PART 3. SCHEMATIC DESIGN PLANS

This Part 3 – Task 4 report provides recommendations, schematic designs and maintenance plans for improving water quality, drainage, and enhancing natural habitats within the Scudder's Pond Subwatershed. This summary report is the final part in a series of three parts. The recommendations provided herein build upon the prior recommendations included in the Part 1-Task 2 report, and respond to the significant findings of the site reconnaissance effort, which was summarized in the Part 2-Task 3 report. This information has been discussed with the Hempstead Harbor Protection Committee (HHPC), the Village of Sea Cliff (VSC), and the North Shore Country Club (NSCC). Additionally, a public presentation was held for all of the residents located within the Scudder's Pond subwatershed to increase public awareness of the subwatershed concerns and to foster local stewardship. This report also provides a summary of the public meeting.

Final Watershed Recommendations

For each of the recommendations listed below the main objective is listed first, followed by the various Best Management Practices (BMPs) or water quality improvements that will help to achieve the stated goal. Tables (B.1 – B.4) included in Appendix B summarize the various types of BMPs available, their uses, and pollutant removal efficiencies to improve water quality conditions within the subwatershed and ultimately to the receiving waters of Hempstead Harbor. Certain management recommendations discussed below provide additional narratives that summarize the existing conditions, which prompt the recommendation. These recommendations are depicted graphically on Map nos. 3-1 and 3-2. Preliminary versions of these maps were presented to the HHPC, VSC, and NSCC prior to the public meeting held on April 1, 2005. The preliminary maps were also exhibited at the public meeting.

A. Reduce nutrient and contaminant loading from the North Shore Country Club Golf Course-

1. Continue use of fertilizer & pesticide BMPs:

The NSCC Golf Course Maintenance program currently utilizes the following (Streeter, NSCC, December 16, 2004):

Pesticides

- Pesticide applications on a preventive schedule, influenced by environmental conditions and insect life cycles. Applications 1st of May through September;
- Pre-emergent weed killer ("Dimension Ultra") applied across entire course (70 acres) in April;
- 2, 4-D used only as needed during growing season;
- No pesticides used on the rough other than pre-emergent;
- Fungicides applied on a preventive basis. Course uses contact and systemic fungicides including Heritage™.

Fertilizers

- Slow release nitrogen fertilizers:
  a) Dormant fertilizer used in early December. Organic product (from raisin stems) applied to greens and tees as pellets at 1 lb N/1000 SF. Nitrogen released above 55ºF when microbes break down material. The freezing and thawing cycle helps release the nitrogen. The application is good until the 3rd week of May.
  b) Isobutylidene diurea (IBDU) is used as a slow-release nitrogen fertilizer. It is based on low water solubility and not on soil temperature (microbial activity). IBDU applications benefits shoot and root growth. New roots formed in all but coldest parts of the winter.
  c) Slow release sulfur-coated urea fertilizer. Layer of sulfur and size of pores in coating determine solubility of urea inside. Once water enters the sulfur shell, the urea is dissolved and the nitrogen slowly leaks out.
  d) Quick release ammonium sulfate and urea also used as foliar feeds every 10 days on greens from June on through the growing season.

- Phosphorous is applied only in late summer for over-seeding. Otherwise, the background levels are already adequate in the golf course soils.

Table 3.1
Summary of NSCC Golf Course Areas

Course	**Area**	Area	Nitrogen	Dormant Nitrogen	Total N Application	% Liquid/ % Granular
Use	**Acres**	**Feet**	**Lbs N/ 1000 SF**	**Lbs N/ 1000 SF**	**Lbs N/Year**	
Greens	4	174,240	2.5	1	610	75/25
Tees	2	87,120	3.0	1	348	50/50
Fairways	28	1,219,680	2.5	1	4,269	50/50
Rough	36	1,568,160	2.0	0	3,136	??
Total Play Area	**70**	**3,049,200**			**8,364**	
To groundwater (5%)					418	
Native Plant Areas	7					
Other Areas	33					
Total Acreage	**110**					

Notes:

- Suffolk County Department of Health Services, Division of Environmental Quality. December 2002. Golf Course Impacts to Shallow Groundwater, Suffolk County, NY
- Average total N concentration was 3.58 mg/L in golf course monitoring wells

2. ***Continue and expand use of native grasses as receiving areas for stormwater:***

Non-fertilized grass buffers serve as vegetated filter strips for treating stormwater runoff.

3. ***Continue bluebird nesting program and consider adding swallow and purple martin nest boxes to reduce reliance on pesticides:***

NSCC has indicated a continued interest in cooperating with the New York Audubon program.

B. Reduce nutrient and contaminant loading to groundwater within the Scudder's Pond subwatershed

1. ***Conduct public education for homeowners on benefits of regular septic system maintenance and proper disposal of household chemicals:***

The HHPC and the VSC have conducted a public outreach meeting for residents located within the Scudder's Pond subwatershed. The meeting took place on Wednesday April 13, 2005, and was hosted at the NSCC. A brief summary of the public meeting is provided at the rear of this report along with the list of questions that were discussed.

