4.0 Goose Creek Subwatershed

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

4.1 Subwatershed Characteristics

The Goose Creek subwatershed is located within the Town of Southold on the south side of Long Island's North Fork. This subwatershed is less densely developed in comparison with other subwatersheds located in Southold, dominated by residential development, and includes several well-established, medium-density neighborhoods as well as agricultural lands and undeveloped or otherwise vacant lands. The subwatershed area is approximately 569 acres, 86 acres (15%) of which are impervious. Topography in the subwatershed ranges from 0 feet to 70 feet in elevation in the southeastern corner of the subwatershed. The subwatershed is bounded to the north by the Town/Jockey Creek subwatershed and to the southwest by the Richmond Creek subwatershed. Southold Bay is located to the northeast. Main Bayview Road is the primary roadway within the subwatershed, which runs north-south in the western part of the subwatershed and approximately east-west along the southern part of the subwatershed. Nearly all neighborhoods within the Goose Creek subwatershed are accessed off Main Bayview Road, extending toward Goose Creek itself.

4.1.1 Land Use and Infrastructure

Goose Creek is largely a residential subwatershed, interspersed with some agricultural areas as well as undeveloped lands. The neighborhoods along Goose Creek are moderately densely developed, with the greatest density to the north/northwest and to the southeast of Goose Creek, where many homes have direct frontage on Goose Creek or its adjacent marshes. Residential properties contain a mix of moderately developed lots with older and subsequently smaller homes and relatively low-maintenance landscaping; lots with newer homes tend to support larger structures with higher maintenance lawns and landscaping. One lower-density neighborhood is located along the salt marshes to the northwest of Goose Creek.

The banks of Goose Creek are flanked with single-family residential parcels as well as private neighborhood association beaches, particularly to the south. One commercial/agricultural property, Dart's Christmas Tree Farm, as well as other agricultural lands (vineyards) occupy a portion of the subwatershed to the west. Undeveloped lands, as noted above, are interspersed throughout, but are most prominent in the eastern portion. Table 4.1 shows a summary of the land uses in the subwatershed, and a land use map is provided in Appendix A.

Table 4.1. Land Use Summary – Goose Creek Subwatershed

Land Use	Percent of Subwatershed
Low Density Residential	14%
Medium Density Residential	37%
High Density Residential	1%
Commercial	0%

Land Use	Percent of Subwatershed
Industrial	0%
Institutional	2%
Open Space	4%
Agricultural	10%
Vacant	20%
Transportation	12%
Utilities	0%
Waste Handling	0%
Surface Water	0%

Existing stormwater infrastructure within the subwatershed 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. In some instances, steep terrain coupled with the clogged leaching catchbasins has resulted in direct discharge of untreated stormwater along private swimming beaches, potentially creating a human health hazard.

4.1.2 Soils and Hydrology

The soils in the subwatershed are mapped by the USDA Natural Resources Conservation Services as Carver and Plymouth sands, Haven loam, and Riverhead sandy loam, with lesser amounts of Tidal Marsh and Beaches. 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 4.2 provides a breakdown of the HSGs found in the subwatershed. Ninety-six percent of soils in the Goose 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 4.2 shows a summary of the soils found in the Goose Creek area. A map of the soil conditions is provided in Appendix A.

Table 4.2. Summary of Soil Conditions – Goose Creek Subwatershed

Soil HSG	Percent in Subwatershed
A	54%
B	42%
C	0%
D	4%

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.

4.1.3 Water Quality

To comply with the Clean Water Act, the NYSDEC compiles a Priority Waterbodies List (PWL). Goose Creek is included under PWL# 1701-0236, identified as an impaired waterbody. In 2006, a TMDL for pathogens was developed with runoff from residential and rural lands and water fowl identified as pollutant sources. In addition, the NYSDEC has designated the Richmond Creek as "growing area 22" for shellfish, which is seasonally closed for shellfishing.

4.2 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 4.1.

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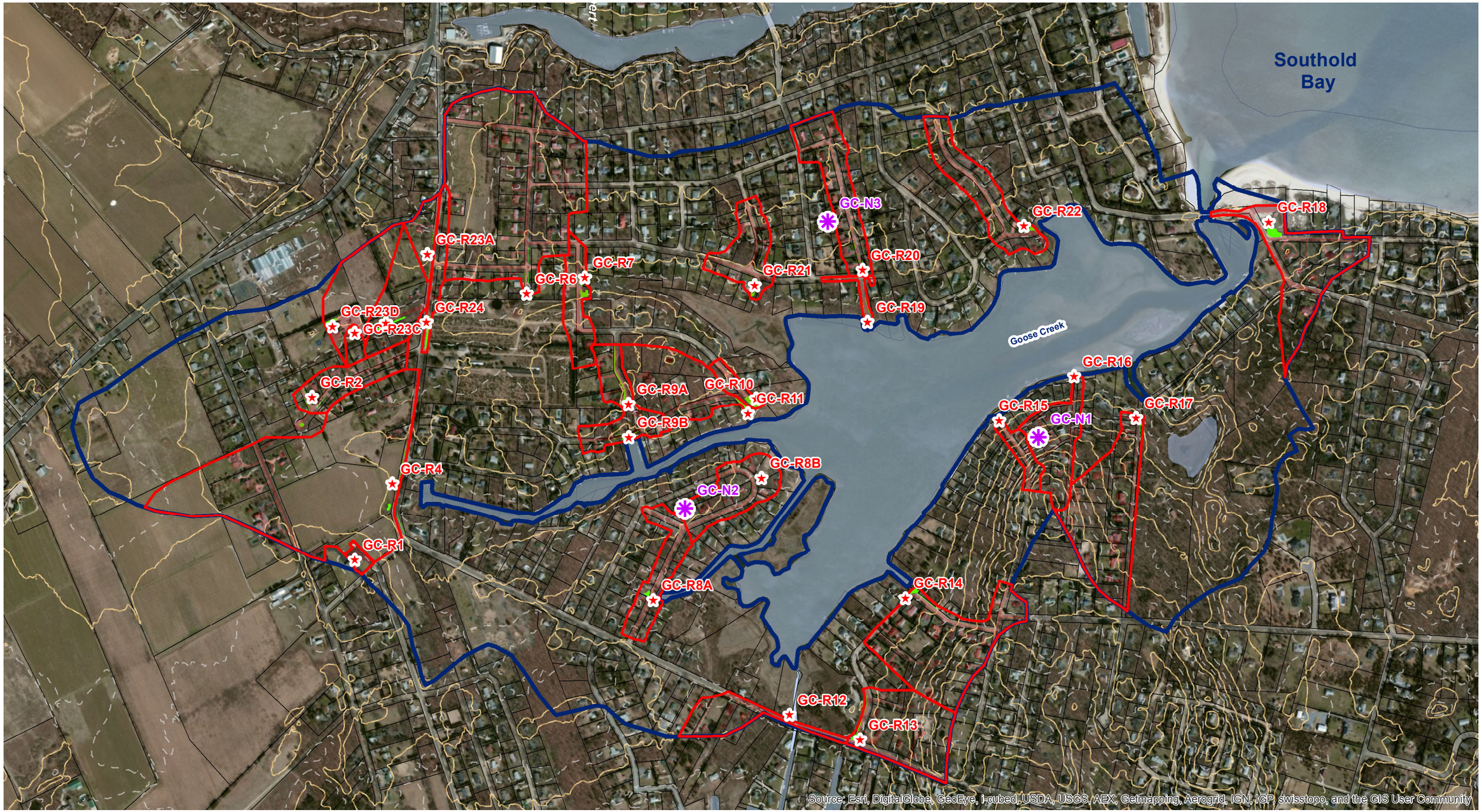

Legend

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

N

700 Feet

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
Goose Creek
Subwatershed
Southold, NY

Date: 7/1/2013

Figure 4.1

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\Report_Figures\130630_GC_RestOpps_11x17_9072.mxd

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4.2.1 Stormwater Retrofit Sites

More than 25 sites were identified by project partners and evaluated through field assessment as potential stormwater improvement opportunities. 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 4.3 summarizes that were considered during the watershed planning process. A more detailed description of existing conditions and potential opportunities at these sites are provided below.

Table 4.3 Summary of Stormwater Retrofits

Site ID/ Name	Jurisdiction	Description	Ranking
GC-R1/ Firehouse	Private (Fire Department)	New dry swale for pretreatment; discharge to leaching CB	High
GC-R2/ Grange Ln. cul-de-sac & Grange Rd. Ext.	Town	New dry swale off Grange Rd. Ext.	Med.
GC-R3/ Dart's Christmas Tree Farm	Private	(not needed)	Low
GC-R4/ Outfall from Main Bayview Rd.	Town	New WQ swales on either side of roadway (possible issues w/utilities to south; need retaining wall to north). Possibility of bioretention island at intersection	High
GC-R6/ Ponding off end of Gardiners Ln.	Town	Raingarden/constructed wetland adjacent to existing wetland at end of Gardiners Rd. (not a lot of space).	Low
GC-R7/ Excessive pavement on Willow Pond Ln.	Town	Removal of impervious surface in parking area (private); proposed large bio at low point, discharge to existing leaching CB; possible roadway width reduction	Med.
GC-R8A / Discharge from Smith Rd. "south" in Goose Neck Estates	Town	Bioretention area (or constructed wetland)	Med.
GC-R8B / Goose Neck POA at Private Beach Lot	Private	Grass swale to raingarden	High
GC-R9A / Grissom Ln. cul-de-sac	Town	Removal of impervious surface from 32-foot wide road; proposed bio at low point, discharge to leaching CB	High
GC-R9B / Off Glenn Rd. across from small marina & downgradient of Town ROW	Town	Bioretention area and swales upgradient of inlet (marina)	High*

Site ID/ Name	Jurisdiction	Description	Ranking
GC-R10 & 11/ Retrofit cul-de-sacs at Sleepy Hollow Ln. and Glenn Rd.	Town	Impervious surface removal with new bio at ends of existing cul-de-sacs; connect two roads to eliminate dead ends	High
GC-R12/ Outfall from Main Bayview Rd. across from Elizabeth Ln.	Town	Swale along Main Bayview Rd.	Med.
GC-R13/ Outfall from Waterview Dr. at Corner with Main Bayview Rd.	Town	Bioretention area and swale at intersection; will need to incorporate piping through constructed berm at lot for #105 Waterview Dr. to allow drainage	Low
GC-R14/ Bend at Waterview Dr.	Town	Swales with upgraded culvert to replace crushed 12" CMP to bioretention area at bend in road	Med.
GC-R15/ End of road at Cedar Ave.	Town	Conventional structural measures including CBs with sumps directed to large leaching chamber with pretreatment tank (particle and oil/grit separators) to be retrofitted to overflow structure; repair berm along roadway	High*
GC-R16/ End of road at Pine Ave.	Private	Conventional structural measures including CBs with sumps directed to large leaching chamber with pretreatment tank (particle and oil/grit separators) to be retrofitted to overflow structure; repair berm along roadway	Med.
GC-R17/ End of road at Goose Creek Ln.	Private	Swale with check dams/water bars leading to sediment forebay; alternatively, pave gravel roadway	Low
GC-R18/ Outfall at N. Bayview Rd. / Public Park	Town	Shallow bioretention area (enlarge existing grass depression in park) with swales; add drainage inlet to direct SW away from Goose Creek inlet	High
GC-R19/ End of road at Gagens Landing Rd.	Town	Extend existing wet swale on east side of road and mimic on west side of road	Med.-High
GC-R20/ Intersection at Gagens Landing Rd. and Clearview Ave.	Town	Construct swales along west side of road (culverts beneath driveways) to shallow bio at intersection where there are no existing CBs - need to add "bump out"	Low

Site ID/ Name	Jurisdiction	Description	Ranking
GC-R21/ Landing Path	Town	Proposed bioretention area with swale(s); pavement reduction	High*
GC-R22/ Beechwood Ln. cul-de-sac	Town	Proposed bioretention area with swale(s); pavement reduction	High*
GC-R23/ Head Start and Main Bayview Road	Private/Town	Proposed dry swale and bioretention areas	Med.-High
GC-R24/ Main Bayview Road	Town	Proposed dry swale	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 4.3.

Southold Fire Department Sub-Station Firehouse (GC-R1)

The Southold Firehouse is located just southwest of the intersection of Baywater Avenue and Main Bayview Road in the far southwestern corner of the subwatershed. Currently, stormwater is managed through a series of leaching catchbasins that likely discharge to underground infiltration chambers. The surrounding grounds also contribute high-input runoff from turfgrass. This site was initially identified as a potential hotspot, but this assessment was later dismissed, since it does not appear to be contributing high pollutant input. The recommendation for this site is to construct **dry swales** to treat runoff before discharging into the existing catchbasin/infiltration system.

