PART 2. SITE RECONNAISSANCE & IDENTIFICATION OF NON-POINT SOURCE PROBLEM AREAS

This section of the report presents detailed information from the field reconnaissance of the Scudder's Pond Subwatershed area conducted by EEA, Inc. and Cameron Engineering & Associates (CEA). It also describes the current condition of the subwatershed, the Scudder's Pond sediment sampling and laboratory analysis, identifies problem areas and projects pollutant loading for the full build-out analysis. This summary report serves as part 2 of a 3 part final document.

Methodology

Site reconnaissance efforts began with a walk-through of the immediate environs of Scudder's Pond following the project kickoff meeting on November 3, 2004. All attendees participated (i.e., EEA, CEA, HHPC, VSC, NSCC, NYSDOS), observed the field conditions, and discussed the history of Scudder's Pond, past maintenance practices and recurrent problems within the subwatershed. A follow-up meeting took place on December 16, 2004 at the North Shore Country Club (NSCC) with EEA and CEA, wherein the portion of the Scudder's Pond subwatershed located on the golf course property was field surveyed, and golf course management practices and long-term plans were discussed. EEA continued the field reconnaissance after the field meeting with the NSCC, around Scudder's Pond and off-site to identify the ecological communities within the subwatershed applying the New York Natural Heritage Program's classification system "*Ecological Communities of New York State*" (Reschke, 1990). EEA also conducted a preliminary reconnaissance of the pond in December 2004 to ascertain access points for future sediment collection locations. Field reconnaissance efforts were on hold between late December 2004 through early February 2005 due to heavy snow accumulations and ice cover on the pond.

During this mid-winter period, CEA obtained the Nassau County GIS maps for the study area, delineated the subwatershed area based on file topographic information and identified the vacant parcels. EEA obtained the historic water quality sampling records for Scudder's Pond from the Nassau County Department of Health. EEA resumed site reconnaissance activities on February 15 and 18, 2005; field verified the preliminary subwatershed delineation by CEA and visited each of the vacant parcels to determine their potential suitability for improvements and installation of Best Management Practices (BMPs). CEA then conducted a final field reconnaissance to confirm the validity of their subwatershed delineation before preparing the base maps for the project.

Subwatershed Boundary and Hydrologic Flow Path

CEA delineated the Scudder's Pond subwatershed boundaries using the GIS database maps provided by the Nassau County Department of Public Works (NCDPW). CEA field verified these boundaries and checked the existing stormwater collection basins to ensure that they corresponded to actual field conditions. Drainage areas serviced by catch basins and subsurface leaching pools were excluded from the subwatershed boundaries, along with roadways and adjacent areas serviced by stormwater collection and conveyance systems that routed runoff into other watershed areas (e.g., Woodridge and Orchard Lanes). Inventorying the type and condition of each catch basin and leaching pool located inside the Scudder's Pond subwatershed boundary was not included in the scope of this study. As stated in part 1, it is recommended that the Village of Sea Cliff conduct routine checks of these drainage features, particularly after significant storm events, to insure proper function and minimize local flooding. The Scudder's Pond subwatershed boundary (depicted in Map 2-1) encompasses 166.1 acres, and contains over half of the North Shore Country Club (NSCC) property. The highest point in the Scudder's Pond subwatershed is elevation 188, which occurs at the intersection of Hillside and Highland Place as depicted on Map 2-1. The existing stormwater conveyance features (i.e., catch basins, subsurface drainage pipes and outfalls) in the subwatershed are depicted on Maps 2-2 and 2-2a. This GIS data was also obtained from the NCDPW and supplemented with drainage information from the Village of Sea Cliff. The following narrative describes the general flow path for stormwater in the Scudder's Pond subwatershed, originating in the residential neighborhood at the upper reaches, down to the outlet of Scudder's Pond at Shore Road.

Stormwater runoff from area roadways and adjacent developments in the eastern portion of the subwatershed (i.e., fronting Carpenter, Ransom, Marden and Glenlawn Avenues) generally drains towards the NSCC property and the upper reaches of the subwatershed above the Upper Pond. Runoff from area roadways and developments in the western portion of the subwatershed (i.e., fronting Circle Way, Florence Avenue and Littleworth Lane) is primarily collected into catch basins at the intersection of Downing Avenue and Littleworth Lane or along the length of Littleworth Lane. This water ultimately discharges directly into the northeastern corner of Scudder's Pond, through a 30-inch diameter outfall located on the south side of Littleworth Lane.

