Dering Harbor Subwatershed Management Plan

June 2013

Prepared for:

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

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1.0 Introduction

This plan is part of the on-going efforts of the Peconic Estuary Program (PEP), operating from the Suffolk County Department Health Services' Office of Ecology, to improve water quality in the Peconic Estuary and its watersheds. In 2001, the PEP adopted a final Comprehensive Conservation and Management Plan (CCMP) that identifies four priority management issues: control of pathogens, nitrogen, toxins, and enhancement of habitat and living resources. In 2003, Horsley Witten Group (HW) completed a regional stormwater assessment and management project for the Peconic Estuary Program that focused on developing a regional, storm-event-based, pollutant loading model to help prioritize management efforts for four pilot watersheds within the greater Peconic Estuary system based on the contributions of pathogens and nitrogen from each watershed. In 2006, HW completed management plans for those four pilot subwatersheds. The development of this Subwatershed Management Plan for the Dering Harbor Subwatershed in the Town of Shelter Island, along with plans for 5 other subwatersheds in the Towns of Southold, East Hampton, and Southampton, continues the work of those initial projects.

1.1 Peconic Estuary Watershed Issues

The Peconic Estuary is located on the eastern end of Long Island, New York between the North and South Forks (see Figure 1-1). It is one of 28 estuaries in the National Estuary Program (NEP), administered by the United States Environmental Protection Agency (USEPA) under Sec. 320 of the Clean Water Act to protect and preserve nationally significant estuaries which are threatened by pollution, development, or overuse. The Peconic Estuary was accepted into the program as an "estuary of national significance" in 1992. Its waters cover approximately 158,000 acres with 450 miles of shoreline and support a wide array of wildlife. There are several smaller bays recognized throughout the greater Peconic Estuary including Flanders Bay, Great Peconic Bay, Shelter Island Sound, Gardiners Bay, and Little Peconic Bay. Bordering this estuary are the towns of East Hampton, Southampton, Brookhaven, Riverhead, Southold, and Shelter Island. The region is popular for vacationing and supports a wide variety of both recreational and commercial activities and contains abundant natural resources. Boating, swimming and sunbathing are a few of the many recreational activities that draw thousands of people to this region. Fishing and shellfishing are two of the predominant local industries that are directly dependent upon the water quality of the estuary. Economic studies of the overall Peconic Estuary region have estimated that those businesses and industries directly tied to the estuary produce upwards of $450 million of annual income within the region (PEP CCMP, 2001).

Unfortunately, many of the tidal creeks and harbors within the Peconic Estuary, including Dering Harbor, are currently not meeting water quality standards and are classified as impaired water bodies. Specifically, the shellfishing beds in the Peconic Estuary have been monitored for several decades by the New York State Department of Environmental Conservation (NYSDEC) in order to assess the safety of these shellfish for consumption. High levels of coliform bacteria have resulted in the closure, either periodic or year-round, of much of the most productive beds in the estuary. Coliform bacteria, specifically fecal coliform (FC), are produced in the intestinal tracts of warm-blooded animals and are present in high concentrations in their fecal matter. FC bacteria are used as an indicator for the presence of other, potentially harmful pathogens. In 2006, a Total Maximum Daily Load (TMDL) for pathogens was developed for the impaired waterbodies in the estuary, and in 2007, a TMDL for nitrogen was developed. One of the sources of both pathogen and nitrogen loading to the estuary is from

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

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

Within the CCMP, non-point source pollution, including stormwater runoff, is designated as the highest priority for remedial efforts. Carefully planned and implemented stormwater management practices and strategies can reduce loadings of both bacteria and nitrogen. These strategies would therefore work to help accomplish several of the goals outlined within the Peconic CCMP including reopening shellfishing areas, reducing overall nitrogen loading, and decreasing the occurrence of brown tide.

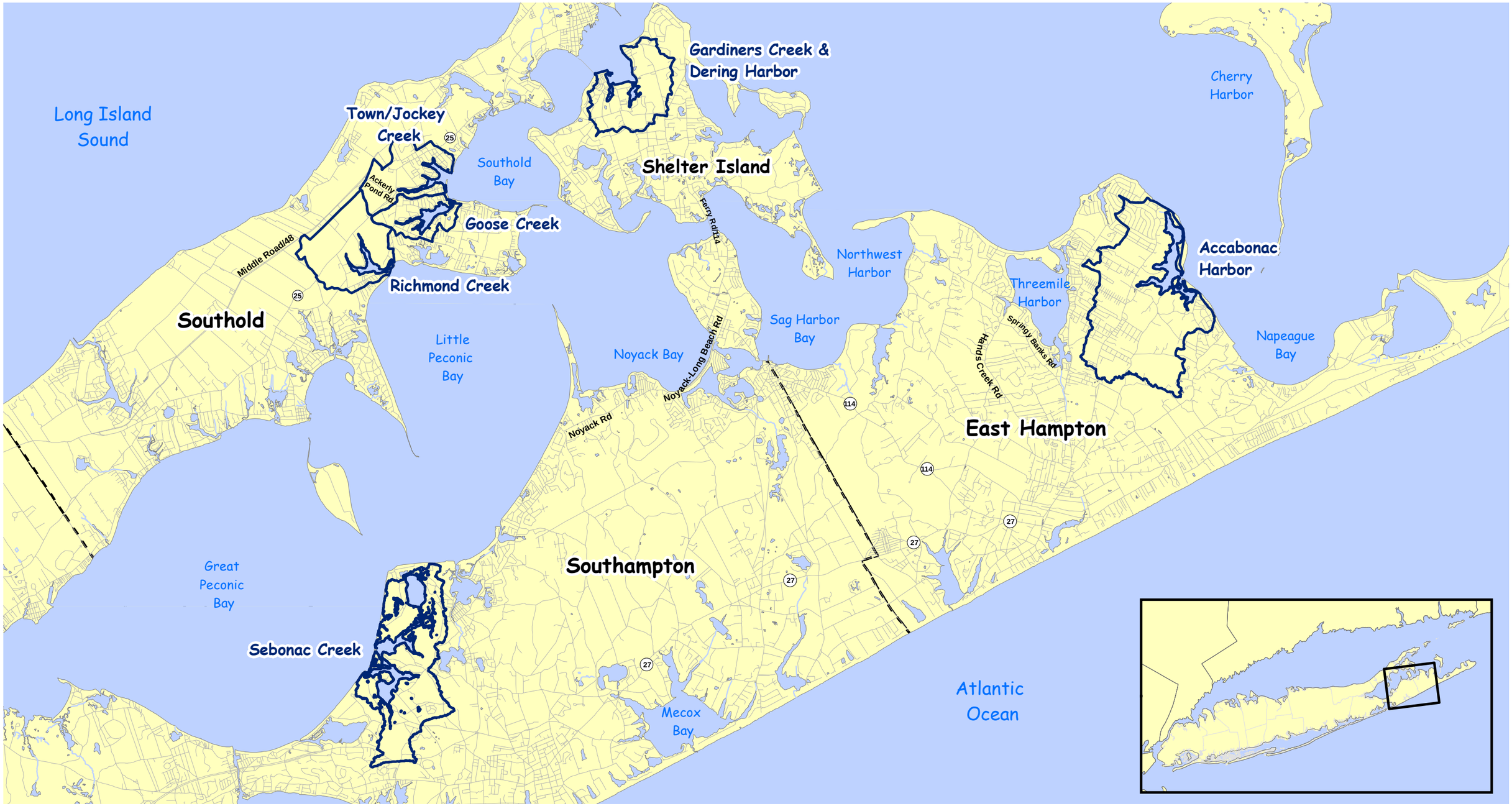
1.2 Purpose of the Plan

This plan focuses on identifying cost-effective structural and non-structural practices to reduce overall pollutant loadings (e.g., bacteria, sediment, nutrients) and runoff volume to Dering Harbor. The approach included rapid field assessment for stormwater management throughout the watershed. The stormwater assessment was used to identify likely stormwater pollutant sources as well as areas where best management practices (BMPs) could be installed to improve the management and treatment of stormwater in the watershed. Successful implementation of this plan is expected to help reduce stormwater runoff pollution; maintain or improve overall water quality conditions, shellfish harvesting capacity, eelgrass habitat, and degraded marsh areas.

Caveats

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

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



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Subwatersheds Evaluated as Part of this Assessment

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The Peconic Estuary Region Vicinity and Subwatershed Context Map

Date: 6/30/2013 Figure 1.1

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Dering Harbor and
Gardiners Creek Subwatershed

N

Feet

1,750

Horsley Witten Group
Sustainable Environmental Solutions

Aerial
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 7/1/2013 Figure 1.2

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2.0 Dering Harbor Subwatershed

This section summarizes baseline information specifically for the Dering Harbor Subwatershed, including a description of the unique subwatershed characteristics and a brief summary of existing water quality conditions. A more detailed description of the area can be found in the Watershed and Waterbody Inventory Report prepared for the Town of Shelter Island Watershed Management Plan (NP&V, 2012).

2.1 General Subwatershed Characteristics

The Dering Harbor subwatershed is located within the Town of Shelter Island in between the north and south forks of Long Island. This subwatershed is primarily rural-residential with few commercial properties. The subwatershed is 1,238 acres of which 9.5% is impervious. Topography in the watershed ranges from 0 feet to 180 feet in elevation at the western boundary. Portions of the Village of Dering Harbor (incorporated) and Shelter Island Heights (the "Heights," a historic hamlet) are located in the subwatershed. There are two main waterbodies that discharge into Dering Harbor: Chase Creek and Gardiner's Creek.

2.2 Land Use and Infrastructure

The subwatershed includes a small, more urbanized downtown area in the Heights that is comprised of commercial areas such as restaurants, retail stores, markets, and a gas station, and medium to high density residential areas. Most of the other neighborhoods in the subwatershed are made up of low to medium density (one-quarter to one acre). There are two golf courses in the subwatershed: one public (Shelter Island Country Club) and one private (Gardiners Bay Golf Course). Much of the eastern portion of the subwatershed is undeveloped, listed as either vacant or open space.

Table 2.1. Land Use Summary

Land Use	Percent of Subwatershed
Low Density Residential	38%
Medium Density Residential	11%
High Density Residential	1%
Commercial	3%
Industrial	0%
Institutional	1%
Open Space	14%
Agricultural	2%
Vacant	22%
Transportation	8%
Utilities	0%
Waste Handling	0%
Surface Water	0%

Existing stormwater infrastructure within the subwatershed generally consists of drainage inlets and leaching catchbasins to infiltrate runoff. However, it appears that many of the leaching catchbasins, particularly those within the public rights-of-way, are clogged due to high accumulations of sediment and organics. The roads in the Heights are owned and managed by the Shelter Island Heights Property Owners Corporation (SIHPOC); they have recently contracted with the Town to help inspect and maintain their drainage structures. Overall, within the subwatershed, there are only a few drainage outfalls that discharge directly into Dering Harbor or any of its tributaries.

Most of the subwatershed is on septic systems; however, the Heights is sewered, and its sewage treatment plant (STP) discharges into Dering Harbor. This plan is focused on stormwater management, and thus, does not directly address the impacts from septic systems or the STP.

2.3 Soils and Hydrology

The soils in the subwatershed are mapped by the USDA Natural Resources Conservation Services as Carver and Plymouth sands, Montauk fine sandy loam, Montauk loamy sand, Montauk silt loam, Plymouth loamy sand, Riverhead sandy loam, Bridgehampton silt loam, and Haven loam, with lesser amounts of Fill land, Muck, Tidal Marsh, and Sudbury sandy loam. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with A indicating high infiltration rates (i.e., sands and gravels) and D representing very poorly drained soils. The subwatershed is mostly compromised of HSG Type B and Type C soils. Much of the Type A soil is found in the western portion of the subwatershed. Table 2.2 provides a breakdown of the soils found in the subwatershed. A map of the soil conditions is provided in Appendix A.

Table 2.2. Summary of Soil Conditions

Soil HSG	Percent in Subwatershed
A	12%
B	24%
C	61%
D	3%

2.4 Existing Water Quality

To comply with the Clean Water Act, the NYSDEC compiles a Priority Waterbodies List (PWL). Dering Harbor is included under PWL# 1701-0050 as an impaired waterbody, and in 2006, a TMDL for pathogens was developed for these areas with urban stormwater runoff identified as a pollutant source, along with inputs from forest runoff and waterfowl. In addition, the NYSDEC has designated Dering Harbor as “growing area 18” for shellfish, which is closed for shellfishing.

3.0 Field Assessment of Restoration Opportunities

This chapter describes both the methodology used for the watershed assessment and the proposed recommendations to help improve the water quality of the Dering Harbor Subwatershed. The proposed options range from site-specific stormwater retrofits to non-structural control measures. A map showing the restoration opportunities is included as Figure 3.1.

3.1 Assessment Methods

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

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

Stormwater Retrofits

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

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

Vegetated infiltration and filtering practices have the best bacteria and nitrogen removal potential and were recommended where feasible based on soils and estimated groundwater elevations. In areas of high suspected groundwater, wet swales and constructed wetlands were proposed. In general, all of these practices can be adapted as necessary to several different drainage configurations including larger open areas, roadside drainage, and parking lots. Additional information and details on the design of each of these practices can be found in the 2010 update of the New York State Stormwater Management Design Manual. In addition, the 2010 Rhode Island Stormwater Design and Installation Standards Manual is an additional resource for the design and assessment of stormwater management practices.

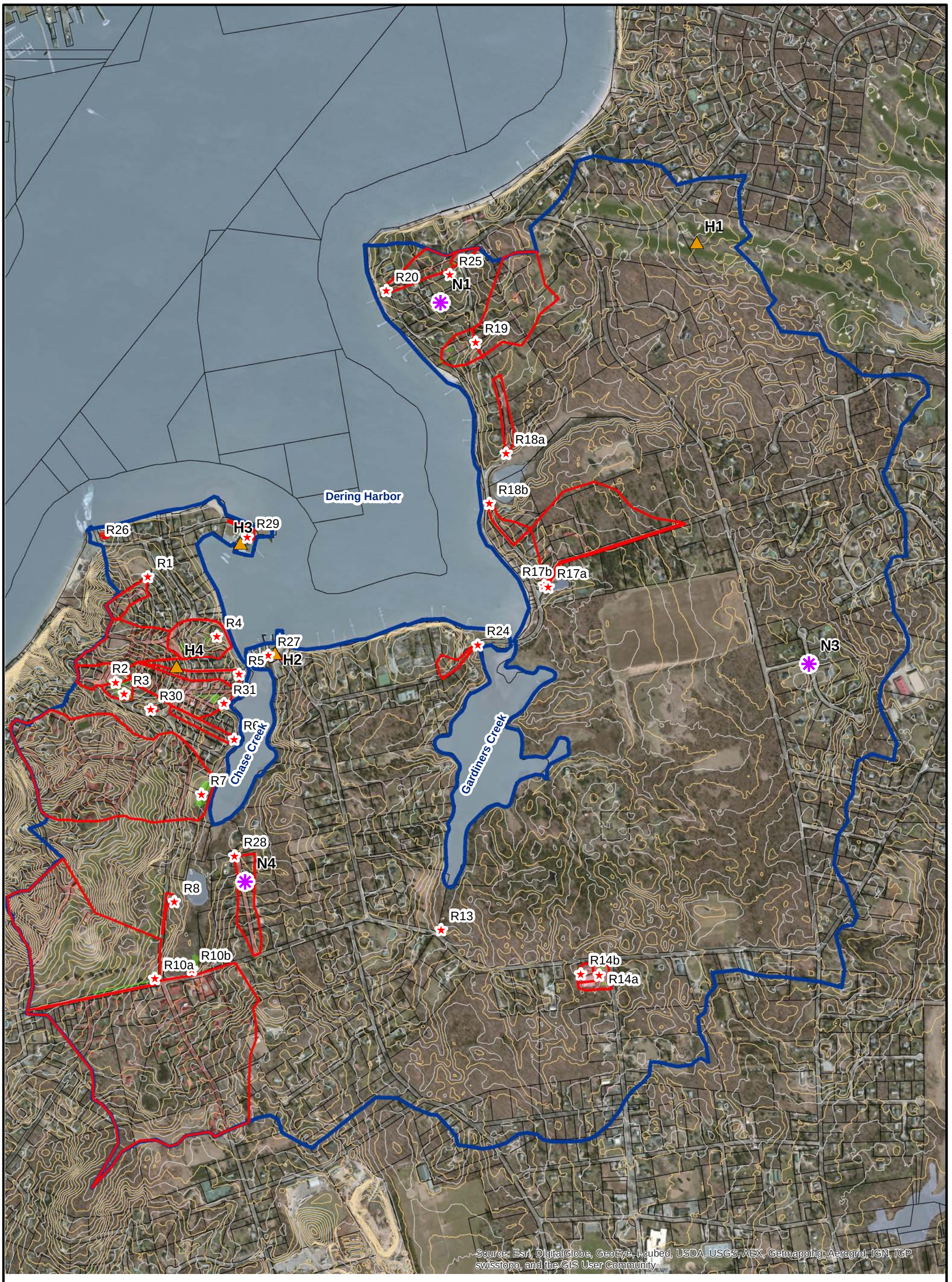
A preliminary ranking process was conducted to determine which of the retrofit design concepts should be further refined – the full methodology and results are included in Appendix C.

Neighborhood Assessments

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

Hotspot Assessment

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



Legend

- Dering Harbor Subwatershed
- Parcels
- Retrofit Sites
- Retrofit Footprint
- Retrofit Drainage Area
- Retrofit Impervious
- Hot Spots
- Neighborhoods
- Hydrography
- Hydrography
- Shelter Island 10ft. Contours
- Shelter Island 5ft. Contours

N

900 Feet

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Restoration Opportunities
Dering Harbor Subwatershed
Shelter Island, NY

Date: 7/1/2013 Figure 3.1

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3.2 Stormwater Retrofits

Multiple sites were identified by project partners and through field assessment as potential stormwater improvement opportunities. These stormwater retrofit opportunities are summarized in Table 3.1. A more detailed description of existing conditions and potential opportunities at these sites is provided below.

Table 3.1 Stormwater Retrofit Summary

Site ID/ Name	Description	Ranking
(DH-R1) Spring Garden and Bay Street	Pavement removal and raingarden; in Shelter Island Heights	Med
(DH-R2/R3) Lady of the Isles Church	Formalize parking lot; multiple infiltrating bioretention cells in parking lot and park; leaching chambers; benches and educational signage	Low
(DH-R4) Cedar Avenue/Grand Avenue Park	Terraced dry swale and infiltrating bioretention	High
(DH-R5) Corner of Locust Avenue and Chase Avenue	Infiltrating bioretention; catchbasin maintenance; replacement of outfall pipes	Low
(DH-R6) Meadow Lane and Locust Avenue	Replace curbing and install raingarden; community disconnection project	Med
(DH-R7) New York/Meadow Street	Constructed wetland; buffer enhancement	High
(DH-R8) Ice Pond Park	Raingardens and porous pavers in the parking lot	Low
(DH-R10) Ice Pond Park South	Swale and bioretention in Goat Hill Golf Course; constructed wetland	High
(DH-R14) IGA Parking Lot	Landscape island bioretention; restriping of parking lot; pavement reduction; potential for permeable pavement and planter boxes	Low*
(DH-R17) Cobbetts Lane Wet Pond	Reconnect drainage to existing detention basin; install forebay and expand as necessary	Med
(DH-R18) Shore Road Infiltration Chambers	Provide pretreatment biofilter for existing infiltration chambers; install leaching catchbasins; pavement removal and road realignment	Low
(DH-R19) Yoco Road	Raingardens; buffer enhancement	High*
(DH-R20 Shore Road	Raingarden and buffer enhancement	Low
(DH-R24) Outfall at Winthrop Road Bridge	Dry swale; deep sump catchbasin	High*
(DH-R25) Dering Village Hall	Demonstration raingarden; lawn management	Med*

Site ID/ Name	Description	Ranking
(DH-R26) North Ferry Office	Raingarden; educational signage	Low
(DH-R27) Bridge Street	Perimeter sand filter; catchbasin repair; tidal flap gate	Low
(DH-R28) Sylvan Street Neighborhood	Wetland forebay; pavement removal; or "green streets" alternative	High
(DH-R29) Yacht Club	Demonstration raingarden	Med
(DH-R30) Fire Station	Demonstration raingarden and rainbarrel	Med
(DH-R31) Sylvan and Auburn Open Space	Dry swale; infiltrating bioretention; raingarden; educational signage; and pet waste station	High

**Rankings were adjusted based on the Town's local areas of concern and priorities*

Highlighted sites were selected as priorities, and their concept designs are included in Section 3.3.

Spring Garden and Bay Street (DH-R1)

Two main roads in a residential portion of *The Heights* drain to a catchbasin in an open space area on Bay Street. The catchbasin was clogged/filled to rim with sediment, so it is unknown if it is a leaching catchbasin or if it is tied into an existing drainage network. Spring Garden and Wesley Roads are each one-way and have excessively wide pavement areas where they merge with Bay Street. We propose **pavement reduction** at each of the road connections and the installation of a **raingarden** in the open space area (Figure 3-2). The raingarden can overflow into the existing catchbasin. Permeable paver blocks can be used for the driveway extension. This location provides significant opportunities to engage the community, educate the public, enhance aesthetics, and provide for traffic-calming devices.

Figure 3-2. Area for pavement reduction and potential rain garden in The Heights.

Lady of the Isles Church (DH-R2 & R3)

This site is a large church parking lot in the hamlet of Shelter Island Heights. There is currently no stormwater management in place, and sheet flow from the parking lot drains southward across Spring Garden Road into an existing catchbasin which appears to outlet into the park. An eroded flow path

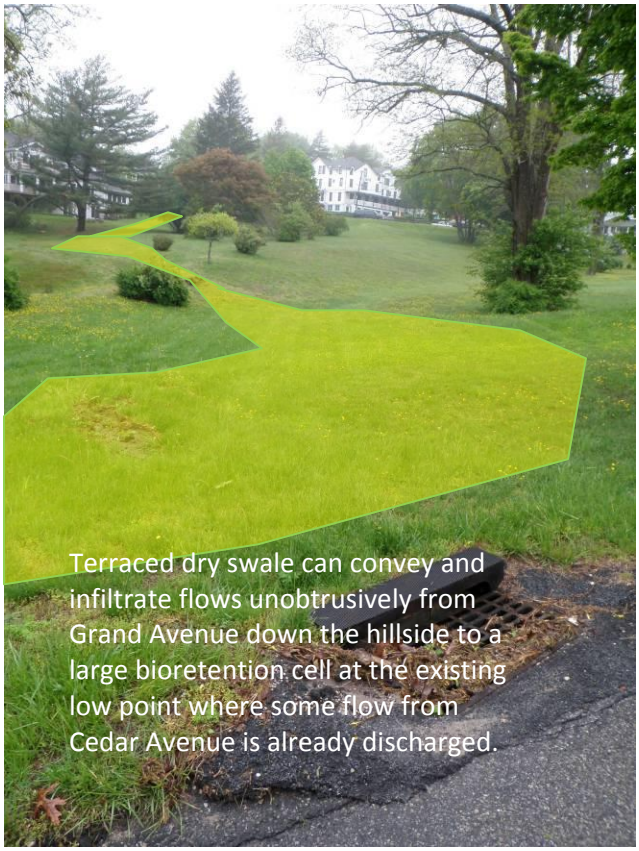
from the outlet structure is visible through the park. The soils here are conducive to infiltration (see Soils Map in Appendix A). The concept at this site is to formalize the parking lot with a landscaped **bioretention island**, **stripe parking stalls**, and provide **clear demarcation of the drive aisles and entrances**. The current entrance along Spring Garden Road will be relocated to the southeastern corner of the lot. Overflow from the bioretention will be piped to **terraced bioretention cells** in the park with **leaching chambers** to enhance infiltration in the lower cells (Figure 3-3). **Benches and educational signage** could be incorporated into the design to promote spiritual meditation and stormwater awareness.

Figure 3-3. Proposed series of infiltrating bioretention cells in parking lot and adjacent park

Cedar Avenue/Grand Avenue Park (DH-R4)

There is a large open space/park area extending downhill between the commercial area on Grand Avenue and the waterfront along N. Ferry Road and Cedar Avenue that could potentially be used to improve stormwater management. This land is owned by the Peconic Land Trust and managed by SIHPOC. Currently, there is a leaching catch basin in a grass area across the street from the Chequit Inn on Grand Avenue that, upon inspection, was completely clogged by organic debris and sediment (Figure 3-4). In addition, oils, leachate from dumpsters, nutrients, and other pollutants generated in the commercial area of Grand Avenue are likely being carried by stormwater to this point; therefore, providing a vegetated filter prior to infiltration is a preferred management approach. At the bottom of the hill, there is an existing catchbasin that conveys runoff from Cedar Avenue into an existing depression in the park. The soils here are conducive to infiltration (HSG A soils; see Soils Map in Appendix A). The total drainage area to this site needs to be further investigated, but it appears that there is enough space here to manage at least the 11 acres (3 acres impervious) initially estimated. The concept is to **modify the existing catchbasin** on Grand Avenue to convey road runoff to a **vegetated swale**, which then transitions down the slope via a **stepped dry swale** system to allow for infiltration. This swale can convey excess flows to a larger **infiltrating bioretention** excavated at the bottom of the hill in the existing depression. Additional bioretention cells can be included in the design, if necessary. The open space area in the park is an important community asset; therefore, the retrofit goal should be to minimize the footprint of a proposed facility, while taking advantage of the infiltration capacity of the soils and existing drainage features. This would be an effective area for public education signage.

Figure 3-4. Opportunity to clean and infiltrate stormwater in an existing park.



Corner of Locust/Chase Avenues (DH-R5)

The catchbasins at this intersection show signs of sedimentation/clogging and are in need of maintenance. A temporary fix to flooding at the street corner was to install two PVC pipes in the asphalt berm with a direct discharge to Chase Creek (Figure 3-5). There is a large grassed private lot on the corner where a **bioretention** or other infiltration practice could be installed prior to discharge to the existing catchbasin. A **swale** to collect additional road drainage and take overflow from the bioretention can be fit into the road ROW. This would provide water quality treatment and help reduce catchbasin clogging. Depending on the separation distance to groundwater and soils conditions, additional infiltration could be attained here. The PVC pipes should be replaced with a **deep sump catchbasin**. Additional investigation at this site could refine the concept design and perhaps identify a potential **parcel for the Town to purchase or obtain a drainage easement**. This retrofit was ranked as low priority at this point, partly due to the ownership issue.

Figure 3-5. Provide water quality treatment and reduce maintenance burden at corner of Locust/Chase Avenues

Meadow Lane and Locust Avenue (DH-R6)

Existing runoff down Meadow Lane is deteriorating the edge of the road and flooding leaching catchbasins along Locust Avenue. Organic debris and sediment were visible on the road surface and likely contribute to clogging of the catchbasins (Figure 3-6). The proposed retrofits for this area include replacing the existing degraded swale on the south side of Meadow Lane with an asphalt berm to direct flows to a **concrete dip** across Locust Avenue. Sheet flow from the dip will be directed into a **raingarden** in the grassed area at the bottom of the street, which can then overflow into the existing leaching catchbasin. The raingarden should include a sediment forebay area that can be easily maintained, and should incorporate native plants to enhance the existing riparian buffer, while not restricting residential uses and views. This community-based retrofit can be enhanced with a residential disconnection program to install raingardens and rainbarrels in this neighborhood to help reduce the volume of runoff sheet flowing across Locust Avenue.

Figure 3-6. Location for community raingarden at bottom of Meadow Lane

New York and Meadow Street (DH-R7)

Two undeveloped residential waterfront lots (ball fields) off New York Avenue owned by SIHPOC offer potential for managing stormwater from the road and upgradient homes and the golf course. Residents upgradient from this site experience flooding during storm events, and recently, large recharge basins were installed upgradient of New York Avenue. The concept is to modify the existing catchbasin on the road to convey flows from the road and any runoff not captured by the upgradient rechargers to a **constructed wetland** via **grass channels** on both sides of the open field. This retrofit would also provide enhanced **buffer protection** for Chase Creek and be could be maintained as a public park, with walking/bike paths that weave through the area and benches/signage to educate park users about the watershed issues. Additional runoff volume reduction in this drainage area could be achieved with infiltration swales along the eastern edge of the golf course where the soils have high infiltration rates (HSG A soils; see Appendix A).

Figure 3-7. Location of potential constructed wetland off New York Ave (Source: Google Maps)

Ice Pond Park (DH-R8)

This site is located at a public park in the headwaters of Chase Creek and offers a great opportunity to demonstrate simple stormwater practices that can also be done on individual residential lots. The parking lot is for access to a well, and is owned by the Town, but the SIHPOC has an easement here for access/maintenance. The concept here is to install a **raingarden** adjacent to existing dirt road entrance and parking area. A **swale** may be necessary to convey flow from the existing road to the raingarden (Figure 3-8), and drainage structures could be installed along the street to help collect runoff at several locations rather than all at one point to reduce erosion potential. We recommend paving the entrance, but resurfacing the parking area with **pervious paver blocks** (e.g., concrete grid grass pavers) to provide recharge and prevent erosion. If pervious paver blocks are not feasible, the parking area should be graded to direct sheet flow to adjacent raingardens for treatment. **Educational signage** would be installed to highlight the connection between the wetlands of Chase Creek, Dering Harbor and Peconic Estuary water quality issues, and the stormwater practices demonstrated on site. These stormwater demonstration projects could be coupled with larger community participation activities related to wetland invasive species management, trail maintenance, etc.

Figure 3-8. Ice Pond Park entrance and parking area.

Ice Pond Park South (DH-R10A/B)

Over 90 acres (including roads, Goat Hill Public golf course, residential area, and a small commercial strip) drain to five catchbasins at the New York Avenue/West Neck Road intersection and the Capital One Bank entrance. The four catchbasins at the intersection drain to the catchbasin at the bank, which then discharges through a culvert under West Neck Road directly into a wetland complex upstream of Ice Pond Park and Chase Creek. No stormwater treatment practices were observed in the drainage area. A distinct flow path from the outfall location to the wetland was visible, and a significant amount of sediment deposition in the area was observed (Figure 3-9). There are two proposed retrofits to treat runoff coming to this site. The first is to install a linear **dry swale** and **infiltrating bioretention** in the corner of the golf course property. A **new drain inlet** could be installed to the west of the existing catchbasin to convey flows into the swale and then into the bioretention. Alternatively, a flow splitter could be installed in the existing catch basin to divert a portion of flow from roadway into a bioretention facility. Overflows can tie back into the existing catchbasin. In addition, more water retention could be provided within the golf course itself, incorporating water treatment and storage features into the design of the golf holes. This would also serve as excellent public education in the Town's largest public land mass in the watershed.

A second project is to divert a portion of the remaining flows from the catchbasin in front of the bank into a **small stormwater wetland** with a long flow path (created with berms and meandering permanent pools) within the Ice Pond Park boundaries. A preliminary wetland evaluation indicated that there is space for a small facility to provide some level of pretreatment prior to ultimate discharge into the stream.

Figure 3-9. Outfall from West Neck Road and sediment deposition (top). Two locations for proposed retrofits (bottom).

IGA Parking Lot (DH-R14)

The roof and parking lot at a local grocery store currently drain untreated to the adjacent forested parcel/potential wetland area. The parking lot gets a lot of use during the summer, and has been recently repaved. The drive aisle widths seem wider than they need to be, and the lot lacks landscaping and canopy cover. The proposed concept for this site is to add a **landscaped island bioretention cell** in the central portion of the lot where a few trees can be planted either as a retrofit or as part of any future repaving at this site. The lot should then be **re-striped and aisle widths minimized** where possible, with no reduction in parking spaces. Alternative opportunities exist at this site as well, including **pavement removal** and/or use of **permeable pavement**, as well as the installation of **stormwater planter boxes** where the building downspouts exist to provide some volume reduction and improve aesthetics. Due to the high use of this area, this is a good location for public education to demonstrate that even sites that do not directly discharge into Dering Harbor play a role in overall water quality and watershed health.

Figure 3-10. There are many opportunities to provide stormwater management at the IGA.

Cobbetts Lane Wet Pond (DH-R17)

There is an existing, privately owned wet pond at the intersection of Cobbetts Lane and Winthrop Road that reportedly accepted road drainage until the property owner recently installed a landscaped berm

that caused road drainage to bypass the facility and pond at the intersection instead (Figure 3-11). This has also led to the increased erosion of the beach access trail at this location. The retrofit concept for this site is to install infiltrating dry swales along Cobbetts Lane where possible to avoid trees and utilities to treat and manage runoff from 1.5 acres of impervious cover.

Figure 3-11. Intersection of Cobbetts Lane and Winthrop Road.

Shore Road Infiltration Chamber (DH-R18)

Just south of Third Bridge, the Town installed an underground infiltration chamber; however, the structure has become clogged with grass and debris. Soil maps (see Appendix A) indicate C and D soils in this area (poor infiltration capacity). Ponding occurs at the corner of Locust and Shore Roads, particularly at high tide. A hand-dug channel to pond/wetland area was dug to encourage drainage. Retrofit concepts for this site include providing pretreatment prior to the underground leaching field using a **shallow biofilter** (vegetated swale/raingarden) upgradient of the existing practice, depending on depth of chambers (Figure 3-12). This retrofit should be viewed as a demonstration practice on how to provide pretreatment for these types of infiltration practices. In addition, the concept for this site includes the installation of **two leaching catchbasins** with **deep sump catchbasins** to provide pretreatment along Locust Road to reduce overall volume of road drainage at bottom of hill; however, infiltration capacity of soils in this area should be further investigated. **Pavement removal** at the intersection would help reduce impervious cover (and thus volume of runoff) and realign the

intersection for safety purposes. The Village of Dering Harbor has recently replaced the culvert in this area (Julia Dodd Creek), which should also help reduce flooding in this area.

