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Project Title:	**Merokee Pond, Bellmore**
Client:	County of Nassau Department of Public Works 1194 Prospect Avenue Westbury, New York
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EXECUTIVE SUMMARY

Purpose
The purpose of this report is to study water quality issues at Merokee Pond in Bellmore and to present recommendations for improving conditions pursuant to the 2004 and 2006 Environmental Bond Acts. Water quality issues at Merokee include:

- The deposition of sediments in the pond;
- The accumulation of floatable debris in the pond;
- The presence of bacteria and excessive nutrients in the pond;
- The presence of invasive and excessive amounts of aquatic vegetation.

Work Performed
The work that was performed as part of this study includes:
- A hydrologic and hydraulic analysis of the watershed that the pond is part of;
- A review of the pond's regulatory status;
- A review of theoretical calculations of pollutant loads to the pond;
- A review of storm water management practices recommended by the New York State DEC
- A survey of existing pond depths and a comparison of that survey to previous surveys done in 1981, 1995, and 1997;
- Sampling and testing of sediments in the pond;
- Sampling and testing of the pond water in dry weather and wet weather;
- A survey of the aquatic vegetation in the pond;
- A survey of upland vegetation around the pond;
- A survey of fish and wildlife at the pond.

Findings
The findings of the study are as follows:
- The pond is part of a 1,750 acre watershed that drains areas of Bellmore and East Meadow through Cedar Swamp Creek and Whaleneck Creek to East Bay. Approximately 1590 acres drains through the pond. While the pond was created in the early 1900's the majority of the development in the watershed, including the homes around the pond, were post-war developments. The majority of the watershed roads are owned by the Town of Hempstead and the State of New York.
- The pond is also fed by groundwater. The bottom of the pond is below the ground water table.
- The pond is classified as a Class II Wetland and a Class C Surface Water.
- Pollutant load calculations predict higher concentrations of pollutants in the pond than are actually there.

- The pond is an important part of the system that works to protect Whaleneck Creek and East Bay from pollution, which Nassau County is mandated to do under EPA Storm Water Regulations.
- The upper branches of the pond were dredged in 1997 to create sediment traps. Approximately 5,500 cubic yards of sediment have been deposited in these traps since 1997, which is a rate that is slightly higher than predicted, but which indicate that the sediment traps are performing as designed.
- The main body of the pond has had a total of 4" of sediment deposition since 1981. The sediment layer averages 2' thick and the water depth in the main body of the pond ranges from 4.5' to 5'.
- The sediments in the upper branches of the pond are classified as clean sand.
- The sediments in the main body of the pond are silty sand and are contaminated with certain metals and pesticides that are common in ponds throughout Nassau County. As long as the sediments remain in place they are not deemed to be a public health risk by the New York State Department of Health and the New York State Department of Environmental Conservation.
- The pond water has an excess of nutrients and bacteria in it, but the levels are comparable to other Nassau County Ponds.
- The pond receives a significant amount of floatable debris from the watershed. Efforts to control floatables with a boom on the east branch of the creek and a chain link fence on the west branch have been unsuccessful.
- The main body of the pond has dense stands of coontail and Brazilian waterweed. The coontail is common in Long Island ponds and is primarily beneficial to the pond as it absorbs excess nutrients and produces oxygen, however it is present in what is considered nuisance amounts. The Brazilian Waterweed is an invasive plant.
- The landscaping around the pond is primarily manicured lawns running to bulkheads at the edge of the pond. The south bank of the pond is wooded with a combination of native and invasive species.
- The pond is home to a good variety of fish and bird life indicating that it is a relatively healthy environment.

Recommendations

The study makes the following recommendations:

- Perform maintenance dredging on the upper branches of the pond to the depths established in 1997. This will serve to control sediment levels in the pond for another 12 to 15 years.
- Install inserts in catch basins throughout the watershed if a maintenance agreement can be reached with the Town of Hempstead and the State of New York. Catch basin inserts will capture floatables, sediment, and nutrients if they are effectively maintained.

- If a maintenance agreement cannot be reached with Hempstead and the State, construct siphons upstream of the pond to trap floatables before they enter the pond.
- Suction harvest approximately 50% to 70% of the aquatic vegetation in the pond, working from north to south. This will reduce the aquatic vegetation to below nuisance levels, but it will not be a permanent fix. There is a risk that this effort will lead to a greater proliferation of Brazilian Waterweed and/or algae.
- To mitigate the risk of increase in Brazilian Waterweed or algae blooms, treat the pond with a program of bacterial inoculation. Bacterial inoculation is the introduction of beneficial bacteria that help to control nutrient levels in the pond.
- Construct an aquatic bench in the pond with wetland plantings that will help absorb nutrients from the pond and improve the habitat.
- Create an education program for homeowners around the pond to reduce the introduction of pollutants directly into the pond.
- Work with the Bellmore-Merrick School District to create a watershed wide education program aimed at reducing the introduction of pollutants into storm water.

Costs

The recommendations in this report, exclusive of education programs, are estimated to cost $2.3 million.

Schedule

The proposed schedule for work, which is contingent on receiving the necessary regulatory permits from all involved agencies, is:

- Harvesting Aquatic Vegetation – Fall 2009
- Dredging – Winter 2009 to Spring 2010
- Construction of Aquatic Bench with Wetland Plantings - Winter 2009 to Spring 2010
- Installation of catch basin inserts or construction of siphons – Winter 2009 to Spring 2010

PURPOSE OF REPORT

The purpose of this report is to address water quality issues at Merokee Pond in Bellmore in a manner that is consistent with EPA Phase II Storm Water Regulations and the Nassau County Storm Water Management Program. The work is being done pursuant to the Nassau County 2004 Environmental Bond Act. The problems that have been identified/reported that have led to this investigation include:

1. Accumulation of sediments in the upper branches of the pond since it was dredged in 1997;
2. Accumulation of sediments/organics in the southern portion of the pond that was not dredged in 1997.
3. Excessive accumulation of floatable debris along the banks of the pond
4. Growth of coon tail predominantly in the southern part of the pond

DESCRIPTION OF EXISTING SYSTEM

Merokee Pond is 10 acre pond located in Bellmore between Smith Street and the LIRR Babylon branch; about midway between Merrick Avenue and Newbridge Road. The pond is horseshoe shaped and it is fed by the West and East branches of Cedar Swamp Creek, as well as by groundwater flow. The watershed contributing to the pond covers approximately 1,600 acres and is roughly bounded by a ridge line 1,200’ west of Merrick Avenue on the west; North Jerusalem Road to the north, and a ridge line 500’ east of Newbridge Road. The watershed is almost entirely residential subdivisions with 50’ x 100’ and 60’ x 100’ lots. Significant commercial development is found on Merrick Avenue, Bellmore Avenue, and Newbridge Road.

At the south end of Merokee Pond there are two weirs that control the flow out of the pond. The water flows over the weirs into a concrete channel and then through culverts under the LIRR tracks and Sunrise Highway to the Merokee Preserve. Flow continues for 2 miles through the preserve, Whaleneck Creek and out to East Bay.

The pond was developed in the early 1900’s as a reservoir for the Brooklyn Waterworks. It ceased to serve that purpose in the 1960’s. Its size and configuration classify it today as a Storm Water Management Practice that serves to protect the quality of water in the downstream Merokee Preserve and in East Bay. The pond is also classified by the New York State Department of Environmental Conservation (DEC) as a Class C Surface Water, which is described as suitable for fish, shellfish, wildlife propagation and survival. It is intended that Class C waters are suitable for primary and secondary contact recreation, although conditions at the water body may restrict such use. The pond is protected under the New York Freshwater Wetlands Act as a Class II Wetland.

The contributing watershed is broken into 8 sub-watersheds that are described as follows:

Merokee Pond – Contributing Sub-Watersheds		
No.	**Description**	**Area (Acres)**
1	West Branch of Cedar Swamp Creek – Open creek that runs generally northwest from Merokee Pond to the intersection of Merrick Avenue and Little Whaleneck Road.	152
2	West Branch 60" Pipe: Drainage system that runs west on Smith Street (Grand Avenue) and north on Merrick Road	149
3	West Branch 4' x 10' Culvert – Drainage system that roughly parallels the creek on Park Avenue and Camp Avenue and continues north on Little Whaleneck Road to Southern State Parkway	443
4	East Branch of Cedar Swamp – Creek and drainage system that runs due north from the east branch of the pond ending at Redmond Road. The creek is fed at its north end by 72" and 48" drains that deliver storm water from a little more than a mile of Southern State Parkway and from an area of 195 acres north of the parkway respectively. The creek is also fed by a series of smaller drains along its length.	802
5	24" Seneca Drive Drain – takes storm water from the neighborhood immediately west of the pond	23
6	18" Merokee Circle Drain – Drains Merokee Circle on the north side of the pond	4
7	18" Merokee Place Drain – Drains Merokee Place on the east side of the pond	4
8	Overland Flow – Direct flow from the properties that abut the pond	17
	Total Area	**1,594**

ANALYSIS OF EXISTING SYSTEMS

Storm Water Quality

We have used the New York State DEC Storm Water Management Manual and Natural Resource Conservation Service TR55 Method to calculate total runoff and peak runoff from the Water Quality storm event. The water quality storm event is defined as a 24 hour storm that is equal to or larger than 90% of all 24 hour rain events for a given year, and is given the designation P. For Nassau County this is a 1.3" storm. The total runoff from this storm, Q, measured in inches, is calculated as:

Q = P x Rv, where Rv = .05 + 0.009 x % Impervious Area.

For this watershed the % Impervious Area has been calculated as 41% by Cashin in their report titled "Cedar Swamp Creek Subwatershed – Stormwater Runoff Impact Analysis and Candidate Site Assessment Report." Therefore,

Q = 1.3" x 0.41 = 0.55"

The water quality volume, Wqv, is calculated as Q x Area, or

Wqv = 0.55" x 1594 acres x 1/12 = 73 acre-feet.

The peak runoff for the Water Quality storm event is calculated using TR 55 Method. The key variables in the TR 55 calculation are the Curve Number (CN) which is related to what percentage of the rainfall runs off, and the Time of Concentration (Tc) which defines how long it takes runoff from the most remote part of the watershed to reach the pond. For the CN, we have used the New York State DEC Storm Water Management Manual formula, which predicts the CN more conservatively than the NRCS method does. The calculated CN for this watershed is 90. For Time of Concentration we have used the hydraulic calculations that were prepared by A. James de Bruin in 1986 as part of a drainage study of this watershed. The resulting peak flows for the sub-watersheds are listed below:

Merokee Pond
Peak Runoff for Sub-Watersheds for Water Quality Storm Event

No.	Description	Area (Acres)	Peak Runoff (cfs)*
1	Cedar Swamp Creek – West Branch	152	45
2	60" Pipe on Smith Street	149	45
3	4' x 10' Culvert – West Branch	443	133
4	Cedar Swamp Creek – East Branch	802	160
5	24" Seneca Drive Drain	23	9
6	18" Merokee Circle Drain	4	2
7	18" Merokee Place Drain	4	2
8	Direct Runoff to Pond	17	9
	Totals		346

* Total peak runoff does not equal sum of individual areas because the Tc for all areas is not the same.

Water Quality Issues

In their assessment of the Cedar Swamp Creek Sub-watershed, Cashin Associates followed the methodology outlined in the Nassau County Stormwater Runoff Impact Analysis Procedures Manual to calculate pollutant loading to the surface waters in the watershed. Pro-rating those calculations to the portion of the watershed contributing to Merokee Pond (90% of the watershed), the annual pollutant loading to both branches of Cedar Swamp Creek and to Merokee Pond is summarized as follows:

Pollutant	Estimated Quantity per Year
Total Suspended Solids	490,000 lbs
Total Nitrogen	12,000 lbs
Total Phosphorous	2,000 lbs
Fecal Coliform	10 billion colonies
Floatable Debris	8,900 lbs
Oil and Grease	26,000 lbs

Suspended solids represent silts and sediments that are found in the creeks and in the ponds. They are generated from surface erosion, stream erosion, vehicle tire wear, and winter sanding/salting operations. Excessive deposition of sediments in wide portions of streams and in ponds can change their hydraulic and ecological characteristics.

Phosphorous and nitrogen are non-point sources of pollution that are nutrients for plant growth. They commonly originate from fertilizers used on lawns and from animal waste. Build up of these nutrients in ponds can lead to the excessive growth of harmful algal blooms that use up the limited amounts of dissolved oxygen in a water body and ultimately cause eutrophic conditions creating an environment that cannot support aquatic life.

Coliform bacteria are pathogens that can be traced to sources such as improperly treated or untreated sewage, animal waste, and water fowl waste. Coliform bacteria and Enterococci bacteria are used as indicator organisms because if they are detected in large quantities in a water sample they signal the potential presence of more harmful pathogens such as viruses. Coliform is universally present even in pristine spring water; at high levels they indicate excessive decaying organic material in the water. Fecal coliform is a component of total coliform and indicates that there are mammal or bird feces in the water. Enterococci bacteria also indicate that there are feces from warm blooded animals, and typically human-specific wastes in the water (USEPA,1997.Volunteer Stream Monitoring: A Methods Manual. USEPA Office of Water, EPA 841-B-97-003).

Floatable debris is an aesthetic pollutant, but also poses a risk to wildlife through entanglement or ingestion.

Oils and grease (hydrocarbons) arrive in the pond either attached to sediments, floating on the water surface or emulsified within the water. They contain an array of hydrocarbon compounds, some of which can be toxic to aquatic life even at low concentrations.

Water Quality Assessment

Suspended Solids

As was noted above, Total Suspended Solids carried in storm water runoff results in sediment deposition in streams and ponds where the velocity of flow is low enough to allow the sediments to settle. De Bruin Geomatics prepared a hydrographic survey of the pond in 2008 and we compared the results of that survey to previous surveys done by A. James de Bruin and Sons in 1981, 1995, and 1997. The 1981 survey included elevations of both the hard bottom of the pond and the top of the sediment layer. Later surveys are of just the sediment layer. The 1997 survey covered only the northerly branches of the pond and was conducted immediately after the pond was dredged. Drawings found in the back of this report depict the pond at various cross sections, showing where the bottom of the pond was at each survey.

The key findings of the 2008 survey are that the west and east branches of the pond have filled 2,000 cubic yards and 3,500 cubic yards since 1997 when they were last dredged. The total filling in these branches is approximately 500 cubic yards per year. The survey shows that the southern end of the pond has filled 3,100 cubic yards over 27 years, a total of about 4 inches, or an average of less than ½" per year. The sediment thickness in the southern end of the pond is approximately 2' and the water depths are 4.5' to 5'.

EEA Inc performed a sediment sampling program in accordance with a plan approved by the New York State DEC. The plan was designed to characterize the sediments for dredging purposes should it be determined that dredging is desirable.

The sediments in the pond were sampled in three locations – the west branch, the east branch and the main body, or southern portion of the pond. In each part of the pond a sample was taken of the sediment layer and a second sample was taken of the layer of material that would remain in the pond after it was dredged. All samples were analyzed for grain size, moisture content, and total organic carbon. The samples in the branches of the pond were also analyzed for VOC's due to their proximity to the major outfalls that feed the pond. VOC's in a pond are typically the product of petroleum runoff or vehicle exhaust. In accordance with the approved sampling and testing plan, testing for metals, PCBs, Pesticides, and SVOCs was only performed on samples that contained more than 10% silt and clay.

The key results of the sediment testing program are:

- All samples in the sediment layer and bottom layer contained less than 10% silt and clay except for the sediment layer on the main body of the pond. This sample was further tested for metals, PCBs, pesticides, and SVOCs.
- All VOC compounds were found to be below State limits for unrestricted use of dredge materials with the exception of 1,4-Dioxane and Acetone. The quantity of these compounds was below the minimum detection limit of the testing equipment, but that testing limit is about 10% higher than the State limit for unrestricted use.
- The sediment layer in the main body of the pond had the following metals and compounds at concentrations above the State limit for unrestricted use if they were to be dredged.

Compound	Units	NYSDEC Limit for Unrestricted Use	Concentration in Sample
Cadmium as Cd	ppm	2.5	3.1
Copper as Cu	ppm	50	55
Lead as Pb	ppm	63	420
Mercury as Hg	ppm	0.18	0.27
Zinc as Zn	ppm	109	250
Chlordane	ppm	94	480
p,p-DDD	ppm	3.3	97
p,p-DDE	ppm	3.3	77

In addition to these compounds, there were 17 others for which the detection limit of the testing equipment was higher than the DEC limit. If the main body of the pond were to be dredged, the material would have to be treated as a contaminated material.

It is important to note that the characterization of the sediments is based on their beneficial use in upland disposal areas. We have compared the levels of the contaminants in this pond to 7 other ponds in Nassau County and the Merokee Pond levels are in the same range as these other ponds. A table showing this comparison is included at the end of this report.

Nutrients, Bacteria, Dissolved Oxygen, and Physical Water Characteristics
EEA Inc. performed water quality sampling in the pond and in the streams above the pond in both fair weather and wet weather conditions. The full scope of their work is contained in an Appendix to this report. The tables below show the testing results and compare them to available EPA and New York State Standards and Guidance Values. Merokee Pond is classified as a Class C Water Body. A Class C water body should support fish and wildlife propagation and survival and should be suitable for primary and secondary recreational contact. Since DEC has not established Class C water quality criteria for all parameters tested, Class A and B limits were also considered. Numbers in red exceed the standards.

Station - Event	Date	Time	Enterococci MPN/ 100mL	Fecal Coliform MPN/ 100mL	Total Coliform MPN/ 100mL
Station 1** - Dry	4/22/2008	11:15	240	2400	11000
Station 2** - Dry	4/22/2008	12:07	23	93	150
Station 3** - Dry	4/22/2008	12:40	3	240	460
Station 4** - Dry	4/22/2008	13:30	3	93	1100
Station 1 - Wet	5/9/2008	10:45	11000	430	2100
Station 2 - Wet	5/9/2008	11:10	15	40	110
Station 3 - Wet	5/9/2008	11:28	460	430	11000
Station 4 - Wet	5/9/2008	11:38	4600	11000	46000
Standard/Guidance			151 EPA	< 200 DEC	< 2,400 DEC
Pollutant Model				5,000 +/-	

Station - Event	Ammonia mg/L	TKN mg/L	Nitrogen mg/L	Nitrate mg/L	Phosphorus mg/L
Station 1 - Dry	0.05	1	3.3	2.3	0.05
Station 2 - Dry	0.05	1.4	3.6	2.2	0.11
Station 3 - Dry	0.05	0.6	2.1	1.5	0.03
Station 4 - Dry	0.05	0.3	3.3	3	0.02
Station 1 - Wet	0.062	0.7	2.9	2.2	0.03
Station 2 - Wet	0.05	0.6	2.9	2.3	0.02
Station 3 - Wet	0.11	0.8	2.6	1.8	0.08
Station 4 - Wet	0.27	2.8	4.9	2.1	0.2
Standard/Guidance	2.2 DEC		10 DEC 0.32 EPA	10 DEC	0.02 DEC 0.008 EPA
Pollutant Model			2.5 +/-		0.45 +\-

Table 3: Merokee Pond Water Quality Sampling, Spring 2008 - Physical Measurements *

Station - Event	Salinity ppt	TSS mg/L	pH	Surface DO mg/L	Temperature oC
Station 1 - Dry	0.2	11	6.3	10.2	17.4
Station 2 - Dry	0.2	16	6.6	11.55	17.3
Station 3 - Dry	0	2.5	6.4	8.6	15.6
Station 4 - Dry	0.1	2.5	6.4	10.3	18.7
Station 1 - Wet	0.1	9	7.2	6.61	16.2
Station 2 - Wet	0.1	6	7.2	6.65	16.7
Station 3 - Wet	1.8	17	7.1	6.35	12.1
Station 4 - Wet	0.1	50	7.1	7.34	13
Pond Center (8/7/08)	0.2	N/A	6.9	7	21.4
Limits/Guidance			6.5 < pH < 8.0 DEC	> 4 DEC	

*Numbers in red indicate levels exceeding standard or guidance limits

** Stations 1 and 2 are in the pond. Station 3 is in the east branch of the creek. Station 4 is in the west branch of the creek.

The test results indicate that bacteria counts are too high for primary and secondary recreational contact with the water. This is likely due to excessive pet and water fowl feces getting into the pond through runoff from the watershed and from direct use of the pond by water fowl. It is also an indication of the possible presence of pathogens in the pond, which may lead to its categorization as an impaired water body. Re-testing of the water in January 2009 found the problem with Enterococci is no longer present.

Phosphorous levels are above State Guidance Values for a Class B water body and well above EPA standards. Phosphorous is linked to algal blooms like the one observed during dry weather sampling on August 7, 2008.

It should be noted that the concentrations of all pollutants in the pond are significantly less than the Pollutant Loading Model predicts for concentrations in storm water runoff. This is presumably due to the constant flow of groundwater into the pond that dilutes the pollutants. It may also indicate that some of the pollutants are being taken up by the plant and aquatic life, and others are flowing through the pond to points further downstream. The water quality in Merokee Pond is comparable to other Nassau County Ponds. A table showing these comparisons is included at the back of this report.

Floatable Debris

The most significant complaint raised by residents on the pond is the excessive amount of bottles, cups, and other floatable debris that is washed up on the shore lines and trapped in the vegetation of the pond. No attempt was made to measure the quantity of debris, but there is no doubt that it is an aesthetic eyesore and a potential risk to wildlife. Periodic efforts made by County forces to remove the debris are apparently not sufficient to keep up with the problem.

Pond Ecology

Upland Flora and Fauna

The key aspects of pond ecology that are affected by the water quality are the flora and fauna found in and around the pond. Most of the shoreline of Merokee Pond is hardened, typically by timber bulkheads or concrete headwalls. Mowed lawn grasses often grow to the edge of the pond. A section of shoreline on the west side of the pond features shrub dogwoods (*Cornus* spp.), which are native to New York.

The south side of the pond features a small woodland consisting of the following canopy and understory trees: red maple (*Acer rubrum*), black cherry (*Prunus serotina*), tree of heaven (*Ailanthus altissima*), scarlet oak (*Quercus coccinea*), black oak (*Q. velutina*), white oak (*Q. alba*), pin oak (*Q. palustris*), Norway maple (*A. platanoides*), black locust (*Robinia pseudoacacia*), sassafras (*Sassafras albidum*), cottonwood (*Populus deltoides*), gray birch (*Betula populifolia*), mulberry (*Morus* spp.), and white pine (*Pinus strobus*). Red maple is dominant in much of the area. Black cherry is abundant. Tree of heaven is common. The shrub layer features sweet pepperbush (*Clethra alnifolia*), autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), winged burning bush (*Euonymus alatus*), privet (*Ligustrum* spp.), silky dogwood (*Cornus amomum*), Japanese barberry (*Berberis thunbergii*), shrub honeysuckle (*Lonicera* spp.), and Japanese knotweed (*Polygonum cuspidatum*). Many of the plant species in the shrub layer, with the exception of sweet pepperbush and silky dogwood, are invasive species. Vines include Asiatic bittersweet (*Celastrus orbiculatus*), poison ivy (*Toxicodendron radicans*), and exotic wisteria (*Wisteria* spp.). Asiatic bittersweet and exotic wisteria are invasive plants. Poison ivy and Asiatic bittersweet are abundant. The herbaceous layer features garlic mustard (*Alliaria petiolata*), mugwort (*Artemisia vulgaris*), and Japanese honeysuckle (*Lonicera japonica)*, all of which are invasive plants.

Birds observed or heard on site include Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), belted kingfisher (*Megaceryle alcyon*), red-winged blackbird (*Agelaius phoeniceus*), common tern (*Sterna hirundo*), cormorant (*Phalacrocorax auritus*), mute swan (*Cygnus olor*), American robin, song sparrow (*Melospiza melodia*), white throated sparrow (*Zonotrichia albicollis*), gray catbird (*Dumetella carolinensis*), common grackle (*Quiscalus quiscula*), European starling (*Sturnus *vulgaris*), black-crowned night-heron (*Nycticorax nycticorax*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and northern cardinal (*Cardinalis cardinalis*). Canada goose feces were abundant on lawns around the pond in several places. Other fauna observed includes tiger swallowtail (*Papilio glaucas*) and cabbage white (*Pieris rapae*) butterflies.

Flora identified along the northeast tributary to the pond include red maple, pussy willow (*Salix discolor*), Asiatic bittersweet, black cherry, multiflora rose, Japanese knotweed, poison ivy, common reed (*Phragmites australis*), oak (*Quercus* spp.), and Virginia creeper (*Parthenocissus quinquefolia*).

Flora identified along the northwest tributary to the pond include lesser celandine (*Ranunculus ficaria*), Norway maple, red maple, red osier dogwood (*Cornus sericea*), multiflora rose, tupelo (*Nyssa sylvatica*), speckled alder (*Alnus incana*), and black cherry. Lesser celandine, Norway maple and multiflora rose are invasive plants.

Flora and Fauna in the Pond

EEA conducted a survey of aquatic vegetation in Merokee Pond on June 19, 2008. Plants were collected from a boat and from the shore using the rake-toss method. This method involves the use of a two-sided rake attached to a rope. 11 sampling sites were evenly distributed throughout the lake. Collected plants were separated and enumerated qualitatively, using a scale developed by Robert Johnson and Paul Lord from Cornell University (NYSDEC 2006). The abundance of plant material on the rake was ranked according to the following classifications:

Z = zero = no plants found on the rake
T = trace = a fingerful of plants found on the rake
S = scarce = a handful of plants found on the rake
M = moderate = plants covering the entirety of the rake
D = dense = sufficient abundance to limit the ability to lift the rake out of the water

Coontail (*Ceratophyllum demersum*) was found to be the most abundant aquatic plant in Merokee Pond, with samples ranging from zero to dense. Coontail was found most abundantly in the south-central and southeastern areas of the pond, where abundance ranged from moderate to dense. Coontail was found in zero to scarce (mostly scarce) amounts in northwestern, western areas, and northeastern areas of the pond. Coontail is a native, perennial, submerged, and evergreen aquatic plant commonly found in ponds, lakes, and streams. It is usually found in slow-moving or still water. The densely bushy stem tips are said to resemble a raccoon's tail. Coontail lacks true roots, and therefore is free floating, although it may anchor in sediment by modified leaves. The stems feel rough, are branched, and can reach 15 feet or more in length. The leaves consist of whorls of dichotomously branching (branch no more than twice) leaves; the margins of leaves have tooth-like serrations, each arising from a fleshy base. The flowers are small, solitary, without a stalk, and occur at the leaf bases (leaf axils). Flowers are inconspicuous and have no sepals and petals. Flowers remain submersed throughout the year. Coontail spreads primarily by fragmentation of its stems. Coontail can be beneficial as a shelter for small fishes and aquatic invertebrates. Coontail provides cover for young bluegills, largemouth bass, and other fish; and supports insects that are consumed by fish. Fish and water birds use it as a food source. Coontail absorbs nutrients from the surrounding water, and may use nutrients in the water column that might otherwise contribute to algal blooms. As such, it is generally regarded as a beneficial aquatic plant. Coontail can achieve nuisance levels under conditions that are optimal for its growth, such as water bodies with moderate to high nutrient levels.

An invasive aquatic plant, Brazilian water-weed (*Egeria densa*), was found in trace to scarce abundance, mostly in the south-central and southeastern areas of the pond. Brazilian water-weed is a submersed, perennial, freshwater aquatic herb. This highly invasive plant is native to South America, and has been spreading rapidly to waterbodies throughout the United States. The earliest report of the plant in the United States was from Mill Neck, Long Island, where the plant was collected in 1893. Brazilian water-weed is a popular aquarium plant. Many infestations may be the result of people dumping aquariums into lakes. Nassau County recently banned the sale of this plant.

Brazilian water-weed spreads by fragmentation of its stems. Stems are typically 1 to 2 feet long, though they can be up to 20 feet long. It is usually rooted in the substrate. The stems are cylindrical and simple or branched. The leaves and stems are bright green in color. The leaves are usually about 2 cm (0.8 in.) long and arranged in whorls of 4-6 leaves. The leaf margins have fine teeth that can be seen with the aid of a hand lens. The flowers have three white petals that are approximately 2 cm (0.75 in.) across and are situated about 2.5 cm (1 in.) above the water. These flowers, if present, can be seen from the summer to the fall. Only male plants are present in the United States, so reproduction occurs only vegetatively by fragmentation. Fragments may be dispersed by water birds and by attaching to boats, trailers, and gear. Stems can grow 1 foot per day. Similar species include *Elodea canadensis*, *Elodea nuttallii*, and *Hydrilla verticillata.* NYSDEC found scarce to trace amounts of common waterweed (*Elodea canadensis*) in Merokee Pond in 2008

Once established, Brazilian water-weed is extremely difficult to eradicate. Control has been attempted with mechanical methods, herbicide, biological control, water level manipulation, and benthic barriers. In many cases these plants have survived attempts at control.

