5.0 Richmond Creek Subwatershed

This section summarizes baseline information specifically for the Richmond 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 hotspots, and neighborhood descriptions.

5.1 General Subwatershed Characteristics

The Richmond Creek subwatershed is located within the Town of Southold on the south side of Long Island's North Fork. This subwatershed is the least densely developed of other assessed subwatersheds located in Southold, dominated by agricultural lands. The subwatershed area is approximately 1,400 acres, of which 94 acres (7%) are impervious. Topography in the subwatershed ranges from 0 feet to 45 feet in elevation in the southwestern corner of the subwatershed. The subwatershed is bounded to the northeast by the Town/Jockey Creek and Goose Creek subwatersheds; Little Peconic Bay is located to the southeast. The major roadway within the watershed is New York State Route 25 (NY 25) which runs northeast/southwest through the subwatershed.

5.1.1 Land Use and Infrastructure

Richmond Creek is primarily agricultural, interspersed with some residential areas as well as commercial and undeveloped lands. The agricultural land is mostly comprised of vineyards and the associated wineries. Municipal land uses such as police, highway maintenance, recreation center, and a park are located in the upper portions of the subwatershed. The neighborhoods are mainly located in the areas closest to Richmond Creek, where many homes have direct frontage on the creek or its adjacent marshes. Commercial properties are mostly located along NY 25. Table 5.1 shows a summary of the land uses in the subwatershed, and a land use map is provided in Appendix A.

Table 5.1. Land Use Summary– Richmond Creek Subwatershed

Land Use	Percent of Subwatershed
Low Density Residential	15%
Medium Density Residential	5%
High Density Residential	0%
Commercial	1%
Industrial	0%
Institutional	0%
Open Space	2%
Agricultural	64%
Vacant	7%
Transportation	5%
Utilities	0%
Waste Handling	0%
Surface Water	0%

Similar to the other subwatersheds in Southold, existing stormwater infrastructure generally consists of gutter and catchbasin collection systems that often discharge directly to outfalls into the creek or adjacent wetlands. Another common practice used to manage runoff on the Town roads is leaching catch basins, which are intended to collect and infiltrate runoff. The Town of Southold has been working to improve water quality throughout Town and remove direct discharges by replacing them with subsurface infiltration chambers. However, many of the observed leaching catchbasins, particularly on the Town roads, were clogged due to high accumulations of sediment and organic debris. As a result, it appears that during higher intensity rain events, overland flows along the roadways discharge directly into the creek in many cases, causing scouring and delivery of untreated stormwater runoff to natural or landscaped areas.

5.1.2 Soils and Hydrology

The soils in the subwatershed are mapped by the USDA Natural Resources Conservation Services as Carver and Plymouth sands, Montauk silt loam, Plymouth Loamy Sand, and Tidal Marsh, with lesser amounts of Riverhead sandy loam and Sudbury sandy 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 5.2 provides a breakdown of the HSGs found in the subwatershed. Ninety-seven percent of soils in the Richmond 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 5.2. Summary of Soil Conditions – Richmond Creek Subwatershed

Soil HSG	Percent in Subwatershed
A	13%
B	84%
C	0%
D	3%

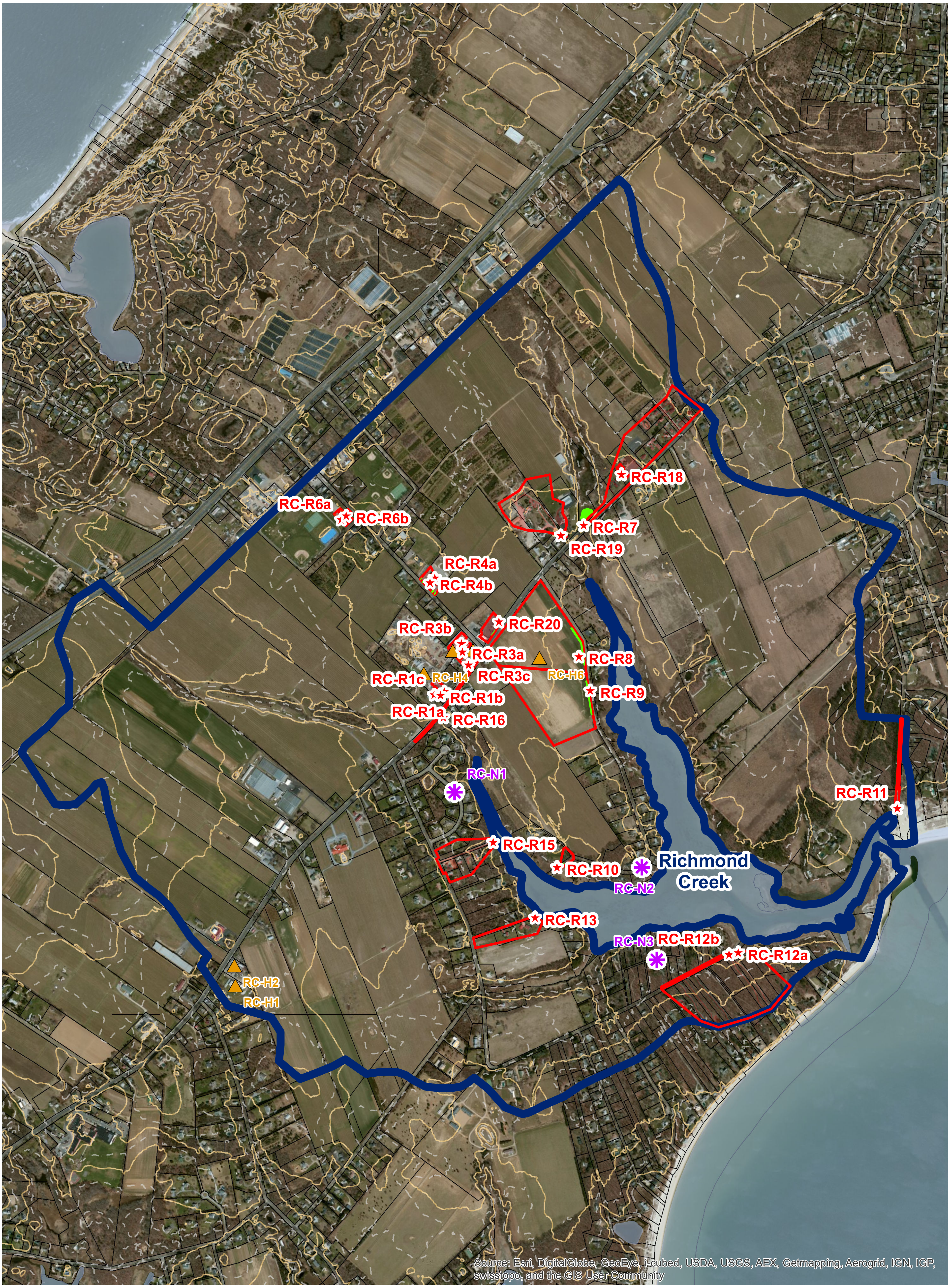
Depth to groundwater in the subwatershed is relatively shallow. Historical data from USGS recorded from a 50-foot deep monitoring well located near the railroad bed on Horton Lane shows that the groundwater levels in this area fluctuate between elevations of 5.2 and 6.4 feet.

5.1.3 Water Quality

To comply with the Clean Water Act, the NYSDEC compiles a Priority Waterbodies List (PWL). Richmond Creek is included under PWL# 1701-0245, identified as an impaired waterbody. In 2006, a TMDL for pathogens was developed with runoff from rural lands and water fowl identified as pollutant sources. In addition, the NYSDEC has designated the Richmond Creek as "growing area 26" for shellfish, which is seasonally closed for shellfishing.

5.2 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 5.1.



Legend

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

N

Feet

1,000

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

Restoration Opportunities
Richmond Creek
Subwatershed
Southold, NY

Date: 7/1/2013

Figure 5.1

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\Report_Figures\130630_RC_RestOpps_11x17_9072.mxd

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5.2.1 Stormwater Retrofit Sites

Over 20 sites were evaluated for drainage improvement and stormwater retrofit potential in the Richmond 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 5.3 summarizes retrofits that were considered during the watershed planning process. A more detailed description of existing conditions and restoration concepts at these sites are provided below.

Table 5.3. Summary of Stormwater Retrofits

Site ID/ Name	Jurisdiction	Description	Ranking
RC-R1 Southold Police Department	Town	Bioretention/raingarden in front lawn and replacement of deteriorated parking stalls with permeable pavers	High
RC-R3 Highway Department Facilities Yard	Town	Manage stormwater at hotspot with underground oil/grit separators; designated vehicle/equipment wash area; sand filter, and bioretention	Med
RC-R4 Southold Recreation Center	Town	Pavement reduction, bioretention, raingardens, and parking lot sweeping to enhance water quality treatment; include educational signage	High
RC-R6 Jean W. Cochran Park	Town	Swales and demonstration raingardens; educational signage	High
RC-R7 Main St./ Osprey Dominion	Private	Constructed wetland to manage road runoff	High
RC-R8 &R9 Sod Farm/Wells Rd.	Town	Filter strips and infiltration swales to reduce sediment plumes to adjacent wetland	High
RC-R10 Wells Rd Landing	Town	Dry swale	High*
RC-R11 South Harbor Park	Town	High visibility for conversion of pavement to bioretention at end of road prior to discharge to beach/marsh	High
RC-R12 Indian Neck Landing	Town	Bioretention and dry swale; waterbars to reduce erosion of unpaved driveways	Low
RC-R13 Kielbasa Rd.	Private	Residential raingarden demonstration	Low
RC-R15 Spring Ln.	Public	Pavement removal and bioretention at dead end	High*
RC-R16 Main St. Outfall	State	Bioretention at outfall	Med
RC-R18 Duck Walk Vineyards	Private	parking lot bioretention	Low
RC-R19 Briarcliff Landscape Sod	Private	Modification of existing detention pond (add pretreatment forebays); swale; and erosion control around stockpiles	Med
RC-R20 Ford Dealership	Private	Bioretention with leachers	Low

**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 5.3.

Southold Police Department (RC-R1)

The Police Department is located off of Route 25, Main St., southeast of the intersection with Peconic

Lane. Full access to the site was restricted during the field assessment; however, the rooftop drains to an extensive lawn area in the front via exposed downspouts. A portion of the parking area on the south side of the building drains down the drive aisle to the street, bypassing an existing leaching catchbasin (Figure 5.2). The parking and fueling areas behind the buildings mostly drain towards an existing catchbasin (presumably leaching) in the rear parking lot. A significant amount of sediment was observed on the pavement, and there is high potential for oil/gas and other auto-related pollutants to be conveyed by stormwater and discharged untreated into groundwater or to a nearby surface stream.