The 1973 map of "Scudder's Pond Area" included in the previous part 1 report (Figure 1.2) depicts the baseline hydrologic conditions for the wetland system that drains into Scudder's Pond. Two small, spring-fed ponds (proximal to the Costello property along Littleworth Lane) are situated above the Upper or "rear" pond, and drain into the northern side of the Upper Pond. A third small pond drains to the south through the wooded wetland area and enters the Upper Pond at the southeast corner. Two small man-made ponds occupy the 11th fairway on the NSCC golf course. These ponds receive runoff from the maintained fairways of greens #11 and #18, as well as runoff from paved cart paths and overflow from a drywell. In addition, a former drinking water well is situated immediately uphill of the ponds, and provides a constant low flow into the ponds. The well was sampled by the Nassau County Health Department in the 1990s, and tested positive for trace levels of the volatile organic compounds perchloroethylene and trichloroethylene (PCE/TCE). NYSDEC is continuing the investigation and searching for the source of the contaminants (Decandia,

NYSDEC, April 22, 2005). The NSCC is currently using municipal water supplies for drinking water.

According to the NSCC, the two ponds on fairway #11 are concrete-lined aesthetically unpleasing, and occupy otherwise active areas of play for the golf course (Streeter, personal communication, December 16, 2004). EEA's site reconnaissance confirmed that the two golf course ponds provide little ecologic value to the rest of the wetland system. These two ponds are inter-connected via a subsurface pipe, and the lower golf course pond outlets on its western edge through a 12-inch diameter concrete pipe. This pipe drains northwest toward the woodlands surrounding the Upper Pond. While the upper end of this pipe is buried, the lower end outlets at the surface into a weedy meadow area before reaching the woodlands.

With the exception of one developed residential lot (Section 21, Block M, Lot 580) on the northern edge of the Upper Pond, the entire perimeter of the Upper Pond is wooded. Thus, the Upper Pond receives filtered runoff from the surrounding areas, plus inputs from the several small ponds and brooks mentioned previously. Two additional outfalls were noted along the southern bank of the Upper Pond. A 4-inch diameter pipe that drains the 11th tee discharges onto the hillside above the pond. An 18-inch corrugated metal pipe of unknown source was found to be non-functional. The Upper Pond outlets into Scudder's Pond over a deteriorated, rock-filled, gabion dam structure. A corrugated pipe through the dam is currently non-functional. Full failure of the dam could drain the Upper Pond.

The major inputs to Scudder's Pond are the 30-inch diameter outfall at Littleworth Lane and the overflow from Upper Pond. During the EEA/CEA site reconnaissance of 2004-2005, substantial erosion was noted in the steep-sided channel immediately below the Littleworth Lane outfall and scour along the southeastern banks of Scudder's Pond. Additionally, a large alluvial fan has developed at the upstream/eastern end of Scudder's Pond, where the outflow stream from the Upper Pond enters Scudder's Pond. EEA/CEA did not encroach on private properties during this site reconnaissance, and therefore could not verify the exact condition of the residential backyards bordering the northern shoreline of Scudder's Pond. However, it appeared that at least a minimal buffer of natural vegetation or common reeds exists along this edge and serves as a filter for stormwater runoff. In contrast, the southerly shoreline has turf grasses down to the water's edge, with little to no natural vegetation that serves as a buffer. In addition, several small outfall pipes were noted (some actively draining and some dry) leading from the NSCC cottages or the yard drains between the cottages to Scudder's Pond. According to the NSCC, these cottages often experience basement flooding, which requires drainage with sump pumps. The NSCC also stated that sanitary wastes collected from the cottages are pumped up to a central wastewater treatment system located at the top of the adjacent hill (Streeter, personal communication, April 1, 2005).