Figure 4.2. Parking area behind Southold Firehouse with expansive turf areas. Proposed dry swale shown shaded in green, view toward the northeast with vineyards in background (left), and view toward intersection of Main Bayview Road and Baywater Avenue (right).

Grange Lane Cul-de-Sac and Grange Lane Extension (GC-R2)

Grange Lane and Grange Lane Extension are located in the far western reaches of the Goose Creek subwatershed. Currently, stormwater collects in the roadway along Grange Lane. In addition, the cul-de-sac pavement is in poor condition with a pair of clogged leaching catchbasins. Stormwater overflows into the adjacent open area, originally designed as a detention pond. The area is now forested, and has evolved into a naturally-recharging detention basin. Unfortunately, there is significant evidence of sedimentation and dumping of debris in this location. Recommended stormwater retrofit BMPs would include installation of a **dry swale** along Grange Lane, overflowing to the existing detention basin.

Pavement could also be removed from the cul-de-sac to reduce the amount of impervious surface (and thus, volume of runoff). Non-structural practices such as maintenance of the catchbasins and the existing forested detention pond would also be recommended. Implementation of BMPs at this site has been given a lower priority for this subwatershed due to the presence of the existing recharging detention basin.

Figure 4.3. Grange Lane with views toward cul-de-sac (right) and Grange Lane Ext. (left). Proposed dry swales (shaded in green) would be directed to inlets and leaching chambers (shaded in red).

Dart's Christmas Tree Farm (GC-R3)

Dart's Christmas Tree Farm is located east of Main Bayview Road in the west-central portion of the subwatershed. Interior unimproved roadways and use of herbicides around trees to reduce weed growth allow for some areas of exposed soils. A composting area in the north-central fields may contribute excess nutrients to the subwatershed, but this area, on private property, was inaccessible at the time of our field investigation. Implementation of BMPs at this site has not been prioritized for this subwatershed.

Outfall from Main Bayview Road (GC-R4)

Located just north of the curve in Main Bayview Avenue, an existing outfall discharges directly into the westernmost reaching finger of Goose Creek. Here, catchbasins (one functional, the rest fully or partially clogged with debris and sediment) collect stormwater from Main Bayview Road, as well as agricultural runoff from the adjacent vineyard (Corey Creek Vineyards), and feed directly into the creek. Proposed BMPs include construction of new **water quality swales** on either side of Main Bayview Road, which would be directed into inlets and ultimately into the existing outfall pipe. Implementation of this BMP would require installation of a retaining wall to the west (adjacent to the vineyard) and avoidance of utility poles to the east. It is recommended that this be constructed in conjunction with an agricultural practice (e.g., a **shallow vegetated swale**) to disconnect the agricultural runoff from the street drainage stormwater runoff. The roadway at this location is also relatively wide, and there may be an option to **reduce pavement** width and/or install a **bioretention area** at the intersection between Main Bayview Road and Baywater Avenue.

Figure 4.4. Main Bayview Road facing north (top). Proposed dry swales would direct stormwater to the existing outfall pipe at Goose Creek. Proposed BMPs could also include a vegetated swale within the vineyard (bottom left), and pavement reduction at the intersection of Main Bayview Road and Baywater Avenue (bottom right).

Ponding off End of Gardiners Lane (GC-R6)

In the northwestern corner of the Goose Creek subwatershed, drainage along Clearview Avenue and Gardiners Lane flows toward the end of Gardiners Lane and discharges directly into an adjacent isolated wetland area as well as an irrigation pond. Upgradient leaching catchbasins were observed to be overwhelmed during a higher intensity storm event that occurred during HW's field investigations. Proposed BMPs for this location would include construction of a shallow **bioretention area/constructed wetland** immediately adjacent to the existing wetland at the end of Gardiners Lane. Site feasibility is dictated by the amount of physical space available for this practice and depth to groundwater.

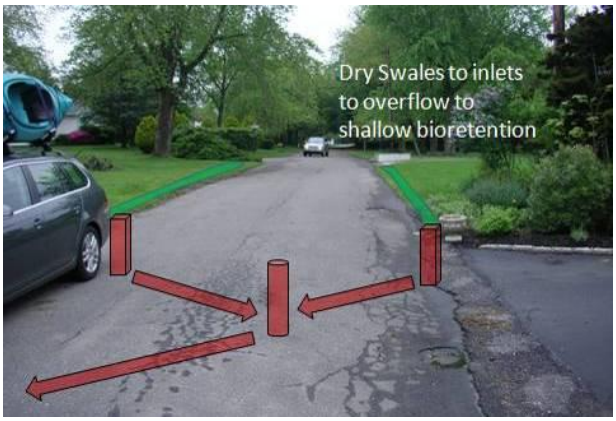


Figure 4.5. Sedimentation (top left) and stormwater flow during a high intensity storm event (top right) at the end of Gardiners Lane. Proposed pave flume and forebay directed to a shallow bioretention area/constructed wetland at the end of Gardiners Lane. Additional proposed measures include construction of dry swales along Gardiners Lane that would be directed to inlets and leaching chambers within the roadway (right).

Excessive Pavement on Willow Pond Lane (GC-R7)

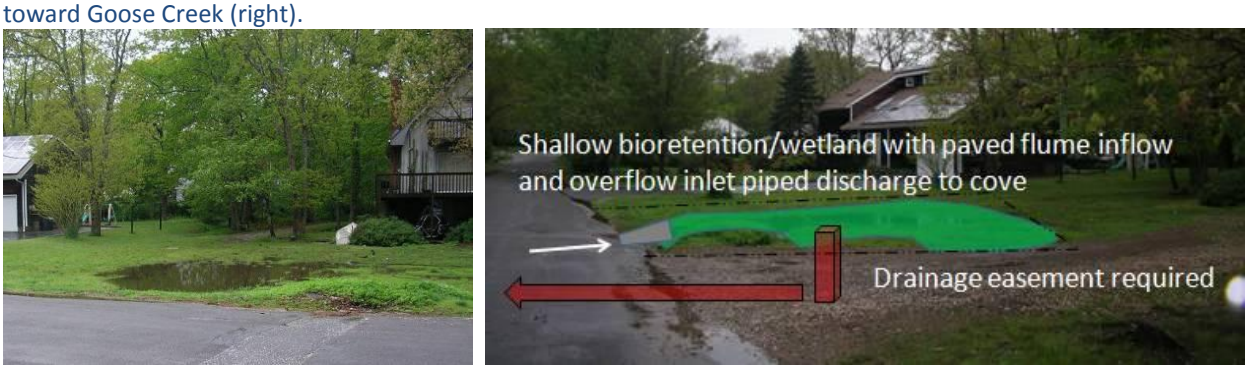
Willow Pond Lane is a 36-foot wide roadway with a wide right-of-way that also encompasses an additional section of pavement that appears to have been a former cul-de-sac, and which is now utilized by the adjacent property owner. Also within the right-of-way at the low point of the road is a large expanse of manicured lawn that extends into the adjacent residential property. The proposed retrofit at this site includes a **reduction of impervious surface** (retaining two guest parking spaces) and revegetation, as well as construction of a **bioretention area** with a modified inlet that would overflow into a **leaching chamber**. The Town may consider reducing the road width in this area to reduce runoff and save the Town money on future road repaving and other maintenance tasks.

Figure 4.6. Willow Pond Lane. Proposed BMPs would involve the construction of a bioretention area with a modified inlet overflowing to a leaching chamber (right) and pavement removal (left).

Discharge from Smith Road South in "Goose Neck Estates" (GC-R8A)

The Goose Neck Estates neighborhood is located north of Main Bayview Road just northeast of the intersection with Corey Creek Lane. Clogged catchbasins along Smith Road South across from the Goose Creek inlet have resulted in ponded drainage in front of house #405. Here, the property owner has excavated a small channel within the ponded area to direct waters to the existing catchbasins. Additional leaching chambers have been added along this road since the field investigations were performed, which likely have reduced some of the ponding issues at the site. To handle remaining pond issues and any bypass of the upgradient leaching chambers, a **shallow bioretention area or constructed wetland** could be constructed in front of #405 with an overflow inlet pipe discharging to the cove. Implementation of this stormwater BMP would require an easement from the property owner.

Figure 4.7. Ponding at #405 Smith Road South (left). Proposed shallow bioretention area with overflow inlet toward Goose Creek (right).



Goose Neck POA at Private Beach Lot (GC-R8B)

The second potential retrofit opportunity within Goose Neck Estates is at the existing homeowners association (HOA) private beach parcel along the curved portion of Smith Road South. Currently, stormwater drains to the low point in the roadway just outside of the fenced area. Proposed BMPs include construction of a paved flume and **grass swale** with check dams leading to a **raingarden** in the southwest corner of the lot. Possible conflicts identified for this practice include existing utilities and a cesspool located between the roadway and proposed raingarden location. Implementation of this stormwater BMP would require an easement from the HOA.

Figure 4.8. Ponding at common area (private beach) within Goose Neck Estates (left). Proposed grass swale and raingarden along Smith Road South (right).

Grissom Lane Cul-de-Sac (GC-R9A)

Grissom Lane is located approximately in the center of the Goose Creek subwatershed. Currently, excessive pavement along the roadway contributes to stormwater runoff, which is directed to catchbasins at the Grissom Lane cul-de-sac immediately adjacent and upgradient of a Town-owned right-of-way. Proposed retrofit opportunities include **reduction of pavement** from the existing 32-foot wide roadway and construction of a **dry swale**, as well as construction of a **bioretention area** at the end of the cul-de-sac with a modified inlet overflow to a leaching chamber.

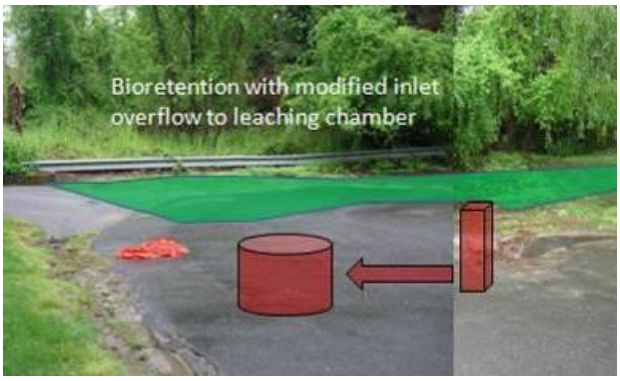


Figure 4.9. Proposed pavement reduction along Grissom Lane, replacing the impervious surface with a dry swale (top) and construction of a bioretention area at the cul-de-sac (bottom).

Off Glenn Road across from Marina and Downgradient of Town ROW (GC-R9B)

Glenn Road parallels the northernmost "finger" of Goose Creek in the central portion of the subwatershed. Currently, stormwater flows unchecked to the low point in the roadway across from a small inlet (marina). Proposed stormwater retrofits for this location include the construction of **dry swales** along the roadway (in the right-of-way) conveying stormwater to a **shallow bioretention area** on the south side of the roadway immediately upgradient of the existing marina. Overflow would be directed to the existing outfall at the bulkhead. Implementation of this practice would require confirmation of property ownership and potentially easements from adjacent property owners.

Figure 4.10. Sedimentation along Glenn Road (left). Proposed retrofit (right) would involve construction of dry swales along Glenn Road directed to a shallow bioretention area that would overflow into the existing inlet.

Retrofit cul-de-sacs at Sleepy Hollow Lane and Glenn Road (GC-R10_R11)

Sleepy Hollow Lane extends off Willow Pond Lane in the north-central portion of the subwatershed. This roadway is very wide (approximately 35 feet) and terminates at a large cul-de-sac just upgradient of

the salt marsh area along Goose Creek, and is parallel to the cul-de-sac for Glenn Road; the two cul-de-sacs are separated by a narrow wooded area. Water currently ponds at the end of Sleepy Hollow Lane, and evidence of overland flow and minor scouring were observed. Water also ponds along the southwestern corner of the Glenn Road cul-de-sac. A small landscaped berm presumably built by the adjacent homeowner does not allow for natural runoff and infiltration away from the paved surface.

The proposed concept for this site would be to join Sleep Hollow Lane and Glenn Road so as to **eliminate the existing cul-de-sacs**, treating stormwater with **terraced bioretention facilities**, increasing the **vegetated buffer** to the salt marsh, and creating improved public access and education. This concept would involve removing excessive pavement (7,300 sf from Sleepy Hollow Lane and 6,400 sf from Glenn Road), while maintaining access to existing driveways, creating four to five guest parking spaces, and creating a pedestrian pathway to the shoreline. Bioretention areas would be constructed to treat and infiltrate runoff from both streets before overflowing to an inlet and ultimately to Goose Creek.

A potential future addition to this project, though not included in the formal project ranking, would be to also remove excessive pavement from the center of Sleepy Hollow Lane and install a vegetative island/dry swale. This could be accomplished when the road needs repaving and the crowned section could be inverted to drain towards the center island. Not only would this reduce water quality impacts to the creek, but it would also reduce costs of paving for the Town.