The proposed concept for this site is to divert runoff from the roof and rear fueling/parking lot into a raingarden or **bioretention facility** in the front lawn. The location and design of the practice will depend on the actual location of underground utilities and septic drain field, soils, and other siting and aesthetic preferences of the Police Department. Directing rooftop runoff to this area is relatively simple; redirecting runoff from the catchbasin in the rear of the building may involve modification of the existing structure to direct flows to the practice, or regrading to passively direct flows to a paved flume/channel into a pretreatment forebay. In addition, because the asphalt parking area to the side of the building is in poor condition, we recommend repaving parking spaces with **pervious pavers**. The Town is currently in the process of expanding this parking lot, providing an excellent opportunity to incorporate advanced stormwater management such as the recommended pervious pavers and bioretention facilities in the design as feasible.

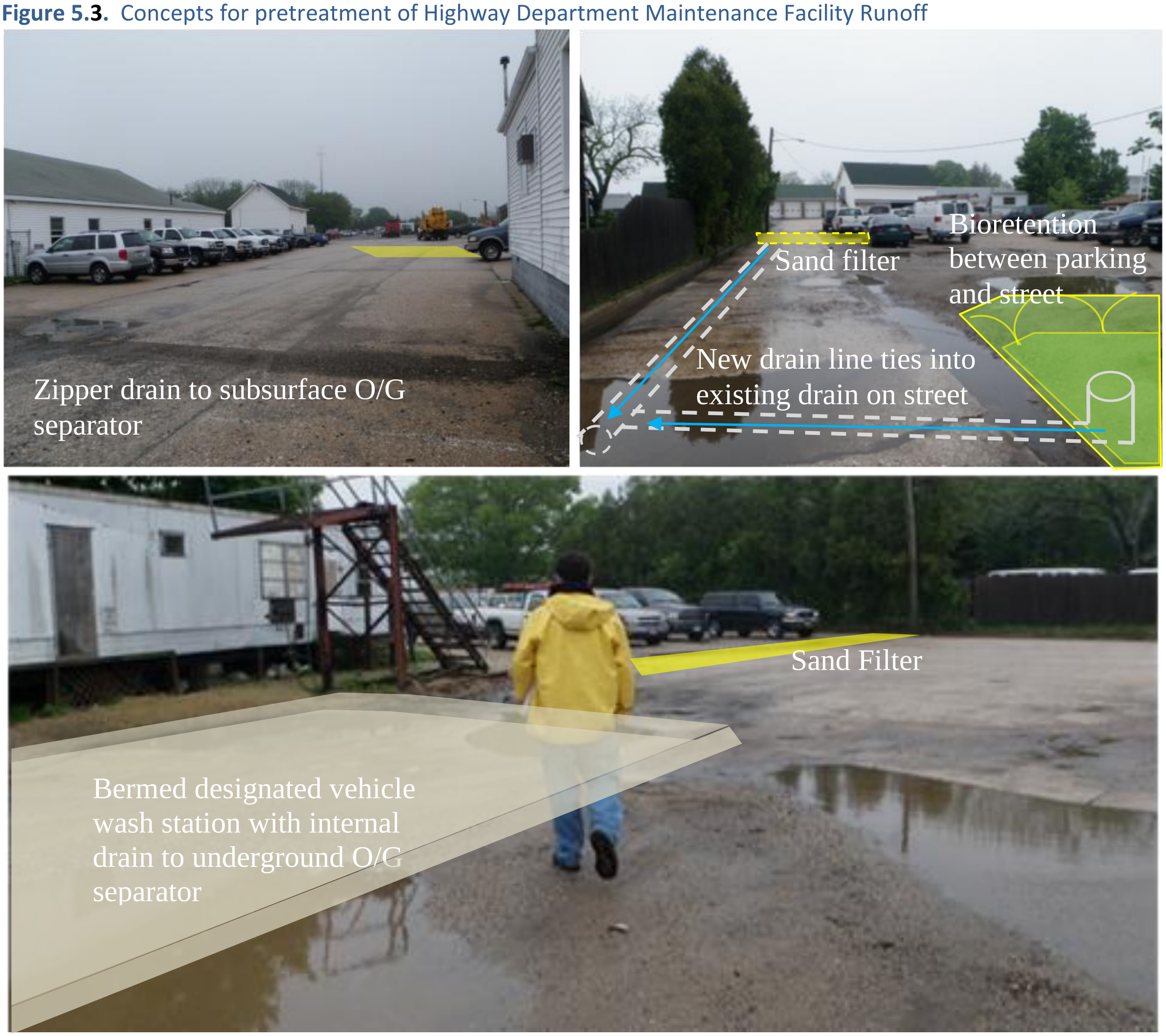
Figure 5.2. Catchbasin at high point in entrance drive (top left); replace deteriorated pavement with permeable pavers (top right); location of bioretention at highly visible location in front lawn area (bottom left and right).

Highway Department Maintenance Yard (RC-R3a, b, c)

Located near the corner of Main St. (Route 25) and Peconic Lane, the Highway Facility contains administrative offices, equipment and vehicle storage, material storage, and fueling and maintenance areas and is considered a stormwater hotspot. Currently, there is no formal stormwater management on site. Runoff drains down the entrance road to a clogged catchbasin that is tied into the drainage infrastructure along Main St., which then discharges to the stream. There is one existing leaching catchbasin in the vehicle wash area that is chronically clogged.

The proposed concepts for this site include: a) pretreatment of runoff from the fueling and garage area with a **two-chambered perimeter sand filter** and providing a designated wash station with **oil/grit separator**; b) collection of runoff from roof and parking/driving lanes in the northern portion of site in a zipper drain to be conveyed to an **underground oil/grit separator**; and c) paving of south parking area and installation of a **bioretention cell** between the sidewalk and parking lot (Figure 5.3). Overflows from each of these practices will tie back into the existing drain lines on the street. The Town is currently in the process of providing new facilities at this location, providing an opportunity to incorporate the recommended stormwater management practices in the design as feasible.

Figure 5.3. Concepts for pretreatment of Highway Department Maintenance Facility Runoff



Southold Town Recreation Center (RC-R4)

The Southold Recreation Center is located northeast of Peconic Lane between Route 25 (Main Street) and Carroll Avenue. The facility is surrounded to the east/southeast by vineyards. The site has two wide access entrances off of Peconic Lane and supports a parking area to the east and west of the Recreation Center building. The rear (eastern portion of the site) supports a small dog park and a large detention basin. The access driveways and parking areas mostly drain towards the detention basin. A significant amount of sediment was observed on the pavement. The proposed BMP concept for this site would be to **reduce pavement** along the entrance driveways, and constructing **bioretention systems** that would overflow to inlets and then into **leaching chambers** (Figure 5.4). Rooftop runoff from the building itself would be directed to small **raingardens** along the building. No reduction in dog run area is needed, and reductions in excess pavements will reduce the Town's future paving costs. Non-structural practices such as **street sweeping** are also recommended, and this is good location for **educational signage**.

Figure 5.4. Northernmost entrance to Southold Town Recreation Center with proposed pavement reduction and construction of bioretention (left); roof runoff to be captured by raingardens (right).

Jean W. Cochran Park (RC-R6)

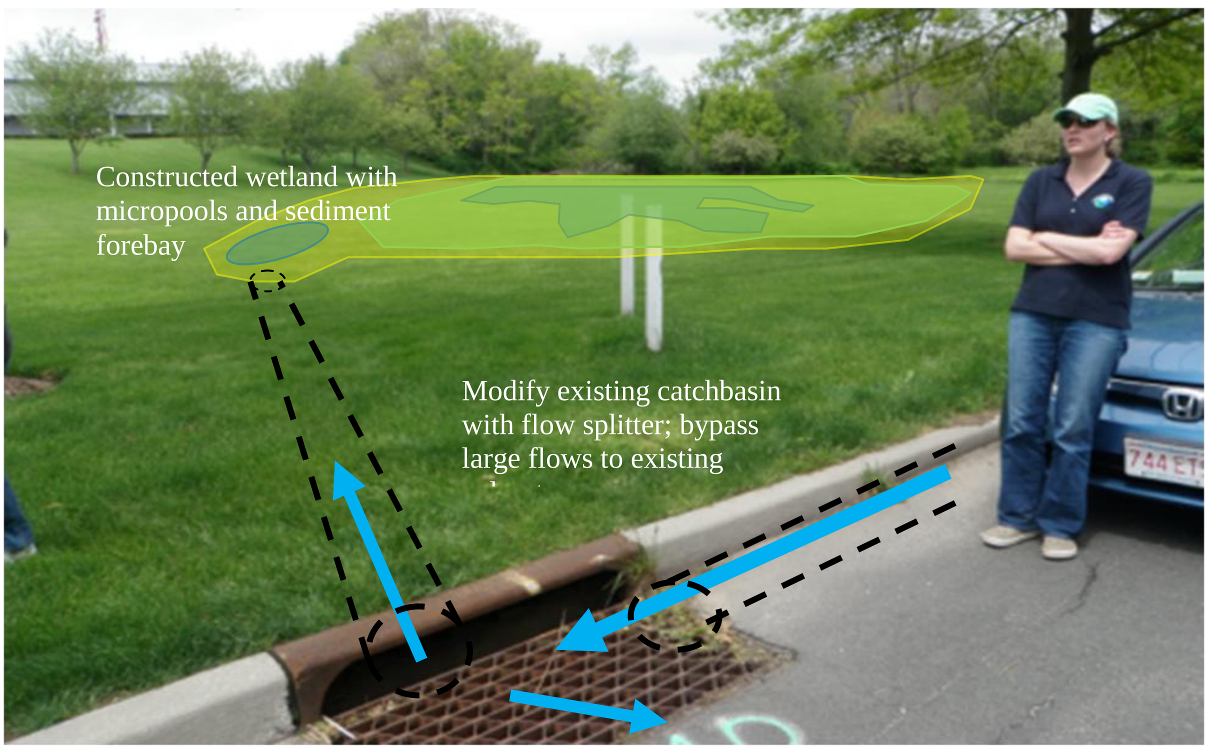
The Jean W. Cochran Park is located southwest of Peconic Lane south of the existing railway and northwest of the Carroll Avenue/Peconic Lane intersection. The existing gravel parking lot has no existing stormwater management practices and ponded stormwater was observed at the time of the site visits (Figure 5.5). The proposed concept for this site is to direct runoff from the gravel parking lot to **dry swales** and convey stormwater to twin **raingardens** along the park entrance driveway. Overflow would be directed to adjacent turf areas and the existing drainage swale next to the hockey rink, which already has overflows to underground leaching chambers. Additional vegetation could be added to the existing swale make it more effective. Because this site is a public recreational park, this site is highly visible, and the proposed stormwater retrofit practices could be used as an educational opportunity. The aesthetics of this retrofit site would be important, and **educational signage** describing the stormwater practices and their importance is encouraged.

Figure 5.5. Location of proposed dry swales and raingardens.

Main St./Osprey Dominion Wetland (RC-R7)

The historic stream/wetland network at this location was divided when the Route 25 embankment was constructed, and a large wetland area is now disconnected to the north of the road. A significant portion of Main St. drainage in this area is collected via curb inlets and piped to a single outfall south of Route 25 just below this location. We propose to divert in-pipe flows from the existing road drainage system into a **constructed wetland** in the open grassed area adjacent to Osprey Dominion (Figure 5.6). Parcel ownership should be investigated to determine if an easement can be purchased by the Town or DOT. A constructed wetland would provide water quality treatment for currently untreated stormwater runoff, adding habitat value for adjacent wetland areas, protecting downstream habitat, and potentially, provide aesthetic benefits for visitors to the vineyard.