Given that Brazilian water-weed was found in scarce to trace amounts at Merokee Pond, and coontail abundance was often moderate to dense, there is the possibility that coontail is suppressing the growth and spread of Brazilian waterweed by competition for nutrients, competition for light, and allelopathy. Allelopathy, the inhibition of growth of a plant species by chemicals produced by another species, has been shown to occur by coontail. Most samples of Brazilian water-weed appeared to be not typically bushy (i.e. the leaves were relatively widely spaced), which may indicate growth with insufficient light. Whether or not coontail is suppressing Brazilian water-weed is not known with certainty; further study may be warranted.

Other flora observed in the pond and tributaries includes algae, common water starwort (*Callitriche palustris*), and duckweed (*Lemna* spp.).

EEA found moderate amounts of spirogyra, a filamentous green algae, in Merokee Pond in June 2008. Filamentous algae are single algae cells that form long visible chains, or filaments. Spirogyra is very common in freshwater ponds, often forming slimy filamentous green masses. Under favorable conditions, spirogyra can form dense mats that float on, or just beneath, the surface of the water. The apparent abundance of spirogyra can vary monthly and yearly. Algae are free floating, and therefore receive their nutrients from the water column. Nuisance growth of spirogyra is an indicator that a pond has excessive nutrients, particularly phosphorus. As little as 15 parts per billion of phosphorus can cause excessive growth of algae.

Common duckweed is a very small light green free-floating, seed bearing plant. Duckweed colonies provide habitat for micro invertebrates. If duckweed completely covers the surface of a pond for an extended period, it may cause oxygen depletions. Dense colonies may eliminate submerged plants by blocking sunlight penetration. Many kinds of ducks consume duckweed and often transport it to other bodies of water (TAES 2008).

Common water starwort is a native aquatic plant that typically grows in submersed and emergent plant communities. This plant is generally found in cool, quiet waters or along muddy shores, preferring muddy or sandy substrates. Ducks and other waterfowl feed upon the stems and fruits of common water starwort. Colonies of this plant provide food and shelter for fish (MCIAP 2008).

During EEA's field reconnaissance, fish activity was observed on the surface of the pond. DEC does not keep records of finfish populations in Merokee Pond. In order to identify some of the species present, EEA deployed five (5) killie pots and dropped them in at various shoreline locations at the beginning of each aquatic weed sampling event. The wire mesh killie pots contained a lead sinker and were baited with a sardine plus a half-dollar sized chunk of uncooked pastry dough. The pots were left submerged for varying lengths of time (typically over ½ hour in duration), and then retrieved to identify the catch. Dip nets were also used to sample aquatic life along the pond edge; and the shoreline was examined with binoculars to spot potential turtle basking areas.

Aquatic sampling on Merokee Pond revealed the presence of large breeder-size common carp (*Cyprinus carpio*), bullfrog (*Rana catesbeiana*), and green frog (*Rana clamitans*). Pumpkinseed sunfish (*Lepomis gibbosus*) and banded killifish (*Fundulus diaphanus*) were caught in the killie pots deployed just upstream of the eastern outfall weir, as well as at the southeastern edge of the pond where submerged aquatic plants were dense. Sunfish spawning areas were also noted along the eastern end of the pond where coarse bottom sediments were dominant.

The banded killifish is the only freshwater member of the killifish family present in New York State. The banded killifish is a small (2-4 inches), slender fish with a head that is somewhat flattened on top and a small mouth adapted to surface feeding. The tail is nearly square or slightly convex or rounded. Olive green on the back and white on the lower side and belly, it has numerous light and dark vertical bars along its sides. They are typically found in the quiet waters of lakes, ponds, rivers, and estuaries. Banded killifish are abundant on Long Island (Kraft et al. 2006).

The pumpkinseed sunfish is the most widely distributed and abundant sunfish in New York, occurring throughout the state, including Long Island. Pumpkinseed sunfish seem to prefer weedy, warm water lakes and ponds, using weed patches, docks, and logs for cover and usually staying close to shore. They are present in the calm pools of most rivers. The average pumpkinseed is about 5 to 6 inches in length, although some may approach 10 inches (Kraft et al. 2006).

Banded killifish and sunfish are beneficial for mosquito control because they consume mosquitoes in the aquatic stages of the life cycle and prevent them from becoming adults (NJMCA 2004).

The common carp has been introduced as a food and ornamental fish into temperate freshwaters throughout the world. It is often considered a pest because of its abundance and its tendency to reduce water clarity (by constantly stirring up the substrate) and uproot the aquatic vegetation used as habitat by a variety of species (GISD 2008). The common carp is a heavy-bodied minnow with barbels on either side of the upper jaw. Typically, color varies from brassy green or yellow, to golden brown, or even silvery. The belly is usually yellowish-white. Individuals 12-25 inches in length and weighing up to 8-10 pounds are common, although they can grow much larger. Common carp may live in excess of 47 years and weigh more than 75 pounds (TPW 2008).

Residents report a proliferation of midges on the pond at certain times of the year. These infestations were not observed during EEA field visits, but they are common on ponds of this sort. A fact sheet from the Ohio State University Extension describes the situation as follows:

"During peak emergence, extremely large populations of non-biting midges may create much annoyance simply by accumulating in freshly applied paints, hanging onto outdoor laundry, clustering on screens, etc. Summer resorts along lakes and other water frontage may have houses and buildings covered with these midges that enter around vent openings, air conditioning units, windows, doors, etc. The following day, these midges are found dead on window sills throughout the building. Their presence causes concern to homeowners and others"…

"No control measures for midges are entirely satisfactory when large bodies of water are nearby…. Houses and buildings with outside lighting will attract large numbers of non-biting midges. Move light away from sensitive areas such as doorways, windows, patios, etc. Avoid the use of unnecessary lights until 45 minutes after sundown since 90 percent or more of flight activity takes place before that time. Sometimes, eggs are laid on surfaces around lights and on buildings. These egg masses can become unsightly and smear when wet. By replacing a 100-Watt mercury vapor light (ultraviolet energy) with a 50-Watt high-pressure sodium vapor light, midge concentrations are significantly reduced. (Lights least attractive to insects are sodium vapor or halogen with pink, yellow or orange tints and dichrom yellow bulbs.) Blacklight traps (bug zappers) will kill midges, but unfortunately often attract more midges into the area than are killed. Larvae have been controlled in small bodies of water by stocking with carp and goldfish at the rate of 150 to 500 pounds of fish per acre."

SOLUTIONS

The Purpose of this report identified the following items of concern on Merokee Pond.

1. Accumulation of sediments in the upper branches of the pond since it was dredged in 1997;
2. Accumulation of sediments/organics in the southern portion of the pond that was not dredged in 1997.
3. Excessive accumulation of floatable debris along the banks of the pond
4. Growth of coon tail predominantly in the southern part of the pond

The assessment work found that the sediments and water quality in Merokee Pond are comparable to other ponds around Nassau County. But the assessment work on the pond also turned up the following additional concerns.

5. The presence of Brazilian Waterweed in the pond, which is an invasive species that can have potentially devastating effects on the pond ecology
6. The periodic occurrence of algal blooms that can choke the pond of dissolved oxygen and impact aquatic life

Each of these issues is discussed below.

Accumulation of Sediments in the Upper Branches of the Pond

As was noted above, Merokee Pond lies in the center of the Cedar Swamp Watershed and the upper branches of the pond are designed to serve as sediment traps, or forebays, for the pond. The dredging in 1997 was projected to have a life of about 20 years before the sediment traps would need to be dredged again. The western branch of the pond has filled at a rate somewhat faster than predicted and the eastern branch has filled at about the predicted rate. If the ponds were to continue to fill at the current rate, it is certain that dredging of both branches will be necessary in the next 5 to 7 years.

An alternative to using the upper branches of the pond as sediment traps is to trap sediment before it reaches the pond using hydrodynamic storm water treatment units such as those sold by Contech, Baysaver and Terre Hill. These treatment units use various technologies to separate particles suspended in the storm flow from the water. They are typically sized to handle the Water Quality Volume Peak Flow Rate, which is approximately 1/3 of the design flow rate developed using standard Nassau County Rational Formula calculations with an intensity of $I = 120/(t + 20)$. As such, the structures are best placed in an “off-line” configuration to reduce the possibility of causing upstream flooding. In a typical right-of-way, the maximum width of one of these structures is limited to 8’ to 10’, due to the inevitable conflicts with existing utilities. A review of the literature from several manufacturers indicates that treatment flows for this size structure will typically be on the order of

10 cfs. The table on page 3 of this report shows total treatment flows for the watershed on the order of 300 cfs. Roughly speaking this translates to 30 hydrodynamic units placed throughout the watershed at a cost of approximately $100,000 each for a total of about $3,000,000. The typical storage capacity of these units is about 2 to 3 cubic yards of sediment for a system capacity of 60 to 90 cubic yards. Based on the sedimentation rate in the pond of about 500 cubic yards per year, the units would have to be maintained 6 to 9 times per year.

By comparison, dredging the upper branches to the limits used in 1997 would require the removal of approximately 5,500 cubic yards of clean, sandy sediment at and estimated cost of $600,000 and with an expectation that further maintenance would not be required for another 10 to 15 years. If proper erosion and sediment control practices become more common on construction sites and if street sweeping frequency is increased, it can be expected that the filling rate at the pond will decrease over the years and maintenance dredging will be required less frequently. The maintenance dredging approach is clearly the best method for addressing the problems of sediment in the storm water runoff.

Accumulation of sediments/organics in the southern portion of the pond
As was noted above, the average accumulation of sediment in the southern portion of the pond is 4” over the last 27 years. This slow rate of sedimentation is attributable to the fact that the majority of sedimentation occurs in the upper branches of the pond. The total thickness of the sediment layer on the main body of the pond averages 2’ and the water depth averages 4.5’. Removal of this layer would cost on the order of $4 million to $5 million since the contaminants that are contained in it would require regulated disposal. Since there is no definable benefit that would be achieved by dredging the main body of the pond this work is not recommended.

Excessive accumulation of floatable debris along the banks of the pond
Floatable debris reaches the pond in runoff that is delivered through the streams and drainage systems that feed the pond. A floating boom was installed several years ago by the County on the east branch of Cedar Swamp Creek to attempt to control debris at that point of entry. Unfortunately, during periods of heavy rain the boom is overwhelmed and the debris is pushed into the pond. On the west branch, in the channel south of Smith Street, a piece of chain link fence has been place across the channel in an attempt to trap debris. The fence is bent into the water, clearly overwhelmed by the force of storm flow and is thus ineffective.

There are generally two approaches to physically addressing the problem of floatables in a watershed. The first approach is to treat the problem near its source. In the case of Merokee Pond, the majority of storm water is collected at catch basins and delivered to the creeks or through the piped drainage systems. Various devices are available – sacks, filters, and hoods - that are designed to trap floatable debris at the catch basin. All of these devices are effective if they are properly installed and maintained. They typically cost about $1,500 per catch basin. In the 1,600 acre watershed that is contributing to Merokee Pond there are approximately 800 to 1,000 catch basins. Installing devices in each of these would cost approximately $1.5 million, and could be expected to significantly reduce the quantity of floatable debris reaching the pond, if the catch basins are maintained. Some insert devices in catch basins can come with filters that work to capture hydrocarbons, bacteria, and/or nutrients and can also trap sediments at the catch basins. This is an added benefit to this approach. Inserts are typically maintained two to three times a year so for 1,000 catch basins this is a full time job for this watershed.

Alternatively, floatable debris can be collected at a single location immediately upstream of the pond. The use of the floating boom and chain link fences in the streams was an attempt to do this, but the designs were not sufficiently robust. Construction of concrete siphons ahead of the pond would provide an effective method of trapping all of the floatables in one place at an estimated cost of about $800,000. The advantage of this approach is that it concentrates all of the maintenance activity in a single place and will also provide some reduction in oil and grease reaching the pond. The disadvantages are:

1. If maintenance is not performed regularly, there is a risk of the debris backing up and causing upstream flooding problems;
2. The maintenance effort would fall entirely to the County where as the source of the debris is primarily through Town streets with State roads also being a significant contributor.
3. There is no ancillary pollutant reduction benefit as there is with the catch basin inserts.

Our recommendation is to pursue installation of the catch basin inserts throughout the watershed while securing the cooperation of the Town of Hempstead and the State of New York to maintain them. If a maintenance agreement cannot be reached with these other government agencies, then the construction of siphons immediately upstream of the pond is recommended.

The majority of floatable debris in the pond is the by-product of a disposable society. The primary components are drink containers – water bottles, soda bottles, and coffee cups – that have been either thrown on the ground or arrived from recycling bins that blow over. Reduction of this sort of debris at its source requires behavioral changes such as reducing the use of disposable products, not overfilling recycling and garbage bins, picking up garbage in front of your home or place of business, and developing a cultural attitude that littering is taboo. Accomplishing this sort of behavioral change requires a combination of education, marketing, and legislation not unlike the campaigns that have reduced cigarette smoking. Possible components of an educational and outreach program are included at the end of this report.

Coontail, Brazilian Waterweed, and Algal Blooms
Coontail and Brazilian Waterweed were found in the pond in varying degrees and an algal bloom was observed during month of August. Coontail is a native species that has numerous ecological benefits associated with it when it grows in modest quantities, as described earlier in the report. It can grow to nuisance levels in water bodies with moderate to high nutrient levels, which has become the case at Merokee Pond. The invasive Brazilian Waterweed and algal blooms are of no redeeming value and both are supported by high nutrient levels.

There are two general approaches to control an excess of aquatic plants. The first is to manage the aquatic plants through physical, chemical and biological means. The second approach is to manage the nutrient load in the pond to reduce the nutrients to a point where they will not support the plants. Each of these approaches is discussed below.

<u>Plant Management through Physical/Mechanical Methods</u>
Physical/mechanical controls employ materials, methods, or equipment to remove aquatic plants from a water body or prevent their growth. Plant fragmentation is a concern with all physical/mechanical control methods.

- Harvesting ranges from manual hand-pulling of unwanted plants to the use of mechanical harvesting machines. For target plants *that do not reproduce vegetatively*, harvesting can provide some long-term control of aquatic plants if the plants are removed prior to the formation and fall of their seeds. However, Brazilian water-weed and coontail both reproduce vegetatively by stem fragmentation. Harvesting frequently results in increased fragmentation, incomplete plant removal, high turbidity, and bottom disturbance. Fragmentation may increase the distribution and density of invasive or nuisance aquatic plants. Regrowth to pre-harvest levels may occur within 30-60 days. Harvesting may need to be repeated several times each growing season.

  Diver-operated suction harvesting (e.g. Aqua Cleaner) entails the use of barge, raft, or boat-mounted pumps and strainer devices with hoses used by divers to "vacuum" plants uprooted by hand. The use of careful techniques and fragment barriers can reduce the creation and escape of fragments, however, the potential for fragmentation with diver-operated suction harvesting is moderately high (Maine Volunteer Lake Management Program, 2009).

Suction harvesting can have significant side effects, including high turbidity and algal blooms resulting from nutrients that are released from the disturbance of bottom sediments. This may result in reduced oxygen conditions. Disturbing sediments that contain metals or other potentially hazardous materials may release these contaminants into the water. The cost of suction harvesting can be approximately $15,000 per acre (Kishbaugh 2008).

- Benthic barriers can prevent plant growth by blocking out the light required for growth and providing a physical barrier to growth. Benthic barriers are typically used in small areas of either intensive use or significant concern, due to the difficulty of installation, cost of the materials, and potentially negative impacts to desirable plants and wildlife. They are most often used around docks, in swimming areas, or to open boat access channels. Benthic barriers are not likely to be effective on floating plants, such as coontail. The cost of benthic barriers can be approximately $10,000 to $30,000 per acre (Kishbaugh 2008).

<u>Plant Management through Chemical Control</u>

Herbicides have been used to control Brazilian water-weed and coontail. Liquid or pelletized herbicides may be applied to a target area or plants directly. Herbicides typically require reapplication every 1 to 5 years. Systemic herbicides, such as Fluridone, are absorbed and move within the plant to the site of action. Herbicide often requires a long contact time (e.g. 45 to 60 days). There are no herbicides that are selective for Brazilian water-weed or coontail; therefore, herbicide may have adverse impacts on all underwater plants. Rapid water movement or any condition which results in rapid dilution of herbicide may reduce its effectiveness. There is a risk of downstream impacts, which is a major concern at Merokee Pond, given that the pond is located upstream of a New York Natural Heritage site (Atlantic white cedar swamp) at the Merokee Preserve. Herbicide applications in this system must include measures for blocking outflows for a minimum time period, which would raise the pond level and create potential flooding problems. The cost of herbicides can be approximately $1,500 or more per acre.

<u>Plant Management through Biological Control</u>

Grass carp (*Ctenopharyngodon idella*) will consume Brazilian water-weed, which is one of their preferred foods. Coontail, on the other hand, is not a preferred food and is sometimes not controlled by grass carp. The grass carp superficially resembles the common carp (*Cyprinus carpio*), but differs in several characteristics. Its body is more streamlined, its mouth is terminal, and it lacks a stiff dorsal spine and barbels. At moderate stocking rates (10-15 fish per vegetated acre), grass carp can be effective at removing nuisance vegetation, however, near total eradication of plants can occur at the higher end of this range. Grass carp may escape upstream or downstream. They could potentially promote the growth of coontail and algal blooms through nutrient enrichment to the water column caused by stirring up bottom sediments.

Nutrient Management through Plantings

The dredge material that is removed from the northeast and northwest sediment forebays could be placed around the perimeter of Merokee Pond to create an emergent wetland border. Establishing an emergent wetland fringe, landscaping the upland adjacent areas and the replacement of ornamental turfgrass with native meadow grasses, wildflowers and shrubs, will increase the vegetative buffer between Merokee Pond and residential areas. The benefits of such landscaping are numerous, including:

1. Enhancing the vegetative filter between the manicured backyard areas and the pond will reduce sediment and nutrient inputs carried in runoff from fertilized garden beds, as well as pet and waterfowl wastes;
2. Establishing taller vegetation along the pond shoreline will discourage geese from congregating on backyard lawns, since geese are wary of potential predators lurking behind objects they cannot see above or around;
3. Developing a vigorous wetland fringe will also increase the pond’s capability to naturally process the nutrient loads it receives from the watershed. As mentioned above, the plants themselves serve as a filter and the dependent organisms that live on or in the wetland plants will also assist with cycling nutrients within the water column; and
4. Introducing native wetland plants along the pond’s edge will assist with soil erosion control, reduce competition from invasive plant species, increase plant species diversity, and enhance the value of the pond for fish and wildlife resources.

The following table lists various native plants for landscaping along the shoreline of Merokee Pond. This list is by no means exhaustive, but it provides several choices of plant materials that are readily available from commercial nurseries. Proper plant selection must be guided by site conditions (e.g., amount of sunlight or shade, soil texture and drainage, micro-topography, etc.). “Emergent wetland species” include water-dependent plants that could be established in the water along the pond fringe. The majority of the emergent species listed below typically attain heights less than 3 feet at maturity, which will provide unobstructed views of the pond from the neighboring yards. "Transitional species" include shrubs, evergreen and herbaceous plants that are considered water-loving, but not water dependent plants, and don't need to be inundated year-round to survive. "Upland adjacent species" include native shrubs, groundcovers and wildflowers that would make good replacements for manicured turf areas immediately bordering the pond.

Common Name	Botanical Name	Plant Type[1]
Emergent Wetland Species		
Arrow Arum	*Peltandra virginica*	H
Arrowhead/Duck Potato	*Sagittaria latifolia*	H
Blue Flag	*Iris versicolor*	H
Bulrushes	*Scirpus spp. [except tall varieties such as wool grass (S. cyperinus)]*	H
Eastern bur-reed	*Sparganium americanum*	H
Fox sedge	*Carex vulpinoidia*	H
Pickerelweed	*Pontederia cordata*	H
Rushes	*Juncus spp.*	H
Sedges	*Carex spp.*	H
Sweet Flag	*Acorus calamus*	H
Transitional Species		
Buttonbush	*Cephalanthus occidentalis*	S
Cardinal Flower	*Lobelia cardinalis*	H
Cinnamon Fern	*Osmunda cinnamomea*	H
Highbush Blueberry	*Vaccinium corymbosum*	S
Inkberry	*Ilex glabra*	ES
Jack-in-the-pulpit	*Arisaema triphyllum*	H
Juneberry	*Amelanchier alnifolia*	S
Lizard Tail	*Saururus cernuus*	H
Maidenhair Fern	*Adiantum pedatum*	H
Marsh Fern	*Thelypteris palustris*	H
Marsh Marigold	*Caltha palustris*	H
Meadow Beauty	*Rhexia virginica*	H
Meadow Sweet	*Spirea tomentosa*	S
Netted Chain Fern	*Woodwardia areolata*	H
New York Aster	*Aster novi-belgii*	H
New York Fern	*Thelypteris noveboracensis*	H
Redstem Dogwood	*Cornus sericea*	S
Royal Fern	*Osmunda regalis*	H

Rushes	*Juncus spp.*	H
Sedges	*Carex spp.*	H
Sensitive Fern	*Onoclea sensibilis*	H
Skullcap	*Scutellaria galericulata*	H
Swamp azalea	*Rhododendron viscosum*	S
Swamp Rose	*Rosa palustris*	S
Swamp Rose-mallow	*Hibiscus moscheutos*	S
Sweet Pepperbush	*Clethra alnifolia*	S
Tussock Sedge	*Carex stricta*	H
Winterberry	*Ilex verticillata*	S
Upland Adjacent Species		
Bearberry	*Arctostaphylos uva-ursi*	EG
Blanketflower	*Gaillardia aristata*	H
Broomsedge	*Andropogon virginicus*	G
Butterflyweed	*Asclepias tuberosa*	H
Dutchman's Breeches	*Dicentra cucullaria*	H
Grass-leaved Goldenrod	*Euthamia graminifolia*	H
Little Bluestem	*Schizachyrium scoparium*	G
Moss Pink	*Phlox subulata*	EG
New England Aster	*Aster novae-angliae*	H
Northern Bayberry	*Myrica pensylvanica*	S
Pasture rose	*Rosa carolina*	S
Purple Coneflower	*Echinacea purpurea*	H
Scarlet Bee Balm	*Monarda didyma*	H
Showy Goldenrod	*Solidago speciosa*	H
Spiderwort	*Tradescantia virginiana*	H
Squirrel-corn	*Dicentra canadensis*	H
Switchgrass	*Panicum virgatum*	G
Virginia rose	*Rosa virginiana*	S
Wild Bergamot	*Monarda fistulosa*	H
Wild Bleeding Heart	*Dicentra eximia*	H
Wild Indigo	*Baptisia tinctoria*	H
Wild Geranium	*Geranium maculatum*	H

[1] Shrub = S; Herbaceous = H; Evergreen = E; Groundcover = G

Nutrient Management through Bacterial Inoculants

Urban ponds are continuously attempting to reach and maintain equilibrium as a balanced, well-functioning ecosystem, which can be made difficult by the types and concentrations of pollutants entering the pond from surrounding areas. Pollutants that influence water quality include nutrients, sediments, bacteria, and garbage/floatables. Pollutants can degrade water quality and impact aquatic life directly or indirectly through the reduction of dissolved oxygen, chemical and nutrient toxicity, and elevated risk of pathogenic microbes, among others. The most direct solution to improving water quality and creating a more-balanced, well-functioning pond system is to reduce the type and concentration of pollutant loads. Since non-point source pollutant control and reduction can be systematically difficult and slow to implement, short-term treatment options may also be considered to improve water quality in the interim. It must be noted that treatments are not solutions and often require time before results are evident and continual application in order to maintain those results.

Bacterial inoculants offer a relatively new treatment method that has been developing over the past decade. Bacterial inoculants are essentially “good” bacteria that are added regularly to a pond system. The bacteria are “good” in that individual strains are selected that naturally occur and are non-pathogenic. Variations in bacteria diversity and concentration are key components in the different commercially available inoculant products. Products generally include a variety of aerobic and facultative (i.e. do not require oxygen to function) bacteria types. Products are available in several different application forms: liquid, gel, tablet, powder. Pond system characteristics should determine the form and concentration of bacterial inoculant product that will be most effective. Most products recommend a concentrated initial dose and then regular maintenance level doses based on the total water volume for the duration of the growing season, usually bi-weekly or monthly.

Manufacturers of bacterial inoculant products claim to reduce nutrient toxicity, reduce excessive plant and algal growth, reduce noxious odors, improve water clarity and improve overall water quality. Bacterial inoculants are generally formulated to bind to and break down available nutrients such as phosphorous and nitrogen. Bacteria strains utilize phosphates, nitrates and ammonia to satiate their own metabolic functions. Ammonia and nitrate can be toxic at elevated concentrations; bacteria (such as nitrosomonas and nitrobacter) can reduce these to the less toxic nitrite form and facultative, denitrifying bacteria can remove nitrates from the water column by converting it to harmless and odorless nitrogen gas. If excessive nutrients are present and available for uptake, bacterial inoculants can compete with aquatic plants and algae to limit extreme growth/die-back patterns.

Bacterial inoculants could potentially have impacts on nutrient cycles and food webs; however at this time no side-effects or negative consequences to the application of bacterial inoculation have been identified. Since this treatment method is relatively new, there are concerns whether the treatment will be effective and efficient to produce the desired goal of water quality improvement in a variety of cases. Several factors can influence the effectiveness of this treatment including: water flow, pond shape/surface area, pond size/total water volume, plant species present, animal presence (specifically animal waste: fish, waterfowl, pet), storm water runoff rate, water temperature, pH range, and calcium availability. Water flow appears to be the most influential factor; a closed pond system with good circulation is the optimum environment to achieve the best results using bacterial inoculation. Bacterial inoculation products can be used in conjunction with other treatment methods including: submerged aeration systems, storm water runoff filtration systems, aquaculture harvesting, and scavengers/filter feeders. Bacterial inoculation treatments can help improve pond water quality while additional efforts are made to implement watershed-wide solutions to reduce non-point source pollution control.

At this time, these products are so new on the market that NYSDEC has not yet established a statewide policy on their use. EEA has worked with inoculants on a pond in the Nissequogue River watershed. The pond suffered from reoccurring severe algae blooms. Seasonal water quality sampling was conducted to assess the physical, chemical and biological state of the pond. Analysis identified nutrient loading as the most likely factor influencing algal bloom development. Best management practices (BMPs) were implemented in an attempt to reduce the nutrient loading into the pond. Recommended BMPs included not using fertilizer directly around the pond, minimal use of slow release, low nitrogen fertilizer on outer lawn areas; bagging of leaves and grass clippings, no feeding of waterfowl, and bagging of domestic pet waste. Since the pond is situated to directly receive storm water from multiple points of a parking lot, nutrient loading could not be completely avoided. The bacterial inoculant treatment was researched to be an option applied in-conjunction the current BMPs and regular harvesting of the algae. The goal is that eventually the harvesting will not be required. Bacterial inoculant tablets were applied regularly during the growing season. Observations made throughout the growing season were an overall reduction of algae mats present. Monitoring test results indicated decreases in ammonia and phosphorus; however more time is required to see if nutrient concentrations will continue to decrease and remain stable.

Products are evaluated by the NYSDEC on a case-by-case basis depending on the purpose of use for the specific site and the intended use claim on the product label. If the product label indicates that content can “kill” or “control” algae or plants it could be regulated and require an aquatic pesticide permit. Product labels should be submitted for review and approval by the NYSDEC Bureau of Pesticide Management before application. Additionally, since Merokee Pond is a NYSDEC mapped wetland / regulated water body, product application would most likely require a freshwater wetland permit.

Nutrient Management through Common Carp (*Cyprinus carpio*) Controls

Mature common carp were witnessed spawning in Merokee Pond during EEA's 2008 field reconnaissance surveys. This introduced fish species can tolerate stressed water conditions in eutrophic ponds, and is considered detrimental because their bottom feeding habits uproot aquatic plants and continuously stir up the pond sediments so that the water is often turbid. Re-suspension of the bottom sediments can aggravate nutrient enrichment in Merokee Pond, and lead to further water quality degradation. Removal of this alien carp species from Merokee Pond would improve the overall health of the aquatic system by restoring the balance of native finfish populations and reducing nuisance aquatic vegetation.