Figure 4.11. Ponding at the end of Sleepy Hollow Lane (upper left) and at the end of Glenn Road (upper right). Proposed concept includes connecting the roads, pavement removal, construction of bioretention areas, and public parking and access (lower left). The additional concept for a central island with dry swale (lower right).

Outfall from Main Bayview Road across from Elizabeth Lane (GC-R12)

The existing outfall along Main Bayview Road located directly across from (north of) the Elizabeth Lane intersection is in the southern-most reaches of the subwatershed. This site consists of three clogged leaching catchbasins, one of which discharges directly into the adjacent salt marsh. As this location has many design constraints (narrow roadway shoulder, adjacent salt marsh, and overhead utilities), the proposed concept is construction of a **dry swale** along Main Bayview Road with an inlet that overflows to the adjacent marsh. No work should be done within the marsh itself.

Figure 4.12. Proposed dry swale along Main Bayview Road will allow for improved water quality of stormwater discharging into the adjacent salt marsh.

Outfall from Waterview Drive at Corner with Main Bayview Road (GC-R13)

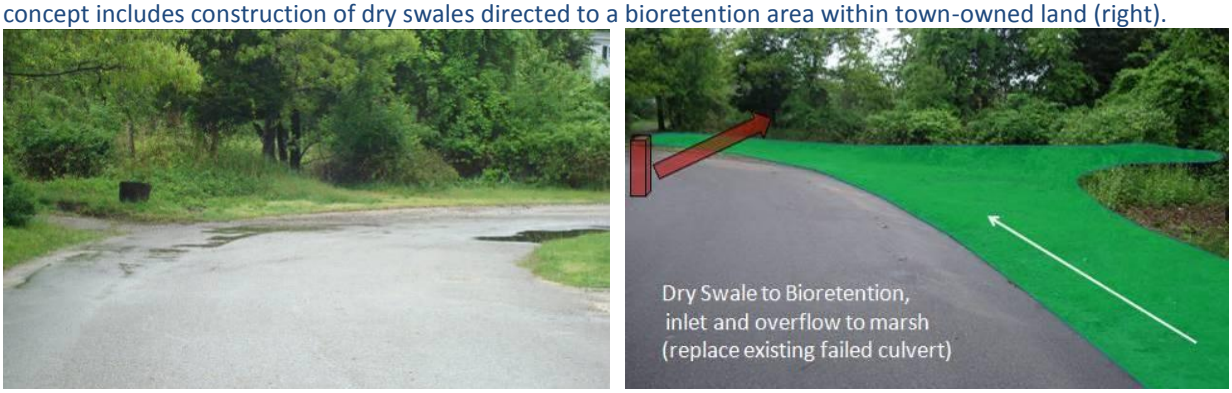
The existing outfall at the corner of Main Bayview Road and Waterview Drive is located at the southern-most reaches of the subwatershed, just east of GC-R12 (above). This area currently experiences severe ponding following higher intensity/larger precipitation storm events. A wide berm, approximately 4-5 feet tall and 10-20 feet wide has been constructed at this corner lot (#105 Waterview Drive), separating the roadways from the adjacent wetlands. The presence of this berm likely contributes to the lack of drainage in this location. The proposed retrofit concept for this site includes the construction of a paved flume to convey stormwater to a **bioretention area** with an inlet that overflows to the marsh. The proposed practice will also need to incorporate piping through the constructed berm to allow for sufficient drainage from the bioretention area. No work should be done within the marsh itself.

Figure 4.13. Ponding at the corner of Waterview Drive and Main Bayview Road (left). The proposed retrofit will allow for some groundwater recharge and will improve the safety conditions at this intersection (right).

Bend at Waterview Drive (GC-R14)

The bend at Waterview Drive is located in the southeastern corner of the subwatershed, in close proximity to a small inlet. At this location, stormwater drains to the low point in the road, resulting in sedimentation and ponding. Two 8-ft diameter precast concrete leaching chambers were recently installed (backfilled with gravel and covered with sand) in this area as retrofits to improve the existing issues. However, they were placed in groundwater (top of water at elevation of adjacent pavement) and are currently in need of maintenance. The proposed retrofit upgrades to improve water quality treatment and reduce ponding on the road includes installation of **dry swales** along Waterview Drive to direct flows to a **shallow bioretention area** in the adjacent open lot. The bioretention area would be equipped with an inlet and an overflow to Goose Creek. The existing, partially crushed 12-inch corrugated metal pipe (CMP) beneath the adjacent driveway (house # 1255) would need to be replaced as part of the westernmost dry swale. In addition, the property ownership of the vacant lot should be confirmed, and an easement obtained as needed. The proposed upgrade to the retrofit already in this area would allow for both water quality improvements as well as additional groundwater recharge within this drainage area.

Figure 4.14. Ponding and sedimentation observed at bend in Waterview Drive (left). Proposed stormwater retrofit concept includes construction of dry swales directed to a bioretention area within town-owned land (right).



End of Road at Cedar Avenue (GC-R15)

Located in the eastern portion of the subwatershed where some of the highest elevations occur, the downgradient end of Cedar Avenue receives a considerable amount of high velocity stormwater runoff from a reasonably sized drainage area. This has resulted in considerable sedimentation within the roadway, which ultimately accumulates at the end of Cedar Avenue before being conveyed to the outlet at the private swimming beach area. Higher velocity runoff from the surrounding steep slopes overwhelms the existing catchbasin, bypassing the existing stormwater structure and carrying sediment and nutrients along a crumbling asphalt trough before discharging directly into Goose Creek, as evidenced by observation of a delta of sediment deposition in the water and scouring along the beach. The proposed stormwater retrofit involves fairly conventional structural measures including installation of catchbasins with sumps directed to a **pretreatment tank** (equipped with oil/grit separators) and ultimately into appropriately sized underground **leaching chambers**. This system could then replace the existing drainage system currently draining to the beach. In conjunction with these structural measures, the existing berm along the roadway should be repaired. Overhead utilities and the existing water main within in roadway may be conflicts to the proposed design.

Figure 4.15. Existing conditions along Cedar Avenue where extensive sedimentation has resulted in direct discharge of stormwater into Goose Creek during higher intensity storms (top photos). Proposed retrofit concept would involve more traditional structural measures to accommodate the steep slopes and relatively narrow right-of-way along Cedar Avenue (bottom).

End of Road at Pine Avenue (GC-R16)

The situation at the end of Pine Avenue is nearly identical to that at the end of Cedar Avenue (see GC-R15 above), where sedimentation from storm events has overwhelmed the existing catchbasin at the end of the roadway, resulting in an accumulation of sediments forming a delta within Goose Creek. As with Cedar Avenue, this area also serves as a private beach. Again, based upon the drainage area characteristics where steep slopes result in high velocity stormwater runoff, the proposed concept involves conventional structural measures including installation of catchbasins with sumps directed to a **pretreatment tank** (equipped with a particle/oil and water separator) and ultimately into **leaching chambers**. This system could then replace the existing drainage system currently draining to the beach. In order to accommodate this retrofit design, it may be necessary to relocate the existing water lines in roadway may be conflicts to the proposed design. Because this is a private road, easements would need to be obtained.

Figure 4.16. Existing conditions at the end of Pine Avenue where stormwater runoff results in an accumulation of sediments that have created a delta within Goose Creek at a private beach (top photos). Proposed stormwater retrofit concept would involve traditional structural measures to address the steep slopes and relatively narrow roadway right-of-way along Pine Avenue (bottom).

End of Road at Goose Creek Lane (GC-R17)

Goose Creek Lane is an unimproved private roadway located in the extreme southeastern portion of the subwatershed. Runoff from the gravel roadways results in erosion, gullying, and sediment deposition within roadway. The existing catchbasin at the base of the road is clogged and is frequently overwhelmed, which then results in erosion and sedimentation within the downgradient wetland area. The proposed retrofit concept would involve the installation of **water bars** at intervals along the roadway to direct runoff to a **dry swale with check dams**, designed to slow stormwater velocities. Downgradient of the dry swale, a sediment forebay equipped with an overflow weir would be installed to allow for settling prior to discharge into the downgradient wetland. These BMPs would allow for improved sediment trapping efficiency. Alternatively, the gravel driveway could be permanently stabilized, directing stormwater toward a dry swale leading to a sediment forebay. Because this is a private road, easements would need to be obtained.

Figure 4.17. Existing conditions along Goose Creek Lane. Unmitigated stormwater flow along the gravel roadway has resulted in erosion and gullying within the roadway, and deposition of sediments at the end of the road which then results in sedimentation within the downgradient wetland. The proposed retrofit concept would involve the installation of water bars in the road, leading to a dry swale equipped with check dams (middle left). An alternative to the installation of water dams in the road would be to pave Goose Creek Lane (left).

Outfall at N. Bayview Road / Public Park (GC-R18)

The outfall at North Bayview Road near the public park is located at the extreme northeastern corner of the subwatershed. Here, stormwater discharges directly into Goose Creek at the mouth of the outlet to Peconic Bay, in close proximity to a public beach. An existing grass depression in the adjacent park currently receives some runoff from adjacent impervious surfaces, but stormwater still ponds in the roadway. The proposed retrofit concept for this location would involve enlarging the existing depression within the park to create a **bioretention area** and installation of drainage inlets and swales to convey stormwater to the bioretention area. The bioretention area would then overflow to Goose Creek. Implementation of the proposed BMPs would allow for increased flood storage and improved water quality treatment and groundwater recharge. As this is a public park, there may also be opportunities for public education. Potential design constraints for this site include the specific location of the existing septic system for the bathhouse, which may take up a large portion of the open space here, and the presence of overhead utilities which may pose constraints during construction.

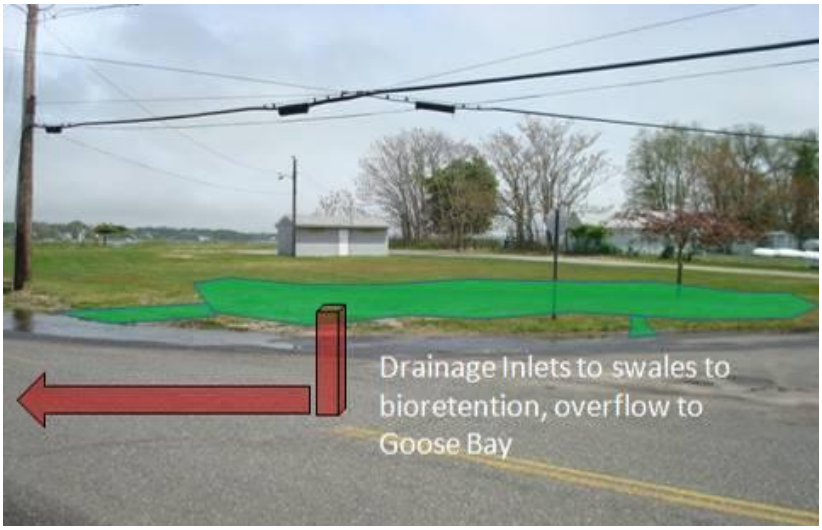


Figure 4.18. Existing conditions along North Bayview Road at the mouth of Goose Creek (top photos). An existing depression within the nearby public park presents an opportunity to repurpose the depression as a bioretention area to improve storage, groundwater recharge, and water quality within the subwatershed (right).

End of Road at Gagens Landing Road (GC-R19)

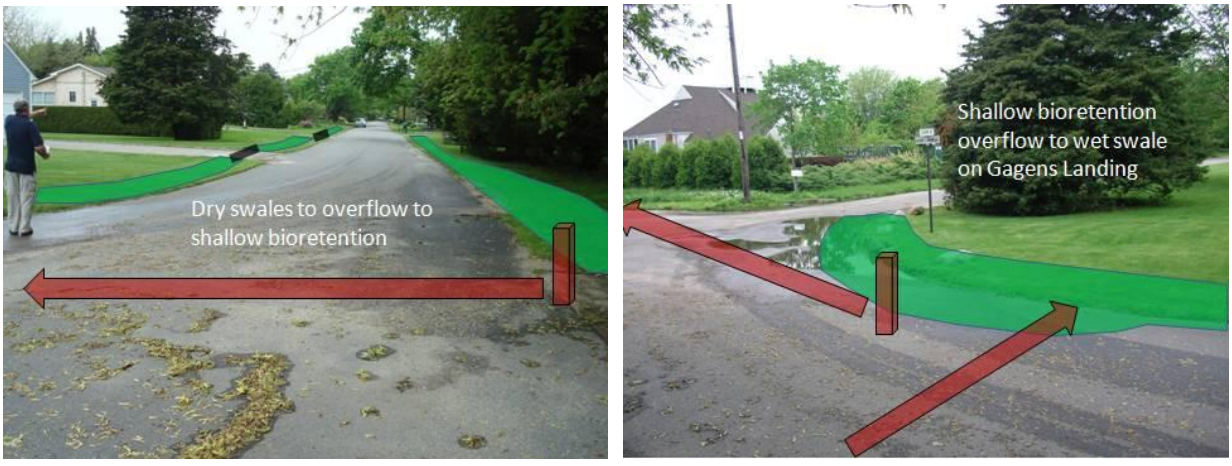
The end of Gagens Landing Road ends in a large cul-de-sac with a public boat ramp in the north-central portion of the subwatershed. Surrounding vegetated areas that are not naturally occurring wetlands are subject to flooding during storm events. While not observed during the field investigation, the Town has stated that a retrofit has been installed at this site by excavating the road shoulders to a depth of three feet and backfilling with gravel, covered with sand, but that it currently needs maintenance. The field team did observe the linear wet swale "garden" created by the property owner at 2520 Clearview Ave at the edge of the property. The recommended retrofit updgrades to improve water quality in this area would be to extend this **wet swale** along both sides of the roadway, allowing for some pretreatment of stormwater prior to discharging into Goose Creek.