Representatives from the New York Sea Grant NEMO (Nonpoint Education for Municipal Officials) program assisted with the ~~first~~ public presentation. The VSC can consider taking advantage of additional technical outreach programs available through NEMO. NYSG NEMO provides support to Long Island local governments in addressing nonpoint source pollution control, the selection of the most appropriate implementation measures, and the USEPA Phase II Storm Water Regulation requirements. The NYSG NEMO provides educational programs for local land use officials and consultations to municipalities in the development of effective nonpoint source pollution management plans and practices. In addition, through their partnerships with numerous federal, state and local governments, NYSG NEMO can collaborate with experts in nonpoint source pollution management and control to assist municipalities address complex issues. The USDA Natural Resources Conservation Service, through their local outreach in Nassau and Suffolk County Soil and Water Conservation District offices, can also provide technical assistance to homeowners, the VSC and the HHPC on selection and implementation of BMPs for non-point source pollution reduction.

2. ***Investigate feasibility of Village ordinance requiring regular septic maintenance for homes adjacent to waterbodies:***

This recommendation was also made to the VSC in earlier studies, as presented in the Part 1-Task 2 report.

3. Investigate feasibility of Village requiring replacement of cesspools with septic systems upon property transfer for residences immediately adjacent to Scudder's Pond:

This recommendation underscores the perceived need for improved treatment efficiencies and sanitary waste disposal measures in the developed areas immediately surrounding Scudder's Pond. The Village should also review their file records and update their inventory of sanitary systems within the subwatershed to determine which systems have been upgraded to include septic tanks in series with cesspools, and currently meet the VSC and State code requirements.

C. Improve stormwater collection & treatment-

1. Field verify and update the drainage map database & implement routine monitoring and clean out of drainage structures:

As discussed in the part 1 and part 2 reports, the existing drainage maps depicting the street inlets in the Scudder's Pond subwatershed appear dated and incorrect at several locations. Additional catch basins and leaching pools may be needed higher in the subwatershed to capture and infiltrate stormwater runoff, and reduce the volume of untreated surface runoff reaching the pond. The VSC should consider establishing a GIS database of drainage structures within the subwatershed, which includes details on drainage feature components, structure capacity, and scheduling for clean out. Reports of local flooding or icing could also be tied to this system to diagnose drainage system malfunction and identify the need for upgrades.

2. Improve stormwater collection on Downing Avenue with overflow directed to vacant property:

Based on EEA/CEA site reconnaissance, stormwater runoff generated along Glenlawn and Richardson Avenues and the properties immediately fronting these roadways currently flows to a low point on Downing Avenue. However, there are no existing stormwater collection or control measures on Downing Avenue at this location. There is a large vacant, wooded parcel that abuts Downing Avenue immediately south of Park Avenue and the Saint Christopher's Home that is ideally situated to install a stormwater collection basin. This wooded property is contiguous to a larger vacant property that leads downhill towards fairway #11 on the NSCC golf course. The project team understands that this recommendation involves private property, which presents logistical problems. However, the VSC could consider obtaining a conservation easement to retain the upper portion of this steep slope area in open space (to prevent future erosion and sedimentation problems), and negotiate a drainage easement for development of a stormwater treatment system at the base of the hill. Such a project would also require routine VSC clean out of floatable debris, so that trash does not accumulate on private property to maintain acceptable conditions.

3. Construct treatment marsh on vacant property with overflow to NSCC woodlands:

The stormwater collection measure proposed in C.1. above could be coupled with the development of a treatment wetlands at the base of the hill. Since this vacant property occupies a natural ravine, a small dike could be constructed at the base of the hill across the downhill side of the ravine to impound water. The treatment marsh could be constructed to function as a wooded wetland, and thus provide additional habitat for wood ducks, kingfishers and other desirable water birds. The treatment marsh should be designed to detain the first flush and impound a portion of the stormwater received; however it could also recharge treated stormwater above a certain design elevation to reduce the treatment volumes necessary further downhill in the subwatershed. Design provisions should also include a low-maintenance overflow feature that will safely convey excess water downhill and dissipate water along the route.

4. Install stormwater detention or recharge basin on isolated flag lots between Gates Way and NSCC:

Based on EEA/CEA site reconnaissance, there appears to be three vacant parcels situated south of Downing Avenue and west of Gates Way. These are isolated flag lots that do not maintain frontage along either roadway, but are sandwiched between residential properties and the NSCC. These vacant parcels also occupy a low-lying area, which is ideally situated for the development of a stormwater detention basin or a recharge basin. Currently located immediately north and outside the fenced area for the NSCC, if such a basin was created, access might be negotiated between the VSC and NSCC for routine sediment removal. Again, EEA/CEA understand that this recommendation involves private property, which presents logistical problems. However, the VSC could consider obtaining a conservation or drainage easement for development of a stormwater treatment system at this location.

D. Trap sediments, floatables and contaminants-

1. Install a swirl separator beneath Littleworth Lane or within ROW:

As indicated in the previous Task Reports, one of the Littleworth Lane storm drains is a major outfall into the Scudder's Pond system. It is responsible for much of the volume entering the pond, as well as the pollutant and sediment loads. Installation of a swirl or oil/grit separator device at this location, could significantly reduce the sediment deliveries and improve water quality in Scudder's Pond. According to the VSC, the Village maintains a 20-foot wide drainage easement centered on the current outfall and drainage ditch. Final design for such a structure should include an investigation of the area immediately adjacent to the southern curb line to determine if the area can accommodate installation of an oil/grit separator and a manhole to facilitate routine clean outs. Installing this feature in the roadway right-of-way will eliminate the need to travel internally onto adjacent properties for service.

