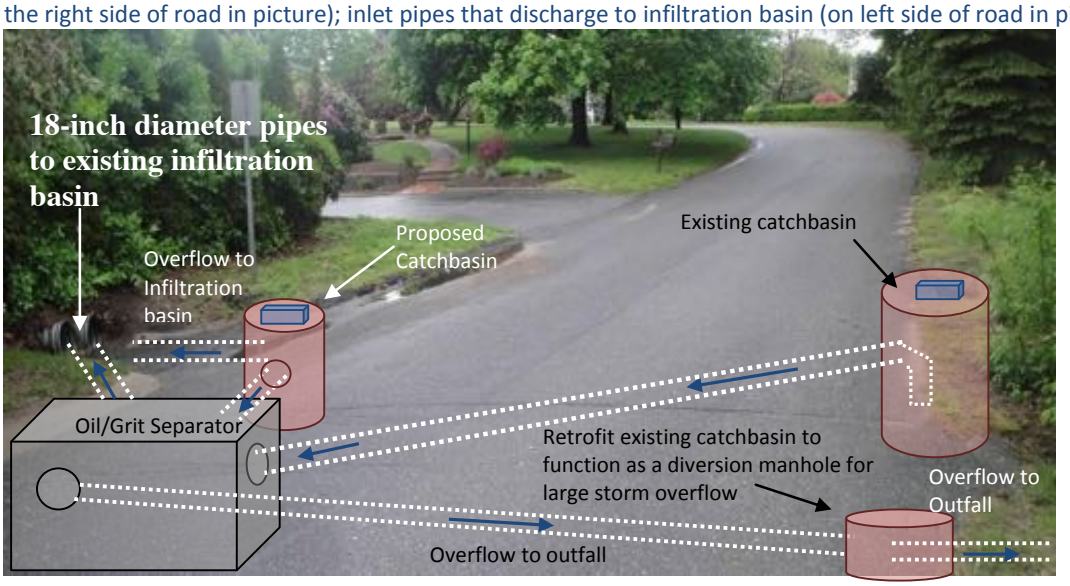


Figure 3.47. Existing inlet pipes to infiltration basin (left); eroding slopes in the existing infiltration basin (right).

3.2.2. Neighborhood Assessment

A summary of general neighborhood conditions is provided below in order to identify which neighborhoods are likely to generate pollutants of concern, what the common sources are, and which areas/sources should be targeted for subwatershed stewardship activities. Unless otherwise noted, it is assumed that neighborhoods consist of single-family detached residences, with on-site septic systems, and paved roads with curb and gutter collection systems. Table 3.4 is a comparative summary of each neighborhood, and more detail is provided below. Pollution source is determined by the number of observed pollutants (1-2 = medium; >2 = High).

Table 3.4. Neighborhood Inventory Summary

Site ID/ Name	Pollutant Loading	Main Pollutant Source	Stewardship Activities
TJ-N1/ Jasmine Lane	Medium	Sediment, organic matter, nutrients	Address lawn care, downspout disconnection, pavement reduction (cul-de-sacs), reforestation
TJ-N2/ Founders Path	Low	Sediment, organic matter, nutrients, bacteria	Address lawn care, downspout disconnection, pavement reduction (street width), reforestation, cesspools
TJ-N3/ Calves Neck Road	High	Sediment, organic matter, nutrients, bacteria	Address lawn care, downspout disconnection, reforestation, cesspools
TJ-N4/ Founders Village	Low	Nutrients	Address lawn care

Jasmine Lane / TJ-N1

Jasmine Lane is a newer neighborhood of single-family detached dwellings that appear to be approximately five to ten years of age. The neighborhood has not yet reached full build out; for example, one cul-de-sac includes four additional lots that are undeveloped. All roads within the neighborhood are paved and in good condition with a sidewalk along one side. Overall, the neighborhood is approximately 22 acres and 20% of the neighborhood is forested. A typical lot is approximately ½ of an acre, with maintained yard conditions that are on average 20% impervious, 70% grass cover, and 10% landscaped beds. A majority (70%) of the lawns appear to have permanent irrigation with high management requirements, while the remaining 30% of lawns may require a medium level of maintenance. The neighborhood was clean at the time of observation without visible pet waste, trash, or illegal dumping.

Stormwater runoff is collected via a curb-and-gutter system, and it appears to be recharged on site through sub-surface infiltration. There is an area within the subdivision reserved for a stormwater treatment basin; however, at the time of field observations, a stormwater treatment practice was not visible.

Opportunities for pollution prevention within the neighborhood include homeowner education on the proper use of fertilizers, and the benefit (cost and water quality) of replacing turf with trees and shrubs (reforestation). Additionally, homeowners could effectively reduce runoff impervious area "disconnection"; approximately 50% of the dwellings have downspouts that could be re-directed to pervious portions of the yard, rain gardens, or rain barrels rather than to the driveways.

Figure 3.48. Jasmine Lane intersection at Apple Court

Founders Path (Founders Path, Landon Lane, Old Shipyard Lane, and Lhommedieu Lane)/ TJ-N2

Founders Path is an older, well-established neighborhood of single-family detached dwellings that appears to be approximately 50 to 100 years of age. Overall, the neighborhood is approximately 41 acres and 30% of the neighborhood is forested. The typical lot is approximately 1/3 of an acre, and on average are 40% impervious, 55% grass cover, and 5% landscaped beds. About 10% of the yards appear to have high maintenance requirements.

The stormwater management system in this neighborhood primarily consists of individual leaching catchbasins. Many of the leaching catchbasins are clogged from high accumulations of sediment and organic matter. As a result, runoff is bypassing up-gradient basins in the neighborhood study area and entering catchbasins down-gradient that directly discharge to the creek.

Opportunities for pollution prevention within the neighborhood include homeowner education on fertilizer use with emphasis on reduction or elimination. In addition, the Town should address storm drain maintenance and repair in this area. Clogged leaching catchbasins should be replaced with systems that can trap sediments/organics and provide pretreatment prior to discharge to infiltration basins. Similarly, many of the existing catchbasins would benefit from more frequent maintenance, and storm drains that directly discharge to the creek should be stenciled to identify this direct connection.

The Town should consider reducing the amount of runoff to Town Creek by removing excess impervious pavement in the neighborhood; for example, many of the roads in the neighborhood are wider than necessary, measuring 28 to 30 feet. It may be possible to reduce this width to 24 feet or less as roads are repaired or upgraded, saving the Town money on future road paving and also reducing runoff and associated impacts.

Figure 3.49. Founders Path neighborhood

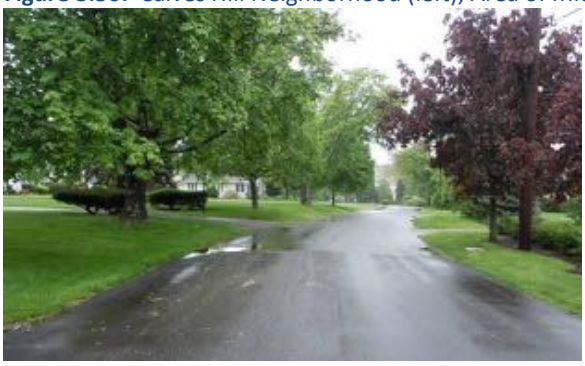
Calves Neck Road (Calves Neck Road, Harper Road, Midfarm Road, Hill Road, & Hill Road west)/ TJ-N3

Calves Neck Hill is an older, well-established neighborhood of single-family detached dwellings that appear to be approximately 50 to 60 years of age. Overall, the neighborhood is roughly 37 acres and 40% of the neighborhood has remained forested. A typical lot is approximately 3/4 of an acre, of which in general 20% is impervious, 70% grass cover, and 10% landscaped beds. About 80% of the yards appear to have high maintenance requirements, and the remaining 20% require a medium level of maintenance. All of the houses in this neighborhood have garages, and approximately 60% have impervious driveways. At the time of observation, the neighborhood was clean without visible trash or illegal dumping. However, there are indicators within the neighborhood that there is a high potential for pollutant accumulation; particularly, sediment, organic matter, nutrients, and bacteria. Some indicators of these potential pollutants are the appearance of a high level of yard maintenance activities, visible accumulation of sediment and organics in storm drains, and the presence of cesspools and waterfowl waste.

The storm drain system in this neighborhood consists of leaching catchbasins and a few direct outfalls to Jockey Creek. Many of the leaching catchbasins are clogged from high accumulations of sediment and organic matter. As a result, runoff either ponds on the roads or, in some places, bypasses the clogged basins and enters catchbasins that directly discharge to the creek. Flooding in the roadways appears to remain long after storm events and attracts waterfowl.

Opportunities for pollution prevention include increased maintenance and repair of the existing leaching catchbasins, and storm drains that directly discharge to the creek should be stenciled to identify this direct connection. Additionally, retrofit practices should be prioritized at/near catchbasins that have direct discharges to provide treatment prior to discharge (see retrofit TJ-R23 for greater detail).