Figure 4.19. Ponding and sedimentation along Gagens Landing Road near public boat ramp (below center). The existing "wet swale" garden created by the adjacent property owner (next page left) suggests an easily implemented stormwater retrofit by extending this wet swale practice along both sides of the lower reaches of Gagens Landing Road (next page right).

Intersection at Gagens Landing Road and Clearview Avenue (GC-R20)

Just upgradient of the Gagens Landing Road at the intersection with Clearview Avenue, stormwater ponds within the roadway. No existing stormwater infrastructure was observed in this location. The proposed retrofit concept would include installation of **dry swales** along both the eastern and western sides of the roadway, with culverts beneath existing driveways. An overflow structure would convey stormwater to a **bioretention area**, which would then overflow to the proposed retrofit **wet swales** described above (see GC-R19). Construction of the bioretention area may require an easement from the property owner at the northwest corner of this intersection, and a traffic calming "bump out" into the roadway. The proposed practices would allow for some temporary storage and water quality improvements.

Figure 4.20. Sedimentation and ponding at the intersection with Gagens Landing Road and Clearview Avenue. Proposed stormwater retrofit would involve the installation of dry swales directed to a shallow bioretention area to allow for temporary storage and water quality treatment.



End of Road at Landing Path (GC-R21)

Landing Path is a short roadway "spur" located two streets west of Gagens Landing Road within the same north-centrally located neighborhood ("Southwood") within the subwatershed. Similar to other dead end roadways or cul-de-sacs observed within the Goose Creek subwatershed, the existing road is wider than necessary for the residential neighborhood. Stormwater flows along this section of the road have resulted in an accumulation of sediment and debris within the roadway and in the adjacent lawn area (Figure 4.21, top left). In addition, it is located immediately adjacent to a nature sanctuary owned

by The Nature Conservancy. The proposed retrofit concept would involve **pavement reduction** to a uniform width of 24 feet and construction of a **dry swale** to convey stormwater to a **bioretention area** with an outlet to the marsh along Goose Creek. This will allow for both water quality treatment and groundwater recharge, and may improve vegetative buffering to the adjacent salt marsh.

Figure 4.21. Existing conditions along Landing Path, which is located just west of a nature sanctuary (left). The proposed retrofit includes a reduction of impervious surface, a dry swale, and a bioretention area (right).

Beechwood Lane Cul-de-Sac (GC-R22)

The Beechwood cul-de-sac, as with several others observed within Goose Creek, has more pavement than necessary. An adjacent homeowner has planted an area at the end of the cul-de-sac such that it is elevated above roadway to create positive drainage toward salt marsh; however, stormwater ponds within the roadway prior to reaching that area. The proposed concept for this site would be to **remove excessive pavement** and construct a **bioretention area** equipped with an overflow inlet to Goose Creek. This proposed practice would allow for water quality treatment and increased groundwater recharge, and would also increase vegetative buffering to the salt marsh.

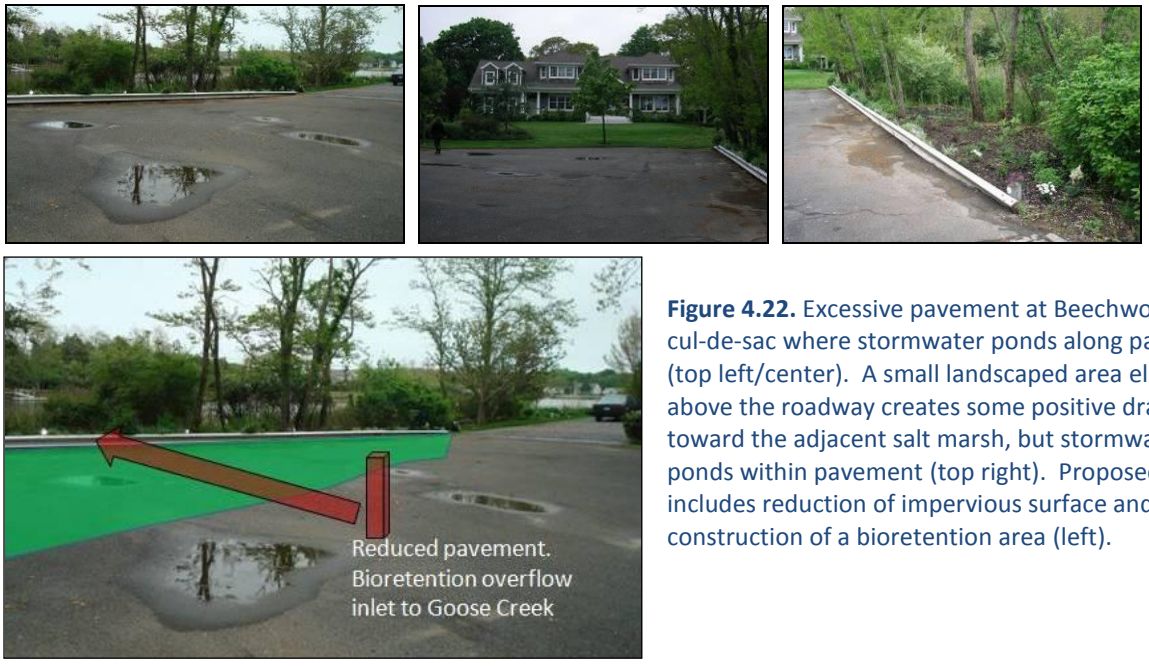


Figure 4.22. Excessive pavement at Beechwood Lane cul-de-sac where stormwater ponds along pavement (top left/center). A small landscaped area elevated above the roadway creates some positive drainage toward the adjacent salt marsh, but stormwater still ponds within pavement (top right). Proposed retrofit includes reduction of impervious surface and construction of a bioretention area (left).

Head Start Childcare Facility (GC-R23A, R23B, R23C, and R23D)

The Head Start childcare facility is located off Main Bayview Road. Currently, stormwater infiltrates in

the parking area at leaching catchbasins. However, a portion of the driveway does not have stormwater infrastructure and ponding was observed. Much of the stormwater flowing on the driveway comes from Main Bayview Road, which does not have infrastructure in place along the west side of the road to capture runoff up gradient of the Head Start driveway. An area of open space in the right-of-way along the western side of Main Bayview Road is ideal for construction of a **dry swale** to provide water quality treatment of roadway runoff (GC-23A). Additionally, there is ample space along the south side of the Head Start driveway for a **bioretention area** (GC-23B) that could provide treatment for the driveway as well as the overflow from the proposed dry swale along Main Bayview Road. The combination of the dry swale along Main Bayview Road and the bioretention along the driveway will greatly improve water quality treatment, groundwater recharge, and alleviate existing flooding issues. The Town would need to work with Head Start and potentially obtain easements to treat some Town runoff from Main Bayview on Head Start property.

Two additional **bioretention areas** are proposed for treatment of runoff from the parking area. One (GC-23C) is proposed in an existing parking island located in the upper portion of the parking lot, and the second (GC-23D) is proposed in open space to the northwest of the parking area. In addition to installation of the second bioretention area, the existing leaching basins closest to the practice should be abandoned and the pavement between the abandoned basins and the bioretention inlet should replaced with a shallow paved swale with sufficient pitch to drain runoff from the parking surface to the bioretention area. The bioretention areas will provide greater water quality treatment than that provided by the existing leaching catchbasins in addition to groundwater recharge.

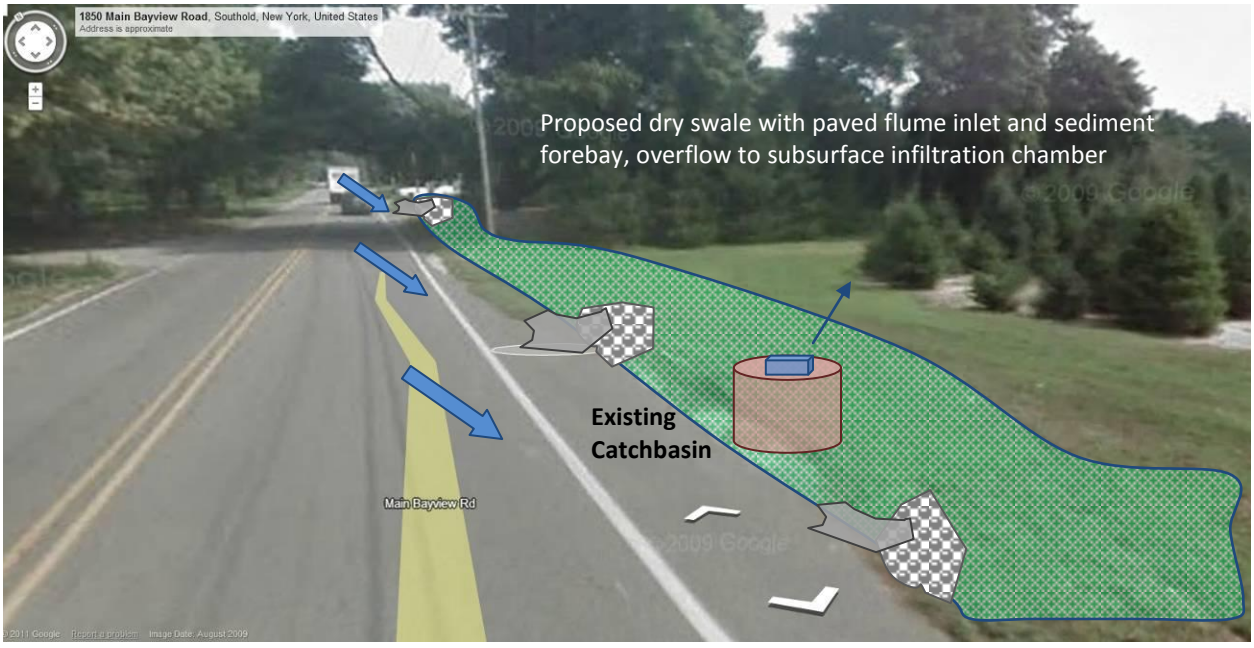
Figure 4.23. Proposed dry swale along Main Bayview Road near Clearview Avenue intersection (top image source Google Maps), and flooding on the Head Start driveway with the proposed bioretention area shown shaded (left).

Figure 4.24. Proposed bioretention area at upper parking area (left), and proposed bioretention area lower parking area (right).

Main Bayview Road near Dart's Christmas Tree Farm (GC-R24)

The runoff from the eastern portion of Main Bayview Rd (the portion not captured by GC-23A) currently flows along the edge of the road to an inlet structure just upgradient from the Dart's Christmas Tree Farm (see also GC-R3 above). While it was not confirmed in the field, it appears that this inlet structure discharges to an existing wetland to the north of the tree farm. A large area of open space within the right-of-way along the east side of Main Bayview Road near the inlet structure is ideal for construction of a **dry swale** to provide water quality treatment of roadway runoff before discharge.

Figure 4.25. Proposed dry swale with paved flume inlet and sediment forebay with overflow to a subsurface infiltration chamber. The proposed retrofit concept would provide for improved water quality treatment in this location.



4.2.2 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 4.4 is a comparative summary of each neighborhood, with additional detail provided below. Pollution source is determined by the number of observed pollutants (<1 = Low; 1-2 = Medium; >2 = High).