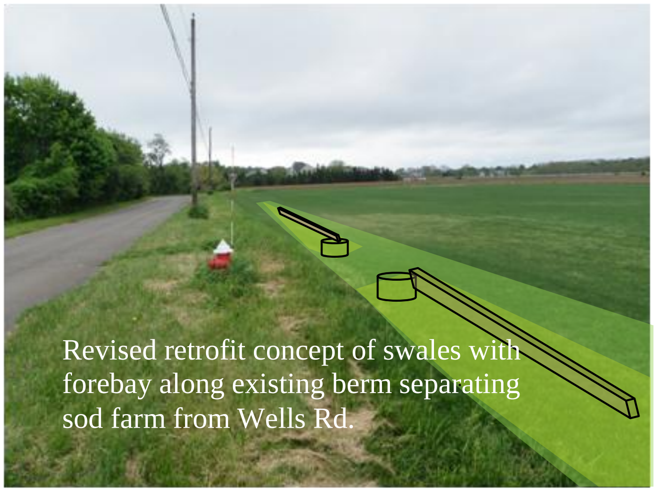
Figure 5.6. Divert flows from existing drain line along Main St. to constructed wetland in open lawn area.

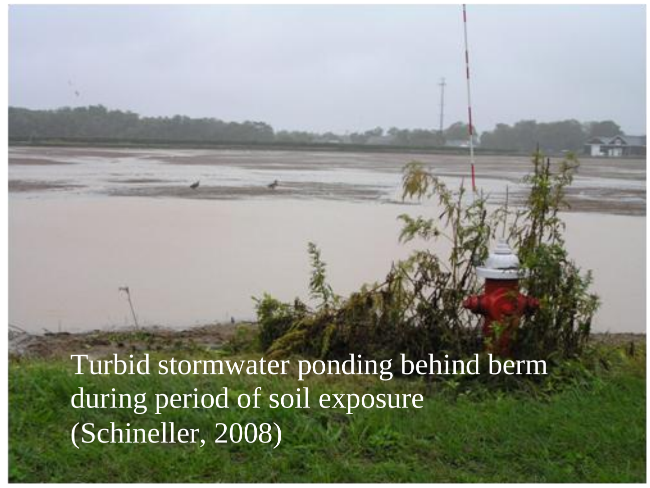


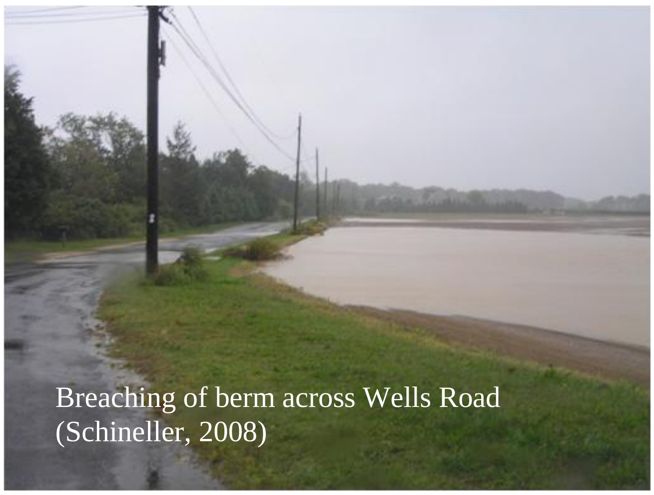
Wells Rd. and Sod Farm (RC-R8, R9)

During large rain events, runoff from the sod farm overflows across Wells Road in two primary locations, where it ultimately is discharged into the adjacent wetlands. When the sod has been harvested, runoff over exposed soils mobilizes fine soil particles and results in turbid stormwater plumes into the open water (Figure 5.7). Additional pollutants of concern include high levels of agricultural chemicals such as fertilizers and pesticides. A proposed retrofit design plan has already been prepared (provided by P. Schineller, 2011) that involves swales with infiltration leachers in the newly Town-acquired 50-ft wide parcel (RC-R8) and within a 50-ft wide easement (RC-R9) immediately adjacent to the Wells Road right-of-way. Given the amount of suspended sediment anticipated and the absence of pretreatment provided in the proposed design, clogging of the practice is likely. To avoid this issue, we recommend a modification of the design to include a **berm, check dams, or timber weirs in the swales** to create a **pretreatment forebay** and to extend the flow path prior to outlet at leaching basins. The Town already intends to install a barrier between the sod farm and the swale area to prevent inadvertent encroachment by future farming operations, which will be very effective. We also recommend maintaining a **grass filter strip** from the edge of the swale bed and thick native grasses in the secondary portion of the swale to increase sediment deposition prior to infiltration. Overflows from the swales should be directed to the existing culvert across Wells Rd. Maintenance will require removal of sediment from the pretreatment chamber.

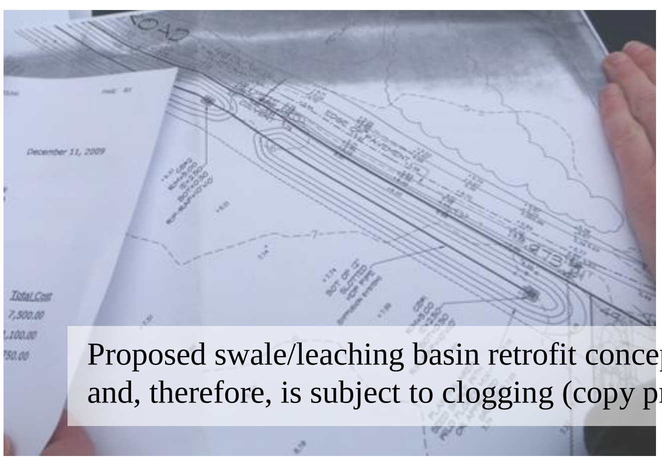
Figure 5.7. Series of photographs documenting stormwater conditions and proposed retrofit concepts at sod farm.

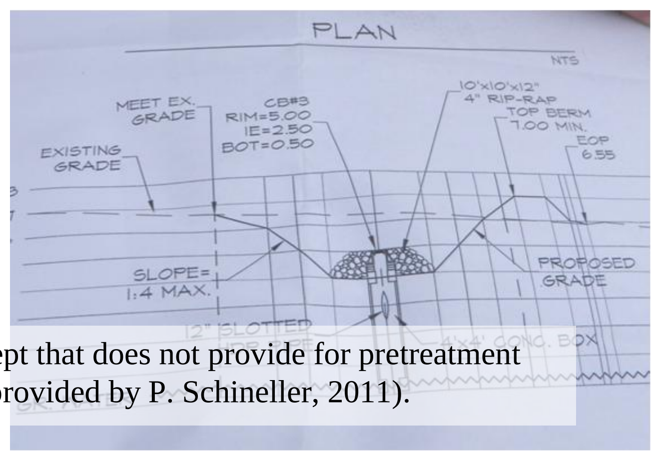

Revised retrofit concept of swales with forebay along existing berm separating sod farm from Wells Rd.


Turbid stormwater ponding behind berm during period of soil exposure (Schineller, 2008)


Breaching of berm across Wells Road (Schineller, 2008)


Runoff from sod farm entering wetland adjacent across Wells Rd. (Schineller, 2008)





Proposed swale/leaching basin retrofit concept that does not provide for pretreatment and, therefore, is subject to clogging (copy provided by P. Schineller, 2011).

Wells Landing Rd. (RC-R10)

A public boat ramp is located at the end of Wells Rd. that, reportedly, is infrequently used. Installation of a **dry swale** along the northside of entrance drive could provide some water quality benefit and help reduce ponding that occurs on the turnaround bulb (Figure 5.8). There may also be opportunity for installation of a small **raingarden** on the north side of the turnaround bulb where ponding occurs. Space for parking is still available on the southern side of the entrance way. Much of the pavement and ramp at this location is deteriorated. If repaving occurs, consider replacing some of the existing pavement on the bulb flare-outs with concrete **grid pavers** filled with crushed oyster shell or stone. No construction should occur within the surrounding wetland areas.

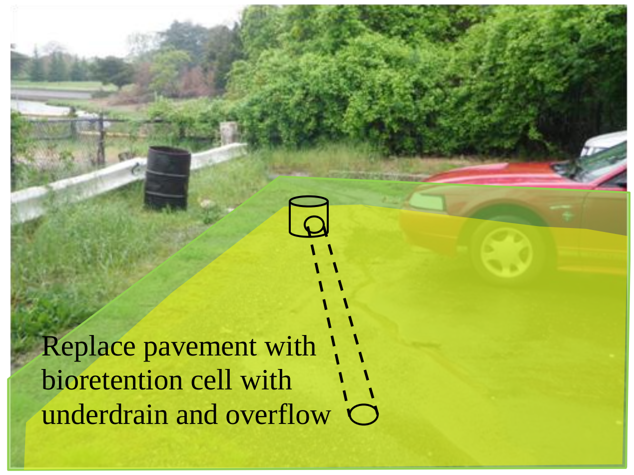
Figure 5.8. Deteriorated pavement at Wells Rd. landing and potential retrofit areas.

South Harbor Park (RC-R11)

This site is a highly visible location for a demonstration project at a local beach park where untreated runoff currently leaves a visible gully to the adjacent waterway. Currently, runoff from South Harbor Rd. flows along the edge of pavement to the road end and carves a channel through beach sand then into waterbody (Figure 5.9). The retrofit concept here is to **remove approximately 75 feet of pavement** at the dead end and capture remaining runoff in a **bioretention area** (Figure 5.10), while maintaining a pathway to the beach. We recommend conveying flows to the bioretention area via shallow roadside swales and paved flumes where necessary, with overflows directed to the existing wetland area. This project will add vegetated buffer to the wetland area, water quality treatment, and public education.

Figure 5.9. Runoff from road drains from parking area, across beach, and into waterway at South Harbor Park.

Figure 5.10. Retrofit concept at South Harbor Park.



Indian Neck Landing (RC-R12)

This is a highly visible location at a public boat landing. Currently, there is no stormwater management or formal drainage infrastructure at this site, despite the large contributing drainage area from Indian Neck Rd, surrounding woodlands, and residential lots. Unpaved, eroded driveways directly across from the ramp entrance appear to discharge a significant amount of sediment to the area. Based on the wrack line observed on site, it is obvious that a good portion of the paved turnaround bulb and boat ramp is submerged at high tide.

The proposed concept is to **remove some of the pavement** on the eastern side of the entrance and install a **shallow bioretention cell** with a sediment forebay and salt tolerant intertidal plant species (Figure 5.11 and 12). On the other side of the landing, a narrow **vegetated swale with check dams** could be inserted into the road right-of-way to capture a portion of Indian Neck Rd. No construction should occur within the surrounding wetland areas, nor should boat trailer turnaround access be restricted. Strategically located **waterbars** along the private, unpaved drive could help reduce road surface erosion and the deposition of sediment at the landing (the Town would need to collaborate with private property owners or gain easements for this work). Opportunities exist for enhancing existing wetland vegetation and educating users on watershed issues.