Scudder's Pond currently outlets via a concrete weir fitted with timber flashboards, located on the western shoreline fronting Shore Road. The pond weir was damaged in mid-December 2004, allowing much of the standing water to drain out of the pond. EEA/CEA conducted one of the site reconnaissance surveys immediately following this event, which

provided an unusual view of the bottom and peripheral emergent vegetation. According to the NSCC, the hole in the weir was eventually plugged by debris and the pond filled back up with water (Lawrence, personal communication, December 17, 2004). Overflow from Scudder's Pond enters a storm drainage system under Shore Road/Prospect Avenue that eventually empties into Hempstead Harbor via a 36-inch outfall pipe located immediately north of Tappan Beach Park and the Littleworth Lane intersection. Although the Nassau County Drainage maps indicate that Scudder's Pond drains to the harbor further south through a pipe that runs through Tappen Beach, this was refuted during the field investigation conducted by Cashin Associates for the 1996 Village of Sea Cliff Shoreline Study. The 1996 study confirmed through VSC records that Scudder's Pond actually discharges through the northerly outlet opposite Littleworth Lane.

Soil Types within the Subwatershed

The USDA Soil Conservation Service has mapped the surface soils in the Village of Sea Cliff. The soils occupying the Scudder's Pond subwatershed are depicted on the Soils Map Figure 2.1, and described in the soils legend presented in Table 2.1. The more highly developed portions of the subwatershed to the north and east are characterized as urban land-soil complexes, where approximately 70 percent of the surface is covered with pavements or buildings and the remaining 30 percent is mapped as the underlying soil types. The majority of the surface soils in the subwatershed consist of well-drained sandy loam. However, the low-lying area surrounding Scudder's Pond and the upper pond contains very poorly-drained hydric or wetland soils, referred to as Manahawkin muck. Manahawkin muck soils contain a high percentage of organic matter (up to 95%), are strongly acid and express moderate permeability rates. These soils are typically flooded up to 1 foot above the surface during seasonally wet periods (generally 10 months of the year). Manhawkin mucks are classified as hydrologic soil group "D".

The more urbanized portions of the subwatershed mapped as urban land or urban land-soil complexes are problematic in terms of stormwater management. As the amount of impervious surfaces increase, so does the flow rate and volume of stormwater runoff due to a reduction in natural soil areas capable of intercepting and infiltrating the runoff. Additionally, as the intensity of development increases, there are typically fewer open space areas remaining that can capture and store these increased volumes of runoff. Runoff emanating from urbanized areas can easily pick up pet and wildlife wastes, contaminants such as greases and oils, and sediments along the flow path. If there are no measures in place to filter or treat these loads, they can easily be transported directly into the drainage systems and waterways, resulting in reductions in water quality

Table 2.1 also provides a listing of native plants that are well adapted to the various soil types found within the subwatershed. Homeowners, the NSCC and the Village should be encouraged to maximize the use of these native plants in landscaping to reduce the dependency on applied fertilizers or chemical herbicides. Table 2.2 provides an expanded list of emergent wetland plants that could be utilized in created freshwater wetlands or on the edges of freshwater ponds. This table was developed especially for golf course landscaping around ponds, where the maximum height of vegetation cannot exceed three feet; otherwise it would impede the line of play.