Table 4.4. Neighborhood Inventory Summary

Site ID/ Name	Pollutant Loading	Main Pollutant Source	Stewardship Activities
GC-N1/ Pine Ave /Cedar Ave Neighborhood ("Goose Creek Estates")	Medium	Nutrients, Sediment	Provide on-site retrofit (bioretention area, swales). Encourage maintenance of common spaces (roads - cracked pavement). Moderate feasibility for storm drain stenciling, CB cleanouts, repair/maintenance (see GC-R8A and GC-R8B)
GC-N2/ Smith Drive ("Goose Neck Estates")	Low	Nutrients, Bacteria	Provide on-site retrofit practices for common areas; Encourage maintenance of common spaces (e.g., ponding observed in beach areas; shoreline erosion observed at "marina"). Moderate feasibility for CB cleanouts, repair/maintenance; Recommend plantings along shoreline to discourage geese
GC-N3/ Oak Lawn Ave/Gagens Landing Rd Neighborhood	Low	Nutrients, Bacteria, Sediments	Moderate feasibility for: street sweeping, storm drain stenciling, CB cleanouts, repair/maintenance; on-site retrofit possible

Pine Ave /Cedar Ave Neighborhood (GC-N1)

"Goose Bay Estates" is an older neighborhood located in the southeastern section of the subwatershed. Single-family detached dwellings estimated to be constructed between the 1920s and 1940s. Approximately 10% of the homes are newly remodeled or reconstructed. Paved roads within the neighborhood are generally in good condition with some cracked surfaces observed. One roadway, Goose Creek Lane, is unimproved. The overall size of the neighborhood is approximately 26 acres, of which approximately 60% of the neighborhood is forested. Lots range in size from ⅛ to ⅓ of an acre, with typical lot sizes being ¼ acre. Since lots are smaller, average impervious cover is approximately 40%, typically with low-maintenance lawn areas (40%) and 15% landscaped beds. Less than 10% of the lawns have permanent irrigation with higher management requirements. The neighborhood was clean at the time of observation without visible pet waste, trash, or illegal dumping.

Figure 4.26. Typical roadways within "Goose Bay Estates" (top). Most roads within the neighborhood are in good condition with some cracked pavement observed along roadway edges. One roadway, Goose Creek Lane, is unimproved (bottom center).





Stormwater runoff is generally collected via a curbed system; given the relatively forested character of the neighborhood, a good amount of precipitation is intercepted by vegetation with a fair amount of infiltration. Storm drain stenciling was observed at the downgradient areas, but not throughout the neighborhood. Opportunities for pollution prevention within the neighborhood include cleaning and regular maintenance of catchbasins; on-site retrofits of existing drainage facilities; additional storm drain stenciling; and maintenance and repair (as necessary) of roadways.

Smith Drive Neighborhood/GC-N2

"Goose Neck Estates" is also an older well-established private neighborhood with original homes constructed in approximately the 1940s. Many of these homes have been more recently renovated or reconstructed. Smith Drive North/Smith Drive South is the primary roadway. The overall size of the neighborhood is approximately 32 acres of which approximately 50-60% is forested. The typical lot is approximately ⅓ of an acre, although there is a marked difference between those lots directly abutting Goose Creek and interior lots within the neighborhood. Interior lots typically have slightly smaller structures, and proportionally less impervious cover (25%) with low maintenance lawns ranging from 25 to 40% with reciprocal amounts of landscaped beds (i.e., 40 to 25%) and less than 5% bare soils. Lots along the water tend to support larger structures and driveways and a proportionally larger percentage of impervious cover (50%), with 30% grass cover that appear to have higher maintenance requirements, with 20% landscaped beds. Common areas include a private dock/boat launch and a private beach.

Figure 4.27. Common areas within "Goose Neck Estates" (top). Typical interior lot (bottom left) and typical lot bordering Goose Creek (bottom right).

The stormwater system consists primarily of individual leaching catchbasins. Many of the leaching catchbasins are clogged due to high accumulations of sediment and organic matter. As a result, runoff is bypassing upgradient 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. Many of the existing catchbasins would benefit greatly from more frequent cleaning and maintenance, while clogged leaching catchbasins should be replaced with systems that can trap sediments/organics and provide pretreatment prior to discharge. The homeowners association is encouraged to work with the Town to address storm drain maintenance and repair. On-lot retrofit practices to disconnect roof runoff (e.g., rain gardens, ran barrels) appear to be feasible on most lots, and retrofits of common spaces such as the private beach and marina also appear feasible (see Site GC-R8B). Providing plantings of native vegetation along the shoreline would increase vegetative buffering along the shoreline while also discouraging waterfowl from gathering in common areas, potentially reducing bacteria within stormwater runoff.

Gagens Landing/Oak Lawn/Mailler Court Neighborhood (GC-N3)

The Gagens Landing Road/Oak Lawn Avenue Extension/Mailler Court neighborhood is a somewhat newer neighborhood by comparison, with most houses constructed in the 1960s-1970s. The overall size of the neighborhood is approximately 26 acres, and approximately 30% has remained forested, although this is somewhat variable among lots. A typical lot is approximately ½ an acre in size, of which approximately 30% of the area is impervious, 50% is lawn cover, and 20% is landscaped beds with

several undeveloped lots. The majority (approximately 90%) of the yards appear to have medium level maintenance requirements, with approximately 10% high maintenance lawns.

Figure 4.28. Typical lots within the Gagens Landing Road/Oak Lawn Avenue Extension neighborhood.

More than 50% of the houses in this neighborhood have garages and approximately 75% 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, and nutrients. Some indicators of these potential pollutants are the appearance of a high level of yard maintenance activities and visible accumulation of sediment and organics along the road and in storm drains.

The stormwater management system in this neighborhood consists of leaching catchbasins. Many of the leaching catchbasins are clogged due to accumulations of sediment and organic matter. As a result, runoff either ponds on the roads or in some places, bypasses the clogged basins and directly discharges to the creek. Opportunities for pollution prevention include street sweeping and increased maintenance and repair of the existing leaching catchbasins. Storm drains that directly discharge to the creek should be stenciled to identify this direct connection. Moderate feasibility exists for on-site retrofit practices to disconnect downspouts.

4.2.3 Stormwater Hotspot Inventory

No hotspots were identified within the Goose Creek subwatershed.

4.3 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 in this chapter. 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).

GC-R10 and 11. Sleepy Hollow and Glen Road Cul-de-sacs — Pavement removal and bioretention facilities

Site Description

Sleepy Hollow Lane extends off Willow Pond Lane in the north-central portion of the subwatershed. This roadway is very wide (approximately 35 feet), terminates at a large cul-de-sac just upgradient of the salt marsh area along Goose Creek, and is parallel to the cul-de-sac for Glenn Road. The two cul-de-sacs are separated by a narrow wooded area. Water currently ponds at the end of Sleepy Hollow Lane, and evidence of overland flow and minor scouring were observed. Water also ponds along the southwestern corner of the Glenn Road cul-de-sac. A small landscaped berm presumably built by the adjacent homeowner does not allow for natural runoff and infiltration away from the paved surface in this location.

Proposed Concepts

The proposed concept for this site would be to join Sleep Hollow Lane and Glenn Road so as to **eliminate the need for the existing cul-de-sacs**, treat road runoff with **terraced bioretention facilities**, increase the **vegetated buffer** to the salt marsh, and create improved public access and education. This concept would involve removing excessive pavement (7,300 SF from Sleepy Hollow Lane and 6,400 SF from Glenn Road), while maintaining access to existing driveways, creating four to five guest parking spaces, and creating a pedestrian pathway to the shoreline. Bioretention areas would be constructed to treat and infiltrate runoff from both streets before overflowing to an inlet and ultimately to Goose Creek.

A potential future addition to this project, though not included in the formal project ranking, would be to also remove excessive pavement from the center of Sleepy Hollow Lane and install a vegetative island/dry swale. This could be accomplished when the road needs repaving and the crowned section could be inverted to drain towards the center island. Not only would this reduce water quality impacts to the creek, but it would also reduce costs of paving for the Town.

Practice Sizing/Design Considerations

The bioretention areas should be sized for treating the water quality volume, which equates to approximately 7,600 SF of treatment area. There is sufficient available surface area at this location to provide the full 7,600 SF, assuming a 6-inch ponding depth. Due to the slope in the retrofit location, the bioretention facilities should be terraced, which is accomplished by creating bioretention cells that are separated by boulder or timber "steps."

Pollutant Removal

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

Project costs

The construction of Site GC-R10_11 is expected to cost approximately $230,000. An additional $69,000 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 roughly $11,500, annually.

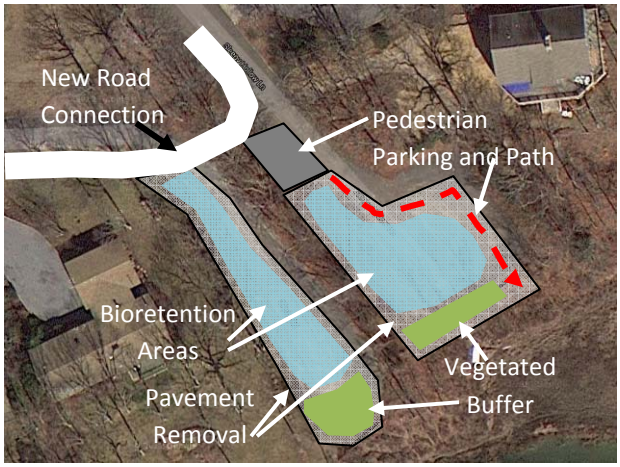
Next steps

- Perform public outreach in the neighborhood;
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities;
- Map limits of right-of-way; and
- Map resource area boundaries and buffers.

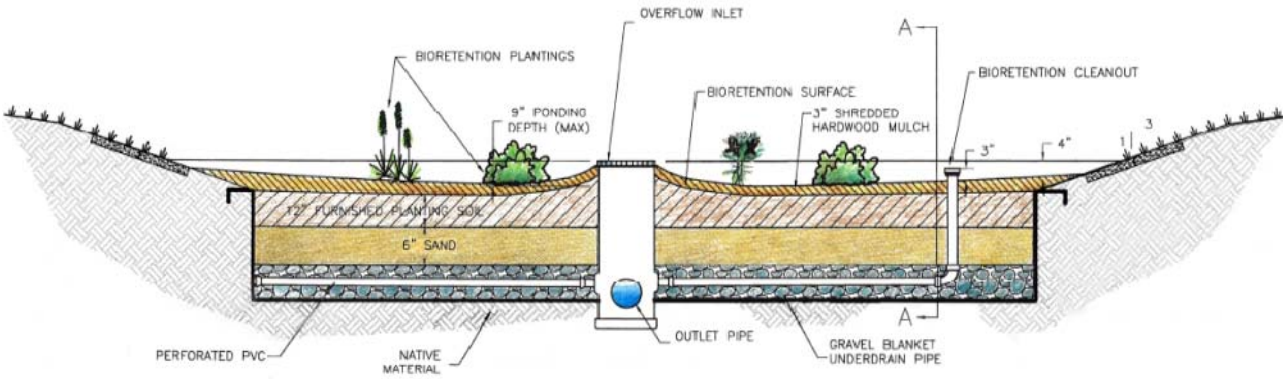
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
GC-R10_11	8.4	20	8,250	7,600	7,600

*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

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

N

125 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 10/11
Goose Creek Subwatershed
Southold, NY

Date: 7/10/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_Goose_blowups_landscape_9072.mxd

GC-R21. Landing Path — Pavement removal, dry swale, and bioretention facility

Site Description

Landing Path is a short roadway "spur" located two streets west of Gagens Landing Road in the same north-centrally located neighborhood ("Southwood") within the subwatershed. Similar to other dead end roadways or cul-de-sacs observed within the Goose Creek subwatershed, the existing road is wider than necessary for the residential neighborhood, particularly since it serves only one house. Stormwater flows along this section of the road have resulted in an accumulation of sediment and debris within the roadway and in the adjacent lawn area. In addition, it is located immediately adjacent to a nature sanctuary owned by The Nature Conservancy.

Proposed Concepts

The proposed retrofit concept would involve **pavement reduction** to a uniform width of 24 feet and construction of a **dry swale** in the right-of-way to convey stormwater to a **bioretention area** with an outlet to the marsh along Goose Creek. This will allow for both water quality treatment and groundwater recharge, and may improve vegetative buffering to the adjacent salt marsh.

Practice Sizing/Design Considerations

The dry swale and bioretention area should be sized for treating the water quality volume. This equates to approximately 4,400 SF of optimal treatment area. There appears to be available surface area at this location to provide approximately 1,050 SF, or almost 25% of the optimal treatment area. This assumes a 9-inch ponding depth, 115 linear feet of dry swale with a 2-3 foot bottom width, and over 720 SF of bioretention area. Additional pavement removal and/or disconnection of residential runoff (e.g., with rain barrels, rain gardens, etc.) would further reduce the required treatment area.

The key aspect to this retrofit site is working with and educating the residents about what the BMPs are, how they are supposed to look, how they function, and why they are important. In particular, it is important to reach out to the one adjacent homeowner on Landing Path. Dry swales should hardly be noticeable with shallow side slopes and planted with grass. The bioretention area should become a neighborhood amenity planted with native shrubs, grasses, and wildflowers. Residential access should be maintained at all times during the construction of this site.

Pollutant Removal

Bioretention areas and dry swales 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 GC-R21 is approximately $39,500. An additional $11,900 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 between $1,200 and $2,000, annually.