Figure 5.11. Proposed retrofit and erosion control practices at Indian Neck Landing.

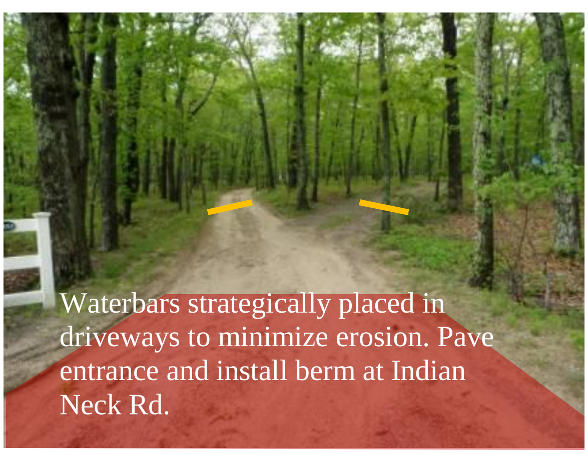
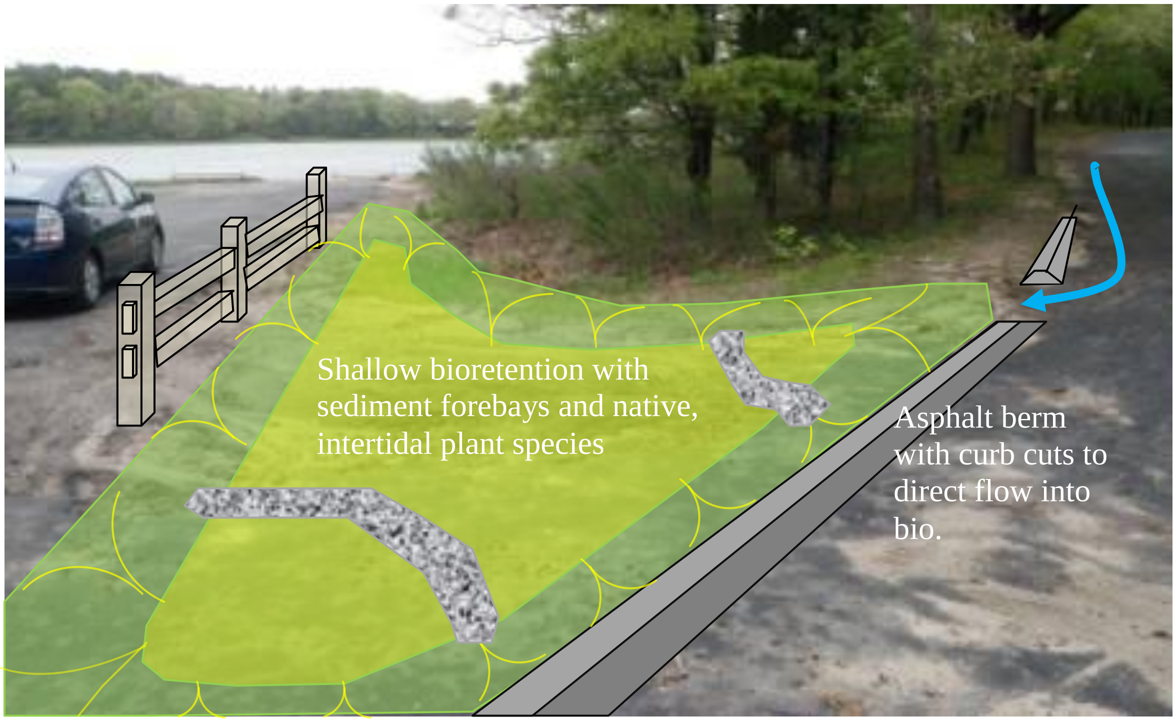


Figure 5.12. Proposed retrofit and erosion control practices at Indian Neck Landing.



Kielbasa Rd. (RC-R13)

There is no formalized drainage network along this residential road; however there is a good opportunity for demonstration raingardens adjacent to the water (Figure 5.13). Installation of a **raingarden** on either side of the road may help alleviate ponding on the road and extend the longevity of the asphalt, provide some water quality treatment, and provide an opportunity for community stewardship. Easements will be needed for work along this private road.

Figure 5.13. Location of small residential raingardens on Kielbasa Rd.

Spring Lane (RC-R15)
The site is at the end of a residential dead end street in a grassed open space area, with an access trail to the water. Runoff currently flows down the road to the end, where sediments and organics are deposited and ponding occurs. There is also an unpaved cul-de-sac used for turnarounds, which looks to be used fairly often. The concept for this site is to **remove excess pavement** at the end and install a large **bioretention** with overflow outlet to the marsh (Figure 5.14). Paved flumes and asphalt berms are proposed to direct flow into a sediment forebay (made with timber weir) for pretreatment. In addition, the concept recommends formalizing the parking area with **gravel-pave** (or other pervious pavement option), installing a split rail fence to prevent vehicle access, providing educational signage, stabilizing the unpaved turnaround, and restoring native buffer vegetation.

Figure 5.14. Spring Lane bioretention with pretreatment forebay.

Main St./Outfall (RC-R16)
This site provides an opportunity to divert flows from the drainage system on Main St. into an off-line, bioretention system prior to discharge at an existing 36-inch corrugated metal outfall pipe. There is a small open grassed area between a catchbasin on the road and the outfall, which discharges to a surface stream. The outfall pipe and headwall are in need of repair/maintenance (Figure 5.15). The concept is to modify the existing catchbasin (or install up-gradient inlets) to divert low flows to a surface **bioretention** to filter the water before it discharges through an underdrain system back to the outfall pipe. Large flows can bypass the system. It is assumed that this area is part of an existing drainage easement. There is a paved access path adjacent to the stream, and a wetland restoration project could be coupled with the installation of the bioretention facility.

Figure 5.15. Proposed location for bioretention cell between existing catchbasin and outfall pipe.

Duck Walk Vineyards (RC-R18)

Runoff from the parking area in the front of the building currently drains directly to a leaching catchbasin with no pretreatment for water quality. There is an existing grassed area adjacent to and downhill from this parking area that can be easily converted to **bioretention facility** (Figure 5.16). The concept includes covering the existing catchbasin and regrading the surrounding pavement to convey flows to the practice area. Install curb cuts and paved flumes where necessary to convey flows into the practice. Relocate the leaching basin to bioretention to manage overflow. This is an opportunity for a property owner to construct a stormwater retrofit for positive marketing, and/or an easement would be required to install this retrofit.

Figure 5.16. Location of existing catchbasin and proposed bioretention.

Briarcliff Landscaping (RC-R19)

Much of this private site drains to an existing wet pond that also serves as a focal point for the business. The existing drainage inlet to the practice is clogged with sediment, and the pond has likely lost some capacity. Much of the sedimentation may be derived from erosion of exposed stockpiles stored in the back of the property. Simple modification of the pond inlet structures should help improve pond performance and improve ease of maintenance. We recommend installing an **in-pond forebay** at the existing paved flume, as well as excavating a forebay up-gradient of the pond. In addition to the pond modification, we recommend providing erosion and sediment control for the uncovered stockpile area, and installation of a swale system and small raingarden to convey/filter runoff to the new sediment forebay above the pond (Figure 5.17). This is an opportunity for a property owner to construct a stormwater retrofit for positive marketing, and/or an easement would be required to install this retrofit.

Figure 5.17. Sedimentation from surrounding area has clogged existing drainage infrastructure. Stabilizing exposed stockpiles and providing pretreatment for existing detention basins can help reduce maintenance and enhance pollutant removal.

Ford Dealership (RC-R18)

This property is for currently sale; however, a recently constructed berm along the road results in a ponding situation in the northeast corner of the site. The site is almost 100% impervious, with no formal stormwater management system. All drainage flows to inlets on Main St., or evaporates. The recommended retrofit concept at this site includes installing a **pretreatment swale** to convey sheet flow from the roof and parking lot into a **bioretention facility** in the northwest corner (Figure 5.18). The soil survey indicates good infiltration capacity at this location; therefore, we recommend the use of a **leaching chamber** as the overflow mechanism for the bioretention facility. This is an opportunity for a property owner to construct a stormwater retrofit for positive marketing, and/or an easement would be required to install this retrofit.

Figure 5.18. Location of ponding in corner of old Ford dealership.

5.2.2 Neighborhood Assessment Summary

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 watershed 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 5.4 is a comparative summary of each neighborhood, and more detail is provided below. Pollution source is determined by the number of observed pollutants (none-1=low; 2 = medium; >2 = High).

Table 5.4 Neighborhood Inventory Summary

Site ID/ Name	Pollutant Loading	Main Pollutant Source	Stewardship Activities
RC-N1/ Richmond Lane	Low	Sediment, Nutrients	Proper lawn care, downspout disconnection; septic maintenance, long-term BMP maintenance
RC-N2/ Wells Rd	Low	Sediment	Septic maintenance, catchbasin maintenance; riparian buffer management
RC-N3/ Wood Lane	Low	Sediment	maintenance of dirt roads; septic systems; riparian buffer management

Richmond Lane (RC-N1)

Richmond lane is a newer neighborhood of 24 single-family detached dwellings that appears to be approximately five to ten years old. Located off of Indian Neck Road, the neighborhood has two main streets, Richmond and Shore Lanes. Three of the homes are accessed from Indian Neck Rd. and six homes are located around a 98-100 ft diameter, paved cul-de-sac. Both streets are relatively wide (28 ft paved) with an overall right-of-way width of approximately 50 ft. There are no sidewalks (Figure 5.19). Stormwater runoff is collected via a curb-and-gutter system and is conveyed to a central infiltration basin. The facility is fenced, thickly vegetated, and inaccessible, which limited our ability to evaluate the design or condition of the practice. The neighborhood is approximately 23 acres, a quarter of which was left as forested open space, including a protective riparian buffer that ranges between 30 and 170 ft from rear lot lines. Lots are typically half an acre in size, and on average, each lot is comprised of 20-30% impervious cover, 50% grass cover, and 20-30% landscaped area/trees. Almost all the driveways are impervious. No permanent irrigation was observed; however, a majority (60%) of the lawns appear to have high management requirements. Some sediment accumulation along curbs was observed, but no pet waste, trash, or dumping of debris was seen.

Opportunities for pollution prevention within the neighborhood include long-term stormwater facility maintenance, and homeowner education on proper lawn care and use of fertilizers. Additionally, homeowners could effectively reduce runoff by disconnecting directly connected impervious areas; approximately 30% of the dwellings have downspouts that could be re-directed to pervious portions of the yard, raingardens, or rain barrels.

Figure 5.19. Richmond Lane neighborhood with wide streets and curb/gutter system.