Table 2.1. Soils Occupying the Scudder's Pond Subwatershed			
Map Symbol	**Soil Name**	**Profile Description**	**Adapted Native Trees and Shrubs**
Ma	Manahawkin Muck	Very deep and very poorly drained soil occupying drainage ways and low basins. Very dark muck over peat and sand. Hydric wetland soil.	Red maple, Black gum or tupelo, Alder, Black willow, River birch, Atlantic white cedar, Eastern arborvitae, Sweetbay magnolia, Chokeberry, Shadbush, Buttonbush, Highbush blueberry, Groundsel-tree, Swamp azalea, Spice bush, Sweet pepperbush, Winterberry, Inkberry, Shrub dogwoods, Fetterbush, Swamp rose, Elderberry, Highbush blueberry, Arrowood.
PrD	Plymouth-Riverhead complex, 15 to 35% slopes	Very deep soils on hillsides and steep ridges. Thin layer of leaves and twigs over sandy loam and gravelly sand.	Northern red oak, American beech, Chestnut oak, Red maple, Black birch, Eastern white pine, Eastern red cedar, American holly, Red stem dogwood, sweet pepperbush, Highbush blueberry, Witch-hazel, Bayberry, Pinxterbloom, Virginia creeper, Mountain laurel, bearberry.
RdB	Riverhead Sandy Loam, 3 to 8% slopes	Very deep, gently sloping and well-drained soils. Thin cover of leaf litter and partly decomposed organic material over sandy loam and gravelly sand.	Pin oak, Tulip tree, Northern red oak, American beech, Black birch, Flowering dogwood, Shadbush, Sweetgum, Scarlet oak, White ash, American hornbeam, White fir, Eastern hemlock, White pine, American holly, Red osier dogwood, Winterberry, Viburnum, Deciduous azalea, Witch-hazel, Highbush blueberry, Chokeberry, Inkberry, Mountain laurel.
RdC	Riverhead Sandy Loam, 8 to 15% slope	Very deep, strongly sloping and well-drained soils. Thin cover of leaf litter and partly decomposed organic material over sandy loam and gravelly sand	Pin oak, Tulip tree, Northern red oak, American beech, Black birch, Flowering dogwood, Shadbush, Sweetgum, Scarlet oak, White ash, American hornbeam, White fir, Eastern hemlock, White pine, American holly, Red osier dogwood, Winterberry, Viburnum, Deciduous azalea, Witch-hazel, Highbush blueberry, Chokeberry, Inkberry, Mountain laurel.
RdD	Riverhead Sandy Loam, 15 to 25% slope	Very deep, moderately steep and well-drained soils, typically on hillsides or side slopes of drainage ways. Thin cover of leaf litter and	Pin oak, Tulip tree, Northern red oak, American beech, Black birch, Flowering dogwood, Shadbush, Sweetgum, Scarlet oak, White ash, American hornbeam, White fir, Eastern hemlock, White pine,

		partly decomposed organic material over sandy loam and gravelly sand.	American holly, Red osier dogwood, Winterberry, Viburnum, Deciduous azalea, Witch-hazel, Highbush blueberry, Chokeberry, Inkberry, Mountain laurel.
Ua	Udifluvents, rarely flooded	Very deep, moderately well-drained soil. Along major drainageways subject to rare flooding.	Pin oak, Tulip tree, Northern red oak, American beech, Black birch, White Ash, American Hornbeam, Shadbush, Sweetgum, Scarlet oak, Eastern hemlock, White pine, American holly, Red osier, Dogwood, Winterberry, Chokeberry, Viburnum, Deciduous Azalea, Winged Euonymus, Witch-hazel, Highbush blueberry, Inkberry, Mountain laurel, Rhododendron.
UdA	Udipsamments nearly level	Manmade sandy fill or borrow areas. Very deep and excessively drained soils.	Northern red oak, Red maple, Black birch, Chestnut oak, American beech, Red oak, Eastern white pine, Red pine, Eastern red cedar, Redstem dogwood, Sweet pepperbush, Highbush blueberry, Witch-hazel, Sumac, Bayberry, Pinxterbloom, Virginia creeper, Bearberry, Mountain laurel.
Ug	Urban Land	Areas where at least 85% of the surface soil is covered with asphalt or other building material. Includes small areas of soil that haven't been altered.	American hornbeam, Hackberry, Pin oak, Northern red oak.
UrB	Urban Land - Riverhead Complex, 3 to 8% slopes	Urbanized areas and very deep, well-drained Riverhead soils. Sandy loam on top of gravelly sand.	Hackberry, Green ash, Pin oak, Willow oak, American hornbeam, Eastern red cedar.
UrC	Urban Land – Riverhead Complex, 8 to 15% slope	Urbanized areas and very deep, well-drained Riverhead soils. Open areas are typically lawns, gardens and small playgrounds.	Hackberry, Green ash, Pin oak, Willow oak, American hornbeam, Eastern red cedar.

Sources:

Environmental Concern, Inc. 1993. Wetland Planting Guide for the Northeastern United States.
Municipal Tree Restoration Program, Pennsylvania State University. 1989. Street Tree Fact Sheets.
USDA, Soil Conservation Service. February 1987. Soil Survey of Nassau County, New York.