Figure 3.50. Calves Hill Neighborhood (left); Area of Midfarm Road with clogged leaching basins (right)




Founders Village (2555 Youngs Avenue)/ TJ-N4

Founders Village is a newer condominium/ town house, multi-family dwelling neighborhood that appears to be approximately 10 to 20 years of age. Overall, this neighborhood is in good condition with low levels of visible pollutant accumulation. The neighborhood has a homeowners association that is responsible for maintenance activities.

The roads within the development are paved with berms along both sides. The stormwater system primarily consists of individual leaching catchbasins that appear to be in good condition. Overall, approximately 15% of the neighborhood has remained forested. The lots are typically 20% impervious, 70% grass cover, and 10% landscaped beds. All of the yard area appears to receive a high level of maintenance.

Opportunities for pollution prevention within the neighborhood include homeowner association education on the proper use of fertilizers, and the benefits of replacing turf with trees, shrubs, and native wildflowers or grasses (reforestation).

Figure 3.51. Founders Village Town House Community.

3.2.3. Stormwater Hotspot Inventory

A summary of hotspot conditions is provided below in order to identify which hotspots are likely to generate pollutants of concern, what the common sources are, and which areas/sources should be targeted for pollution control activities. Table 3.5 is a comparative summary of each hotspot, with more detail on each site provided below. Pollution source initial ranking is determined by the number of observed pollutants (1-2 = medium; >2 = High).

Table 3.5. Hotspot Inventory Summary

Site ID/ Name	Description	Ranking
TJ-H1/ Empire Mini-Mart Gas station at intersection of Main St. and Main Bayview	Fuel pumps are not covered, all stormwater runoff leaves the site	Medium
TJ-H2/ Southold Marine Center	Failing bulkhead, no driveway drainage	Low
TJ-H3/ Auto Repair of Southold	Good pollution control practices in place	Low
TJ-H4/ Mullen Motors - Car Dealership on Main St	Site used for vehicle storage, stormwater runoff leaves site, observed staining on pavement from hydrocarbon-derived pollutants (e.g., oil/grease) and observed sediment loading	Medium
TJ-H5/ Goldsmith Marina on Hobart Road	Failing bulkhead, uncovered material storage, cesspool close to creek	Medium
TJ-H6/ Agway-Nursery at intersection of Youngs and Hommel Avenues	Landscape materials stored up-gradient of leaching basin	Medium
TJ-H7/ Burts Reliable - Fuel storage & distribution	Good pollution control practices in place	Low
TJ-H10/ Catapano Farms- Commercial Nursery	Uncovered dumpster and discarded planting pots in fields	Low
TJ-H12/ U-Store-it Self Storage	Uncovered material and equipment storage	Medium

Empire Mini-Mart Gas station (At Intersection of Main Road and Main Bayview Road)/ TJ-H1

The Empire Mini-Mart Gas Station is identified as a medium-level potential pollutant hotspot, due to the observed sediments, and the likelihood of hydrocarbon-derived pollutants leaving the site during rain events. Since the fueling area is not covered, is located on a steep slope, and there is no visible

stormwater infrastructure at the site, runoff from the fueling pad flows onto the adjacent roads (Main and Main Bay View Roads) and discharges into nearby Jockey Creek with no treatment or attenuation. We recommend that the fueling area be covered and that stormwater infrastructure be installed on site that is suitable to provide treatment of runoff in storm events, and act as an emergency management measure in the case of a fuel spill. The site should also be maintained regularly to address high levels of sediment visible within the paved drive and parking areas. A potential stormwater retrofit for this site is described in Section 3.2.

Figure 3.52. Uncovered and sloped vehicle fueling area at Empire Mini-Mart Gas station

Southold Marina (At Intersection of Main Road and Bayview Road)/ TJ-H2

Southold Marina is a potential hotspot because of boat maintenance activities that occur on site. Stormwater infrastructure was not visible; runoff likely infiltrates or ponds in the gravel/dirt driveway. Currently, the marina uses good pollution control practices that include performing a majority of boat maintenance activities indoors, and performing outdoor maintenance activities above a recovery cloth. The site has a low pollutant potential; however, sediment loading was observed in areas where the existing bulkhead is failing adjacent to the dirt driveway. We recommend stabilizing these areas to minimize contribution of runoff and sediment to Jockey Creek.

Figure 3.53. Boat maintenance barn at Southold Marina

Auto Repair of Southold (NY 25/Main Road)/ TJ-H3

Auto Repair of Southold was identified as a potential hotspot because of vehicle maintenance activities that occur at the site. Stormwater infrastructure was not visible on site; runoff likely contributes to storm drains located on Main Road/ NY Route 25. Pollutants from the site were determined to be minimal as maintenance activities appear to occur in the garage.

Figure 3.54. Auto Repair of Southold

Mullen Motors (NY 25/Main Road)/ TJ-H4

Mullen Motors is a car dealership that provides services such as vehicle sales and repairs. Due to the nature of this business, the site is predominantly impervious to provide ample vehicle parking. While vehicle maintenance activities do appear to occur inside the garage, this site is categorized as a potential hotspot of medium priority because of observations of oil/grease stains and sediment loading on the impervious surfaces. The site does not appear to manage all stormwater on-site, with runoff flowing to storm drain infrastructure in Cottage Place Road, which ultimately discharges to Town Creek via one of the outlet structures in Hobart Avenue. Additionally, roof runoff from the site is discharging into the parking areas and running offsite. We recommend that the Town discuss disconnection of roof runoff

from impervious areas with the owner as current practices increase the amount of runoff carrying pollutants off site.

Figure 3.55. Mullen Motors maintenance garage with roof runoff directly connected to impervious area (left); visible staining on pavement and directly connected roof runoff (right).

Goldsmith Marina (Hobart Ave)/ TJ-H5

Goldsmith Marina is categorized as a medium-level potential hotspot. The following observations of pollutant indicators were found at the site: sediment loading is occurring in areas where the bulkhead is failing; high likelihood of bacteria contribution from a cesspool that is within close proximity of the bulkhead as well as groundwater; and observations of uncovered materials storage. We recommend that restoration activities at the Marina include fixing the failing bulkhead and stabilizing the associated bank, replacing the cesspool with a septic system that will provide improved treatment at a greater distance from the Creek, and covering or removing material storage areas.

Additionally, there is evidence of pollutant loading at the outfall from Hobart Avenue that discharges into the Marina. Large amounts of sediment are visible in one of the marina dock slips below the outlet pipe. The Town should provide treatment for stormwater prior to the outfall if possible (also see description of recommended up-gradient neighborhood stewardship activities in Section 3.3).

Figure 3.56. Goldsmith Marina potential contribution of sediment along failing bulkhead

Figure 3.57. Hobart Avenue inlet with outfall pipe into marina

Agway-Nursery (At Intersection of Youngs Ave. and Hommel Ave.)/ TJ-H6

The Agway Nursery is characterized as a potential hotspot with a pollutant problem of medium severity. Observations of pollutants at the site included sediment and nutrient loading from damaged bags of compost, mulch, soil, and fertilizer that is stored uncovered outside, adjacent to the onsite stormwater infrastructure. We recommend that materials be stored away from stormwater inlets in locations not contributing to the stormwater infrastructure. Additionally, the owner should consider site parking improvements and stormwater retrofits to reduce impervious area and provide greater treatment of runoff through vegetative practices such as bioretention areas in parking islands prior to infiltration.

Figure 3.58. Material storage areas up-gradient of leaching catchbasin at Agway

Burt's Reliable (At Intersection of Youngs Ave. and Hommel Ave.)/ TJ-H7

Burt's Reliable is a home heating oil supply/distribution company. The site includes aboveground oil storage tanks and a truck filling area. The site is characterized as a low priority potential hotspot. The stormwater system at this site consists of leaching catchbasins that appear to be in good condition. The oil storage and truck filling areas are contained with spill prevention best management practices in place. The site is clean, and no pollutants of concern were observed.

Figure 3.59. Covered fuel delivery truck filling area at Burt's Reliable

Catapano Farms- Commercial Nursery (NY 25/ Main Road) TJ-H10

Catapano Farms is a commercial nursery that is characterized as a low priority potential hotspot based on observations of debris and possibly nutrients. We recommend that the owner cover the dumpster located at the site and remove planting pots from the fields that are no longer in use.

Figure 3.60. Catapano Farms dumpster area

U-Store-it Self Storage Plaza (Horton Lane) / TJ-H12

The parking area behind the building is characterized as a medium-level potential hotspot based on observations of hydrocarbon-derived pollutants and debris resulting from uncovered storage that includes equipment, tires, and liquid storage drums up-gradient of leaching catchbasins.

Figure 3.61. Uncovered material storage up-gradient of leaching basin (arrow indicated leaching basin location)

3.3 Concept Designs for Priority Retrofits

This section provides concept designs for the top-ranked retrofits identified above and in Appendix C. The ranking results from the method described in Appendix C were adjusted based on the Town's local areas of concern and priorities to determine which sites to include here. These concepts are planning-level designs that use the estimated drainage area, impervious cover, and proposed practice design criteria to identify the size, pollutant removal effectiveness, and estimated costs for each retrofit. In addition, necessary next steps are identified. The purpose of the concept designs is to provide sufficient level of detail to be used in grant applications for funding the full implementation of the proposed retrofits. The concepts were provided in fact sheet formatting so that they can be used as stand-alone documents as needed. Design criteria and pollutant removal assumptions were based on information in the New York State Stormwater Management Design Manual (2010 update), as well as the Rhode Island Stormwater Installation and Design Standards Manual (2010).