E. Increase pond capacity and reduce invasive plants-

1. Excavate Phragmites and create shallow pond area:

As discussed in the previous Part 2 - Task 3 report, a large sediment deposit or alluvial fan has formed along the northeastern side of Scudder's Pond, which has been invaded by a monoculture of invasive common reed (*Phragmites australis*). This recommendation includes the removal of the sediment deposit along with the invasive common reed (above ground portion as well as rhizomes) immediately upstream from the open water area of Scudder's Pond. This will increase the capacity of the pond, reduce invasive species as well as improve the pond aesthetics. The sediment deposit was determined to be approximately 0.8 acres in size. For the purposes of the engineering cost estimate, an excavated depth of three feet was assumed to entirely remove the Phragmites below the rhizome depth.

2. Dredge Scudder's Pond, truck and dispose of material to lined landfill:

Based upon the recent sediment sampling results from Scudder's Pond (presented in the previous Part 2 – Task 3 section) and preliminary discussions with the VSC, it appears that dredging the pond and disposal at an upland location is still a feasible option. However, NYSDEC will have to approve the sediment sampling and analysis plan before a final decision about disposal of the dredged material can be reached. Additionally, the location for upland spoil placement will have to be carefully selected if a municipal landfill is no longer available to accept such material. For engineering cost estimating purposes, an average dredge depth of 2 feet over 2.1 acres was assumed based on EEA's sediment sampling collection, which revealed that the pond depths ranged from ½ to 4 feet deep. This would provide a finished pond depth of about 4 – 5 feet. The actual dredging needs (extent, depth and location) can be further refined after a bathymetry survey is conducted for Scudder's Pond (see recommendation P.1. below).

Dredging Scudder's Pond will accomplish several water quality and habitat improvement goals. It will remove the nutrient laden sediments from the pond basin; increase the holding capacity and detention time for water in the pond thereby increasing the nutrient removal efficiency of the system; restore sub-aquatic habitat and allow re-development of a warm water fishery in the pond; inhibit the proliferation of invasive wetland species (i.e., common reed and purple loosestrife); as well as improve the aesthetics and visual character of the pond.

F. Improve water quality discharged to pond-

1. Re-direct stream channel away from the eroded bank below the Upper Pond, stabilize stream channel and pond banks:

The stream channel and southeasterly shoreline of Scudder's Pond has experienced erosion or scour as it makes a sharp bend to the west just below the point of confluence with the Upper Pond overflow. This recommendation includes modifying the stream channel alignment away from the eroded bank in order to stabilize the bank using a combination of methods including stone faced concrete walls, rock armoring, vegetated geogrids, and/or brush mattresses depending upon the available width of treatment area between the cottages and the stream channel, and the calculated flow velocity. Such engineering is outside the scope of this conceptual plan, but should be conducted during the design phase.

It is anticipated that hard structural measures would be needed in areas prone to high scour, at any abrupt bends in the channel or where loss of adjacent residential property is of concern. Softer bioengineering solutions are more applicable further downstream in wider channel sections and reaches experiencing slower flow velocities. Vegetated geogrids and brush mattresses are two types of bioengineering practices used for stream channel stabilization. Vegetated geogrids utilize a combination of rock fill below the baseflow level of the stream and live cuttings of willows or dogwoods above the normal water level. Brush mattresses utilize both live cut stakes and dead stake bundles applied against the shoreline to armor it in a soft structural fashion, until the live material takes root. A perimeter safety fence is also recommended due to the height of the cut bank and its proximity to residential areas.

2. Install overflow wetland at the head of Scudder's Pond:

This recommendation includes developing a stormwater treatment wetland at the head of Scudder's Pond, immediately downstream of the realigned and reinforced stream channel to provide additional filtration to surface waters. This assumes that an oil/grit separator will be installed upstream at the Littleworth Lane outfall to remove coarse sediments prior to discharge into the upper stream segment. Realignment and stabilization of the mid-stream segment will help reduce sediment delivery to Scudder's Pond, coupled with the development of a shallow wetland system at the downstream reach to provide additional filtration of fine sediments and uptake of metals and nutrients.

G. Improve public visibility and reduce invasive plants-

1. Replace Phragmites near Shore Road with native emergent plant species: During the kickoff meeting for the Scudder's Pond Subwatershed Plan, the HHPC, VSC and NSCC had stated ~~at~~ that restoring public views into Scudder's Pond from Shore Road would be a goal of this project. This can be accomplished by several means. Short-term provisions could include frequent cutting of the vegetation along Shore Road throughout the growing season to restrict the vegetative height and increase the public viewshed. The height of vegetation must be maintained below 2 ½ to 3 feet in order to enable passing motorists, bicyclists and pedestrians a glimpse into the pond. If the VSC, HHPC and NSCC wish to strictly benefit pedestrians, the controlled vegetative height can increase slightly. Since the vegetation consists primarily of invasive common reed, cutting may take several years to set back the vigor of the plants.