Table 2.2 - Native Wetland Plants for Landscaping around Freshwater Ponds

Native wetland species could be planted along pond edges to increase species diversity, enhance the vegetated buffer and improve visual aesthetics. These include various sedges (*Carex* spp.), rushes (*Juncus* spp.), and bulrushes [(*Scirpus* spp.) except tall varieties such as wool grass (*S. cyperinus*). All plants listed below generally maintain heights less than 3 feet at maturity, which is ideal for golf courses. Taller native wetland species appear in the previous Table 2.1, where they are grouped adaptively according to each of the mapped soil types.

Common Name	Botanical Name
Arrow Arum	*Peltandra virginica*
Blue Flag	*Iris versivcolor*
Cardinal Flower	*Lobelia cardinalis*
Cinnamon Fern	*Osmunda cinnamomea*
Duck Potato	*Sagittaria latifolia*
Eastern bur-reed	*Sparganium americanum*
Jack-in-the-pulpit	*Arisaema triphyllum*
Lizard Tail	*Saururus cernuus*
Marsh Fern	*Thelypteris palustris*
Marsh Marigold	*Caltha palustris*
Meadow Beauty	*Rhexia virginica*
New York Aster	*Aster novi-belgii*
New York Fern	*Thelypteris noveboracensis*
Pickerelweed	*Pontederia cordata*
Royal Fern	*Osmunda regalis*
Sensitive Fern	*Onoclea sensibilis*
Skullcap	*Scutellaria galericulata*
Sweet Flag	*Acorus calamus*
Yellow Iris	*Iris pseudacorus*

Pond Sediment Sampling

EEA, Inc. prepared a Sampling, Analysis and Monitoring Plan for the collection of sediment cores in Scudder's Pond, and submitted it to the NYSDEC for their review and approval on February 10, 2005. The sampling plan was reviewed and approval was granted on February 24, 2005. Sediment core samples were collected from Scudder's Pond on April 4, 2005 and sent to EcoTest Laboratories for analysis of the following constituents: grain size, total organic carbon, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), RCRA metals and dioxins. The PCE/TCE contamination that NYSDEC is currently investigating in the subwatershed area was not specifically tested for during this sampling event. The core samples were primarily a clayey silt with highly organic, decomposed roots and leaf litter material. This material is generally unsuitable for re-use in construction.

All of the analytical results were presented in tabular form in the final sampling report. The analytical results were compared to the newly released NYSDEC Technical and Operational Series (TOGS) 5.1.9 Recommended Guidelines. The new guidance document has three categories of sediments, Class A "no appreciable contamination", Class B "moderate contamination" and Class C "high contamination". Almost all of the results of the analytes and compounds tested fell within the Class A category. Five analytical results were found to lie within the Class B category of "moderate contamination". One result from one core was within the Class C category of "high contamination". All sediments exceeding the Class A category were within the areas which would be removed during the proposed dredging. However, final approval for dredging and the management of these pond sediments as dredge spoils for upland disposal would require a permit from the NYSDEC.

The full Sediment Sampling and Analysis report is attached to the end of this document. If the VSC and the HHPC opts to pursue dredging as a means of improving Scudder's Pond, a copy of this report should be forwarded by the HHPC to NYSDEC for their review and response as to the adequacy of the material for disposal on or off-site.

Ecological Communities Surrounding Scudder's Pond and Occupying Vacant Parcels

According to the NSCC, Scudder's Pond was created either in 1899 or in 1905 (depending on the source) by the construction of a main road leading into the Village of Sea Cliff, and subsequent damming of the downstream end of a marsh that formerly drained directly into Hempstead Harbor (1899 date provided by Lawrence, personal communication, November 2004; 1905 date per WQIP, 1998). The surface area of Scudder's Pond has decreased over the years due to sedimentation, measuring approximately 2.9 acres in 1950 and only 1.6 acres in 1976 (H2M Corp, 1976). Scudder's Pond was dredged by VSC and TOB in 1980, which resulted in slightly enlarging the pond surface area to 1.8 acres and achieving mean and maximum depths of 2.3 and 4.5 feet respectively (Envirodyne Engineers, 1982). While conducting the pond sediment sampling in April 2005, EEA noted that Scudder's Pond depth varied from approximately ½ foot to 4 feet deep. However, a bathymetric survey was not conducted as part of this investigation, so the current pond acreage and exact depths are unknown.