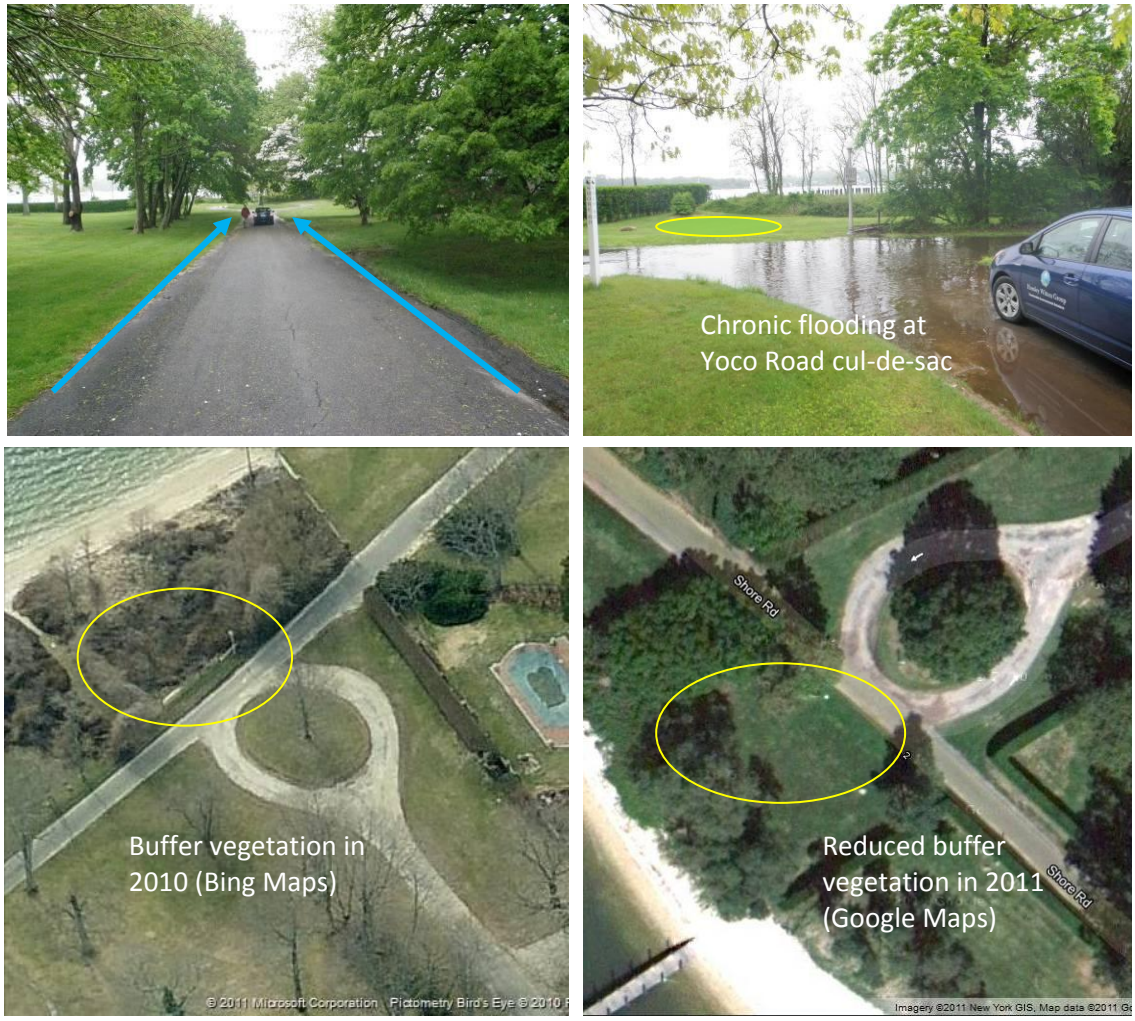
Figure 3-12. Location of existing underground leaching field and proposed leaching catchbasins.

Yoco Road and Shore Road (DH-R19/R20)

Runoff flows down the open-sectioned Yoco Road and ponds at the cul-de-sac/Shore Road intersection. Flooding is reportedly a chronic issue at this location. The only stormwater infrastructure observed in the area is uphill at the intersection of Yoco and Locust. There appears to be sufficient room in the grassed areas around Yoco Road to excavate **raingardens** that may help provide some temporary storage; however, soils do not appear conducive to infiltration in this area based on the soils mapping. It is assumed that the drainage area to this site does not include areas east of Locust Road, which are presumed to be captured in the leaching catchbasin at the intersection. If it is determined that additional drainage area does contribute, swales along either side of the road may need to be installed in addition to the raingardens. From a comparison of 2010 and 2011 aerial photos, the vegetated buffer area between the beach and the cul-de-sac appears to have been cleared and replaced with lawn (Figure 3-13). Retrofits opportunities at this site should look to re-establish some of the protective plants in this area.

A similar concept could be applied to the north at the bend in Shore Road. Mapping indicates that there is a stormwater outfall at this location; however, no stormdrain inlets or outfalls were observed in the field.

Figure 3-13. Yoco Road looking towards the flooded cul-de-sac area (top); removal of buffer vegetation between 2010 and 2011 (aerials by Bing and Google Maps, respectively) (bottom).



Outfall at Winthrop Road Bridge (DH-R24)

Road runoff enters an existing catchbasin and leaching pit that is partially clogged and causes water to be conveyed further down the road to a paved flume with a direct pipe discharge into Gardiners Creek. Residents report sediment plumes at this location. According to mapping information, soils are questionable for infiltration (HSG C soils). The concept for this site is the installation of a **dry swale** in road ROW uphill from existing catchbasin to provide pretreatment and replacement of the paved flume on the causeway with a **deep sump catchbasin** (Figure 3-14). There does not appear to be enough room for the swale to meet full water quality volume criteria, but this retrofit will alleviate erosion from the clogged leaching pit to the banks of Gardiners Creek and reduce direct discharge of runoff through the paved flume. Further investigation on distance to groundwater would be required to pursue this retrofit, as well as a commitment to frequent maintenance due to the swale not meeting the full water quality volume.

Figure 3-14. Location for proposed pretreatment swale and deep sump catchbasin.

Dering Village Hall (DH-R25)

There is no stormwater infrastructure at the Village Hall. Most of the area is turf grass that appears to have been recently replaced with sod. Rooftop and a small gravel parking area are the only impervious areas. Roof runoff is discharged to the lawn. For a demonstration project, consider converting a small portion of the northeast corner of the property into a **raingarden** to collect flows from the adjacent road (Figure 3-15). In addition, a small asphalt berm (small speed bump) should be used to direct road runoff into the practice.

Figure 3-15. High management lawn at Village Hall and proposed location for demonstration raingarden (Bing Maps).

North Ferry Terminal and SIHPOA Offices (DH-R26)

On the watershed boundary, this site offers a highly visible location for public education. There is currently an underground stormwater management system in place at the site that appears to be working well. The concept for this site is to install a **demonstration raingarden** in front of the office building to collect rooftop runoff as shown in Figure 3-16. Currently, the roof drains to the road, where shingle particles were observed at the PVC pipe outfall. **Educational signage** could be placed here for both visitors and residents, describing the water quality issues in the watershed and what individuals can do to help.

Figure 3-16. Location for a demonstration raingarden in front of office building.

Bridge Street (DH-R27)

There are a number of catchbasins along Bridge Street that discharge to outfalls near the docks across from the gas station. An existing underground oil/grit separator was installed in the parking area near the docks across from the gas station. While it appears that this retrofit is likely undersized for the area draining to it, if maintained, it will provide some level of water quality treatment. The catchbasin in front of the liquor store takes drainage from the gas station and a portion of Bridge Street. It is completely clogged and in need of structural repair. Given the high potential for pollutants (oil, sediment, washwater, dumpster leachate, etc.), installation of a **sand filter** and **reconstruction of the existing catchbasin** are recommended (Figure 3-17). A sand filter was chosen because it has a level of pollutant removal but does not impact parking in this constrained area since vehicles can park on top of the structure. In addition, the outfall pipe by the dock bulkhead should be investigated to determine if a **tidal gate** needs to be added to prevent inflow.

Figure 3-17. Catchbasin for replacement during installation of a sand filter; outfall at bulkhead

Sylvan Street Neighborhood (DH-R28)

This road services 18 single family residences and has a paved width greater than 30 ft, with wider areas towards the end of the street. Runoff from the road and surrounding area drains north on either side of the road and discharges through a paved flume and a corrugated metal pipe into a wooded area to the west of the two driveways at the end of the road. The neighborhood backs up to Ice Pond Park, and the drainage flows into a headwater wetland to Chase Creek. There appears to be one catchbasin along the road which was flooded at the time of observation; therefore, we were unable to determine if this is a leaching structure or if it is tied into the discharge pipe at the end of the road.

Figure 3-18 shows the large volume of water quickly generated during a short rainfall event that flooded the catchbasin and discharged into the wooded area during the site visit. **Pavement reduction** and pretreatment prior to discharge is recommended. Depending on the location of wetland and drainage easement boundary, a **constructed wetland with forebay** could be installed to provide energy dissipation and water quality treatment. Another alternative for this site is to provide pretreatment prior to the existing catchbasin in the form of a bioswale that also serves as a road narrowing device (aka "**green streets**").

Figure 3-18. Sylvan Road before and during a rain event.

Shelter Island Yacht Club (DH-R29)

There is currently no stormwater management at the Shelter Island Yacht Club. A portion of the parking lot drains to an existing leaching catchbasin adjacent to the grass area in front of the clubhouse. For demonstration purposes, and to provide for increased water quality treatment, a **raingarden** could be installed that ties overflow back into the existing catchbasin (Figure 3-19).

Figure 3-19. Location for retrofit at Yacht Club

Fire Station (DH-R30)

The Shelter Island Fire Station is located at the intersection of Prospect Ave and Grand Avenue. Currently, roof runoff discharges to the grassed area adjacent to the building and the impervious parking area and roadway. For demonstration purposes and to provide for volume reduction, disconnect rooftop runoff from the fire station in a **raingarden** and/or **rain barrel** at existing downspouts on either side of the building (Figure 3-20). The fire station would make a great location for school kids to participate in the construction and planting of a raingarden, and is also a good location to host a community rain barrel distribution event.

Figure 3-20. Downspout disconnection at fire station

Sylvan and Auburn Open Space (DH-R31)

The green space between Auburn and Sylvan Avenue (owned by SIHPOC) provides a great opportunity to capture and treat runoff from a residential area prior to infiltration. There are at least three existing catchbasins along the road in this area; one of which is a recently installed leaching catchbasin. While the existing leaching catchbasins seem to be working well, they provide little nutrient removal compared to vegetated practices. The concept proposed here is to divert flows via paved flumes from the top of the open space into a **shallow dry swale** (planted with grass to allow for pedestrian crossing and mowing) and then into a **large infiltrating bioretention facility**. The overflow from large storm events can be directed into the existing leaching catchbasin. Confirmation of the size of the contributing drainage area, the location of trees, and the location of catchbasins will determine the final footprint of the facility. Plantings will need to be shade tolerant as there is a high percentage of canopy cover at this location. Additionally, a smaller raingarden can be placed at the bottom of the hill in the grassed area upstream of the outfall. **Educational signage** and a **pet waste station** may be ideal for this location.

Figure 3-21. Swale and bioretention facility in open green space between Sylvan and Locust Avenue.

3.3 Neighborhood Summaries

A summary of general neighborhood conditions is provided below in order to identify which neighborhoods are likely to generate pollutants of concern, what the common sources are, and which areas/sources should be targeted for watershed stewardship activities. Unless otherwise noted, it is assumed that neighborhoods consist of single-family detached residences, with on-site septic systems, and paved roads. Table 3.2 is a comparative summary of each neighborhood, and more detail is provided below.

Table 3.2 Neighborhood Inventory Summary

Site ID/ Name	Pollutant Loading	Main Pollutant Source	Stewardship Activities
DH-N1/ Gardiner Way	Low	Nutrients	Buffer management; proper lawn care and landscaping
DH-N3/Bonnie Lane	Medium	Sediment, nutrients	Long-term BMP maintenance; grass clipping and yard waste management
DH-N4/ Sylvan Road	High	Sediment, nutrient	On-lot volume reduction activities; see retrofit DH-R28

Gardiner Way (DH-N1)

The Gardiner Way residential area is located in the Village of Dering Harbor between Locust Road and Shore Road and south of the Dering Harbor Village Hall. This area consists of approximately 7 single-family homes located on both sides of the road, sixty or more years of age, on lots that range in size from 1/2 to greater than 1 acre. Gardiner Way is a narrow, paved, open-section road that drains to the west towards Shore Road; no stormwater practices were observed. There are no sidewalks present, and the road surface shows signs of deterioration. The overall size of the area is approximately 18 acres, of which 60% is forested. Lot cover typically consists of less than 50% impervious cover, with extensive turf grass. Very few driveways are impervious (~10%). No permanent irrigation was observed, and the majority of the lawns appear to have high to medium maintenance requirements. The neighborhood was clean at the time of observation without visible pet waste, trash, or dumping. Evidence of buffer encroachment was observed with managed lawn abutting the bulkhead at the western portion of the road adjacent Shore Road and Dering Harbor. Opportunities for pollution prevention within the neighborhood include education of waterfront homeowners on proper buffer management and landscaping practices.

Figure 3.22. Gardiner Way looking east and west

Bonnie Lane (DH-N3)

Bonnie Lane is a newer neighborhood of 13 single-family detached dwellings that appear to be approximately ten to fifteen years of age. Located off Manhanset Road, the neighborhood has two main streets, Bonnie Lane and Locust Woods Drive. Two of the homes are accessed from Bonnie Lane; the remaining eleven homes are located on Locust Woods Drive, a dead-end street that has grass/landscaped cul-de-sacs at the north and south ends. Both streets are relatively wide (28 ft of pavement) with an overall right-of-way width of approximately 50 ft and open-section road draining to a catch basin at the low point in the road. Standing water was observed in some of the drain inlets, most likely due to sediment accumulation. No outfalls were observed, and the catchbasin is assumed to be leaching. There are no sidewalks present, and the road surface shows some signs of deterioration. The neighborhood is approximately 23 acres, and lots are typically an acre in size. On average, each lot is comprised of 15% impervious cover, 70% grass cover, and 15% landscaped area/trees. Almost all the driveways are impervious. No permanent irrigation was observed; however, a majority (80%) of the lawns appears to have high management requirements. Some sediment accumulation was observed originating from one of the driveways where the homeowner had excavated a trench to drain their

property. Additionally, grass clippings and yard waste dumping were observed in a wooded area next to the northern cul-de-sac. No pet waste or trash was seen.

Opportunities for pollution prevention within the neighborhood include long-term leaching catchbasin maintenance and homeowner education on proper lawn care and use of fertilizers. Additional opportunities include education for owners and landscape contractors on the proper disposal of grass clippings and yard waste.

Figure 3.23. Bonnie Lane grass cul-de-sac (left), sediment-laden runoff to leaching pit (right) and grass and yard waste dumping (below).

Sylvan Road (DH-N3)

The Sylvan Road residential area is located off County Road 115 adjacent to Chase Creek. This area consists of approximately 18 single-family homes on either side of the road that appear to be approximately twenty years of age. Sylvan Road is a wide, paved, open-section road that drains to the north into Chase Creek at the cul-de-sac end of the roadway. The cul-de-sac is excessively wide for the size of the development. One catchbasin was observed at the midpoint of the roadway along with an outfall pipe to Chase Creek at the cul-de-sac. Runoff also flows along the gutter line on both sides of the road to a paved flume at the cul-de-sac. There are no sidewalks present, and the road surface shows some signs of deterioration. The overall size of the area is approximately 15 acres, of which 50% is forested. Most of the lots are ½ acre. Lot cover typically consists of 30% impervious cover, 65% turf grass, and 5% landscaped beds. Approximately 50% of the driveways are pervious. No permanent irrigation was observed, and the majority of the lawns appear to have medium maintenance requirements. The neighborhood was clean at the time of observation without visible pet waste, trash, or illegal dumping. Heavy flooding of the catchbasin and wetland at the end of the road was observed during the site reconnaissance. Opportunities for pollution prevention within the neighborhood are likely tied to volume reduction techniques that retain and/or infiltrate runoff on individual lots (e.g., rain gardens, dry wells, rain barrels). Retrofit and pavement reduction opportunities are discussed under DH-R28.

3.4 Stormwater Hotspot Inventory

A summary of hotspot conditions is provided below in order to identify which hotspots are likely to generate pollutants of concern, what the common sources are, and which areas/sources should be targeted for pollution control activities. Table 3.3 is a comparative summary of each hotspot, with more detail on each site provided below.

Table 3.3 Hotspot Inventory Summary

Site ID/ Name	Description	Ranking
DH-H1 Gardiners Bay Golf Course	Nutrients from fertilization	Med (additional evaluation necessary)
DH-H2 Bridge Street Gas Station	Gas, oils and grease from gas station See DH-R27	High
DH-H3 Yacht Club	Gas and oil from parking area See DH-R29	Low
DH-H4 Alley behind Chequit Inn/Pharmacy	Gas, oils, grease, dumpster leachate	High

Gardiners Bay Golf Course/DH-H1

We were unable to evaluate the hotspot potential at this site due to limited access. In general, golf courses tend to generate a higher pollutant load for nutrients, pesticides, and other lawn care chemicals. However, much of the tee boxes, fairways, and greens at Gardiners Bay Country Club, as well as the clubhouse and maintenance facility, are located outside of the delineated boundary of the Dering Harbor subwatershed. Additional evaluation of turf management, irrigation, and maintenance practices will be necessary to determine if this site should be treated as a stormwater hotspot.

Bridge Street Gas Station/DH-H2

The gas station on the corner of Bridge Street, directly adjacent to Dering Harbor, is used for fueling, fuel storage, and bike rental/repair. Across the street from the gas station is a SPDES-permitted propane and home heating oil storage facility. Runoff from the gas station flows north to a series of baffled tanks and through the bulkhead to Dering Harbor, and south to catchbasins in the adjacent commercial parking lot. Catchbasin cleaning in the commercial parking lot is recommended. Also, gas station fueling areas should be covered, and catch basin frames should be stenciled. Retrofit DH-R27 describes improvements to the northern section of Bridge Street, including a perimeter sand filter and tide gate valves on the outlet pipe to Dering Harbor.

Figure 3.24. Good examples of existing pollution prevention techniques employed include the spill containment for storage tanks and bermed refueling area with separate drain (top); lack of pollution prevention at uncovered fueling island and leaching catchbasin in the rear of the gas station should be addressed (bottom).

Yacht Club/DH-H3

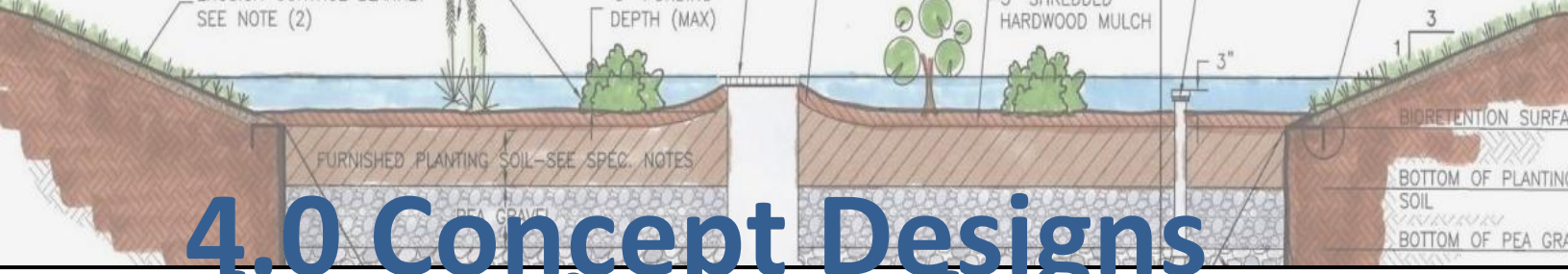
The Shelter Island Yacht Club has a restaurant and bar and is also used for boat storage and docking. The main parking lot is paved, while the overflow parking lot and boat storage area are gravel. Two leaching catchbasins are onsite; one at the edge of the parking lot adjacent to the club and the other in the gravel parking/boat storage area. No evidence of runoff from the gravel parking area from boat maintenance was observed; runoff is contained in the leaching basin onsite. Retrofit DH-R29 describes recommended stormwater improvements to the site, including a raingarden in the grass area adjacent to the paved parking lot.

Figure 3.25. Yacht Club parking lot (left); boat storage area (right)

Alley Behind Chequit Inn/Pharmacy /DH-H4

In the alley off Grand Avenue behind the Shelter Island Heights Pharmacy and the Chequit Inn, runoff from downspouts, dumpsters, gas storage, paint dumping, and grease traps discharges directly to a catchbasin in the center of the alley and continue to Grand Avenue. Improvement recommendations include redirecting downspouts away from the storage areas. Storage areas should be covered or spill containment areas built to eliminate polluted runoff from entering the catchbasins. Retrofit DH-R4 described additional opportunities for pollutant prevention from runoff originating from this area.

Figure 3.23. Pollutant storage (top), polluted runoff to alley and roadway catchbasins (bottom).



4.0 Concept Designs for Priority Retrofits

This section provides concept designs for the top-ranked retrofits identified in Section 3. 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).

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DH-R10. Ice Pond Park South — Swale and bioretention system; constructed wetland

Site Description

Over 90 acres (including roads, Goat Hill Public golf course, residential area, and a small commercial strip) drain to five catchbasins at the New York Avenue/West Neck Road intersection and the Capital One Bank entrance. The four catchbasins at the intersection drain to the catchbasin at the bank, which then discharges through a culvert under West Neck Road directly into a wetland complex upstream of Ice Pond Park and Chase Creek. No stormwater treatment practices were observed in the drainage area. A distinct flow path from the outfall location to the wetland was visible, and a significant amount of sediment deposition in the area was observed.

Proposed Concepts

There are two proposed retrofits to treat runoff coming to this site. The first (DH-R10A) is to install a linear **dry swale** and **infiltrating bioretention** in the corner of the golf course property. A **new drain inlet** could be installed to the west of the existing catchbasin to convey flows into the swale and then into the bioretention. Alternatively, a flow splitter could be installed in the existing catch basin to divert a portion of flow from roadway into a bioretention facility. Overflows can tie back into the existing catchbasin. In addition, more water retention could be provided within the golf course itself, incorporating water treatment and storage features into the design of the golf holes. This would also serve as excellent public education in the Town's largest public land mass in the watershed.

A second project (DH-R10B) is to divert a portion of the remaining flows from the catchbasin in front of the bank into a **small stormwater wetland** within the Ice Pond Park boundaries. A preliminary wetland evaluation indicated that there is space for a small facility to provide some level of pretreatment prior to ultimate discharge into the stream.

To reduce runoff further, residents of the upgradient neighborhood should **disconnect roof runoff** from impervious areas by redirecting downspouts into rain barrels, rain gardens, or pervious lawn/landscaped space.

Practice Sizing/Design Considerations

Based on the optimal treatment volume, the bioretention and dry swale surface area should be approximately 13,400 SF of total treatment area, which is available at the site.

Constructed wetlands have a shallow permanent pool and are planted with native wetland vegetation to provide pollutant uptake and wildlife habitat. For planning purposes, constructed wetlands that are designed for treating the water quality volume are roughly 1.5% of the total drainage area to the practices. This equates to approximately 39,500 SF of required treatment area. The available surface area for the constructed wetland is about 10,200 SF but could possibly be enlarged depending on delineation of existing adjacent wetlands.

Pollutant Removal

Bioretention areas and dry swales are expected to remove 90% TSS; 30% TP; 55% TN; and 70% bacteria, while constructed wetlands are expected to remove 85% TSS; 48% TP; 30% TN; and 60% bacteria (RI Manual, 2010). This assumes the full design treatment volumes can be provided.

Project costs

The construction of Site DH-R10A is expected to cost approximately $246,000, and Site DH-R10B is expected to cost approximately $129,000. An

additional $112,500 should be added to the site total (both 10A and 10B) for an estimated 10% fee for final engineering design and permitting and a 20% contingency. Total long-term operation and maintenance costs are likely to be about 5% of the construction costs, or $18,750, annually.

Next steps

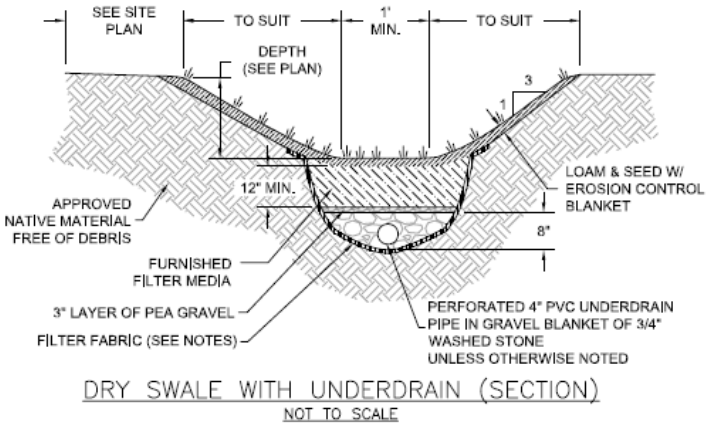
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities; and
- Map existing resource area boundaries and buffers.

Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
DH-R10A	30	7	14,550	13,400	13,400
DH-R10B	60.5	14	52,700	39,500	10,200

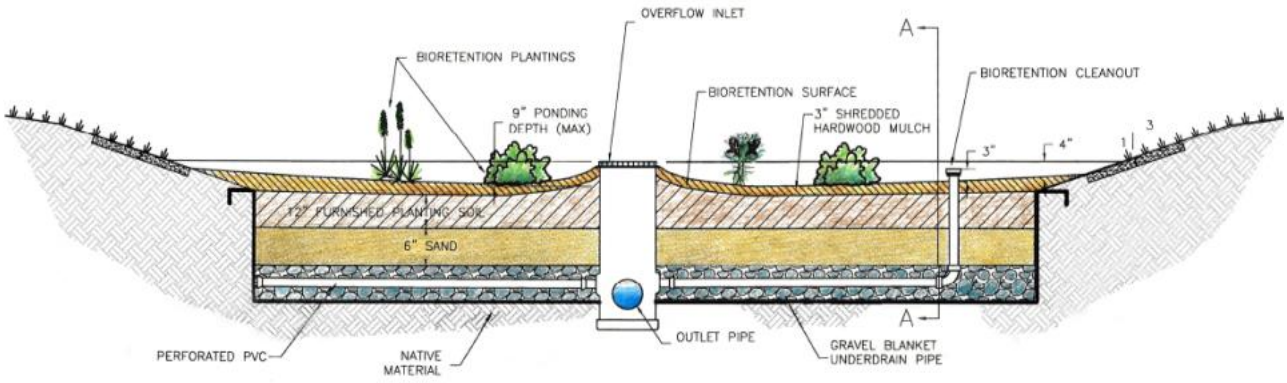
*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design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

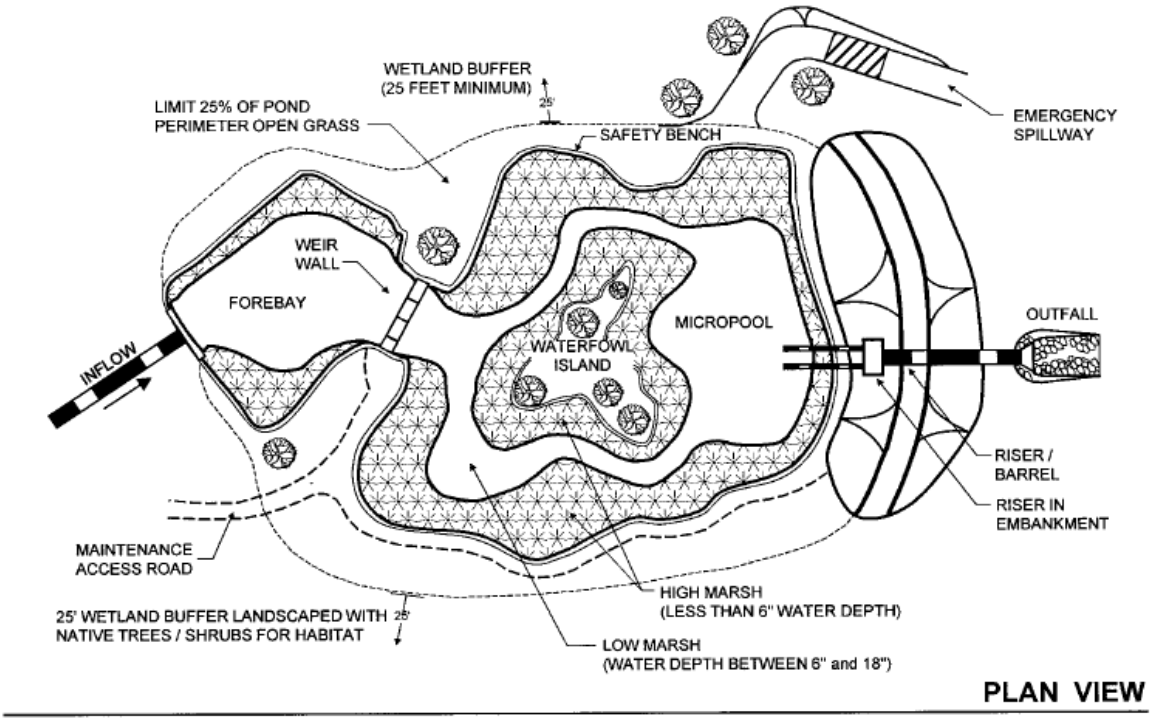


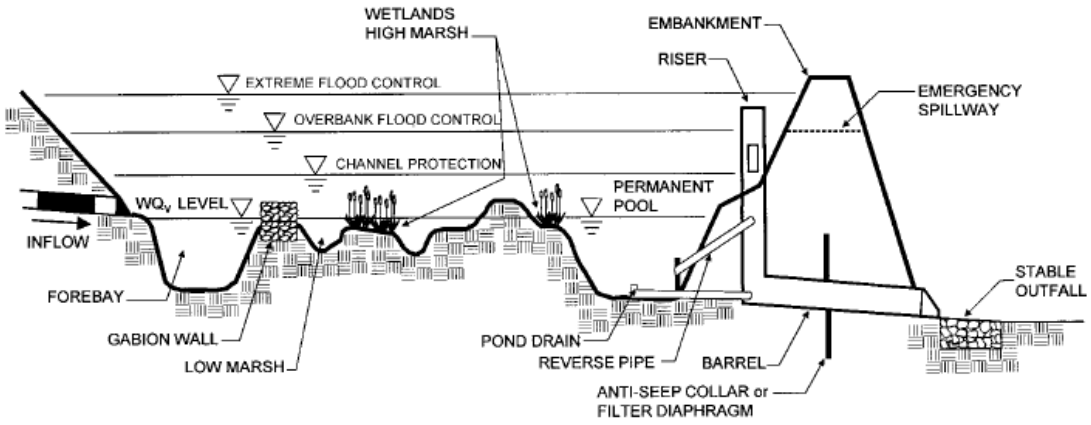
Typical bioretention facility detail, showing filter media, plantings, underdrain if needed, and overflow structure.

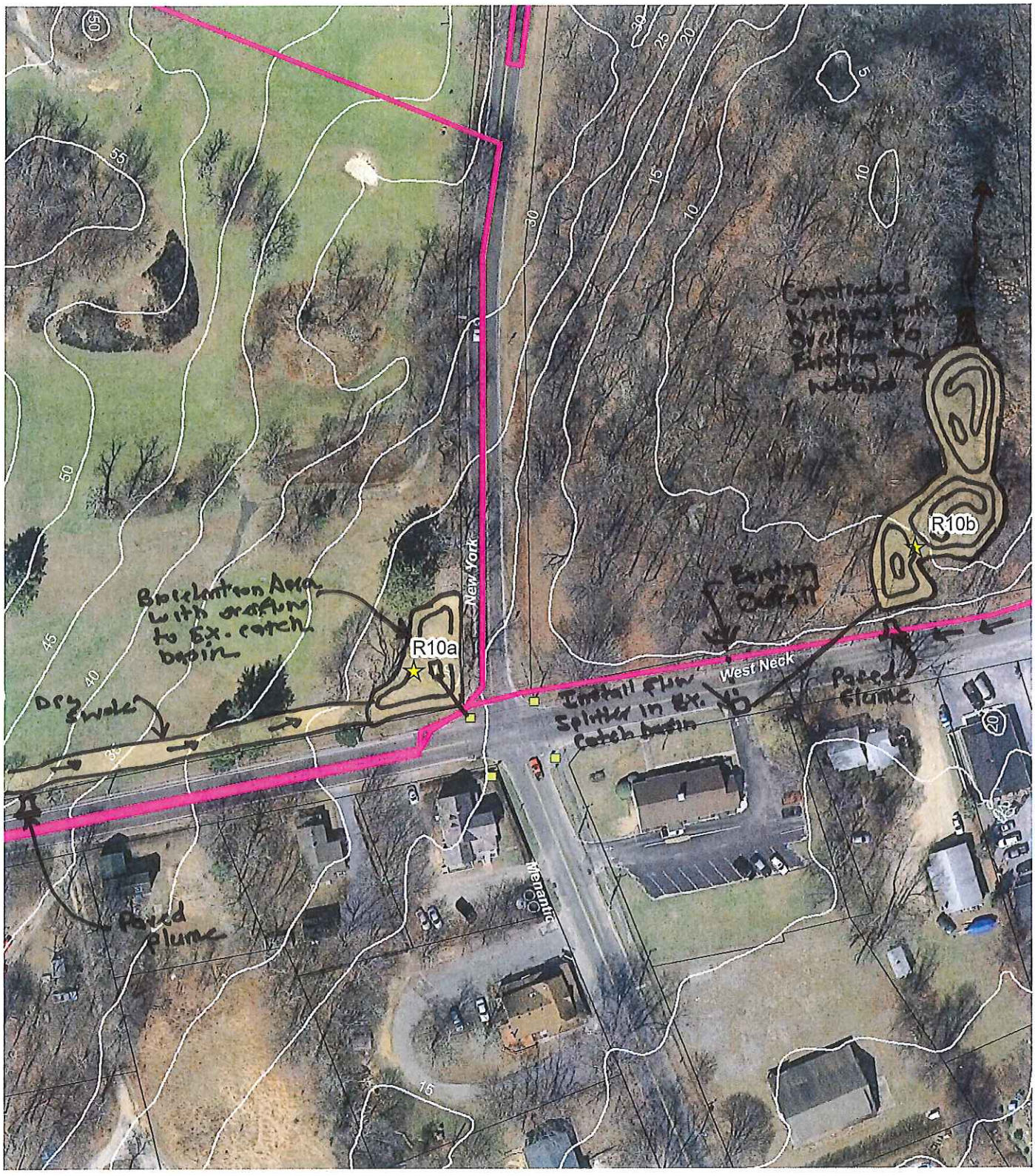


Typical constructed wetland detail (NY Stormwater Manual, 2010).

Figure 6.7 Shallow Wetland (W-1)







Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

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 10
Dering Harbor
Shelter Island, NY
Ice Pond Park South

Date: 12/15/2011

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

DH-R7. New York Avenue — Constructed Wetland

Site Description

Two undeveloped residential waterfront lots (ball fields) off New York Avenue owned by SIHPOC offer potential for managing stormwater from the road, upgradient homes and the golf course. Residents upgradient from this site experience flooding during storm events, and recently, large recharge basins were installed upgradient of New York Avenue.

Proposed Concepts

The concept is to modify the existing catchbasin on the road to convey flows from the road and any runoff not captured by the upgradient rechargers to a **constructed wetland** via **grass channels** on both sides of the open field. This retrofit may require acquisition of the parcels by the Town or obtaining an easement, but this project would also provide enhanced **buffer protection** for Chase Creek and be could be maintained as a public park, with walking/bike paths that weave through the area and benches/signage to educate park users about the watershed issues. Additional runoff volume reduction in this drainage area could be achieved with infiltration swales along the eastern edge of the golf course where the soils have high infiltration rates (HSG A soils).

Practice Sizing/Design Considerations

Constructed pocket wetlands have a shallow permanent pool and are planted with native wetland vegetation to provide pollutant uptake and wildlife habitat. For planning purposes, constructed wetlands that are designed for treating the water quality volume are roughly 1.5% of the total drainage area to the practices. This equates to approximately 25,000 SF of required treatment area, which is available at this site. This surface area could be reduced if more upgradient practices were constructed, such as swales in the golf course as mentioned above.

Pollutant Removal

Constructed wetlands are expected to remove 85% TSS; 48% TP; 30% TN; and 60% bacteria (RI Manual, 2010). This assumes the full design treatment volume can be provided.

Project costs

The construction of Site DH-R7 is expected to cost approximately $315,000. An additional $95,000 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 $10,000 - $16,000, annually.