There are several methods for removing unwanted fish from a pond. Each of the following methods has varying degrees of efficiency, and many can result in unintended consequences or impacts on non-target species:

a) Draining the pond through drawdown or other methods;
b) Stocking larger predatory fish that can eat the target fish;
c) Electro-shocking the pond to temporarily stun all of the fish located between the electric paddles, and selectively removing the unwanted species;
d) Applying chemicals to kill the entire fish population and re-stocking with desirable species;
e) Seining the water body and selectively removing the undesirable fish; and
f) Conducting a selective angling program with the unwanted by-catch being released back into the pond.

Numerous methods of selective carp removal have been tried by NYSDEC in the past; however, none have been fully successful. NYSDEC recommends the latter method for Merokee Pond, and knows of a regional sport-fishing group that targets carp. There is no seasonal restriction or minimum size limits regulating the take of common carp; NYSDEC only requires that a sport-fisherman carry a valid NYS Freshwater Fishing Permit. If Nassau County can open the southern shoreline of Merokee Pond for public access to carp fishermen, the problem of selective carp removal may be solved. If necessary, the County can sell limited access permits to dedicated carp fisherman that allow them to enter through the County maintenance ROW anytime from dawn to dusk on a controlled basis.

Plant Management Recommendations

Efforts to address the aquatic plant growth through benthic barriers, herbicides, or the introduction of grass carp all have significant downside risks that range from exacerbating the Coontail and Brazilian Waterweed density to damaging the Merokee Preserve with herbicides or undesirable grass carp.

Suction harvesting of the aquatic plants to reduce them below nuisance levels is an approach to the problem. If the harvesting is performed carefully, working from north to south in the direction of flow, and with the placement of a temporary barrier at the pond outfalls to prevent dispersion of fragments downstream, temporary improvement of the problem should be realized. The work should be undertaken in the fall and it must be understood that this work is closer to mowing one's lawn than it is to providing permanent control. Following the harvesting with a program of bacterial inoculation may yield longer term benefits and it is recommended that this approach be attempted.

Long term success in aquatic plant management can only be achieved by controlling the nutrient loading in the pond. For long term management we recommend the development of an aquatic shelf of native wetland plantings that will compete for the nutrients, along with an education and outreach program, and the installation of catch basin filters throughout the watershed that are designed to filter nutrients. It is critical that the homeowners around the pond be pro-active in reducing nutrient loads directly into the pond. This can be accomplished by:

Improved Lawn Care

- Fertilizer selection: slow-release, low nitrogen, zero phosphorus, organic.
- Apply fertilizer in the spring and fall, avoid the summer. Calculate the right rates to apply; applying at high rates in the spring and summer stimulate disease, weeds and insect activity, in addition to affecting the pond ecosystem.
- After mowing and raking bag all grass clippings and leaves (they can be source of nitrogen as they decompose in or near the ponds).
- Use rain barrels or cisterns and extend downspouts to collect storm water from roofs and bypass the lawn (effectively reducing contaminated runoff into ponds).
- Instead of concrete or mortared brick patios and paths use wood, dry brick, stone, gravel, mulch to decrease impervious surface flow of storm water into the pond.
- Water lawns early in the morning instead of midday, use a rain gauge and timer to avoid over watering.

Reduced Bacteria Loading

- Plant low-growing native shrubs at waters edge to avoid geese loitering
- Do not feed the waterfowl
- Bag domestic pet waste

Educational Activities

The majority of the water quality issues in the pond are the result of human behavior. Sustained efforts to alter detrimental behavior can result in improvements to water quality in the pond and in the water bodies downstream of the pond.

Local municipalities may take advantage of the technical outreach programs available through the New York Sea Grant NEMO (Nonpoint Education for Municipal Officials) Program. NYSG NEMO provides support to Long Island local governments in addressing nonpoint source pollution control, the selection of the most appropriate Best Management Practices (BMPs) for implementation, and the USEPA Phase II Storm Water Regulation requirements. The NYSG NEMO also 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.

In 2005, NYSG NEMO assisted EEA, the Village of Sea Cliff and the Hempstead Harbor Protection Committee with public outreach and education sessions for all residents located within the Scudder's Pond subwatershed. They provided a video entitled "After the Storm " and educational material was presented to increase public awareness and foster local stewardship for the subwatershed. The educational materials covered the topics of stormwater pollution, auto care, 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 by the project team and the agencies. Residents remarked that the sessions were extremely helpful and should have been publicized more extensively to encourage Village-wide viewer ship.

The NCDPW in conjunction with Legislator Dennenberg can host one or more such public outreach sessions to raise the awareness of residents about the impacts of nonpoint source pollution within the Merokee Pond watershed, and what they can, individually or collectively, do to improve downstream conditions. A likely location for hosting such events could be the local schools. Bolstering public knowledge within the school districts will likely have positive trickle-down effects in the community. School programs can incorporate pollution identification and reduction themes into science, math, language and arts curricula; encourage development of ecology clubs in after school extra-curricula activities; or even promote outdoor classroom activities along affected stream segments. Grade school children can become involved in BMP practices on-school grounds, thereby bringing the larger message home within the watershed. Hosting poster contests, preparation and/or distribution of educational brochures, and non-point source pollution themes for Science Fair projects are additional ways to raise public awareness within the school districts. The Nassau County Soil and Water Conservation District may support the local schools in such activities, and can encourage students to participate in the "Long Island Envirothon", a hands-on environmental sciences competition for High School students that covers many of the watershed planning and protection measures necessary to improve environmental conditions in waterbodies such as Merokee Pond.

The following list provides some non-point source pollution abatement and stormwater BMP activities that the residents may partake in to improve downstream water quality. NYSG NEMO could provide additional ideas and support:

Signage:
- ✓ Stenciling on catch basin inlets
- ✓ Watershed informational signage at Merokee Pond
- ✓ Adopt-a-Watershed signs
- ✓ Signs to discourage supplemental feeding of waterfowl

Reduce Animal Wastes:
- ✓ Support Pooper Scooper Ordinances
- ✓ Clean-up after pets
- ✓ Discourage artificial feeding of geese and waterfowl

Home Improvements or Residential Landscaping:
- ✓ Replace old concrete/asphalt pavements with grid pavers or other pervious surfaces
- ✓ Install cisterns or rain-barrels on downspouts for future irrigation use
- ✓ Re-direct downspouts to vegetated areas, rain gardens or grassy swales
- ✓ Vegetate bare areas to stop soil erosion & promote infiltration
- ✓ Cover piles of bare dirt or mulch to minimize soil erosion and sedimentation
- ✓ Plant native vegetation as filter strips or buffers along roadways, ponds and streams to trap pollutants in storm water
- ✓ Sweep up litter & debris from sidewalks, driveways & parking areas especially around storm drains
- ✓ Minimize use of de-icing materials

Decrease Fertilizer and Pesticide Dependence:
- ✓ Landscape with natives

- ✓ Trade turfgrass for native groundcovers
- ✓ Incorporate xeriphytic vegetation in beds and home landscaping
- ✓ Compose or mulch yard waste
- ✓ Minimize or avoid the use of pesticides, herbicides & fertilizers
- ✓ Use yard chemicals wisely based on the results of a soil test.
- ✓ Whenever possible use organic fertilizers, mulch & safer pest control methods
- ✓ Don't overwater lawns washing excess fertilizers and chemicals into storm drains

Auto Care

- ✓ Repair leaks & dispose of auto fluids & batteries at designated drop-offs and recycling locations
- ✓ Use a commercial carwash that treats or recycles its wastewater
- ✓ Do not pour automotive fluids, solvents, or wash-water into storm drains

Household Hazardous Waste

- ✓ Choose less toxic or non-toxic alternatives to limit exposure to hazardous products. When you need to use hazardous chemical, purchase them carefully.
- ✓ Store the product in their original containers so directions can be reviewed whenever used
- ✓ Never dump excess products on the ground, down the drain or storm drain, or dispose of in the trash. Set aside and bring to your local hazardous waste collection center.
- ✓ Do not pour chemicals, paints, pesticides, or their residues into storm drains or the ground. Recycle containers or properly dispose of them.

Foster Volunteerism:

- ✓ Community litter removal/Clean-ups
- ✓ At-home composting
- ✓ Adopt-a-Watershed
- ✓ Neighborhood storm drain stenciling "No Dumping Drains to Merokee Pond"
- ✓ Form a Pond watch program collecting water samples, recording observed wildlife and plants present and conduct other pond monitoring activities.

SUMMARY OF RECOMMENDATIONS

The recommendations for improvements to the pond are summarized as follows:

1. Install catch basin inserts throughout the watershed to control floatables, sediments, and nutrients if maintenance agreements can be worked out with the Town of Hempstead and the State of New York. Alternately install siphons upstream of the pond to control floatable debris.
2. Perform maintenance dredging in the upper branches of the pond. Use a portion of the dredge material to build an aquatic shelf of wetland planting around the pond.
3. Suction harvest 50% to 70% of the aquatic vegetation in the pond, working from north to south. Follow the harvesting with a program of bacterial inoculation to attempt to control nutrients in the pond.
4. Develop and education program for homeowners around the pond to reduce nutrient loading of the pond.
5. Develop a watershed-wide education program through the school district to reduce pollutant loading from the watershed.

FUNDING AND CONSTRUCTION COSTS

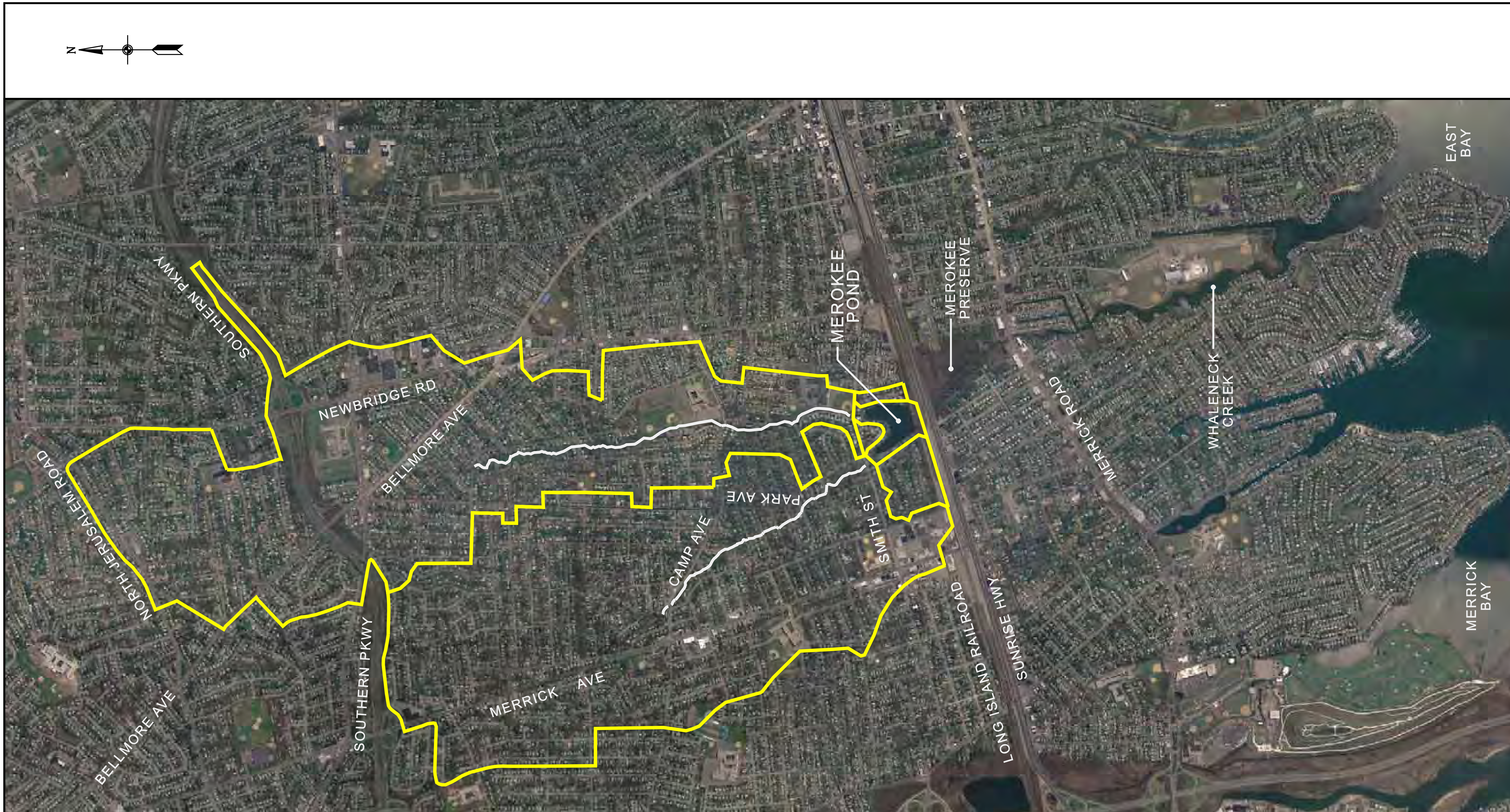
The available funding from Bond Act and grant sources is as follows:

MEROKEE POND FUNDING SOURCES	
SOURCE	**AMOUNT**
2004 EBA Funding for Merokee Pond Dredging Design	$600,000
2004 EBA Funding for Smith Street Right of Way	$310,000
2006 EBA Funding for Merokee Pond Dredging	$1,850,000
Total	$2,760,000

The actual funds available for construction activities are estimated at $2,430,000.

Construction costs of recommendedl activities discussed in this report are as follows:

MEROKEE POND ESTIMATED CONSTRUCTION COSTS	
ACTIVITY	**AMOUNT**
Catch Basin Inserts	$1,500,000
Dredging – East Branch	$350,000
Dredging – West Branch	$200,000
Aquatic Plant Harvesting – One Season	$100,000
Bacterial Inoculants – One Season	$30,000
Plant Aquatic Bench	$100,000
Total of Recommended Activities	**$2,280,000**
Alternate: Add Siphon – East Branch	$425,000
Alternate: Add Siphon – West Branch	$380,000
Alternate: Deduct catch basin inserts	($1,500,000)
Total with Alternates	**$1,585,000**



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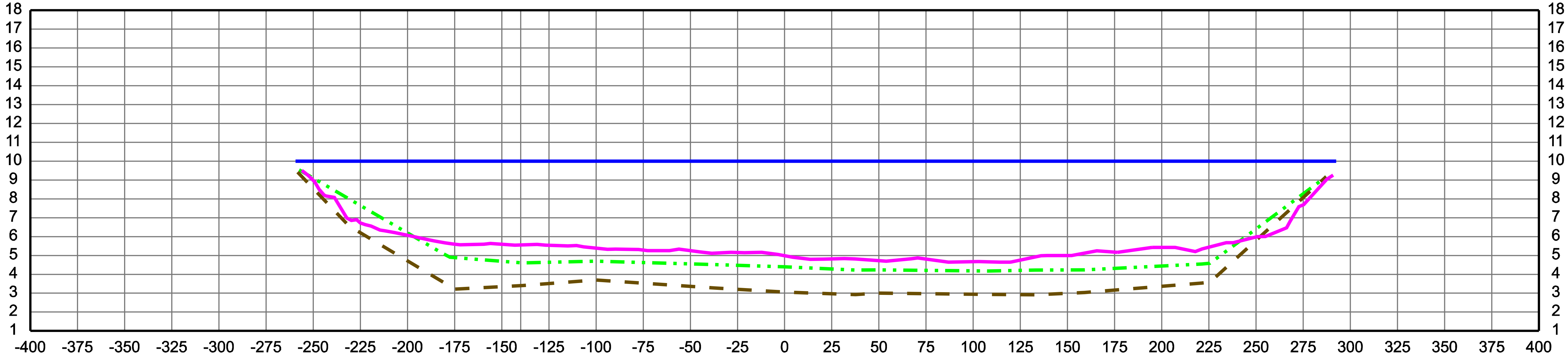
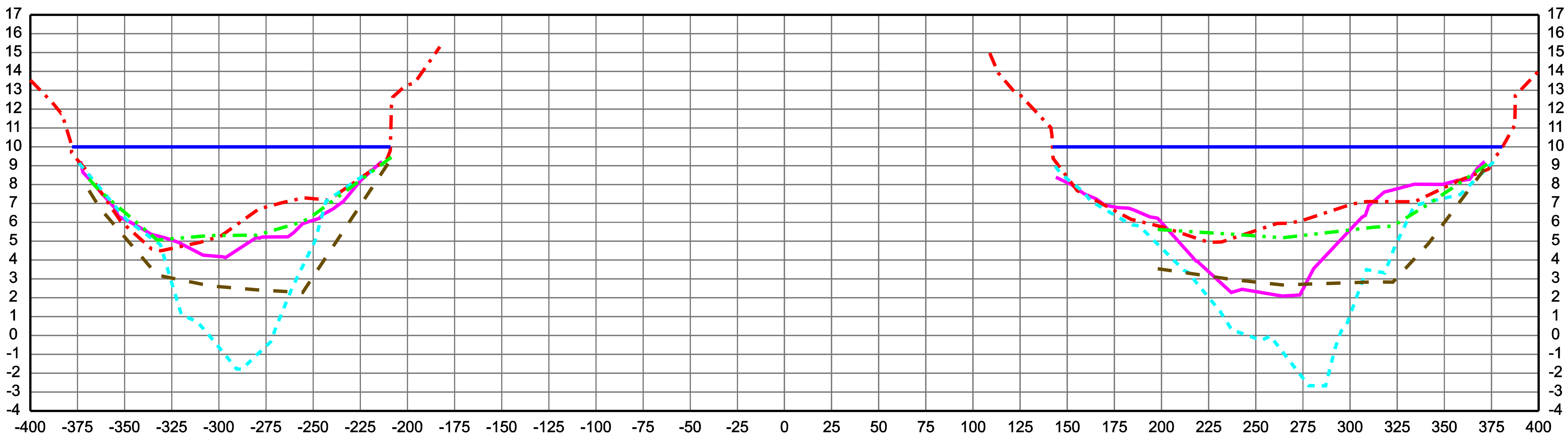
MEROKEE POND
BELLMORE-MERRICK, NY TOWN OF HEMPSTEAD
COUNTY OF NASSAU
DEPARTMENT OF PUBLIC WORKS

EXISTING CONDITIONS

SHEET NO. 2 OF 7



MAIN BODY OF MEROKEE POND



UPPER BRANCHES OF MEROKEE POND

WATER LEVEL
2008
1997
1995
1981
HARD BOTTOM

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TYPICAL CROSS SECTIONS OF THE POND SHOWING CHANGES IN POND DEPTH SINCE 1981

SHEET NO. 3 OF 7

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MEROKEE POND
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SITE PLAN

SHEET NO. 4 OF 7

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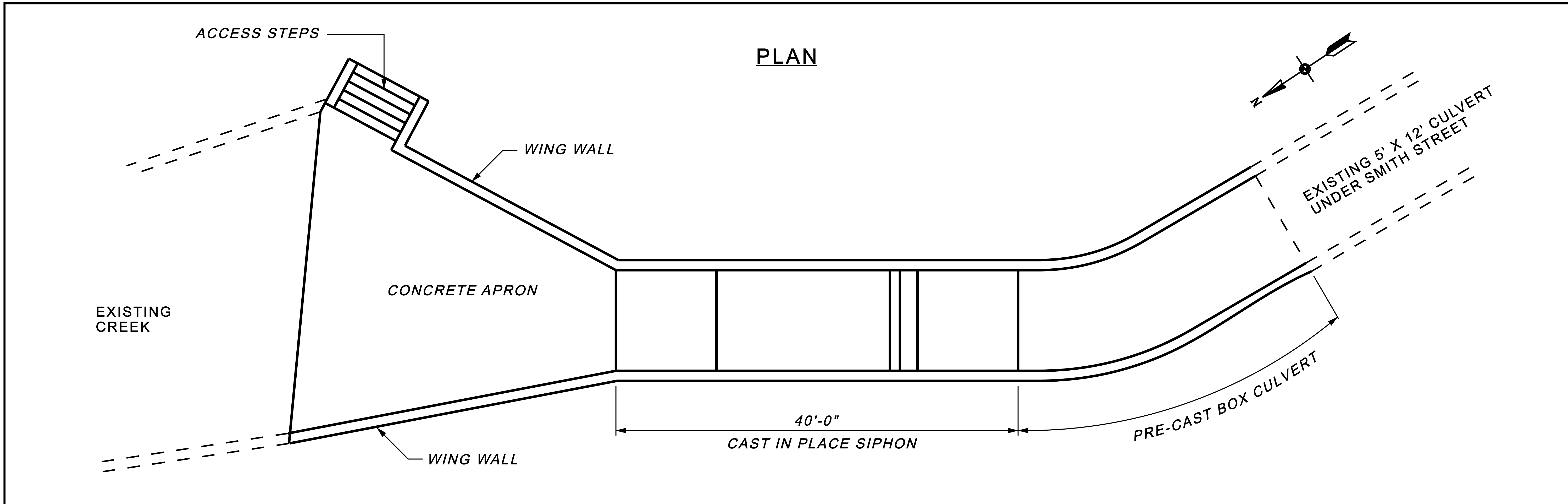
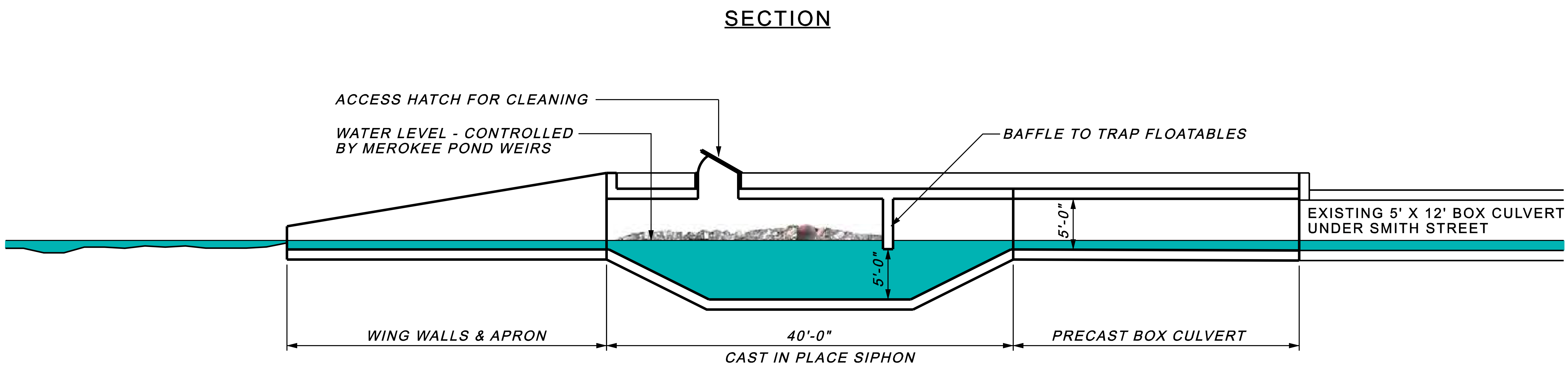
MEROKEE POND
BELLMORE-MERRRICK, NY TOWN OF HEMPSTEAD
COUNTY OF NASSAU
DEPARTMENT OF PUBLIC WORKS

CATCH BASIN INSERTS

SHEET NO. 5 OF 7





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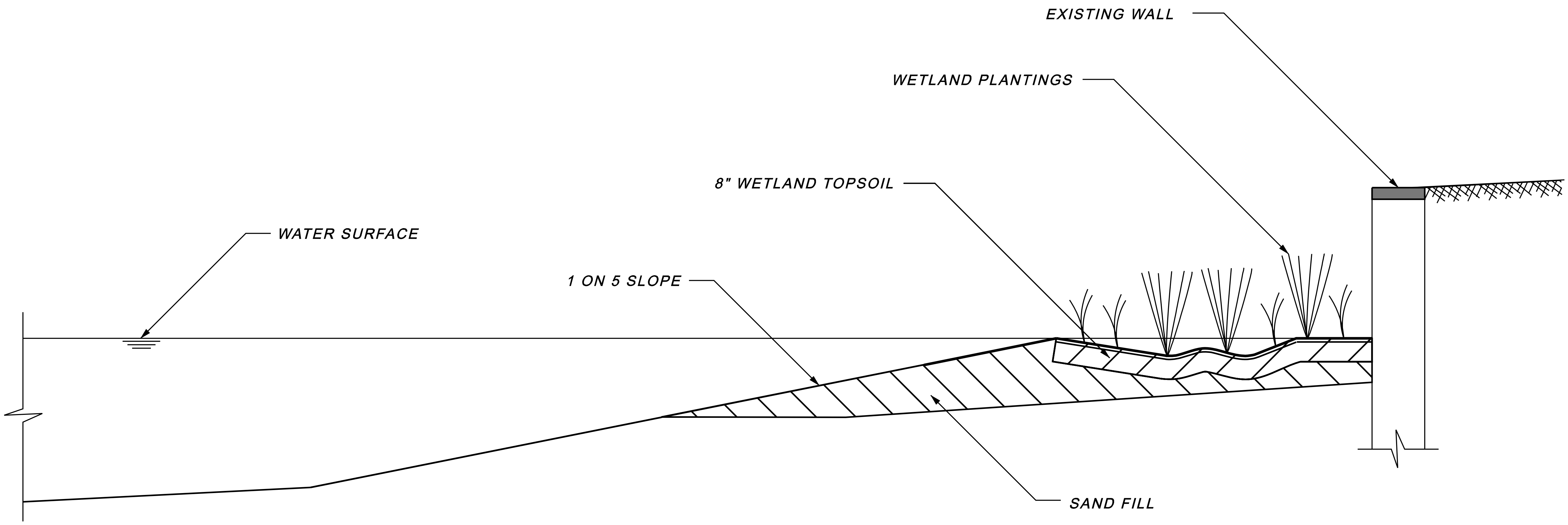
CULVERT PLAN AND SECTION

SHEET NO. 6 OF 7



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Appendix A
Merokee Pond Ecological Characterization

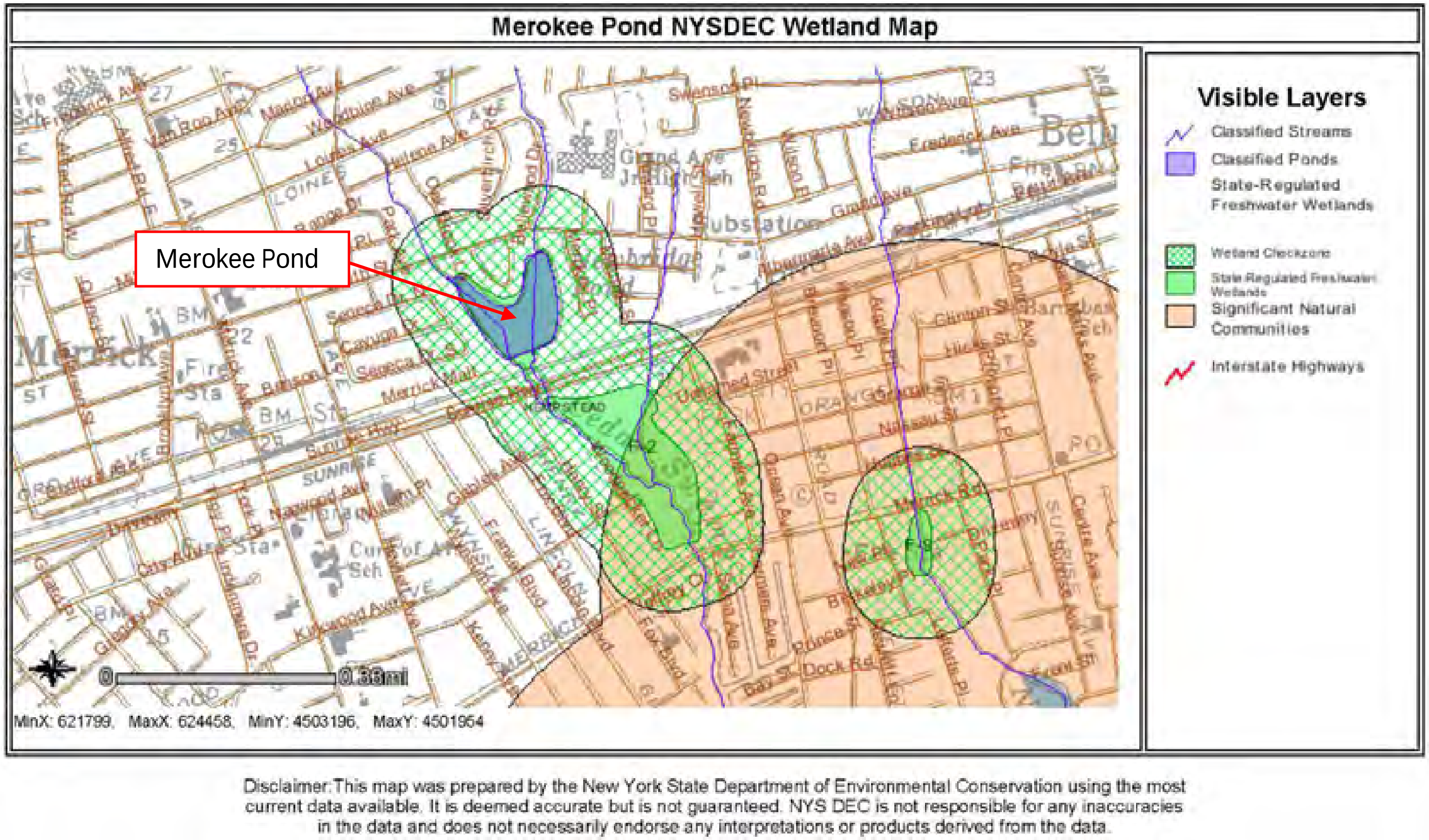
Flora and Fauna around the Pond

The New York State Department of Environmental Conservation (DEC) regulates and maps freshwater and tidal wetlands. Merokee Pond, also known as Newbridge Pond, is mapped by DEC as wetland F-2 (Figure 1). The DEC wetland size is 29.3 acres. Merokee Pond is protected under the New York Freshwater Wetlands Act as a Class II freshwater wetland system. The Act requires DEC to rank freshwater wetlands in one of four classes ranging from Class I, which represents the greatest benefits and is the most restrictive, to Class IV. The permit requirements are more stringent for a Class I wetland than for a Class IV wetland. Around every regulated freshwater wetland is a regulated adjacent area of 100 feet, which serves as a buffer area for the wetland (Environmental Conservation Law Article 24 and 6 NYCRR Parts 663 through 665).