Wells Road (RC-N2)

The Wells Road residential area is located off Main Road (Route 25), south of the sod farm and north of the boat landing. This area consists of approximately 20 single-family homes on either side of Wells Rd. that appear to be approximately 5 to 25 years of age. Wells Rd. is a26-28 ft wide, paved, open-section road with a handful of catchbasins at the low points in the road. Ponding water was observed at some of the drain inlets, most likely due to sediment accumulation (Figure 5.20). No outfalls were observed, and the catchbasin are assumed to be leaching facilities. There are no sidewalks present, and the road surface shows signs of deterioration. The overall size of the area is approximately 17 acres, of which more than half is forested. Most of the lots are waterfront and range in size from 1/2 to 1 acre; there are a few larger parcels. Lot cover east of the road typically consists of 20% impervious cover, 70% turf grass, and 10% landscaped beds underneath tree canopy. Most of the driveways are impervious and many are crushed shell. Most waterfront lots have docks. Lots on the west side of the road have minimal tree cover. No permanent irrigation was observed, and the majority of the homes appear to have low maintenance requirements. The neighborhood was clean at the time of observation without visible pet waste, trash, or illegal dumping.

Opportunities for pollution prevention include increased maintenance and repair of the existing leaching catchbasins and proper septic maintenance. Waterfront homeowners should be educated on proper buffer management and landscaping, and proper boat/dock cleaning practices.

Figure 5.20. Ponding at leaching catchbasin, gravel driveway

Wood Lane (RC-N3)

The Wood Lane neighborhood area is located off Indian Neck Rd. and consists of single-family homes that appear to be approximately 30 years of age. All roads within the neighborhood are dirt with no formal stormwater infrastructure. The overall size of the areas is approximately 20 acres, of which about 70% of the neighborhood is forested. Lots are typically greater than 1 acre in size, and many of the lots are waterfront. Typical lot cover consists on average of 20% impervious cover, 35% turf grass, and 45% landscaped beds or natural areas. Permanent irrigation was observed at one home, but the majority of the lots appear to have low lawn maintenance burden. No visible pet waste, trash, or dumping was observed.

Opportunities for pollution prevention include maintenance of the existing dirt roadways, riparian buffer management, and proper septic system maintenance.

Figure 5.21. Dirt road entrance off Indian Neck Road (left); typical house lot (right)

5.2.3 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 5.5 is a comparative summary of each hotspot, with more detail on each site provided below. Pollution source ranking is determined by the number of observed pollutants (1-2 = medium; >2 = High).

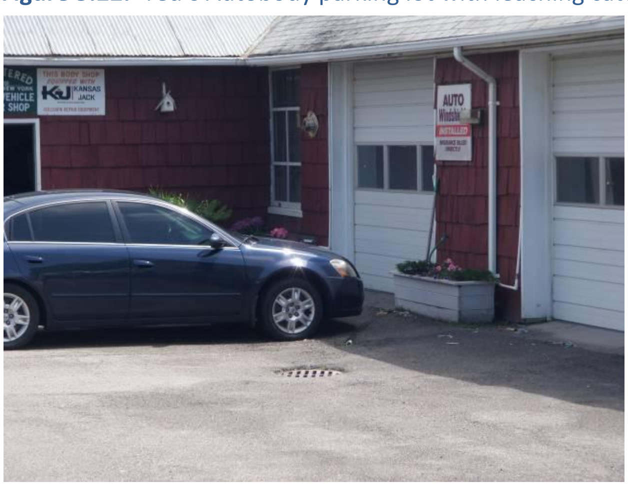
Table 5.5 Hotspot Inventory Summary

Site ID/ Name	Description	Ranking
RC-H1 Ted's Autobody	Auto body repair, used car sales, auto storage	Low
RC-H2 Chucks Fiberglass Service	Boat washing and storage	Low
RC-H3 First Class Autobody	Auto body repair, auto storage	Low
RC-H4 Animal Shelter	Animal housing, animal waste	Medium
RC-H5 Highway Maintenance Yard	Storage of materials, vehicle and equipment maintenance and fueling; need a designated wash station; See Retrofit (RC-R3)	High
RC-H6 Sod Farm	Sediment loading, agricultural fertilizers, etc See Retrofit (RC-R7/8)	High

Ted's Auto Body (RC-H1)

At Ted's Autobody there is one leaching catchbasin located outside the building to service the parking area and front portion of the roof (Figure 5.22). It is assumed that all repair work occurs inside the enclosed garage. The catchbasin is located directly outside the garage doors in front of the building. Any automotive fluids, paints, or other chemicals washed towards the catchbasin have the potential to be injected directly into the groundwater without pretreatment; therefore, it is important that proper procedures are followed to prevent the discharge of materials from the garage area to the catchbasin. Spill prevention measures and facility washing procedures should be established to minimize the potential for contaminated runoff into the catchbasin.

Figure 5.22. Ted's Autobody parking lot with leaching catchbasin



Chucks Fiberglass Service (RC-H2)

Chucks Fiberglass includes a large, flat, unpaved storage yard and surrounding turf grass area and does not appear to discharge a significant amount of runoff from the storage area offsite. There are no observed stormwater management practices. Boats are washed and stored outside while fiberglass work takes place in the large building onsite. A designated boat washing area with an oil/water separator for wash water pretreatment is recommended. Paving of the dirt drive and parking area would help stabilize area and reduce any sediment laden runoff.

Figure 5.23. Chucks Fiberglass parking area

First Class Autobody/RC-H3

At First Class Autobody, there is one leaching catchbasin located in the front parking area and a second basin in the rear of the building that is reportedly subject to chronic clogging and requires frequent maintenance (Figure 5.24). In addition, run-on from adjacent Highway Department is likely contributing to the problem. Based on observed operations, this location was not necessarily considered a hotspot; however, the flooding in the rear of the property is an issue. Retrofit upgrades at the Highway Department may help alleviate some of the issue; however, providing pretreatment prior to infiltration may be necessary to reduce catchbasin clogging issues. In addition, a small grass area in front of the building could be utilized as a raingarden to collect roof runoff, reduce volume to rear catchbasin, and serve as an education demo (it is adjacent to the bus stop on Main St.). Operational procedures should be followed by employees to prevent automotive fluids, paints, or other chemicals from draining to these catchbasins.

Figure 5.24. First Class Autobody flooding in rear and raingarden opportunity to reduce stormwater volume

Animal Shelter (RC-H4)

There are a number of outdoor kennels adjacent to the parking lot at the animal shelter. Urine and feces deposited on the concrete surfaces in the kennels may wash off into adjacent cathbasins in the parking lot (Figure 5.25). Depending on animal density, washdown practices, and design of storm drain system, this site could be considered a pollution hotspot for nitrogen and bacteria. At a minimum, kennel cleaning procedures should direct washwater towards the grassed areas rather than to drain inlets. Additional site investigation is necessary to more fully evaluate wastewater and stormwater pollution potential.

Figure 5.25. Location of kennels adjacent to catchbasin (Source: Google Maps 2011 aerials)

Highway Maintenance Yard (RC-H5)

Located near the corner of Main St. (Route 25) and Peconic Lane, the Highway Facility contains administrative offices, equipment and vehicle storage, material storage, and fueling and maintenance areas. This site was described in more detail previously as a retrofit opportunity RC-R3.

Sod Farm (RC-H6)

During large rain events, runoff from the sod farm overflows across Wells Road, where it ultimately carries sediment, nutrients, and other agricultural chemicals into the adjacent wetlands. This site was described in more detail previously as retrofit opportunities RC-R8/9.

5.3 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).

RC-R11. South Harbor Road End — Pavement removal and bioretention facility

Site Description

This site is a highly visible location for a demonstration project near a local beach park. Currently, runoff from South Harbor Road flows along the edge of pavement to the road end and erodes a channel through beach sand then into the adjacent waterway, which is near the mouth of Richmond Creek.

Proposed Concepts

The retrofit concept here is to **remove approximately 75 feet of pavement** at the dead end and capture remaining runoff in a **bioretention area**, while maintaining a pathway to the beach. Shallow roadside swales and paved flumes where necessary should be used to convey flows to the bioretention area, with overflows directed to the existing wetland area. A shallow berm/speed hump should be used as needed at the park entrance drive to keep runoff along the road flowing towards the bioretention.

Because this site is adjacent to a public recreational park, it is highly visible, and the proposed stormwater retrofit could be used as an educational opportunity. The aesthetics of this retrofit site would be important, and educational signage describing a bioretention facility and its importance is encouraged. This project will add vegetated buffer to the wetland area, water quality treatment, a reduction in erosion, and public education.

Practice Sizing/Design Considerations

The bioretention area should be sized for treating the water quality volume. This equates to approximately 2,100 SF of required treatment area. There is sufficient available surface area at this location to provide the full 2,100 SF. The bioretention should be designed to allow a maximum of 6 inches of ponding before overflow, and should be planted with a variety of native plants that can withstand both infrequent flooding and long-term drought, as well as saltwater spray.

The existing large trees and other vegetation, adjacent wetland, park fence, and utilities (overhead wires and water) are the potential constraints for construction of this retrofit practice. Public access should be maintained at all times during the construction of this site, and the retrofit should not affect use of the adjacent park.

Pollutant Removal

Bioretention areas are expected to remove 90% TSS; 30% TP; 55% TN; and 70% bacteria (RI Manual, 2010).

Project costs

The planning-level construction costs of Site RC-R11 is approximately $70,200. The pavement reduction will be a long-term benefit to the Town, reducing future paving and maintenance costs of the roadway in that location. An additional $21,100 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 $3,500, annually.

Next steps

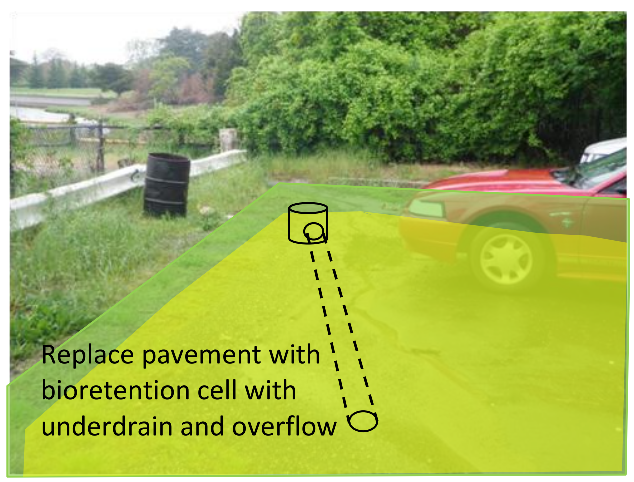
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities and right-of-way;
- Map existing resource area boundaries and buffers; and
- Advance design for permitting and construction.

Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
RC-R11	0.7	90	2,250	2,100	2,100

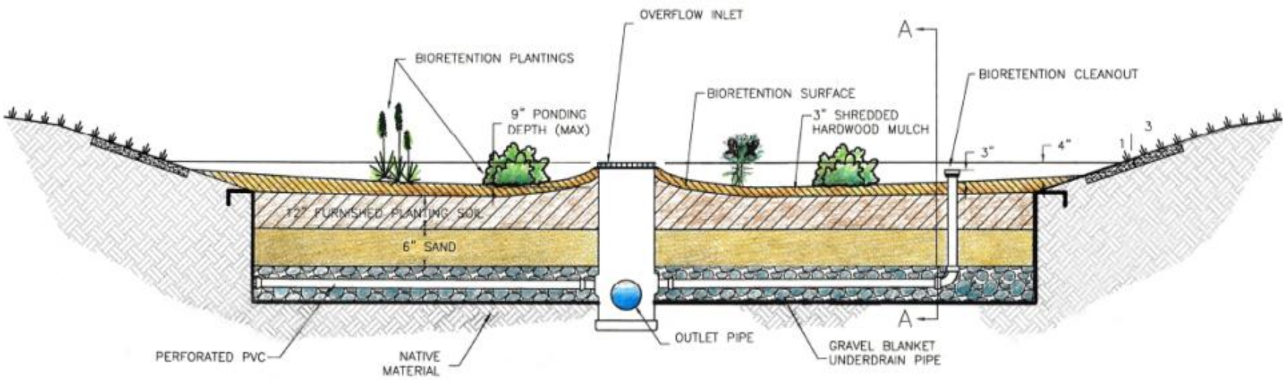
*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design 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.

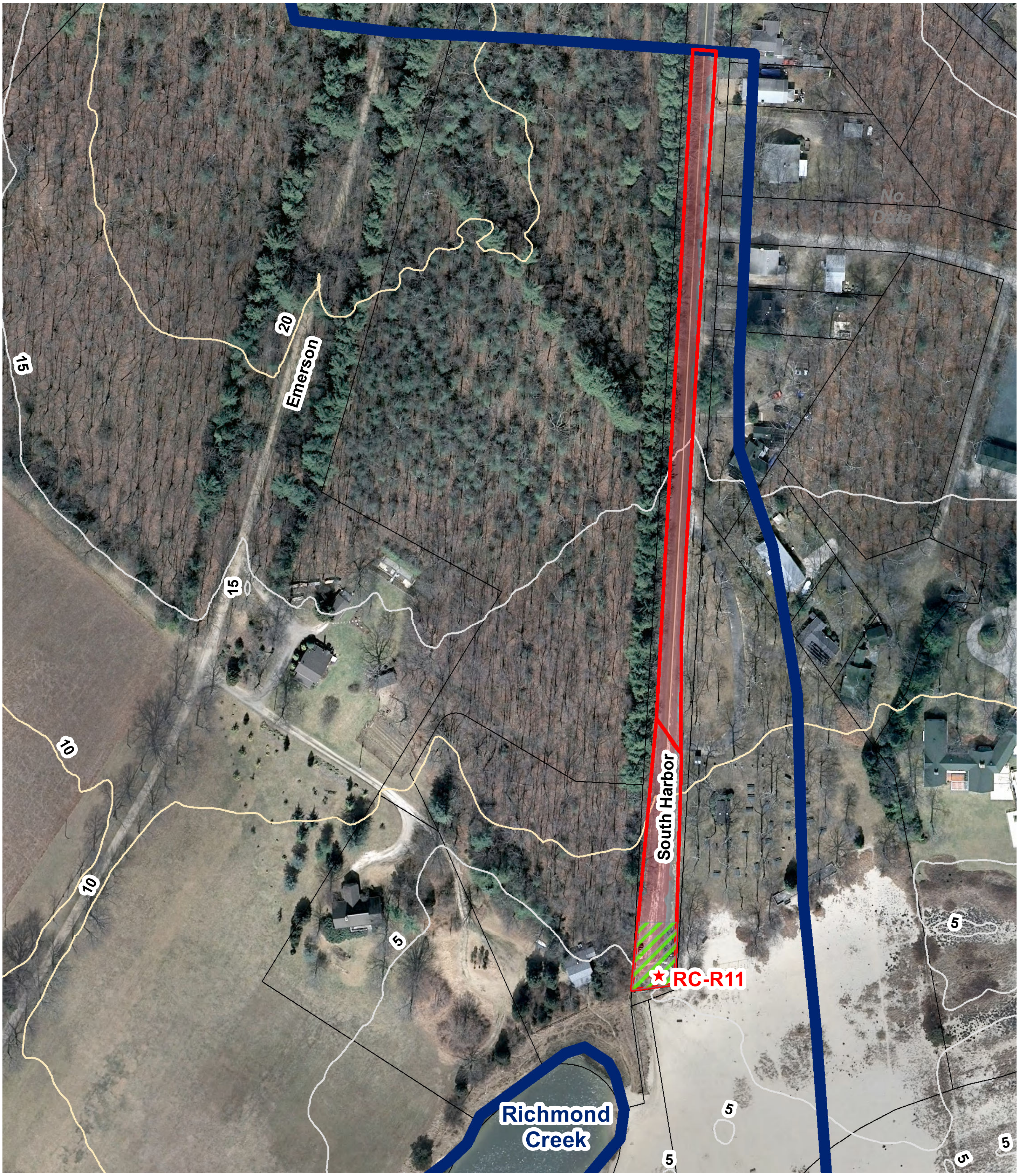
Existing Conditions

Proposed Concept Sketch



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





Legend

Richmond 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

Feet
150

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

Retrofit 11
Richmond Creek Subwatershed
Southold, NY

Date: 7/26/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_RichmondCreek_blowups_portrait_9072.mxd

RC-R8 and R9. Sod Farm/Wells Road — Filter strips and bioswales with check dams

Site Description

During large rain events, runoff from the sod farm overflows across Wells Road in two primary locations, where it ultimately is discharged into the adjacent wetlands and into Richmond Creek. When the sod has been harvested, runoff over exposed soils mobilizes fine soil particles and results in turbid stormwater plumes into the open water. Additional pollutants of concern include potentially high levels of agricultural chemicals such as fertilizers and pesticides.

Proposed Concepts

A proposed retrofit design plan has already been prepared (provided by P. Schineller, 2011) that involves swales with infiltration leaching chambers in the newly Town-acquired 50-ft wide parcel (RC-R8) and within a 50-ft wide easement (RC-R9) immediately adjacent to the Wells Road right-of-way. Given the amount of suspended sediment anticipated and the absence of pretreatment provided in the proposed design, clogging of the practice is likely to occur on a frequent basis. To avoid this issue and reduce anticipated maintenance, the Town and sod farm should consider a modification of the design to include a berm, check dams, or timber weirs in the swale to create a **pretreatment forebay** and to extend the flow path prior to outlet at leaching basins. The Town already intends to install a barrier between the sod farm and the swale area to prevent inadvertent encroachment by future farming operations, which will be very effective. A **grass filter strip** from the edge of the swale bed and thick native grasses in the secondary portion of the swale should also be constructed and maintained to increase sediment deposition prior to infiltration. Overflows from the swales should be directed to the existing culvert across Wells Road. Maintenance will require removal of sediment from the pretreatment chamber.

Practice Sizing/Design Considerations

The bioswales should be sized to treat up to the water quality volume from the contributing drainage area. This equates to approximately 15,200 SF of required treatment area, all of which is available at this location. Overhead wires and the water line are potential constraints during construction.

Pollutant Removal

Bioswales 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 RC-R8 and 9 is expected to cost approximately $250,000. An additional $75,000 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 3-5% of the construction costs, or $7,500 - $12,500, annually.

Next steps

- Continue to coordinate with the sod farm owner;
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities and drainage structures; 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)*
RC-R8 and R9	30	NA	26,000	15,200	15,200

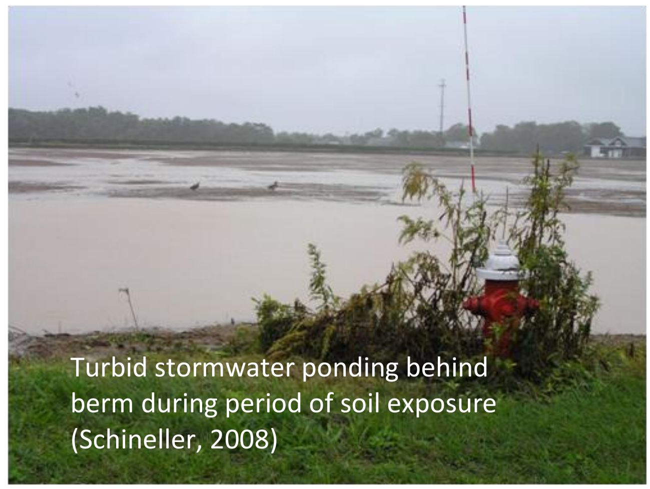
*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010). The required min Rv = 0.2 was used for this site.

*Practice Area Required is calculated based on practice-specific design assumptions.

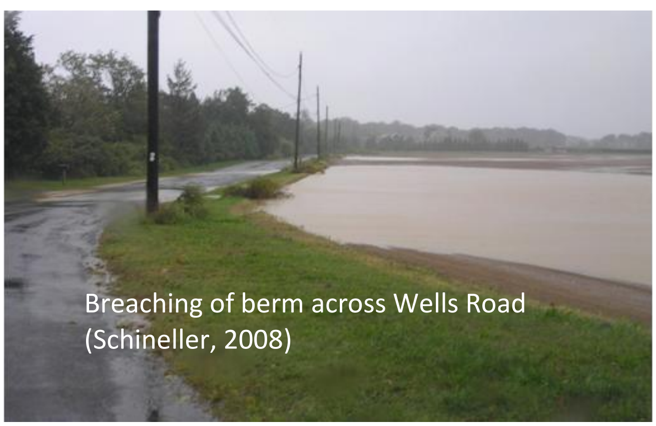
*Practice Area Available is estimated from available mapping. Actual practice area may be adjusted as needed during pre-construction.

Existing Conditions and Proposed Concept Sketch

Revised retrofit concept of swales with forebay along existing berm separating sod farm from Wells Rd.

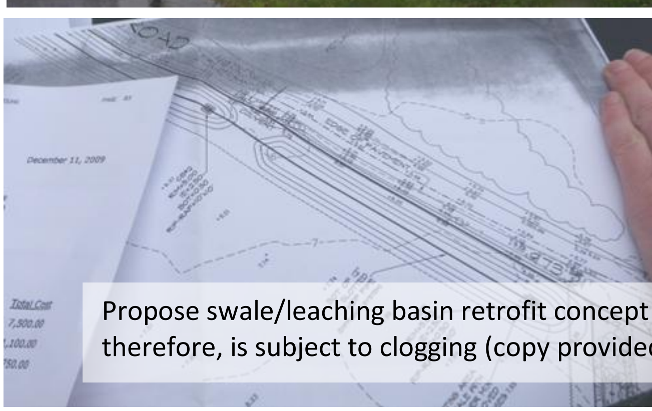


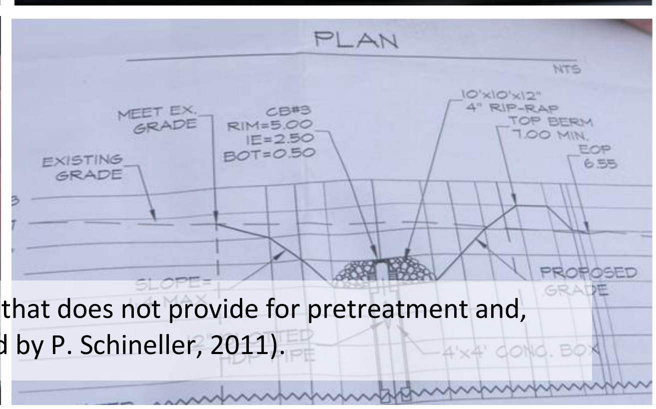
Turbid stormwater ponding behind berm during period of soil exposure (Schineller, 2008)



Breaching of berm across Wells Road (Schineller, 2008)

Runoff from sod farm entering wetland adjacent across Wells Rd. (Schineller, 2008)





Propose swale/leaching basin retrofit concept that does not provide for pretreatment and, therefore, is subject to clogging (copy provided by P. Schineller, 2011).