Next steps

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

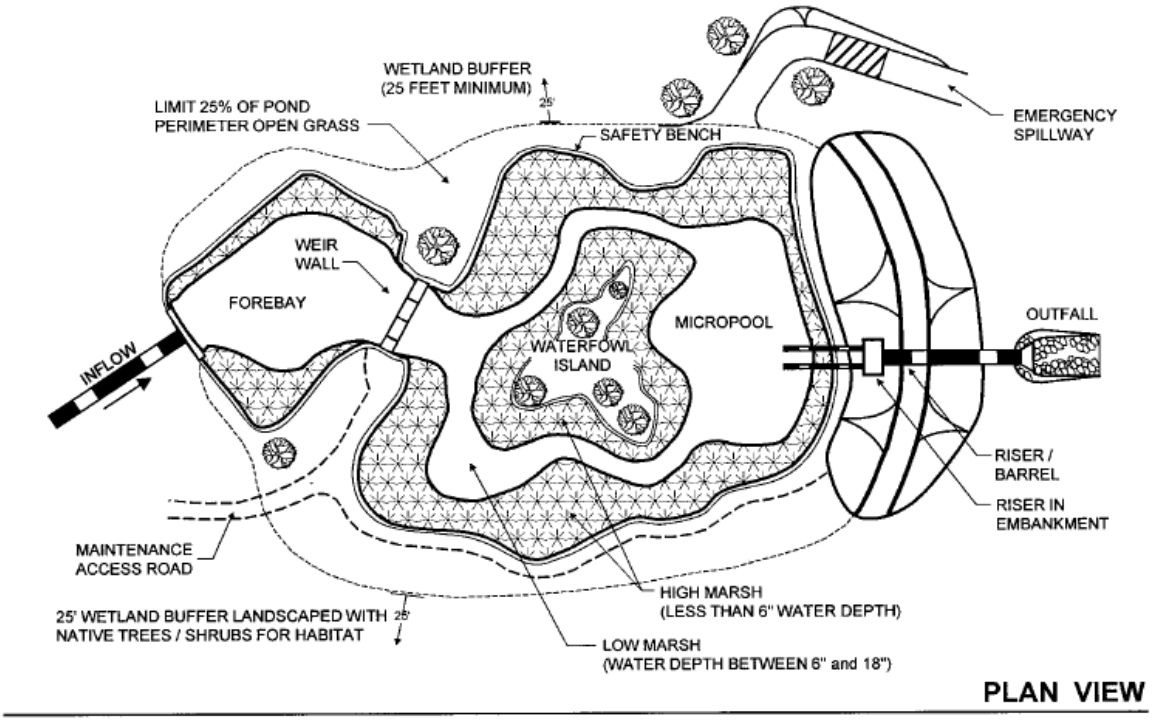
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
DH-R7	38	12	33,100	25,000	25,000

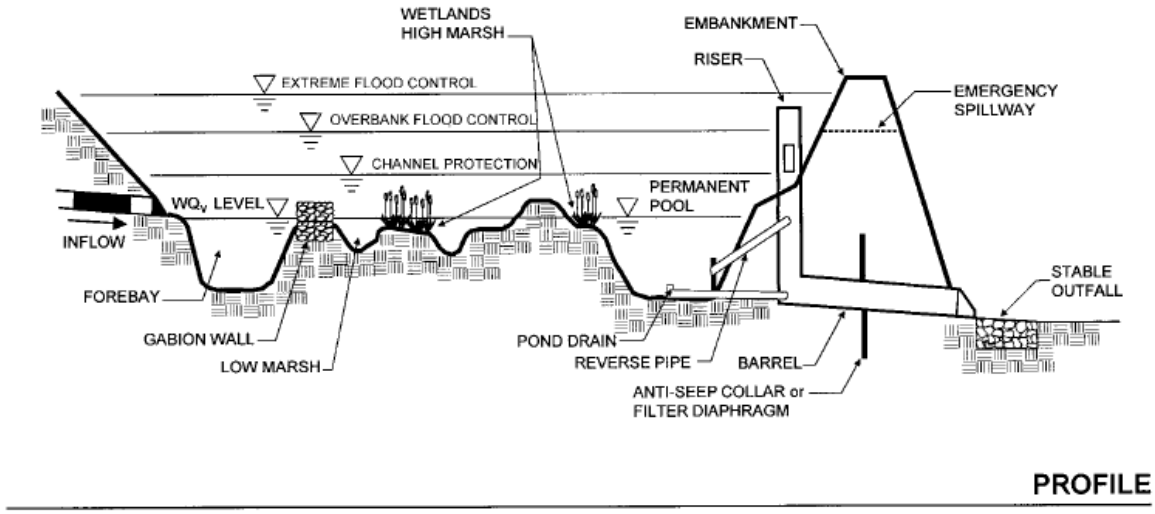
*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*Practice Area Required is calculated based on practice-specific design assumptions (per NY State Stormwater Design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

Typical constructed wetland detail (NY Stormwater Manual, 2010).

Figure 6.7 Shallow Wetland (W-1)





Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

100

Horsley Witten Group
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Retrofit 7
Dering Harbor Subwatershed
Shelter Island, NY
NEW YORK AND MEADOW ST.

Date: 12/15/2011

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

DH-R4. Cedar Avenue/Grand Avenue Park — Terraced dry swale and infiltrating bioretention

Site Description

There is a large open space/park area extending downhill between the commercial area on Grand Avenue and the waterfront along N. Ferry Road and Cedar Avenue that could potentially be used to improve stormwater management. This land is owned by the Peconic Land Trust and managed by SIHPOC. Currently, there is a leaching catch basin in a grass area across the street from the Chequit Inn on Grand Avenue that, upon inspection, was completely clogged by organic debris and sediment. In addition, oils, leachate from dumpsters, nutrients, and other pollutants generated in the commercial area of Grand Avenue are likely being carried by stormwater to this point; therefore, providing a vegetated filter prior to infiltration is a preferred management approach. At the bottom of the hill, there is an existing catchbasin that conveys runoff from Cedar Avenue into an existing depression in the park. The soils here are conducive to infiltration (HSG A).

Proposed Concepts

The total drainage area to this site needs to be further investigated, but it appears that there is enough space here to manage at least the 11 acres (3 acres impervious) initially estimated. The concept is to **modify the existing catchbasin** on Grand Avenue to convey road runoff to a **vegetated swale**, which then transitions down the slope via a **stepped dry swale** system to allow for infiltration. This swale can convey excess flows to a larger **infiltrating bioretention** excavated at the bottom of the hill in the existing depression. Additional bioretention cells can be included in the design, if necessary. To reduce runoff further, residents and commercial properties of the upgradient neighborhood should **disconnect roof runoff** from impervious areas by redirecting downspouts into rain barrels, rain gardens, or pervious lawn/landscaped space.The open space area in the park is an important community asset; therefore, the retrofit goal should be to minimize the footprint of a proposed facility, while taking advantage of the infiltration capacity of the soils and existing drainage features. This would be an effective area for public education signage.

Practice Sizing/Design Considerations

Based on the optimal treatment volume, the bioretention and dry swale surface area should be approximately 12,900 SF of total treatment area. The available surface area for the retrofit is about 11,500 SF but could possibly be enlarged through careful site design within the park. The existing utilities and trees may pose possible conflicts for construction of this retrofit site.

Pollutant Removal

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

Project costs

The construction of Site DH-R4 is expected to cost approximately $336,000. An additional $100,800 should be added for an estimated 10% fee for final engineering design and permitting and a 20% contingency. Long-term operation and maintenance costs are likely to be about 5% of the construction costs, or $16,800, annually.

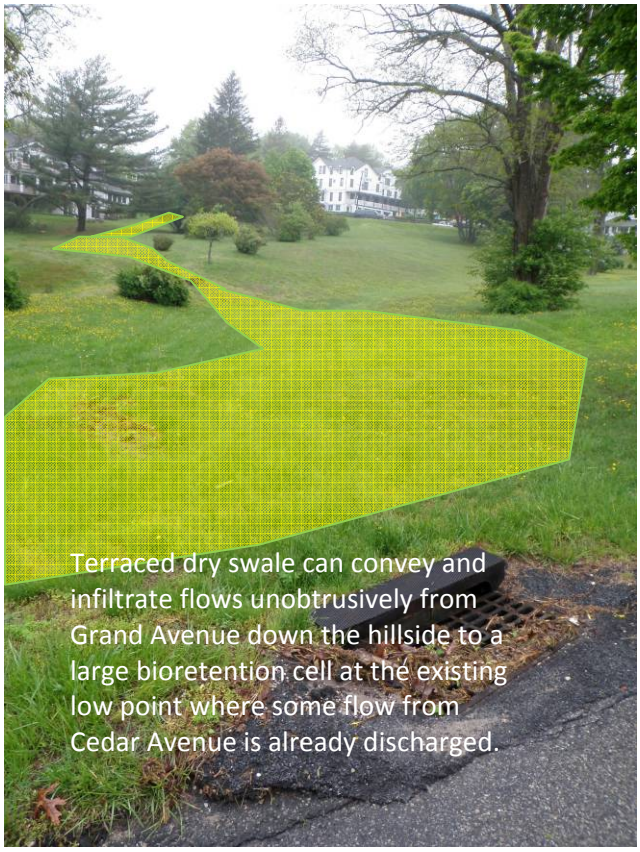
Next steps

- Confirm soil and groundwater conditions;
- Complete a topographic survey; and
- Map existing utilities

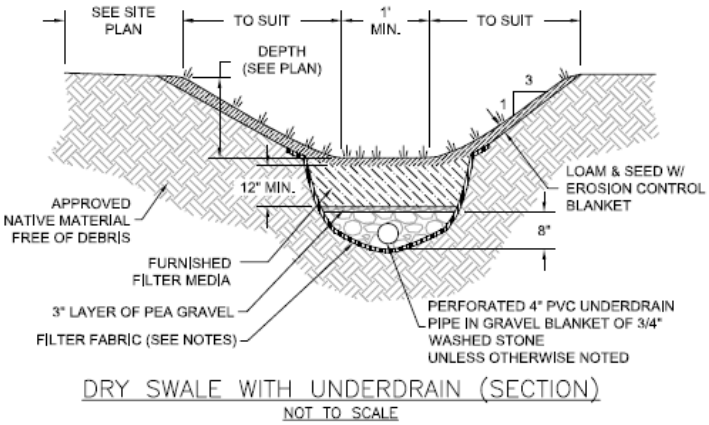
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
DH-R4	11	27	14,000	12,900	11,500

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

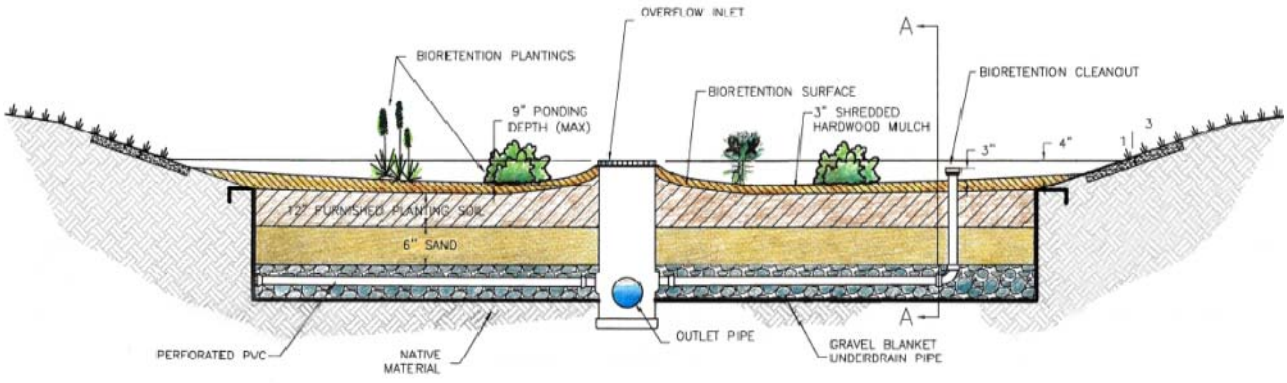
Proposed Concept Sketch



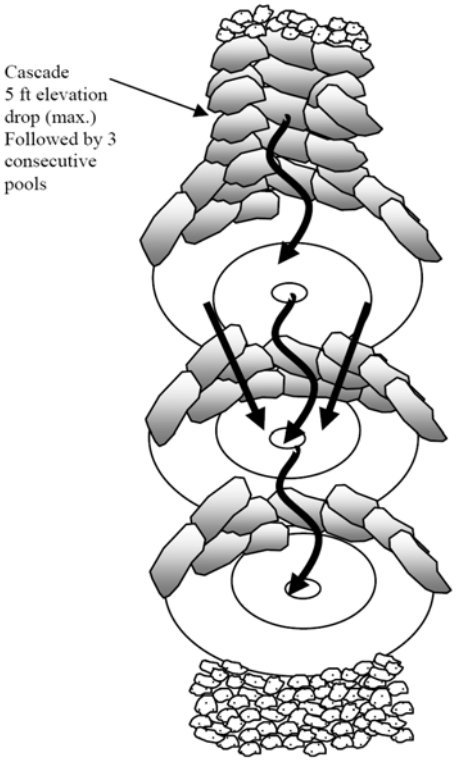
Typical dry swale detail



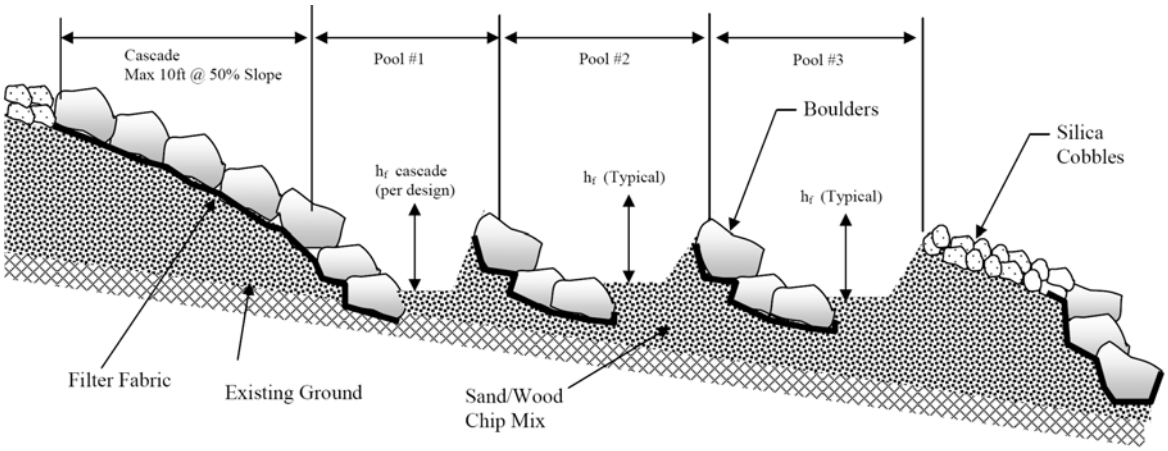
Typical bioretention facility detail, showing filter media, plantings, underdrain if needed, and overflow structure.



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



Cascade Sequence



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

SIZING AND LAYOUT OF PROPOSED PRACTICES DEPEND ON CONFIRMATION OF DA & LOCAL DISCUSSIONS RE: PARK USE

N

90 Feet

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Retrofit 4
Dering Harbor Subwatershed
Shelter Island, NY
GRAND/CEDAR PARK

Date: 12/14/2011

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

DH-R31. Sylvan and Auburn Avenues —dry swale and bioretention system

Site Description

The green space between Auburn and Sylvan Avenue (owned by SIHPOC) provides a great opportunity to capture and treat runoff from a residential area prior to infiltration. There are at least three existing catchbasins along the road in this area; one of which is a recently installed leaching catchbasin.

Proposed Concepts

The concept proposed here is to divert flows via paved flumes from the top of the open space into a **shallow dry swale** (planted with grass to allow for pedestrian crossing and mowing) and then into a **large infiltrating bioretention facility**. The overflow from large storm events can be directed into the existing leaching catchbasin. Confirmation of the size of the contributing drainage area, the location of trees, and the location of catchbasins will determine the final footprint of the facility. Plantings will need to be shade tolerant as there is a high percentage of canopy cover at this location. Additionally, a smaller raingarden can be placed at the bottom of the hill in the grassed area upstream of the outfall. **Educational signage** and a **pet waste station** may be ideal for this location.

Practice Sizing/Design Considerations

Based on the optimal treatment volume, the bioretention and dry swale surface area should be approximately 10,400 SF of total treatment area. The available surface area for the bioretention area is about 10,000 SF but could possibly be enlarged through the design process. The existing utilities and trees may pose possible conflicts for construction of this retrofit site.

Pollutant Removal

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

Project costs

The construction of Site DH-R31 is expected to cost approximately $297,000. An additional $89,100 should be added for an estimated 10% fee for final engineering design and permitting and a 20% contingency. Long-term operation and maintenance costs are likely to be about 5% of the construction costs, or $14,850, annually.

Next steps

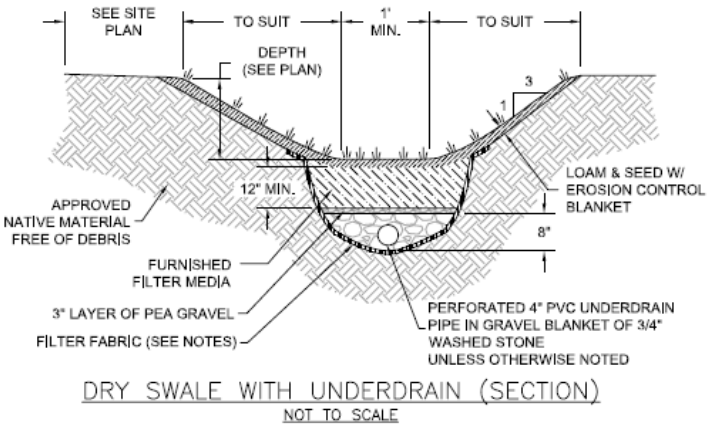
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map existing utilities and trees; and
- Map existing resource area boundaries and buffers.

Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
DH-R31	6.8	37	11,500	10,400	10,000

*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.

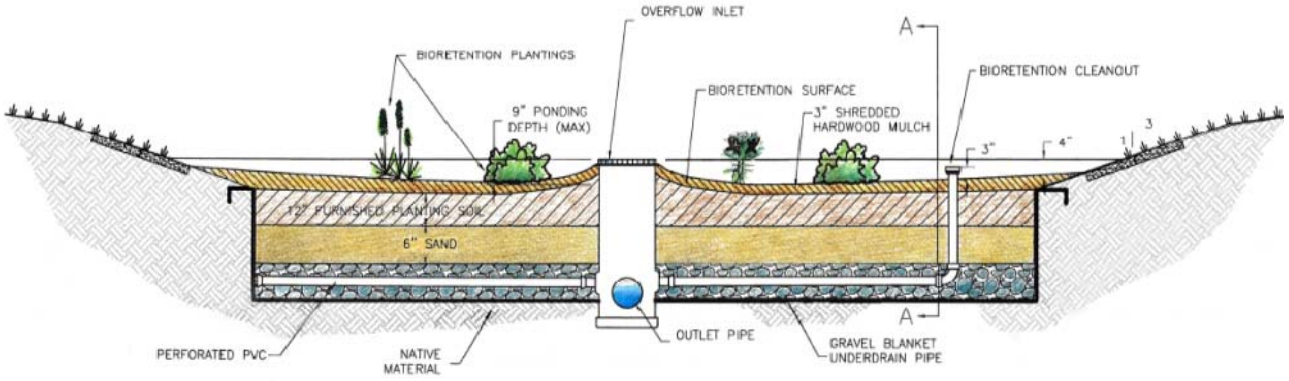
Proposed Concept Sketch

Typical dry swale detail

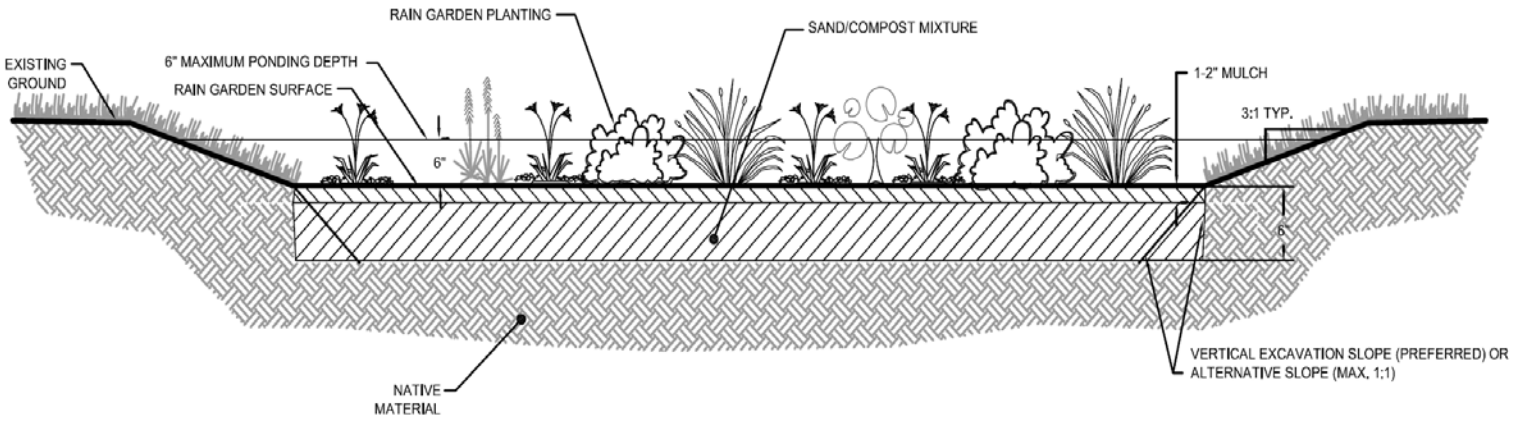


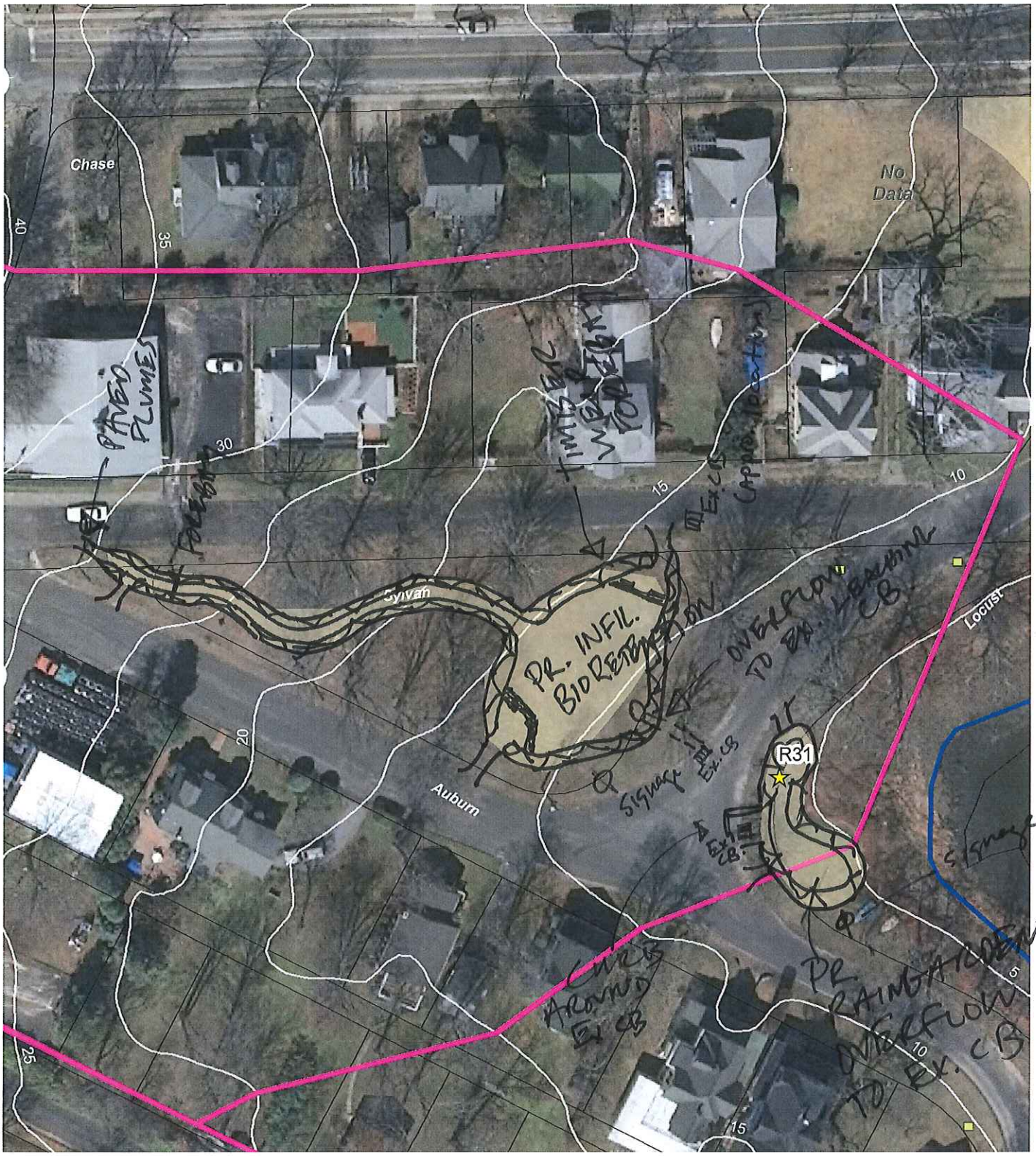
DRY SWALE WITH UNDERDRAIN (SECTION)
NOT TO SCALE

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



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





Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

60 Feet

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Retrofit 31
Dering Harbor
Shelter Island, NY
SYLVAN/AUBURN

Date: 12/18/2011

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

DH-R19. Yoco Road — Raingarden

Site Description

Runoff flows down the open-sectioned Yoco Road and ponds at the cul-de-sac/Shore Road intersection. Flooding is reportedly a chronic issue at this location. The only stormwater infrastructure observed in the area is uphill at the intersection of Yoco and Locust.

Proposed Concepts

There appears to be sufficient room in the grassed areas around Yoco Road to excavate **raingardens** that may help provide some temporary storage and treatment, as well as some infiltration even though the soils in this area are HSG B and C. It is assumed that the drainage area to this site does not include areas east of Locust Road, which are presumed to be captured in the leaching catchbasin at the intersection. If it is determined that additional drainage area does contribute, swales along either side of the road may need to be installed in addition to the raingardens.

From a comparison of 2010 and 2011 aerial photos, the vegetated buffer area between the beach and the cul-de-sac appears to have been cleared and replaced with lawn. Retrofits opportunities at this site should look to re-establish some of the protective plants in this area.

Finally, the neighborhood landscapes include lawns right up to the shoreline; an **improved buffer** between the lawns and creek should be created throughout this area by re-vegetating some of the lawn area with native plants. Enhancement of the buffer will help reduce bacteria contribution by deterring geese from the area and minimize nutrients by reducing fertilizer use in close proximity to the creek.

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

Practice Sizing/Design Considerations

The raingarden surface area should be approximately 2,200 SF of total treatment area. This surface area is available at the site.

Pollutant Removal

Raingardens 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 DH-R19 is expected to cost approximately $32,500. An additional $9,750 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 $975 - $1,625, annually.

Next steps

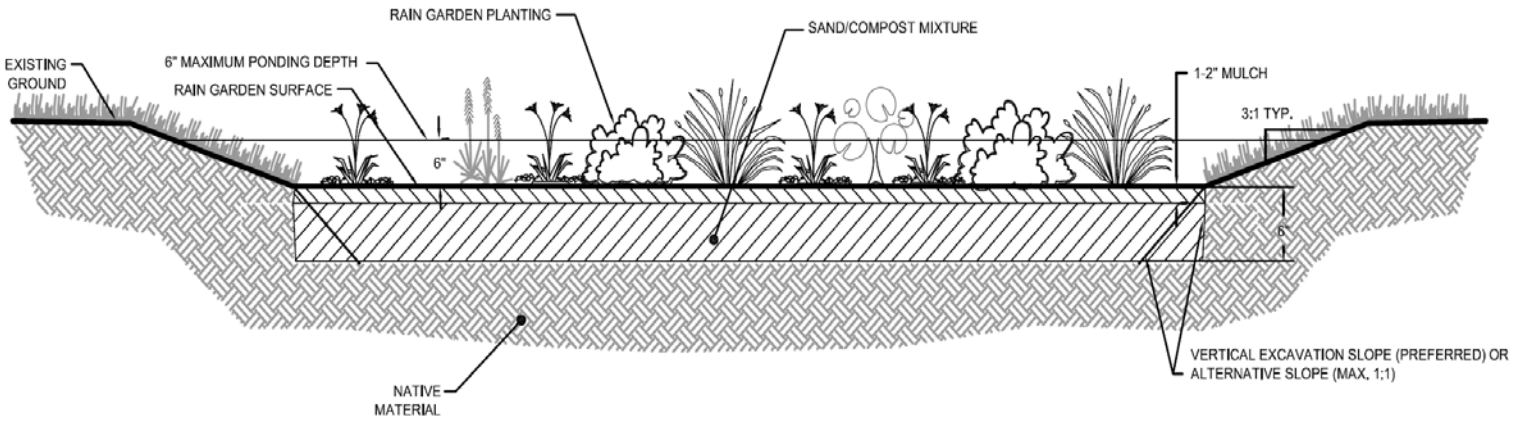
- Approach the residents in the neighborhood to discuss the concept;
- Confirm soil and groundwater conditions;
- Complete a topographic survey;
- Map limits of right-of-way; and
- Map existing resource area boundaries and buffers.

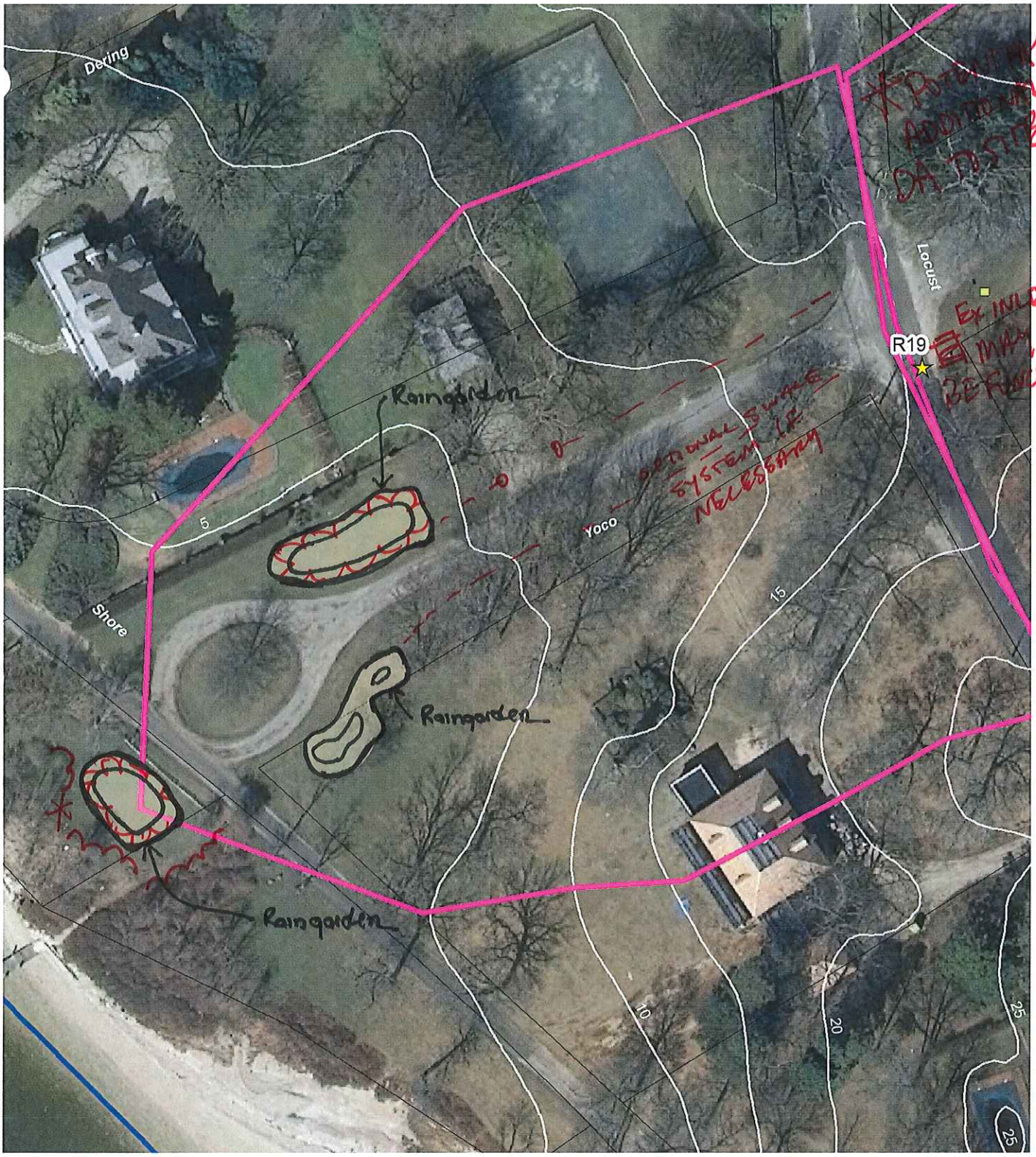
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
DH-R19	2.3	21	2,400	2,200	2,200

*Design Water Quality Volume: WQv (cf) = (1.2")(Rv)(A)/12; where Rv = 0.05+0.009(I), A = drainage area (sf), I = percent impervious cover (per NY State Stormwater Design Manual, 2010).
*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 raingarden detail, showing soil amendments (if needed), plantings, and mulch.





Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

*NOTE: A SIGNIFICANT AMOUNT OF CLEARING OF EX. VEG BUFFER FROM 2010 — 2011

N

Feet

60

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Retrofit 19
Dering Harbor
Shelter Island, NY
YOCO ROAD

Date: 12/16/2011

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

DH-R24. Outfall at Winthrop Road Bridge — Dry swale and deep sump catch basin

Site Description

Road runoff enters an existing catchbasin and leaching pit that is partially clogged and causes water to be conveyed further down the road to a paved flume with a direct pipe discharge into Gardiners Creek. Residents report sediment plumes at this location. According to mapping information, soils are questionable for infiltration (HSG C soils).

Proposed Concepts

The concept for this site is the installation of a **dry swale** in road right-of-way, just uphill from existing catchbasin to provide pretreatment. This site also includes the replacement of the paved flume on the causeway with a **deep sump catchbasin** for some capture of sediment before direct discharge. There does not appear to be enough room for the swale to meet full water quality volume criteria, but this retrofit will alleviate erosion from the clogged leaching pit to the banks of Gardiners Creek and reduce direct discharge of runoff through the paved flume.

Practice Sizing/Design Considerations

Based on the optimal treatment volume, the dry swale surface area should be approximately 1,630 SF of total treatment area. The available surface area for the retrofit is about 240 SF but could possibly be enlarged by removing roadside trees. The existing utilities may pose additional conflicts for construction of this retrofit site. Further investigation on distance to groundwater would be required to pursue this retrofit, as well as a commitment to frequent maintenance due to the swale not meeting the full water quality volume.