Physical removal (by pulling or grading) of common reed and its rhizomes is necessary for a more permanent solution. Alternatively, wick treatment with a systemic herbicide may be considered to kill back the common reed without harming down-drift or adjacent desirable species. The HHPC, VSC and NSCC are advised that any controls of plants within the adjacent area of a state regulated wetland will require pre-approval from NYSDEC. Finally, replacement of vegetation along the ponds' edge is highly recommended to ensure the establishment of desirable wetland species and to out-compete other invasive species. The Part 2 - Task 3 report includes a list of native wetland plants that could be planted, which will maintain mature heights below 3 feet. Table 2.1 in the previous section provides a listing of adapted native trees and shrubs that can tolerate the wetland conditions of Manahawkin Muck soils and attain greater heights at maturity

H. Reduce upland waterfowl activity and runoff to Scudder's Pond-

1. Construct a low profile wall along the southern edge of Scudder's Pond: Large populations of resident Canada geese amplify the nutrient loading problems at Scudder's Pond. In addition, as mentioned in the previous Part 2 -Task 3 report, Canada geese and other waterfowl have access to the southern shoreline of Scudder's Pond near the NSCC cottages for nesting. They have closely grazed the grass at the water's edge, increasing the potential for soil erosion and minimizing the stormwater filtering capability of the perimeter vegetation.

According to the New Jersey Department of Environmental Protection (2000) manual for "*Management of Canada Geese in Suburban Areas*" the most desirable habitat for Canada geese includes flat to gently rolling managed turf areas close to lakes, ponds or watercourses. In order to discourage Canada geese from nesting, several measures could be considered including routine "hazing" or

harassing of potential nesters, installing visually frightening devices (i.e., mylar tape, flagging, eye-spot balloons, scarecrows, etc.), or altering the habitat. Reducing manicured turf along the water's edge or allowing the vegetation to grow to at least 8 inches in height will help to reduce the attractiveness of the shoreline to geese. The most highly recommended permanent measure is to change the turf-water interface to include structural and visual barriers, such as tall native vegetation or large boulders (2 – 3 feet in diameter). For the purposes of the engineer's estimate, installation of a stone-faced concrete wall was assumed.

2. Initiate "Geese Peace" control activities on Scudder's Pond:

Supplemental feeding of wildfowl in waterfront parks exacerbates nutrient enrichment in ponds and embayments by artificially concentrating birds on the water surface as well as in the adjacent uplands. Educational materials should be distributed to the residents surrounding Scudder's Pond, and posted to discourage the feeding of wildfowl, such as the program implemented by the Town of Oyster Bay in Nassau County. Additional wildfowl controls are also recommended to control overpopulation of resident Canada geese. The Town of Oyster Bay has implemented a two-phased program known as "Geese Peace" that targets resident Canada goose reductions. It involves public education of volunteers who participate in an egg-oiling program, and follow-up with a trained border collie to actively chase geese away from the area. The program works through "partnerships" which share the cost of the program. The VSC and the NSCC would be eligible to become partners in the Town's program. In order to be fully effective, instituting a wildfowl control program should be coupled with other less invasive methods of control, such as installing goose exclusion fencing, planting perimeter vegetation and modifying the water-shoreline interface as described in recommendation H.1 above.

I. Increase stormwater detention in Scudder's Pond to reduce pollutant loading to Hempstead Harbor-

1. Replace existing spillway with two-stage spillway;

The existing weir structure that relies on timber flashboards to raise the water level is vulnerable to damage, as occurred in December 2004. Damage to the weir can result in nearly a total drawdown of the impounded water level, resulting in loss of storage capacity, stormwater detention time and impacts to the dependent wetland communities. It is hereby recommended that the existing weir be replaced with a simple two-stage concrete spillway structure, which will allow regular base flows to pass over the lower notch and excess storm surges to flow over the upper weir. If flood plain conditions do not result in damage to the surrounding residential properties, the weir elevation can be designed to provide additional storage within Scudder's Pond. Increasing the detention time in any stormwater treatment system generally increases its effectiveness for pollutant removal, since it allows a greater separation of sediment loads, and increased biological activity that reduces nutrient loads.

2. Install UV treatment system at weir to treat pathogens

High pathogen levels typically cause bathing beach closures. The 1996 Village of Sea Cliff Shoreline Study reported elevated bacteria levels (total and fecal Coliform) during a wet weather sampling event in Scudder's Pond, which approached those typical of untreated domestic wastewater (e.g., total Coliform at 100,000-1,000,000 and fecal Coliform at 10,000 to 100,000). Elevated Coliform levels in surface water bodies can be attributed to ineffective septic treatment systems, influxes of domestic pet or waterfowl wastes and soil organisms picked up by stormwater runoff. Based upon a cursory review of the Nassau County Department of Health bathing beach sampling logs for the Scudder's Pond overflow from 1995 to 2004; high Coliform levels had repeatedly been recorded on numerous occasions, as follows:

Table 3.2 – Summary of Nassau County Bacteriological Monitoring in Scudder's Pond

DATE	TOTAL COLIFORM Per 100 ml	FECAL COLIFORM Per 100 ml
NYSDEC Standard for Class "C" Waters*	2400 count/100mL	200 count/100mL
July 1997	>160,000	13,000
July 1998	160,000	13,000
June 2000	160,000	13,000
May 2001	>160,000	17,000
April 2002	90,000	8,000
July 2002	>160,000	>160,000
August 2002	>160,000	9,000
September 2004	30,000	24,000

*NYSDEC Water Classification, Quality Standards and Best Usage for Scudder's Pond, NYCRR Title 6, Chapter X, Part 703

Installing a UV Treatment system at the Scudder's pond overflow would help ensure that pathogens leaving the pond system (regardless of origin) would be killed prior to discharge to Hempstead Harbor. The design and installation of such a system would be integral to the replacement of the weir structure.