During EEA's field reconnaissance conducted during the fall and winter of 2004-2005, common reed (*Phragmites australis*) appeared to fringe the perimeter of Scudder's Pond to the exclusion of any other emergent wetland plants. Applying the New York Natural Heritage Program (Reschke, 1990) classification for "*Ecological Communities of New York State"*, Scudder's Pond would be considered as a deep emergent marsh based upon the central open water area and existing water depths. While Reschke's definition of classic deep emergent marshes includes a diversity of emergent wetland plant species (i.e., water-lilies, cattails, bulrush), disturbed marshes are also described as "frequently dominated by aggressive weedy species, such as purple loosestrife and reedgrass". EEA observed numerous Canada geese (*Branta canadensis*), mallards (*Anas platyrhynchos*) and ring-billed gulls (*Larus delawarensis*), along with an occasional green-winged teal (*Anas crecca*), great blue heron (*Ardea herodias*) and belted kingfisher (*Ceryle alcyon*) on Scudder's Pond from November 2004 through February 2005. According to the NSCC, wood ducks (*Aix sponsa*) and mallards nest along the pond edges (Lawrence, Personal Communication, November 2004). Table 2.3 provides a list of the flora and fauna identified within the Scudder's Pond Subwatershed during the EEA/CEA field reconnaissance conducted in the fall of 2004 to early spring 2005.

The Upper Pond has also filled with sediment over the years, and appeared to hold between 6 inches to one foot of water during EEA's 2004-2005 site reconnaissance. The central portion of the upper pond would be considered as a deep emergent marsh, since it maintains an open water area and supports common reeds and cattails. Along the periphery of the Upper Pond and in the adjacent wetlands to the east, alders (*Alnus* spp.), willows (*Salix* spp.), and spicebush (*Lindera benzoin*) dominate, which would meet the classification for a shrub swamp. Skunk cabbage (*Symplocarpus foetidus*) dominates the herb layer along the little tributaries that drain into the Upper Pond. On two occasions, EEA flushed black-crowned night herons (*Nycticorax nycticorax*) that were roosting in this wetland.

The other vacant lands occupying the Scudder's Pond subwatershed support woodland areas within and bordering the NSCC property. The oak-tulip tree forest is the predominant

woodland community represented on these vacant parcels in this subwatershed. Reschke (1990) defines this community as a "mesophytic hardwood forest that occurs on moist, well-drained sites in southeastern New York." While the canopy trees and understory vegetation may vary from lot to lot, the entire woodland area is dominated by a mixture of tulip poplar (*Liriodendron tulipifera*), black oak (*Quercus velutina*), red oak (*Quercus rubra*), black birch (*Betula lenta*), red maple (*Acer rubrum*) and American beech (*Fagus grandifolia*). Sassafras (*Sassafras albidum*), black cherry (*Prunus serotina*) and flowering dogwood (*Cornus florida*) are the common, native sub-canopy species that are found in this woodland community. Closer to the edge of Scudder's Pond, EEA identified the native black gum or tupelo (*Nyssa sylvatica*) and ornamental Japanese red maple (*Acer palmatum*) growing along the banks. The Draft 2002 NYNHP update to Reschke's report, "*Ecological Communities of New York State*" describes a red maple-black gum swamp community, which appears along the drainage ways between the Upper Pond and the perimeter of Scudder's Pond. Additional tree species, typical of Reschke's (1990) successional southern hardwood community were noted in the disturbed woodland openings including: black locust (*Robinia pseudo-acacia*), eastern redcedar (*Juniperus virginiana*), Norway maple (*Acer platanoides*), tree-of-heaven (*Ailanthus altissima*), princess-tree (*Paulownia tomentosa*) and the London planetree (*Platanus x acerifolia*).