Pollutant Removal

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

Project costs

The construction of Site DH-R24 is expected to cost approximately $7,000, but this cost would increase if the dry swale could be enlarged to provide additional treatment. An additional $5,000 should be added for final engineering design and permitting and a contingency. Long-term operation and maintenance costs are likely to be about 5-7% of the construction costs, or $350-500, annually.

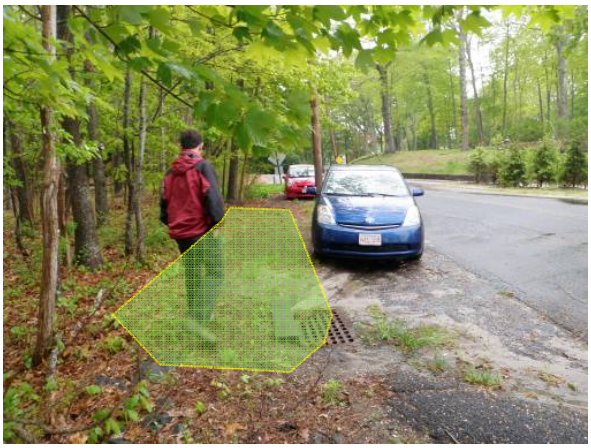
Next steps

- Confirm soil and groundwater conditions;
- Determine space available and how many trees could be removed;
- Complete a topographic survey;
- Map existing utilities;
- Map limits of right-of-way; and
- Map existing resource area boundaries and buffers.

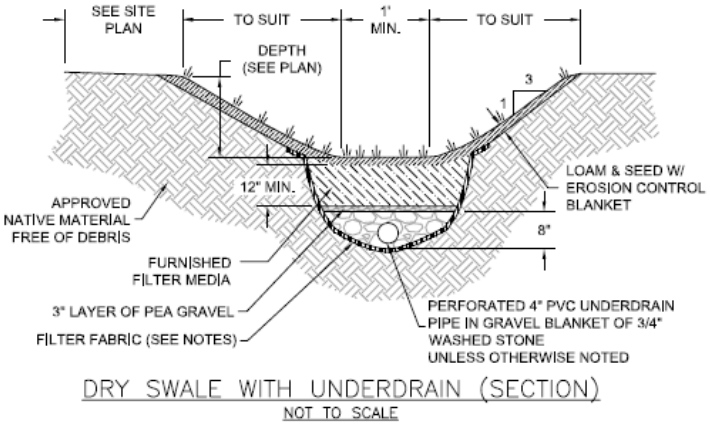
Site ID	Drainage Area (ac)	% Impervious	Design Treatment Volume (cf)*	Practice Area Required (sf)*	Practice Area Available (sf)*
DH-R24	1	42	1,800	1,630	240

*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.

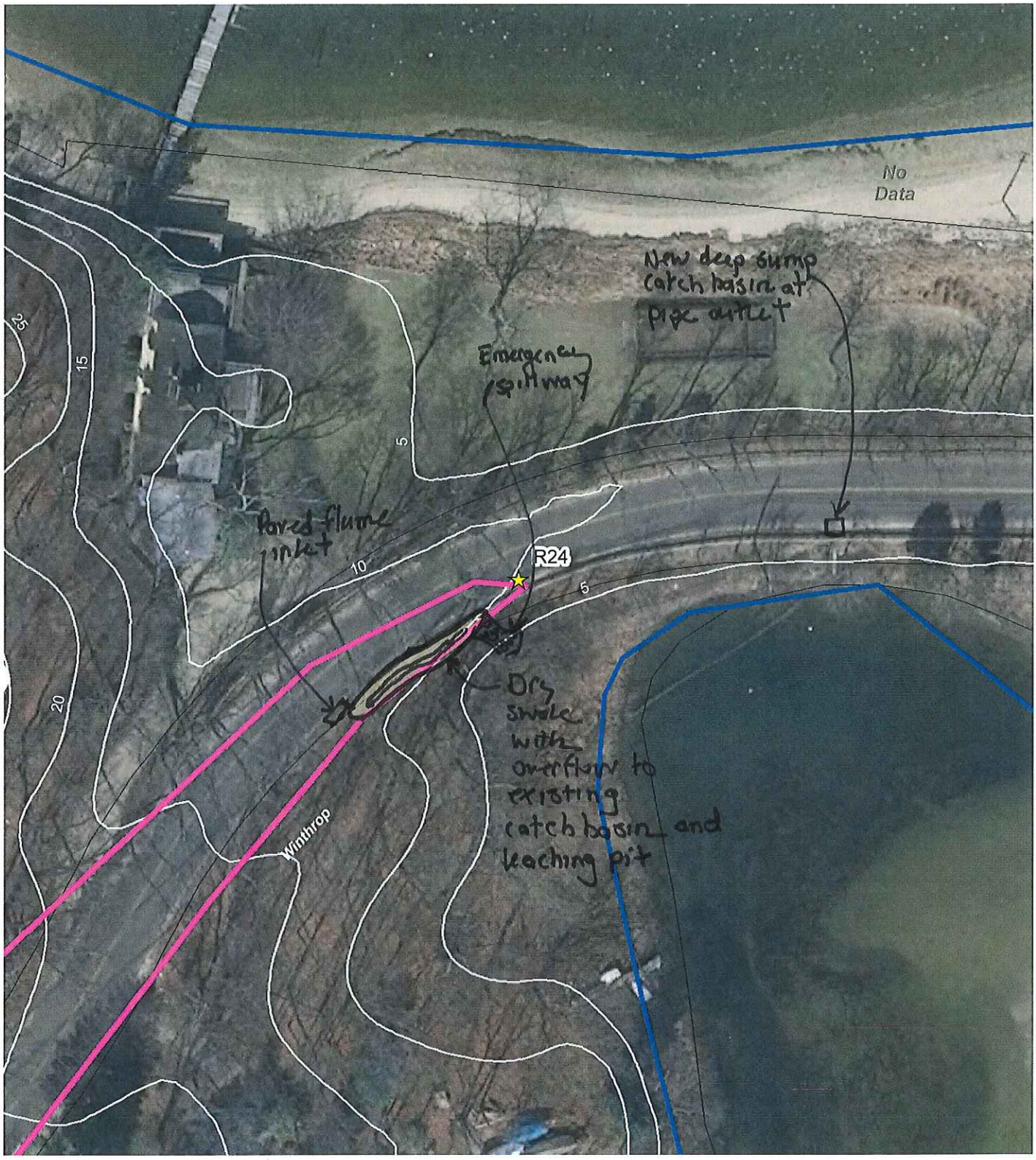
Proposed Concept Sketch



Typical dry swale detail



DRY SWALE WITH UNDERDRAIN (SECTION)
NOT TO SCALE



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

50

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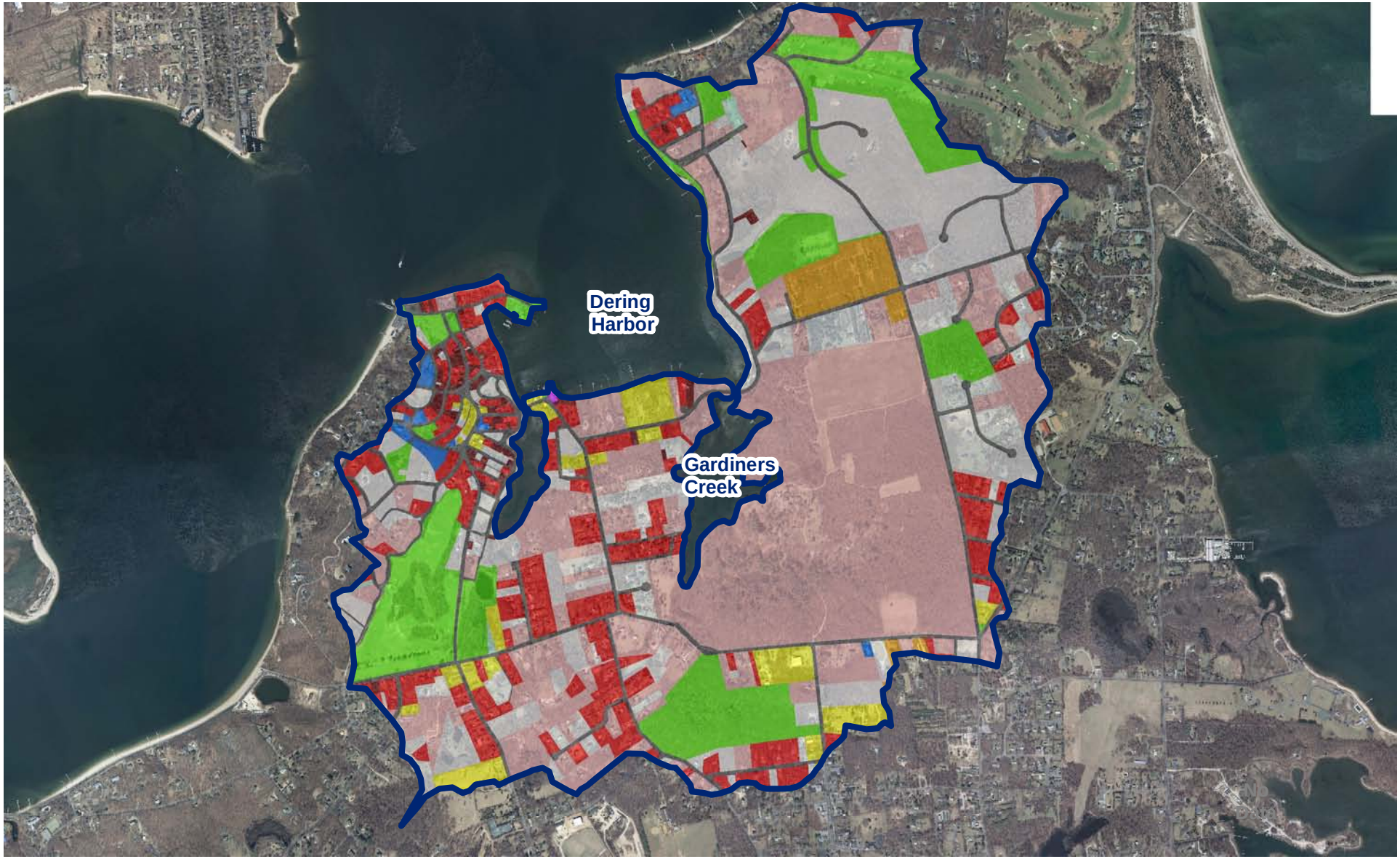
Retrofit 24
Dering Harbor
Shelter Island, NY

Date: 12/16/2011

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

APPENDIX A:

SUBWATERSHED BASELINE MAPS



Legend

Dering Harbor and Gardiners Creek Subwatershed

Land Use

- Transportation
- Low Density Res.
- Med Density Res.
- High Density Res
- Commercial
- Industrial
- Institutional
- Open Space
- Agricultural
- Vacant
- Utilities
- Waste Handling & Mant.

N

Feet

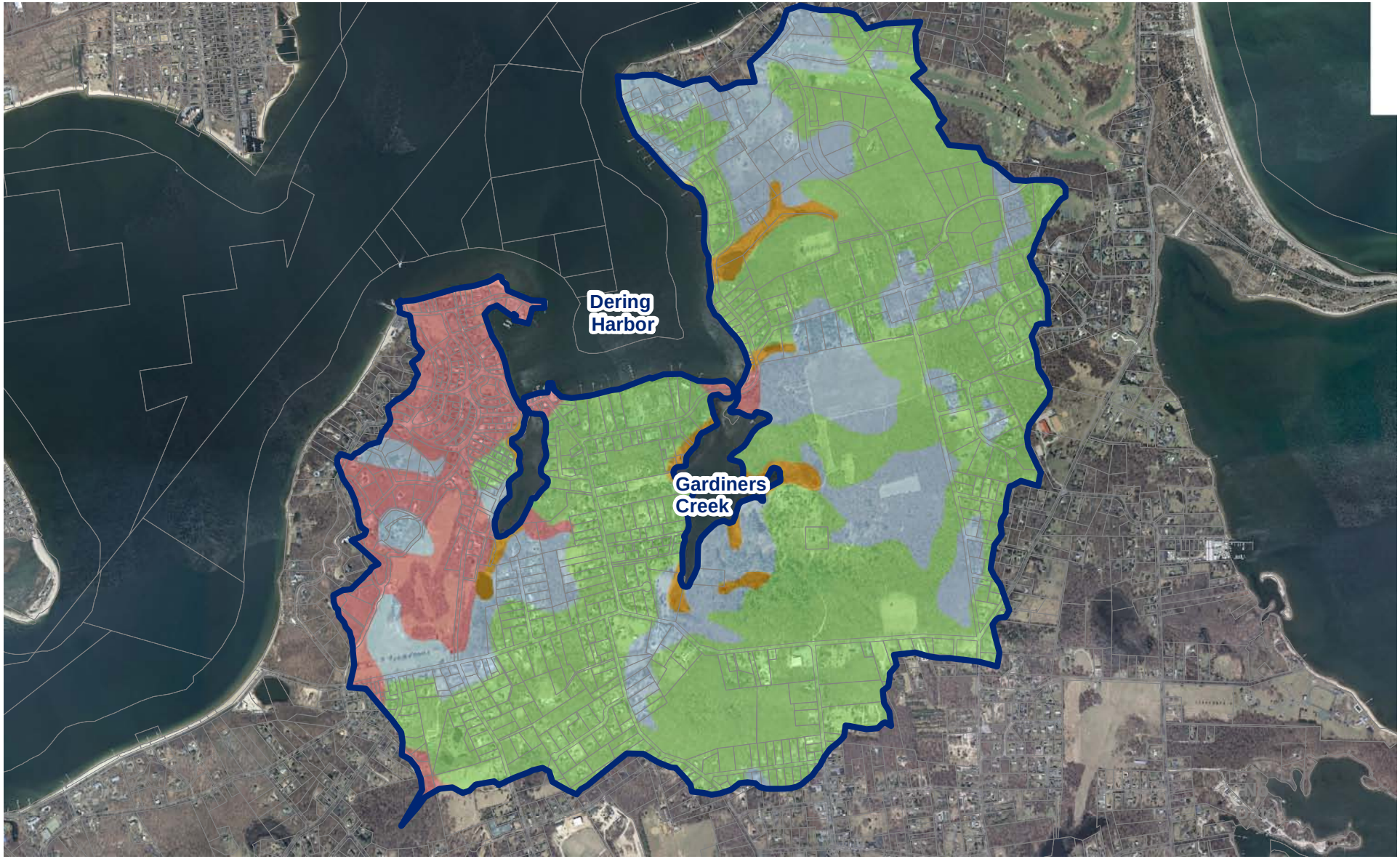
1,750

Horsley Witten Group
Sustainable Environmental Solutions

Land Use
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 6/30/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\Land_Use\130628_DH_LandUse_9072.mxd



Legend

Dering Harbor and Gardiners Creek Subwatershed

Hydro Group

- A
- B
- B/D
- C
- C/D
- D
- U

N

Feet

1,750

Horsley Witten Group
Sustainable Environmental Solutions

Soils
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 6/30/2013

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\Soils\130628_DH_Soils_9072.mxd

APPENDIX B:

FIELD FORMS AND SKETCHES

FIELD FORMS - RETROFITS

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R1 SPRINGGARDEN/BAY **Subwatershed:** Devins Harbour

Date: 5/16/11 **Assessed by:** MK/JH

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: WATERSHED BOUNDARY QUESTIONABLE

Heights

Land Use: ☐ Public ☒ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____ IN RES. AREA

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☒ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

CATCHBASIN FULL of sediment, no sign of leaching chamber, large pavement area in roadway adjacent to grassed open space area. Runoff from neighborhood roads flows down to

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☒ reforestation ☒ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 1.7 acres/sq ft

Imperviousness ≈ 40 %

Impervious Area ≈ 30138 acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☒ Demonstration / Education ☐ Repair ☐ Other:

Possible Conflicts due to: ☐ Soils ☐ Access
☐ Adjacent Land Use ☒ Existing Utilities
☐ Contamination ☐ High water table
☐ Wetlands ☐ Other:

Describe conflicts: maybe used for parking?

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☒ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☒ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☒ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other: confirm in watershed
☐ Obtain utility mapping
☒ Perform test pits

Site ID _____

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Align roadway and remove pavement. Use existing open area and catchbasin for overflow in raingarden. Good soils possible infiltration.

Sketch and/or Sizing Calcs:

See aerial

≈ 2,600 sq ft pavement removal

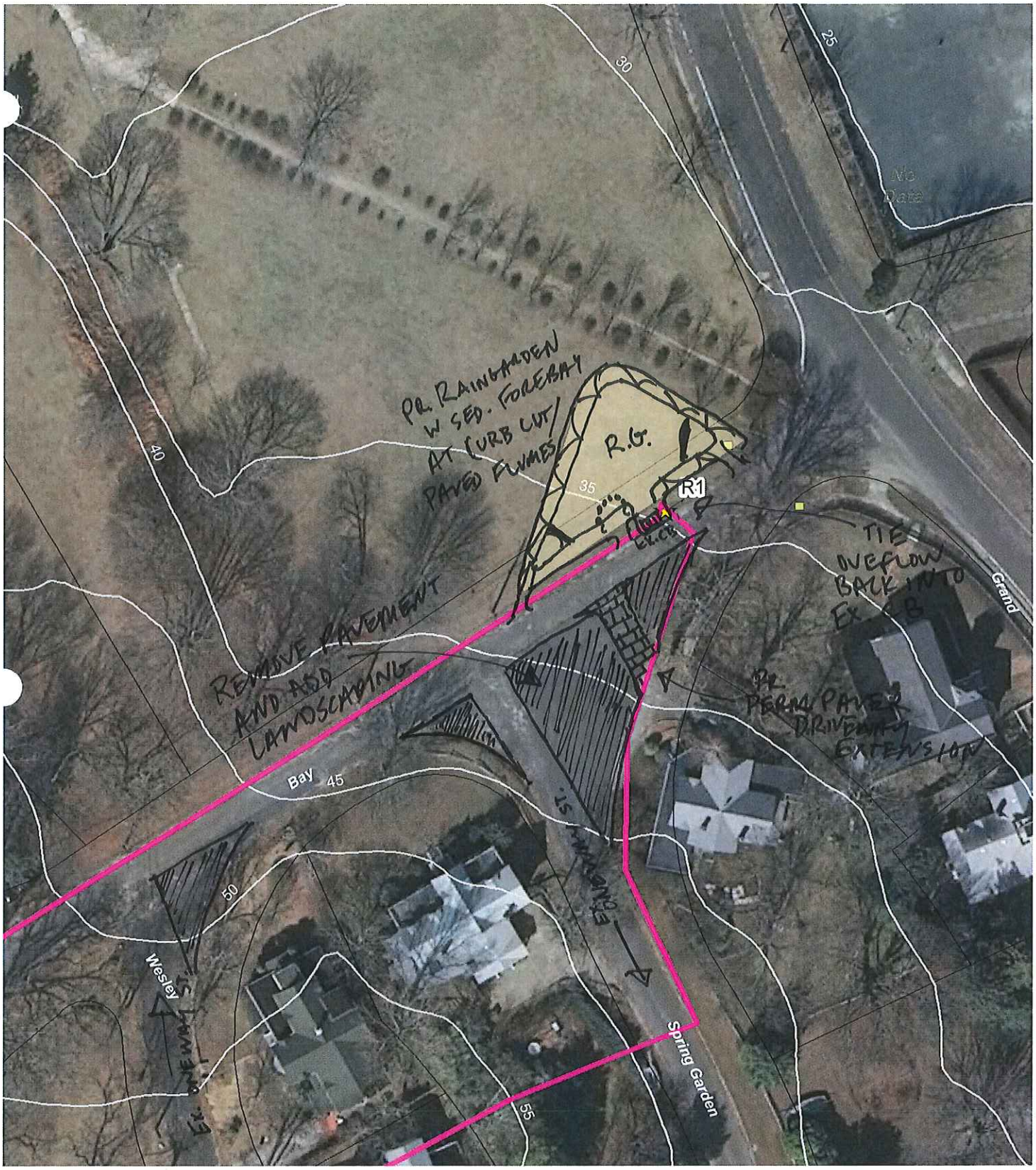
≈ total footprint required for raingarden is ≈ 2800 sq ft for 100% WQv

One-way road. remove 1,600 sq ft of pavement and vegetation. Could reduce size of raingarden in field if this corner was also used as a raingarden.

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

50 Feet

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Retrofit 1
Dering Harbor Subwatershed
Shelter Island, NY
SPRING GARDEN / BAY STs

Date: 12/14/2011

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

75 Feet

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Sustainable Environmental Solutions

Retrofit 1
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R2 / DH-R3 **Subwatershed:** Devins Harbor

Date: 5/16/11 OUR LADY OF THE ISLE **Assessed by:** AMC / JH

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info:

Land Use: ☐ Public ☒ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☒ Park ☐ Agricultural ☐ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☒ Other: CHURCH

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☐ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☐ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☒ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

LARGE CHURCH PARKING LOT → NO STORMWATER MANAGEMENT. DRAINS TO ROAD (SPRING GARDEN) AND ACROSS STREET TO PARK. UNKNOWN STRUCTURE EDGE OF ROAD OVERFLOW / EROSION INTO PARK (R3)

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☒ swale ☐ planter ☐ tree pits ☑ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☒ Parking Lot ☐ other small impervious area
☐ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 5.2 acres/sq ft

Imperviousness ≈ 40 %

Impervious Area ≈ 2.13 acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☒ Recharge
☒ Demonstration / Education ☐ Repair ☐ Other:

Possible Conflicts due to: ☐ Soils ☐ Access
☒ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☐ High water table
☐ Wetlands ☐ Other:

Describe conflicts:
LOSS OF PARKING SPACE
TREE ISSUES

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☒ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☒ Confirm property ownership
☒ Confirm drainage area/impervious cover
☐ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Restripe parking lot and install landscape areas. Install catchbasin on south edge of parking lot at low point, pipe across street to DMH and down hill to existing ~~storm~~ drainage area. Regrade and plant ex drainage area as raingarden/bio

Sketch and/or Sizing Calcs:

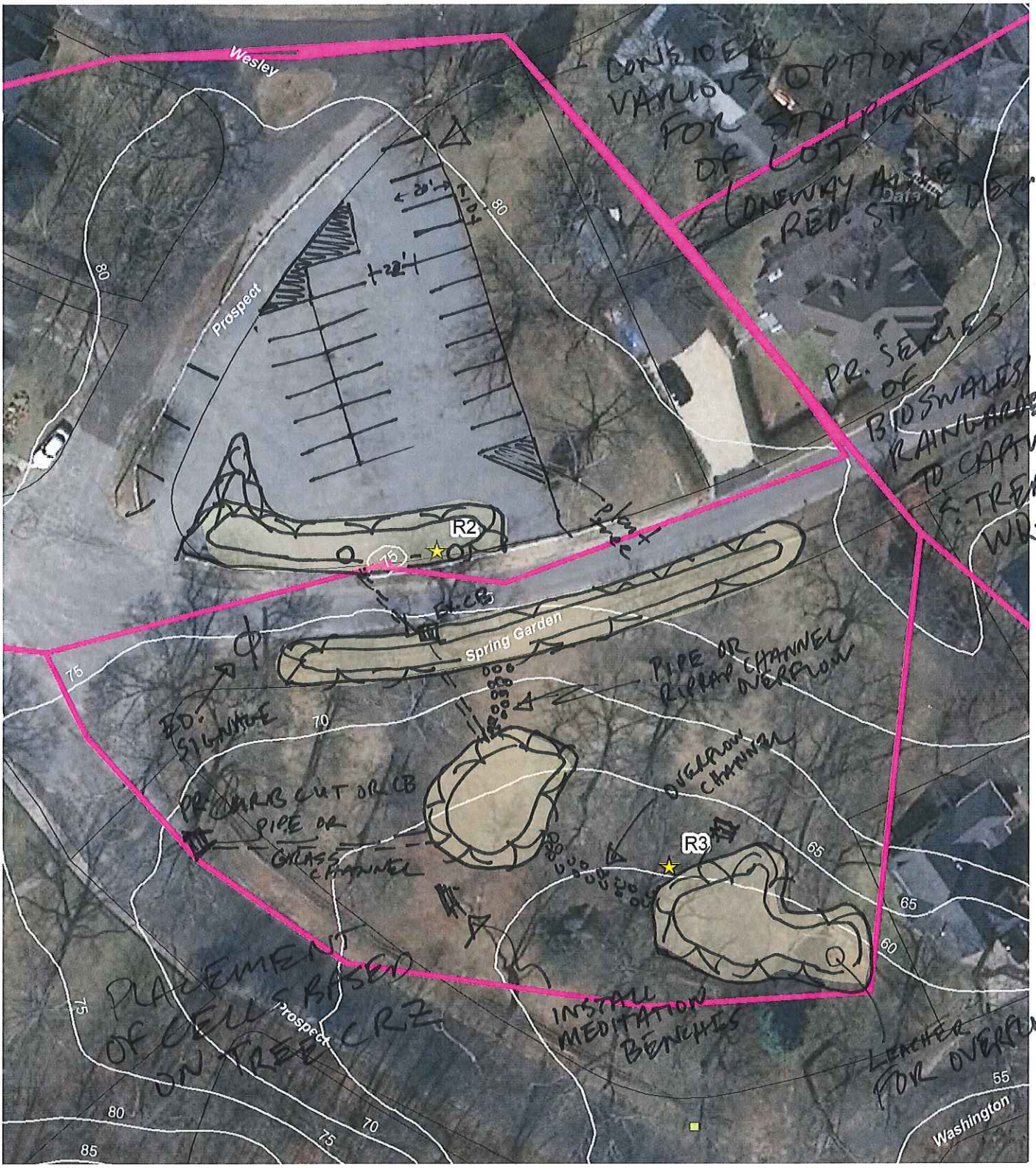
see aerial

4 acres
92,952

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

50

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Retrofit 2/3
Dering Harbor Subwatershed
Shelter Island, NY

Date: 12/14/2011

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

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

Feet

60

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Sustainable Environmental Solutions

Retrofit 2
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R4 PARK **Subwatershed:** Dering harbor

Date: 5/12/11 CEDAR/ORIANO **Assessed by:** AK/JH/RAC/AB

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info:

Land Use: ☒ Public ☐ Private ☐ Unknown: PARK

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☒ Park ☐ Agricultural ☐ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown: SWALE THRU PARK (?)

Soils: ☒ Unknown ☐ poor infiltration ☐ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

INLET FROM ORIANO/NY ST TO LEACHER IN PARK - FILLED COMPLETELY CAN'T TELL HOW MUCH DRAINING THERE .. EX. DEPRESSION AT BOTTOM OF HILL HAS DRAINAGE FROM ORIANO RD COMING IN IT.

DA to SITE MAY INCLUDE UPHILL COMMERCIAL & RESIDENTIAL

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☒ swale ☐ planter ☐ tree pits ☒ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☒ Other (describe): COMMERCIAL DOWNTOWN

Drainage Area to retrofit ≈ _____ acres/sq ft

Imperviousness ≈ _____ %

Impervious Area ≈ _____ acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☒ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☐ Access
☐ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☒ High water table
☐ Wetlands ☐ Other:

Describe conflicts:
PARK/OPEN TURF, MAY NOT WANT TO LOSE.

NEXT STEPS

Candidate for pilot project ☒ yep, love it ☐ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☒ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

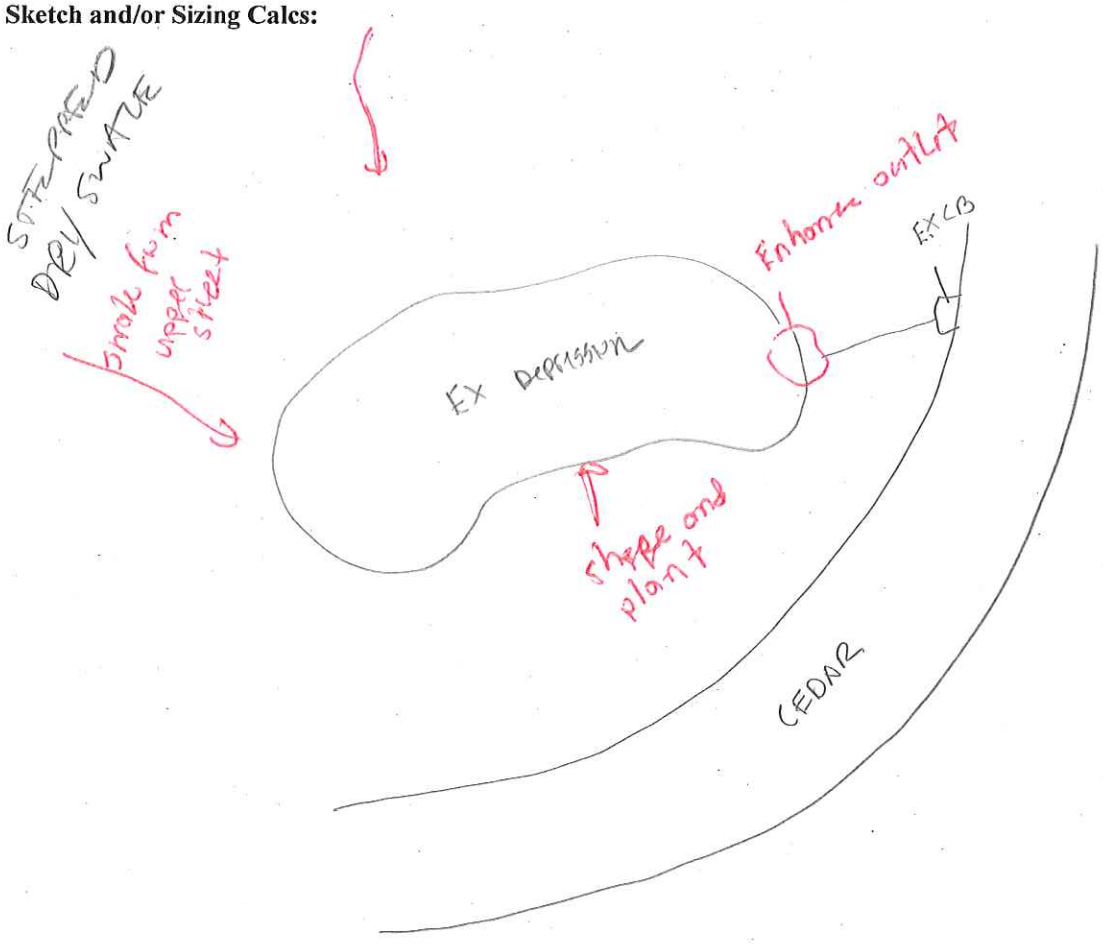
PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

A) ENHANCE EXISTING CB AND DEPRESSION

B) TAKE RUNOFF FROM COMMERCIAL AREA ON GRADE ABANDON EXISTING CB / INSTALL INLET PIPE DOWN TO EX DEPRESSION OR DRY SWALE TO ENCOURAGE INFILTRATION WITHOUT LOSING OPEN SPACE.

Sketch and/or Sizing Calcs:



Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

0

Feet

60

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Retrofit 4
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS OH R-5 **RETROFITS**

Site Name/ID: Corner Locust / Chase Ave **Subwatershed:** Dering Harbor

Date: 5/16/11 **Assessed by:** JH / AZK

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info:

Land Use: ☒ Public ☒ Private ☐ Unknown: LAWN & ROAD ROW

☒ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☒ Unknown ☐ poor infiltration ☐ good infiltration ON A/D LINE

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

Catchbasin on road at intersection clogged... temporary fix to drainage problem involved installation of 2 PVC pipes with direct discharge to Chase Creek. No treatment.

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☒ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 2 (acres/sq ft)
Imperviousness ≈ 50 %
Impervious Area ≈ 1 (acres/sq ft)

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☒ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☐ Access
☒ Adjacent Land Use ☒ Existing Utilities
☐ Contamination ☐ High water table
☐ Wetlands ☐ Other:

Describe conflicts:
Fire Hydrant

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☐ OK ☐ undecided ☒ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☐ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☒ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

install grass swale in road ROW and bio (or other infil practice) on private property. Overflow to existing catch basin. Swale to provide pretreatment for catch basins to reduce clogging. Replace 2 PVC pipes in deep sump CB

Sketch and/or Sizing Calcs:

see sketch.

Probably not feasible

check soils

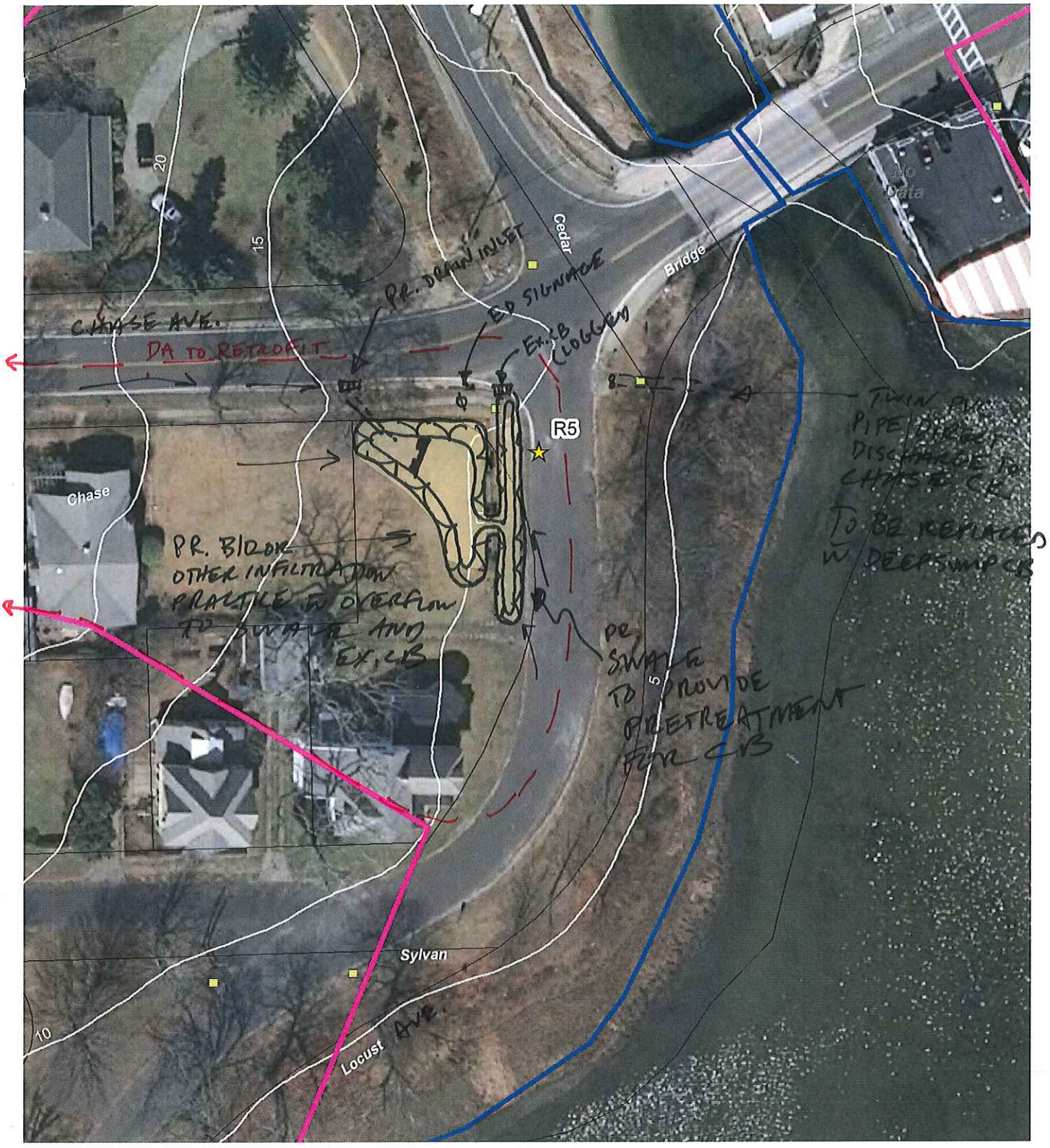
≈ 45% WQv ; but need to confirm DA

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☒ Medium ☐ High

Site ID_____



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

50

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Retrofit 5
Dering Harbor Subwatershed
Shelter Island, NY
LOCUST & CHASE

Date: 12/15/2011

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

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R6 Meadow/Locust Ave **Subwatershed:** Dering Harbor

Date: 9/16/11 **Assessed by:** JH/NCK

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info:

Land Use: ☐ Public ☒ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☐ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☐ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:
Existing runoff from Meadow Ln/Rd including pavement and overflowing catchbasins. Brief sheet eroding along edge of roadway

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☒ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☒ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 1.3 acres/sq ft
Imperviousness ≈ 32 %
Impervious Area ≈ 0.5 acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☐ Demonstration / Education ☒ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☒ Access
☐ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☒ High water table
☒ Wetlands ☐ Other:

Describe conflicts: Existing soils unknown Proximity BW and to chase creek.