In addition to classifying wetlands, DEC classifies waterbodies, including streams and ponds. DEC classifies Merokee Pond as Class C fresh surface waters. The best usage of Class C fresh surface waters is fishing. Class C waters shall be suitable for fish, shellfish, and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes (6 NYCRR Parts 701 through 706 and Part 885).

The New York Natural Heritage Program (NHP) was contacted in regard to any rare, threatened, or endangered species or significant natural communities in the Merokee Pond area. According to a response letter dated April 29, 2008, there is one occurrence of a rare plant species in the immediate vicinity of Merokee Pond: Atlantic white cedar (Chamaecyparis thyoides). The Atlantic white cedar is located in the Meroke Preserve, on the south side of Route 27 (Sunrise Highway) and to the south/southeast of Merokee Pond. EEA scientists found no Atlantic white cedar or suitable habitat on or near Merokee Pond. Atlantic white cedar is a small to medium-sized evergreen tree found in swamps and ponds, typically at sites with a high water table and deep organic soils. The NHP site is characterized as red maple dominated woods near a major highway, with limited natural habitat. The New York legal status of Atlantic white cedar is: rare (S-3, vulnerable). Atlantic white cedar is not federally listed. In New York, this species is known only from the Long Island and lower Hudson Valley regions. In the last 100 years there has been a decline in Atlantic white cedar swamps in western Long Island and the lower Hudson area, including the destruction of some very large swamps in Nassau and Orange counties. Many of the remaining swamps are within developed landscapes without large natural buffers. Trees need to be protected within their wetlands by providing large enough natural buffers to

Figure 1: NYSDEC Freshwater Wetlands Map for Merokee Pond



Source: New York State Department of Environmental Conservation (NYSDEC) Environmental Resource Mapper. http://www.dec.ny.gov/imsmaps/ERM/viewer.htm. Accessed August 28, 2008 preserve hydrologic régimes and to prevent direct destruction of the swamps and trees (NHP 2008).

Applying NHP classifications from *Ecological Communities of New York State* (Reschke 1990), approximately 85% of the area immediately surrounding Merokee Pond can be characterized as "mowed lawn with trees" and "mowed lawn," together with suburban single-family homes and paved roads. Reschke defines "mowed lawn with trees" as residential, recreational, or commercial land in which the groundcover is dominated by clipped grasses and forbs, and it is shaded by at least 30% cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50% cover. The groundcover is maintained by mowing. Characteristic animals include gray squirrel (*Sciurus carolinensis*), American robin (*Turdus migratorius*), mourning dove (*Zenaida macroura*), and mockingbird (*Mimus polyglottos*). Reschke defines "mowed lawn" as residential, recreational, or commercial land, in which the ground cover is dominated by clipped grasses and there is less than 30% cover of trees. The groundcover is maintained by mowing. Characteristic birds include American robin, upland sandpiper (*Bartramia longicauda*), and killdeer (*Charadrius vociferus*) (Reschke 1990).

Most of the shoreline of Merokee Pond is hardened, typically by timber bulkheads or concrete headwalls. Mowed lawn grasses often grow to the edge of the pond. A section of shoreline on the west side of the pond features flowering dogwood shrubs (*Cornus* spp.), which are native to New York.

The south side of the pond features a small woodland consisting of the following canopy and understory trees: red maple (*Acer rubrum*), black cherry (*Prunus serotina*), tree of heaven (*Ailanthus altissima*), scarlet oak (*Quercus coccinea*), black oak (*Q. velutina*), white oak (*Q. alba*), pin oak (*Q. palustris*), Norway maple (*A. platanoides*), black locust (*Robinia pseudoacacia*), sassafras (*Sassafras albidum*), cottonwood (*Populus deltoides*), gray birch (*Betula populifolia*), mulberry (*Morus* spp.), and white pine (*Pinus strobus*). Red maple is dominant in much of the area. Black cherry is abundant. Tree of heaven is common. The shrub layer features sweet pepperbush (*Clethra alnifolia*), autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), winged burning bush (*Euonymus alatus*), privet (*Ligustrum* spp.), silky dogwood (*Cornus amomum*), Japanese barberry (*Berberis thunbergii*), shrub honeysuckle (*Lonicera* spp.), and Japanese knotweed (*Polygonum cuspidatum*). Many of the plant species in the shrub layer, with the exception of sweet pepperbush and silky dogwood, are invasive species. Vines include Asiatic bittersweet (*Celastrus orbiculatus*), poison ivy (*Toxicodendron radicans*), and exotic wisteria (*Wisteria* spp.). Asiatic bittersweet and exotic wisteria are invasive plants. Poison ivy and Asiatic bittersweet are abundant. The herbaceous layer features garlic mustard (*Alliaria petiolata*), mugwort (*Artemisia vulgaris*), and Japanese honeysuckle (*Lonicera japonica*), all of which are invasive plants.

Birds observed or heard on site include Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), belted kingfisher (*Megaceryle alcyon*), red-winged blackbird (*Agelaius phoeniceus*), common tern (*Sterna hirundo*), cormorant (*Phalacrocorax auritus*), mute swan (*Cygnus olor*), American robin, song sparrow (*Melospiza melodia*), white throated sparrow (*Zonotrichia albicollis*), gray catbird (*Dumetella carolinensis*), common grackle (*Quiscalus quiscula*), European starling (*Sturnus vulgaris*), black-crowned night-heron (*Nycticorax nycticorax*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and northern cardinal (*Cardinalis cardinalis*). Canada goose feces were abundant on lawns around the pond in several places. Other fauna observed includes tiger swallowtail (*Papilio glaucas*) and cabbage white (*Pieris rapae*) butterflies.

Flora identified along the northeast tributary to the pond include red maple, pussy willow (*Salix discolor*), Asiatic bittersweet, black cherry, multiflora rose, Japanese knotweed, poison ivy, common reed (*Phragmites australis*), oak (*Quercus* spp.), and Virginia creeper (*Parthenocissus quinquefolia*).

Flora identified along the northwest tributary to the pond include lesser celandine (*Ranunculus ficaria*), Norway maple, red maple, red osier dogwood (*Cornus sericea*), multiflora rose, tupelo (*Nyssa sylvatica*), speckled alder (*Alnus incana*), and black cherry. Lesser celandine, Norway maple, and multiflora rose are invasive plants.

Merokee Pond drains south into the Meroke Preserve. The Meroke Preserve is a 24.5-acre parcel that provides the drainage basin for a naturally flowing fresh water stream. The preserve features a red maple swamp forest, freshwater marsh, and small pools of open water, all of which provide habitat for an abundance of wildlife. Atlantic white cedar can be found at the northernmost swampy area near Sunrise Highway. The preserve is protected by the New York Freshwater Wetlands Act as a Class II wetland (NCSWCD 2000). Atlantic white cedar is a rare plant species in New York State. Trees found on the Meroke Preserve include red maple, which is the dominant tree, and cottonwood, black oak, white oak, and black cherry. Shrubs include sweet pepperbush, highbush blueberry (*Vaccinium corymbosum*), multiflora rose, arrowwood (*Viburnum* spp.), and huckleberry (*Gaylussacia* spp.). Vines include poison ivy. The herbaceous layer features Canada mayflower (*Maianthemum canadense*), skunk cabbage (*Symplocarpus foetidus*), sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmunda cinnamomea*), sweet fern (*Comptonia peregrina*), bracken fern (*Pteridium aquilinum*), jack-in-the-pulpit (*Arisaema triphyllum*), various sedges (*Carex* spp.), wild sarsaparilla (*Aralia nudicaulis*), common reed, Japanese knotweed, and the emersed aquatic plant parrot feather (*Myriophyllum brasiliense*). Multiflora rose, common reed, parrot feather, and Japanese knotweed are invasive species. Fauna observed or heard on the preserve include scarlet tanager (*Piranga olivacea*), wood thrush (*Hylocichla mustelina*), gray catbird, northern cardinal, and eastern box turtle (*Terrapene carolina*).

Figure 2: USFWS National Wetlands Map for Merokee Pond

Source: U.S. Fish and Wildlife Service, National Wetlands Inventory. Google Earth. Accessed July 8, 2008

Merokee Pond forms part of a tributary to East Bay. DEC provided a water body data sheet for Long Island tributaries (freshwater) to East Bay, revised March 26, 2001. The data sheet indicates that aquatic life support and recreational uses in the tributaries to East Bay are affected by siltation, sediment, nutrients, and other pollutants from stormwater and urban nonpoint sources. Aesthetics along the streams in these highly developed and densely populated suburban areas are also degraded. Debris is identified as an aesthetic pollutant.

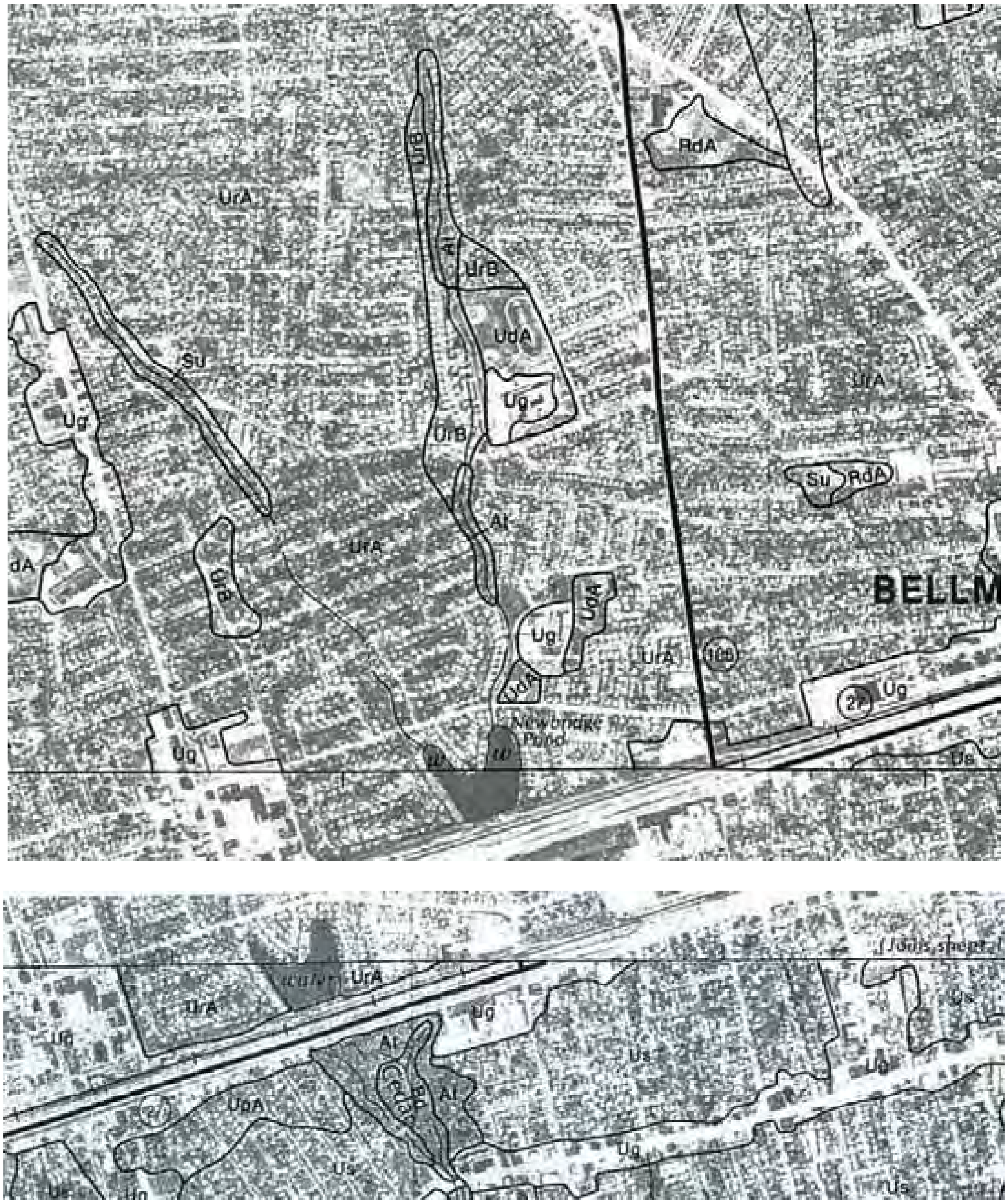
According to the *Soil Survey of Nassau County* (USDA 1987), the soil around Merokee Pond is mapped as UrA, which is Urban land-Riverhead complex, 0 to 3 percent slopes (Figure 3). This unit consists of urbanized areas with very deep, well-drained soils. The soil at the south end of the pond is classified as Ug, which is Urban land. This unit consists of areas where at least 85 percent of the surface is covered with asphalt, concrete, or other impervious building material.

Flora and Fauna in the Pond

Applying the NHP classification from *Ecological Communities of New York State* (Reschke 1990), Merokee Pond can be characterized as a cultural variant of a "eutrophic pond," which is the aquatic community of a shallow, nutrient-rich pond. Typically, the water of a eutrophic pond is green with algae and the bottom is mucky. Aquatic vegetation is abundant. According to Reschke (1990), characteristic plants of a eutrophic pond include coontail (*Ceratophyllum demersum*), duckweeds (*Lemna minor*, *L. trisulca*), waterweed (*Elodea canadensis*), pondweeds (*Potamogeton* spp.), water starwort (*Heteranthera dubia*), algae (*Cladophora* spp.), yellow pond-lily (*Nuphar luteum*), and white water-lily (*Nymphaea odorata*). In contrast to the natural eutrophic pond as described in *Ecological Communities*, Merokee Pond is an artificial impoundment.

The U.S. Fish and Wildlife Service National Wetlands Inventory classifies Merokee Pond as PUBH: [P] Palustrine, [UB] Unconsolidated Bottom, and [H] Permanently Flooded (Figure 2). The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. Wetlands lacking such vegetation are also included if they exhibit all of the following characteristics: 1) are less than 8 hectares (20 acres); 2) do not have an active wave-formed or bedrock shoreline feature; 3) have at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; and 4) have a salinity due to ocean-derived salts of less than 0.5 ppt. [UB] Unconsolidated Bottom includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30%. A wetland is classified as [H] Permanently Flooded when water covers the land surface throughout the year in all years. (USFWS 2008)

Figure 3: Soils Map for Merokee Pond



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Source: United States Department of Agriculture. 1987. *Soil Survey of Nassau County, New York*. Not to scale.

EEA conducted a survey of aquatic vegetation in Merokee Pond on June 19, 2008. Plants were collected from a boat and from the shore using the rake-toss method. This method involves the use of a two-sided rake attached to a rope. 11 sampling sites were evenly distributed throughout the lake. Collected plants were separated and enumerated qualitatively, using a scale developed by Robert Johnson and Paul Lord from Cornell University (NYSDEC 2006). The abundance of plant material on the rake was ranked according to the following classifications:

Z = zero = no plants found on the rake
T = trace = a fingerful of plants found on the rake
S = scarce = a handful of plants found on the rake
M = moderate = plants covering the entirety of the rake
D = dense = sufficient abundance to limit the ability to lift the rake out of the water

Coontail (*Ceratophyllum demersum*) was found to be the most abundant aquatic plant in Merokee Pond, with samples ranging from zero to dense. Coontail was found most abundantly in the south-central and southeastern areas of the pond, where abundance ranged from moderate to dense. Coontail was found in zero to scarce (mostly scarce) amounts in northwestern, western areas, and northeastern areas of the pond. Coontail is a native, perennial, submerged, and evergreen aquatic plant commonly found in ponds, lakes, and streams. It is usually found in slow-moving or still water. The densely bushy stem tips are said to resemble a raccoon's tail. Coontail lacks true roots, and therefore is free floating, although it may anchor in sediment by modified leaves. The stems feel rough, are branched, and can reach 15 feet or more in length. The leaves consist of whorls of dichotomously branching (branch no more than twice) leaves; the margins of leaves have tooth-like serrations, each arising from a fleshy base. The flowers are small, solitary, without a stalk, and occur at the leaf bases (leaf axils). Flowers are inconspicuous and have no sepals and petals. Flowers remain submersed throughout the year. Coontail spreads primarily by fragmentation of its stems. It can be beneficial as a shelter for small fishes and aquatic invertebrates. Fish and water birds use coontail as a food source, although it is a minor source of food for water birds (GISD 2008).

An invasive aquatic plant, Brazilian water-weed (*Egeria densa*), was found in trace to scarce abundance, mostly in the south-central and southeastern areas of the pond. Brazilian water-weed is a submersed, freshwater perennial plant that forms dense monospecific stands. These dense mats restrict water movement, trap sediment, cause fluctuations in water quality, interfere with recreational activities, and provide poor habitat for fish. These mats are similar to, but can be more extensive than, those produced by native vegetation. Brazilian water-weed has stems up to fifteen feet long that are frequently branched. It is a bushy plant with dense whorls of bright green leaves (except when growing with insufficient light, in which case the leaves are widely spaced). Brazilian water-weed usually has four to eight leaves per whorl (arranged around the stem) and each leaf is at least 2 cm long. The lowest leaves are opposite or in whorls of 3, while the middle and upper leaves are in whorls of 4 to 8. It is usually rooted in bottom mud, but may be free-floating. Brazilian water-weed occurs in cool to warm freshwater ponds, lakes, reservoirs, and slowly flowing streams. Very fine serrations may be seen on the leaf margins with a hand lens. Flowers are about 3/4 in. across and have three white petals. Flowers occur on a short stalk about an inch above the water and are produced primarily in the spring through early summer, but occasionally appear later in the growing season. Only male (staminate) plants are present in the United States, so reproduction occurs only vegetatively by fragmentation. Stem fragments frequently break off and float away from the parent plant during active growth in spring. Fragments occur during all times of the year as a result of mechanical shearing of water flows, wave action, waterfowl activity, boating, or other disturbance. Mechanical harvesting can produce thousands of viable fragments per acre. Brazilian water-weed can spread by plant fragments attached to boats and equipment that are not properly cleaned. Biomass increases with increased ammonium in stream water and with total nitrogen in sediments. Turbid water is likely to favor rather than inhibit growth (WSDE 2008).

Given that Brazilian water-weed was found in scarce to trace amounts at Merokee Pond, and coontail abundance was often moderate to dense, there is the possibility that coontail is suppressing the growth and spread of Brazilian waterweed by competition for nutrients, competition for light, and allelopathy. Allelopathy, the inhibition of growth of a plant species by chemicals produced by another species, has been shown to occur by coontail. Most samples of Brazilian water-weed appeared to be not typically bushy (i.e. the leaves were relatively widely spaced), which may indicate growth with insufficient light. Whether or not coontail is suppressing Brazilian water-weed is not known with certainty; further study may be warranted.

Other flora observed in the pond and tributaries includes algae, common water starwort (Callitriche palustris), and duckweed (Lemna spp.).

Common duckweed is a very small light green free-floating, seed bearing plant. Duckweed colonies provide habitat for micro invertebrates. If duckweed completely covers the surface of a pond for an extended period, it may cause oxygen depletions. Dense colonies may eliminate submerged plants by blocking sunlight penetration. Many kinds of ducks consume duckweed and often transport it to other bodies of water (TAES 2008).

Common water starwort is a native aquatic plant that typically grows in submersed and emergent plant communities. This plant is generally found in cool, quiet waters or along muddy shores, preferring muddy or sandy substrates. Ducks and other waterfowl feed upon the stems and fruits of common water starwort. Colonies of this plant provide food and shelter for fish (MCIAP 2008).

During EEA's field reconnaissance, fish activity was observed on the surface of the pond. DEC does not keep records of finfish populations in Merokee Pond. In order to identify some of the species present, EEA deployed five (5) killie pots and dropped them in at various shoreline locations at the beginning of each aquatic weed sampling event. The wire mesh killie pots contained a lead sinker and were baited with a sardine plus a half-dollar sized chunk of uncooked pastry dough. The pots were left submerged for varying lengths of time (typically over ½ hour in duration), and then retrieved to identify the catch. Dip nets were also used to sample aquatic life along the pond edge; and the shoreline was examined with binoculars to spot potential turtle basking areas.

Aquatic sampling on Merokee Pond revealed the presence of large breeder-size common carp (*Cyprinus carpio*), bullfrog (*Rana catesbeiana*), and green frog (*Rana clamitans*). Pumpkinseed sunfish (*Lepomis gibbosus*) and banded killifish banded killifish (*Fundulus diaphanus*) were caught in the killie pots deployed just upstream of the eastern outfall weir, as well as at the southeastern edge of the pond where submerged aquatic plants were dense. Sunfish spawning areas were also noted along the eastern end of the pond where course bottom sediments were dominant.

The banded killifish is the only freshwater member of the killifish family present in New York State. The banded killifish is a small (2-4 inches), slender fish with a head that is somewhat flattened on top and a small mouth adapted to surface feeding. The tail is nearly square or slightly convex or rounded. Olive green on the back and white on the lower side and belly, it has numerous light and dark vertical bars along its sides. They are typically found in the quiet waters of lakes, ponds, rivers, and estuaries. Banded killifish are abundant on Long Island (Kraft et al. 2006).

The pumpkinseed sunfish is the most widely distributed and abundant sunfish in New York, occurring throughout the state, including Long Island. Pumpkinseed sunfish seem to prefer weedy, warm water lakes and ponds, using weed patches, docks, and logs for cover and usually staying close to shore. They are present in the calm pools of most rivers. The average pumpkinseed is about 5 to 6 inches in length, although some may approach 10 inches (Kraft et al. 2006).

Banded killifish and sunfish are beneficial for mosquito control because they consume mosquitoes in the aquatic stages of the life cycle and prevent them from becoming adults (NJMCA 2004).

The common carp has been introduced as a food and ornamental fish into temperate freshwaters throughout the world. It is often considered a pest because of its abundance and its tendency to reduce water clarity (by constantly stirring up the substrate) and uproot the aquatic vegetation used as habitat by a variety of species (GISD 2008). The common carp is a heavy-bodied minnow with barbels on either side of the upper jaw. Typically, color varies from brassy green or yellow, to golden brown, or even silvery. The belly is usually yellowish-white. Individuals 12-25 inches in length and weighing up to 8-10 pounds are common, although they can grow much larger. Common carp may live in excess of 47 years and weigh more than 75 pounds (TPW 2008).

Merokee Pond is not referenced in the *Nassau County Suburban Pond Management Program* report. Merokee Pond is not referenced in the *Invasive Aquatic Plant Survey of Nassau County Parks Ponds* (NYSDEC 2005). Robert Marsh, Regional Manager, DEC Bureau of Habitat, was aware of no other studies conducted by DEC at Merokee Pond (personal communication, May 5, 2008).

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APPENDIX B
MEROKEE POND WATER QUALITY ANALYSIS REPORT

Introduction

Merokee Pond is being studied as part of the Nassau County Project I.D. No. 35106, “Rehabilitation of Various Public Works Water Bodies” under the Environmental Bond Act. The overall goals of this project are to address the accumulation of sediment and enhance the current water quality within Merokee Pond. Various stormwater controls and water quality improvements are being considered within the Merokee Pond watershed.

Field Sampling Program

As part of this study, a water quality sampling program was conducted in April and May of 2008 to better understand the condition of the Merokee Pond ecosystem. Water samples were taken for quality analysis on two separate events; once during dry weather in April 2008 and a second round of sampling during a rain event in May 2008. The intent of the dry weather sampling was to establish the background levels of bacteria and nutrients within Merokee Pond, as well as to determine any residuals introduced into the lake system via groundwater. A dry weather sampling event was defined as one following a period of a week without significant rainfall. Wet weather sampling was conducted to determine the impact of stormwater runoff on the pond system. A wet weather sampling event was defined as one during a significant rainstorm.

Results from this field sampling program were analyzed to 1) explain the impact of stormwater runoff from the watershed on Merokee Pond; 2) characterize the ability of the pond to act as a functioning ecosystem that can process introduced nutrients and pollutants; and 3) if necessary, identify possible treatment measures to improve water quality and overall ecosystem health.

Sampling Methodology

Samples were obtained during the two weather conditions by collecting water in pre-labeled bottles provided by Ecotest Laboratories. Five samples per station were collected and analyzed for nutrient and bacteria count analysis. The bottles were stored on ice between time of collection and delivery to EcoTest Laboratories, a New York State Department of Health certified laboratory. Samples were delivered to the laboratory under the proper Chain-of-Custody documentation. A Chain-of-Custody form was filled out immediately following data collection, and was signed by the data collector and laboratory recipient upon delivery. The form serves as a record of the sampling inventory, requested laboratory tests, and identifies all persons involved in the process.

Field measured water quality parameters were recorded at the time of sampling. Parameters included water depth, water clarity, temperature, pH, dissolved oxygen, salinity, and conductivity. Parameters were measured using a Yellow Springs Instrument model 85 (YSI), ISFET pH meter IQ120, Secchi disk, and meter stick. The YSI measured temperature, dissolved oxygen, conductivity, and salinity. The ISFET measured pH levels. The Secchi disk measured general water clarity. The meter stick measured water depth.

Station Locations

Water quality sampling stations were selected at 4 locations within the Merokee Pond ecosystem to be used during both sampling events as indicated in Figure 1. Station 1 was located off of the interior peninsula as the pond branches, Station 2 was located near the southeast corner of the main pond, Station 3 was located in the west branch north of Smith Road, and Station 4 was located in the east branch north of Smith Road. Station locations were recorded during the dry weather sampling event on April 22, 2008 using a Trimble GeoXT GPS with the GPS coordinates given in Table 1 below.

Table 1: Location Coordinates for Water Quality Sample Stations at Merokee Pond

Station	Latitude (North)	Longitude (West)
Station 1	40^o 40’ 01.31	73^o 32’ 39.79
Station 2	40^o 39’ 59.62	73^o 32’ 36.41
Station 3	40^o 40’ 04.12	73^o 32’ 49.57
Station 4	40^o 40’ 10.36	73^o 32’ 37.34

Federal and State Standards

The New York State Department of Environmental Conservation (NYSDEC) Division of Water has published best usage classifications for the New York State bodies of water and discharge water quality standards for those classifications. The Merokee Ponds system is labeled on S-25ne quad maps, NYSDEC Division of Water maps. The Merokee Pond system is defined as NYSDEC Class C fresh surface waters. The best usage of Class C fresh surface waters are fishing, fish propagation and survival. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes (NYSDEC 1999). Of the fifteen parameters sampled for this investigation, eight were given a NYSDEC concentration standard or guidance shown in Table 2 below.