TJ-R14. Gilbert Road — Dry swales and bioretention facility

Site Description

Gilbert Road is a dead-end road located off Jockey Creek Drive that terminates near the bank of Jockey Creek. At the end of Gilbert Road are three direct outfall pipes that receive untreated runoff generated from impervious areas that include a portion of Jockey Creek Drive and all of Gilbert Road. The paved road is wide with ample space for vehicles to park and turn around.

Proposed Concepts

This is an ideal location for **pavement reduction**, **enhancement of the buffer** to the creek, and construction of a **bioretention area** for water quality treatment and infiltration of runoff. Due to the large size of this drainage area (21 acres), multiple practices are necessary to provide adequate water quality treatment of runoff. Two areas along the south side of Jockey Creek Drive near its intersection with Gilbert Road are ideal for construction of **dry swales** to provide some of the required water quality treatment for runoff contributed by Jockey Creek Drive. The proposed dry swales are approximately eight feet wide (with a minimum two foot bottom width) and are located in the road layout. They are shallow with gentle slopes and vegetated with grass similar to the adjacent properties. They will be low maintenance requiring periodic mowing, and should drain within the 24-hour period following a storm event. Due to site constraints, the dry swales cannot provide 100% water quality treatment. Therefore, runoff in excess of the capacity of the dry swales will overflow to practices proposed at the end of Gilbert Road.

At the end of Gilbert Road, a grass channel, sediment forebay, and two-cell bioretention area are proposed to provide treatment of runoff generated on Gilbert road and the overflow from the dry swales. The grass channel is proposed adjacent to the parking area to re-direct runoff around the parking spaces to a pretreatment sediment forebay that discharges into the bioretention area. The bioretention area is proposed as two cells to provide space for public benches and educational signage describing the function and benefit of the stormwater management practices. Additionally, since the paved area at the end of this road is quite large, some pavement removal is proposed (3,500 SF); however, space for seven (9 ft x 20 ft) parking spaces is to remain. Areas of pavement removal that are not replaced by one of the proposed stormwater practices should be re-vegetated to stabilize exposed soils.

To reduce runoff further, residents of the neighborhood should **disconnect roof runoff** from impervious areas by redirecting downspouts into rain barrels, rain gardens, or pervious lawn/landscaped space. Finally, the neighboring landscapes include high maintenance lawns right up to the bank of the creek; an **improved buffer** between the lawns and creek should be created by re-vegetating some of the lawn area with native plants. Enhancement of the creek buffer will help reduce bacteria contribution by deterring geese from the area and minimize nutrients by reducing fertilizer use in close proximity to the creek.

A key aspect to this retrofit site is working with and educating the residents about the retrofit practices, how they are supposed to look, how they function, and why it they are important. In addition, this highly visible and visited site would be a great location for **public educational signage** describing the issues in Jockey Creek, as well as the site retrofits and what they can do at home to help.

Practice Sizing/Design Considerations

Since this is such a large drainage area and there is not much space available for retrofits, roof runoff was not included in the impervious cover used in the calculation of the water quality volume; it is assumed this runoff can be managed via on-lot disconnection. Based on this reduced optimal treatment volume, the bioretention and dry swale surface area should be approximately 5,700 SF of total treatment area. The available surface area for the bioretention area is about 4,000 SF but could possibly be enlarged through additional pavement removal. The available length for the dry swales is at least 2,000 SF, and could possibly be extended further along Jockey Creek Drive if needed. The existing utilities and trees may pose possible conflicts for construction of this retrofit site.

Pollutant Removal

Bioretention areas and dry swales are expected to remove 90% TSS; 30% TP; 55% TN; and 70% bacteria (RI Manual, 2010). This assumes the full design treatment volume can be provided.

Project costs

The construction of Site TJ-R14 is expected to cost approximately $190,000. An additional $57,000 should be added for an estimated 10% fee for final engineering design and permitting and a 20% contingency. Long-term operation and maintenance costs are likely to be about 5% of the construction costs, or $9,500, annually.

Next steps

- Approach the residents in the neighborhood to discuss the concept;
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities;
- Map limits of right-of-way; and
- Map existing resource area boundaries and buffers.

Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
TJ-R14	21	6	9,150	5,700	5,700

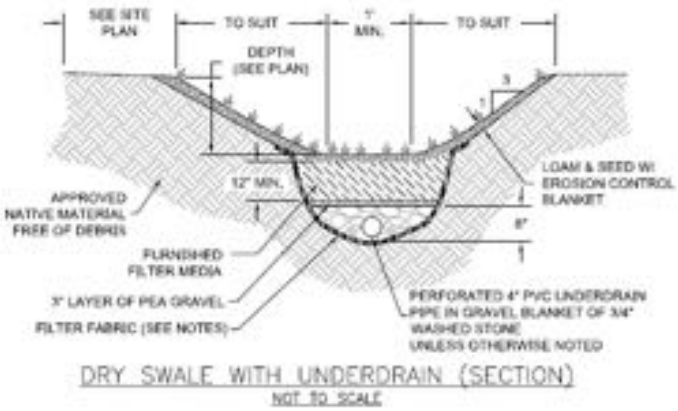
*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).

*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design Manual, 2010).

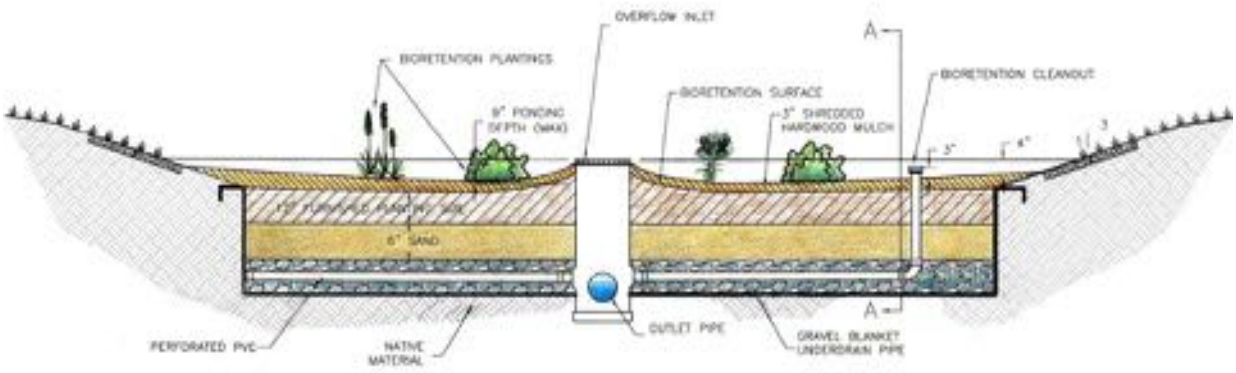
*Practice Area Available is estimated from available mapping with limited field verification. Actual practice area may be adjusted as needed during pre-construction.

Proposed Concept Sketch

Typical dry swale detail



Typical bioretention facility detail, showing filter media, plantings, underdrain if needed, and overflow structure.



Legend

- Town/Jockey Creek Subwatershed
- Parcels
- Retrofit Sites
- Retrofit Footprint
- Retrofit Drainage Area
- Retrofit Impervious
- Water Line
- Pavement Removal
- Inlets (HW)
- Hot Spots
- Neighborhoods
- Hydrography
- Hydrography
- Southold 10ft. Contours
- Southold 5ft. Contours
- Proposed Culverts

N

200 Feet

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

Retrofit 14
Town/Jockey Creek Subwatershed
Southold, NY

Date: 7/25/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_TownJockey_blowups_portrait_9072.mxd

TJ-R17. Outfall to Jockey Creek from Wells Avenue—
Redirect runoff from direct outfall to existing infiltration basin

Site Description
Located on Wells Avenue between the sixth and seventh parcels (as measured on the south side of the road beginning at the intersection of Wells Avenue and Oaklawn Avenue) is a catchbasin that appears to have a six-inch diameter outfall pipe to Jockey Creek. The drainage area to this outfall is 0.3 acres, with 67% impervious cover. The road is crowned in this area, with runoff from the northern half of the road being directed into an existing infiltration with a sediment forebay for pretreatment, or into a recently constructed leaching chamber system to the west of the infiltration basin.

Proposed Concepts
Runoff from the southern portion of the road contributing to the direct Jockey Creek outfall should be redirected to the **existing infiltration basin** north of the road. A new catchbasin should be installed with a pipe that crosses the road to convey runoff to the existing catchbasin located on the northern side of Wells Avenue, which discharges to the infiltration basin.