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☐ OK ☐ undecided ☒ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☒ Confirm property ownership
☒ Confirm drainage area/impervious cover
☒ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☒ Obtain detailed topography
☒ Confirm storm drain invert elevations
☐ Other:
☒ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

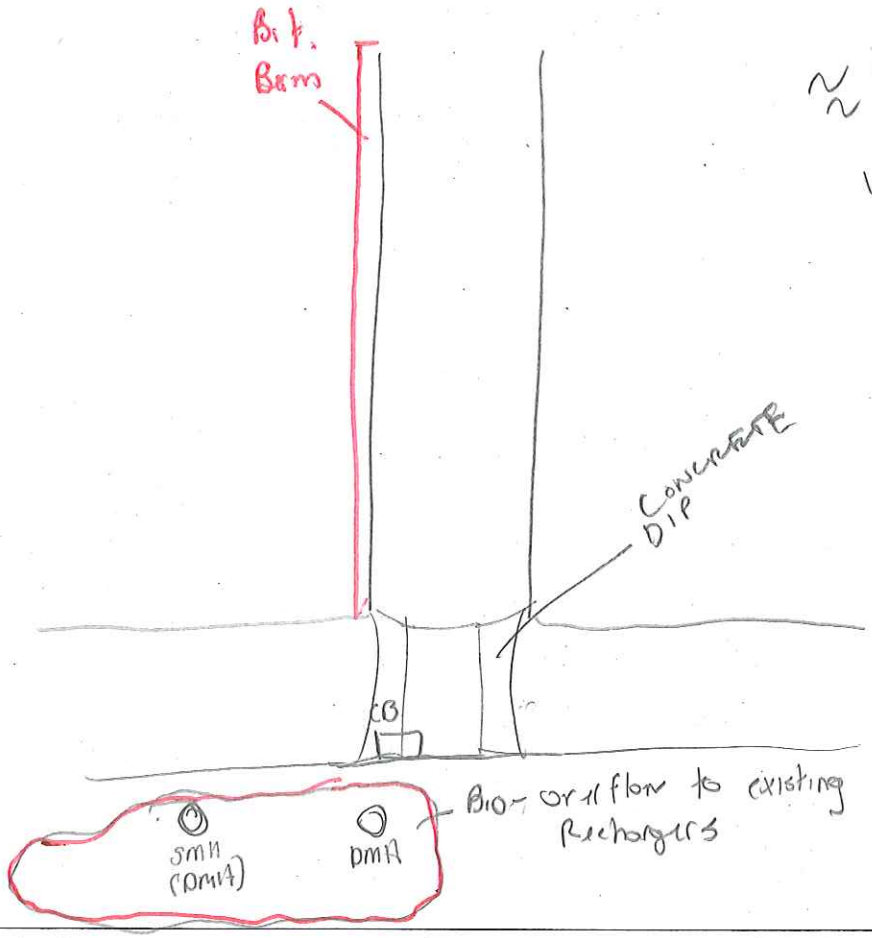
PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

- New bit. berm along south side of Meadow Place
- New driveway inverts
- connect existing CB's at intersection of Meadow and Locust to Bio/RainGarden.

↳ or improve buffer vegetation.

Sketch and/or Sizing Calcs:

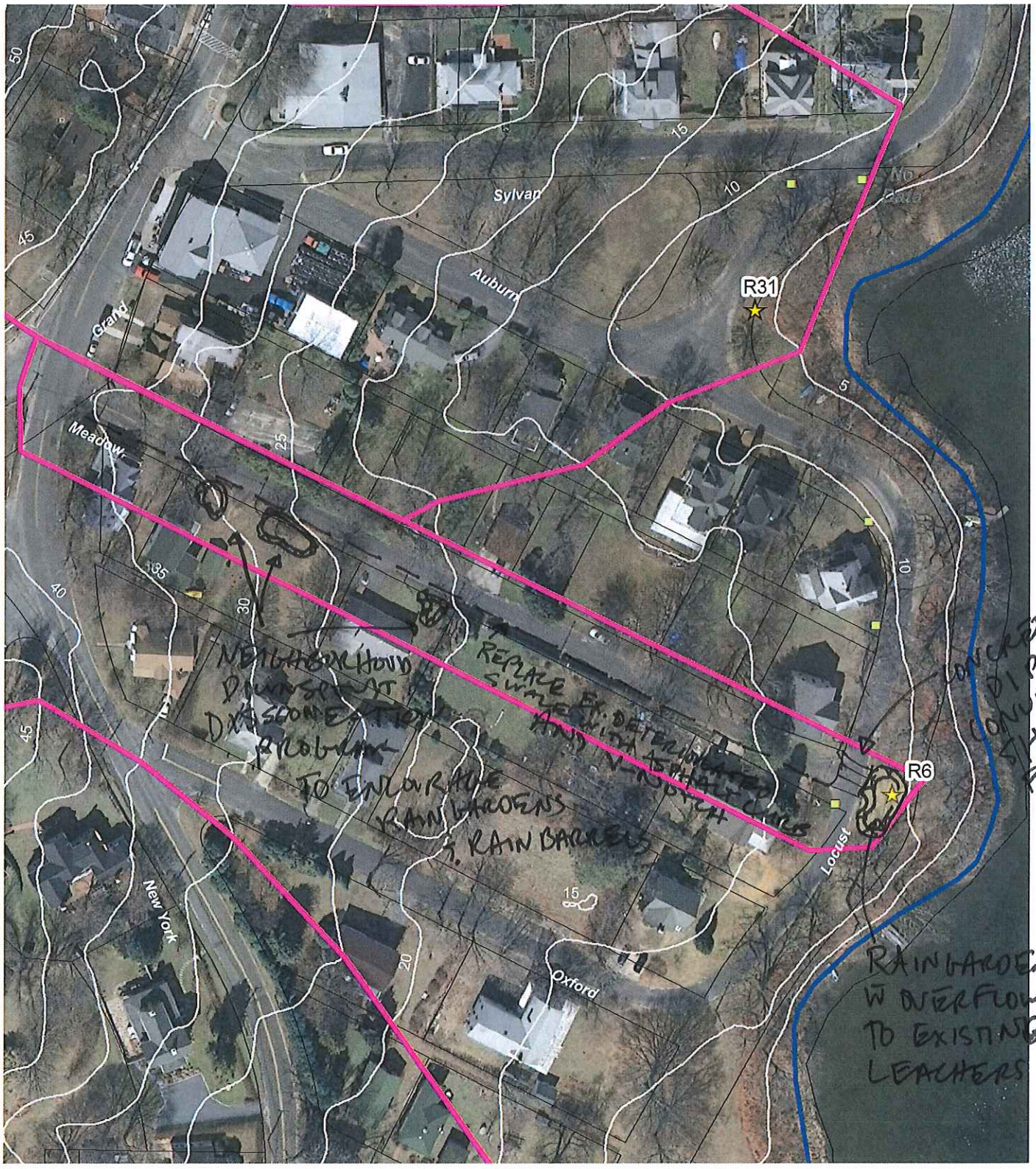


≈ 50% WQv without additional volume red. by residents.

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

100

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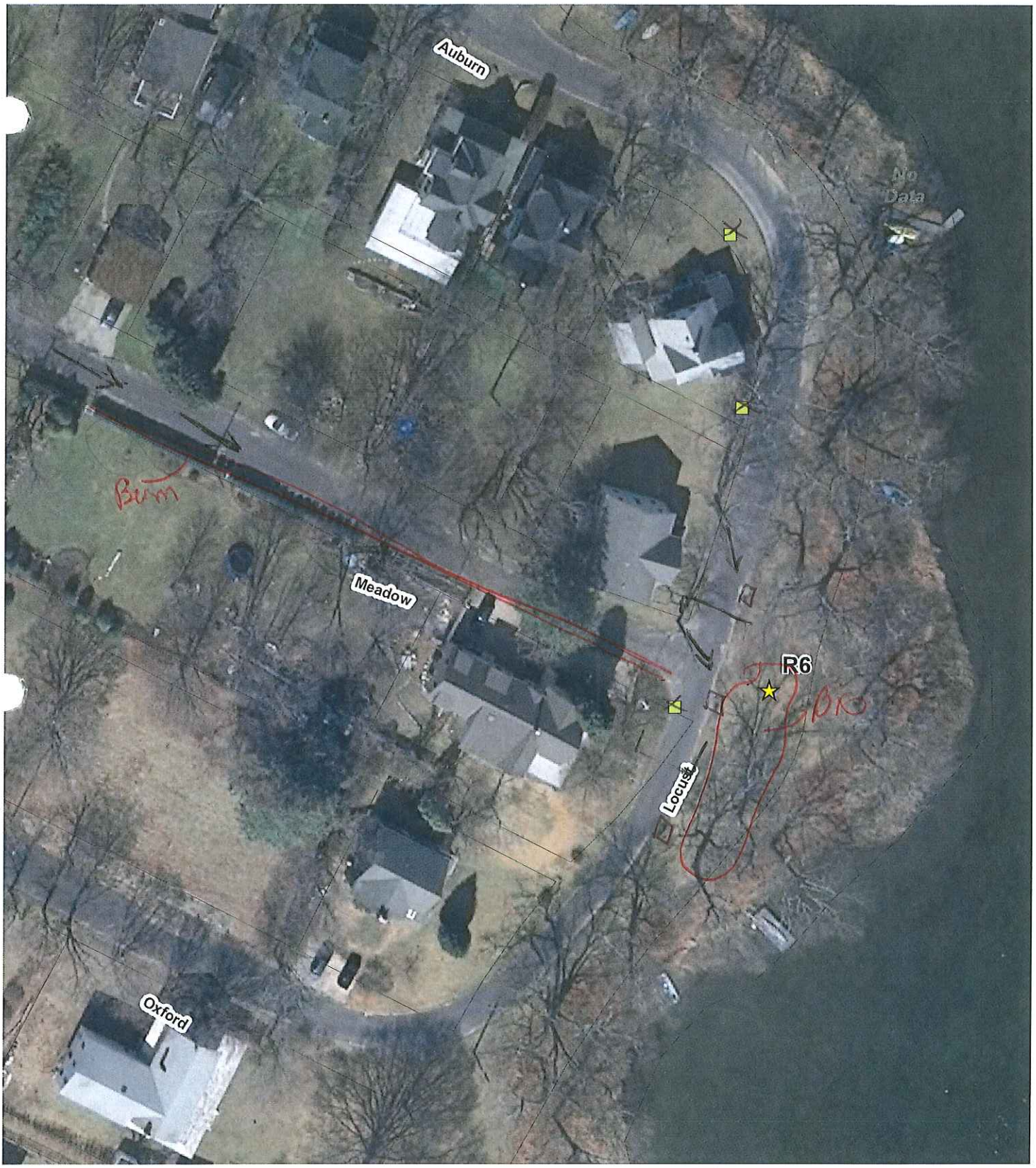
Retrofit 6
Dering Harbor Subwatershed
Shelter Island, NY
MEADOW / LOCUST AVE

Date: 12/15/2011

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



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

Feet

60

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Retrofit 6
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: PH-R7 NEW YORK/MEADOW ST. **Subwatershed:** DERING HARBOR

Date: _____ **Assessed by:** ACK

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: NA

Land Use: ☐ Public ☐ Private ☒ Unknown: ASSUME PRIVATE

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☒ Other: OPEN GRASS

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☒ No ☐ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☒ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

UNDEVELOPED LOTS (WITH PAPER ROADS) ON CHASE CK. GRASS COVER. STORMWATER FROM NY RD COULD BE DIVERTED TO A PRACTICE HERE. LEACHING CATCHBASIN ON ROAD

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☐ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☒ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☒ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 356 acres/sq ft
Imperviousness ≈ 12 %
Impervious Area ≈ 4.7 acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☐ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☐ Access
☐ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☐ High water table
☒ Wetlands ☐ Other:

Describe conflicts:

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☒ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☒ Confirm property ownership
☒ Confirm drainage area/impervious cover
☐ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Sketch and/or Sizing Calcs:

plenty of room to get 100% WQv
sqft required ≈ 25,000 sqft
Private property - potential purchase

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

Feet

100

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Retrofit 7
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R-8 ICE POND PARK **Subwatershed:** Deving Harbor

Date: 6/16/11 **Assessed by:** SH/RK

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info:

Land Use: ☒ Public ☐ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☒ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☒ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:
Stormwater runs along New York ave to dirt drive at ice pond parking, outlying into woods along path towards ice pond

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☒ swale ☐ planter ☐ tree pits ☐ infiltration ☒ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☒ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 0.3 (acres/sq ft)

Imperviousness ≈ 30 %

Impervious Area ≈ 0.1 (acres/sq ft)

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☐ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☒ Soils ☐ Access
☐ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☒ High water table
☐ Wetlands ☐ Other:

Describe conflicts: Need to verify soils and GW post-pits

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☐ OK ☒ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☒ Confirm volume computations
☐ Complete concept sketch
☒ Obtain existing as-builts/site plans
☒ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☒ Obtain utility mapping
☒ Perform test pits

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Install raingarden and swale along dirt drive to raingarden adjacent to parking area

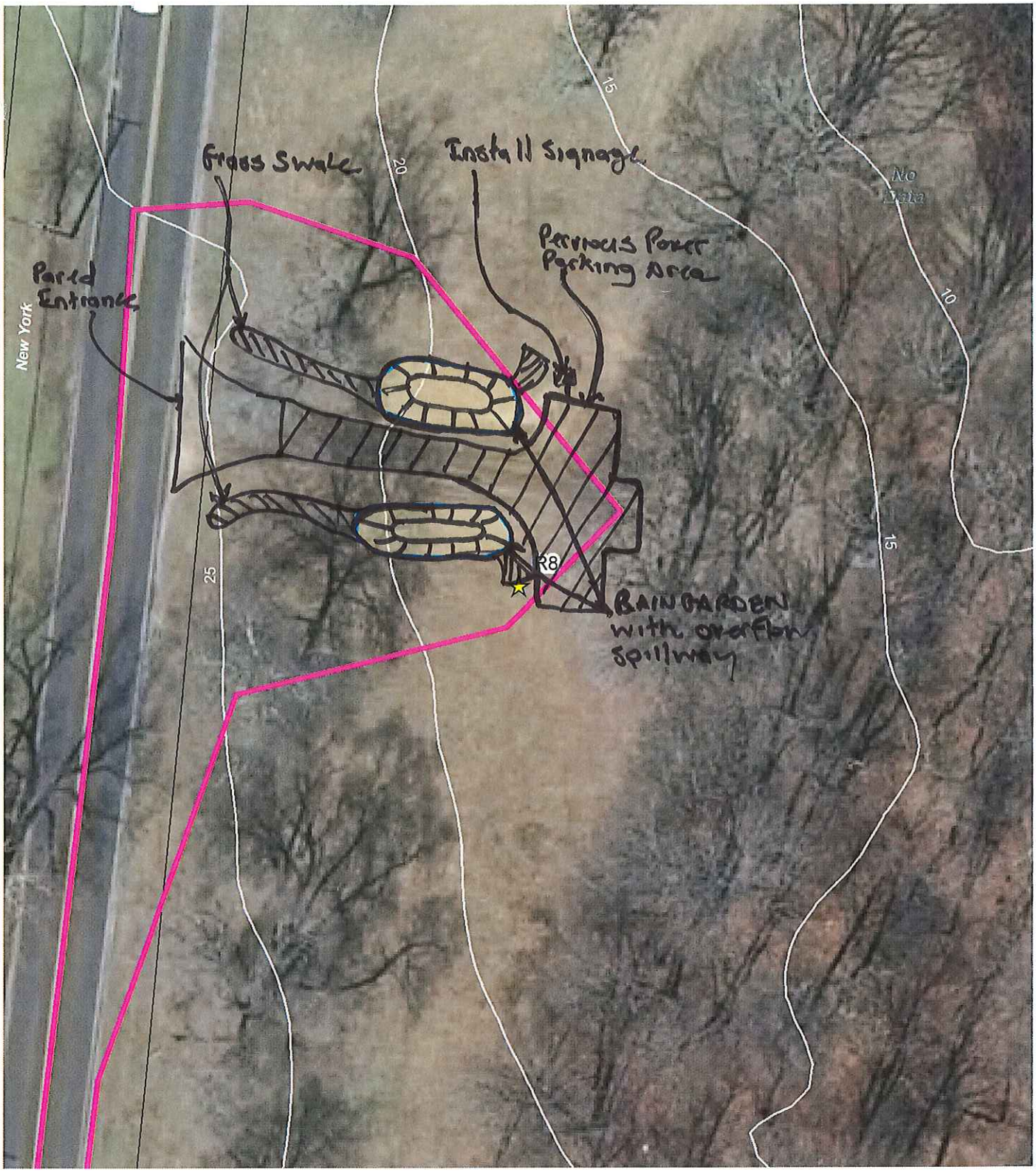
Sketch and/or Sizing Calcs:

Plenty of space for practice ≈ 700 s.f. available ≈ 300 s.f. required for bioretention

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

30

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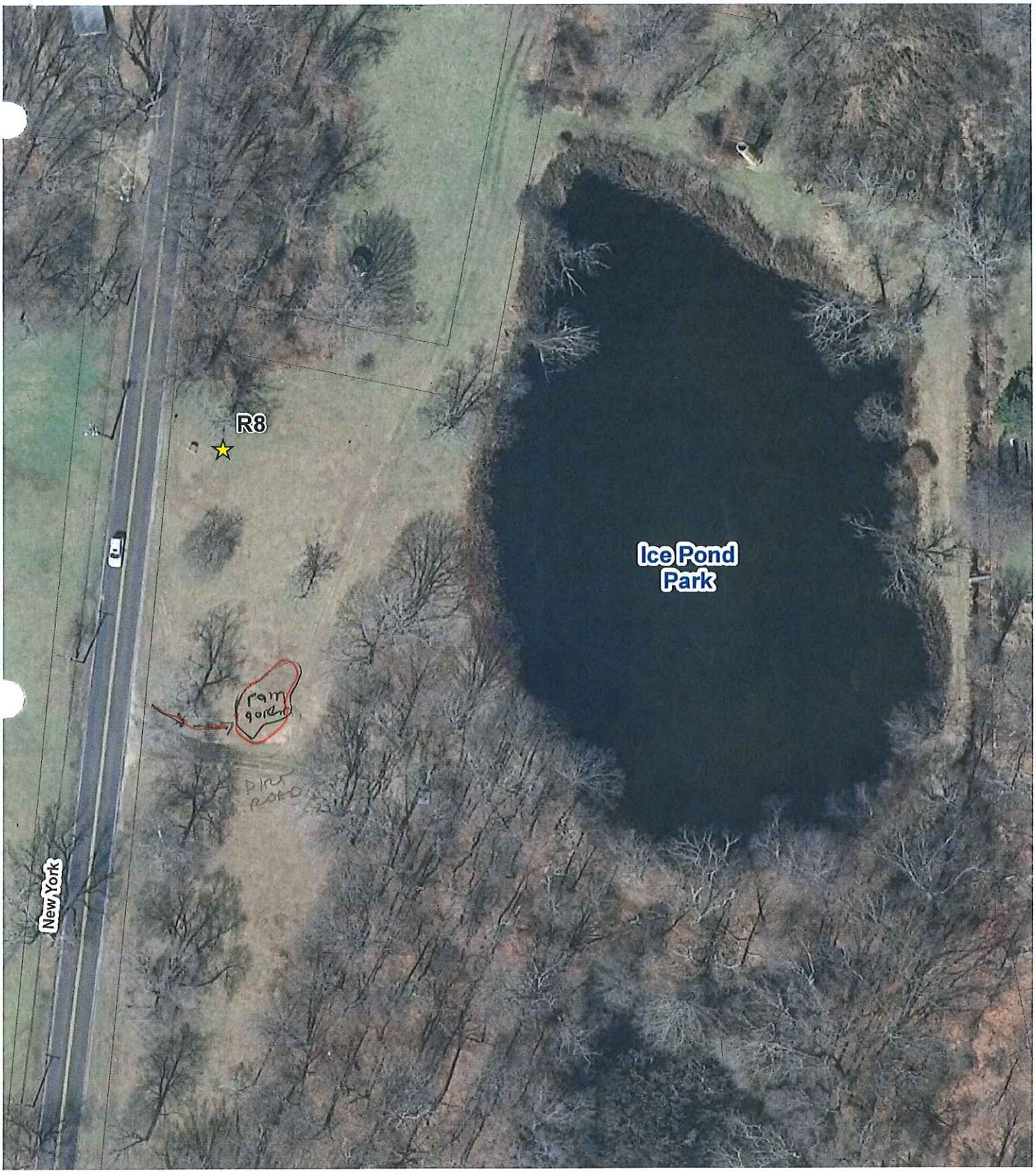
Retrofit 8
Dering Harbor
Shelter Island, NY
ICE POND PARK

Date: 12/15/2011

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



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

Feet

70

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Retrofit 8
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R-10 A & B **Subwatershed:** Devins Harbor

Date: 5/17/11 **Assessed by:** JH/ARK/RAC/ARB

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: WEST NECK/ NEW YORK / CAPITAL ONE / ICE POND (UPPER) COUNTY ROAD

Land Use: ☒ Public ☐ Private ☐ Unknown: GOLF COURSE AND ICE PARK

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☒ Golf Course ☐ Park ☐ Agricultural ☒ Road ☒ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☒ good infiltration SAYS A & B at R10A

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

LARGE DA COMING TO 5 CATCHBASINS TO ONE OUTFALL ACROSS WESTNECK FROM CAPITAL ONE EGRESS. THREE MAIN DRAIN INLETS TO WETLAND INCLUDING DOUBLE 24" OUTFALL, PAVED FLUME, AND BREAK IN CURB SEDIMENT PLUME IN WETLAND

SEDIMENT FROM UNPAVED DRIVE & PARKING LOT.

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond ☒ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal ☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☒ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ A: 30 acres/sq ft B: 60 acres

Imperviousness ≈ 7 % 14%

Impervious Area ≈ 2 acres/sq ft 8.5 acres

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge ☐ Demonstration / Education ☐ Repair ☐ Other: PROTECT WETLAND

Possible Conflicts due to: ☐ Soils ☐ Access ☐ Adjacent Land Use ☐ Existing Utilities ☐ Contamination ☐ High water table ☒ Wetlands ☒ Other: trees

Describe conflicts: HAVE ARMY CHECK WETLAND BOUNDARY

NEXT STEPS

Candidate for pilot project ☒ yep, love it ☐ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☒ Confirm volume computations
☒ Complete concept sketch
☐ Obtain existing as-builts/site plans ☐ Obtain utility mapping
☐ Obtain detailed topography ☐ Perform test pits
☐ Confirm storm drain invert elevations
☒ Other: WETLAND DELINEATION

Site ID _____

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

CREATE 2 BMPS ON NORTH SIDE OF WESTNECK.

(A) BIO ON CORNER / GOLF COURSE (INFILTRATION) Divert runoff from existing catchbasins to BIO. Large storms bypass. OR USE SWALE SYSTEM TO CONVEY TO BIO-OVERFLOW TO CATCH BASIN.

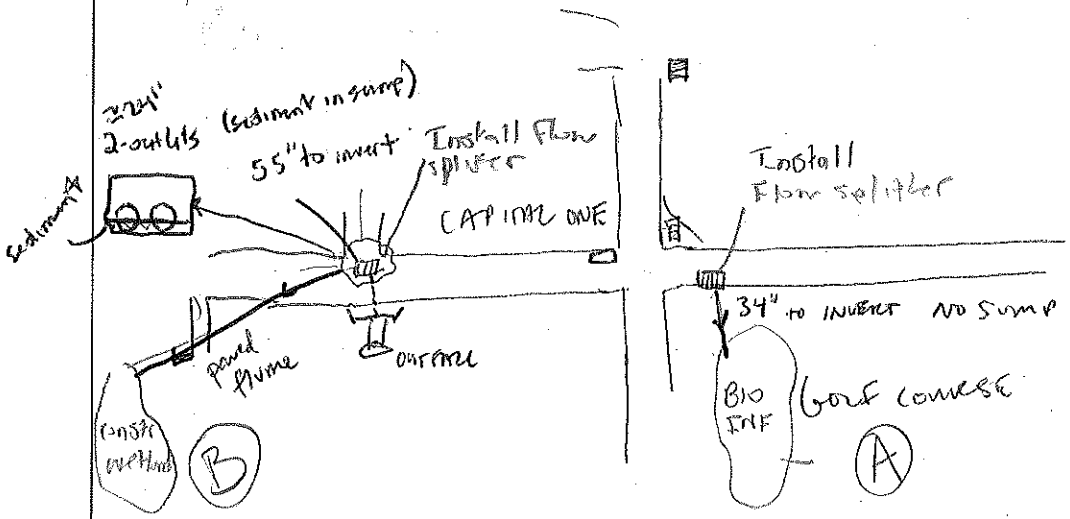
(B) Divert runoff from existing CB at capitol one CB to new constructed wetland. large flows continue to outfall.

Sketch and/or Sizing Calcs:

SEE AERIAL

(A) 100 % of WQv can be captured ≈ 13,000 sq ft. area needed

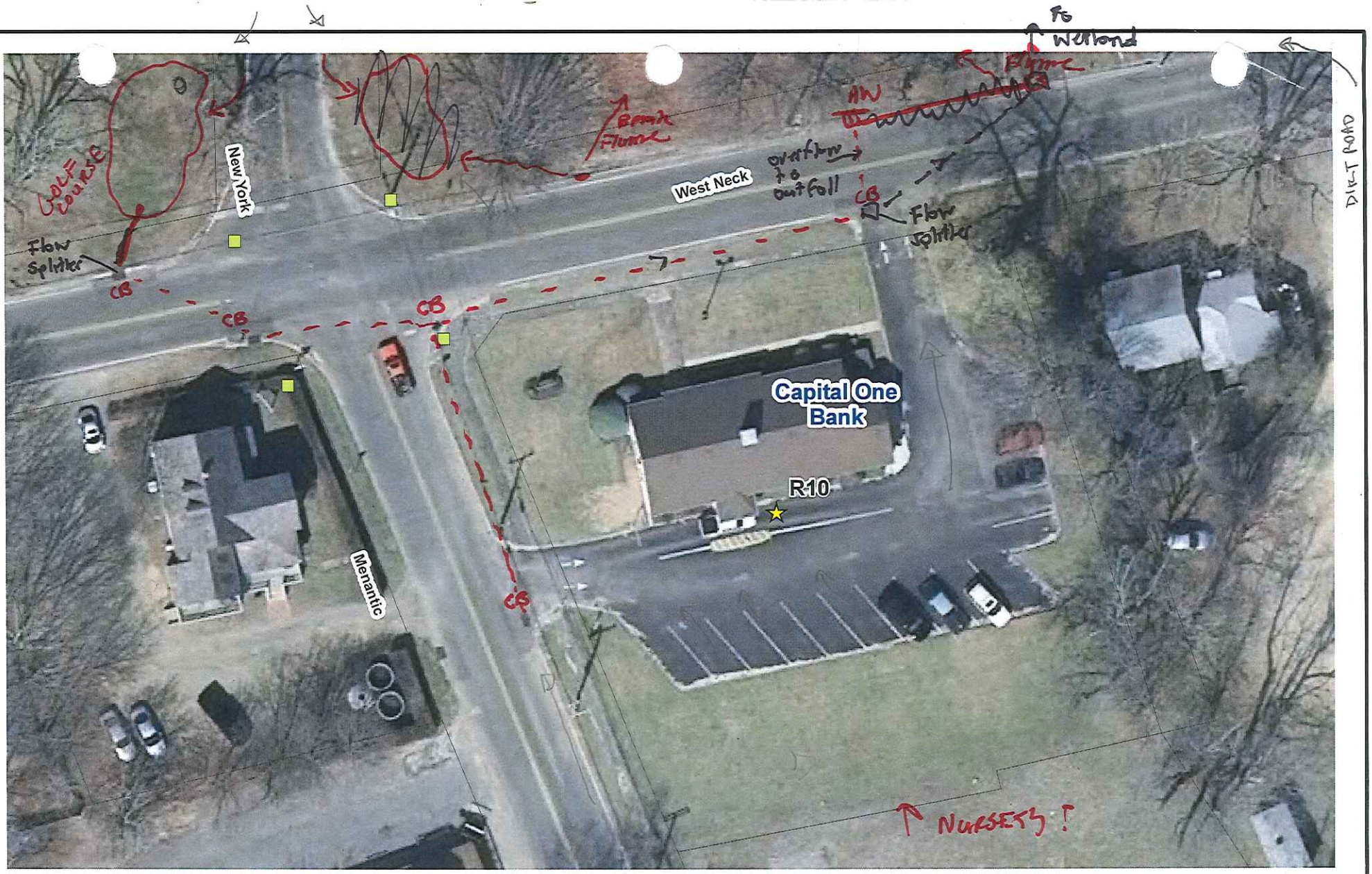
(B) >25 % of WQv - serves as pretreatment for ex. wetland.



Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

40 Feet

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 10
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R13 FOREBAY **Subwatershed:** DERING HARBOR

Date: 5/12/2011 **Assessed by:** ACK / JH

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: Mark Ketchum

Land Use: ☒ Public ☐ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☒ Park ☐ Agricultural ☐ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☒ No ☐ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☒ Yes ☐ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☐ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

AT HEAD OF GARDINERS Creek - Town had installed a small forebay to provide pretreatment. Seems to work OK - no slow observed. perhaps could perform maintance to enhance removal / restore capacity.

PROPOSED RETROFIT CONCEPT (CONT. ON BACK)

Proposed Retrofit Practice(s): ☒ existing BMP upgrade ☐ new BMP

☐ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☒ Other (describe): MAINTENANCE / INCREASE

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☐ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ _____ acres/sq ft DETERMIN OF WQv

Imperviousness ≈ _____ %

Impervious Area ≈ _____ acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☐ Water Quality ☐ Recharge
☐ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☐ Access
☐ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☐ High water table
☐ Wetlands ☐ Other:

Describe conflicts:

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☐ OK ☒ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☐ Confirm volume computations
☐ Complete concept sketch
☒ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☐ Perform test pits

Site ID _____

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

May be able to evaluate performance and determine if additional treatment is possible w minor design alterations (i.e; increased detetention)

Sketch and/or Sizing Calcs:

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

Feet

50

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 13
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH R 14 **Subwatershed:** Deering Harbor

Date: 5/19/2011 **Assessed by:** _____

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: Shelter Island IGA

Land Use: ☐ Public ☒ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☐ Road
☒ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☐ Sediment ☐ Nutrients/organics ☒ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☐ Unknown ☒ poor infiltration ☐ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

Roof and parking lot drainage from IGA drain untreated to possible wet area. Large amounts of impervious area are present.

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☐ swale ☒ planter (Roof) ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☒ Individual rooftop
☒ Parking Lot ☐ other small impervious area
☐ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 1.2 (front area) acres/sq ft
Imperviousness ≈ 91 %
Impervious Area ≈ 1.1 acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☒ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☒ Soils ☒ Access
☐ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☐ High water table
☐ Wetlands ☐ Other:

Describe conflicts: Cooperation with other owners

NEXT STEPS

Candidate for pilot project ☒ yep, love it ☐ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☒ Confirm volume computations
☐ Complete concept sketch
☒ Obtain existing as-builts/site plans
☒ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☒ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Install bioretention in center of parking lot with overflow to possible wet area. Install tree planters for roof runoff. Restripe parking lot.

Sketch and/or Sizing Calcs:

see aerial

meets WQv requirement

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☒ Medium ☐ High

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

50 Feet

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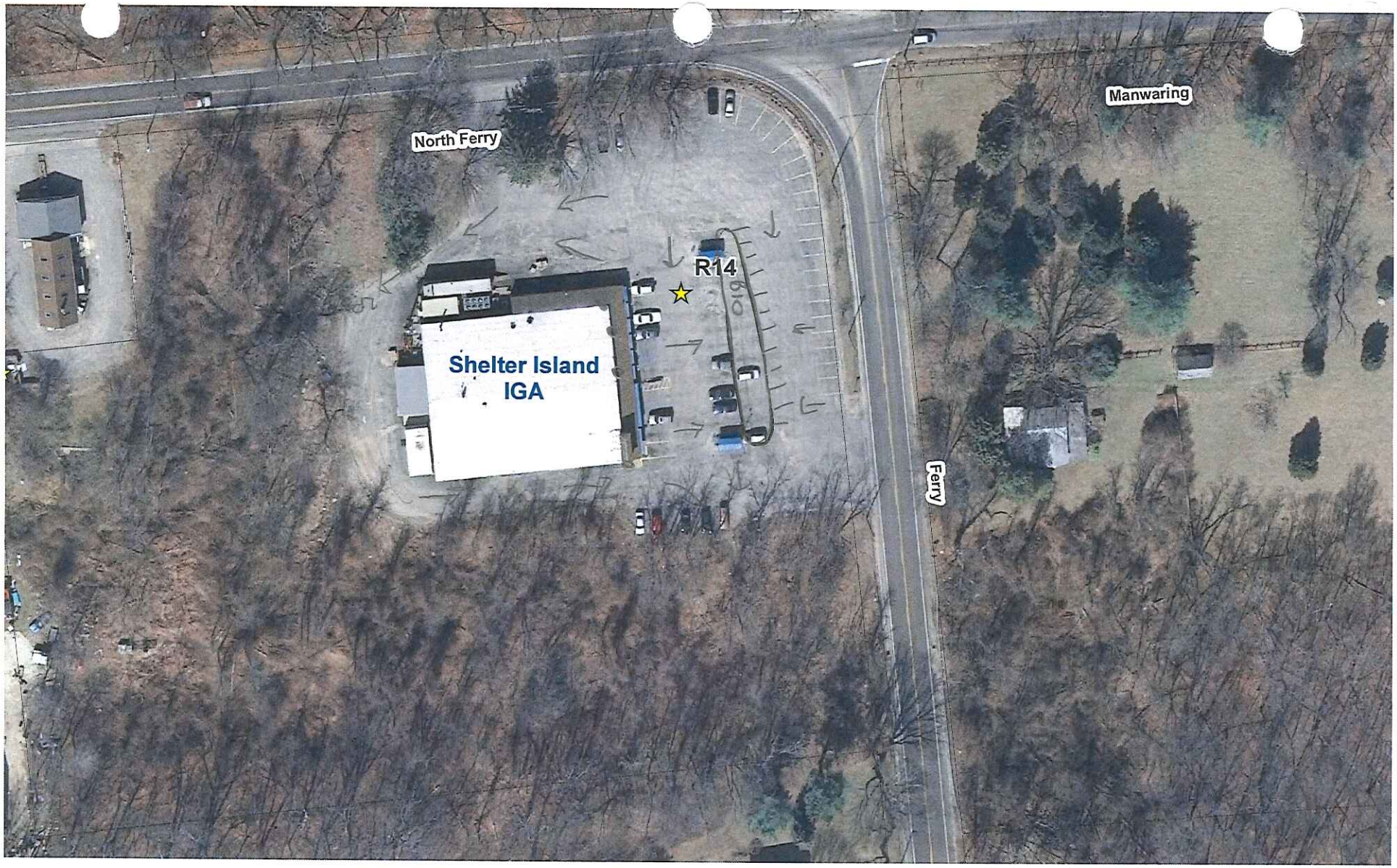
Retrofit 14
Dering Harbor
Shelter Island, NY
IGA STORE

Date: 12/15/2011

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



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

90 Feet

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Sustainable Environmental Solutions

Retrofit 14
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R-17 Cobbetts WETPOND **Subwatershed:** Pering Harbor

Date: 5/10/2011 Winthrop **Assessed by:** _____

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info:

Land Use: ☐ Public ☒ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☒ Yes ☐ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☐ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:
Road flooding at intersection of Short and Cabot Road. Erosion at beach access. New earth berm is blocking flow to existing pond.