Table 2: NYSDEC Acceptable Parameter Values for Fresh Surface Water

Parameter	Water Body Class	Standard
Dissolved Oxygen	C	>4 (mg/L) nontrout water
pH	C	6.5 < pH < 8.5
Total Coliform	C	<2400 (MPN/ 100mL)
Fecal Coliform	C	<200 (MPN/ 100mL)
Ammonia	C	2.2 (mg/L)
Nitrogen	A	10 (mg/L)
Nitrate	A	10 (mg/L)
Phosphorus	B	0.02 (mg/L) guidance value

At the time of writing this report, New York State has not adopted a State standard or guidance value for enterococci. The United States Environmental Protection Agency (USEPA) through the Beaches Environmental Assessment and Coastal Health (BEACH) Rule of 2000 (Federal Regulation 40 CFR Part 131.41) requires states to adopt more protective water quality standards for pathogens and pathogen indicators in coastal recreational waters. The BEACH Rule requires that state standards be at least as protective of human health as the USEPA's 1986 bacteria criteria which use "indicator organisms" E. coli and enterococci. These organisms identify where fecal contamination has occurred, and therefore, where disease-causing microbes may be present. The USEPA BEACH Rule freshwater standard for enterococci in water bodies with infrequent usage for full body recreation is 151 counts per 100mL (USEPA 2004).

USEPA issued several ecoregional nutrient criteria documents in 2002, presenting geographic coverage and recommending nutrient water quality criteria for each of its fourteen designated nutrient ecoregions. This project occurs within Ecoregion XIV – Eastern Coastal Plains (Table 3). The goal of the water quality criteria is to "reduce and prevent eutrophication on a national scale." Nutrient eutrophication is discussed in the "Nutrient Concentration – Definitions and Significance to Study" section of this report.

Table 3: USEPA Ecoregion XIV – Eastern Coastal Plain Nutrient Criteria

Parameter	Guidance Values
Nitrogen	0.32 (mg/L)
Phosphorus	0.008 (mg/L)
Clarity (Secchi)	4.5 (meters)

Sampling Results

Water quality parameters were selected for analysis because of their ability to characterize the condition of a water body; and are described in greater detail below. The field collection and laboratory results for Merokee Pond water quality samples are grouped into three categories: Bacterial Counts, Nutrient and Particle Concentrations, and Physical Parameters. Parameters analyzed by the laboratory for this study were:

- Bacterial Counts – Enterococci, Total and Fecal Coliform
- Nutrient Concentrations – Ammonia (NH_3), Nitrate (NO_3), Total Nitrogen (TN), Total Kjeldahl Nitrogen (TKN), and Total Phosphorous (TP)
- Particle Concentrations – Total Suspended Solids (TSS)

Parameters collected through field measurements include:

- Water depth
- Temperature
- Dissolved oxygen concentration
- pH

- Salinity
- Water clarity

Bacterial Counts

Definition and Significance to Study

Coliform bacteria are a form of pathogens which are known to cause severe illness in humans when ingested. Pathogens can be traced to sources such as improperly treated or untreated sewage from combined sewage overflows, water fowl, animal waste, septic systems, and storm water runoff. To date, no practical method exists to accurately measure the presence of pathogens. Therefore, coliform and enterococci bacteria are used as indicator organisms because if they are detected in large quantities in a water sample, then they signal the potential presence of other more harmful pathogens such as viruses. Coliform is universally present even in pristine spring water. At high levels they indicate excessive decaying organic material in the water. Fecal coliform is a component of total coliform and indicates that there are mammal or bird feces in the water. Enterococci bacteria also indicate that there are feces from warm blooded animals (i.e. humans, dogs, etc.) in the water (USEPA 1997).

The USEPA has determined that enterococci have a greater correlation with swimming-associated gastrointestinal illness in both marine and fresh waters compared to other bacterial indicator organisms (USEPA 2004). The USEPA under the BEACH Rule utilizes enterococci and E. coli as "indicator organisms" in freshwater and coastal systems to identify where fecal contamination has occurred. Yet, since the BEACH Rule is not legally applicable to small inland waters such as Merokee Pond at this time, it is important to sample for both coliform and enterococci bacteria as pathogen indicators.

Comparison with NYSDEC Standards

Stations that exceeded the NYSDEC standards for total coliform and/or fecal coliform as well as the USEPA standard for enterococci are noted in red in Table 4. Results for total coliform, fecal coliform and enterococci are illustrated in Figures 2, 3 and 4, respectively. It was expected that total and fecal coliform counts would be linked because fecal coliform counts are a component of total coliform counts. This link was evident at Station 1 during dry weather sampling where results exceeded total and fecal coliform standards as well as enterococci standards. Station 3 and Station 4 wet weather results exhibited this link between total and fecal coliform with both exceeding the state standards. Station 2 wet and dry weather samples also exhibited the coliform link as neither coliform exceeded their standard limits.

During the dry weather sampling, Station 1 exceeded the standards for all three parameters. Total coliform for Station 1 was four times the acceptable limit, fecal coliform counts were twelve times the acceptable limit and enterococci counts were double the acceptable limit. All of the bacterial parameters at Station 2 and Station 4 had low counts that were well below the standard limit. The fecal coliform level at Station 3 during dry weather sampling was slightly greater than the acceptable limit while the other two parameters fell within the normal range.

During the wet weather event, Station 1 exceeded the limit for fecal coliform by over double and enterococci by nearly one hundred times. Station 2 bacterial parameters were all within the normal range. Station 3 and Station 4 results exceeded all three standards. Station 3's exceedance values were two to four times the respected standard limit, while Station 4's exceednce values for enterococci, fecal and total coliform were approximately 38 times, 55 times and 19 times the allowable counts.

Nutrient Concentrations

Definitions and Significance to Study

Key nutrients were analyzed for this study. In proper quantities, nutrients sustain a thriving ecosystem. However, it is now known that the number one cause of impairment of lakes and coastal waters in the United States is nutrient enrichment. Excessive amounts of nutrients can lead to the growth of harmful algal blooms that use up the limited amounts of dissolved oxygen in a water body and ultimately cause eutrophic conditions creating an environment that cannot support aquatic life. Nutrients sources include wastewater, runoff from fertilized lawns, failing septic systems, animal manure, atmospheric deposition (acid rain), disturbed land areas, and internal nutrient recycling from sediments (USEPA 1997).

Nitrogen and phosphorus are essential plant nutrients, but excess amounts unbalance each nutrient cycle and create significant water quality issues. Nitrates are a form of nitrogen found in terrestrial and aquatic systems which include ammonia, nitrate, and nitrite. Higher levels of ammonia and nitrite (which are more toxic to aquatic life than nitrate) may indicate water that is heavily loaded with nitrogen rich organic matter because the decomposition of organic matter reduces DO, which slows the rate at which ammonia is oxidized to nitrite and then to nitrate. Monitoring phosphorous is challenging because it involves measuring very low concentrations, but it is important because even a minute increase at a very low concentration can have dramatic impacts on pond systems such as excessive bacteria and plant growth. Total phosphorus measures all forms of phosphorus (orthophosphate, condensed phosphate, and organic phosphate) (USEPA 1997).

Comparison to NYSDEC Standards

Stations that exceeded the NYSDEC standards for total nitrogen, nitrate, TKN, ammonia and/or total phosphorus are noted in red in Table 5. Results for total nitrogen, nitrate, TKN, ammonia and/or total phosphorus are illustrated in Figures 5 through 9, respectively. All nitrogen parameters were within their corresponding State standard limits during both wet and dry sampling events at all four stations. All of the nitrogen and phosphorus measurements were above the USEPA eco-region criteria guidance limits at all four stations during both sampling events.

At Station 1 all nutrient parameters measured except ammonia exhibited a decrease in concentration between the dry weather sampling and the wet weather sampling. Ammonia was well within the State standard during the dry weather sampling and then slightly increased over 0.01 mg/l during the wet weather sampling but remained within the State standard. Total nitrogen and nitrate were both relatively low during the dry weather sampling and within the State standard; both slightly decreased during the wet weather sampling. TKN concentrations decreased between dry and wet weather sampling by 0.3 mg/l. Total phosphorus was over the State guidance level during the dry weather sampling, and while phosphorus decreased during the wet weather sampling it remained above the State guidance level.

The Station 2 ammonia and nitrate concentrations remained constant at both sampling events. Total nitrogen and TKN both decreased slightly, a few tenths, from dry to wet weather sampling. Total phosphorus decreased by a magnitude between the dry and wet weather sampling and the wet weather concentration was still slightly greater than the State guidance level.

At Station 3, all of the nutrient parameters increased between the dry and wet weather sampling events. Ammonia over doubled in concentration. TKN, total nitrogen and nitrate increased 0.2-0.5 mg/l between sampling events. Total Phosphorus increased 0.05 mg/l between sampling events and exceeded the State guidance at both events.

Of the four stations, the greatest concentration differences between sampling events were measured at Station 4. At Station 4, all nutrient parameters measured except nitrate exhibited an increase in concentration between the dry weather sampling and the wet weather sampling. Nitrate decreased by nearly 1 mg/l between sampling events. Ammonia increased by over 0.2 mg/l between sampling events, TKN by 2.5 mg/l, total nitrogen by over 1.5 mg/l, and total phosphorus by nearly 0.1 mg/l respectively. Total phosphorus was at the acceptable State guidance limit during the dry weather sampling, however it increased to exceed that limit by over a magnitude during the wet weather sampling event.

Physical Parameters

Definitions and Significance to Study

Constituents found naturally in water can nevertheless be affected by human sources, such as oxygen, bacteria and nutrients. The magnitude of their effects can be influenced by properties such as pH and temperature. For example, temperature influences the quantity of dissolved oxygen that water is able to hold. A water body both produces and consumes oxygen. It gains oxygen from plants and the atmosphere and “loses” oxygen through respiration by aquatic animals, decomposition and various chemical reactions.

Wastewater and urban stormwater runoff often contain organic materials that are decomposed by microorganisms which uses oxygen in the process. Oxygen is measured in its dissolved form as dissolved oxygen (DO). DO levels fluctuate seasonally and over 24-hr periods. Cold water holds more oxygen than warm water. DO levels also vary vertically in the water column of ponds and lakes due to the effects of circulation, which often decreases with increasing water depth. If more oxygen is consumed than is produced, dissolved oxygen decline and some sensitive animals may move away, weaken, or die. Fish are particularly sensitive to DO levels (USEPA 1997).

As discussed above, temperature is a key water factor because it influences biological and chemical processes. Optimal temperatures are species dependent. If possible, fish and macro-invertebrates will move to find their optimal temperature, thus reducing negative physical impacts to temperatures outside their optimal range. Some causes of temperature change include weather, removal of aquatic vegetation, lack of water movement, urban stormwater runoff and groundwater inflow (USEPA 1997).

pH is a term used to indicate the alkalinity or acidity of a substance. It is measured on a scale of 1-14 with 7 indicating neutral. Numbers below 7 indicate a substance is acidic and numbers above 7 indicate alkaline. pH affects many chemical and biological processes in the water. Different organisms flourish within different ranges of pH, most preferring a range from 6.5 to 8.0 pH. pH outside this range can cause stress to numerous organisms reducing species diversity. Low pH can allow toxic elements to become mobile and "available" for uptake by aquatic plants and animals. Changes in acidity can be caused by acid rain, surrounding rock erosion, and certain runoff discharges (USEPA 1997).

Total suspended solids are those particles that can be filtered out with a 0.2 micron filter and include silt and clay particles, plankton, algae, and fine organic matter. An influx of TSS can reduce the useable habitat in an ecosystem as well as clog fish gills, reduce visibility, carry toxins like pesticides, and disrupt photosynthesis in submerged aquatic vegetation. Sources of TSS include industrial discharge, sewage, fertilizers, urban runoff, and soil erosion. TSS can also affect water clarity; higher solids decrease the passage of light through water (USEPA 1997).

Comparison to NYSDEC Standards

Physical measurements are summarized in Table 6. Results of the total suspended solids are illustrated in Figure 10. At all stations water depths were similar during the dry and wet weather sampling events. During the dry weather sampling event water temperatures ranged from 15.6 to 18.7 ^{o}C. During the wet weather sampling event water temperatures ranged from 12.1 to 16.7 ^{o}C. Water temperatures decreased between sampling events at all stations. The average water temperature difference between sampling events was 2.8^{o}C, with the maximum variance at 5.7^{o}C. The sampling events occurred 18 days apart.

Salinity was within freshwater range for all stations. Dissolved oxygen levels at all stations decreased between sampling events, but remained above the minimum State standard amount. The pH levels at all stations increased between the dry and wet sampling, but remained within the State standard range. The pH levels during the dry sampling would be considered “slightly acidic” readings, while the pH levels during the wet weather sampling would be considered “neutral” readings. Total suspended solid (TSS) concentrations varied widely between stations and sampling events. Station 1 and Station 2 decreased in TSS concentration from the dry to wet weather sampling. Station 3 and Station 4 increased in TSS concentration from the dry to wet weather sampling. Due to stormwater runoff it is common for TSS concentrations to increase during storm events especially in swallow tributaries like those sampled at Stations 3 and 4. Water clarity at both Stations was generally good with visibility extending to the pond bottom; the secchi disk readings all marked the total water depth.

During a site inspection in August 2008, some additional physical measurements were recorded from the center of Merokee Pond. Readings of DO were recorded for the surface, 2 feet in depth, and the bottom (approx. 1.5 m) at 7.0 mg/L, 6.5 mg/L and 4.6 mg/L, respectively. These values indicate that there is less oxygen available as the pond depth increases, most likely due to a lack of water circulation. More reading are necessary to evaluate if the DO levels are consistently low along the pond bottom and if the values are low enough to cause harm to aquatic life. Additionally, DO should be monitored during the late summer when water temperatures are higher and DO levels are at their lowest. This will provide data that can be used to determine potential effects of water quality parameters on aquatic organisms in the pond system.

Discussion and Conclusions

Based on the results summarized above it is evident that there are multiple factors/issues that are affecting the Merokee Pond ecosystem and reducing the water quality able to sustain aquatic life. The parameters that are most concerning based on the sampling values are the bacteria and phosphorus. The fecal coliform and enterococci present in the central pond area measured higher than the State standards during both sampling events. The enterococci concentration was nearly one hundred times the acceptable limit for non recreational water bodies. Based on the recoded enterococci level, the possible presence of pathogens within the Merokee Pond ecosystem is high, which may lead to its categorization as an impaired water body. Bacteria levels in both tributaries to Merokee Pond were significantly increased from the dry event to the wet weather event. Canada geese (Branta Canadensis) are likely suspects for bacteria increases during storm events due to waterfowl waste runoff. While no Canada geese were observed near either tributary, several were recorded in Merokee Pond at each site inspection.

As far as nutrient enrichment, phosphorus was high compared to the State Class B guidance value. Phosphorus is linked to algal blooms like the one observed during the dry weather sampling on August 7, 2008. The most common sources of phosphorus are fertilizer, waterfowl waste, and plant material decay. The decrease in many of the nutrient parameters during the wet weather event could indicate a system with a high residence time between storm events. In this type of system nutrients get diluted and/or flushed out of the pond system by the additional water flow.

Recommendations

The results of this water quality sampling program indicate that nutrient loading of Merokee Pond is currently occurring from the surrounding watershed. There are two general approaches to reduce the bacterial and nutrient levels in Merokee Pond: (1) eliminate or reduce the source and (2) treat the nutrient loading and bacteria once in the water body. Ideally, the best option is to eliminate the source of the bacteria and nutrient influx. However, because there is no bank wetland buffer, since most of the pond perimeter is mowed lawn ending at hard bank structures, and the amount of wildlife observed it would be difficult to eliminate the sources (identified in the above section). Only attempting to treat the concentration levels in the pond without reducing sources requires continuous maintenance efforts and associated funding. Therefore, the best tactic is a combination of approaches. The following are recommendations that include methods to help reduce the sources related to nuisance species and human behaviors, and treatment options to reduce the concentration levels once in the pond.

A comprehensive water quality sampling program could shed light on what locations are the true source contributors of pollutants to the Merokee Pond ecosystem. This should include four season water quality sampling for both dry weather and wet weather events in an expanded spatial setting (i.e. more sampling stations including additional perimeter location encompassing all pipe outfalls, and locations upstream of the tributaries of Merokee Pond.)

In order to fully address the water quality improvement needs for Merokee Pond, the sub-watershed needs to be accurately defined and the land uses within identified, along with potential nonpoint source pollution generators. The sub-watershed delineation should include surface and groundwater contributing areas. The current condition, capacity, and GPS locations of stormwater conveyance and disposal features such as catch basins, leach pools, vertical drains, etc. should be identified. These should be mapped in a digital geographic information system (GIS) format to be readily accessible by stormwater managers.

To eliminate the possibility of failing septic systems as bacterial source, all septic/sewer lines should be identified and mapped. It is recommended that dye tracers are utilized to attest that the pipes are within a closed system operating to state and county standards.

To reduce the human influenced sources a long-term commitment to healthy lawn care practices from surrounding residences is required. Nassau County and the Town of Hempstead should coordinate with the groups such as the New York Sea Grant Nonpoint Education for Municipal Officials (NEMO) program and invite their participation in a series of public outreach sessions. Public education and outreach topics that could be used to minimize illicit discharges into East Bay via Merokee Pond are:

1. The nitrogen and phosphorus influx effects of lawn fertilizers on Merokee Pond and the greater East Bay.
2. The effects of at home car washing and vehicle fluid changing
3. The effects of bacterial loads in surface waters as a result of domestic pet waste and feeding of waterfowl

Due to the observed presence of the nuisance Canada goose it is recommended to develop and implement a waterfowl management plan at Merokee Pond. Non-lethal Canada goose controls include:

1. Alteration of habitat
   a. Plant trees and shrubs because geese cleared prefer areas with easy take-off/landing room.
   b. Allow grass to grow since geese do not like walking through tall grass.
2. Restriction on feeding
   a. Discourage feeding by the public.
3. Installation of mechanical barrier
   a. Add fencing, hedgerows or other physical barriers around the pond perimeter since geese prefer to walk not fly to and from the walk and land.
4. Utilize scare tactic devices
   a. Noise makers: Timed sirens, shell crackers or auto-exploders may work in conjunction with other tactics.
   b. Plastic streamers, glittery flagging, scarecrows
5. Use security dogs
   a. Border Collies and other trained dogs can herd geese out of pond and grassy areas.
6. Apply Methyl-anthrantilate – Rejex-it
   a. Naturally occurring sweet flavored compound that is distasteful to many birds including Canada geese.

The occurrence of significant aquatic plant growth and/or algal blooms indicates the presence of excessive nutrients. Past studies have shown that it can be difficult but possible to treat the excessive nutrients once in the system. Creating a wetland buffer along the pond bank with vegetative strips of emergent plants helps trap and filter nutrients from stormwater runoff. Plant selection should be based on value as filtering agents that do not have invasive growth tendencies. Often, ponds either have algal blooms or plant life, usually dependent on water clarity. Merokee is an interesting case because it has an excess of both aquatic plants and algae.

Other possible treatments that may be worth exploring include the use of bacterial inoculants, submerged aeration, and UV treatments. The use of bacterial inoculants is a new market technique to potentially limit the availability of nutrients for algal and plant uptake and growth. Bacterial inoculants are essentially “good” bacteria that compete with algae and aquatic plants to utilize the excess nutrients. Bacterial inoculants have been shown to be most effective in closed pond systems, for Merokee Pond this means trying to retain water discharge during treatments. Submerged aeration, UV treatments, and algaecide are all techniques employed to reduce the occurrence of algal blooms; these are maintenance techniques that reduce algae growth but often result in an increase of plant life since they do not target nutrient loads.

Pond bottom barriers, harvesting, and herbicide are all techniques employed to reduce aquatic plant growth; the reduction of plant growth can result in an increase of algal blooms since these techniques do not target nutrient loads. Due to Merokee Pond's proximity to the Cedar Swamp Preserve and its connectivity to Cedar Swamp Creek, it may be difficult to get the regulatory approval to chemically treat with herbicide or algaecide. The most effective initial treatment effort may be mechanical harvesting of the aquatic plant material and algae on a routine basis, while attempting to identify and reduce specific loading sources.

References

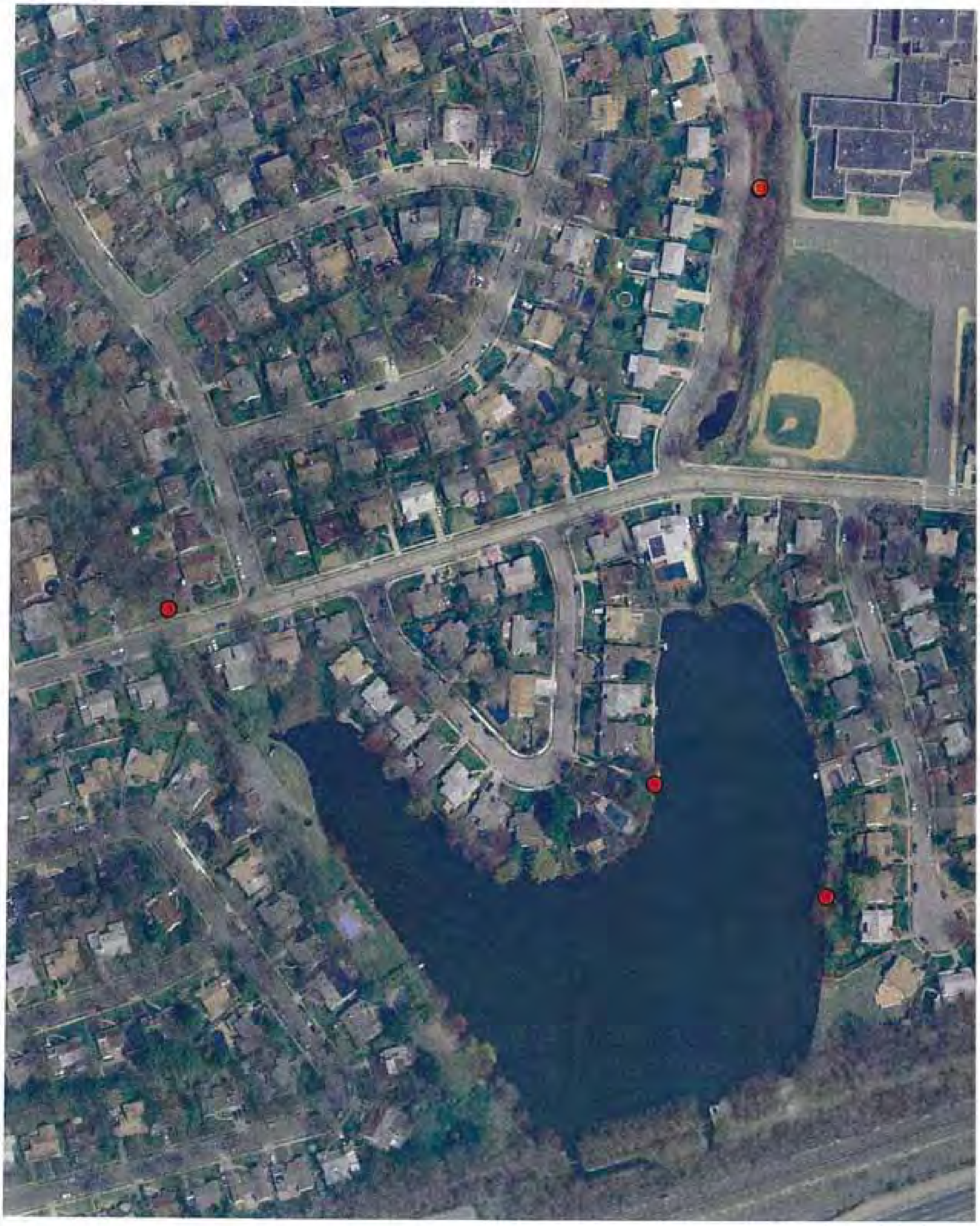
NYSDEC. 1999. Water Quality Regulations: Surface Water and Groundwater Classifications and Standards, 6NYCRR Parts 700-706. NYS Department of Environmental Conservation.

USEPA. 1997. Volunteer Stream Monitoring: A Methods Manual. United States Environmental Protection Agency Office of Water. EPA 841-B-97-003.

USEPA. 2001. Ambient Water Quality Criteria Recommendations: Lakes and Reservoirs in Nutrient Ecoregion XIV. United States Environmental Protection Agency Office of Water. EPA-822-B-01-011.

USEPA. 2004. Water Quality Standards for Coastal and Great Lakes Recreation Waters. Federal Register: Vol. 69, No. 220. Web Access: http://www.epa.gov/fedrgstr/EPA-WATER/2004/November/Day-16/w25303.htm.

Figure 1: Water Quality Sampling Stations
Merokee Pond, Merrick, Town of Hempstead
Nassau County Department of Public Works Project ID 35106



0 20 40 80 120 160 Meters

Projection: 2004 Aerial - NAD 1983 UTM Zone 18N
Data Points Collected and Plotted April 22, 2008 by EEA, Inc.

N

Table 4: Merokee Pond Water Quality Sampling, Spring 2008 - Bacterial Concentrations *

Station - Event	Date	Time	Enterococci MPN/ 100mL	Fecal Coliform MPN/ 100mL	Total Coliform MPN/ 100mL
Station 1 - Dry	4/22/2008	11:15	240	2400	11000
Station 2 - Dry	4/22/2008	12:07	23	93	150
Station 3 - Dry	4/22/2008	12:40	3	240	460
Station 4 - Dry	4/22/2008	13:30	3	93	1100
Station 1 - Wet	5/9/2008	10:45	11000	430	2100
Station 2 - Wet	5/9/2008	11:10	15	40	110
Station 3 - Wet	5/9/2008	11:28	460	430	11000
Station 4 - Wet	5/9/2008	11:38	4600	11000	46000

Table 5: Merokee Pond Water Quality Sampling, Spring 2008 - Nutrient Concentrations *

Station - Event	Ammonia mg/L	TKN mg/L	Nitrogen mg/L	Nitrate mg/L	Phosphorus mg/L
Station 1 - Dry	0.05	1	3.3	2.3	0.05
Station 2 - Dry	0.05	1.4	3.6	2.2	0.11
Station 3 - Dry	0.05	0.6	2.1	1.5	0.03
Station 4 - Dry	0.05	0.3	3.3	3	0.02
Station 1 - Wet	0.062	0.7	2.9	2.2	0.03
Station 2 - Wet	0.05	0.6	2.9	2.3	0.02
Station 3 - Wet	0.11	0.8	2.6	1.8	0.08
Station 4 - Wet	0.27	2.8	4.9	2.1	0.2

Table 6: Merokee Pond Water Quality Sampling, Spring 2008 - Physical Measurements *

Station - Event	Salinity ppt	TSS mg/L	pH	Surface DO mg/L	Temperature oC	Depth meter
Station 1 - Dry	0.2	11	6.3	10.2	17.4	0.5
Station 2 - Dry	0.2	16	6.6	11.55	17.3	0.5
Station 3 - Dry	0	2.5	6.4	8.6	15.6	0.1
Station 4 - Dry	0.1	2.5	6.4	10.3	18.7	0.1
Station 1 - Wet	0.1	9	7.2	6.61	16.2	0.5
Station 2 - Wet	0.1	6	7.2	6.65	16.7	0.5
Station 3 - Wet	1.8	17	7.1	6.35	12.1	0.1
Station 4 - Wet	0.1	50	7.1	7.34	13	0.2
Pond Center (8/7/08)	0.2	N/A	6.9	7	21.4	1.5

* Numbers in red indicate levels exceeding standard or guidance limits

Figure 2
Merokee Pond Water Quality Sampling: Total Coliform
(NYS Standard 2400 MPN/100mL)