The residential areas surrounding Scudder's and the upper ponds contain areas of manicured turf, which Reschke (1990) classifies as "mowed lawn" (with less than 30% trees and less than 50% shrub cover) or "mowed lawn with trees" (with at least 30% cover by trees and less than 50% shrub cover). Landscaped beds also introduce the native white pine (*Pinus strobus*) along with numerous ornamental species into the oak-tulip tree forest community. These include, but are not limited to: azaleas and rhododendrons (*Rhododenron* spp.), yews (*Taxus* spp.), Japanese hollies (*Ilex crenata*), blue spruce (*Picea pungens*), Norway spruce (*Picea abies*), Norway maple and Japanese spurge (*Pachysandra terminalis*). The most notable and problematic introduction is the vine/groundcover, English ivy (*Hedera helix*), which has covered and out-competed most of the native groundcover species throughout the oak-tulip tree forest community. The upland community occupying the narrow edge between Scudder's Pond and Shore Road is comprised primarily of invasive species that are commonly associated with Reschke's "urban vacant lot" community, including common reed, Asiatic bittersweet (*Celastrus orbiculatus*), tree-of-heaven, autumn olive (*Elaeagnus umbellata*) and mulberry (*Morus* spp.).

Site Disturbances and Potential Causes

EEA's field reconnaissance conducted during the fall and winter of 2004-2005 revealed only one site disturbance in the Scudder's Pond subwatershed area. This was noted along the southeasterly edge of Scudder's Pond, in the vicinity of the easternmost cottage and the hillside above. Based on EEA's field reconnaissance of February 18, 2005, a new dry well was installed at the northwestern corner of this cottage along with a new water main leading downhill from the golf course to the cottage. The installation left a bare trench crossing the driveway and along the west side of the cottage through most of the winter months. In addition, the NSCC had apparently developed a yard waste/compost area at the top of the hill above this location. This compost area may contribute to non-point source pollution in the subwatershed depending on the nature of the materials in the pile. Erosion and sediment control provisions (e.g., silt fence, perimeter straw bale barriers or gravel filters) were not evident at the time of EEA's site visit. In addition, gully formation and soil erosion were noted as a chronic problems at the eastern extension of the roadway servicing the NSCC cottages. This was likely due to uncontrolled stormwater that concentrates at the end of the paved roadway and outlets onto bare soils above Scudder's Pond.

Pollutant Loads

CEA estimated pollutant loading within the Scudder's Pond subwatershed using existing data and standard pollutant values. Background information pertaining to each constituent was obtained from the "*New York State Stormwater Management Design Manual"* (Center for Watershed Protection, October 2001), the NYSDEC (1992) publication "*Reducing The Impacts of Stormwater Runoff From New Development"*, along with information from the U.S. Environmental Protection Agency's website, www.epa.gov.

1. Total Suspended Solids

Total Suspended Solids (TSS) are organic and inorganic particles that are suspended in and carried by the water. The term includes sand, mud, and clay particles (and associated pollutants) as well as other solids in stormwater.

2. Nutrients

Nutrients are essential chemicals needed by plants or animals for growth. Excessive amounts of nutrients can lead to degradation of water quality through overproduction of microscopic algae or other aquatic plants. Excessive primary production (algae blooms) causes severe loss of oxygen when the algae die and the bacteria blooms. Both nitrogen and phosphorus are categorized as nutrients.

3. Bacteria

Pathogens, including viruses, bacteria and other microorganisms that can cause diseases are a major concern when detected in public drinking water supplies, waters supporting shellfish for human consumption, and bathing beaches. Coliform bacteria, which are found in the digestive tracts of all warm-blooded animals, are used as general indicators of pathogen levels in water bodies. Some stormwater sources of bacteria include wildlife and pet waste, poorly functioning septic systems or cesspools. Fecal Coliform and enterococcus levels in stormwater runoff may exceed public health standards for water contact recreation. Bacterial contamination of Long Island bays and harbors has resulted in bathing beach and shellfish bed closures.

4. Trace Metals

Copper, lead, and zinc are routinely found in urban and suburban stormwater runoff. Major sources of trace metals are automotive including brake pads and particulate and airborne combustion products. Other sources of trace metals include paints, road salts, and galvanized pipes. Trace metals can be toxic to aquatic life at elevated concentrations. They can accumulate in the bottom sediments of waterbodies where they may affect bottom-dwelling organisms. Trace metals can bio-accumulate in fish and macro-invertebrate tissues. Trace metals, however, are only toxic if they are bio-available.