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☒ existing BMP upgrade ☐ new BMP

☐ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☒ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☒ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 16 acres/sq ft
Imperviousness ≈ 9 %
Impervious Area ≈ 1.5 acres/sq ft

Benefits of Retrofit (primary & secondary): ☒ Storage ☒ Water Quality ☐ Recharge
☐ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☐ Access
☒ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☒ High water table
☐ Wetlands ☐ Other:

Describe conflicts:

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☐ OK ☒ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☐ Confirm drainage area/impervious cover
☐ Confirm volume computations
☐ Complete concept sketch
☒ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☐ Perform test pits

Site ID _____

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Re-grade and install flumes with rip-rap outfalls along shore road. Install flume to existing pond. Install swale and rain garden on Cabbetts Road and reduce sediment area at intersection of Cabbetts and shore roads. Install swale along shore road to existing depression.
Excavate additional storage capacity to North side of ex. pond and create FOREBAY. Install 2 shallow drop inlets on Cabbetts to convey flow to forebay. Emergency spillway on South side to shallow grassed depression for sheet flow for large events across Walnut

Sketch and/or Sizing Calcs:

see aerial

* Forebay needs to be 10% WQv

* historic use of pond to manage road runoff is key.

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

50

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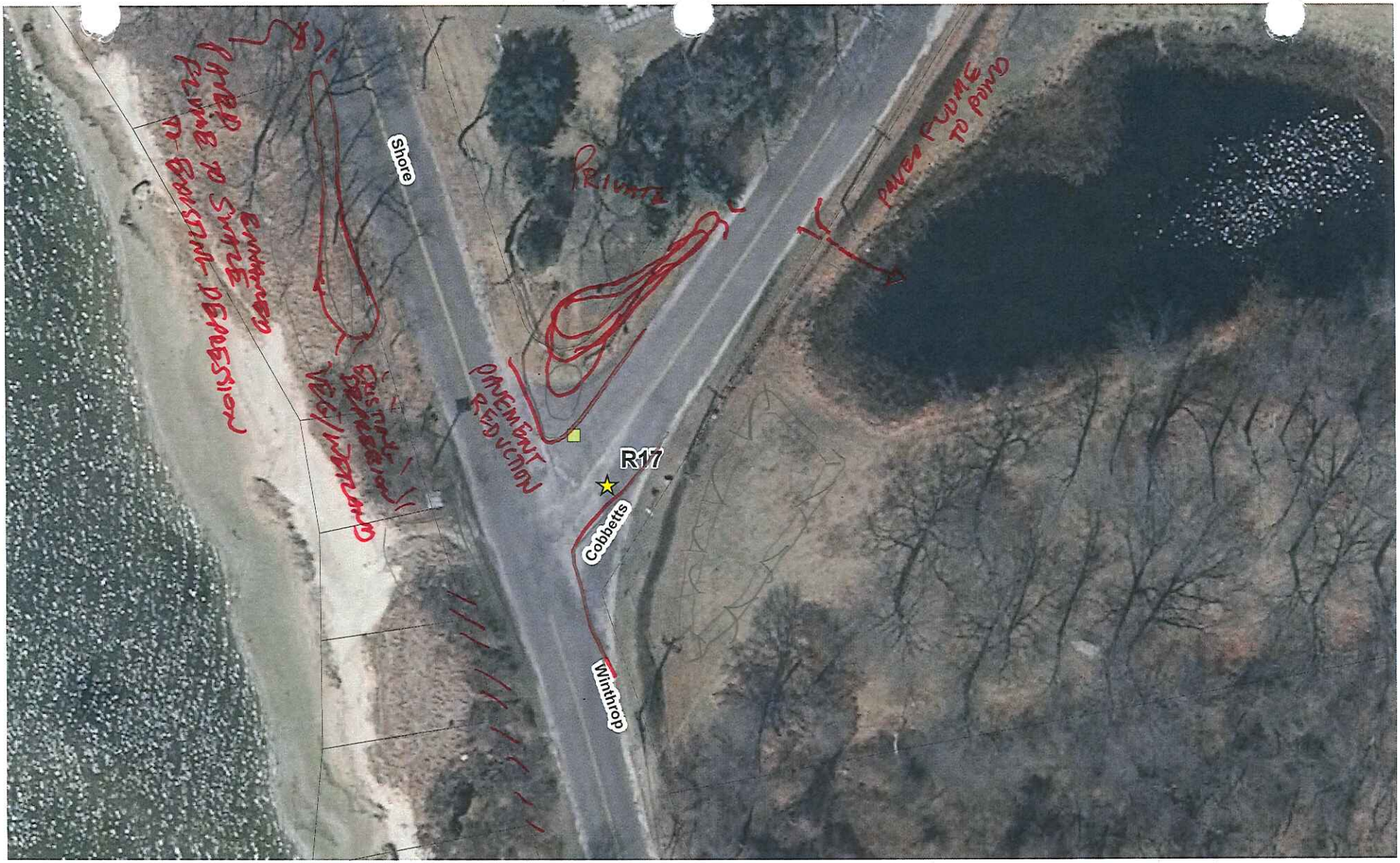
Retrofit 17
Dering Harbor
Shelter Island, NY
COBBETTS WET POND

Date: 12/16/2011

Path: H:\Projects\2009\9072 Peconic-Sub WS Mgt Plans\GIS\Maps\FieldMaps\Dering Harbor_blowups_portrait.m



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

Feet

50

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 17
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R-146 site of culvert replacement **Subwatershed:** Dering Harbor

Date: 5/16/2011 Locust & Shore **Assessed by:** JH + ACK

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info:

Land Use: ☒ Public ☒ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☐ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☐ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

(A) Existing catchbasin with leaching field. Ponding water along shore road. Existing (B) culvert to be replaced w/ wooden bridge or box culvert in Fall (see Richie S.)

(C)

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☒ existing BMP upgrade ☒ new BMP pretreatment for infiltration chambers

☐ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☒ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 1.4 (A) acres/sq ft

Imperviousness ≈ 20 %

Impervious Area ≈ .27 acres/sq ft

Benefits of Retrofit (primary & secondary): ☒ Storage ☒ Water Quality ☒ Recharge
☐ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☒ Soils ☐ Access
☒ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☐ High water table
☒ Wetlands ☐ Other:

Describe conflicts:

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☐ OK ☒ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☐ Confirm drainage area/impervious cover
☐ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans ☐ Obtain utility mapping
☐ Obtain detailed topography ☐ Perform test pits
☐ Confirm storm drain invert elevations
☐ Other:

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

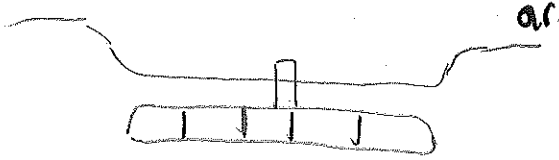
B) Proposed Leaching ~~catch~~ pit with catch basin up gradient of culvert. Install structures so that above water table. one structure on north side of locust Rd.

A) ~~Open clogged~~ Install flume ~~for~~ to depression (raingarden) installed over existing leaching system. Use existing catch basin + leaching as overflow,

Sketch and/or Sizing Calcs:

see aerial

100% of WQV available based on area afa practical

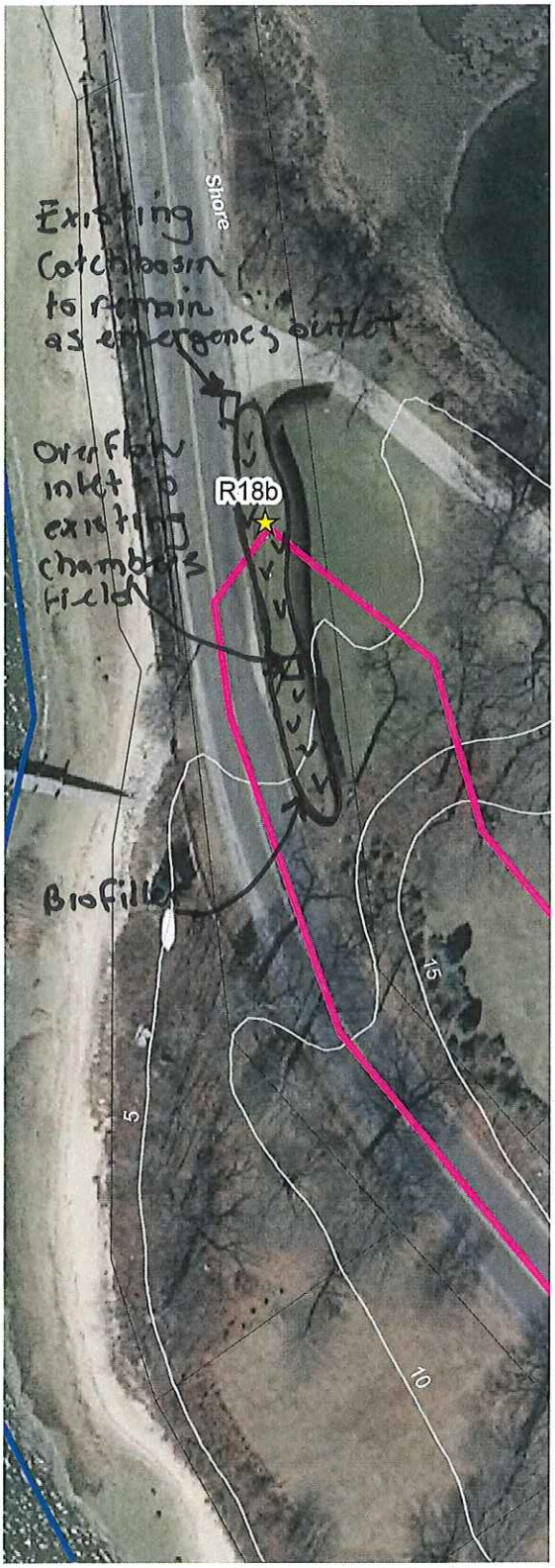


Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Note soils appear to be C/D soils. Soils investigation prior to install recommended

Thoughts on Maintenance Burden: ☐ Low ☑ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

60

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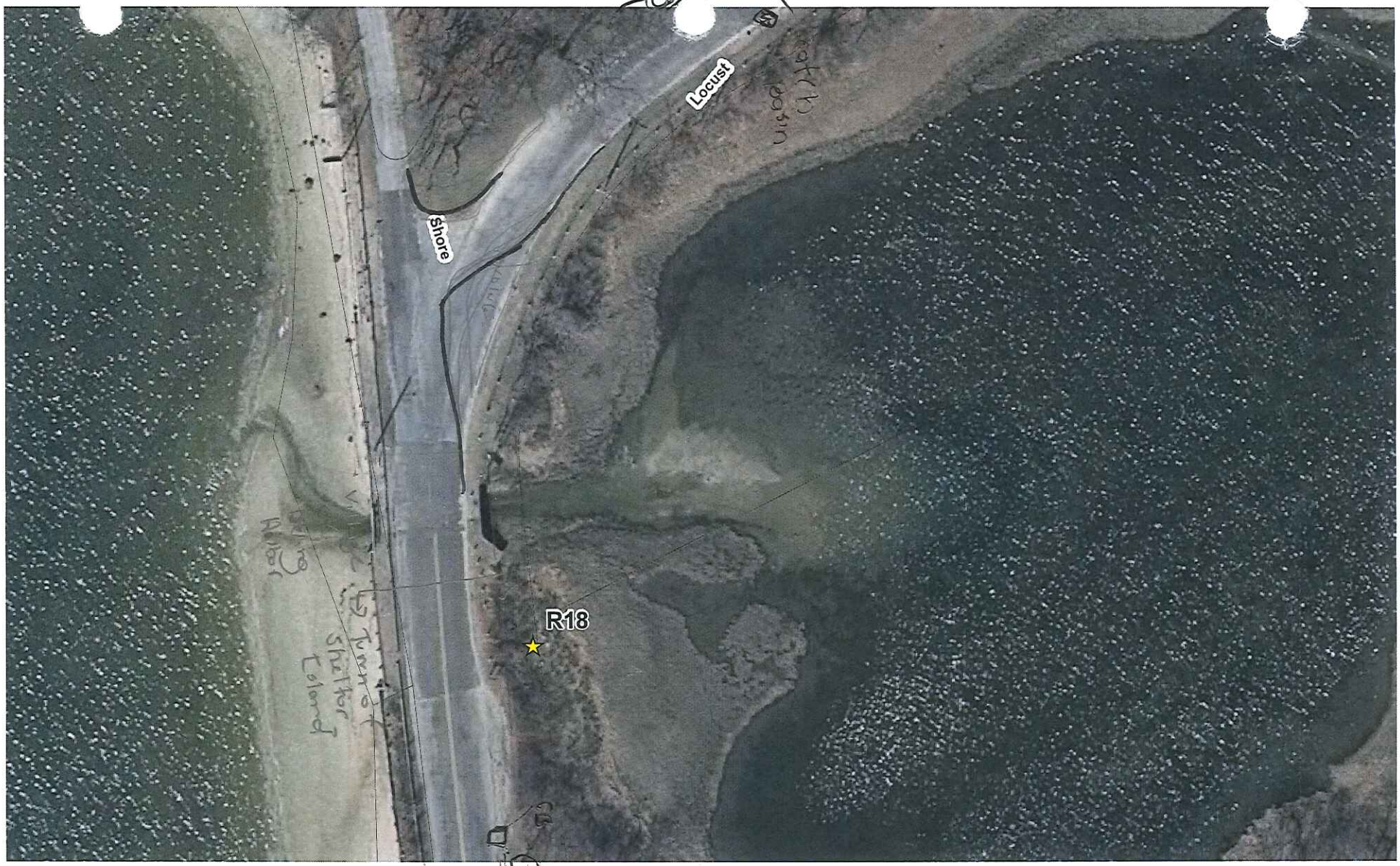
Retrofit 18
Dering Harbor
Shelter Island, NY
Shore Road Infiltration Chambers

Date: 12/16/2011

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



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

Feet

50

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 18
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R-19 Yoco **Subwatershed:** Oering Harbor

Date: 5/16/2011 **Assessed by:** SH + ACR

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: Richie S. & Bridge Hunt

Land Use: ☒ Public ☒ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☐ Unknown ☒ poor infiltration ☐ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

Runoff from beach and shoaled pond south of the cul de sac at the end of Yoco Rd.

Currently flooding common at end of Yoco Rd.

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☐ new BMP

☒ bio/rain garden ☒ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☒ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe): BUFFER ENHANCEMENT

Area Draining to Retrofit

☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☒ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 2.3 (acres)/sq ft

Imperviousness ≈ 21%

Impervious Area ≈ 0.5 (acres)/sq ft

Benefits of Retrofit (primary & secondary): ☒ Storage ☐ Water Quality ☐ Recharge
☐ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☒ Soils ☐ Access
☒ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☒ High water table
☐ Wetlands ☐ Other:

Describe conflicts:

NEXT STEPS

Candidate for pilot project ☒ yep, love it ☐ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept

☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☐ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Install swale* with raingardens along Yoco to intercept road runoff. Possibly install raingarden along Shore Rd at the end of Yoco ~~to address~~ on Private lot.

*SWALES ONLY NECESSARY IF ADDITIONAL DA NORTH OF LOCUST RD IS INCLUDED.

Sketch and/or Sizing Calcs:

see aerial

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

60 Feet

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 19
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

DA = 3.5 ac (contains DH-R25)
IC = 0.71 ac / 20%
WQ_v = 3500 cf
SA REQ. = 3300 sf
SA PROVIDED = ENOUGH SPACE IF DISTRIBUTED

N

Feet
50

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 20
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY
Shore Road cul-de-sac

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R-24 **Subwatershed:** Deering Harbor

Date: 5/16/2011 Winthrop Rd. Bridge **Assessed by:** JH + ACK

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info:

Land Use: ☒ Public ☐ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☐ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

A) Road runoff to 4' DIA by 8' deep catch basin with connection thru 12" pipe to dry well. Overflow from catch basin gulling to pond.

CATCH BASIN → DRY WELL
4 FT DIAMETER / 8 FT DEEP
12" PIPE

B) 12" Aluminum pipe with direct discharge to pond,

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☐ new BMP ☒ or leaching basin

☐ bio/rain garden ☒ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 0.95 (acres)/sq ft

Imperviousness ≈ 41 %

Impervious Area ≈ 0.4 (acres)/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☐ Demonstration / Education ☒ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☐ Access
☒ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☒ High water table
☐ Wetlands ☐ Other:

Describe conflicts: private property, ROW width

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☐ OK ☒ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☒ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

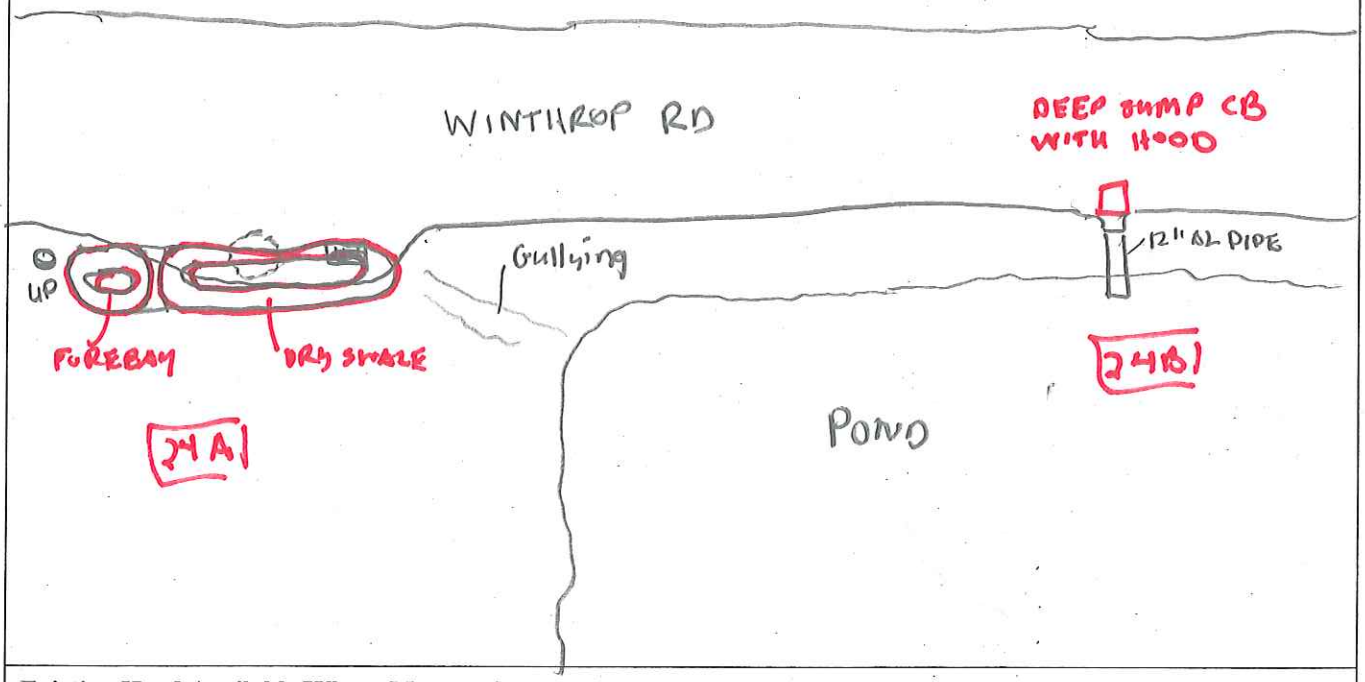
PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Install dry swale along south side of Winthrop Rd approx 50' long 3' wide and 6" deep with gravel base. Use existing leaching chamber and catch basin as overflow storage.

Sketch and/or Sizing Calcs:

not enough room for 100% WQv.
only room available for ∠ 25% treatment

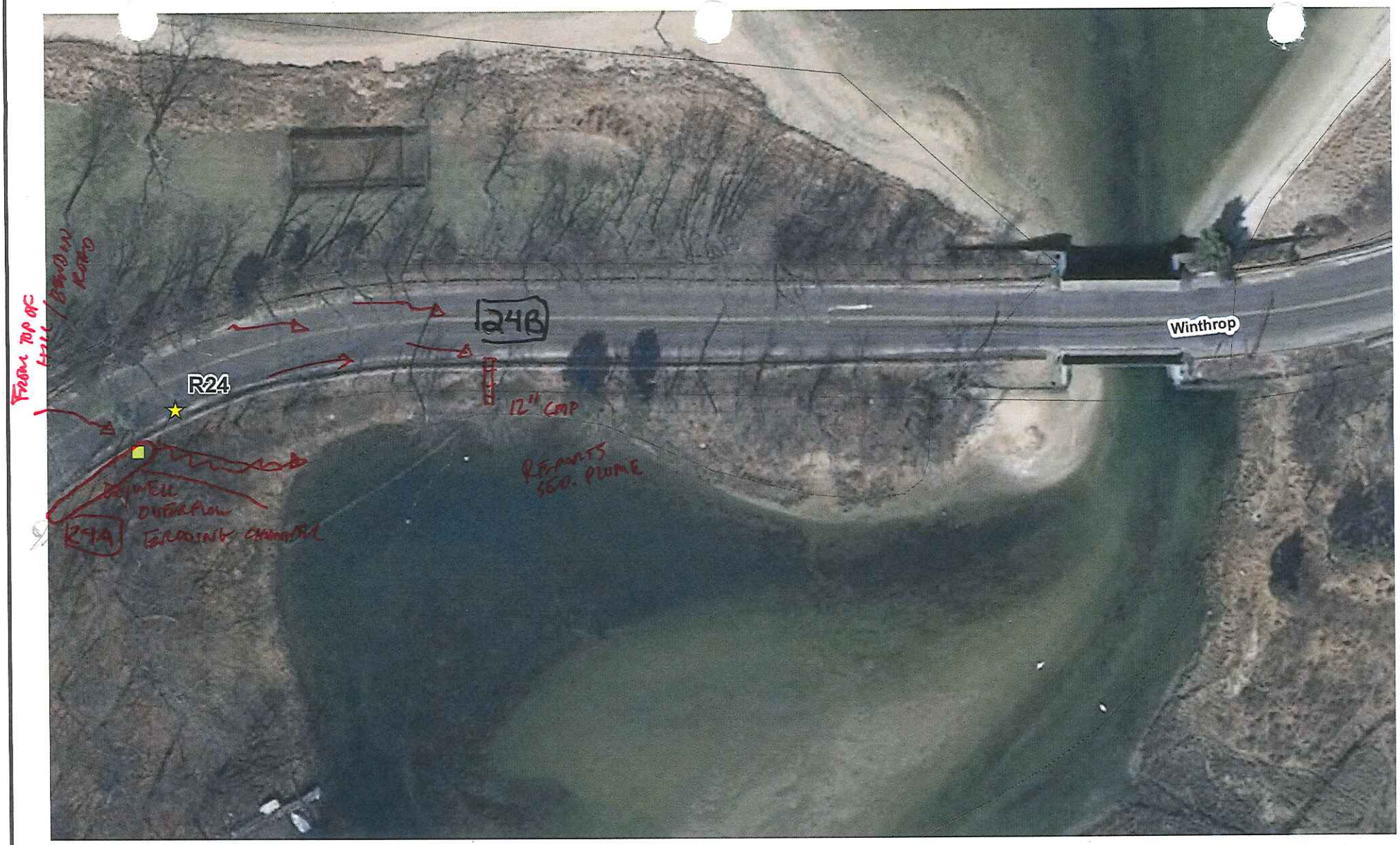


Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Soils are questionable need further evaluation

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☒ High (24B)



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

50 Feet

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 24
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R25 Village Office **Subwatershed:** Dering Harbor

Date: 5/17/11 **Assessed by:** JH / AK

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: Richie Surozinski
Tim Hogue – Mayor

Land Use: ☒ Public ☐ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☐ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☒ Other: GOVN'T

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☐ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☐ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

Runoff from rooftop & small parking area go to grass. Op. for demo rain garden but not very significant. Reforestation and minimal lawn care other opportunities.

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☐ new BMP

☒ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☒ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☐ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ ~~0.95~~ acres/sq ft 0.6 acres

Imperviousness ≈ ~~41~~ % 25% IC

Impervious Area ≈ ~~0.4~~ acres/sq ft 0.15 acres

Benefits of Retrofit (primary & secondary): ☐ Storage ☐ Water Quality ☐ Recharge
☒ Demonstration / Education ☐ Repair ☐ Other:

Possible Conflicts due to: ☐ Soils ☐ Access
☐ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☐ High water table
☐ Wetlands ☐ Other:

Describe conflicts:

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☐ OK ☐ undecided ☒ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☐ Confirm drainage area/impervious cover
☐ Confirm volume computations
☒ Complete concept sketch
☐ Obtain existing as-builts/site plans
☒ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

install simple rain garden in front north corner of Village Hall property to collect runoff from portion of roadway. Install "speed bump" to divert flows. Overflow to ex. lawn

* Consider using central island (w white picket fence) if deemed not a traffic problem)

Sketch and/or Sizing Calcs:

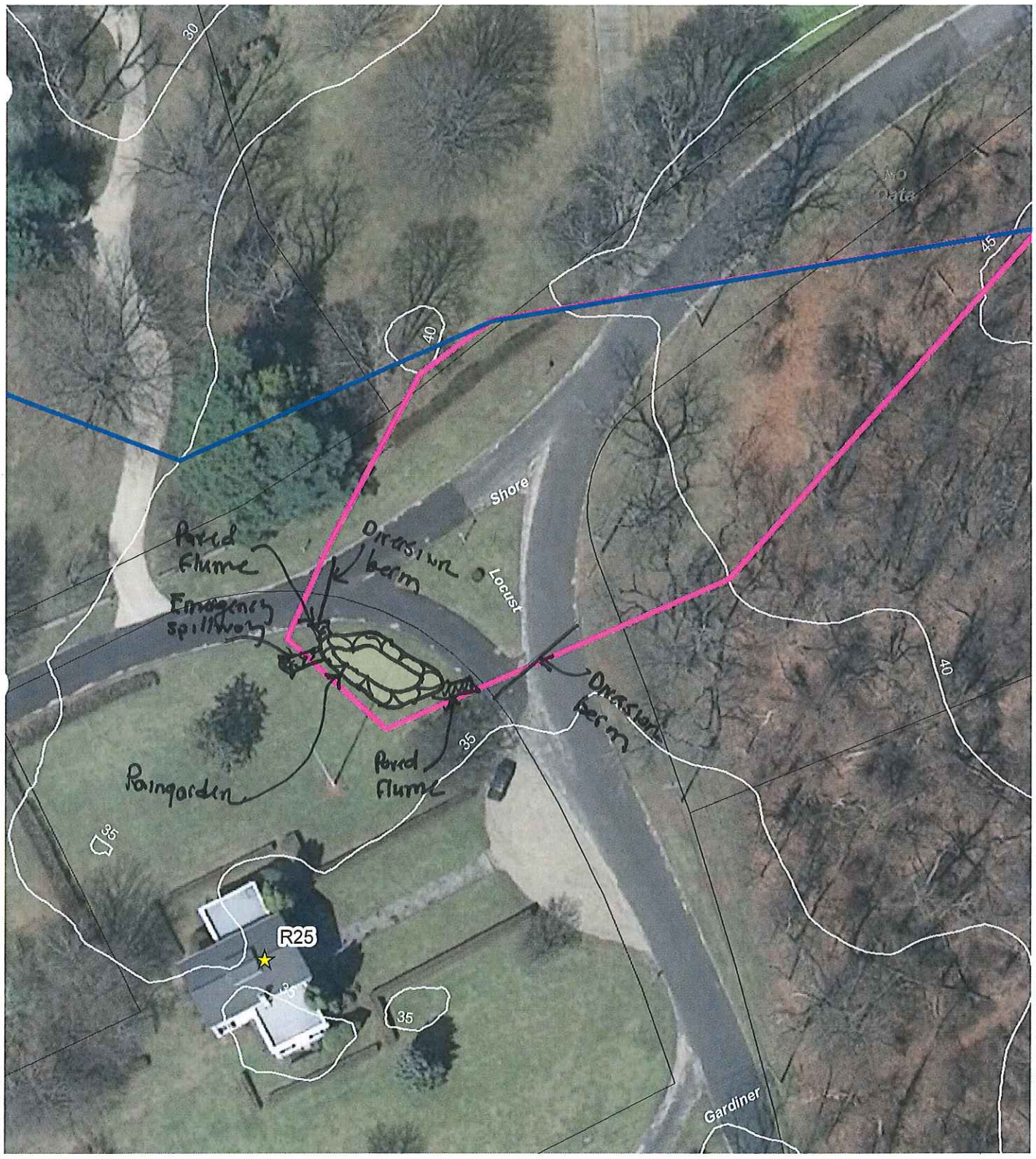
SEE ATTACHED

100% WQ v. need ≈ 700 sq ft.

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☒ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

50

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Retrofit 25
Dering Harbor
Shelter Island, NY

Date: 12/16/2011

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

PECONIC WATERSHEDS DH-R-26 **RETROFITS**

Site Name/ID: N. FERRY PARKING LOT & OFFICE **Subwatershed:** Dering Harbor

Date: 5/16/2011 **Assessed by:** _____

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: HOTSPOT/HIGH TRAFFIC/HIGHLY VISIBLE

Land Use: ☐ Public ☒ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☒ Yes ☐ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☒ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☒ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

A) Existing ferry access area with roof runoff and pavement runoff directly to harbor. OIL NOTED IN RUNOFF, HIGHLY VISIBLE AREA

B) Parking lot with excess pavement. Existing inlet outside parking lot. Flat lot - ponding throughout. Stone filter strip behind bulkhead. NO treatment.