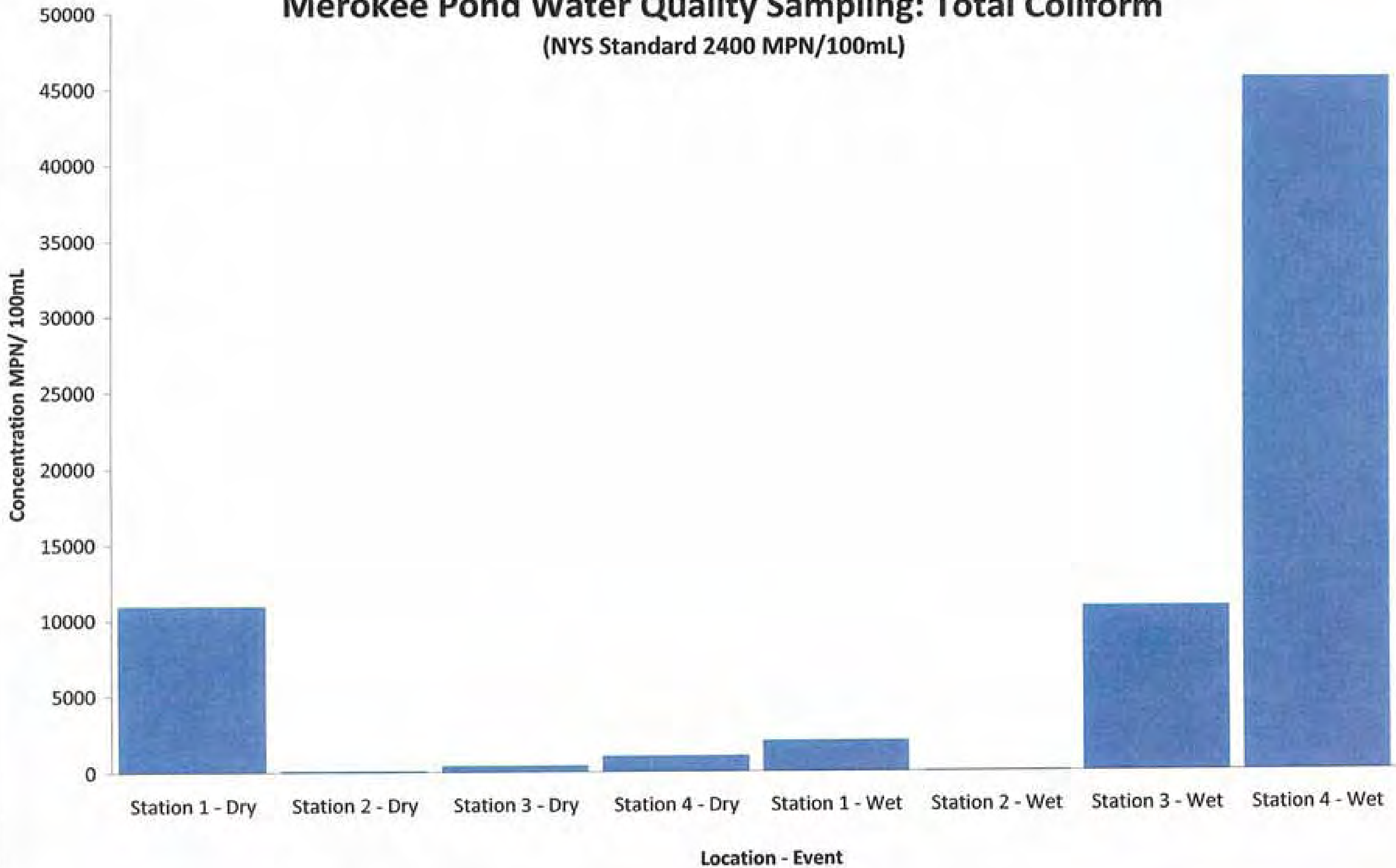
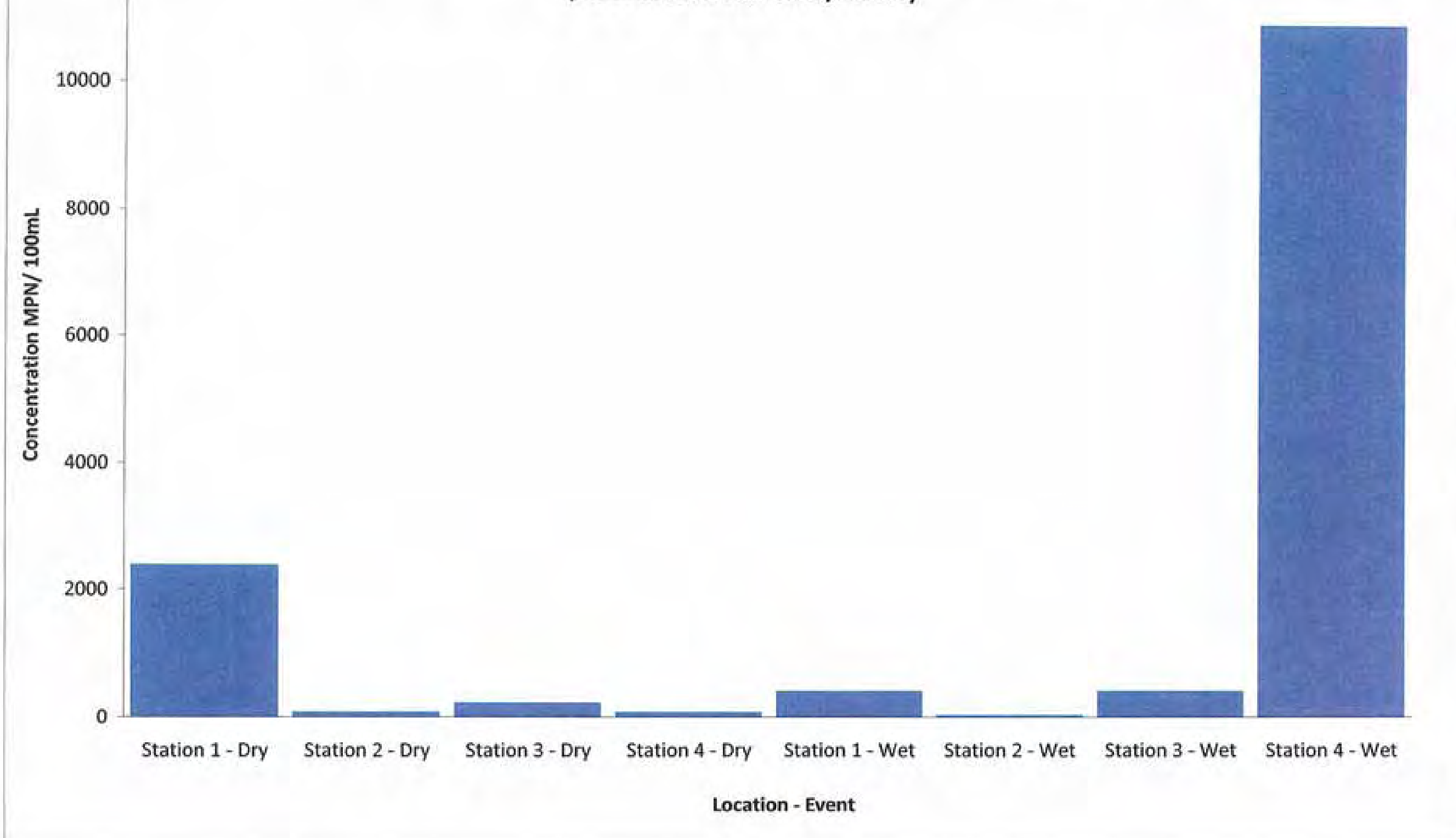


Figure 3

Merokee Pond Water Quality Sampling: Fecal Coliform

(NYS Standard 200 MPN/100mL)



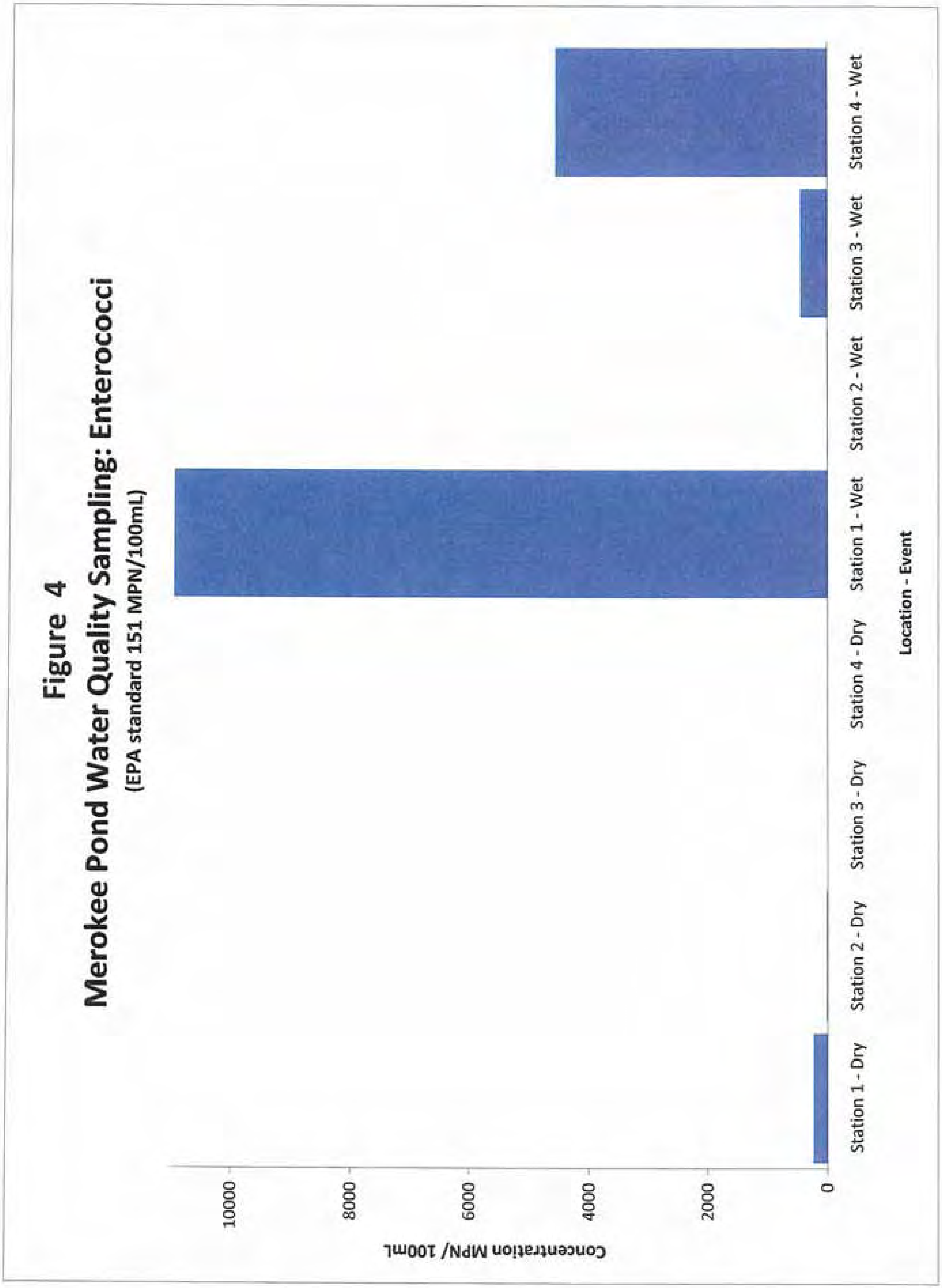


Figure 4
Merokee Pond Water Quality Sampling: Enterococci
(EPA standard 151 MPN/100mL)
Concentration MPN/ 100mL
0
2000
4000
6000
8000
10000
Station 1 - Dry
Station 2 - Dry
Station 3 - Dry
Station 4 - Dry
Station 1 - Wet
Station 2 - Wet
Station 3 - Wet
Station 4 - Wet
Location - Event

Figure 5
Merokee Pond Water Quality Sampling: Total Nitrogen

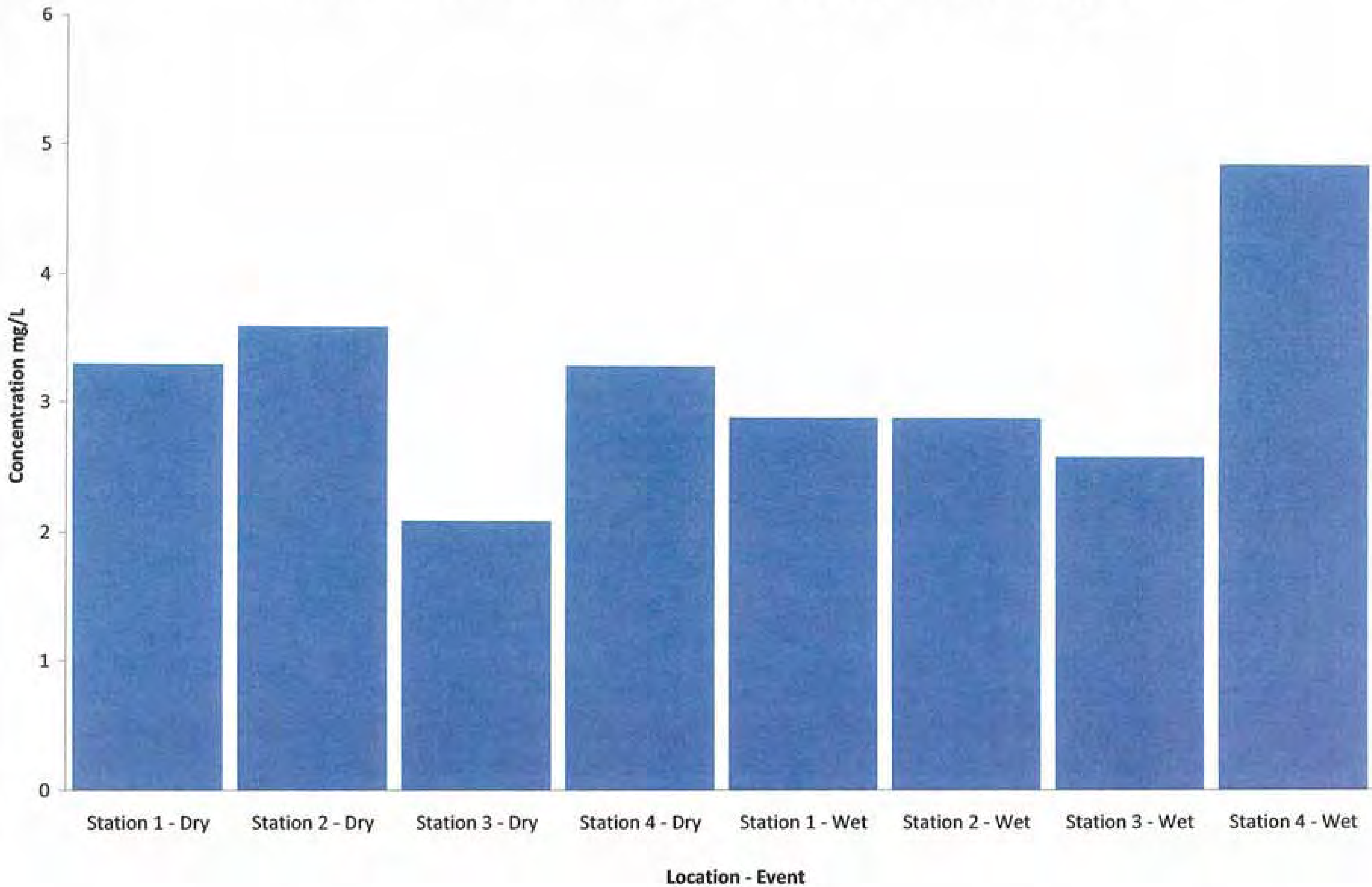


Figure 6
Merokee Pond Water Quality Sampling: Nitrate

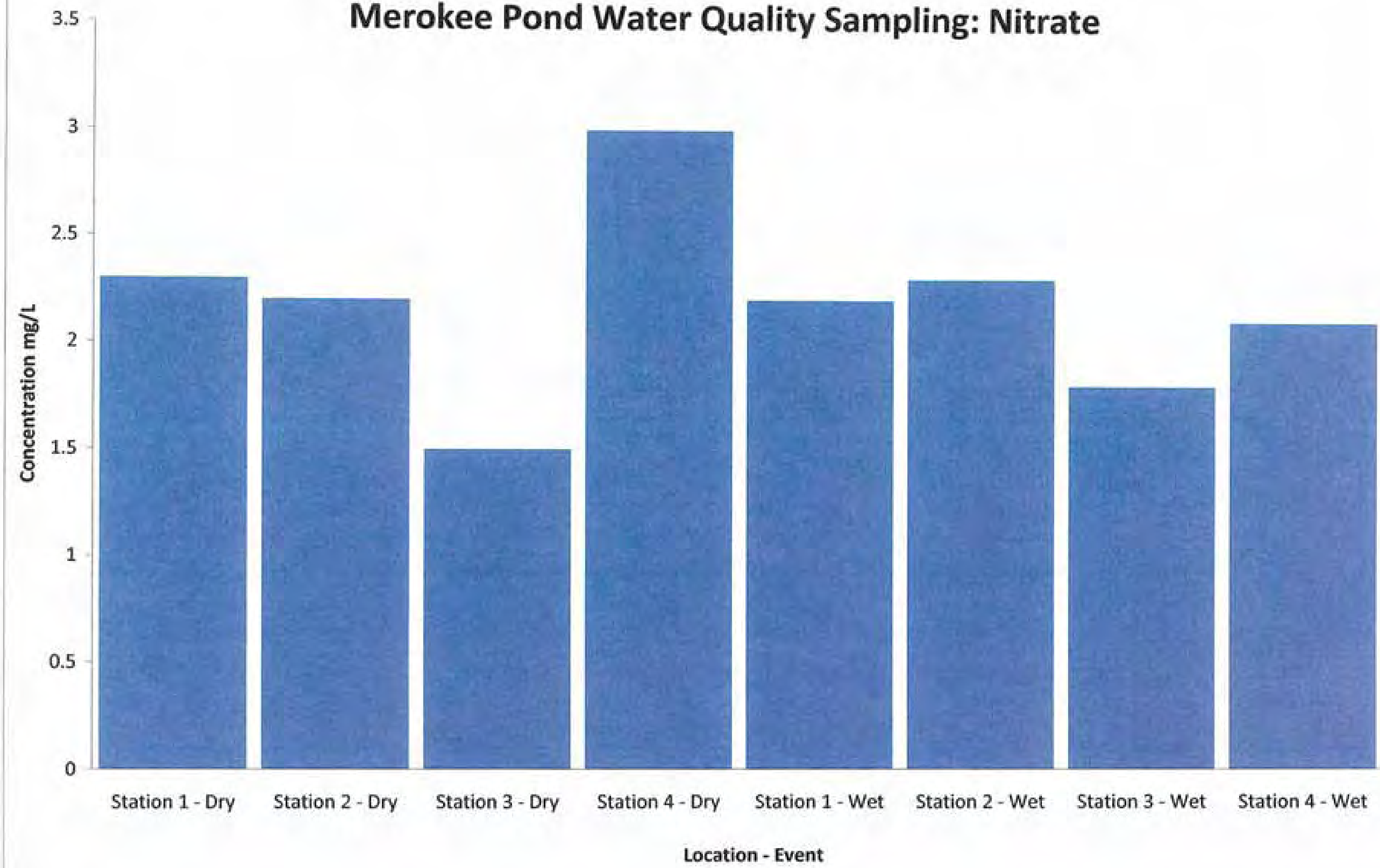
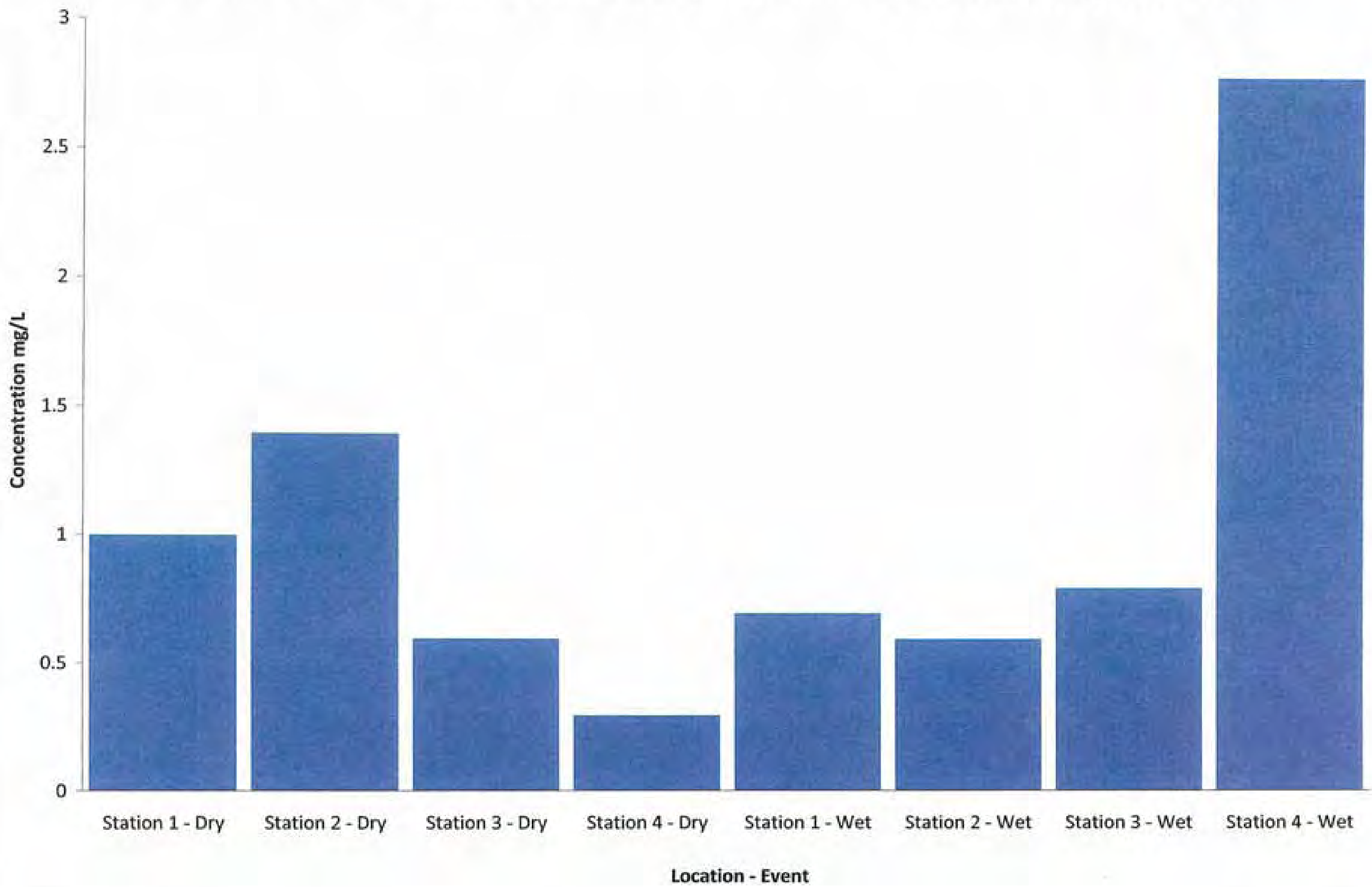


Figure 7
Merokee Pond Water Quality Sampling: Total Kjeldahl Nitrogen (TKN)



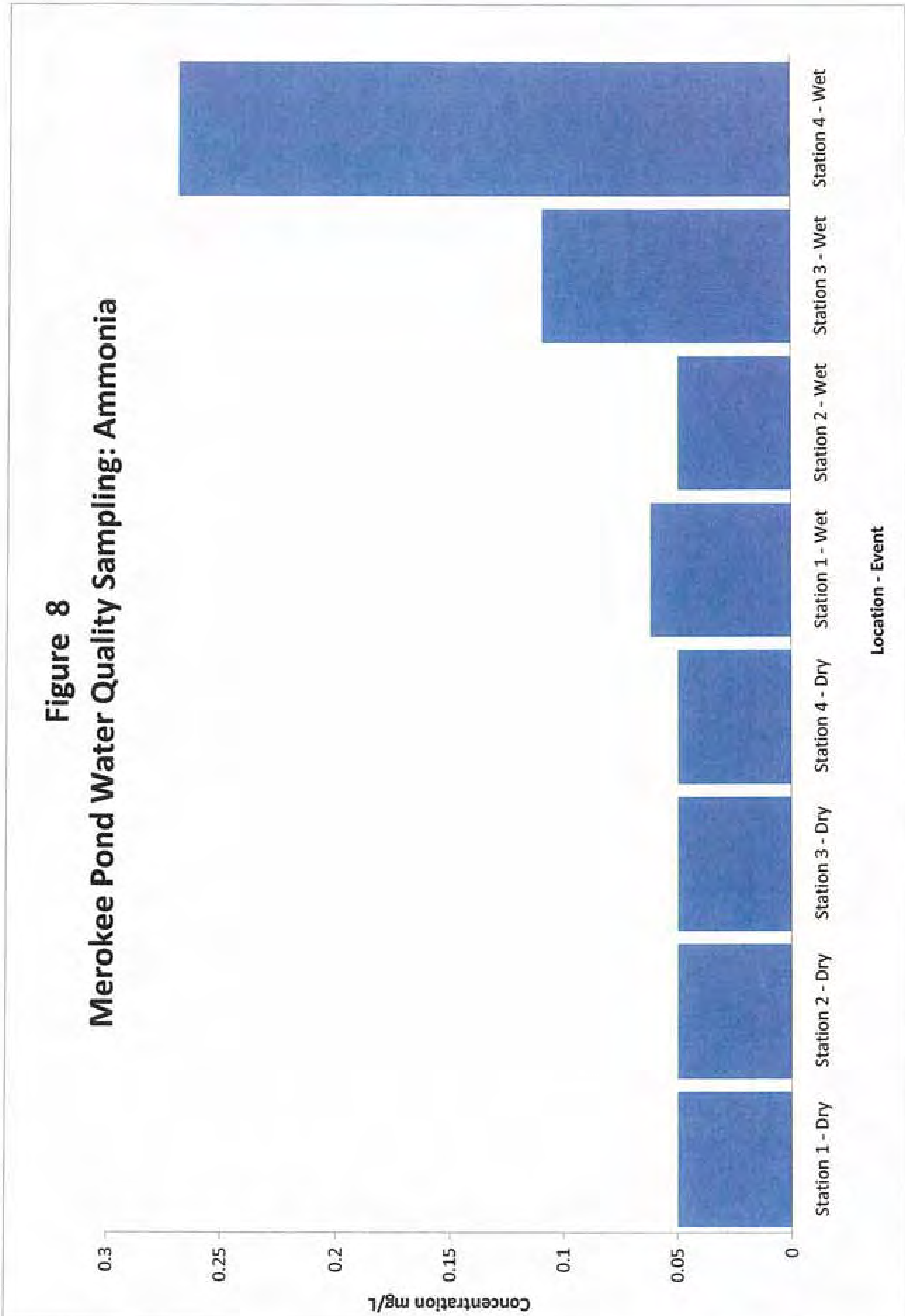


Figure 8
Merokee Pond Water Quality Sampling: Ammonia
Concentration mg/L
0.3
0.25
0.2
0.15
0.1
0.05
0
Station 1 - Dry
Station 2 - Dry
Station 3 - Dry
Station 4 - Dry
Station 1 - Wet
Station 2 - Wet
Station 3 - Wet
Station 4 - Wet
Location - Event