J. Eliminate direct discharges to pond from cottage access drive-

1. Install catch basin with overflow to leaching pool and eliminate overflows to Scudder's Pond:

As discussed in the Part 2-Task 3 report, several small outfall pipes were noted leading from the NSCC cottages or the yard drains between the cottages and discharging directly into Scudder's Pond. During EEA/CEA's site reconnaissance several catch basin inlets were found along the access road, however, the majority were clogged with leaves, sediment and/or debris at that time. Additionally, due to the recent installation of buried utilities, a gully was created at the end of the cottage access drive. This recommendation involves upgrading the current stormwater controls to: a) eliminate direct discharges from the cottages directly into Scudder's Pond, and; b) include the installation of a curb and curb inlet catch basin along the north side of the access road between the fourth and fifth cottage, which would outlet into a leaching pool located closer to the road thereby eliminating the gully erosion problem.

K. Reduce streambank erosion & pond sedimentation-

1. Reinforce channel banks of Littleworth Lane discharge with stone-faced concrete wall or vegetated geogrid, line channel bed with rock, and provide safety fence:

This recommendation applies to the existing drainage channel located at the outlet end of the Littleworth Lane outfall. The channel is steep-sided, shaded and eroded, and consists of mixed layers of soil and unconsolidated debris. This channel experiences high velocity, flash flows during major rainfall events. There is little available width to enlarge the channel within the confines of the 20' wide VSC drainage easement and bank stability is a major concern since the channel adjoins residential properties. Hard engineering structures are typically recommended in areas characterized by high velocity flows prone to scour and where there is limited space to install other types of treatments. Softer, bioengineering treatments are typically applied to downstream segments where the flow velocity has somewhat dissipated and more lateral area is available for channel modifications to receive other treatments. Based upon the collective experience of the EEA/CEA project team, the application of strictly soft vegetative solutions at this location is not advisable. Further investigation (e.g., hydrologic measurements of flow rates and channel configuration, etc.) is recommended to determine whether a combination of structural and vegetative solutions is necessary to stabilize the shaded and steep-sided channel banks below the Littleworth Lane outfall.

L. Maintain Upper Pond water level and increase stormwater detention-

1. Replace deteriorated gabion weir with two-stage concrete spillway:
The existing gabion weir and the accompanying dam on the west side of the Upper Pond have partially failed, effectively reducing the volume of stormwater detained in this basin. Similar to the recommendation for the Scudder's Pond overflow (see #I.1 above), a two-stage concrete spillway structure is recommended for the Upper Pond overflow. Depending upon the elevation of the lower weir, this new spillway could effectively increase the storage volume of the Upper Pond, thereby increasing its capacity to treat or remove pollutants.

M. Intercept and treat stormwater runoff -

1. Eliminate Man-Made Ponds and Replace with Treatment Wetland:
The NSCC has expressed interest in eliminating the two small man-made ponds on fairway #11, in keeping with the recommendations of the "Restoration Master Plan" that includes "altering the two small ponds to improve drainage conditions and aesthetics." This recommendation includes the elimination of these two ponds, and regrading the area to create a shallow grassed drainage swale that would drain through a natural buffer into a new stormwater treatment wetland. Elimination of the ponds and creation of a treatment wetland closer to the woods will improve stormwater treatment and provide habitat enhancement, as well as improving site aesthetics and the line of play for the golf course.

2. Construct treatment wetland with overflow to Upper Pond:
As mentioned above, construction of a stormwater treatment wetland adjacent to the woods would significantly increase the wetland function and habitat value of such a feature. This would also improve the quality of stormwater runoff (e.g., reduce TSS, nutrients and pathogens) that is currently leaving the golf course and entering the Upper Pond.

N. Reduce nutrient inputs to ponds-

1. Establish unfertilized native grass buffer area between golf course and proposed treatment wetland:
This practice would work in tandem with the recommended treatments in Items M.1 and 2 above. A native grass strip bordering the treatment wetland will provide several benefits, including: stormwater filtration; velocity reduction; enhanced site aesthetics; and creation of an ecological transition zone from the manicured turf on the golf course, through the higher meadow of the native grass buffer, to the more naturalized wetland and woodland areas.

O. Eliminate direct discharges to waterbodies-

1. Provide BMP for all outfall pipes:
As mentioned in the previous Part 2 - Task 3 section, two outfalls were noted along the southern bank of the Upper Pond, as depicted on Map 2-2a; a 4-inch diameter pipe that drains the 11th tee and an 18-inch corrugated metal pipe from an unknown source. This recommendation includes eliminating or capping any non-functional outfall pipes. In addition, velocity or scour reduction treatments (i.e., rock bowls, stone apron energy dissipaters, rock-lined forebays, etc.) are recommended for installation below active outfalls. Wherever feasible, active outfalls should be eliminated and replaced with upland stormwater treatment and disposal methods (e.g., upgradient leaching pools).