As an additional part of this project, the infiltration basin should be maintained and improved, including activities such as cleaning and increasing the size of the sediment forebay for easier and more effective maintenance, enhancing vegetation in the basin to improve water quality treatment, and stabilizing the steep sidewalls of the basin.

Practice Sizing/Design Considerations
This is a relatively easy retrofit, and it appears that this large infiltration basin is of sufficient size to handle the additional runoff generated on the southern half of the road. However, the existing outfall should be maintained and utilized as an overflow during large storm events to prevent road flooding if needed. The existing utilities (water main and overhead wires) and existing large trees may pose possible conflicts for construction of this retrofit practice.

Pollutant Removal
Vegetated infiltration basins are expected to remove 90% TSS; 65% TP; 65% TN; and 95% bacteria (RI Manual, 2010). This assumes the full design treatment volume can be provided.

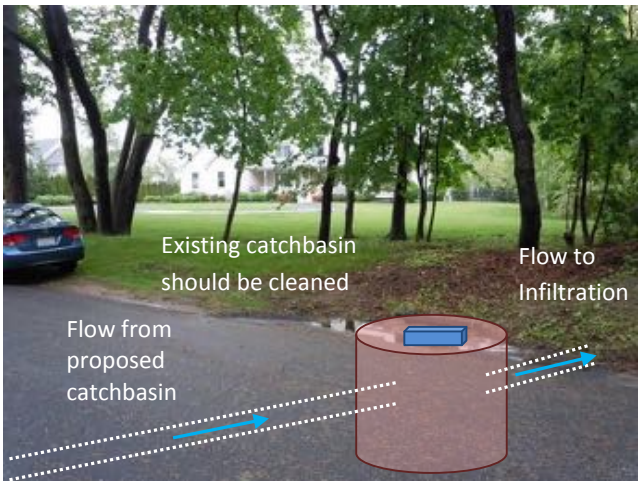
Project costs
The construction of Site TJ-R17 is expected to cost approximately $11,000. An additional $3,300 should be added for an estimated 10% fee for final engineering design and permitting and a 20% contingency. Long-term operation and maintenance costs are likely to be about 3% of the construction costs, or $300, annually.

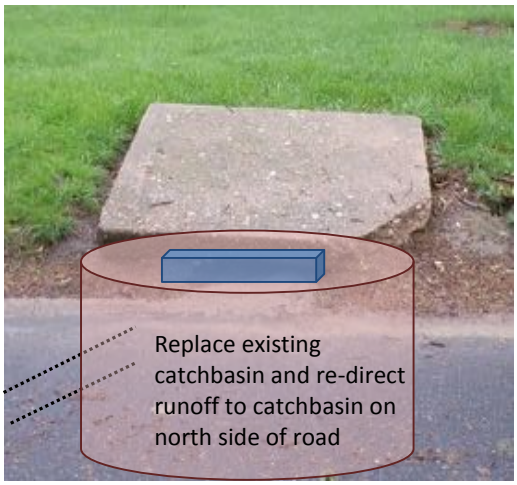
Next steps
- Complete a topographic survey;
- Assess existing drainage structures to determine re-use potential; and
- Analyze existing infiltration basin to determine its capacity to accept additional runoff from only small storm events or perhaps larger events as well.

Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
TJ-R17	0.3	67	900	NA	NA

*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design Manual, 2010).
*Practice Area Available is estimated from available mapping with limited field verification. Actual practice area may be adjusted as needed during pre-construction.

Existing Conditions and Proposed Concept Sketch





Legend

- Town/Jockey Creek Subwatershed
- Parcels
- Retrofit Sites
- Retrofit Footprint
- Retrofit Drainage Area
- Retrofit Impervious
- Water Line
- Inlets (HW)
- Hot Spots
- Neighborhoods
- Hydrography
- Hydrography
- Southold 10ft. Contours
- Southold 5ft. Contours

N

Feet

70

Horsley Witten Group
Sustainable Environmental Solutions
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Retrofit 17
Town/Jockey Creek Subwatershed
Southold, NY

Date: 7/24/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_TownJockey_blowups_portrait_9072.mxd

TJ-R18A-B. Pine Neck Road —Bioretention facilities

Site Description

The Town boat ramp on Pine Neck Road is located near the mouth of Town and Jockey Creeks. Since Pine Neck Road is crowned, stormwater runoff accumulates along both the northern and southern edges of the road. On the northern side of the road, runoff is directed to an existing infiltration trench. Runoff from the southern side of the road either enters a leaching catch basin at the intersection with Kimberly Lane or flows toward the boat ramp in an eroded channel along the edge of the road before discharging into the creek. Both the infiltration trench and leaching catch basin showed some signs of clogging.

Proposed Concepts

The treatment of runoff generated along the northern side of Pine Neck Road (TJ-R18A) can be further improved by retrofitting the existing stone infiltration trench with a **paved flume, sediment forebay, and a vegetated bioretention area**. The existing leaching chamber can be re-used (if in good condition) or replaced for any overflow from the bioretention during large storm events.

To improve water quality treatment and reduce erosion downgradient of the existing leaching catchbasin on the south side of Pine Neck Road (TJ-R18B), a **bioretention swale or bioswale** is proposed. A **paved flume and culvert** are proposed to convey runoff from the existing leaching catchbasin under Kimberly Lane to the proposed bioretention area. A leaching chamber can be installed for any overflows from the bioswale.

In addition, the area along the edge of the road between the proposed bioretention areas and the boat ramp on both sides of Pine Neck Road should be stabilized to minimize erosion and future sediment deposits to creek.

Practice Sizing/Design Considerations

The bioretention areas should be sized to treat the water quality volume. The bioretention surface area for TJ-R18A should be approximately 1,400 SF of total treatment area. The available surface area at this location is about 1,200 SF (~85% of required size) but could possibly be enlarged through pavement removal. Utility lines and existing trees in the right-of-way are potential design constraints for this practice.

The bioretention surface area for TJ-R18B should be approximately 500 SF of total treatment area. There is more than enough space in this area, assuming 180 LF of swale with a 3-foot bottom width. Landscaping trees have been planted in the right-of-way, which may be a potential design constraint for this practice. If a planted bioswale is too much maintenance for this location, a grass dry swale could be considered instead.

Pollutant Removal

Bioretention areas are expected to remove 90% TSS; 30% TP; 55% TN; and 70% bacteria (RI Manual, 2010). This assumes the full design treatment volume can be provided.

Project costs

The construction of Site TJ-R18 is expected to cost approximately $44,600 ($35,000 for TJ-R18A and $9,600 for TJ-18B). An additional $13,400 should be added for an estimated 10% fee for final engineering design and permitting and a 20% contingency. Long-term operation and maintenance costs are likely to be about 3-5% of the construction costs, or $1,400 - $2,200, annually.

Next steps

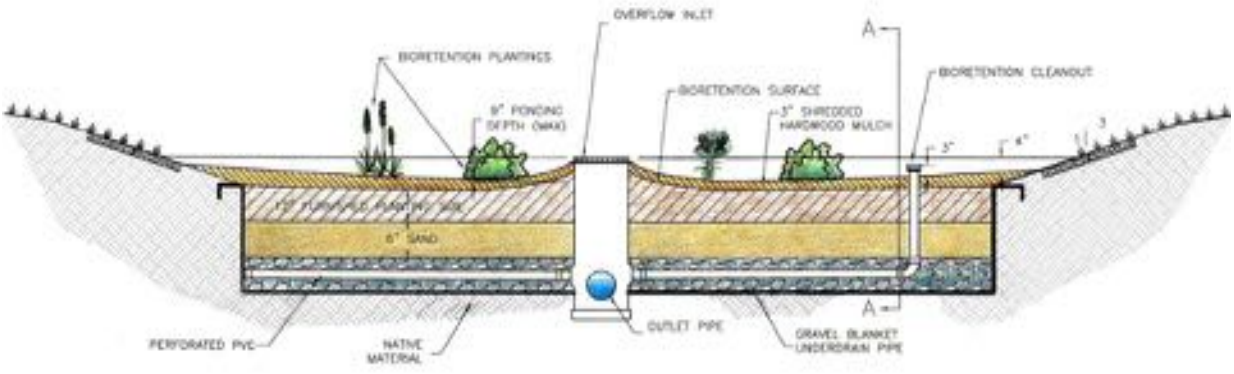
- Confirm soil and groundwater conditions;
- Complete a topographic survey; and
- Map limits of right-of-way.