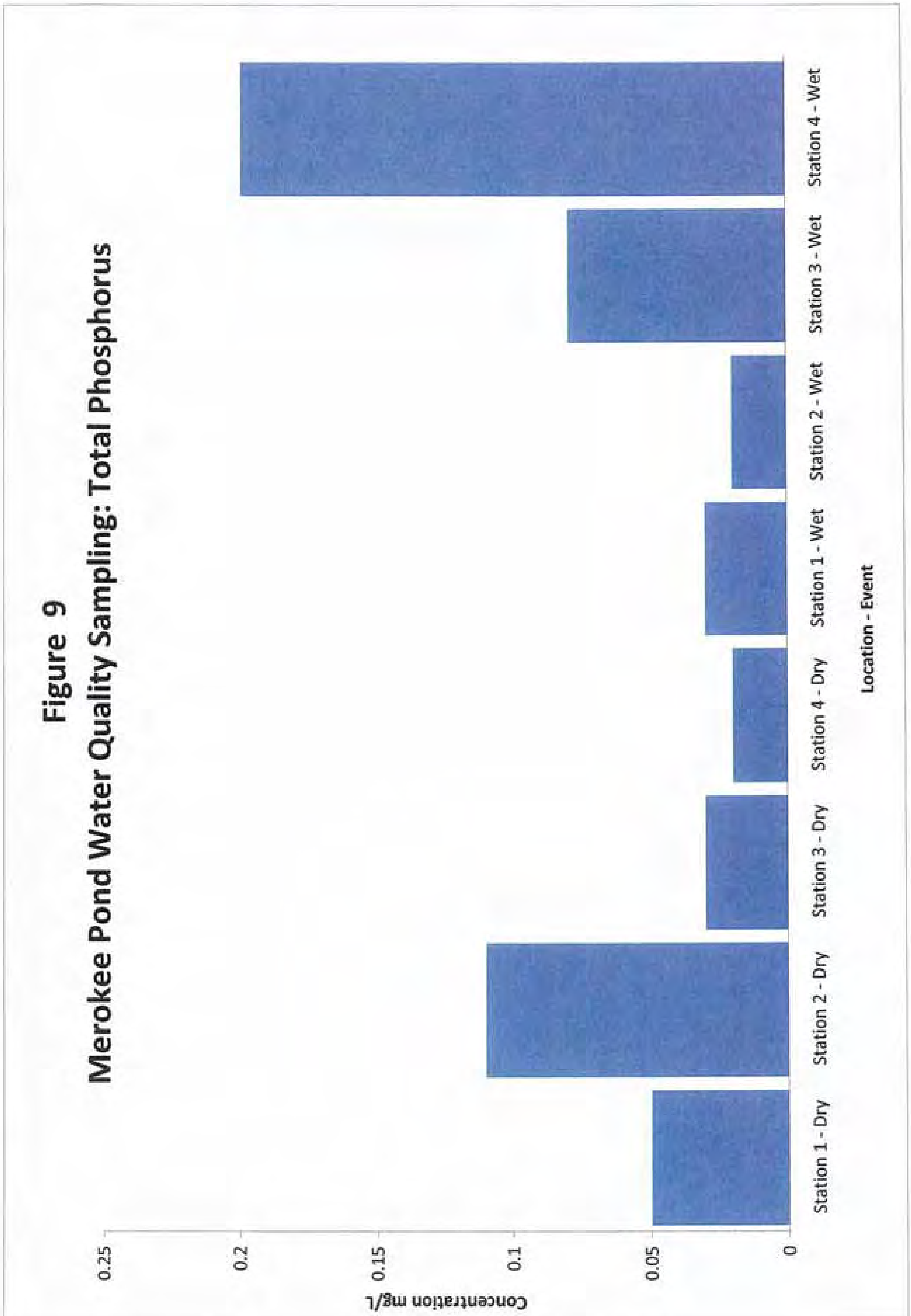
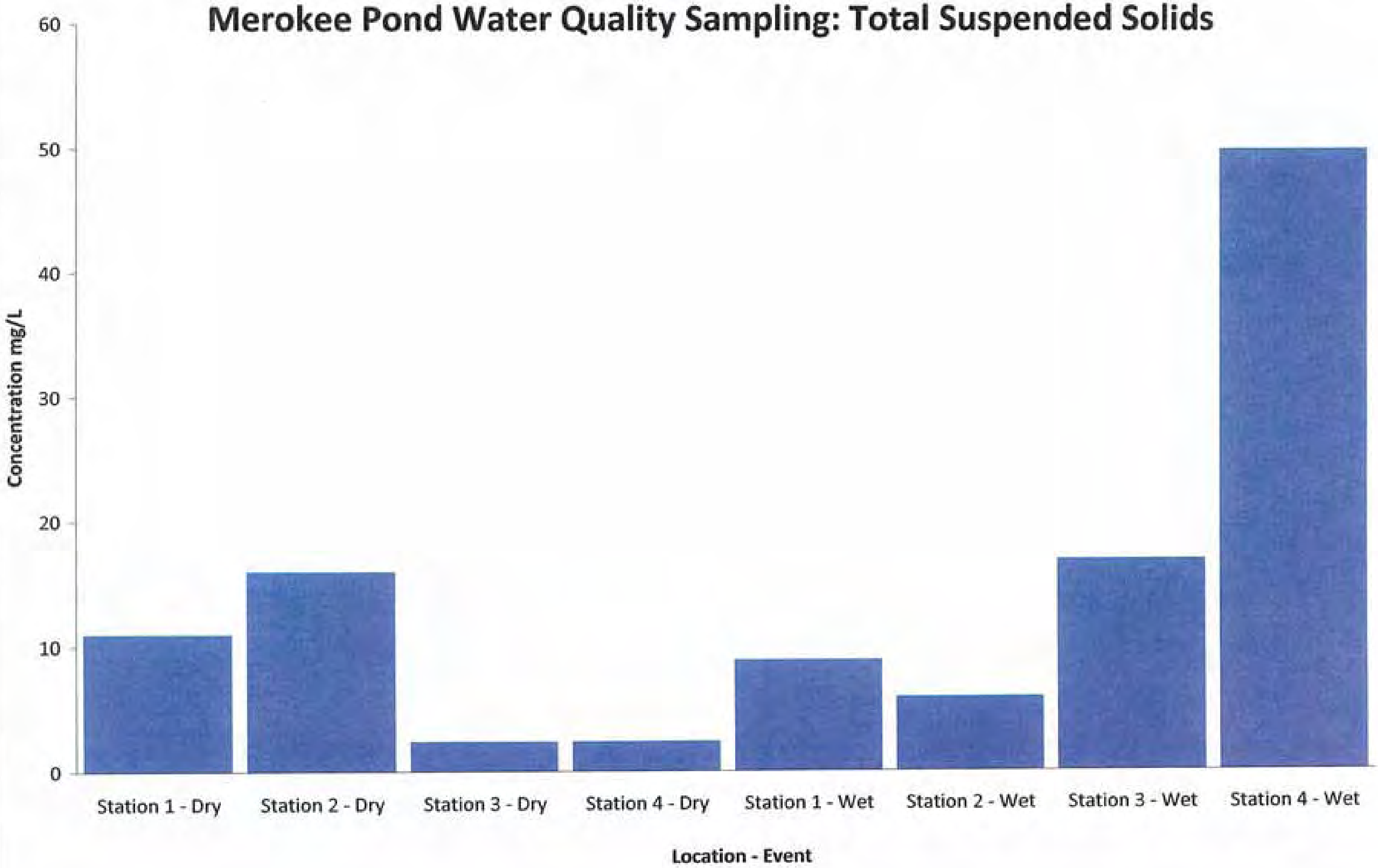


Figure 9
Merokee Pond Water Quality Sampling: Total Phosphorus
Concentration mg/L
0.25
0.2
0.15
0.1
0.05
0
Station 1 - Dry
Station 2 - Dry
Station 3 - Dry
Station 4 - Dry
Station 1 - Wet
Station 2 - Wet
Station 3 - Wet
Station 4 - Wet
Location - Event

Figure 10

Merokee Pond Water Quality Sampling: Total Suspended Solids



EEA WATER QUALITY DATA SHEET

Project Name: NCPPW 4 Ponds
Date: 4/22/08
Crew: B. Jacobs, E. Brosnan

Project Site: Merokee
Temperature: 70°F
Weather Conditions: Sunny

Station ID: Merokee 1 — Desciption: SE corner of Merokee Drive w side of E branch

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
11:15	0.5m	17.4	6.3	10.20 104.0	0.2	115.1	5 marks Still clear	4

Notes: concrete blocks to lake, vegetation growing through blocks

Station ID: Merokee 2 — Desciption: East side of E branch at Merokee Place.

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
12:07	0.5m	17.3	6.6	11.55 117.2	0.2	485.4	5 marks still clear	4

Notes: Homeowner: Kieran Crowley   East side of east branch

Station ID: Merokee 3 — Desciption: W tributary North of Smith St.

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
12:40	0.1m	15.6	6.4	8.60	0.0	141.1	N/A	4

Notes: Neighbors by stream noted odors and low water levels in stream - (Abutting stream east side) No odor when we were there.

Station ID: Merokee 4 — Desciption: E tributary North of Smith St.

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
1:30p	0.1m	18.7	6.4	10.3	0.1	249	N/A	4

Notes:

EEA WATER QUALITY DATA SHEET

Project Name: NCDPW 4 Ponds, Merokee
Date: 5/9/08
Crew: Erin Brosnan, Bill Jacobs

Project Site: Merokee Pond
Temperature: 50°
Weather Conditions: Light rain / Moderate rain } Steady

Station ID: Merokee #1
Desciption:

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
10:45	0.5	16.2	7.2	6.61 66%	0.1	389.3	4+ still clear	4

Notes:

Station ID: Merokee #2
Desciption:

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
11:10	0.5	16.7	7.2	6.65 88%	0.1	391.8	4+ clear	4

Notes: Steady, light-moderate rain Pair of Swans. 6 geese, Pair mallards

Station ID: Merokee #3
Desciption: West tributary, No. of Smith St.

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
11:28	<0.1	12.1	7.1	6.35 60%	0.0	1.8	Clear to ~~N/A~~ bottom	4

Notes: Moderate-heavy rain

Station ID: Merokee #4
Desciption: East trib.

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
11:38	<0.2	13.0	7.1	7.34 70%	0.1	239.0	Clear to bottom ~~N/A~~	4

Notes: Moderate rain

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(631) 422-5777 • FAX (631) 422-5770 • Email: ecotestlab@aol.com

281687

CHAIN OF CUSTODY RECORD

27

Client: EEA, Inc.
Address: 1239 Rt 25A Suite 1
Stony Brook NY 11790
Phone: 631-751-4600 FAX:
Person receiving report: E Brosnan
Sampled by: Erin Brosnan
Source: Merokee Lake
Job No.: NCDPW 4 Ponds

TYPE & NUMBER OF CONTAINERS

MATRIX (Soil, Water, etc.)	COLLECTED DATE	COLLECTED TIME	SAMPLE IDENTIFICATION	TOTAL NUMBER OF CONTAINERS	Bacteria bottle	16oz bottle H_2SO_4	32oz plastic							QC Pkg Type (If Required)	Accelerated Turnaround Date Required	REMARKS-TESTS REQUIRED FOR ALL SAMPLES:
Water	4/22/08	11:35 a	Merokee Station 1	4	2	1	1									Total + Fecal Coliform, Ammonia, Nitrate,
Water	4/22/08	12:15 p	Merokee Station 2	4	2	1	1									Total Nitrogen, TKN, Total Phosphorous,
Water	4/22/08	12:45 p	Merokee Station 3	4	2	1	1									TSS, Enterrococci
Water	4/22/08	1:30 p	Merokee Station 4	4	2	1	1									

Temp = 2.5°C

Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)	Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)
Erin Brosnan Representing: EEA	4/22/08 14:36	YES NO NA	Representing:	Representing:		YES NO NA	Representing:
Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:	Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:

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Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.281687.01 05/06/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Lake, #NCDPW 4 Ponds
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:04/22/08 RECEIVED:04/22/08
TIME COL'D:1135
MATRIX:Water SAMPLE: Merokee Station 1

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		11000		04/22/08	30	SM209221B
Fecal Coli MPN/100mL		2400		04/22/08	30	SM209221E
Enterococci Bacteria,MPN		240		04/22/08	3	ENTEROLERT
Ammonia as N	mg/L	< 0.05		04/28/08	0.05	SM4500NH3D
Tot. Kjeldahl N.	mg/L	1.0		05/05/08	0.1	SM4500NORGB
Nitrate as N	mg/L	2.3		04/29/08	0.5	EPA353.2
Nitrogen, total as N	mg/L	3.3		05/05/08	0.1	EPA351,353
Phosphorous as P	mg/L	0.05		04/25/08	0.02	EPA 365.3
Tot Suspended Solids	mg/L	11		04/29/08	5	SM2540D

cc:

LRL=Laboratory Reporting Limit

REMARKS: Inoculation time: 335pm

DIRECTOR

rn = 11872 NYSDOH ID # 10320 Page 1 of 1

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Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.281687.02 05/06/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Lake, #NCDPW 4 Ponds
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:04/22/08 RECEIVED:04/22/08
TIME COL'D:1215
MATRIX:Water SAMPLE: Merokee Station 2

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		150		04/22/08	3	SM209221B
Fecal Coli MPN/100mL		93		04/22/08	3	SM209221E
Enterococci Bacteria,MPN		23		04/22/08	3	ENTEROLERT
Ammonia as N	mg/L	< 0.05		04/28/08	0.05	SM4500NH3D
Tot. Kjeldahl N.	mg/L	1.4		05/05/08	0.1	SM4500NORGB
Nitrate as N	mg/L	2.2		04/29/08	0.5	EPA353.2
Nitrogen, total as N	mg/L	3.6		05/05/08	0.1	EPA351,353
Phosphorous as P	mg/L	0.11		04/25/08	0.02	EPA 365.3
Tot Suspended Solids	mg/L	16		04/29/08	3.3	SM2540D

cc:

LRL=Laboratory Reporting Limit

REMARKS: Inoculation time: 335pm

DIRECTOR

rn = 11873 NYSDOH ID # 10320 Page 1 of 1

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Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.281687.03 05/06/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Lake, #NCDPW 4 Ponds
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:04/22/08 RECEIVED:04/22/08
TIME COL'D:1245
MATRIX:Water SAMPLE: Merokee Station 3

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		460		04/22/08	3	SM209221B
Fecal Coli MPN/100mL		240		04/22/08	3	SM209221E
Enterococci Bacteria,MPN		< 3		04/22/08	3	ENTEROLERT
Ammonia as N	mg/L	< 0.05		04/28/08	0.05	SM4500NH3D
Tot. Kjeldahl N.	mg/L	0.6		05/05/08	0.1	SM4500NORGB
Nitrate as N	mg/L	1.5		04/29/08	0.5	EPA353.2
Nitrogen, total as N	mg/L	2.1		05/05/08	0.1	EPA351,353
Phosphorous as P	mg/L	0.03		04/25/08	0.02	EPA 365.3
Tot Suspended Solids	mg/L	< 2.5		04/29/08	2.5	SM2540D

cc:

LRL=Laboratory Reporting Limit

REMARKS: Inoculation time: 335pm

DIRECTOR

rn = 11874 NYSDOH ID # 10320 Page 1 of 1

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Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.281687.04 05/06/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790

ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Lake, #NCDPW 4 Ponds
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:04/22/08 RECEIVED:04/22/08
TIME COL'D:1330
MATRIX:Water SAMPLE: Merokee Station 4

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		1100		04/22/08	3	SM209221B
Fecal Coli MPN/100mL		93		04/22/08	3	SM209221E
Enterococci Bacteria,MPN		< 3		04/22/08	3	ENTEROLERT
Ammonia as N	mg/L	< 0.05		04/28/08	0.05	SM4500NH3D
Tot. Kjeldahl N.	mg/L	0.3		05/05/08	0.1	SM4500NORGB
Nitrate as N	mg/L	3		04/29/08	0.5	EPA353.2
Nitrogen, total as N	mg/L	3.3		05/05/08	0.2	EPA351,353
Phosphorous as P	mg/L	< 0.02		04/25/08	0.02	EPA 365.3
Tot Suspended Solids	mg/L	< 2.5		04/29/08	2.5	SM2540D

cc:

LRL=Laboratory Reporting Limit

REMARKS: Inoculation time: 335pm

DIRECTOR

rn = 11875 NYSDOH ID # 10320 Page 1 of 1

ECO TEST LABORATORIES, INC. • ENVIRONMENTAL TESTING
377 Sheffield Avenue, North Babylon, New York 11703
(631) 422-5777 • FAX (631) 422-5770 • Email: ecotestlab@aol.com

281996

CHAIN OF CUSTODY RECORD

6

Client: EEA
Address: 1239 Rte 25A Suite 1
Stony Brook NY 11790
Phone: 631-751-4600 FAX:
Person receiving report: E Brosnan
Sampled by: Erin Brosnan
Source: Merokee Pond
Job No.: 08508.02 NCDPW 4 Ponds

TYPE & NUMBER OF CONTAINERS

MATRIX (Soil, Water, etc.)	COLLECTED DATE	COLLECTED TIME	SAMPLE IDENTIFICATION	TOTAL NUMBER OF CONTAINERS	Bacteria Bottles	16oz H2SO4	32oz Plastic							QC Pkg Type (If Required)	Accelerated Turnaround Date Required	REMARKS-TESTS REQUIRED FOR ALL SAMPLES:
Water	5/9/08	10:43	Merokee Station 1	4	2	1	1									Ammonia, Nitrate, Total Nitrogen, TKN,
Water	5/9/08	11:03	Merokee Station 2	4	2	1	1									Total Phosphorus, TSS, Enterococci
Water	5/9/08	11:23	Merokee Station 3	4	2	1	1									Total + Fecal Coliform [6 dilutions
Water	5/9/08	11:35	Merokee Station 4	4	2	1	1									to MPN of 2.4 million/100mL)
																Temp=13°C

Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)	Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)
Erin Brosnan Representing: EEA	5/9/08 12:38	YES NO NA	[signature] Representing:	Representing:		YES NO NA	Representing:
Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:	Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING
377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770
Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.281996.01 05/20/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.02 NCDPW 4 Ponds
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:05/09/08 RECEIVED:05/09/08
TIME COL'D:1043
MATRIX:Water SAMPLE: Merokee Station 1

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		2100		05/09/08	30	SM209221B
Fecal Coli MPN/100mL		430		05/09/08	30	SM209221E
Enterococci Bacteria,MPN		11000		05/09/08	30	ENTEROLERT
Ammonia as N	mg/L	0.062		05/14/08	0.05	SM4500NH3D
Tot. Kjeldahl N.	mg/L	0.7		05/19/08	0.1	SM4500NORGE
Nitrate as N	mg/L	2.2		05/15/08	0.5	EPA353.2
Nitrogen, total as N	mg/L	2.9		05/19/08	0.1	epa351,353
Phosphorous as P	mg/L	0.03		05/13/08	0.02	EPA 365.3
Tot Suspended Solids	mg/L	9		05/14/08	3.3	SM2540D

cc:

LRL=Laboratory Reporting Limit

REMARKS: Inoculation time: 400pm

DIRECTOR

rn = 14183 NYSDOH ID # 10320 Page 1 of 1

ECOTEST LABORATORIES, INC. *ENVIRONMENTAL TESTING*

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Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.281996.02 05/20/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.02 NCDPW 4 Ponds
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:05/09/08 RECEIVED:05/09/08
TIME COL'D:1103
MATRIX:Water SAMPLE: Merokee Station 2

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		110		05/09/08	30	SM209221B
Fecal Coli MPN/100mL		40		05/09/08	30	SM209221E
Enterococci Bacteria,MPN		15		05/09/08	3	ENTEROLERT
Ammonia as N	mg/L	< 0.05		05/14/08	0.05	SM4500NH3D
Tot. Kjeldahl N.	mg/L	0.6		05/19/08	0.1	SM4500NORGB
Nitrate as N	mg/L	2.3		05/15/08	0.5	EPA353.2
Nitrogen, total as N	mg/L	2.9		05/19/08	0.1	EPA351,353
Phosphorous as P	mg/L	0.02		05/13/08	0.02	EPA 365.3
Tot Suspended Solids	mg/L	6		05/14/08	3.3	SM2540D

cc:

LRL=Laboratory Reporting Limit

REMARKS: Inoculation time: 400pm

DIRECTOR

rn = 14184 NYSDOH ID # 10320 Page 1 of 1

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Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.281996.03 05/20/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.02 NCDPW 4 Ponds
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:05/09/08 RECEIVED:05/09/08
TIME COL'D:1123
MATRIX:Water SAMPLE: Merokee Station 3

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		11000		05/09/08	30	SM209221B
Fecal Coli MPN/100mL		430		05/09/08	30	SM209221E
Enterococci Bacteria,MPN		460		05/09/08	3	ENTEROLERT
Ammonia as N	mg/L	0.11		05/14/08	0.05	SM4500NH3D
Tot. Kjeldahl N.	mg/L	0.8		05/19/08	0.1	SM4500NORGB
Nitrate as N	mg/L	1.8		05/15/08	0.5	EPA353.2
Nitrogen, total as N	mg/L	2.6		05/19/08	0.1	EPA351,353
Phosphorous as P	mg/L	0.08		05/13/08	0.02	EPA 365.3
Tot Suspended Solids	mg/L	17		05/14/08	3.3	SM2540D

cc:

LRL=Laboratory Reporting Limit

REMARKS: Inoculation time: 400pm

DIRECTOR

rn = 14185 NYSDOH ID # 10320 Page 1 of 1

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377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770
Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.281996.04 05/20/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.02 NCDPW 4 Ponds
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:05/09/08 RECEIVED:05/09/08
TIME COL'D:1135
MATRIX:Water SAMPLE: Merokee Station 4

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		46000		05/09/08	30	SM209221B
Fecal Coli MPN/100mL		11000		05/09/08	30	SM209221E
Enterococci Bacteria,MPN		4600		05/09/08	3	ENTEROLERT
Ammonia as N	mg/L	0.27		05/14/08	0.05	sM4500NH3D
Tot. Kjeldahl N.	mg/L	2.8		05/19/08	0.1	SM4500NORGI
Nitrate as N	mg/L	2.1		05/15/08	0.5	EPA353.2
Nitrogen, total as N	mg/L	4.9		05/19/08	0.1	EPA351,353
Phosphorous as P	mg/L	0.2		05/13/08	0.02	EPA 365.3
Tot Suspended Solids	mg/L	50		05/14/08	10	SM2540D

cc:

LRL=Laboratory Reporting Limit

REMARKS: Inoculation time: 400pm

DIRECTOR

rn = 14186 NYSDOH ID # 10320 Page 1 of 1

COMPARISON OF WATER QUALITY AT VARIOUS PONDS

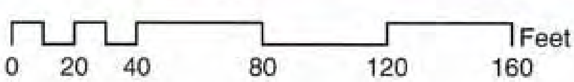
		Enterococci	Fecal Coli	Total Coli	Ammonia	TKN	Nitrogen	Nitrate	Phosphorus	TSS	Salinity	pH	DO	Conduct.	Temp
		MPN/100mL	MPN/100mL	MPN/100mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ppt		mg/L	uS	oC
NY Standard(S) /Guidance(G)*		<151**	<200 (S)	<2400 (S)	<2 (S)		<10 (S)	<10 (S)	<0.02 (G)	<70***		6.5-8.5 (S)	<4 (S)		
Dry Weather															
Cedar - 1	4/23/2008	4	210	11000	0.05	0.7	2.4	1.7	0.04	39	0.1	6.3	8.55	197.8	17.5
Cedar - 2	4/23/2008	3	240	460	0.13	0.8	2	1.2	0.05	4	3.2	5.9	8.5	50	19.9
Udalls - 1	4/24/2008	23	2400	11000	0.4	1	2.7	1.7	0.29	11	3.6	6.6	6.64	5.87	19.6
Udalls - 2	4/24/2008	23	240	11000	1.4	4.2	4.7	0.5	0.26	89	0	7	1.88	1640	24.6
Udalls - 3	4/24/2008	460	1100	2400	0.2	1	3.5	2.5	0.12	13	0.4	6.8	11.25	663	17
Twin - 1	4/24/2008	460	460	2400	0.2	2.4	8.9	6.5	0.39	74	0	8.4	15.4	4.1	21.7
Twin - 2	4/24/2008	43	43	2400	0.2	0.8	8.4	7.6	0.09	7	0.2	8.1	7.76	402	18.3
Merokee - 1	4/22/2008	240	2400	11000	0.05	1	3.3	2.3	0.05	11	0.2	6.3	10.2	115.1	17.4
Merokee - 2	4/22/2008	23	93	150	0.05	1.4	3.6	2.2	0.11	16	0.2	6.6	11.55	485.4	17.3
Minimum		3	43	150	0.05	0.7	2	0.5	0.04	4	0	5.9	1.88	4.1	17
Median		23	240	2400	0.2	1	3.5	2.2	0.11	13	0.2	6.6	8.55	197.8	18.3
Maximum		460	2400	11000	1.4	4.2	8.9	7.6	0.39	89	3.6	8.4	15.4	1640	24.6

* The above ponds are listed as Class C water bodies with the primary use as fishing. Of the NY standards and guidances listed fecal and total coliform, ammonia, pH and dissolved oxygen (DO) relate to Class C water bodies. The other NY standards and guidances correspond to recreation classed water bodies (Class A or B) which are held to stricter water quality standards but are used in this case as a reference point for means of comparison.

** There is no New York State standard or guidance for Enterococci, therefore the reference point selected is from the Federal Regulation 40 CFR 131.41 known as the USEPA Beach Rule. It is assumed that the above water bodies would qualify for the Freshwater - "Infrequently used full body contact recreation" criteria of 151 count per 100 mL.

*** There is no quantifed New York State standard or guidance for Total Suspended Solids (TSS) at this time, therefore the reference point selected is from NPDES permit requirements - "an average monthly concentration of less than 35 mg/L, and a maximum daily concentration of 70 mg/L."

Additional Water Quality Stations - 2009 Sampling
Merokee Pond, Merrick, Town of Hempstead
Nassau County Department of Public Works Project ID 35106



Data Points Collected and Plotted January 26, 2009 by EEA Inc.

Projection: 2004 Aerial - NAD 1983 UTM Zone 18N

Merokee Pond Water Quality Sampling, Winter 2009 - Bacterial Concentrations *

Location	Enterococci MPN/ 100mL	Fecal Coliform MPN/ 100mL	Total Coliform MPN/ 100mL
DEC limit	(151 EPA)	200	2,400
Station 1	4	240	460
Station 2	<3	210	1100
Station 3	4	150	210
Station 4	<3	43	43
Station 5	<3	43	93

Merokee Pond Water Quality Sampling, Winter 2009 - Nutrient Concentrations *

Location	Ammonia mg/L	TKN mg/L	Nitrogen mg/L	Nitrate mg/L	Phosphorus mg/L
DEC limit	2.2		10 (0.32 EPA)	10	0.02 (0.008 EPA)
Station 2	0.08	0.6	3.3	2.7	<0.02
Station 4	<0.05	1.2	4.1	2.9	<0.02
Station 5	<0.05	1.2	4.3	3.1	<0.02

Merokee Pond Water Quality Sampling, Winter 2009 - Physical Measurements *

Location	Salinity ppt	TSS mg/L	pH	Surface DO mg/L	Temperature oC	Depth meter
DEC limit			6.5>pH<8	>4		
Station 2	0.2	3	6.4	9.6	5.2	0.5
Station 4	0.3	<2.5	6.2	7.8	6.2	0.5
Station 5	0.3	<2.5	6.5	11.44	3.7	0.1

* Numbers in red indicate levels exceeding standard or guidance limits

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.290279.03 01/30/09

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:01/26/09 RECEIVED:01/26/09
TIME COL'D:1130
MATRIX:Water SAMPLE: Merokee 2

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		1100		012609 1410	3	209221B
Fecal Coli MPN/100mL		210		012609 1410	3	209221E
Enterococci Bacteria,MPN		< 3		012609 1410	3	Enterolert
Ammonia as N	mg/L	0.08		012709	0.05	4500NH3D
Tot. Kjeldahl N.	mg/L	0.6		012709	0.2	4500NORGB
Nitrate as N	mg/L	2.7		013009	0.5	EPA353.2
Nitrogen, total as N	mg/L	3.3		013009	0.5	EPA351,353
Phosphorous as P	mg/L	< 0.02		012709	0.02	EPA365.3
Tot Suspended Solids	mg/L	3		012809	2.5	2540D

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 1399 NYSDOH ID # 10320 Page 1 of 1

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.290279.01 01/30/09

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:01/26/09 RECEIVED:01/26/09
TIME COL'D:1110
MATRIX:Water SAMPLE: Merokee 1

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		460		012609 1410	3	209221B
Fecal Coli MPN/100mL		240		012609 1410	3	209221E
Enterococci Bacteria,MPN		4		012609 1410	3	Enterolert

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 1397 NYSDOH ID # 10320 Page 1 of 1

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.290279.02 01/30/09

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:01/26/09 RECEIVED:01/26/09
TIME COL'D:1135
MATRIX:Water SAMPLE: Merokee 3

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		210		012609 1410	3	209221B
Fecal Coli MPN/100mL		150		012609 1410	3	209221E
Enterococci Bacteria,MPN		4		012609 1410	3	Enterolert

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 1398 NYSDOH ID # 10320 Page 1 of 1

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.290279.04 01/30/09

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:01/26/09 RECEIVED:01/26/09
TIME COL'D:1200
MATRIX:Water SAMPLE: Merokee 4

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		43		012609 1410	3	209221B
Fecal Coli MPN/100mL		43		012609 1410	3	209221E
Enterococci Bacteria,MPN		< 3		012609 1410	3	Enterolert
Ammonia as N	mg/L	< 0.05		012709	0.05	4500NH3D
Tot. Kjeldahl N.	mg/L	1.2		012709	0.2	4500NORGB
Nitrate as N	mg/L	2.9		013009	0.5	EPA353.2
Nitrogen, total as N	mg/L	4.1		013009	0.5	EPA351,353
Phosphorous as P	mg/L	< 0.02		012709	0.02	EPA365.3
Tot Suspended Solids	mg/L	< 2.5		012809	2.5	2540D

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 1400 NYSDOH ID # 10320 Page 1 of 1

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.290279.05 01/30/09

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:01/26/09 RECEIVED:01/26/09
TIME COL'D:1220
MATRIX:Water SAMPLE: Merokee 5

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
T.Coliform,MPN/100mL		93		012609 1410	3	209221B
Fecal Coli MPN/100mL		43		012609 1410	3	209221E
Enterococci Bacteria,MPN		< 3		012609 1410	3	Enterolert
Ammonia as N	mg/L	< 0.05		012709	0.05	4500NH3D
Tot. Kjeldahl N.	mg/L	1.2		012709	0.2	4500NORGB
Nitrate as N	mg/L	3.1		013009	0.5	EPA353.2
Nitrogen, total as N	mg/L	4.3		013009	0.5	EPA351,353
Phosphorous as P	mg/L	< 0.02		012709	0.02	EPA365.3
Tot Suspended Solids	mg/L	< 2.5		012809	2.5	2540D

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 1401 NYSDOH ID # 10320 Page 1 of 1

ECO TEST LABORATORIES, INC. • ENVIRONMENTAL TESTING

377 Sheffield Avenue, North Babylon, New York 11703
(631) 422-5777 • FAX (631) 422-5770 • Email: ecotestlab@aol.com

CHAIN OF CUSTODY RECORD

290279

12

4 day rush

Client: EEA Inc.
Address: 1239 Rte 25A Suite 1
Stony Brook NY 11790
Phone: 631-751-4600 FAX:
Person receiving report: Erin Brosnan
Sampled by: Brosnan
Source: Merokee Pond
Job No.: 08508

MATRIX (Soil, Water, etc.)	COLLECTED DATE	COLLECTED TIME	SAMPLE IDENTIFICATION	TOTAL NUMBER OF CONTAINERS	Bacteria bottle	16 oz bottle	~~16~~ 32 ~~oz~~ bottle	QC Pkg Type (If Required)	Accelerated Turnaround Date Required	REMARKS-TESTS REQUIRED
Water	1/24/07	11:10a	Merokee 1	1	1				✓	Enterococci, Total + Fecal Coliform
Water	1/24/07	11:35a	Merokee 3	1	1				✓	
Water	1/24/07	11:30a	Merokee 2	4	1	2	1		✓	Ammonia, Nitrate, Total Nitrogen,
Water	1/24/07	12:00p	Merokee 4	4	1	2	1		✓	TKN, total phosphorus, TSS,
Water	1/24/07	12:20p	Merokee 5	4	1	2	1		✓	Total + Fecal Coliform, Enterococci

Temp=2.0°C

Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)	Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)
E. Brosnan Representing:	1/26/07 14:00	YES NO NA	[signature] Representing:	Representing:		YES NO NA	Representing:
Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:	Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:

EEA WATER QUALITY DATA SHEET

Project Name: dB/NCDPW Ponds 08508
Date: 1/26/09
Crew: B Jacobs, E Brosnan

Project Site: Merokee Pond
Temperature: 25° F
Weather Conditions: Sunny, breezy

Station ID: Merokee #1
Desciption: Entry Point Backyard of House between # 2184 and # 2172

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
11:10a	~0.5							1 Bacteria

Notes:
Tested for total + fecal coliform and enterococci

Station ID: Merokee #2
Desciption: Entry point Backyard of House # 2190

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
11:30a	~0.5	5.2	6.4	9.6	0.2	287	Clear	4

Notes:
Tested for ammonia, nitrate, TKN, total nitrogen, total phosphorus, total suspended solids, total + fecal coliform, enterococci

Station ID: Merokee #3
Desciption: Entry point Backyard of House # 2168

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
11:35 a	~0.5							1 Bacteria

Notes:
See #1 notes

Station ID: Merokee #4
Desciption: Entry point ramp at southeast corner of Pond

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
12:00p	~0.5	3.5	6.2	7.8	0.3	355	clear	1 Bacteria

Notes: See #2 notes

EEA WATER QUALITY DATA SHEET

Project Name: dB/NCDPW Ponds 08508
Date: 1/26/09
Crew: B. Jacobs, E. Brosnan

Project Site: Merokee Pond
Temperature: 25°F
Weather Conditions: Sunny, Breezy

Station ID: Merokee 5

Desciption: West outfall gate at South end of Pond

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars
12:20 P	~0.1	3.7	6.5	11.44	0.3	357	clear	4

Notes: See #2 notes

Station ID:

Desciption:

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars

Notes:

Station ID:

Desciption:

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars

Notes:

Station ID:

Desciption:

Time	Depth (m)	Temp (oC)	pH	D.O. (mg/L)	Salinity (ppt)	Conductivity	Secchi Depth	# Collection Jars

Notes:

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

Climatological Report (Daily)

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CDUS41 KOKX 270618
CLIJFK


CLIMATE REPORT
NATIONAL WEATHER SERVICE UPTON NY
118 AM EST TUE JAN 27 2009


...................................