P. Implement Scudder's Pond monitoring-

The following recommendations were explained in detail in the Data Gap Analysis portion of the Part 1, Task 2 section:

1. ***Conduct bathymetric survey in Scudder's Pond to determine potential dredge depth;***

2. ***Collect routine (e.g., minimum quarterly) water quality samples for dissolved oxygen (DO), nutrients, total suspended solids and volatiles; and coordinate with Nassau County Health Department.*** Comparisons of quarterly DO readings taken at the top and bottom of the water column will help determine whether the pond experiences any seasonal turnovers***;***

3. ***Identify the source of the active small diameter drainpipes originating between the cottages along the southern edge of Scudder's Pond.*** Discharge water should be checked for bacterial levels***;***

4. ***The VSC should update their file records of sanitary systems servicing the residences surrounding Scudder's Pond.***

5. ***The VSC should coordinate with Nassau County DPW regarding updating the drainage maps for the Scudder's Pond subwatershed.*** This could include inventorying the current condition of all inlets, catch basins, and overflow structures, and incorporating same into the GIS database along with a scheduler for clean-outs.

Evaluation of Catch Basin Retrofits

Catch basin inserts can be useful for removing suspended solids, trace metals, petroleum hydrocarbons and trash (floatables) from stormwater. Municipalities and their academic and private consultants around the country have reviewed many of these units. The University of Arkansas has conducted one such study. Students at Hofstra University working with the HHPC compiled information on some of the units. For further details, see the (Hofstra University, 2004) Catch Basin Retrofit Project report included in Appendix B. A recent study conducted by CEA for the Manhasset Bay Protection Committee, "*Catch Basin Retrofit Feasibility Study*" (August 2002) examined a number of the units and made recommendations for their use, maintenance frequency, and costs. Some of the recommendations provided in that study include:

- Catch basin inserts are nominally effective at removing fine silts and clays, modestly effective at removing TSS, and between 20-90% effective at removing oil and grease;
- The catch basin insert capacity should equal the quantity of stormwater that passes through the insert plus the quantity that passes through the overflow;
- Conventional catch basins should be cleaned at least once annually, however, some catch basin insert filters require monthly replacements;
- Capital costs for catch basin inserts vary widely by manufacturer, generally falling within the range of $300 to $4,200, installation costs range from $50-$100, and operation and maintenance costs range from about $80 to $400.

Swirl separators are designed to collect sediments, floatables, and associated contaminants from the stormwater stream. Maintenance of the units is dependant on the type of storms experienced in a particular season, the quantity of road sand applied by the municipality, area construction and sediment erosion, street sweeping frequency and watershed homeowner practices. Units are typically sized to accept a high percentage of watershed storms. The percentage is dependant on the requirements of the municipality and the available funding. Most units have emergency overflow capability to prevent clogging. Maintenance involves manhole access and vacuuming or other removal of accumulated material.

Catch basin inserts require maintenance that is dependent on the type of unit selected, its location and its catchment area. Units designed to trap floatables usually have emergency overflow capability. Those utilizing filters and sponges should have emergency overflow capability to prevent flooding when they clog. The smaller the screen or filter size of the units and the greater its catchment area, the more frequently it will need to be cleaned or replaced. If catch basin inserts are selected by the HHPC for implementation in the Scudder's Pond Subwatershed, a routine clean-out schedule should be developed and included in the standard operation and maintenance procedures for these features.

BMP Sizing Requirements, Applicability, Pollutant Removal Efficiencies and Typical Costs

Tables B.1 – B.4 in Appendix B provide a summary of BMPs that can serve as a watershed protection "toolbox". The various mechanisms are generally separated into planning measures, versus practical applications including "soft" or bioengineering practices and "hard" structural practices that involve some sort of earth moving and/or installation of structural components. Table B.1 lists various planning and regulatory strategies, as well as source control measures, general "housekeeping" and maintenance practices. Table B.2 presents a listing of stormwater treatment BMPs along with brief descriptions, general use and sizing criteria. Table B.3 examines the treatment efficiencies and percent pollutant reductions that would typically result from installation of each listed BMP. Table B.4 provides typical unit costs for installation and maintenance of various practices, since actual design is not within the scope of this Subwatershed Plan.

Engineer's Cost Estimates

CEA calculated approximate costs estimates for the various recommendations contained in this Scudder's Pond Subwatershed Plan. These are presented in Table 3.3. As noted earlier, more refined cost estimates are dependant upon actual BMP siting conditions and the development of detailed design criteria for the various structural practices. However, detailed design is currently outside the scope of this Schematic Design report. Therefore, the cost estimates provided generally assume worst-case scenarios and represent conservative estimates that are generally higher than the actual costs for installation. These rough estimates are also provided for the purposes of applying for future grants.

Prioritization of Recommendations

Upon evaluating the series of recommendations provided in this subwatershed plan, it is EEA's opinion that the water quality improvements should progress generally from the outlet end upstream to the upper reaches of the subwatershed. The lower budget items that can be accomplished immediately surrounding Scudder's Pond should take place first (including educational outreach to residents surrounding the pond), followed by improvements to the Scudder's Pond overflow, so that benefits to Hempstead Harbor can be realized early in the process. Potential dredging of Scudder's Pond should only be considered once all improvements have been made to Scudder's Pond and the Upper Pond, so that the dredging work will result in a final clean out of any accumulated sediments that might be dislodged during the implementation of other improvements. Finally, stormwater improvements higher in the watershed could be delayed until later in the process, and completed as additional funding becomes available.

The series of recommendations in the Part 3 – Task 4 section (A-P) have been grouped together into related projects as itemized in Table 3.4. Group 1 includes the highest priority projects, followed by Group 2 and so on until Group 6. Please keep in mind that the numbers presented in the Engineer's cost estimates are ballpark figures that will be refined during the design phase.