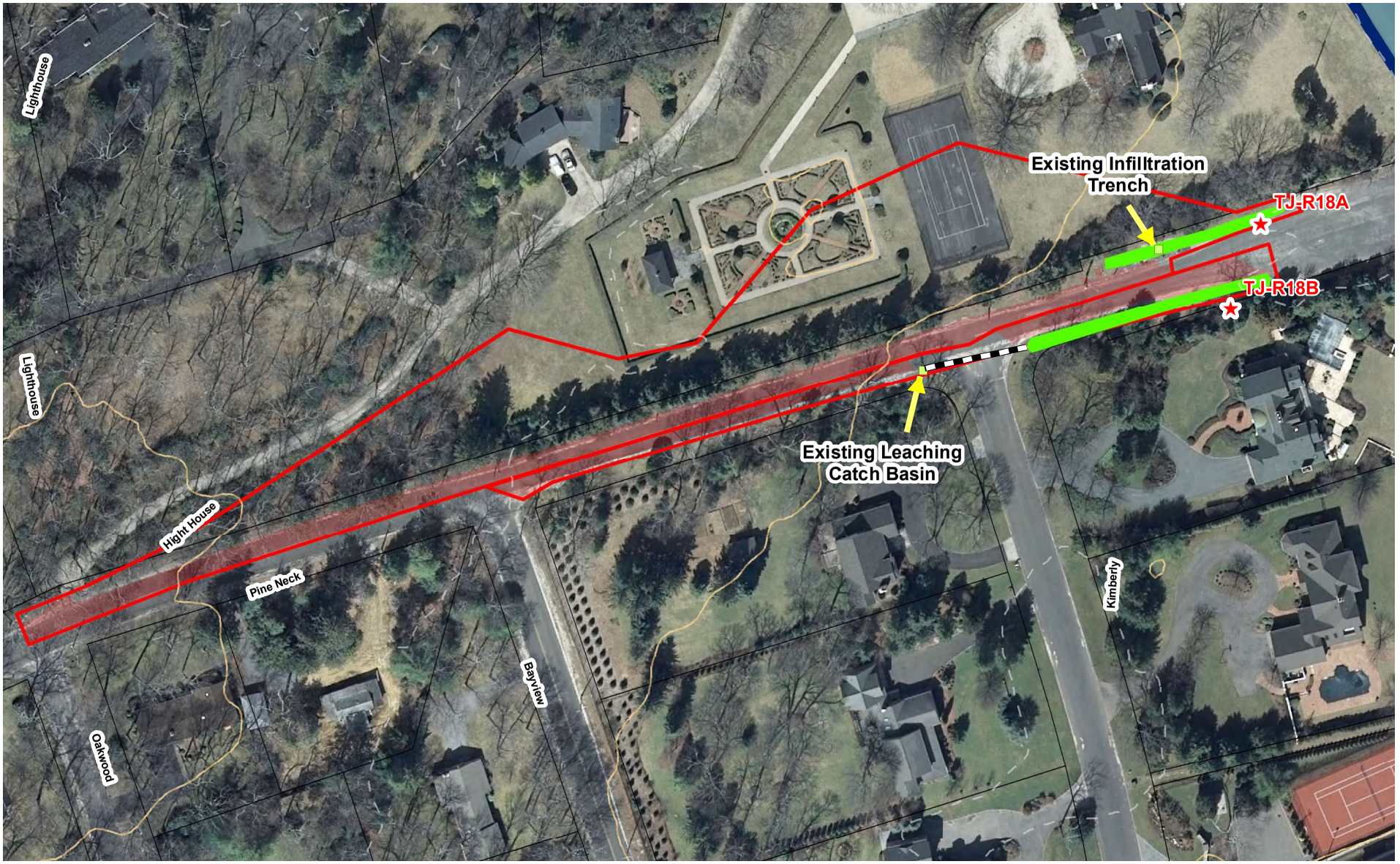
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
TJ-R18A	1.7	18	1,550	1,400	1,200
TJ-R18B	0.25	55	565	500	500

*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design Manual, 2010).
*Practice Area Available is estimated from available mapping with limited field verification. Actual practice area may be adjusted as needed during pre-construction.

Existing Conditions and Proposed Concept Sketch

Typical bioretention facility detail, showing filter media, plantings, underdrain if needed, and overflow structure.





Legend

- Town/Jockey Creek Subwatershed
- Parcels
- Retrofit Sites
- Retrofit Footprint
- Retrofit Drainage Area
- Retrofit Impervious
- Proposed Culverts
- Inlets (HW)
- Hot Spots
- Neighborhoods
- Hydrography
- Hydrography
- Southold 10ft. Contours
- Southold 5ft. Contours

N

100 Feet

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 18A and 18B
Town/Jockey Creek Subwatershed
Southold, NY

Date: 7/25/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_TownJockey_blowups_landscape_9072.mxd

TJ-R16. Jockey Creek Drive — terraced bioswale

Site Description

Jockey Creek Drive is located along the northern shores of Jockey Creek. A catchbasin located on Jockey Creek Drive adjacent to house #1710 and #1850 was observed with an outfall that discharges on the slope up-gradient of the creek. Currently, the outfall from this catchbasin appears to be partially obstructed, and during storm events, water ponds on the roadway. Additionally, due to erosive flows and the steep slope, an eroded channel has formed through the natural landscape down-gradient of the 12-inch diameter CMP pipe outfall.

Proposed Concepts

This site is an ideal location for repairing or replacing the outfall pipe and installing a **terraced bioswale** that could provide non-erosive conveyance and treatment of road runoff prior to discharge to the creek, as well as an aesthetic amenity for the adjacent residents. Roof runoff in the drainage area to this practice should be disconnected where possible with rain barrels, rain gardens, and/or just redirected to pervious open spaces rather than driveways to reduce overall runoff volumes.

Practice Sizing/Design Considerations

The bioswale should be sized to treat the water quality volume. Since this is such a large drainage area (5.6 acres) and the space available for a retrofit is not very big, roof runoff was not included in the impervious cover used in the calculation of the water quality volume. Based on this reduced optimal treatment volume, the bioretention surface area should be approximately 2,600 SF of total treatment area. However, the available surface area at this location is about 1,400 SF (~50% of required size). It is possible that the proposed retrofit footprint could be expanded if the abutters would be amenable to the swale stretching all the way to the road instead of starting near the existing outfall.

A key aspect to this retrofit site is working with and educating the residents about what a terraced bioswale is, how it is supposed to look, how it functions, and why it is important. Terraced bioswales are very similar to bioretention areas, but they are designed in a way to function on a slope rather than in a flat area. Rocks, timbers, or other similar materials are used to create "steps" in the swale such that the practice will become a series of cascading small bioretention areas. Each step will have filter media and will be planted with appropriate bioretention species. An example of a terraced bioswale is shown below, although this site would likely need less rock than the example shown.

The existing large trees and adjacent private structures may pose the greatest conflicts for construction of this retrofit practice; but with careful design, good communication with the residents, and a conscientious contractor, these constraints should not make this retrofit infeasible. However, the drainage easement may need to be adjusted and/or enlarged in this area to encompass the extent of this retrofit. Residential access should be maintained at all times during the construction of this site, and the retrofit should not affect use of the private properties.

Pollutant Removal

Bioretention areas are expected to remove 90% TSS; 30% TP; 55% TN; and 70% bacteria (RI Manual, 2010). This assumes the full design treatment volume can be provided.

Project costs

The construction of Site TJ-R16 is expected to cost approximately $40,600. An additional $12,200 should be added for an estimated 10% fee for final engineering design and permitting and a 20% contingency. Long-term operation and maintenance costs are likely to be about 5% of the construction costs, or $2,030, annually.

Next steps

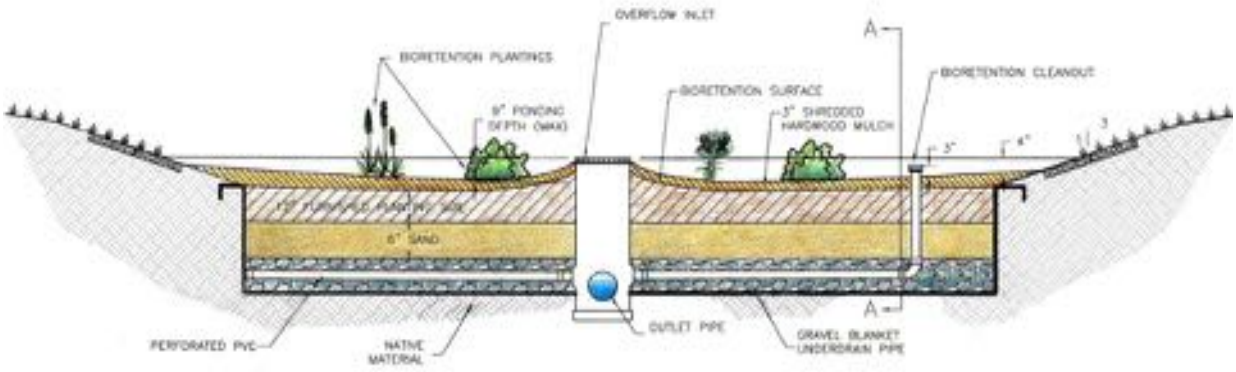
- Approach the two abutting homeowners to discuss the concept;
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities;
- Map limits of existing drainage easement; and
- Map existing resource area boundaries and buffers.

Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
TJ-R16	5.6	36	2,800	2,600	1,400

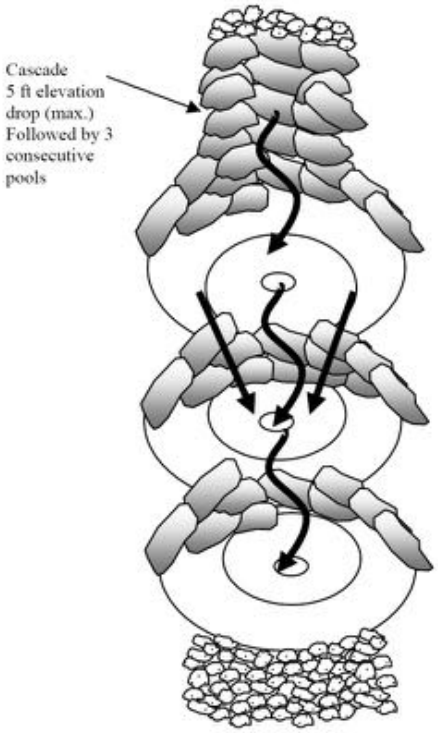
*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design Manual, 2010).
*Practice Area Available is estimated from available mapping with limited field verification. Actual practice area may be adjusted as needed during pre-construction.

Existing Conditions and Proposed Concept Sketch

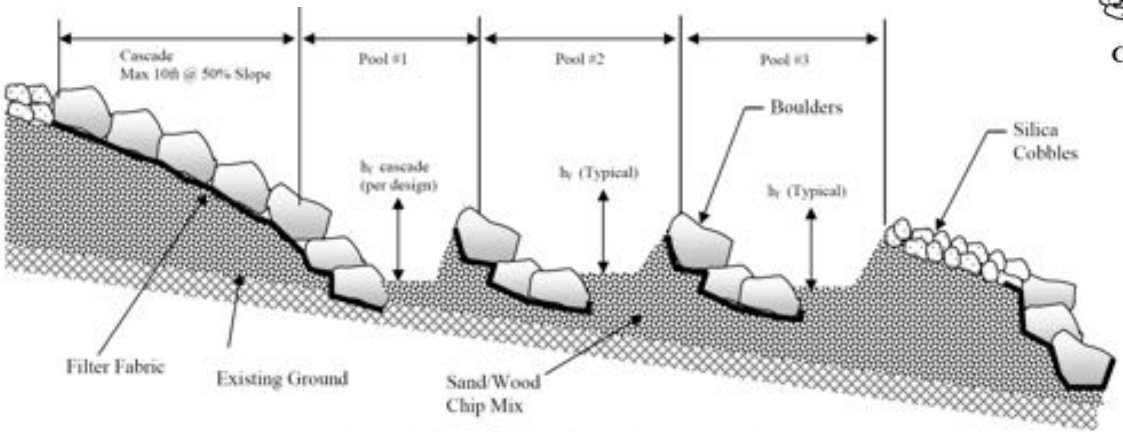
Typical bioretention facility detail, showing filter media, plantings, underdrain if needed, and overflow structure.

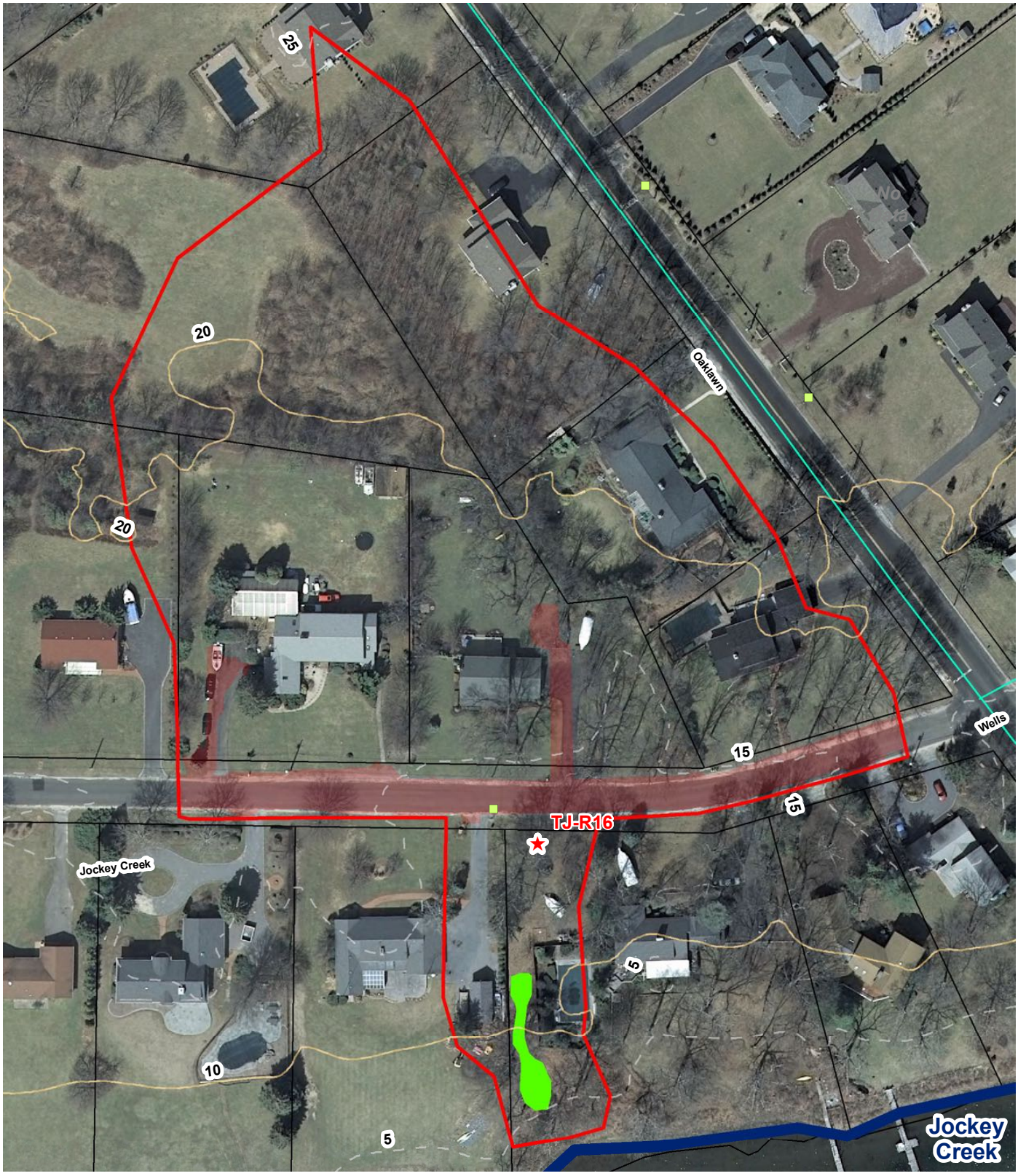


Example plan and profile views of terraced bioretention systems used to treat stormwater runoff while also dissipating erosive flows (from the Design Guidelines for Step Pool Storm Conveyance - Anne Arundel County Government Department of Public Works, Bureau of Engineering. Revised November 2011)



Cascade Sequence





Legend

- Town/Jockey Creek Subwatershed
- Parcels
- Retrofit Sites
- Retrofit Footprint
- Retrofit Drainage Area
- Retrofit Impervious
- Water Line
- Inlets (HW)
- Hot Spots
- Neighborhoods
- Hydrography
- Hydrography
- Southold 10ft. Contours
- Southold 5ft. Contours

N

100 Feet

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

Retrofit 16
Town/Jockey Creek Subwatershed
Southold, NY

Date: 7/24/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_TownJockey_blowups_portrait_9072.mxd

TJ-R21A-B. Hobart Avenue —Bioretention areas

Site Description

Hobart Avenue is a road just to the north of Town Creek, adjacent to the Founders Path Neighborhood (TJ-N2). There are two parts to this retrofit. Site TJ-R21A is located at the corner of Hobart Avenue and Landon Lane where there is an open grassy area. A leaching catchbasin at this corner receives runoff from a portion of Hobart Avenue (the road is crowned) and all of Landon Lane up to the first driveway.

Site TJ-R21B is located further downgradient at a low point in Hobart Avenue adjacent to a wetland and Town Creek. The leaching catchbasin here has major buildup of sediment and organics most likely resulting from nearby dumping of yard waste and upgradient development activities. This area is at a relatively low elevation, and the infiltration capabilities of the existing leaching catchbasin may be limited due to high groundwater.

Proposed Concepts

The proposed retrofit for site TJ-R21A is to construct a paved flume to direct runoff into a **bioretention area**, with overflows from large storm events directed into the existing leaching catchbasin. This site will not only provide water quality treatment and enhanced recharge, but it will also reduce flooding issues at the low point on Hobart Avenue (see site TJ-R21B).

The north side of the road at site TJ-R21B is a good candidate for a **bioretention area** within and beyond the right-of-way if an easement can be obtained. A wetland delineation should be performed to ensure no construction occurs within a wetland resource. A catchbasin on the south side of the road and a paved flume should be constructed to direct runoff into the bioretention area, with overflows from large storm events directed into the existing leaching catchbasin. This catchbasin should be maintained, and any areas contributing sediment should be stabilized using proper erosion and sedimentation control measures. Signage should be installed to discourage people from dumping yard waste in this area.