Legend

- Richmond 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

Feet
250

Horsley Witten Group
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Retrofit 8 and 9
Richmond Creek Subwatershed
Southold, NY

Date: 7/26/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_RichmondCreek_blowups_portrait_9072.mxd

RC-R15. Spring Lane — Pavement removal and bioretention facility at dead end

Site Description

The site is at the end of a residential dead end street in a grassed open space area, with an access trail to the water. Runoff currently flows down the road to the end, where sediments and organics are deposited and ponding occurs before discharging directly to Richmond Creek with no treatment. There is also an unpaved cul-de-sac used for turnarounds, which looks to be used fairly often.

Proposed Concepts

The concept for this site is to **remove excess pavement** at the end of the road and install a large **bioretention area** with an overflow outlet to the adjacent marsh. Paved flumes and asphalt berms are proposed to direct flow into a sediment forebay (made with a timber weir) for pretreatment. In addition, the concept recommends formalizing the parking area with **gravel-pave** (or other pervious pavement option), **installing a split rail fence** to prevent vehicle access to the bioretention area, providing **educational signage**, **stabilizing the unpaved turnaround**, and **restoring native buffer vegetation** to the marsh.

In addition, 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 bioretention area should be sized for treating the water quality volume. This equates to approximately 4,300 SF of required treatment area. There is only sufficient available surface area at this location to provide 1,600 SF, or ~36% of the optimal treatment volume. Any roof and/or driveway disconnection in the drainage area will improve the treatment volume percentage.

A key aspect to this retrofit site is working with and educating the residents about what a bioretention is, how it is supposed to look, how it functions, and why it is important. In particular, the homeowner immediately adjacent to the proposed retrofit should be contacted early in the design process to ensure that his or her needs will be met, which will increase the long-term viability of the bioretention.

The existing large trees and other vegetation, adjacent wetland, and adjacent private property are the greatest potential constraints 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. Residential access should be maintained at all times during the construction of this site, and the retrofit should not affect use of the nearby private properties.

Pollutant Removal

Bioretention areas are expected to remove 90% TSS; 30% TP; 55% TN; and 70% bacteria (RI Manual, 2010).

Project costs

The planning-level construction costs of Site RC-R15 is approximately $46,500. An additional $14,000 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 $2,300, annually.

Next steps

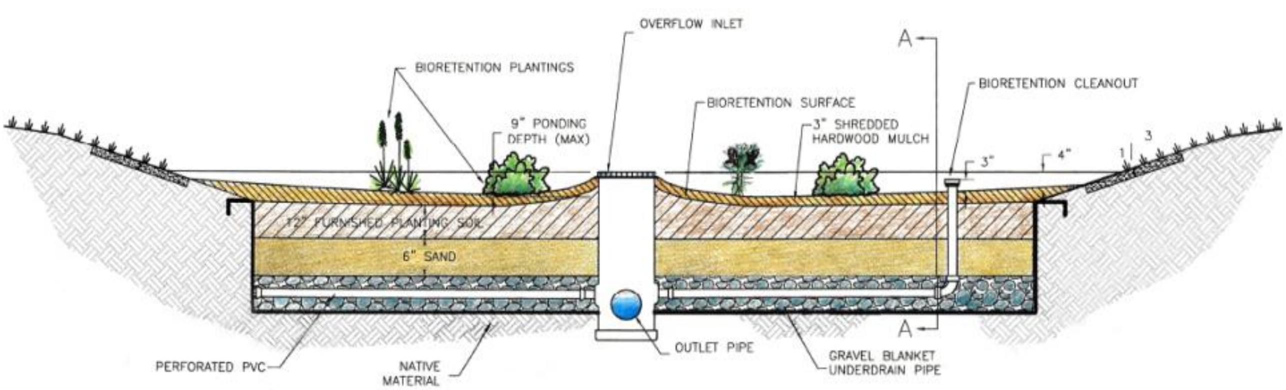
- Approach the abutting homeowners to discuss the concept;
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map any existing utilities and trees;
- Map limits of right-of-way and obtain any necessary easement; and
- Map existing resource area boundaries and buffers.

Site ID	Drainage Area (ac)	% Impervious	Water Quality Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
RC-R15	5	18	4,600	4,300	1,600

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



Legend

- Richmond 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

Feet
100

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 15
Richmond Creek Subwatershed
Southold, NY

Date: 7/26/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_RichmondCreek_blowups_landscape_9072.mxd

RC-R6. Jean W. Cochran Park — Swales and demonstration raingardens with educational signage

Site Description

The Jean W. Cochran Park is located southwest of Peconic Lane, south of the existing railway and northwest of the Carroll Avenue/Peconic Lane intersection. The existing gravel parking lot has no existing stormwater management practices, and ponded stormwater was observed at the time of the site visits. However, there is an existing drainage swale next to the hockey rink, which already has overflows to underground leaching chambers.

Proposed Concepts

The proposed concept for this site is to direct runoff from the gravel parking lot to **dry swales** and convey stormwater to twin **raingardens** along the park entrance driveway. Overflow would be directed to adjacent turf areas and the existing drainage swale as overland flow. Additional vegetation could be added to the existing swale make it more effective.

Because this site is a public recreational park, it is highly visible, and the proposed stormwater retrofit practices could be used as an educational opportunity. The aesthetics of this retrofit site would be important, and educational signage describing the stormwater practices and their importance is encouraged.

Practice Sizing/Design Considerations

Raingardens and dry swales should be sized for treating the water quality volume. This equates to approximately 1,600 SF of required treatment area. There is sufficient available surface area at this location to provide the full 1,600 SF.

Pollutant Removal

Raingardens and dry swales are expected to remove 90% TSS; 30% TP; 55% TN; and 70% bacteria (RI Manual, 2010).

Project costs

The construction of Site RC-R6 is expected to cost approximately $29,300. An additional $8,800 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 roughly $900 - $1,500, annually.

Next steps

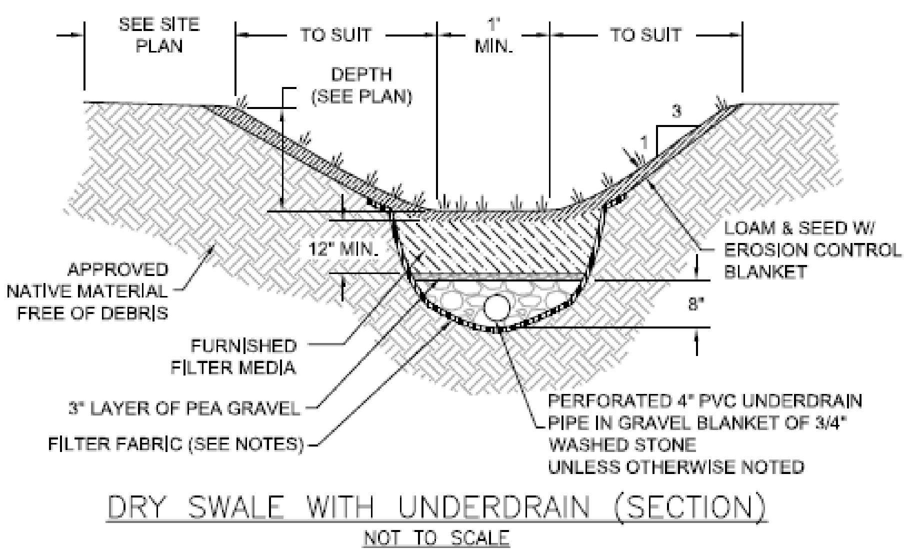
- Confirm soil conditions;
- Complete a topographic survey;
- Map existing utilities; and
- Advance design for permitting and construction.

Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
RC-R6	0.5	80	1,700	1,600	1,600

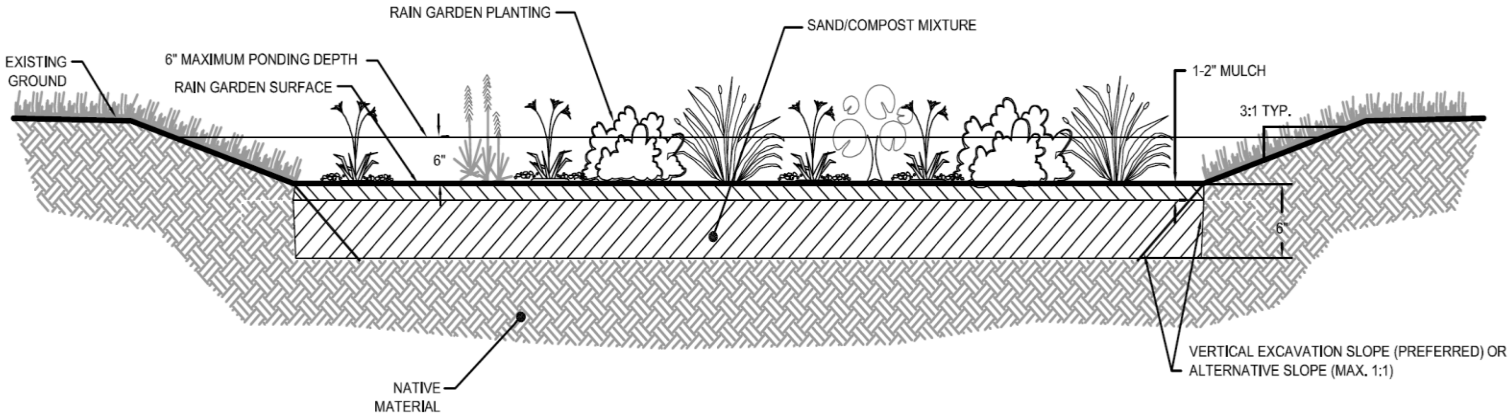
*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design 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.