Table 3.4 – Prioritization of Recommended Actions			
Priority Group #	**Budget Item**	**Proposed Action**	**Engineer's Cost Estimate**
LITTLEWORTH LANE DRAIN IMPROVEMENTS			
1	4a	Swirl Separator at Littleworth lane	$ 75,000.00
1	10a	Reduce erosion/reinforce channel banks immediately downstream of Littleworth Lane outfall	$ 30,000.00
1	15a	Redirect stream channel to treatment wetland	$20,000.00
1	15b	Reinforce stream channel and Scudder's Pond bank below confluence with Upper Pond overflow	$15,000.00
1		Subtotal	$140,000.00
GOOSE CONTROLS & WATER QUALITY INPUTS TO SCUDDER'S POND			
2	7a	Construct low stone wall on southern shoreline of Scudder's Pond and/or install plantings to deter geese	$60,000.00
2	7b	Initiate Geese Peace control activities	$ 0
2	9a	Eliminate direct discharges along southern shoreline	$7,500.00
2		Subtotal	$67,500.00
IMPROVE SCUDDER'S POND OUTLET CONDITIONS			
3	8a	Replace weir with 2-stage spillway	$75,000.00
3	8b	Install UV treatment device	$750,000.00
3		Subtotal	$825,000.00
UPPER POND IMPROVEMENTS			
4	11a	Replace gabion weir with 2-stage spillway	$50,000.00
4	12a	Convert 2 golf course ponds to vegetated swale	$20,000.00
4	14a	Construct treatment wetland on NSCC	$20,000.00
4	13a	Establish native buffer to new treatment wetlands	$3,000.00
4	16a	Cap or provide BMP treatment to outfalls along southern bank	$5,000.00
4		Subtotal	$98,000.00
DEEPEN SCUDDER'S POND			
5	17a	Conduct bathymetric survey	$2,500.00
5	5a	Excavate common reed	$96,800.00
5	5c	Dredge Scudder's Pond	$847,000.00
5	5b	Dispose of dredge material at Landfill	$387,200.00
5	6a	Replace common reed at Shore Road with native plants	$22,500.00
5		Subtotal	$1,356,000.00

UPPER WATERSHED IMPROVEMENTS			
6	3a	Downing Avenue drainage improvements and treatment marsh	$30,000.00
6	3b	Recharge/detention basin between Gates Way and NSCC	$60,000.00
6		Subtotal	$90,000.00

Public Outreach and Education

On April 13, 2005, the HHPC, EEA, VSC and the New York Sea Grant NEMO Program conducted a public presentation for all of the residents located within the Scudder's Pond subwatershed. The findings of EEA/CEA's field reconnaissance, preliminary recommendations and educational material were presented to increase public awareness and foster local stewardship for the subwatershed. The educational materials covered the topics of stormwater pollution, septic and pet wastes, household chemicals, sound gardening tips, and "adopt-a- watershed" activities. Numerous pamphlets were distributed and available for pick up. A question and answer period followed the official presentations. The attendance list and the questions/answers discussed at the public meeting are attached to the rear of this report.

SCUDDER'S POND SUBWATERSHED PUBLIC MEETING
WEDNESDAY APRIL 13, 2005

PARTIAL ATTENDANCE SHEET

Name	Address	Phone/Email
Aldona Lawson	Town of Oyster Bay/DER	516-677-5717, alwason@tobays.net
Sean Whalen	24 Townsend St., Glen Head	516-759-6274, seatwins@earthlink.net
Mr. & Mrs. Malcolm Widemor	111 Dowing Avenue	516-671-5884
Lorraine Aguilar	409 Littleworth Lane, Sea Cliff	516-674-3768
Nancy Kirk	411 Littleworth Lane, Sea Cliff	516-676-3886, nkirk@optonline.net
Marjorie Herskinhart	407 Littleworth Lane, Sea Cliff	516-676-4419
Marilyn K. Smith	413 Littleworth Lane, Sea Cliff	516-671-1755
Elaine Hallett	403 Littleworth Lane, Sea Cliff	516-301-1738, ebhrn@yahoo.com
Dan Maddock	Village of Sea Cliff	516-671-0080
Carol DiPaolo	CSHH	516-759-3832
Melissa Carpentieri	EM	516-728-2459, mcarpe1@pride.hofstra.edu
Geneviene Woods	38 Littleworth Lane, Sea Cliff	
Elizabeth & Richard Weingarten	383 Littleworth Lane, Sea Cliff	516-676-0359
Kevin Costello	375 Littleworth Lane, Sea Cliff	516-671-4937
Kevin Costello	387 Littleworth Lane, Sea Cliff, NY 11579	516-759-4214
Joan Hockberg	8 Tanglewood Lane, Sea Cliff	
Jay Kearney	401 Littleworth Lane, Sea Cliff	
Margaret Hunter	133 Hofstra University, Hempstead NY 11549	
John Streeter	North Shore Country Club	516-676-1319
Christy Witters	NY Sea Grant NEMO	631-444-0407; cew39@cornell.edu
Eileen Keenan	NY Sea Grant NEMO	631-444-0422
Eric Swenson	Hempstead Harbor Protection Committee	516-677-5790; nywaste@erols.com
Laura Schwanof	EEA, Inc., 1239 Route 25A, Suite 1 Stony Brook, NY 11790	631-751-4600; lschwanof@eeaconsultants.com
Denise Harrington	EEA, Inc., Stony Brook, NY	631-751-4600; dharrington@eeaconsultants.com
Tom Ryan		
Douglas Barnaby		
Carolyn Cammalleri (Hofstra University)	4 Kent Court, West Islip, NY 11795	631-943-1676