Practice Sizing/Design Considerations

Bioretention areas should be sized to treat the water quality volume. The bioretention surface area for TJ-R21A should be approximately 450 SF of total treatment area. The available surface area at this location is about 400 SF (~90% of required size) but could possibly be enlarged if vegetation/tree removal is acceptable here. The overhead wires are also a possible conflict for construction of this retrofit practice.

The bioretention surface area for TJ-R21B should be approximately 2,000 SF of total treatment area, which may be 100% available depending on whether an easement could be acquired for the area to the north of the road and whether this area is a wetland. If that area cannot be used for a retrofit, a dry swale should be constructed in the right-of-way as feasible.

Pollutant Removal

Bioretention areas are expected to remove 90% TSS; 30% TP; 55% TN; and 70% bacteria (RI Manual, 2010). This assumes the full design treatment volume can be provided.

Project costs

The construction of Site TJ-R21 is expected to cost approximately $102,200 ($13,500 for TJ-R21A and $88,700 for TJ-R21B). An additional $30,700 should be added for an estimated 10% fee for final engineering design and permitting and a 20% contingency. Long-term operation and maintenance costs are likely to be about 5% of the construction costs, or $5,100, annually.

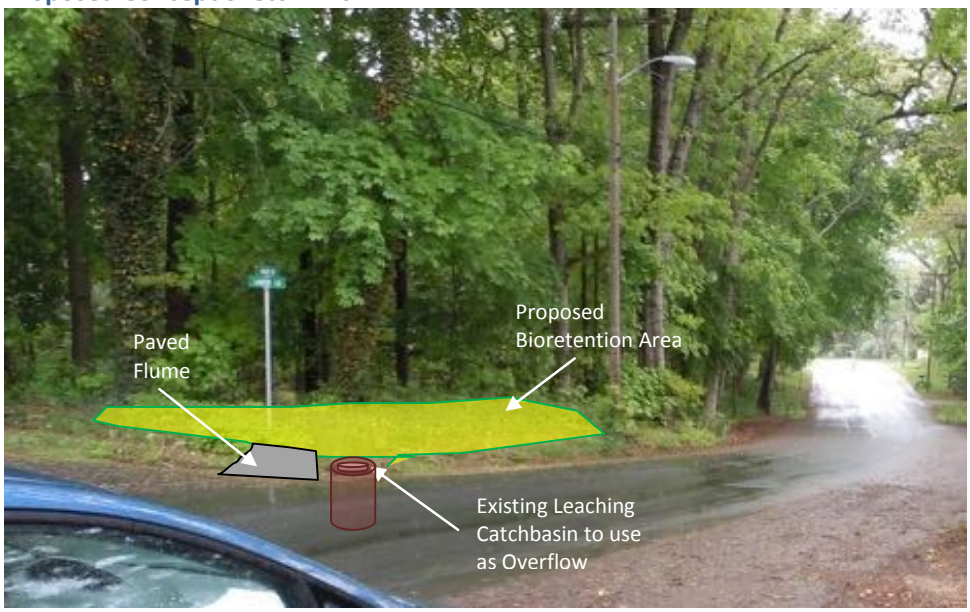
Next steps

- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map limits of right-of-way and obtain drainage easement as necessary; and
- Map existing resource area boundaries and buffers.

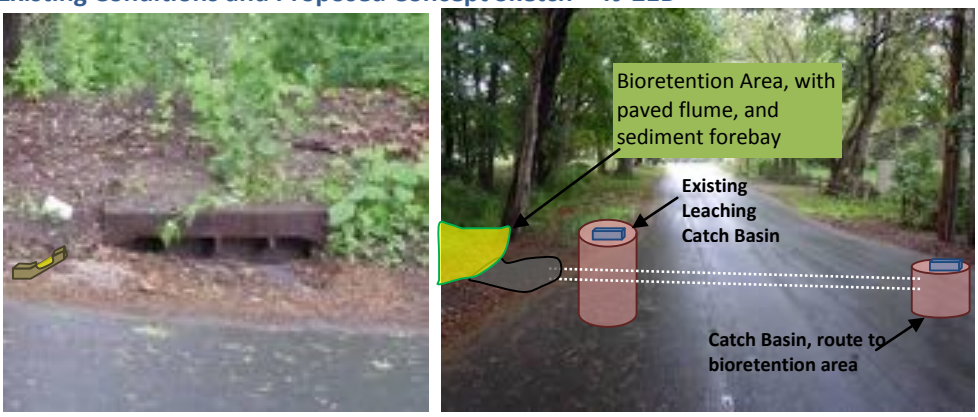
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
TJ-R21A	0.4	25	500	450	400
TJ-R21B	3.1	22	3,300	2,000	2,000

*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design Manual, 2010).
*Practice Area Available is estimated from available mapping with limited field verification. Actual practice area may be adjusted as needed during pre-construction.

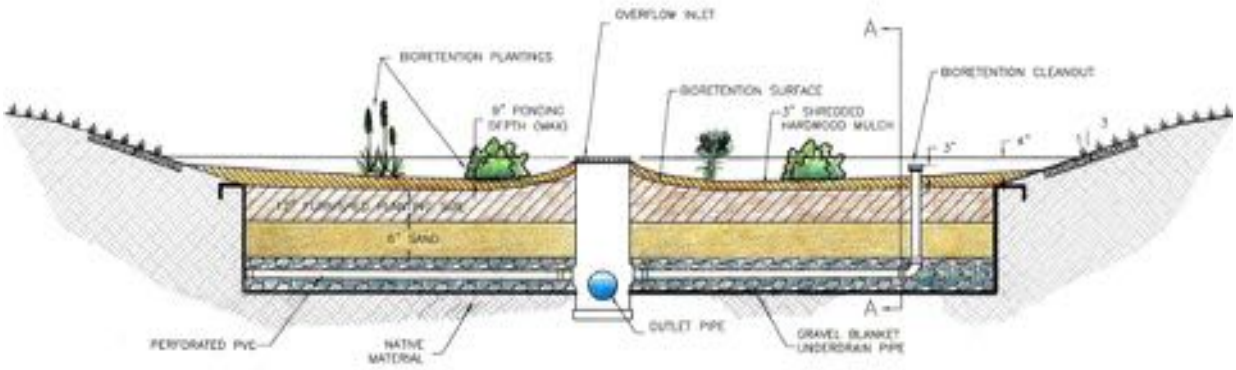
Proposed Concept Sketch – TJ-21A



Existing Conditions and Proposed Concept Sketch – TJ-21B



Typical bioretention facility detail, showing filter media, plantings, underdrain if needed, and overflow structure.



Legend

- Town/Jockey Creek Subwatershed
- Parcels
- Retrofit Sites
- Retrofit Footprint
- Retrofit Drainage Area
- Retrofit Impervious
- Inlets (HW)
- Hot Spots
- Neighborhoods
- Hydrography
- Hydrography
- Southold 10ft. Contours
- Southold 5ft. Contours

N

80 Feet

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 21
Town/Jockey Creek Subwatershed
Southold, NY

Date: 7/24/2013

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TJ-R24. Wells Avenue outfall to Jockey Creek— Redirect runoff from direct outfall to existing infiltration basin

Site Description

This site is focused on a crowned portion of Wells Avenue near the intersection with Jernick Lane and Hill Road West. The east side of Wells Avenue in this area, with a total drainage area of approximately 0.25 acres with 50% impervious cover, is collected in two catchbasins that convey stormwater to an 18-inch diameter CMP pipe that discharges directly to Jockey Creek. Runoff from the west side of Wells Avenue in this area, a drainage area of approximately 0.6 acres with almost 50% impervious cover, flows to two 18-inch pipes that discharge into a large infiltration basin without pretreatment.

Proposed Concepts

The runoff from the east side of Wells Avenue should be re-directed to the **existing infiltration basin** located on the west side of the road for water quality treatment. This can be accomplished by retrofitting the existing catchbasin on the east side of the road with an outlet pipe to convey runoff to a proposed **oil/grit separator** and **deep sump catchbasin** installed adjacent to the infiltration basin. This concept will not only provide pretreatment to the road runoff from the east side, but also to the runoff from the west side the currently discharges to the infiltration basin, replacing the two existing 18-inch diameter inlet pipes. If needed, an overflow outlet should be installed at the oil/grit separator to divert runoff from large storm events to the existing outfall. The infiltration basin should be assessed to ensure that it has capacity for this extra runoff during small storm events, and any **slope erosion issues** in the basin should be stabilized.

Practice Sizing/Design Considerations

The pretreatment structures should be sized for 10% of the water quality volume. For both sides of the road, this adds up to 1,800 CF. Thus, the structures should be at least 180 CF or approximately 1,500 gallons.

Pollutant Removal

Vegetated infiltration basins are expected to remove 90% TSS; 65% TP; 65% TN; and 95% bacteria (RI Manual, 2010). This assumes the full design treatment volume can be provided, and was only applied to the runoff from the east side of the road, which currently receives no treatment.