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☒ Hotspot ☐ Individual rooftop
☒ Parking Lot ☐ other small impervious area
☐ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 1.3 (acres)/sq ft
Imperviousness ≈ 55 %
Impervious Area ≈ 0.7 (acres)/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☒ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☐ Access
☐ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☐ High water table
☐ Wetlands ☐ Other:

Describe conflicts:

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☐ OK ☒ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☐ Confirm volume computations
☒ Complete concept sketch
☐ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☐ Perform test pits

Site ID _____

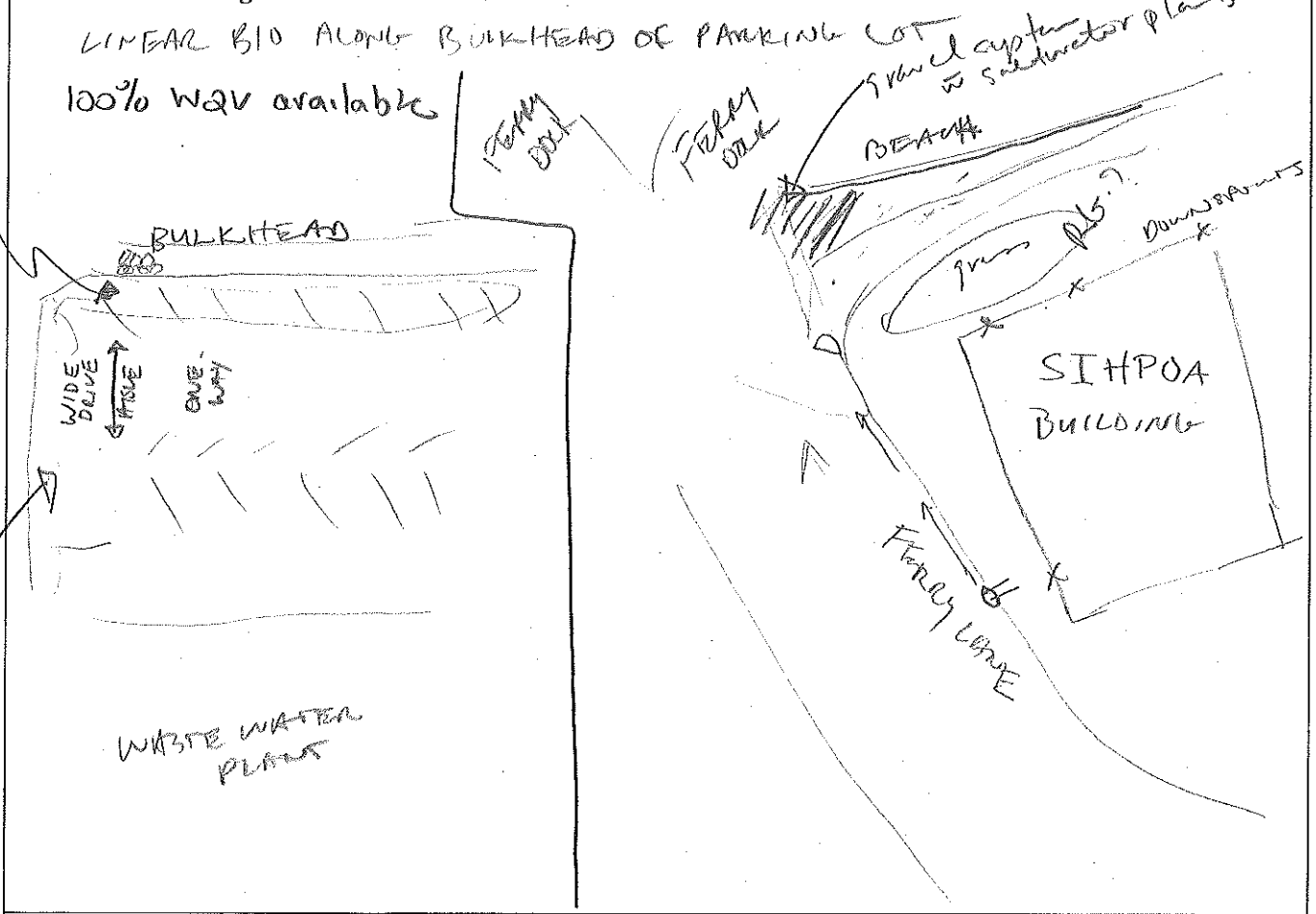
☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

MAY NEED TO RELOCATE PORTION OF LOT

Sketch and/or Sizing Calcs:

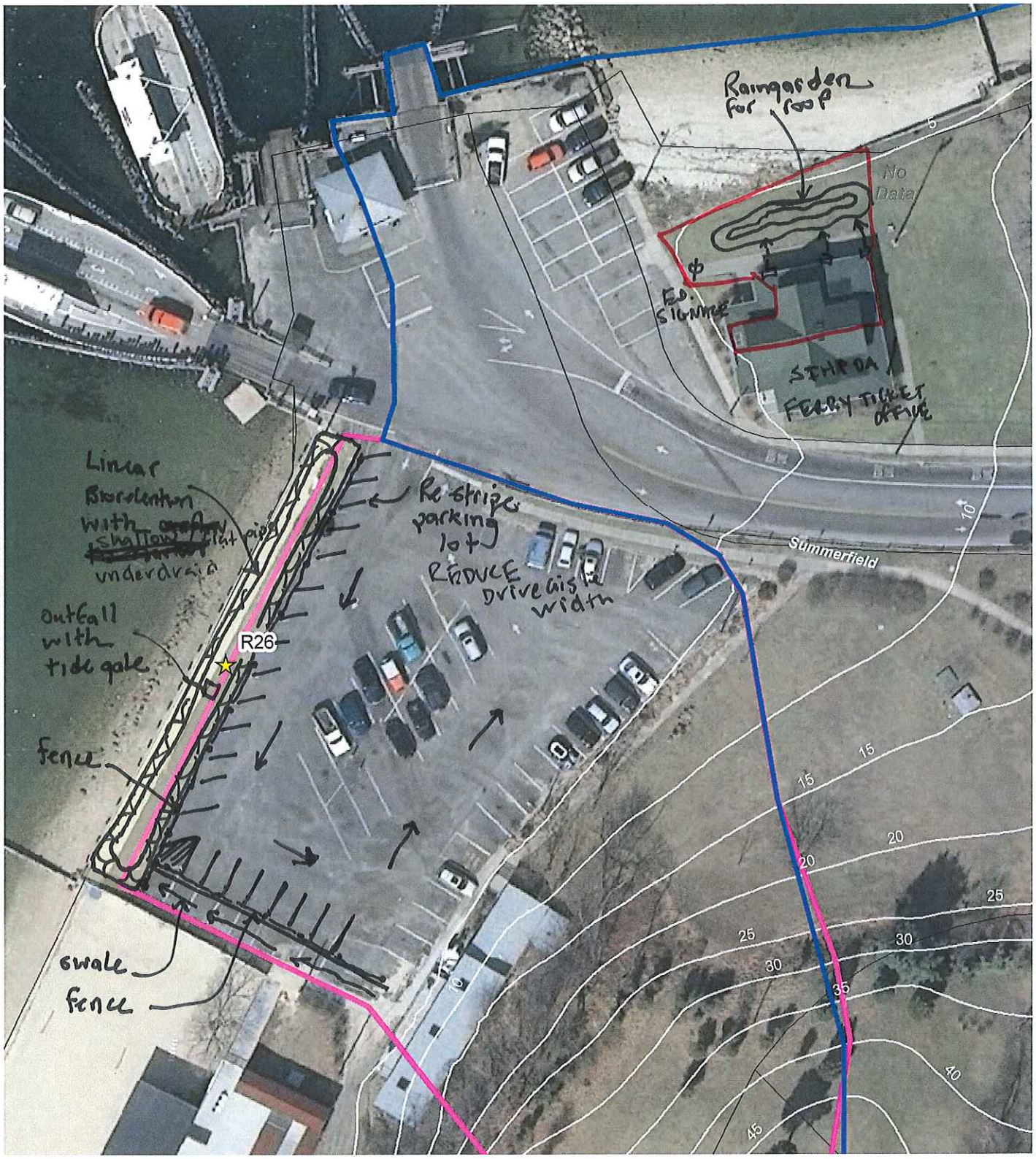


Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

NOT IN WATERSHED

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

50

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Retrofit 26
Dering Harbor
Shelter Island, NY
North Ferry Office

Date: 12/16/2011

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

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R27 BRIDGE ST **Subwatershed:** Deering Harbor

Date: 5/16/2011 **Assessed by:** STACK

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: SEE DH H2

Land Use: ☒ Public ☐ Private ☐ Unknown: IN ROAD

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☐ Road
☒ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☒ Yes ☐ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☒ Sediment ☐ Nutrients/organics ☒ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☒ Yes ☐ No ☐ Unknown: UNDERGROUND BAFFLES ??

Soils: ☐ Unknown ☐ poor infiltration ☐ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

INLET IN FRONT OF LIQUOR STORE TAKES DRAINAGE FROM GAS STATION, ASPHALT, AND PORTION OF BRIDGE STREET.

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP SAND FILTER

☐ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☒ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☒ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 0.35 acres/sq ft
Imperviousness ≈ 100 %
Impervious Area ≈ .35 acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☐ Demonstration / Education ☒ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☐ Access
☒ Adjacent Land Use ☒ Existing Utilities
☒ Contamination ☒ High water table
☐ Wetlands ☐ Other:

Describe conflicts:

NEXT STEPS

Candidate for pilot project ☒ yep, love it ☐ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☒ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

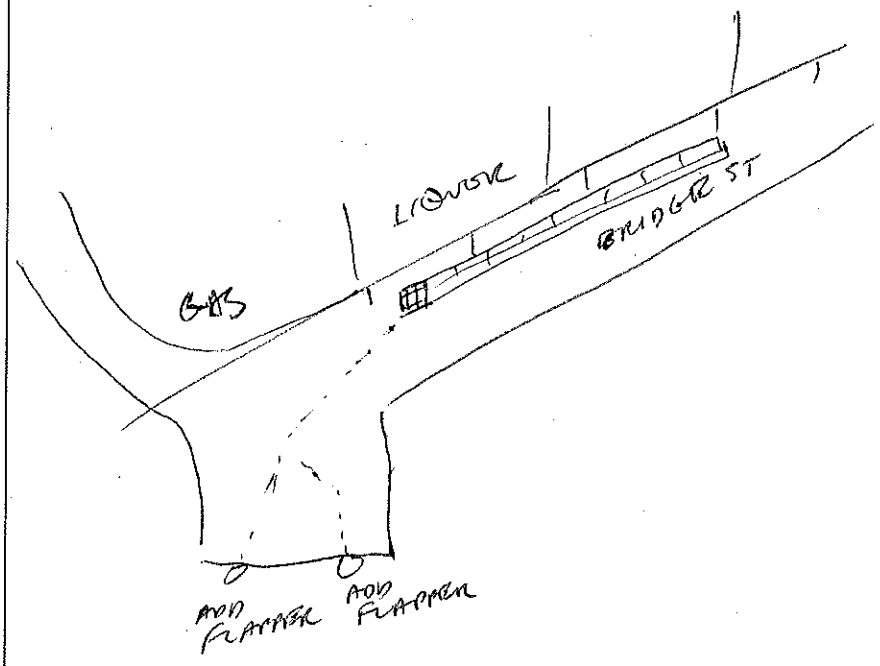
PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

INSTALL SAND FILTER ALONG EXISTING ROADWAY/PARKING STRIPS SHALLOW — TIE TO EXISTING INLET — ADD FLAPPER TO PREVENT TIDAL BACKUP — FIX EXISTING INLET STRUCTURE.

50 FT LINEAR SAND FILTER

Sketch and/or Sizing Calcs:

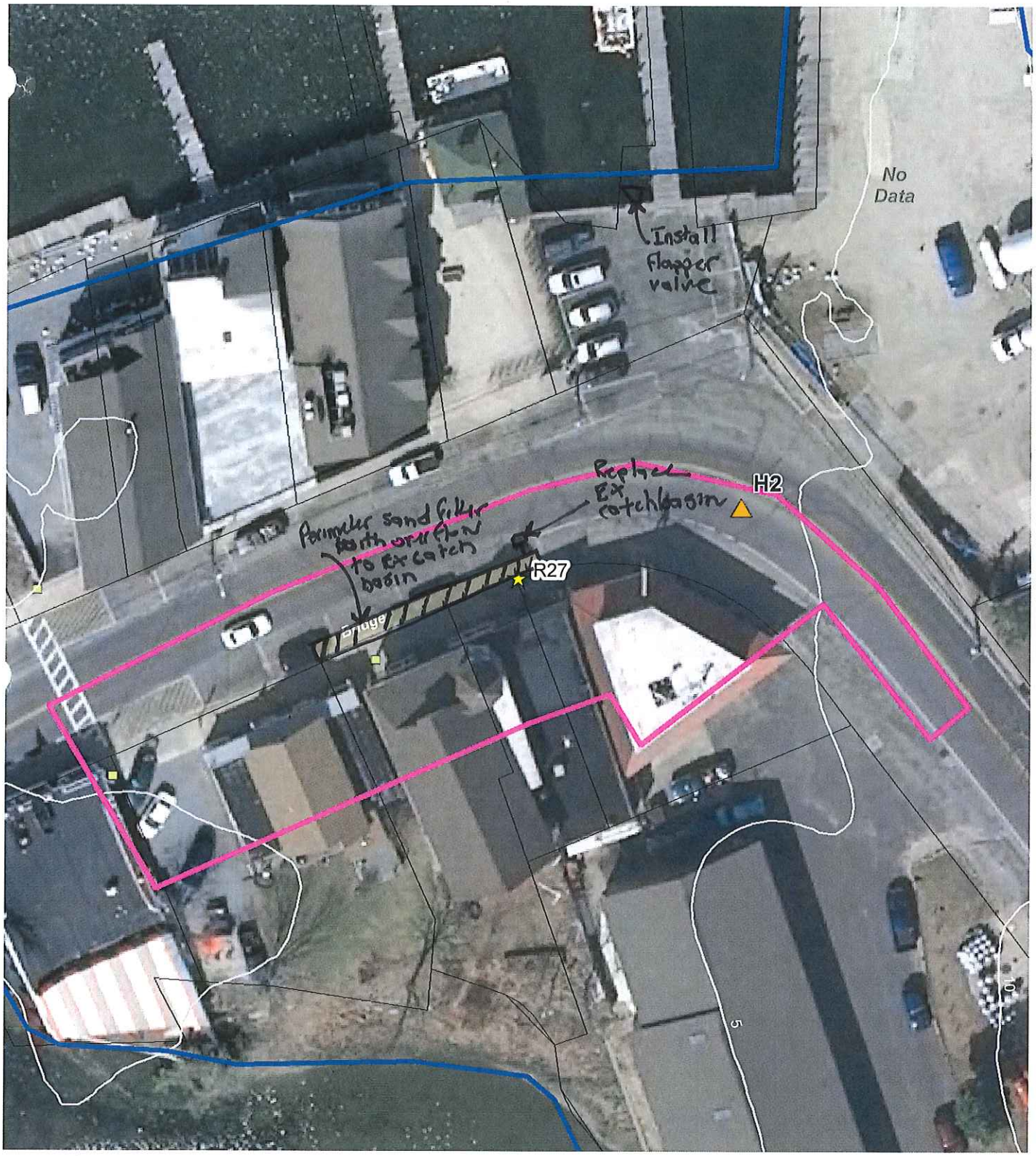


≈ 230 SQ FT
100% WQV

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

40

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Retrofit 27
Dering Harbor
Shelter Island, NY

Date: 12/16/2011

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

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

100 Feet

Horsley Witten Group
Sustainable Environmental Solutions

Hotspot 2
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R-28 Sylvan (N4) **Subwatershed:** Deans Harbor

Date: 5/17/2011 **Assessed by:** JH + ACK

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info:

Land Use: ☐ Public ☐ Private ☒ Unknown: could be an easement

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☑ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☐ No ☐ Unknown:
Sources/pollutants observed? ☐ No ☐ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☒ Unknown ☐ poor infiltration ☐ good infiltration, ONA - B / D BORDER

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

ROAD HAS ONE INLET — OVERFLOWED WITHIN 3 MIN OF RAIN — ALL DRAINAGE TO END OF ROAD — PAVED FLUME AND 18" HDPE DIRECT DISCHARGE TO CHASE CREEK.

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☒ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☒ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 3.9 acres/sq ft

Imperviousness ≈ 30 %

Impervious Area ≈ 1.16 acres/sq ft

Benefits of Retrofit (primary & secondary): ☒ Storage ☒ Water Quality ☐ Recharge
☐ Demonstration / Education ☐ Repair ☐ Other:

Possible Conflicts due to: ☐ Soils ☐ Access
☐ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☐ High water table
☒ Wetlands ☐ Other:

Describe conflicts: NEED TO VERIFY WETLAND & EASEMENT BOUNDARIES

NEXT STEPS

Candidate for pilot project ☑ yep, love it ☐ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☒ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☑ Perform test pits

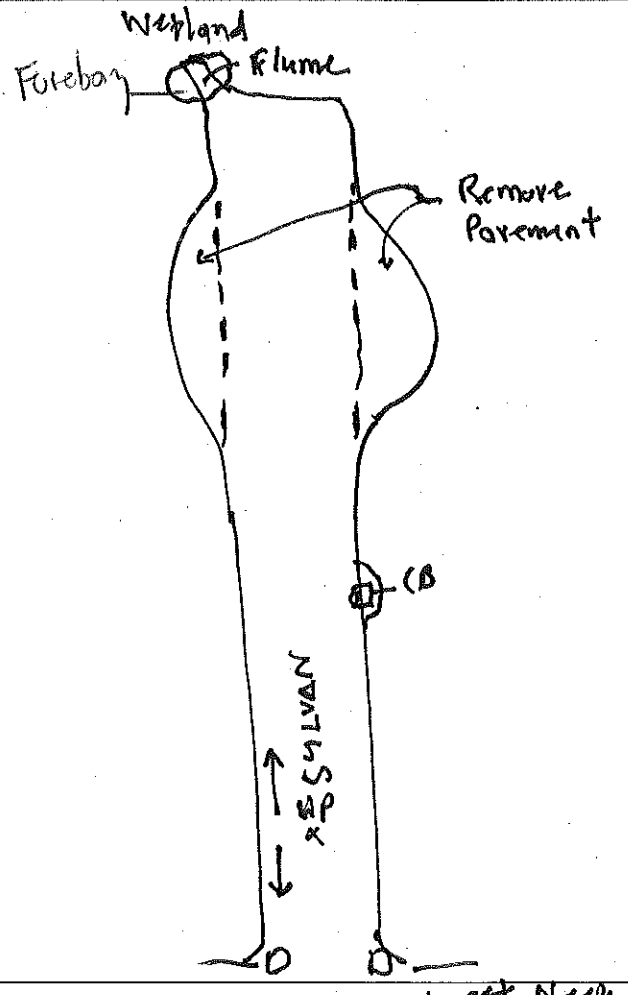
☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Existing CB needs cleaning of debris. Remove excess pavement at northern end of roadway
Add wetland forebay at flume

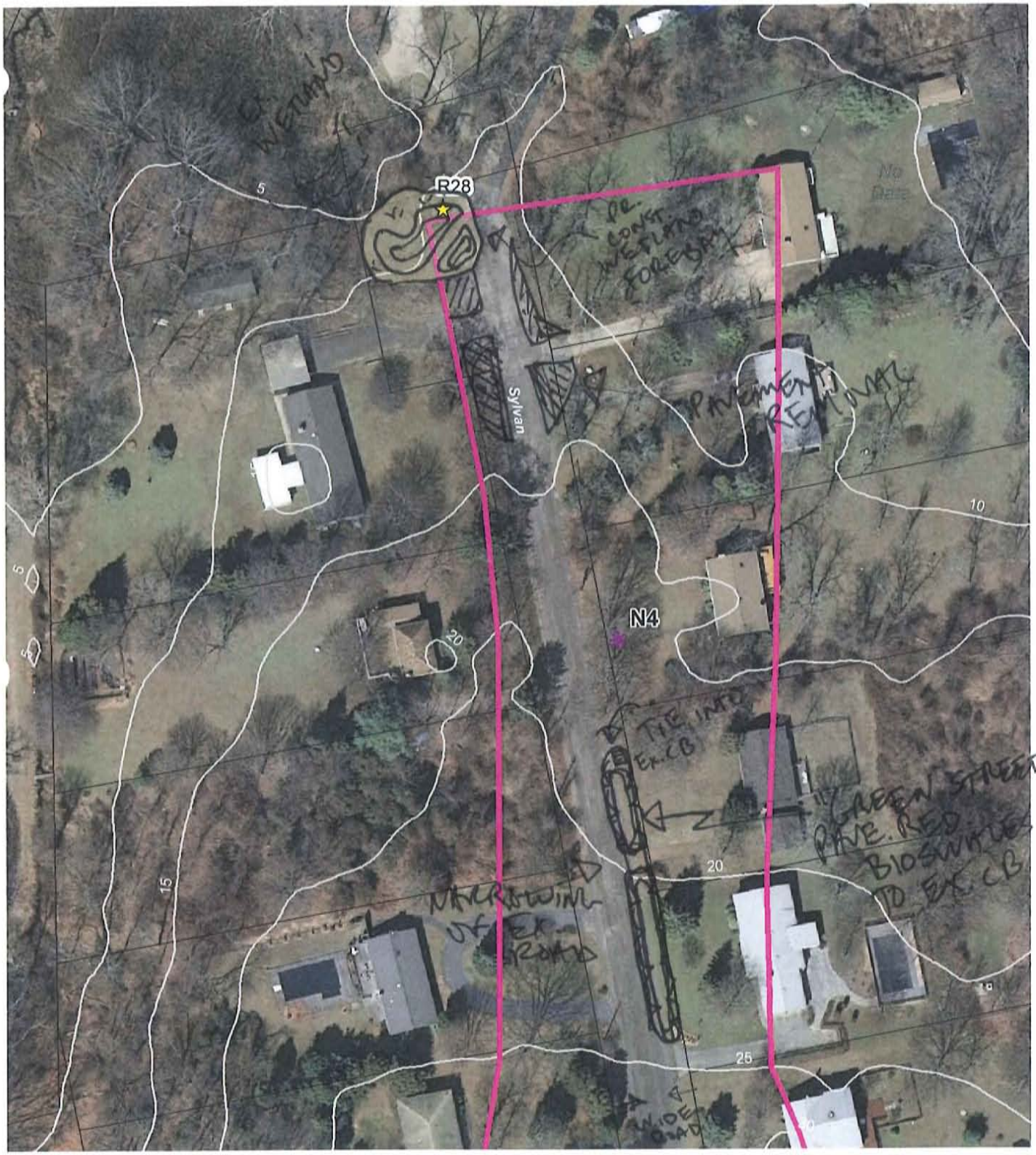
Sketch and/or Sizing Calcs:



Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☒ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

80 Feet

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Retrofit 28
Dering Harbor
Shelter Island, NY
SYLVAN NEIGHBORHOOD

Date: 12/18/2011

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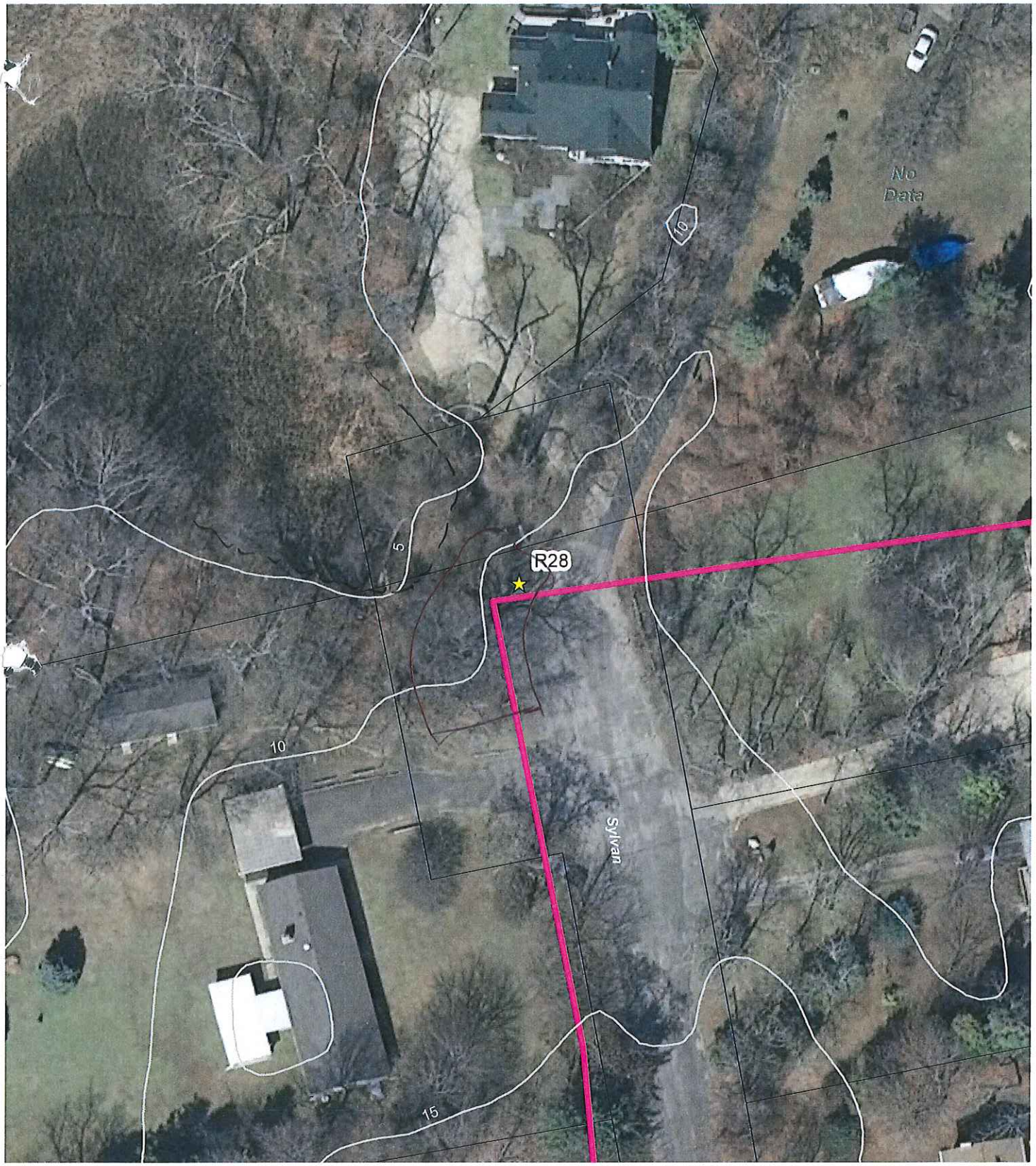

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

Feet

50

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Retrofit 28
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 11/23/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R29 (aka H3 - not inkeot) **Subwatershed:** Deering Harbor

Date: 5/16/2011 YACHT CLUB **Assessed by:** SA TACK

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: Paul Stewart – manager

Land Use: ☐ Public ☒ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☐ Road
☐ Commercial/Industrial ☐ Resort ☒ Marina ☒ Other: YACHT CLUB

Is the site a hotspot? ☒ Yes ☐ No ☐ Unknown: marina
Sources/pollutants observed? ☒ No ☐ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown: lacking CBs

Soils: ☐ Unknown ☐ poor infiltration ☒ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

2 existing CB (one in gravel yard, one in parking lot at edge of lawn). Ponds up at existing inlet. Paul says no outfall

check empty lot on Chequit Rd at low point – Paul says used for parking but Town-owned/[illegible] in back edge

PROPOSED RETROFIT CONCEPT (CONT. ON BACK)

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP

☒ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☒ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 0.31 acres/sq ft
Imperviousness ≈ 76 %
Impervious Area ≈ .24 acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☒ Demonstration / Education ☐ Repair ☐ Other:

Possible Conflicts due to: ☐ Soils ☐ Access
☒ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☐ High water table
☐ Wetlands ☐ Other:

Describe conflicts:
May use grass area for something else – septics?

NEXT STEPS

Candidate for pilot project ☒ yep, love it ☐ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☐ Confirm drainage area/impervious cover
☐ Confirm volume computations
☐ Complete concept sketch
☒ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☒ Obtain utility mapping
☐ Perform test pits

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Install raingarden in existing lawn area infront of Yacht club building. Use existing CB for overflow.

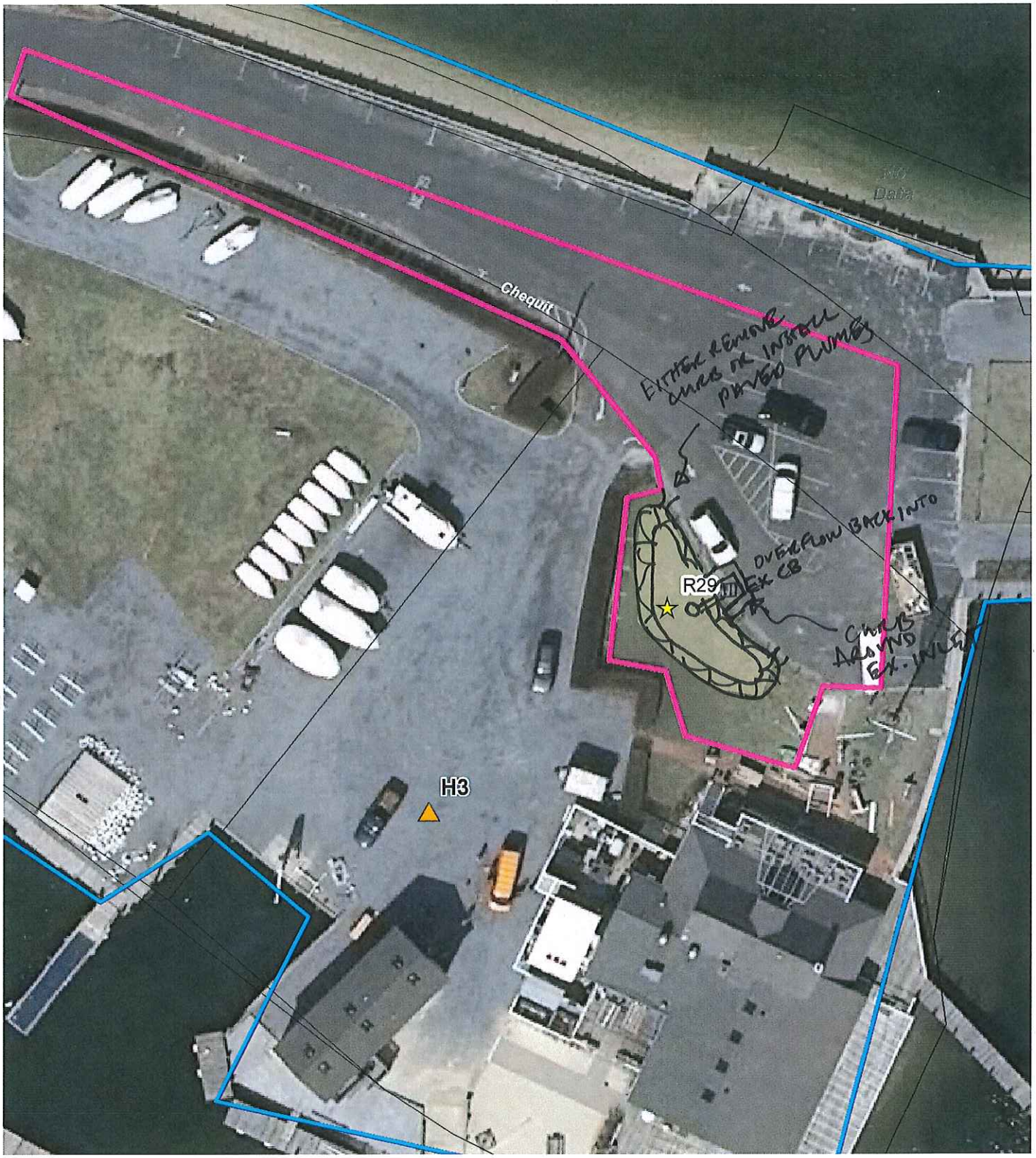
Sketch and/or Sizing Calcs:

see aerial

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High



Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

40

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Retrofit 29
Dering Harbor
Shelter Island, NY
YACHT CLUB

Date: 12/18/2011

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

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

75 Feet

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Hotspot 3
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R-30 Fire House **Subwatershed:** Daring Harbor

Date: 5/16/2021 **Assessed by:** _____

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info:

Land Use: ☐ Public ☒ Private ☐ Unknown:

☐ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☐ Road
☒ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: Fire Station

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☒ No ☐ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☐ Yes ☒ No ☐ Unknown:

Soils: ☐ Unknown ☐ poor infiltration ☒ good infiltration

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

Existing roof down spouts discharging to grass area on west side of building adjacent to Prospect Street

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☐ new BMP

☒ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☒ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☐ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ _____ acres/sq ft

Imperviousness ≈ _____ %

Impervious Area ≈ _____ acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☐ Water Quality ☐ Recharge
☒ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☒ Access
☐ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☐ High water table
☐ Wetlands ☐ Other:

Describe conflicts:

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☒ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☒ Confirm volume computations
☐ Complete concept sketch
☐ Obtain existing as-builts/site plans
☒ Obtain detailed topography
☐ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☒ Perform test pits

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

Sketch and/or Sizing Calcs:

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- Drainage Area to Practice
- Parcels

N

Feet

20

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Retrofit 30
Dering Harbor
Shelter Island, NY
FIRE STATION

Date: 12/18/2011

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

Legend

- Inlets (HW)
- Stormdrain Outfalls (PEP)
- PEP Stormdrain Conveyance Systems
- Parcels

N

75 Feet

Horsley Witten Group
Sustainable Environmental Solutions

Retrofit 3
Dering Harbor &
Gardiners Creek Subwatershed
Shelter Island, NY

Date: 5/10/2011

PECONIC WATERSHEDS **RETROFITS**

Site Name/ID: DH-R31 Sylvan & Auburn **Subwatershed:** Devins Harbor

Date: _____ **Assessed by:** MK/JH

EXISTING SITE/STORMWATER MANAGEMENT

Site Contact Info: mark ketcham

Land Use: ☒ Public ☐ Private ☐ Unknown:

☒ Single Family Residential ☐ Multi-Fam. Residential ☐ School ☐ Golf Course ☐ Park ☐ Agricultural ☒ Road
☐ Commercial/Industrial ☐ Resort ☐ Marina ☐ Other: _____

Is the site a hotspot? ☐ Yes ☒ No ☐ Unknown:
Sources/pollutants observed? ☒ No ☐ Sediment ☐ Nutrients/organics ☐ Oil/grease ☐ Trash/Floatables

Existing Stormwater BMP on site? ☒ Yes ☐ No ☐ Unknown: LEACHING CBs

Soils: ☐ Unknown ☒ poor infiltration ☒ good infiltration → A soils in upper area

Describe Existing Stormwater Conditions, Including Existing Site Drainage and Conveyance:

→ D soils adjacent to water

Grassed area between roads. Leaching catch basins on side of roadway. Outfall into Chase Ck

PROPOSED RETROFIT CONCEPT *(CONT. ON BACK)*

Proposed Retrofit Practice(s): ☐ existing BMP upgrade ☒ new BMP Pretreatment

☒ bio/rain garden ☐ swale ☐ planter ☐ tree pits ☐ infiltration ☐ permeable paver ☐ sand filter ☐ pond
☐ constructed wetland ☐ proprietary practice ☐ soil amendments ☐ reforestation ☐ impervious cover removal
☐ rainwater harvesting ☐ disconnection ☐ Other (describe):

Area Draining to Retrofit
☐ Hotspot ☐ Individual rooftop
☐ Parking Lot ☐ other small impervious area
☒ Street ☐ Pervious area
☐ Other (describe):

Drainage Area to retrofit ≈ 6.8 acres/sq ft
Imperviousness ≈ 37 %
Impervious Area ≈ 2.5 acres/sq ft

Benefits of Retrofit (primary & secondary): ☐ Storage ☒ Water Quality ☐ Recharge
☐ Demonstration / Education ☐ Repair ☐ Other: _____

Possible Conflicts due to: ☐ Soils ☐ Access
☒ Adjacent Land Use ☐ Existing Utilities
☐ Contamination ☒ High water table
☒ Wetlands ☐ Other:

Describe conflicts: Adjacent to wetlands

NEXT STEPS

Candidate for pilot project ☐ yep, love it ☒ OK ☐ undecided ☐ no, but keep listed ☐ no way

Follow-up needed to Complete Field Concept
☐ Confirm property ownership
☒ Confirm drainage area/impervious cover
☐ Confirm volume computations
☐ Complete concept sketch
☒ Obtain existing as-builts/site plans
☐ Obtain detailed topography
☒ Confirm storm drain invert elevations
☐ Other:
☐ Obtain utility mapping
☒ Perform test pits

☐ SITE AERIAL INCLUDED

PROPOSED RETROFIT CONCEPT (CONT.)

Narrative Description (Including key elements, approx. surface area/ depth of treatment, conveyance structures):

USE green space to divert road runoff into swale/bio retention. overflow into ex. leaching catchbasins, Raingarden @ bottom of hill to expand vegetation of buffer.