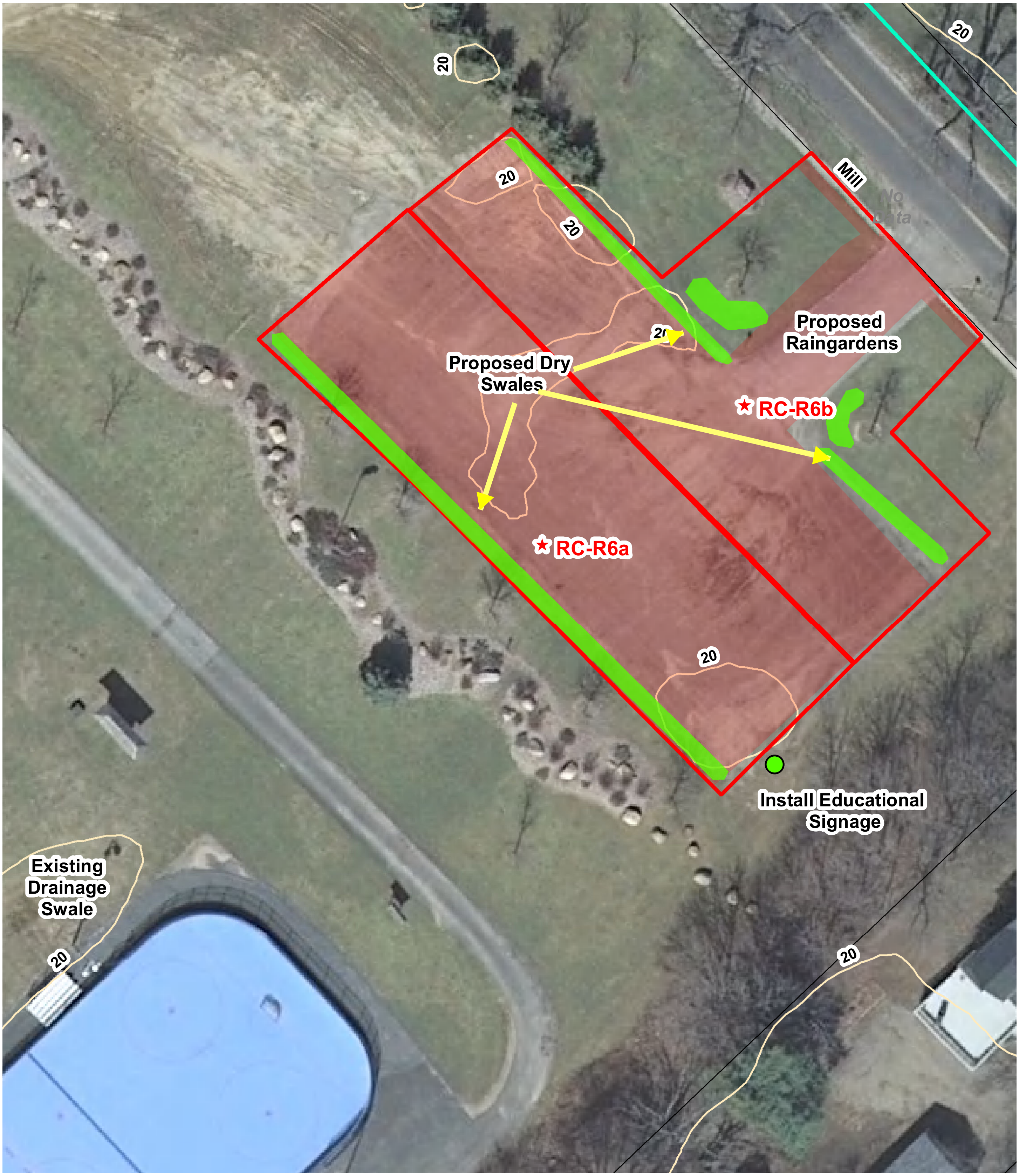
Proposed Concept Sketch

Typical dry swale detail



Typical raingarden detail, showing soil amendments (if needed), plantings, and mulch.





Legend

- Richmond 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

Feet
40

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Sustainable Environmental Solutions
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Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

Retrofit 6
Richmond Creek Subwatershed
Southold, NY

Date: 7/26/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_RichmondCreek_blowups_portrait_9072.mxd

RC-R10. Wells Road Landing — Dry swale

Site Description

A public boat ramp for Richmond Creek is located at the end of Wells Road that, reportedly, is infrequently used. Much of the road pavement and ramp at this location is deteriorated. The turnaround area near the ramp is unpaved, and there is evidence of ponding and erosion in this area. There are wetlands on either side of the road.

Proposed Concepts

The retrofit concept for this site includes the installation of a shallow, narrow **dry swale** along the northside of the road where the grass shoulder is currently maintained/mowed. This practice will provide some water quality benefit and help reduce the ponding that occurs on the turnaround bulb.

There may also be opportunity for installation of a small, shallow **raingarden** on the north side of the turnaround bulb where ponding occurs. Space for parking is still available on the southern side of the entrance way. If repaving occurs, consider replacing some of the existing pavement and stabilizing eroded areas on the bulb flare-outs with concrete grid pavers filled with crushed oyster shell or stone.

Practice Sizing/Design Considerations

The dry swales should be sized to treat the water quality volume. The dry swale surface area should be approximately 620 SF of total treatment area. There is sufficient available surface area at this location to provide the full 620 SF.

There are no existing utilities in this area, but trees and the adjacent wetland may pose possible conflicts for construction of this retrofit practice. Depending on groundwater levels, the dry swale detail may need to be modified with a shallower filter depth and no underdrain to address the site constraints. It is important that no construction occur within the surrounding wetland areas.

Pollutant Removal

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 RC-R10 is expected to cost approximately $12,000. An additional $3,600 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 3-5% of the construction costs, or $360-$600, annually.

Next steps

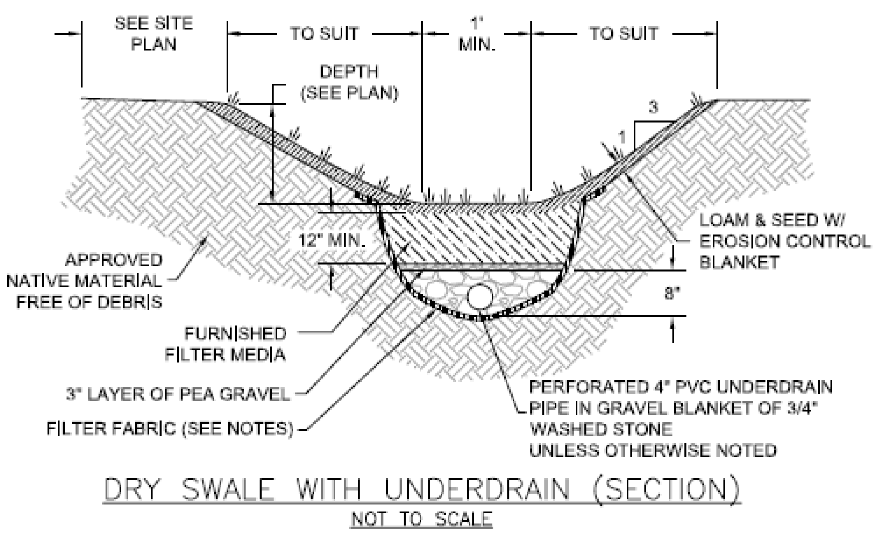
- Investigate the need to repave the road and provide a stabilized, pervious turnaround area;
- Confirm soil and groundwater conditions;
- Complete a topographic survey; and
- Map existing resource area boundaries and buffers.

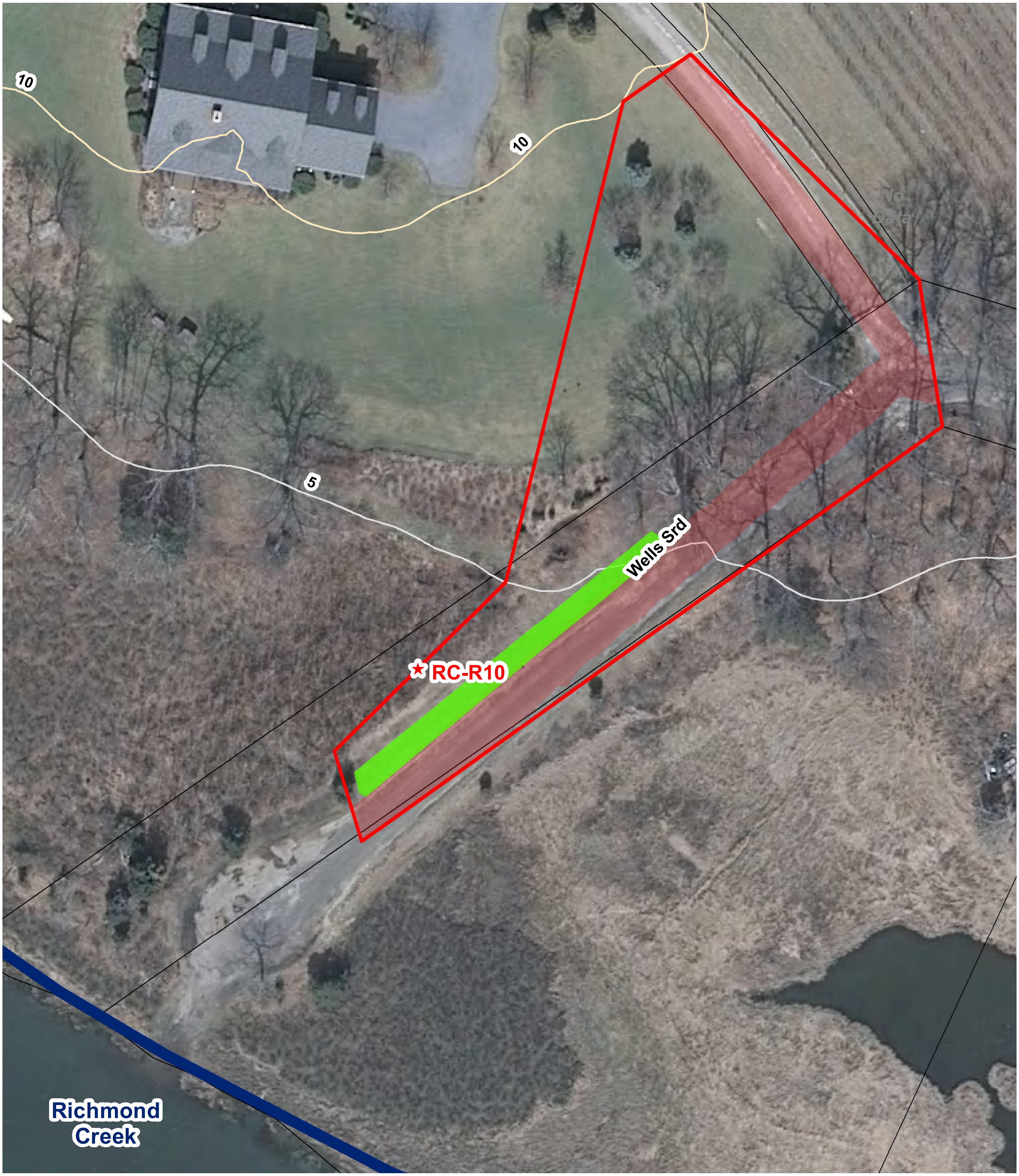
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
RC-R10	0.6	25	700	620	620

*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 dry swale detail





Legend

- Richmond 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

Feet
50

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

Retrofit 10
Richmond Creek Subwatershed
Southold, NY

Date: 7/26/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_RichmondCreek_blowups_portrait_9072.mxd