Project costs

The construction of Site TJ-R24 is expected to cost approximately $32,000. An additional $9,600 should be added for an estimated 10% fee for final engineering design and permitting and a 20% contingency. Long-term operation and maintenance costs are likely to be about 3% of the construction costs, or $1,000, annually.

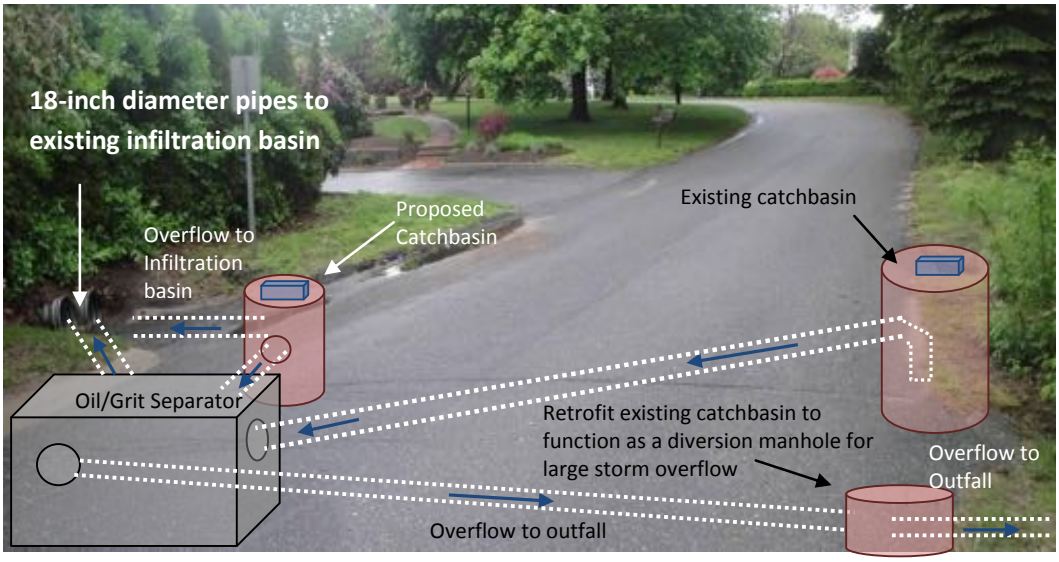
Next steps

- Complete a topographic survey;
- Assess existing drainage structures to determine re-use potential; and
- Analyze existing infiltration basin to determine its capacity to accept additional runoff from only small storm events or perhaps larger events as well.

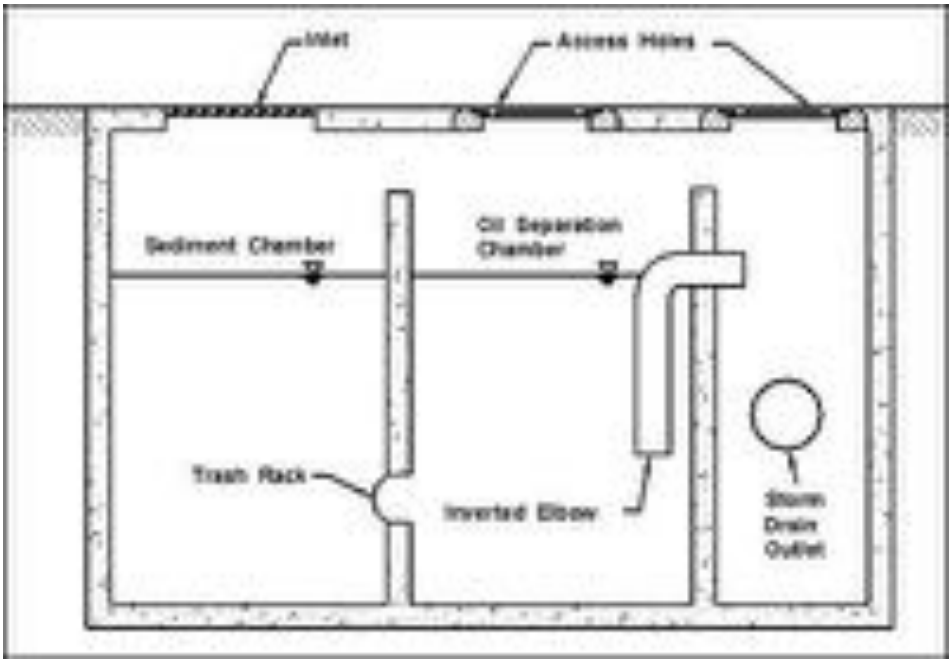
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
TJ-R24	0.25	50	500	NA	NA

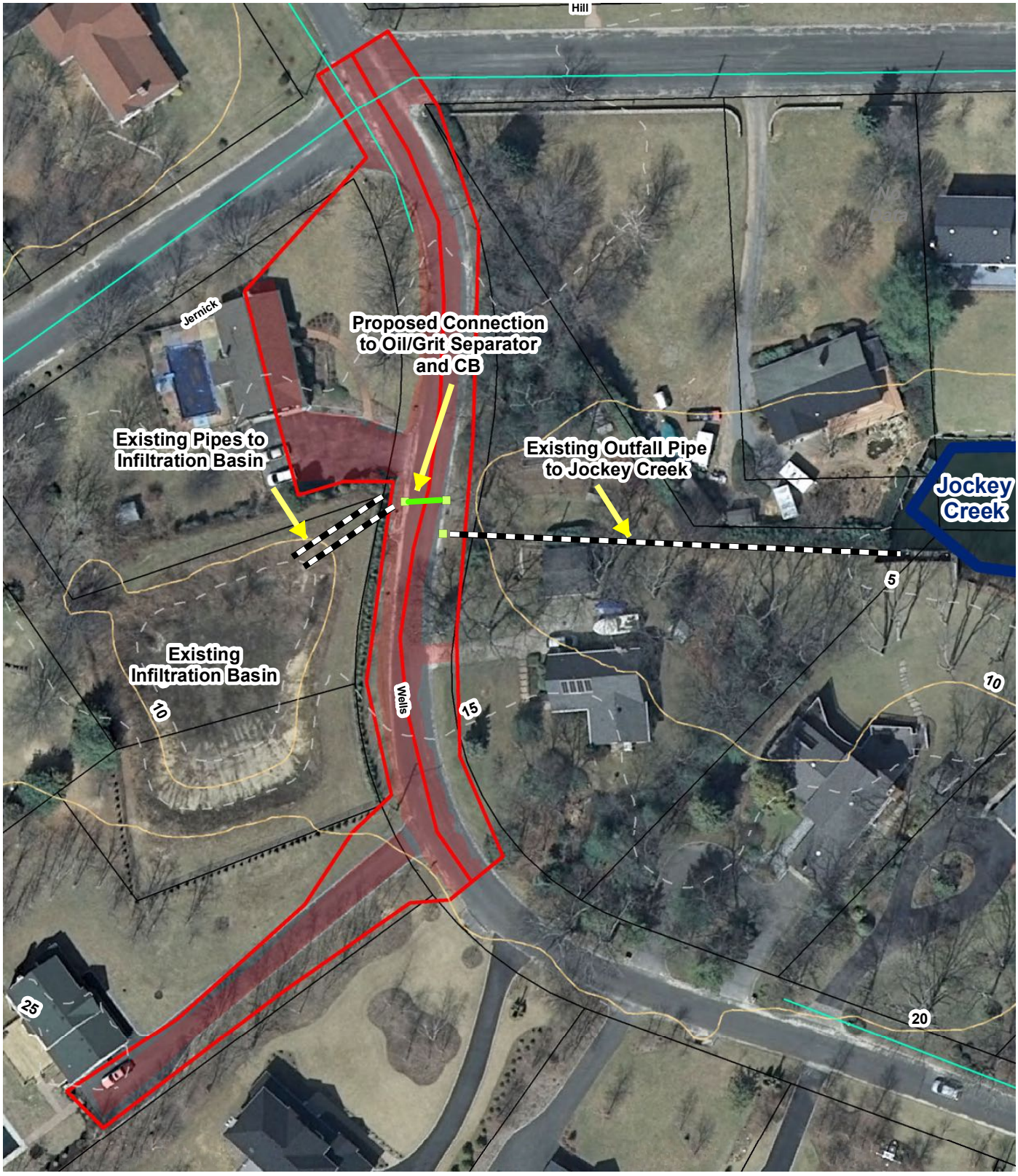
*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design Manual, 2010).
*Practice Area Available is estimated from available mapping with limited field verification. Actual practice area may be adjusted as needed during pre-construction.

Existing Conditions and Proposed Concept Sketch



Typical oil-grit separator detail (right; Federal Highway Administration)





Legend

- Town/Jockey Creek Subwatershed
- Parcels
- Retrofit Sites
- Retrofit Footprint
- Retrofit Drainage Area
- Retrofit Impervious
- Water Line
- Inlets (HW)
- Hot Spots
- Neighborhoods
- Hydrography
- Hydrography
- Southold 10ft. Contours
- Southold 5ft. Contours

N

70 Feet

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Retrofit 24
Town/Jockey Creek Subwatershed
Southold, NY

Date: 7/25/2013

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