SCUDDER'S POND SUBWATERSHED PUBLIC MEETING
WEDNESDAY APRIL 13, 2005

QUESTION & ANSWER SESSION

- Resident noted that muskrats are present in Scudder's Pond and is concerned that any new plantings will be eaten by muskrats. Muskrat population level must be determined and, if present, plantings must be selected that are not preferred by muskrats and other mammals.
- Resident noted that existing weir and depth of Scudder's leads to flooding in adjacent homeowners' basements. Pond needs to be deepened.
- Resident noted that large-scale improvements and a substantial amount of money are necessary for the proposed Scudder's Pond improvements moreso than actions by residents and others. Response noted that resident actions coupled with large-scale improvements are necessary. Good housekeeping and resident actions can reduce pollutant loads entering Scudder's Pond watershed and ultimately reduce the nonpoint source pollution in Scudder's Pond. Money for structural and nonstructural improvements (i.e., stormceptors) only addresses the effects of pollution and do not reduce the pollutant loads entering the subwatershed. By addressing both cause and effects of pollution more funding can likely be leveraged and structural improvements will be more effective. Monies available from grants and other sources usually require both local and governmental actions that address the sources and receptors of nonpoint source pollution.
- Resident inquired about the negatives associated with dredging Scudder's Pond. Response noted that dredging might be a costly endeavor depending upon the nature of the dredged material. Material that is highly organic in nature often maintains a high level of contaminants. The presence of contaminants and the limited the reuse potential of contaminated organic material both act to drive up the cost of dredge material disposal. HHPC will be able to assess the quality of the sediment before proceeding with the project by reviewing the sediment testing results. Sediment cores of the Pond were taken this winter and are undergoing analysis now. In addition, to simply removing material, discussion ensued regarding the need to reduce sediment and pollutant loads entering the Pond and subwatershed. HHPC is looking into model ordinances to reduce pollutant and sediment loads from entering the subwatershed and Pond.
- Resident noted that ships going to the LIPA plant in Hempstead Harbor leak oil. This oil adversely affects the health of the Harbor. HHPC stated that they were not aware of any leaks in recent years and that safeguards appear to be working. In addition, the ships are most likely going to the Exxon Mobil facility, not LIPA (KeySpan).
- Resident inquired about the timeline for the proposed improvements. HHPC noted that although capital improvements requiring monetary funds will likely take a long time to implement, immediate action could be taken to change habits and

help reduce nonpoint source pollution entering the Pond. Ordinance development can also occur in the short-run.

- Resident noted that more workshops are needed to educate more people on ways they can reduce nonpoint source pollution. A second workshop with a larger target audience was mentioned as being under discussion.
- Resident noted that all of Sea Cliff should be invited to future workshops not just the residents of the Scudder's Pond subwatershed. Workshops should educate people on the goals, objectives and recommendations of the Hempstead Harbor Water Quality Improvement Plan; ways they can reduce nonpoint source pollution and improve the health of the watershed.
- Resident inquired how to know which native plants are best suited for a particular site. It is best to know the soils and light conditions you have onsite so you can match plant requirements to onsite conditions. The Soil Survey of Nassau County provides information regarding the overall soil type in your area and soil characteristics. Also, Cornell Cooperative Extension can analyze soil sample from a particular site for a nominal fee.
- Resident noted that recommended structural measures are costly and money is needed. Group agreed.
- Discussion ensued regarding what collective actions residents or businesses could take as a group in addition to modifying individual habits. Some ideas discussed included: join Nassau County's Adopt a Watershed program; form a Scudder's Pond association to protect the Pond; participate in and help organize educational seminars; organize a storm drain stenciling event in your area, participate in water quality testing efforts on the Harbor and elsewhere in the watershed; build bird boxes to increase avian nesting opportunities; and create habitat for wildlife through plantings.
- Resident noted the need for a water quality-sampling program for the Pond. Discussion ensued regarding likely participants including schools, resident, key clubs or school groups.
- Resident noted the need to involve surrounding areas and municipalities in effort to improve water quality and reduce nonpoint source pollution.
- Discussion ensued about the 5-year stormwater plan for Tilley's Beach and installation of a stormceptor at the top of Tilley's steps.
- Resident voiced concern over the amount of Canada geese and their input to the nonpoint source pollution problem. HHPC noted that the "Geese Peace" program involves oiling geese eggs and site aversion techniques. Oiling geese eggs prevents the eggs from hatching and, thereby, reduces the geese population. After the young are hatched, border collies run the site with the ultimate goal of rendering the site inhospitable for geese. Approximately 1400 eggs were oiled in Nassau County in 2004 and more participants are needed for 2005. Contact HHPC for more information.

<u>After Meeting Discussions</u>

- Resident noted that educational articles should be printed in the local newspapers, (i.e., Record Pilot and Gold Coast Gazette) to educate the public about HHPC, the

Water Quality Improvement Plan, Scudder's Pond Subwatershed Plan and what they can do to reduce nonpoint source pollution.

- Lorraine Aguilar, 516-674-3768 & 516-656-0672, yogaflow@eathlink.net, expressed interest in being more actively involved in setting up pond meetings, organizing volunteers, holding educational seminars at her yoga studio. She was especially interested in the development of bird habitat.