Sketch and/or Sizing Calcs:

SEE SKETCH

NEED APPROX 10,000 SQFT TO GET 100% WQv
Sketch is close to that. Need to:

- investigate drainage area
- get invrts on ex. cbs
- look at soils

Existing Head Available/Where Measured:

Initial Feasibility and Construction Considerations/ Design or Delivery Notes:

Thoughts on Maintenance Burden: ☐ Low ☐ Medium ☐ High

FIELD FORMS – NEIGHBORHOOD AND STREETS SOURCE ASSESSMENTS

PECONIC WATERSHEDS **NEIGHBORHOOD AND STREETS SOURCE ASSESSMENT**

Site Name/ID: DH-N1 (Village Gardiner Street Road Way) **Subwatershed:** Dering Harbor

Date: 5/19/2011 **Assessed by:** JH + ACK

NEIGHBORHOOD CHARACTERIZATION

Neighborhood / Subdivision Name: GARDINER ST Approx. Area (acres): ____

Main Road Names: Locust Road Homeowners Association? ☐ Y ☐ N ☒ Unknown

If yes, name and contact information: ____

Residential (*circle average single family lot size*):

☐ Single Family Attached (Duplexes, Row Homes) $<1/8$ $1/8$ $1/4$ $1/3$ $>1/3$ acre

☒ Single Family Detached $<1/4$ $1/4$ (1/2) 1 (>1) acre mix

☐ Multifamily (Apts, Townhomes, Condos) ☐ Mobile Home Park

Estimated Age of Neighborhood: OLD ≈60 or more years	Percentage of Homes with Garages: 100 %	
Sewer Service? ☐ Y ☒ N	Amount of Infill, Redevelopment, and Remodeling: ☐ No Evidence ☒ <5% of units ☐ 5-10% ☐ >10%	
Yard and Lawn Conditions (Typical Lot)		Comments/Notes
% of lot with impervious cover IN SMALLER LOTS	70 %	
% of lot with grass cover	25 %	
% of lot with landscaping (e.g. mulched bed areas)	5 %	
% of lot with bare soil	0 %	
Note: The % above must total 100%		
% of lot with forest canopy	60 %	
Evidence of permanent irrigation or "non-target" irrigation	%	NOT NOTICED
Proportion of *total neighborhood* turf lawns with following management status:	High: %	5
	Med: %	85
	Low: %	10
Outdoor swimming pools? ☐ Y ☐ N ☒ Can't Tell Est.# ___	%	
Junk or trash in yards? ☐ Y ☒ N ☐ Can't Tell	%	
Driveways and Sidewalks		Comments/Notes
% of driveways that are impervious ☐ N/A	~~50~~ %	10 %

Driveway condition: ☒ Clean ☐ Stained ☐ Dirty ☐ Breaking up

Are sidewalks present? ☐ Y ☒ N If yes, are they on ☐ one side of street or ☐ along both sides

☐ Spotless ☐ Covered with lawn clippings/leaves ☐ Receiving "non-target" irrigation

Distance between sidewalk and street? ____ ft Is there pet waste in this area? ☐ Y ☒ N ☐ N/A

☐ SITE AERIAL INCLUDED

Rooftops (Typical Lot)		Comments/Notes hard to see
Downspouts directly connected to storm drains or sanitary sewer	0 %	past hedges.
Downspouts are directed to impervious surface	0 %	
Downspouts discharge to pervious area	50 %	
Downspouts discharge to a cistern, rain barrel, etc.	50 %	drywells?
Note: The % above must total 100%		
Lawn area present downgradient of leader for rain garden? ☒Y ☐N	790 %	

Streets

Condition of pavement: ☐New ☐Good ☒Cracked ☐Broken Narrow

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

Are large cul-de-sacs present? ☐Y ☒N | Storm drain inlets? ☒Y ☒N Are they stenciled? ☐Y ☒N

Is trash present in curb and gutter? If so, use the index to the below to rate condition:

	Clean				Filthy
Sediment	☒1	☐2	☐3	☐4	☐5
Organic matter	☒1	☐2	☐3	☐4	☐5
Litter	☒1	☐2	☐3	☐4	☐5

inlet

Common Areas

Stormwater pond? ☐Y ☒N Is it a ☐ wet pond ☐dry pond? Is it overgrown? ☐ Y ☐ N
What is the estimated pond area? ☐ <1 acre ☐ about 1 acre ☐ > 1 acre

Open space? ☐Y ☒N If yes, is pet waste present? ☐ Y ☒ N Dumping? ☐ Y ☒ N
Buffers/floodplain present: ☒Y ☐ N If yes, encroachment evident? ☒ Y ☐ N LAWN TO BULKHEAD

Pollutant Reduction Strategies ☐Municipal ☒Private

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

Rate the feasibility of the following pollution prevention strategies:

Street Sweeping	☐ High	☐ Moderate	☒ Low
Storm Drain Stenciling	☒High	☐ Moderate	☒ Low
Catchbasin Clean-outs	NONE (in our defined area) ☒High	☐ Moderate	☒ Low
Repair / Maintenance	☐ High	☐ Moderate	☒ Low

INITIAL NEIGHBORHOOD ASSESSMENT AND RECOMMENDATIONS

Based on field observations, this neighborhood has significant indicators for the following: (*check all that apply*)
☒Nutrients ☐Oil and Grease ☐Trash / Litter ☐Bacteria ☒Sediment ☐Other _____

Recommended Actions:

- ☐Onsite retrofit potential (small)
- ☐ Existing BMP retrofit
- ☐Better maint. of common spaces (e.g., roads, BMPs)
- ☒Address lawn care issues
- ☒Buffer management
- ☐Address pet waste issues
- ☐Downspout disconnection
- ☐ Parking lot retrofit
- ☐Reforestation/lawn conversion
- ☐Address septic issues
- ☐Other action(s) _____

PECONIC WATERSHEDS

NEIGHBORHOOD AND STREETS SOURCE ASSESSMENT

Site Name/ID: DA N3 BONNIE

Subwatershed: Dering Harbor

Date: 5/17/2011

Assessed by: JH+ACK

NEIGHBORHOOD CHARACTERIZATION

Neighborhood / Subdivision Name: Bonnie Ln Approx. Area (acres): _____

Main Road Names: Bonnie, Locust Woods Homeowners Association? ☐ Y ☐ N ☒ Unknown

If yes, name and contact information: _____

Residential (*circle average single family lot size*):

☐ Single Family Attached (Duplexes, Row Homes) $<1/8$ $1/8$ $1/4$ $1/3$ $>1/3$ acre

☒ Single Family Detached $<1/4$ $1/4$ $1/2$ 1 (>1) acre

☐ Multifamily (Apts, Townhomes, Condos) ☐ Mobile Home Park

Estimated Age of Neighborhood: 10-15 years	Percentage of Homes with Garages: 100 %	
Sewer Service? ☐ Y ☒ N	Amount of Infill, Redevelopment, and Remodeling: ☒ No Evidence ☐ <5% of units ☐ 5-10% ☐ >10%	
Yard and Lawn Conditions (Typical Lot)		Comments/Notes
% of lot with impervious cover	15 %	
% of lot with grass cover	70 %	
% of lot with landscaping (e.g. mulched bed areas)	15 %	
% of lot with bare soil	0 %	
Note: The % above must total 100%		
% of lot with forest canopy	10 %	most lots open lawn
Evidence of permanent irrigation or "non-target" irrigation	%	not observed
Proportion of *total neighborhood* turf lawns with following management status:	High: %	80 %
	Med: %	20 %
	Low: %	
Outdoor swimming pools? ☐ Y ☐ N ☒ Can't Tell Est.#___	%	
Junk or trash in yards? ☐ Y ☒ N ☐ Can't Tell	%	Absolutely not
Driveways and Sidewalks		Comments/Notes
% of driveways that are impervious ☒ N/A	5 %	

Driveway condition: ☒ Clean ☐ Stained ☐ Dirty ☐ Breaking up MOSTLY PERVIOUS STONE/GRAVEL

Are sidewalks present? ☐ Y ☒ N If yes, are they on ☐ one side of street or ☐ along both sides

☐ Spotless ☐ Covered with lawn clippings/leaves ☐ Receiving "non-target" irrigation

Distance between sidewalk and street? _____ ft Is there pet waste in this area? ☐ Y ☐ N ☐ N/A

☐ SITE AERIAL INCLUDED

Rooftops (Typical Lot)		Comments/Notes
Downspouts directly connected to storm drains or sanitary sewer	%	
Downspouts are directed to impervious surface	%	
Downspouts discharge to pervious area	100%	
Downspouts discharge to a cistern, rain barrel, etc.	%	
Note: The % above must total 100%		
Lawn area present downgradient of leader for rain garden? ☒Y ☐N	%	

Streets

Condition of pavement: ☐New ☒Good ☐Cracked ☐Broken

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

Are large cul-de-sacs present? ☐Y ☒N | Storm drain inlets? ☒Y ☐N Are they stenciled? ☐Y ☒N

Is trash present in curb and gutter? If so, use the index to the below to rate condition:
No

	Clean		FILLED W WATER		HARD TO TELL Filthy
Sediment	☐1	☐2	☒3	☐4	☐5
Organic matter	☐1	☒2	☐3	☐4	☐5
Litter	☒1	☐2	☐3	☐4	☐5

Common Areas

Stormwater pond? ☐Y ☒N Is it a ☐ wet pond ☐dry pond? Is it overgrown? ☐ Y ☐ N
What is the estimated pond area? ☐ <1 acre ☐ about 1 acre ☐ > 1 acre

Open space? ☒Y ☒N If yes, is pet waste present? ☐ Y ☒N Dumping? ☒Y ☐ N UNKNOWN OPEN SPACE.
Buffers/floodplain present: ☐ Y ☒N If yes, encroachment evident? ☐ Y ☐ N There is town parcel

Pollutant Reduction Strategies ☐Municipal ☒Private

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

Rate the feasibility of the following pollution prevention strategies:

Street Sweeping	☐ High	☐ Moderate	☐ Low
Storm Drain Stenciling	☒ High	☐ Moderate	☐ Low
Catchbasin Clean-outs	☒ High	☐ Moderate	☐ Low
Repair / Maintenance	☐ High	☒ Moderate	☐ Low

INITIAL NEIGHBORHOOD ASSESSMENT AND RECOMMENDATIONS → 2 cb being undermined

Based on field observations, this neighborhood has significant indicators for the following: (*check all that apply*)
☐Nutrients ☐Oil and Grease ☐Trash / Litter ☐Bacteria ☐Sediment ☐Other MAYBE NUTRIENTS? NOT ALOT OF EVIDENCE OF DRAINAGE TO START

Recommended Actions:

☐Onsite retrofit potential (small)	☒Address lawn care issues	☐Parking lot retrofit
☐ Existing BMP retrofit	☐ Buffer management	☒Reforestation/lawn conversion
☐Better maint. of common spaces (e.g., roads, BMPs)	☐Address pet waste issues	☐Address septic issues
	☐Downspout disconnection	☐Other action(s) _____

PECONIC WATERSHEDS

NEIGHBORHOOD AND STREETS SOURCE ASSESSMENT

Site Name/ID: DH N4 - Sylvan

Subwatershed: Delong Harbor

Date: 5/17/2011

Assessed by: SH + ACK

NEIGHBORHOOD CHARACTERIZATION

Neighborhood / Subdivision Name: Sylvan Road Approx. Area (acres): ____

Main Road Names: Sylvan Road Homeowners Association? ☐ Y ☐ N ☒ Unknown

If yes, name and contact information: ____

Residential (*circle average single family lot size*):

☐ Single Family Attached (Duplexes, Row Homes) $<1/8$ $1/8$ $1/4$ $1/3$ $>1/3$ acre

☒ Single Family Detached $<1/4$ $1/4$ (1/2) 1 >1 acre

☐ Multifamily (Apts, Townhomes, Condos) ☐ Mobile Home Park

Estimated Age of Neighborhood: 20 years	Percentage of Homes with Garages: 100 %
Sewer Service? ☐ Y ☒ N	Amount of Infill, Redevelopment, and Remodeling: ☒ No Evidence ☐ <5% of units ☐ 5-10% ☐ >10%

Yard and Lawn Conditions (Typical Lot)		Comments/Notes
% of lot with impervious cover	30 %	
% of lot with grass cover	65 %	
% of lot with landscaping (e.g. mulched bed areas)	5 %	
% of lot with bare soil	0 %	
Note: The % above must total 100%		
% of lot with forest canopy	50 %	
Evidence of permanent irrigation or "non-target" irrigation	%	NOT SEEN
Proportion of *total neighborhood* turf lawns with following management status:	High: 10 %	
	Med: 60 %	
	Low: 30 %	
Outdoor swimming pools? ☐ Y ☐ N ☒ Can't Tell Est.# ___	%	
Junk or trash in yards? ☐ Y ☐ N ☐ Can't Tell	%	
Driveways and Sidewalks		Comments/Notes
% of driveways that are impervious ☐ N/A	50 %	

Driveway condition: ☒ Clean ☐ Stained ☐ Dirty ☐ Breaking up

Are sidewalks present? ☐ Y ☒ N If yes, are they on ☐ one side of street or ☐ along both sides

☐ Spotless ☐ Covered with lawn clippings/leaves ☐ Receiving "non-target" irrigation

Distance between sidewalk and street? ____ ft Is there pet waste in this area? ☐ Y ☐ N ☐ N/A

☐ SITE AERIAL INCLUDED

Rooftops (Typical Lot)		Comments/Notes
Downspouts directly connected to storm drains or sanitary sewer	%	
Downspouts are directed to impervious surface	10 %	
Downspouts discharge to pervious area	90 %	
Downspouts discharge to a cistern, rain barrel, etc.	%	
Note: The % above must total 100%		
Lawn area present downgradient of leader for rain garden? ☒Y ☐N	%	

Streets

Condition of pavement: ☐New ☒Good ☐Cracked ☐Broken

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

Are large cul-de-sacs present? ☐Y ☐N | Storm drain inlets? ☐Y ☐N Are they stenciled? ☐Y ☐N

Is trash present in curb and gutter? If so, use the index to the below to rate condition:

	Clean				Filthy
Sediment	☒1	☐2	☐3	☐4	☐5
Organic matter	☒1	☐2	☐3	☐4	☐5
Litter	☒1	☐2	☐3	☐4	☐5

Common Areas

Stormwater pond? ☐Y ☒N Is it a ☐ wet pond ☐dry pond? Is it overgrown? ☐ Y ☐ N
What is the estimated pond area? ☐ <1 acre ☐ about 1 acre ☐ > 1 acre DISCHARGE TO WETLAND

Open space? ☐Y ☒N If yes, is pet waste present? ☐ Y ☐ N Dumping? ☐ Y ☐ N
Buffers/floodplain present: ☒Y ☐ N If yes, encroachment evident? ☐ Y ☐ N

Pollutant Reduction Strategies ☐Municipal ☐Private

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

Rate the feasibility of the following pollution prevention strategies:

Street Sweeping	☐ High	☐ Moderate	☐ Low
Storm Drain Stenciling	☐ High	☐ Moderate	☐ Low
Catchbasin Clean-outs	☒ High	☐ Moderate	☐ Low
Repair / Maintenance	☐ High	☐ Moderate	☐ Low

INITIAL NEIGHBORHOOD ASSESSMENT AND RECOMMENDATIONS

Based on field observations, this neighborhood has significant indicators for the following: (*check all that apply*)
☐Nutrients ☐Oil and Grease ☐Trash / Litter ☐Bacteria ☐Sediment ☐Other NONE

Recommended Actions:

☐Onsite retrofit potential (small)
☐ Existing BMP retrofit
☐Better maint. of common spaces (e.g., roads, BMPs)
☐Address lawn care issues
☐ Buffer management
☐Address pet waste issues
☐Downspout disconnection
☐ Parking lot retrofit
☐Reforestation/lawn conversion
☐Address septic issues
☒Other action(s) RETROFIT

FIELD FORMS – HOTSPOT/POLLUTION PREVENTION

PECONIC WATERSHEDS **HOTSPOT/POLLUTION PREVENTION**

Site Name/ID: DH-H2 GAS STATION **Subwatershed:** Deering Harbor

Date: 5/16/2011 **Assessed by:** SHACK

EXISTING CONDITIONS

Contact Information/location:
ANGELO — DOWN GAS STATION, BIKE SHOP, FUEL STORAGE

Land Use: ☒ Commercial ☒ Industrial ☐ Institutional ☐ Municipal ☐ Golf Course ☐ Transport-Related ☐ Marina ☐ Animal Facility ☐ Other:

Basic Description of Operation: SPDES PERMIT FOR GAS STORAGE PROPANE / HEATING OIL

Existing stormwater management on-site? ☐ Unknown ☒ No ☐ Yes, describe:
Condition of drain inlets on-site: ☐ None ☐ Good ☐ Need maintenance
STATE INSTALLED UNDERGROUND BAFFLES/TANKS TO HOLD SEDIMENT COMPLETELY FILLED W SEDIMENT

Evidence of riparian/wetland buffer encroachment: ☐ Unknown ☐ No ☒ Yes, describe:

Potential pollutants associated with:
- ☒ Vehicular operations (fueling, storage, maintenance)
- ☐ Waste management (dumping)
- ☐ Outdoor material storage (uncovered, leaking, no secondary containment)
- ☐ Landscaping (over fertilizing, irrigation)
- ☐ Building/parking lot maintenance (washdowns)
- ☐ Other:

Pollutant of concern?
- ☐ Limited ☐ Likely ☒ Observed for **sediment loading**
- ☐ Limited ☐ Likely ☒ Observed for **oil/grease**
- ☐ Limited ☐ Likely ☐ Observed for **trash**
- ☐ Limited ☐ Likely ☐ Observed for **nutrient loading**
- ☐ Limited ☐ Likely ☐ Observed for **bacteria**
- ☐ Limited ☐ Likely ☐ Observed for **other:**

Severity of Problem: ☐ Low ☐ Medium ☐ High

Describe Conditions:

- GAS STATION FUELING AREA UNCOVERED / DRAINING DIRECTLY TO HARBOR. CATCH BASIN IN REAR FULL, NEEDS CLEANING
- DORY RESTAURANT — DUMPING INTO DRAIN

PROPOSED RESTORATION ACTIVITIES

- DRAINAGE INLET IN FRONT OF LIQUOR STORE... NO SUMP OVERFLOWS AT HIGH TIDE
- FLAPPER VALVES — TIDE GATE / ON OUTLET PIPES
- SAW STENCILED STORM DRAIN
- NEED MORE STORAGE & HYDROCARBON TREATMENT. SAND FILTER ?? AT DOCK ?

NEXT STEPS

CATCH BASIN INSERTS CAUGHT ON FIRE.

☐ SITE AERIAL INCLUDED

SKETCH

Site ID DH HZ

PECONIC WATERSHEDS **HOTSPOT/POLLUTION PREVENTION**

Site Name/ID: DH-H4 Pharmacy Alley **Subwatershed:** Deering Harbor

Date: 5/16/2011 **Assessed by:** JH + ACK

EXISTING CONDITIONS

Contact Information/location:

Land Use: ☒ Commercial ☐ Industrial ☐ Institutional ☐ Municipal ☐ Golf Course ☐ Transport-Related ☐ Marina ☐ Animal Facility ☐ Other:

Basic Description of Operation:
Area behind pharmacy and other restaurants downtown Heights.

Existing stormwater management on-site? ☐ Unknown ☒ No ☐ Yes, describe:
Condition of drain inlets on-site: ☐ None ☐ Good ☐ Need maintenance ☐

Evidence of riparian/wetland buffer encroachment: ☐ Unknown ☒ No ☐ Yes, describe:

Potential pollutants associated with:
- ☐ Vehicular operations (fueling, storage, maintenance)
- ☒ Waste management (dumping)
- ☒ Outdoor material storage (uncovered, leaking, no secondary containment)
- ☐ Landscaping (over fertilizing, irrigation)
- ☐ Building/parking lot maintenance (washdowns)
- ☐ Other:

Pollutant of concern?
- ☐ Limited ☐ Likely ☐ Observed for **sediment loading**
- ☐ Limited ☐ Likely ☒ Observed for **oil/grease**
- ☐ Limited ☐ Likely ☐ Observed for **trash**
- ☐ Limited ☐ Likely ☐ Observed for **nutrient loading**
- ☐ Limited ☐ Likely ☐ Observed for **bacteria**
- ☐ Limited ☐ Likely ☐ Observed for **other:**

Severity of Problem: ☐ Low ☐ Medium ☐ High

Describe Conditions:
Dumpsters, gas cans, paint dumping, grease traps in alley behind buildings. Downspouts discharging directly

PROPOSED RESTORATION ACTIVITIES

→ redirect downspouts — covered storage or 2° containment
→ maybe use park area to treat

NEXT STEPS

☐ SITE AERIAL INCLUDED

SKETCH

APPENDIX C:

RETROFIT RANKING METHODOLOGY AND RESULTS

APPENDIX C – Retrofit Ranking Methodology

The recommended stormwater retrofits sites identified within this plan will likely not be implemented simultaneously; therefore, each of the evaluated retrofit sites were subject to a ranking procedure in order to help prioritize locations for further evaluation. Not all recommendations are equal when it comes to implementation. Some proposed projects may require additional planning and permitting, both of which will require additional time, while others may require a large amount of upfront construction costs. Prioritizing candidate sites allows retrofit sites to be compared to find the most cost-effective and feasible sites within the study area. The ranking system used a 100-point scoring system, where the relative merit of each proposed retrofit BMP was evaluated by assigning points based on the following site BMP ranking criteria:

- Pollutant Removal Potential (40 points)
- Estimated Construction Cost (25 points)
- Ease of Implementation (20 points) including:
    - Wetland impact/permitting
    - Site accessibility
    - Ownership
    - Maintenance burden
- Additional Benefits (25 points) including:
    - Public education/demonstrations
    - Additional stormwater benefits
    - Available partners

1) **Pollutant Removal Potential (40 points)--**This category was allotted the highest number of possible points based on the main goal of addressing the two pollutants of concern under the Peconic Estuary 2006 Total Maximum Daily Load (TMDL) for pathogens and the 2007 TMDL for nitrogen. We analyzed this category based on water quality volume treated (with a goal of 1.2 inch per impervious acre), as well as the most currently accepted removal efficiencies for the proposed practices as documented in the 2010 Rhode Island Stormwater Design Manual (see Table 1). Note, the 2010 RI Manual was used because it reflects the latest research results on pollutant removal capabilities within the northeastern region of the country.
    - Water Quality Volume Treated - The site with the maximum volume treated received 20 points, while the minimum received 10 points, and the remaining sites were ranked accordingly.

    - Pollutant Reduction – The practices were ranked based on their removal efficiency for both bacteria and nitrogen, for a maximum of 20 points possible (10 points each pollutant).

Table 1. Pollutant Removal Efficiencies (Source: 2010 Rhode Island Stormwater Design Manual)

Practice	% Bacteria Removal	%TN Removal
Constructed Wetland	60	30
Bioretention	70	55
Dry Swale	70	55
Wet Swale	60	30
Infiltration Basin	95	65
Infiltration Trench	95	65

Practice	% Bacteria Removal	%TN Removal
Permeable Paving	95	40
Rain Garden	70	55
Stormwater Planters	70	55
Gravel Wetland	85	55
Subsurface Chambers	40	90
Sand Filter	70	32
Dry Well	40	90
O/G Separator	0	0
Wet ED Basin	70	31
Deep Sump Catch Basin	*0*	*0*
Sediment Forebay	12	3
Grass Channel	0	40

2) **Estimated Construction Cost (25 points)—** Preliminary construction costs were roughly estimated on a unit cost per volume or area of the practice based on literature and HW's recent experience with implementation of local projects (see Table 2). Total estimated project cost was then divided by the water quality volume treated by each retrofit. Next, relative scores were assigned to each project, where the lowest cost per WQv unit was assigned 25 points and the highest cost was assigned 5 points.

Table 2. Construction Costs per Unit Treated

Practice	$/Unit
Constructed Wetland	$ 9.45 per cu ft
Bioretention	$27.00 per cu ft
Dry Swale	$16.90 per cu ft
Wet Swale	$16.90 per cu ft
Infiltration Basin	$10.80 per cu ft
Infiltration Trench	$21.60 per cu ft
Permeable Paving	$40.50 per cu ft
Rain Garden	$13.50 per cu ft
Stormwater Planters	$35. per cu ft
Pavement Removal	$0.5 per sq ft
Repaving	$3 per sq ft
Sand Filter	$125 per sq ft
O/G Separator	$3 per gallon

3) **Ease of Implementation (20 points)--**This category compared the concepts based on the following implementation factors:

- Potential required permitting
  - Minimal to no permitting required = 5 points;
  - Some permitting likely = 2.5 points; and
  - Complicated permitting likely = 0 points.

- Access issues
    - Site easily accessed = 5 points;
    - Some difficulty getting equipment to the site = 2.5 points; and
    - Site is difficult to access = 0 points.

- Ownership issues
    - Publically-owned = 5 points;
    - Ownership potentially an issue = 2.5 points; and
    - Privately-owned = 0 points.

- Maintenance burden
    - Low = 5 points;
    - Medium = 2.5 points; and
    - High = 0 points.

4) **Additional benefits/factors (15 points).** This category helps compare the proposed concepts based on additional factors of interest to this project, as listed below:

- Public Education/Demonstration
    - Site is located in a high visibility area and provides an excellent opportunity for reaching the public = 5 points:
    - Site provides moderate visibility and located where some portion of the public could benefit = 2.5 points; and
    - Site provides low visibility and is located in an area few people will visit = 0 points.

- Additional Stormwater Benefits
    - Concept provides additional flood abatement, runoff reduction, habitat benefits = 5 points;
    - Site provides moderate additional benefits = 2.5 points; and
    - Site provides little other benefits than water quality = 0 points.

- Available partners
    - Good opportunity for, or there are existing partners/funding/volunteers available for implementation = 5 points:
    - Some opportunity for implementation assistance = 2.5 points
    - Little to no opportunity for implementation assistance = 0 points

The eight or fewer retrofits with the highest total score were preliminarily classified as “high priority” for each subwatershed. Remaining retrofits were assigned “medium” or “low” priority ratings based on natural breaks in the total scores. Ranking categories are listed in the plan in the retrofit summary tables. Point thresholds defining categories vary between each subwatershed.

APPENDIX C - Retrofit Ranking Spreadsheet

Preliminary Sizing Calculations for Stormwater Retrofits:

Note: Water Quality Volume Required is based upon 1.2 inch of runoff times the contributing impervious area per 2010 NY Manual (Fig. 4.1)

Water Quality Volume (WQv)

#	Project	% Imp.	Drainage Area		Imp. Area		WQv Required	WQv provided	WQv provided	Bacteria removed	TN removed	Total Cost $	Wetlands/ Permitting	Access Issues	Ownership Issues	Maintenance Burden	Public ed	Addl SW Benefits	Other Partners
		%	ac	sf	ac	sf	cf	%	cf	%	%								
DH-R1	Spring Garden/Bay St.-raingarden	40.70	1.70	74,052	0.69	30,138	3,083	100.0	3083	70	55	$ 43,016.18	L	L	H	M	H	L	L
DH-R2/3	Our Lady of the Isle-bioretention	41.06	5.20	226,512	2.13	93,000	9,503	93.7	8903	70	55	$ 178,056.67	L	L	H	M	H	L	L
DH-R4	Grand/Cedar Rd. Park-bioretention	26.82	11.00	479,160	2.95	128,523	13,963	89.2	12458	70	55	$ 336,375.00	L	L	L	M	H	M	H
DH-R5	Locust/Chase-swale and bioretention	50.07	2.10	91,476	1.05	45,800	4,579	54.4	2492	70	55	$ 67,275.00	M	L	H	M	H	L	L
DH-R6	Meadow Lane/Locust-raingardens	36.69	1.33	57,935	0.49	21,259	2,203	63.9	1408	70	55	$ 19,012.50	M	L	H	M	M	H	L
DH-R7	New York Ave. Empty Lots-constructed wetland	12.29	38.00	1,655,280	4.67	203,457	33,106	100.0	33105	60	30	$ 312,845.40	H	L	H	L	H	H	L
DH-R8	Ice Pond Park-rain gardens	30.19	0.30	13,068	0.09	3,945	420	100.0	420	70	55	$ 11,350.53	L	L	L	M	H	L	H
DH-R10A	Ice Pond Park South/Goat Hill Golf-swale/bio	6.90	29.80	1,298,088	2.05	89,513	14,547	100.0	14547	70	55	$ 245,837.71	L	L	L	M	H	L	H
DH-R10B	Ice Pond Park South-constructed wetland	14.19	60.50	2,635,380	8.59	373,991	52,708	25.9	13651	60	30	$ 128,998.80	H	L	L	L	M	H	H
DH-R14a	IGA-large bioretention	91.42	1.23	53,579	1.12	48979	4,676	90.1	4214	70	55	$ 39,823.88	L	L	H	M	H	L	L
DH-R14b	IGA-small bioretention	73.83	0.62	27,007	0.46	19939	1,930	100.0	1930	70	55	$ 18,234.09	L	L	H	M	L	L	L
DH-R17	Cobbetts-dry swales	9.33	16.00	696,960	1.49	65,000	13,939	100.0	13939	70	55	$ 235,572.48	M	L	L	L	M	M	L
DH-R18	Shore Infiltration Chambers-biofilter	19.23	1.40	60,984	0.27	11727	1,360	97.0	1320	70	55	$ 35,626.50	L	L	L	H	M	L	H
DH-R19	Yoco Rd.- raingardens	21.09	2.30	100,188	0.48	21,125	2,402	100.0	2402	70	55	$ 32,429.57	L	L	H	M	L	H	L
DH-R20	Shore Rd cul-de-sac- raingardens	20.42	3.50	152,460	0.71	31,132	3,564	43.8	1560	70	55	$ 42,120.00	L	L	H	M	L	H	L
DH-R24	Winthrop Rd. Bridge-dry swale	41.91	0.95	41,382	0.40	17,345	1,768	13.6	240	70	55	$ 7,056.00	M	L	L	M	H	M	H
DH-R25	Dering Village Office-raingarden	25.53	0.60	26,136	0.15	6,672	731	100.0	731	70	55	$ 9,870.66	L	L	L	L	H	L	H
DH-R26	N. Ferry Office/SIHPOA-raingarden	80.35	0.06	2,614	0.05	2,100	202	100.0	202	70	55	$ 5,000.00	M	L	M	L	H	L	M
DH-R27	Bridge St.-sandfilter	100.19	0.35	15,246	0.35	15,274	1,451	100.0	1451	70	32	$ 40,000.00	L	L	L	H	H	H	H
DH-R29	Yacht Club-raingarden	76.51	0.31	13,504	0.24	10,331	997	100.0	997	70	55	$ 13,463.66	L	L	H	M	H	L	L
DH-R28	Sylvan St. Neighborhood-wetland forebay	29.63	3.90	169,884	1.16	50,334	5,380	100.0	5380	60	30	$ 50,836.38	H	L	M	M	M	H	L
DH-R30	Firestation-raingarden	83.14	0.06	2,614	0.05	2,173	209	100.0	209	70	55	$ 5,000.00	L	L	L	L	H	L	H
DH-R31	Sylvan and Auburn Ave-bioretention	37.15	6.83	297,515	2.538	110,538	11,436	96.2	11000	70	55	$ 297,000.00	M	L	L	M	H	H	H

Ranking Results:

Site #		1. Pollutant Removal Potential (possible 40 pts)			2. Cost (25 points)		3. Ease of Implementation (20 points)					4. Additional Benefits/Factors (15 points)				TOTAL SCORE		Site Priority In Descending Order	
		Total WQv treated (20)	Pollutant Reduction (20)	#1 Score	Total Cost/WQv	#2 Score*	Wetlands/ Permitting (5)	Accessibility (5)	Ownership (5)	Maintenance Burden (5)	#3 Score	Public Education/ Demonstration (5)	Addl SW Benefits (flood reduction, runoff reduction) (5)	Other Partner Involvement (5)	#4 Score			Site #	Score
DH-R1	Spring Garden/Bay St.-raingarden	10.88	12.5	**23.4**	$ 14.0	**20.5**	5	5	0	2.5	**12.5**	5	0	0	**5**	**61.4**		**DH-R10B**	**75.6**
DH-R2/3	Our Lady of the Isle-bioretention	12.64	12.5	**25.1**	$ 20.0	**14.4**	5	5	0	2.5	**12.5**	5	0	0	**5**	**57.1**		**DH-R7**	**74.0**
DH-R4	Grand/Cedar Rd. Park-bioretention	13.72	12.5	**26.2**	$ 27.0	**7.4**	5	5	5	2.5	**17.5**	5	2.5	5	**12.5**	**63.6**		DH-R25	73.6
DH-R5	Locust/Chase-swale and bioretention	10.70	12.5	**23.2**	$ 27.0	**7.4**	2.5	5	0	2.5	**10**	5	0	0	**5**	**45.6**		**DH-R10A**	**71.9**
DH-R6	Meadow Lane/Locust-raingardens	10.37	12.5	**22.9**	$ 13.5	**20.9**	2.5	5	0	2.5	**10**	2.5	5	0	**7.5**	**61.3**		DH-R17	66.7
DH-R7	New York Ave. Empty Lots-constructed wetland	20.00	9.0	**29.0**	$ 9.5	**25.0**	0	5	0	5	**10**	5	5	0	**10**	**74.0**		DH-R14a	66.2
DH-R8	Ice Pond Park-rain gardens	10.07	12.5	**22.6**	$ 27.0	**7.4**	5	5	5	2.5	**17.5**	5	0	5	**10**	**57.5**		**DH-R4**	**63.6**
DH-R10A	Ice Pond Park South/Goat Hill Golf-swale/bio	14.36	12.5	**26.9**	$ 16.9	**17.5**	5	5	5	2.5	**17.5**	5	0	5	**10**	**71.9**		**DH-R31**	**63.2**
DH-R10B	Ice Pond Park South-constructed wetland	14.09	9.0	**23.1**	$ 9.5	**25.0**	0	5	5	5	**15**	2.5	5	5	**12.5**	**75.6**		DH-R28	63.1
DH-R14a	IGA-large bioretention	11.22	12.5	**23.7**	$ 9.5	**25.0**	5	5	0	2.5	**12.5**	5	0	0	**5**	**66.2**		DH-R30	63.0
DH-R14b	IGA-small bioretention	10.53	12.5	**23.0**	$ 9.5	**25.0**	5	5	0	2.5	**12.5**	0	0	0	**0**	**60.5**		**DH-R19**	**61.6**
DH-R17	Cobbetts-dry swales	14.18	12.5	**26.7**	$ 16.9	**17.5**	2.5	5	5	5	**17.5**	2.5	2.5	0	**5**	**66.7**		DH-R1	61.4
DH-R18	Shore Infiltration Chambers-biofilter	10.34	12.5	**22.8**	$ 27.0	**7.4**	5	5	5	0	**15**	2.5	0	5	**7.5**	**52.7**		DH-R6	61.3
DH-R19	Yoco Rd.- raingardens	10.67	12.5	**23.2**	$ 13.5	**20.9**	5	5	0	2.5	**12.5**	0	5	0	**5**	**61.6**		DH-R29	61.2
DH-R20	Shore Rd cul-de-sac- raingardens	10.41	12.5	**22.9**	$ 27.0	**7.4**	5	5	0	2.5	**12.5**	0	5	0	**5**	**47.8**		DH-R14b	60.5
DH-R24	Winthrop Rd. Bridge-dry swale	10.01	12.5	**22.5**	$ 29.4	**5.0**	2.5	5	5	2.5	**15**	5	2.5	5	**12.5**	**55.0**		DH-R8	57.5
DH-R25	Dering Village Office-raingarden	10.16	12.5	**22.7**	$ 13.5	**20.9**	5	5	5	5	**20**	5	0	5	**10**	**73.6**		DH-R27	57.4
DH-R26	N. Ferry Office/SIHPOA-raingarden	10.00	12.5	**22.5**	$ 24.7	**9.7**	2.5	5	2.5	5	**15**	5	0	2.5	**7.5**	**54.7**		DH-R2/3	57.1
DH-R27	Bridge St.-sandfilter	10.38	10.2	**20.6**	$ 27.6	**6.8**	5	5	5	0	**15**	5	5	5	**15**	**57.4**		**DH-R24**	**55.0**
DH-R29	Yacht Club-raingarden	10.24	12.5	**22.7**	$ 13.5	**20.9**	5	5	0	2.5	**12.5**	5	0	0	**5**	**61.2**		DH-R26	54.7
DH-R28	Sylvan St. Neighborhood-wetland forebay	11.57	9.0	**20.6**	$ 9.5	**25.0**	0	5	2.5	2.5	**10**	2.5	5	0	**7.5**	**63.1**		DH-R18	52.7
DH-R30	Firestation-raingarden	10.00	12.5	**22.5**	$ 24.0	**10.4**	5	5	5	5	**20**	5	0	5	**10**	**63.0**		DH-R20	47.8
DH-R31	Sylvan and Auburn Ave-bioretention	13.28	12.5	**25.8**	$ 27.0	**7.4**	2.5	5	5	2.5	**15**	5	5	5	**15**	**63.2**		DH-R5	45.6

APPENDIX D:

HOMEOWNERS GUIDE TO IMPROVING WATER QUALITY IN THE PECONIC ESTUARY