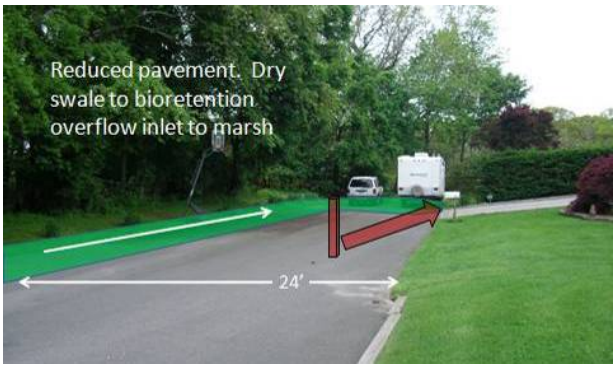
Next steps

- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities;
- Map existing resource area boundaries and buffers;
- Approach adjacent private landowner about the proposed concept; and
- Advance design for permitting and construction.

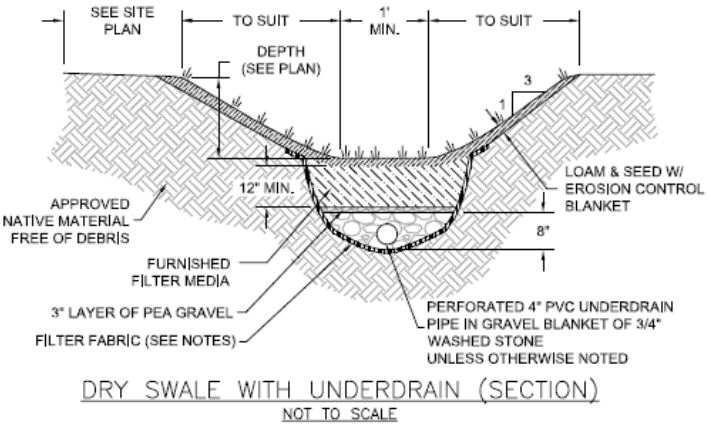
Site ID	Drainage Area (ac)	% Impervious	Water Quality Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
GC-R21	4.4	30	6,100	4,400	1,050

*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

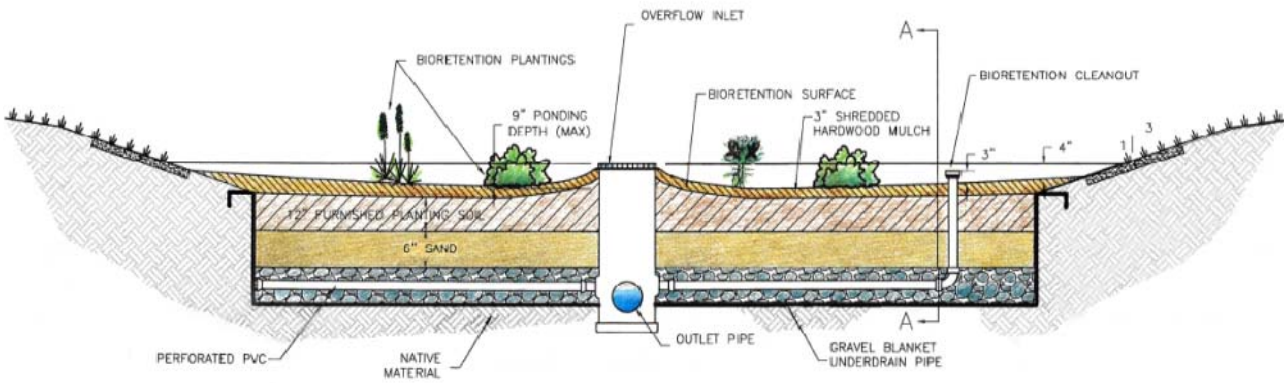


Typical dry swale detail



DRY SWALE WITH UNDERDRAIN (SECTION)
NOT TO SCALE

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



Legend

- Inlets (HW)
- Goose Creek Subwatershed
- Parcels
- Retrofit Sites
- Retrofit Footprint
- Retrofit Drainage Area
- Retrofit Impervious
- 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 21
Goose Creek Subwatershed
Southold, NY

Date: 7/10/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_Goose_blowups_portrait_9072.mxd

GC-R22. Beachwood Cul-de-Sac — Pavement removal and bioretention area

Site Description

The Beachwood cul-de-sac, as with several others observed within Goose Creek, has more pavement than necessary for the four houses along this dead-end street. An adjacent homeowner has planted an area at the end of the cul-de-sac such that it is elevated above roadway in an attempt to create positive drainage toward salt marsh; however, stormwater still ponds within the roadway prior to reaching the salt marsh.

Proposed Concepts

The proposed concept for this site would be to **remove excessive pavement** at the Beachwood cul-de-sac and construct a **bioretention area** equipped with an overflow to Goose Creek. This proposed practice would allow for water quality treatment and increased groundwater recharge, and would also increase vegetative buffering to the salt marsh. In addition, it would provide a great public education opportunity and reduce an ongoing ponding/maintenance problem at this site.

Practice Sizing/Design Considerations

The bioretention area should be sized for treating the water quality volume. This equates to approximately 6,200 SF of optimal treatment area. There appears to be available surface area at this location to provide approximately 1,450 SF, or almost 25% of the optimal treatment area. This assumes that sufficient pavement can be removed in this location and that a 9-inch ponding depth can be provided before overflow. Additional pavement removal and/or disconnection of residential runoff throughout the drainage area to this site (e.g., with rain barrels, rain gardens, etc.) would further reduce the required treatment area.

A key aspect to this retrofit site is working with and educating the residents about what a bioretention facility is, how it is supposed to look, how it functions, and why it is important to the health of the creek. The bioretention area should become a neighborhood amenity planted with native shrubs, grasses, and wildflowers. Residential access should be maintained at all times during the construction of this site.

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 GC-R22 is expected to cost approximately $55,000. An additional $16,500 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 $2,750, annually.

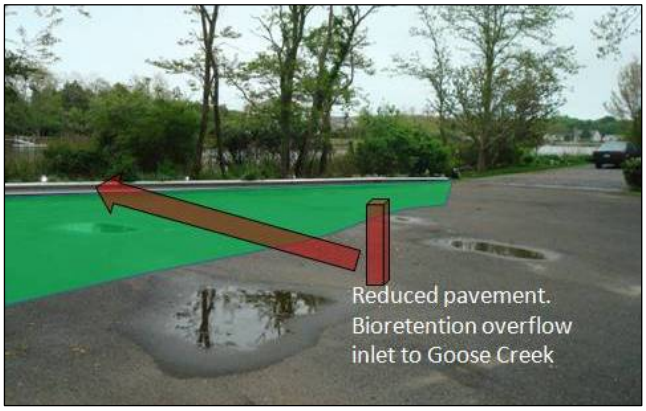
Next steps

- Perform public outreach to the four affected residents along the project reach;
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities;
- Map limits of right-of-way;
- Map existing resource area boundaries and buffers; and
- Advance design for permitting and construction.

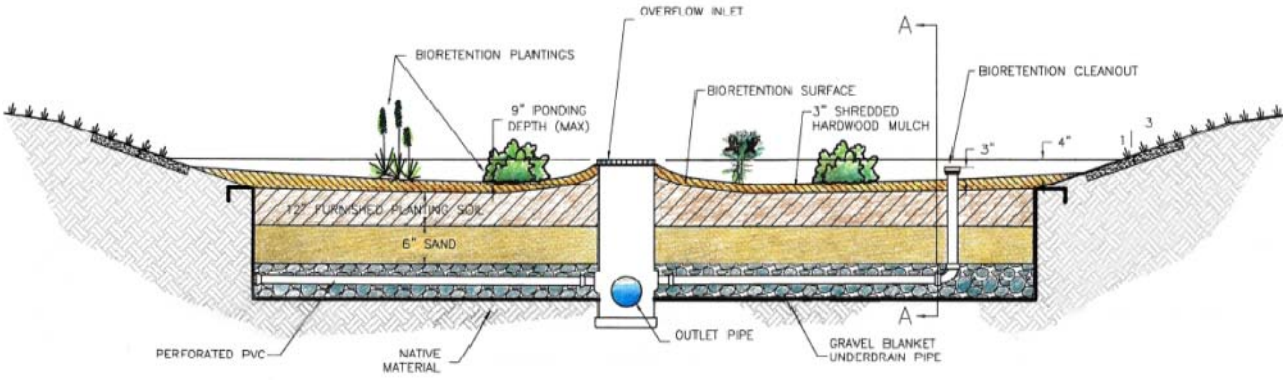
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
GC-R22	5.75	32	8,600	6,200	1,450

*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

- Goose 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

125 Feet

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Retrofit 22
Goose Creek Subwatershed
Southold, NY

Date: 7/10/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_Goose_blowups_portrait_9072.mxd

GC-R4. Outfall from Main Bayview — Dry swales and Bioretention area

Site Description

Located just north of the curve in Main Bayview Avenue, an existing outfall discharges directly into the westernmost reaching finger of Goose Creek. Here, catchbasins (one functional, the rest fully or partially clogged with debris and sediment) collect stormwater from Main Bayview Road, as well as agricultural runoff from the adjacent vineyard (Corey Creek Vineyards), and feed directly into the creek.

Proposed Concepts

Proposed BMPs include construction of new **dry swales** on either side of Main Bayview Road (~740 linear feet on west side; ~200 linear feet on east side), which would be directed into inlets and ultimately into the existing outfall pipe. It is recommended that this be constructed in conjunction with an agricultural practice (e.g., a shallow vegetated swale) to disconnect the agricultural runoff from the street runoff. The roadway at this location is also relatively wide, and there may be an option to **reduce pavement** width and install a **bioretention area** at the intersection between Main Bayview Road and Baywater Avenue. Overflows from the bioretention area should be routed to the swale system.

Practice Sizing/Design Considerations

Ideally, the dry swales and bioretention area should be sized to treat the water quality volume. Based on sizing criteria for these BMPs and an estimated 6 inch ponding depth, the total surface area should be approximately 16,250 SF of treatment area. The available surface area at this location is about 5,400 SF (~33% of optimal size)assuming bottom widths of 2-4 feet, but could possibly be enlarged through additional pavement removal and/or additional swale length on the east side of Main Bayview. Any amount of additional pavement removal would also decrease the amount of required treatment area, and the cost of future road paving and maintenance. In addition, the recommended agricultural swales and any residential practices (e.g., rain barrels, rain gardens, etc.) implemented throughout the drainage area will also help reduce the required treatment area.

A retaining wall will be required for the proposed dry swale to the west (adjacent to the vineyard) due to the existing slope in this area. The existing overhead wires and mature trees on the east side of road also pose conflicts for construction, and should be taken into consideration as this design is advanced. In addition, easements may be needed for the swales depending on the right-of-way limits in this area. If groundwater is too high near the existing outlet, the design should be modified to wet swales.

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 GC-R4 is expected to cost approximately $100,000. An additional $30,000 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 $3,000 - $5,000, annually.

Next steps

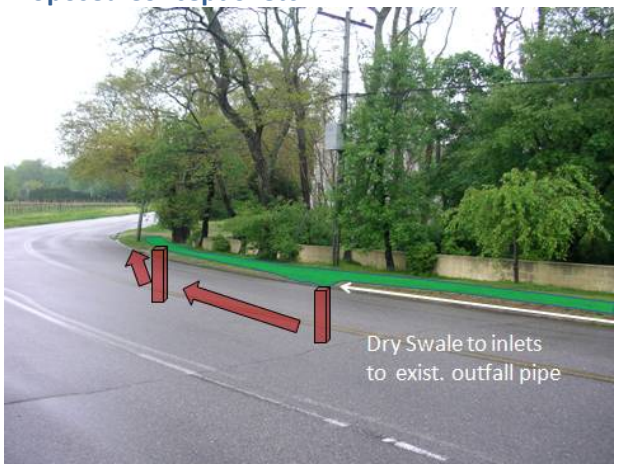
- Approach Corey Creek Vineyards for potential partnering opportunities;
- Investigate reducing excess pavement at intersection;

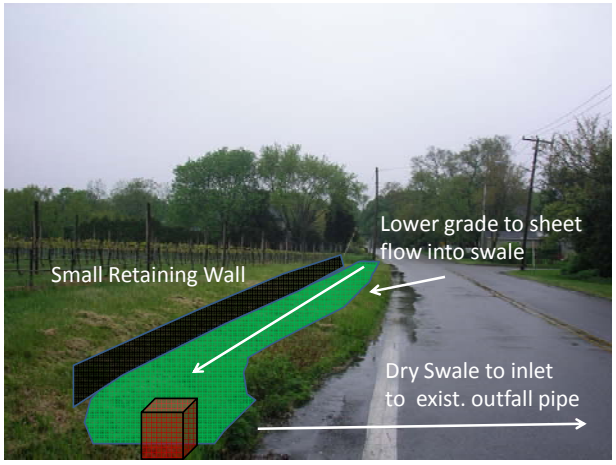
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities;
- Map limits of right-of-way; and
- Map existing resource area boundaries and buffers.

Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
GC-R4	31.7	9	17,900	16,250	5,400

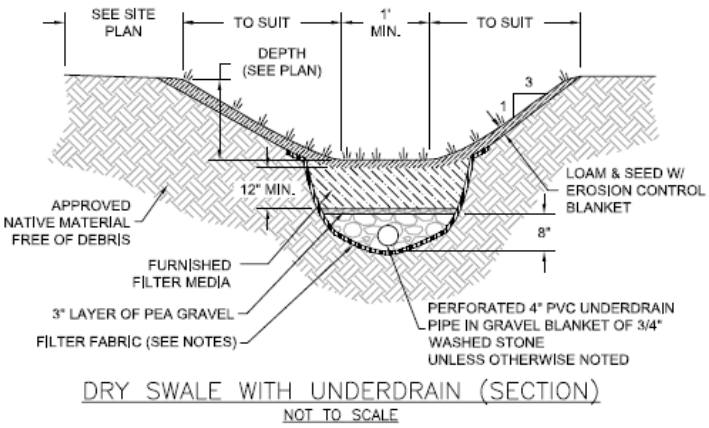
*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design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

Proposed Concept Sketch

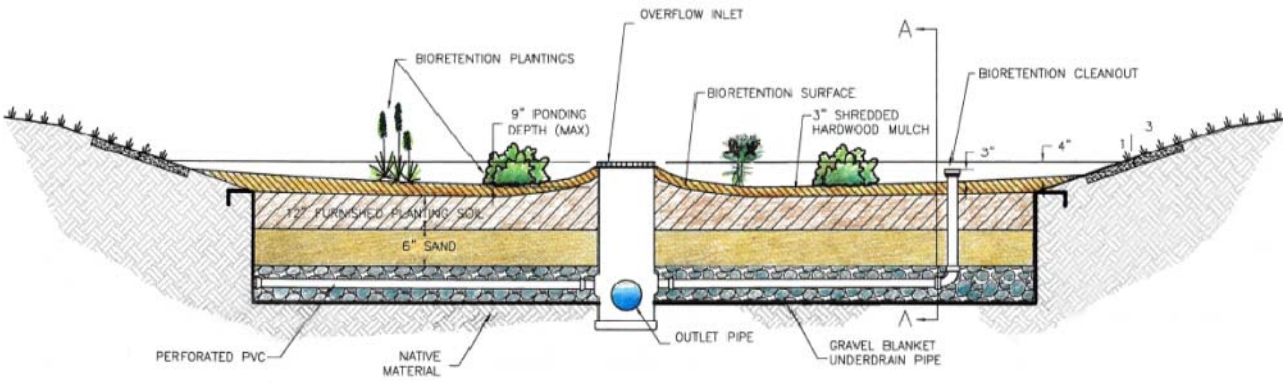


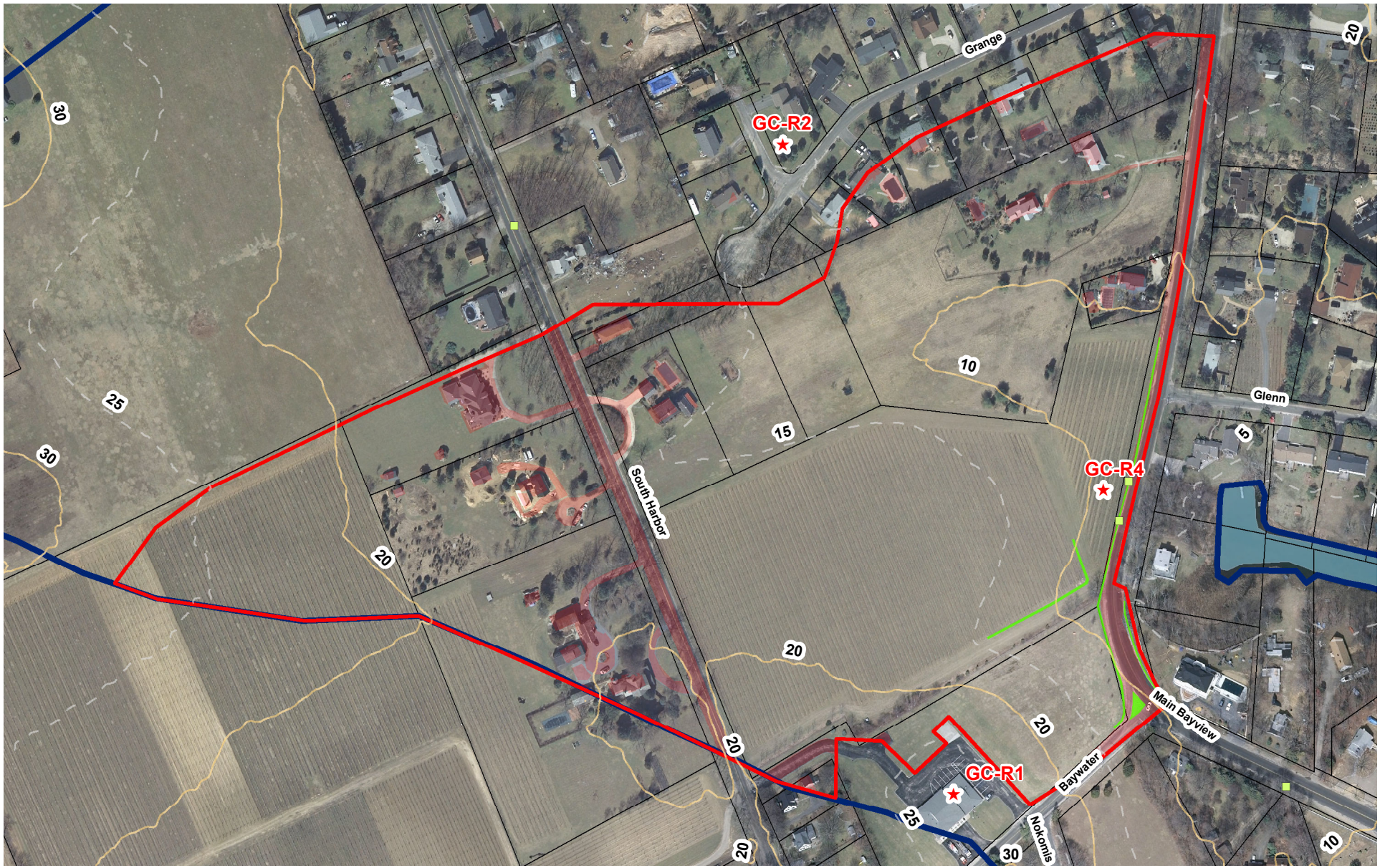


Typical dry swale detail



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





Legend

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

N

250 Feet

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Retrofit 4
Goose Creek Subwatershed
Southold, NY

Date: 7/11/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_Goose_blowups_landscape_9072.mxd

GC-R9A. Grissom Road Cul-de-sacs — Pavement removal, dry swale, bioretention facility, and leaching chamber(s)

Site Description

Grissom Lane is located approximately in the center of the Goose Creek subwatershed. Currently, excessive pavement along the roadway contributes to stormwater runoff, which is directed to catchbasins at the Grissom Lane cul-de-sac immediately adjacent and upgradient of a Town-owned right-of-way.

Proposed Concepts

Proposed retrofit opportunities include **reduction of pavement** from the existing 32-foot wide roadway to a 24-foot width, and the construction of a **dry swale** along the road connected to a **bioretention area** at the end of the cul-de-sac. The dry swale should be connected by culverts under the three affected driveways, and the bioretention area should have a modified inlet overflow to a large leaching chamber for handling runoff from larger storm events.

Practice Sizing/Design Considerations

The dry swale and bioretention area should be sized for treating the water quality volume. This equates to approximately 2,700 SF of required treatment area. There is sufficient available surface area at this location to provide the 2,000 SF, or almost 75% of the optimal treatment area. This assumes a 6-inch ponding depth, 320 linear feet of dry swale with a 2-foot bottom width, and over 1,000 SF of bioretention area. Additional pavement removal and/or disconnection of residential runoff (e.g., with rain barrels, rain gardens, etc.) would further reduce the required treatment area.

The key aspect to this retrofit site is working with and educating the residents about what the BMPs are, how they are supposed to look, how they function, and why they are important. Dry swales should hardly be noticeable with shallow side slopes and planted with grass. The bioretention area should be a neighborhood amenity planted with native shrubs, grasses, and wildflowers. Residential access should be maintained at all times during the construction of this site.

Pollutant Removal

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

Project costs

The construction of Site GC-R9A is expected to cost approximately $43,300. An additional $13,000 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 $1,250, annually. Long-term operation and maintenance costs are likely to be about 5% of the construction costs, or roughly $1,300 - $2,200, annually.

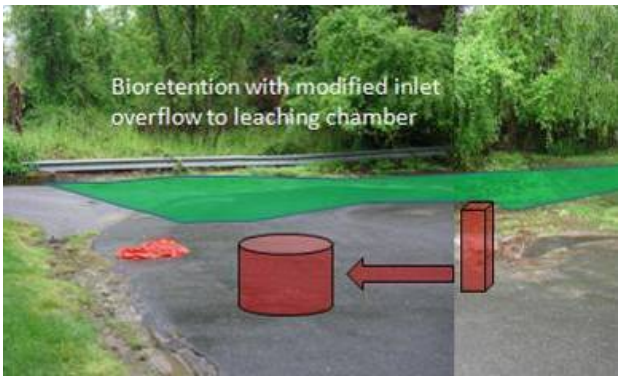
Next steps

- Perform public outreach to the four affected residents along the project reach;
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities; and
- Map limits of right-of-way.

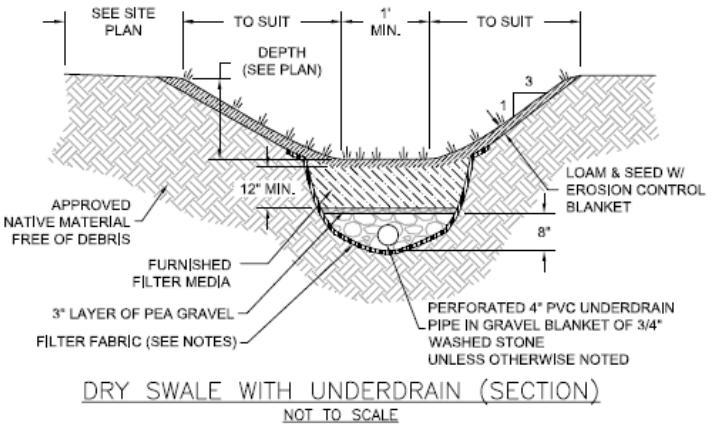
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
GC-9A	2.0	36	3,300	2,700	2,000

*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.

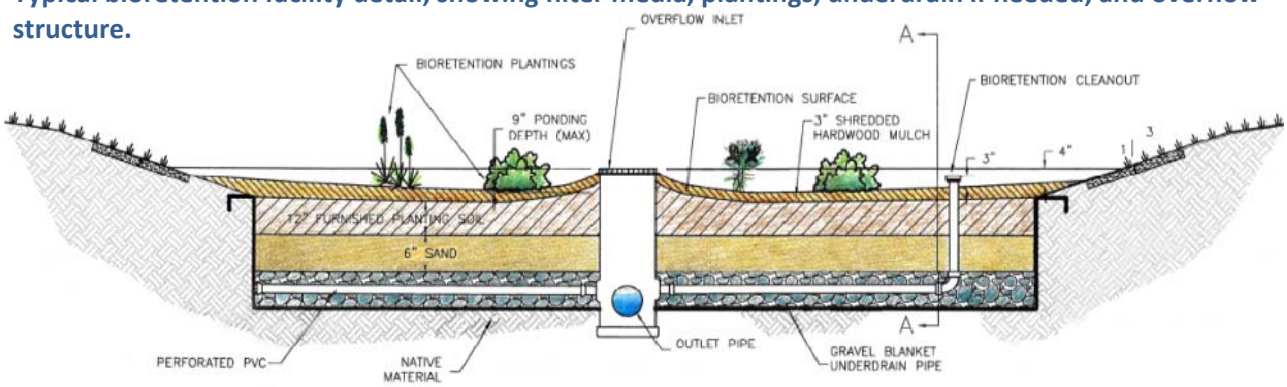
Proposed Concept Sketch



Example of a leaching chamber (left) and typical dry swale detail (right)



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



Legend

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

N

60 Feet

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Retrofit 9A
Goose Creek Subwatershed
Southold, NY

Date: 7/10/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_Goose_blowups_portrait_9072.mxd

GC-R9B. Glenn Road— Dry swale and bioretention facility

Site Description

Glenn Road parallels the northernmost "finger" of Goose Creek in the central portion of the subwatershed. The drainage area to this site is 2.7 acres, and is adjacent to retrofit site GC-R9A, which is just to the north. Currently, stormwater flows unchecked to the low point in the roadway across from a small inlet (marina). The drainage area to this site

Proposed Concepts

Proposed stormwater retrofits for this location include the construction of **dry swales** along the roadway (in the right-of-way) conveying stormwater to a **shallow bioretention area** on the south side of the roadway immediately upgradient of the existing marina. Overflows from large storm events would be directed to the existing outfall at the bulkhead.