Pollutant Load Calculations:

The Annual Pollutant Load was calculated using the Simple Method, a calculation recommended in the *New York State Stormwater Management Design Manual*. The Simple Method estimates pollutant loads for chemical constituents as a product of the annual runoff volume and pollutant concentration. The formula is:

$$L=0.226*R*C*A$$

Where:

- L= Annual pollutant load (lbs)
- R= Annual runoff (44.1 inches)
- C= Pollutant concentration (mg/l)
- A= Area (acres)
- 0.226= Unit conversion factor

Different types of units are used to calculate Fecal Coliform. Fecal Coliform is measured in billions of colonies per year, while chemical constituents are measured in pounds per year. The formula for Fecal Coliform is:

$$L=103*R*C*A$$

Where:

- L= Annual pollutant load (billion colonies)
- R= Annual runoff (inches)

- C= Bacteria concentration (1,000/ml)
- A= Area (acres)
- 103= Unit conversion factor

The impervious fraction is the ratio of impervious area (impermeable surfaces, such as pavement or rooftops, which prevent the percolation of water into the soil) over the total land area in question. This was calculated using the information obtained from section A.2 of Appendix A of the (2001) "*New York State Stormwater Management Design Manual"*.

Scudder's Pond Subwatershed Land Uses

The Scudder's Pond subwatershed is 166.1 acres in size. Within the subwatershed, there are 95.8 acres of residential uses, 21.2 acres of roadway, and 49.1 acres of vacant land (24.7 acres of which are part of the North Shore Country Club). The chart below illustrates the breakdown of land acreage across the subwatershed:

Land	Acres	Percent of Subwatershed	Percent Impervious*
Residential	95.8	57.7 %	21 %
Vacant	49.1	29.5 %	9 %
Roads	21.2	12.8 %	100 %
TOTAL	166.1	100 %	---

*Statewide Averages for Land Use Types per New York State Stormwater Management Design Manual

Each land use was categorized by acreage, impervious fraction, and the corresponding pollutant concentration. The specific values were entered into the formulas for each constituent to generate the annual pollutant load. The concentrations for each constituent were taken from the NYSDEC "*New York State Stormwater Management Design Manual"*, which reflect statewide and nationwide averages, and should not be construed or examined as exact field measurements. The pre-development annual pollutant loads for total phosphorous and total nitrogen were taken from a listing of statewide and National pollutant concentrations in the handbook entitled "*Reducing the Impacts of Stormwater Runoff from New Development"*. The concentrations targeted were consistent with native undeveloped land similar to the Sea Cliff area. Values for the remaining constituents were unavailable, so they were set to zero.

The target pollutant loading reduction goals were reached by subtracting pre-development pollutant loading from the existing pollutant loading. This value is an estimate of pollutant loading due to development. The pollutant reduction target will be a percentage of the gap between the pre-development totals and the existing totals, in accordance with approvable current Best Management Practices (BMPs). These pollutant-loading calculations are presented in Table 2.4.

EEA/CEA's field reconnaissance also included an examination of all current vacant lands within the Scudder's Pond watershed for the purpose of determining whether any potential exists for implementing improved stormwater control measures. These vacant lands are depicted in Map 2-3. Their location (in relation to adjacent land uses as well as position in the watershed), current level of use, condition and size were carefully considered. Most of the parcels were deemed either too small or improperly oriented to develop the necessary improvements, or located too high in the watershed to effectively capture and treat stormwater runoff in an efficient fashion. However, two areas were identified within the upper portion of the Scudder's Pond subwatershed as providing potentially good opportunities for improved stormwater treatment and control:

a) Immediately south of Downing Avenue between Richardson and Glenlawn Avenues; and
b) South of Downing Avenue and west of Gates Way.

Recognizing that these two parcels are privately owned and could represent an expensive option for implementation; should funding become available and there is a willingness on behalf of the owners to cooperate with the HHPC and the Village, the Village of Sea Cliff could explore the feasibility of obtaining drainage or conservation easements to retain these areas in open space or to develop stormwater collection and detention features at these locations. Any drainage features developed at these locations should be routinely maintained and accumulated trash removed by the Village of Sea Cliff under a formal agreement with the property owners. Additionally, numerous opportunities exist immediately surrounding Scudder's Pond and the Upper Pond, as well as on the neighboring NSCC property. These are described in detail in the following part 3 - Schematic Design report.