Practice Sizing/Design Considerations

The bioretention area and dry swales should be sized for treating the water quality volume. This equates to approximately 3,000 SF of required treatment area. There is sufficient available surface area at this location to provide 1,750 SF, or almost 60% of the optimal treatment area. This assumes a 6-inch ponding depth, 300 linear feet of dry swale with a 2-3 foot bottom width, and an approximately 1,000 SF bioretention area.

Implementation of this practice would require confirmation of property ownership and potentially easements from adjacent property owners. The design would need to be worked around the existing large trees in the area.

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 GC-R9B 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 3-5% of the construction costs, or $1,000-$1,600, annually.

Next steps

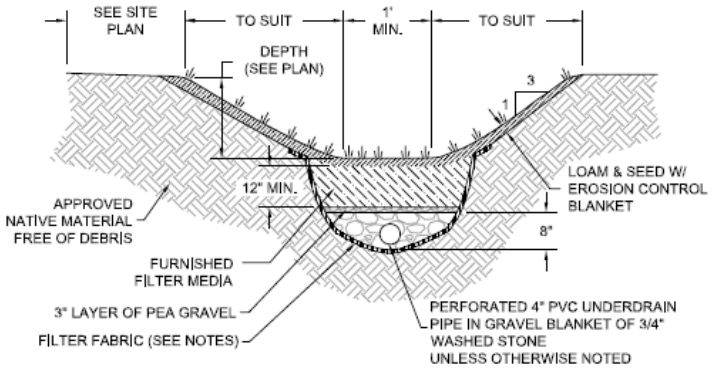
- Public outreach for neighborhood residents and marina users;
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities;
- Map limits of right-of-way; and
- Map existing resource area boundaries and buffers.

Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
GC-9B	2.7	25	3,200	3,000	1,750

*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.

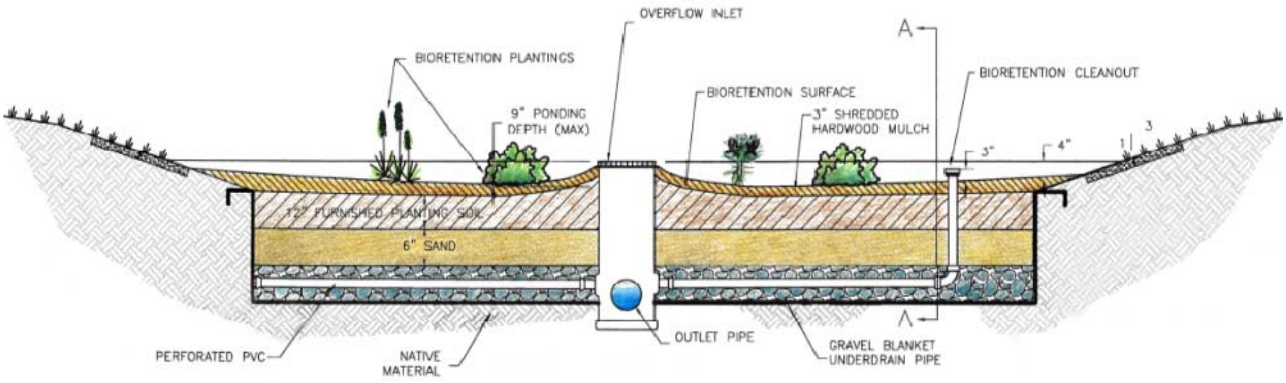
Existing Conditions and Proposed Concept Sketch

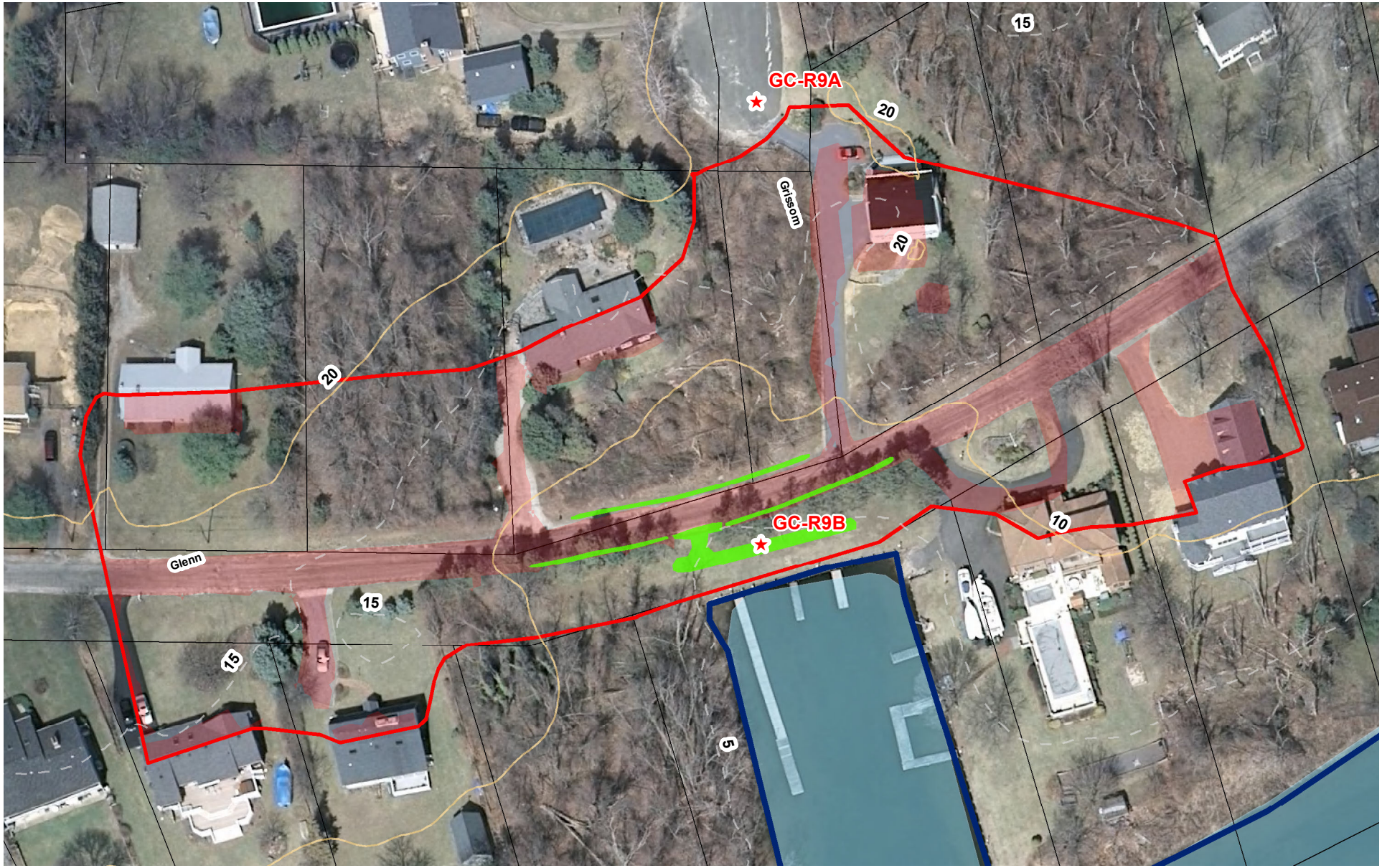
Typical dry swale detail



DRY SWALE WITH UNDERDRAIN (SECTION)
NOT TO SCALE

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





Legend

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

N

75 Feet

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Retrofit 9B
Goose Creek Subwatershed
Southold, NY

Date: 7/11/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_Goose_blowups_landscape_9072.mxd

GC-R15. Cedar Drive — Oil-water separators to leaching chambers.

Site Description

Located in the eastern portion of the subwatershed where some of the highest elevations are located, the downgradient end of Cedar Avenue receives a considerable amount of high velocity stormwater runoff from a reasonably sized drainage area (1.6 acres). This has resulted in considerable sedimentation within the roadway, which ultimately accumulates at the end of Cedar Avenue before being conveyed to the outlet at the private swimming beach area. High velocity runoff from the surrounding steep slopes overwhelms the existing catchbasin, bypassing the existing stormwater structure, and carrying sediment and nutrients along a crumbling asphalt trough before discharging directly into Goose Creek. This has resulted in scouring along the beach and a delta of sediment in the water.

Proposed Concepts

The proposed stormwater retrofit involves fairly conventional structural measures including installation of catchbasins with sumps directed to a **pretreatment tank** (equipped with oil/grit separators) and ultimately into appropriately sized underground **leaching chambers**. This system could then replace the existing drainage system currently draining to the beach. In conjunction with the construction of these structural measures, the existing berm along the roadway should be repaired.

Practice Sizing/Design Considerations

The oil/grit separators and leaching chambers should be sized for capturing and treating the peak flow from the water quality rain event. Overhead utilities and the existing water main within in roadway may be conflicts to the proposed design. Given these site constraints, it was estimated that leaching chambers could be designed to infiltrate approximately 25% of the water quality volume. This assumed chambers were 4 feet deep and that the underlying soils were HSG B.

Pavement removal and/or disconnection of residential runoff throughout the drainage area to this site (e.g., with rain barrels, rain gardens, etc.) would help to reduce the required treatment area. Public outreach and education should be a part of this project to teach residents about stormwater pollution, how it affects their beach and swimming area, and how the retrofits are supposed to work. If homeowners understand what is and what is not supposed to go into the stormwater structures on their street, long-term maintenance can be reduced. Residential access should be maintained at all times during the construction of this site.

Pollutant Removal

Oil/grit separators and leaching chambers are expected to remove 90% TSS and 90% bacteria (RI Manual, 2010) with limited TN removal.

Project costs

The construction of Site GC-R15 is expected to cost approximately $15,000. An additional $4,500 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 $750, annually.

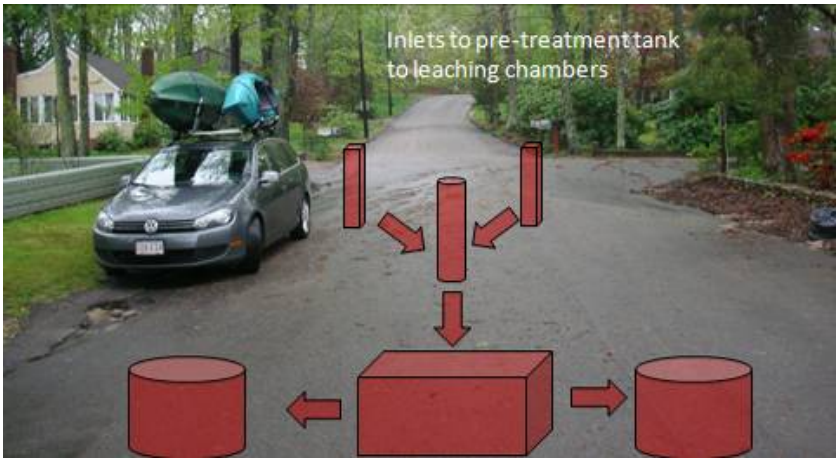
Next steps

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

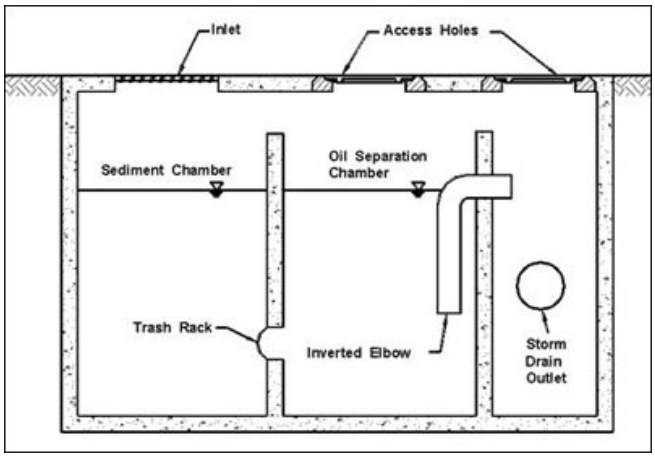
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
GC-15	1.6	34	2,400	1,400	350

*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



Example of a leaching chamber (left) and typical oil-grit separator detail (right; Federal Highway Administration)



Legend

- Goose 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

65 Feet

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Retrofit 15
Goose Creek Subwatershed
Southold, NY

Date: 7/10/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\130701_Goose_blowups_portrait_9072.mxd

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%