...THE KENNEDY NY CLIMATE SUMMARY FOR JANUARY 26 2009...

CLIMATE NORMAL PERIOD 1971 TO 2000
CLIMATE RECORD PERIOD 1949 TO 2009


WEATHER ITEM   OBSERVED TIME   RECORD YEAR NORMAL DEPARTURE LAST
                VALUE   (LST)  VALUE       VALUE  FROM      YEAR
                                                  NORMAL
...................................................................
TEMPERATURE (F)
 YESTERDAY
  MAXIMUM         29   1159 PM  69    1950  38      -9        32
  MINIMUM         20    648 AM   9    1994  24      -4        25
  AVERAGE         25                        31      -6        29

PRECIPITATION (IN)
  YESTERDAY        0.00          1.98 1986   0.11  -0.11      0.00
  MONTH TO DATE    1.97                      3.07  -1.10      2.29
  SINCE DEC 1      7.94                      6.38   1.56      6.68
  SINCE JAN 1      1.97                      3.07  -1.10      2.29

SNOWFALL (IN)
  YESTERDAY        0.0           3.3  1994   0.3   -0.3       0.0
                                      1987
  MONTH TO DATE    4.1                       5.6   -1.5       0.4
  SINCE OCT 1      9.0                       8.6    0.4       2.8
  SINCE JUL 1      9.0                       8.6    0.4       2.8
  SNOW DEPTH       0

DEGREE DAYS
 HEATING
  YESTERDAY       40                        33       7        36
```

MONTH TO DATE	947	850	97	765
SINCE DEC 1	1768	1697	71	1617
SINCE JUL 1	2618	2546	72	2363
COOLING				
YESTERDAY	0	0	0	0
MONTH TO DATE	0	0	0	0
SINCE DEC 1	0	0	0	0
SINCE JAN 1	0	0	0	0

....

WIND (MPH)

HIGHEST WIND SPEED	15	HIGHEST WIND DIRECTION	W (260)
HIGHEST GUST SPEED	16	HIGHEST GUST DIRECTION	W (260)
AVERAGE WIND SPEED	9.4		

SKY COVER

POSSIBLE SUNSHINE MM

AVERAGE SKY COVER 0.7

WEATHER CONDITIONS

THE FOLLOWING WEATHER WAS RECORDED YESTERDAY.

NO SIGNIFICANT WEATHER WAS OBSERVED.

RELATIVE HUMIDITY (PERCENT)

HIGHEST	50	800 PM
LOWEST	35	300 PM
AVERAGE	43	

....

THE KENNEDY NY CLIMATE NORMALS FOR TODAY

	NORMAL	RECORD	YEAR
MAXIMUM TEMPERATURE (F)	38	65	1974
MINIMUM TEMPERATURE (F)	24	2	1994

SUNRISE AND SUNSET

JANUARY 27 2009.......SUNRISE 709 AM EST SUNSET 507 PM EST

JANUARY 28 2009.......SUNRISE 708 AM EST SUNSET 508 PM EST

\- INDICATES NEGATIVE NUMBERS.

R INDICATES RECORD WAS SET OR TIED.

MM INDICATES DATA IS MISSING.

T INDICATES TRACE AMOUNT.

Appendix C
Merokee Pond Sediment Characterization

Introduction

Merokee Pond is being studied as part of the Nassau County Project I.D. No. 35106 "Rehabilitation of Various Public Works Water Bodies" under the Environmental Bond Act. The overall goal of this project is to address the accumulation of sediment, aquatic weeds, and floatables in Merokee Pond. Numerous stormwater controls and water quality improvements are being considered within the Merokee Pond watershed; including the potential for a maintenance dredge operation.

There are three potential dredging sites within Merokee Pond. Of those sites the final selection will be made on an "as needed" determination. Since the northwest and northeast branches were dredged in 1997, removal of only the accumulated sediment may be required. The overall goal for this project is to address the problem of sedimentation in the pond. Maintenance dredging is an approach under consideration. Any dredge spoil will be disposed of at an approved site by the contractor. The volume of sediment will be calculated after the final dredge site selection has been determined. The potential dredge sites are depicted in Figure 1 as S-1, S-2 and S-3.

As depicted in Figure 1, the project site is located just south of Merokee Drive and east of Merokee Place in Merrick – Bellmore, Nassau County, New York. The management and maintenance of Merokee Pond is overseen by Nassau County Department of Public Works. The northeast and northwest sections of Merokee Pond were dredged in 1997 under the NYSDEC permit application # 1-2820-02593/00001. Current bathymetric survey revealed the northwest section has filled in to the 1997 pre-dredge depth.

Sediment grabs and cores were collected to analyze grain size, % moisture, Total Organic Carbon (TOC), Semi-Volatile Organic Compounds (SVOC), Volatile Organic Compounds (VOC), Pesticides, Polychlorinated Biphenols (PCB), and Metals. Sediments will be characterized for the preparation of the upland disposal dredge specification.

Methodology

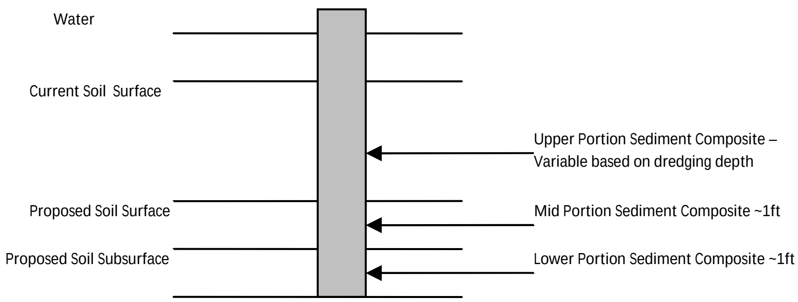
Sediment samples were collected for physical and chemical analysis at each of the three potential dredge sites. For each of the three locations of possible dredging, three soil borings were performed and combined into three composite samples for analysis based on depth, for each of the three sampling locations, as illustrated in Figure 2 (depicted below). Soil boring locations are depicted in Figure 1 by red points. The core was driven into the sediment approximately two feet below the proposed dredging depth. At the two northern sites a grab sample was collected for VOC analysis, depicted in Figure 1 by yellow points. There was not a VOC sample taken at the southern station, as NYSDEC determined that it was far enough away from outfall locations that testing was not necessary. In total there were nine core samples and two grab samples collected.

Figure 1: Merokee Pond Sediment Sampling Points

Three composites were created based on depth by combining the samples into upper, mid, and lower portions from each of the soil borings taken from each of the three potential dredge sites (samples from separate sites were not combined):

A. 1 composite of the upper portion (surface to proposed dredge depth)
B. 1 composite of the mid portion (proposed new exposed surface)
C. 1 composite sample of the lower portion (up to 2 ft below the proposed exposed surface)

Figure 2: Cross Section of Soil Boring and Sediment Composite Sampling



The upper portion and mid portion composites were submitted to the laboratory for immediate analysis. The lower portion composite was stored at the laboratory for future analysis if the surface sediments prove to be contaminated.

Samples were labeled based on pond name, site number, and composite letter:

- M = Merokee Pond
- S (1-3) = Site Number
- C (A-C) = Composite Letter (based on depth)

The composite samples were analyzed for the following list of parameters.

- Grain Size
- Moisture Content
- Total Organic Carbon

If the grain size was smaller than the 90% sand or coarser standard, the State required chemical analyses (NYSDEC Table 375-6.8 or otherwise informed by NYSDEC staff based on historic site specific sediment analysis results) were conducted including:

- Metals
- Pesticides and PCBs
- VOCs
- SVOCs

Results

The following table shows the results of the grain size, % moisture, and TOC analysis. The sediment in Merokee Pond was primarily sand, however, the southern station had 19% silt and clay in the layer to be removed by dredging. Percent moisture ranged from 25% to 68% and Total Organic Carbon (TOC) ranged from 2,600 mg/Kg to 250,000 mg/Kg. In general, those samples with a greater percentage of silt and clay had a higher moisture content and higher TOC content.

Merokee Pond					
Sample	**% Gravel**	**% Sand**	**% Silt & Clay**	**% Moisture**	**TOC (mg/Kg)**
M-S1-CA	14	83	3.2	45	24,000
M-S1-CB	12	85	2.7	27	2,600
M-S2-CA	3.4	87	9.3	68	250,000
M-S2-CB	12	82	6.6	42	45,000
M-S3-CA	3.9	77	19	66	53,000
M-S3-CB	14	84	2.1	25	8,000

The sample high-lighted in yellow in the above table indicates sediment that was less that ninety percent sand and gravel. This sample, S-3, was further analyzed for SVOC, pesticides, PCB, and metals. The two northern sites, S-1 and S-2, were also analyzed for VOCs, as they were close to outfalls that entered the pond. The higher percentage of fine material at the southern end of the pond is most likely a result of its distance from the outfalls, as finer materials stay suspended for longer periods of time and can travel farther from the outfalls.

Merokee Pond Metals			
Compound	UNITS	NYSDEC	M-S3-CA
Arsenic as As	mg/Kg	13	8.4
Barium as Ba	mg/Kg	350	58
Beryllium as Be	mg/Kg	7.2	1.5
Cadmium as Cd	mg/Kg	2.5	3.1
Chromium as Cr	mg/Kg	30	21
Chromium hex as Cr	mg/Kg	1	< 2.6
Copper as Cu	mg/Kg	50	55
Lead as Pb	mg/Kg	63	420
Manganese as Mn	mg/Kg	1600	220
Mercury as Hg	mg/Kg	0.18	0.27
Nickel as Ni	mg/Kg	30	17
Selenium as Se	mg/Kg	3.9	< 3.2
Silver as Ag	mg/Kg	2	< 1.6
Zinc as Zn	mg/Kg	109	250
Cyanide as CN	mg/kg	27	< 6.5

value at or over state limit
value approaching state limit
detection limit of machine at or above State unrestricted use level

The above table shows the concentrations of metals found in sediments from Merokee Pond. Cadmium, chromium, copper, lead, mercury, and zinc were all found at levels above the NYSDEC unrestricted use for dredged sediments (NYSDEC, 2006). These were all found in the removal layer at the southern end of the pond, the only location where SVOC, pesticide, and PCB testing was conducted. It should be noted that the levels of chromium in the hexavalent state measured in the new dredge surface were below the detection limit of the machine, and therefore it is difficult to determine the concentrations of this form found in the sediment. Cadmium, copper, and mercury were marginally higher than the State unrestricted use levels. Lead and zinc were found at levels much higher than State unlimited use levels.

Merokee Pond
SVOCs, PCBs, and Pesticides

Compound	UNITS	NYSDEC	M-S3-CA
Acenaphthene	ug/Kg	20000	< 480
Acenaphthylene	ug/Kg	100000	< 480
Anthracene	ug/Kg	100000	< 480
Benzo(a)anthracene	ug/Kg	1000	< 480
Benzo(a)pyrene	ug/Kg	1000	580
Benzo(b)fluoranthene	ug/Kg	1000	740
Benzo(ghi)perylene	ug/Kg	100000	< 480
Benzo(k)fluoranthene	ug/Kg	800	710
Chrysene	ug/Kg	1000	580
Dibenzo(a,h)anthracene	ug/Kg	330	< 480
Dibenzofuran	ug/Kg	7000	< 480
Fluoranthene	ug/Kg	100000	1000
Fluorene	ug/Kg	30000	< 480
Indeno(1,2,3-cd)pyrene	ug/Kg	500	< 480
Naphthalene(sv)	ug/Kg	12000	< 480
Phenanthrene	ug/Kg	100000	< 480
Pyrene	ug/Kg	100000	1100
2-Methylphenol (o-cresol)	ug/Kg	330	< 480
3-Methylphenol (m-cresol)	ug/Kg	330	< 480
4-Methylphenol (p-cresol)	ug/Kg	330	< 480
Pentachlorophenol (ms)	ug/Kg	800	< 4800
Phenol	ug/Kg	330	< 480
a BHC	ug/Kg	20	< 6.5
Aldrin	ug/Kg	5	< 6.5
b BHC	ug/Kg	36	< 6.5
Chlordane	ug/Kg	94	480
d BHC	ug/Kg	40	< 6.5
Dieldrin	ug/Kg	5	< 6.5
Endosulfan 1	ug/Kg	2400	< 13
Endosulfan 2	ug/Kg	2400	< 13
Endosulfan Sulfate	ug/Kg	2400	< 39
Endrin	ug/Kg	14	< 6.5
Heptachlor	ug/Kg	42	< 6.5
Lindane	ug/Kg	100	< 6.5
p,p-DDD	ug/Kg	3.3	97
p,p-DDE	ug/Kg	3.3	77
p,p-DDT	ug/Kg	3.3	< 13
Aroclor 1016	ug/Kg	100	< 130
Aroclor 1221	ug/Kg	100	< 130
Aroclor 1232	ug/Kg	100	< 130
Aroclor 1242	ug/Kg	100	< 130
Aroclor 1248	ug/Kg	100	< 130
Aroclor 1254	ug/Kg	100	< 130
Aroclor 1260	ug/Kg	100	< 130
2,4,5-TP	ug/Kg	3800	< 16

value at or over state limit
value approaching state limit
detection limit of machine at or above State unrestricted use level

SVOCs, pesticides, and PCBs were found in the sediments collected from the southern end of this pond. They were found in the layer to be removed by dredging. Pesticides: Chlordane, p,p-DDD, and p,p-DDE were detected above the State's unrestricted use levels (NYSDEC, 2006). Several other compounds were identified below the detection limits of the machine, however, the machine's detection limit was above the State's unrestricted use level. Those compounds were: Dibenzo(a,h)anthracene, 2-Methylphenol, 3-Methylphenol, 4-Methylphenol, Pentachlorophenol, Phenol, Aldrin, Dieldrin, p,p-DDT and several PCB congeners.

Merokee Pond
VOCs

Compound	Units	NYSDEC	VOC-1	VOC-2
1,1 Dichloroethane	ug/Kg	270	< 5.7	< 6
1,1 Dichloroethene	ug/Kg	330	< 5.7	< 6
1,2 Dichlorobenzene (v)	ug/Kg	1100	< 5.7	< 6
1,2 Dichloroethane	ug/Kg	20	< 5.7	< 6
1,3 Dichlorobenzene (v)	ug/Kg	2400	< 5.7	< 6
1,4 Dichlorobenzene (v)	ug/Kg	1800	< 5.7	< 6
1,4-Dioxane	ug/Kg	100	< 110	< 120
111 Trichloroethane	ug/Kg	680	< 5.7	< 6
124-Trimethylbenzene	ug/Kg	3600	< 5.7	< 6
135-Trimethylbenzene	ug/Kg	8400	< 5.7	< 6
Acetone	ug/Kg	50	< 57	< 60
Benzene	ug/Kg	60	< 5.7	< 6
c-1,2-Dichloroethene	ug/Kg	250	< 5.7	< 6
Carbon Tetrachloride	ug/Kg	760	< 5.7	< 6
Chlorobenzene	ug/Kg	1100	< 5.7	< 6
Chloroform	ug/Kg	370	< 5.7	< 6
Ethyl Benzene	ug/Kg	1000	< 5.7	< 6
Methyl Ethyl Ketone	ug/Kg	120	< 57	< 60
Methylene Chloride	ug/Kg	50	< 5.7	< 6
n-Butylbenzene	ug/Kg	12000	< 5.7	< 6
n-Propylbenzene	ug/Kg	3900	< 5.7	< 6
sec-Butylbenzene	ug/Kg	11000	< 5.7	< 6
t-1,2-Dichloroethene	ug/Kg	190	< 5.7	< 6
ter.ButylMethylEther	ug/Kg	930	< 5.7	< 6
tert-Butylbenzene	ug/Kg	5900	< 5.7	< 6
Tetrachloroethene	ug/Kg	1300	< 5.7	< 6
Toluene	ug/Kg	700	< 5.7	< 6
Trichloroethene	ug/Kg	470	< 5.7	< 6
Vinyl Chloride	ug/Kg	20	< 5.7	< 6
Xylene	ug/Kg	260	< 17	< 18
% Solids			88	84

value at at or over state limit
value approaching state limit
detection limit of machine at or above State unrestricted use level

The two VOCs collected in Merokee Pond that were identified below the detection limits of the machine were 1,4-Dioxane and Acetone. These detection limits, however, were above the State's unrestricted use level (NYSDEC, 2006). VOCs were only measured in the northern end of the pond, as the outfalls which would contribute the VOCs were located in the northern end.

Discussion

The sediment in the southern end of the Pond generally had a greater number and higher levels of contaminants than the northern end. This corresponds to the greater percentage of silt and clay at the southern end. Grain size and TOC can influence the concentration of contaminants associated with the sediment. Contaminants may bind to sediment particles or complex with dissolved organic material in the sediment (Burton, 1992). The finer grained sediments are also more strongly associated with organic carbon than the coarser material. Metals and organic compounds generally bind to the finer grained particles of sediment than the coarser particles because the silts and clays have greater surface area per volume for binding sites than the sand and gravel, and are more easily ionized (Burton, 1992).

The outfalls, which are a major source of pollution into this pond, are at the northern end, however, the coarser grain size does not allow for as much contaminant accumulation as does finer material. Contaminants that enter the pond through the outfalls, therefore, would associate with finer material at the southern end. Also, contaminants that enter the pond already attached to fine grained sediment would stay suspended for longer periods and travel in the outfall plume.

Sediment will be disturbed and suspended during the dredging process. Compounds associated with the suspended sediments may have several fates. The compounds may stay strongly sorbed to the sediment, they may dissolve in the water column, they may mobilize to groundwater, they may evaporate from surface waters, or they may be biodegraded by bacteria in the sediment. The fate of the compounds determines the exposure of organisms exposed to the sediment. Compounds may bioaccumulate and magnify in the food chain if they are hydrophobic and sorb to organic material, fine sediments, and lipids in organisms; or exposure may occur through the dissolved state as the compound is released to the water column.

Many of the metals, heavy PCBs, PAHs, and pesticides are hydrophobic, become strongly bound to the organic material in fine sediments, and are persistent in the environment (Howard, 1990). These compounds are the ones that bioaccumulate in organisms. These compounds are introduced to the environment through heavy industry, pipe corrosion, incomplete combustion of organic materials, and spraying of pesticides (ATSDR, 2008; Eco-USA, 2008; Howard, 1990; Spectrum Laboratories, 2008; USEPA, 2008). The compounds in this category that have been measured above the unrestricted use level in the sediment from Merokee Pond include:

Cadmium, Copper, Lead, Mercury, Zinc, Chlordane, p,p-DDD, and p,p-DDE. Compounds that were not able to be measured at levels below the unrestricted use level, due to interference on the machine, and therefore can not be ruled out as possibly having elevated concentrations include: Chromium, Dibenzo(a,h)anthracene, Aldrin, Dieldrin, p,p-DDT, and several PCB congeners. During the dredging process, these compounds are anticipated to remain bound to the sediment, due to their low solubility, and have the same residence time in the water column as the sediment (Burton, 1992). The more strongly a contaminant is bound to sediment, the less able to leach and less bioavailable it becomes (Burton, 1992). Biological exposure would occur through organisms that ingest the organic material in sediment and would magnify as these organisms are eaten and passed up the food web (Howard, 1990).

Not all compounds measured in the sediment of Merokee Pond are strongly sorbed and persistent in sediment. Some less hydrophobic compounds have the ability to dissolve in the water column if released during the dredging process (Howard, 1990; USEPA, 2008). These compounds include Cadmium and 1,4-Dioxane. Fish may be exposed to the dissolved forms of these compounds.

Mercury may evaporate if it is released from the sediment during the dredging process (ATSDR, 2008; USEPA, 2008). Acetone and some PCBs (which were both flagged as having concentrations below the detection limit of the machine, but due to interference with other compounds, were not eliminated as having levels below the unrestricted use level approved by the State) would also evaporate if released during the dredging process. Acetone also has the potential to mobilize to groundwater if released (Howard, 1990).

Other compounds that can not be eliminated as having concentrations below the unrestricted use level, due to the detection limits of the machine, were: 2-Methylphenol, 3-Methylphenol, 4-Methylphenol, Pentachlorophenol, and Phenol. These compounds are generally biodegraded. If they are released to the surface of the sediment or to the depth of biological activity, these compounds will be broken down by bacteria (Howard, 1990).

Acute exposure to metals and responses by aquatic organisms differs from species to species. Effects can vary widely ranging from reduction of growth to mortality. Generally metals associated with sediments become bioavailable to organisms in the dissolved state (Anchor, 2003). In a Literature Review of the Effects of Resuspended Sediments due to Dredging Operations it was concluded that during dredging, release of dissolved metals from sediments even in highly contaminated areas were minimal (Anchor, 2003). In general the release of soluble phases of heavy metals is dependant on certain chemical processes that are rarely attained during typical dredging operations (Anchor, 2003). It is anticipated that contaminants suspended on sediment particles during the dredging process should not be bioaccumulated to lethal levels by resident organisms.

The processes by which contaminants are released to the water column are complicated. Any associated disturbance of bottom sediments that have bound contaminants could be minimized by use of a hydraulic dredge and turbidity boom. The use of a hydraulic dredge could also reduce resuspension of suspended solids at the dredge site and is indicated as preferable by the NYSDEC when the placement site is within pumping distance of the dredge site (NYSDEC, 2004).

Additionally, a cap of clean granular material could be placed over the newly exposed sediment which will stop any potential exchange of contaminants from the sediment to the overlying water. The cap should be thick enough to prevent bioturbation, and of a large enough grain size to withstand erosion. The cap should be laid by hydraulic methods to limit disturbance to the finer grained contaminated sediments beneath.

Some of the elevated metals: copper and chromium are those associated with pressure treated wood that is used in the construction of bulkheads. Bulkheading and docks made of pressure treated wood were observed in and around the pond. There are also some metals that are the byproducts of engines, which may be the result of runoff from nearby roads of boat usage in the ponds. VOCs and SVOCs in the Pond may be contributed from petroleum runoff into the Pond of from vehicle exhaust. The pesticides are most likely from local spraying and runoff.

The levels of some of the metals, VOCs, SVOCs, and pesticides do not allow the sediment from Merokee Pond to have unrestricted use (NYSDEC, 2006). Many compounds are low enough in concentration that the sediment would qualify for residential use, however, the lead concentrations in the sediment are high enough to eliminate it from this beneficial use category. This sediment may be used in commercial and industrial uses only. Once the specific area to be dredged is determined, the concentrations of compounds in that area may be farther analyzed to determine the beneficial use category.

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USEPA. 2008. Groundwater and Drinking Water Consumer Fact Sheets. http://www.epa.gov. Accessed 11/18/08.

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284448.01 10/10/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:1130
MATRIX:.Soil SAMPLE: M-S1-CA

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
% Gravel	%	14		100908	0	136-95a
% Sand	%	83		100908	0	136-95a
% Silt + Clay	%	3.2		100908	0	136-95a

cc:

LRL=laboratory Reporting Limit

REMARKS: Values reported on this page are automatically rounded off to 2 significant figures. For exact results see attachment with detailed data tabulations and chart.

DIRECTOR

rn = 29536 NYSDOH ID # 10320 Page 1 of 1

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284448.02 10/10/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:1130
MATRIX:.Soil SAMPLE: M-S1-CB

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
% Gravel	%	12		100908	0	136-95a
% Sand	%	85		100908	0	136-95a
% Silt + Clay	%	2.7		100908	0	136-95a

cc:

LRL=laboratory Reporting Limit

REMARKS: Values reported on this page are automatically rounded off to 2 significant figures. For exact results see attachment with detailed data tabulations and chart.

DIRECTOR

rn = 29537 NYSDOH ID # 10320 Page 1 of 1

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284448.03 10/10/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:1330
MATRIX:.Soil SAMPLE: M-S2-CA

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
% Gravel	%	3.4		100908	0	136-95a
% Sand	%	87		100908	0	136-95a
% Silt + Clay	%	9.3		100908	0	136-95a

cc:

LRL=laboratory Reporting Limit

REMARKS: Values reported on this page are automatically rounded off to 2 significant figures. For exact results see attachment with detailed data tabulations and chart.

DIRECTOR

rn = 29538 NYSDOH ID # 10320 Page 1 of 1

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284448.04 10/10/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:1330
MATRIX:.Soil SAMPLE: M-S2-CB

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
% Gravel	%	12		100908	0	136-95a
% Sand	%	82		100908	0	136-95a
% Silt + Clay	%	6.6		100908	0	136-95a

cc:

LRL=laboratory Reporting Limit

REMARKS: Values reported on this page are automatically rounded off to 2 significant figures. For exact results see attachment with detailed data tabulations and chart.

DIRECTOR

rn = 29539 NYSDOH ID # 10320 Page 1 of 1

ECOTEST LABORATORIES INC.
377 SHEFFIELD AVE. N. BABYLON NY 11703
(631) 676-2217

LAB NO. 284448.01

DATE ANALYZED: 10/9/2008

Sample Wet Weight.g 300g

Sample ry Weight 206.9g

CLIENT EEA

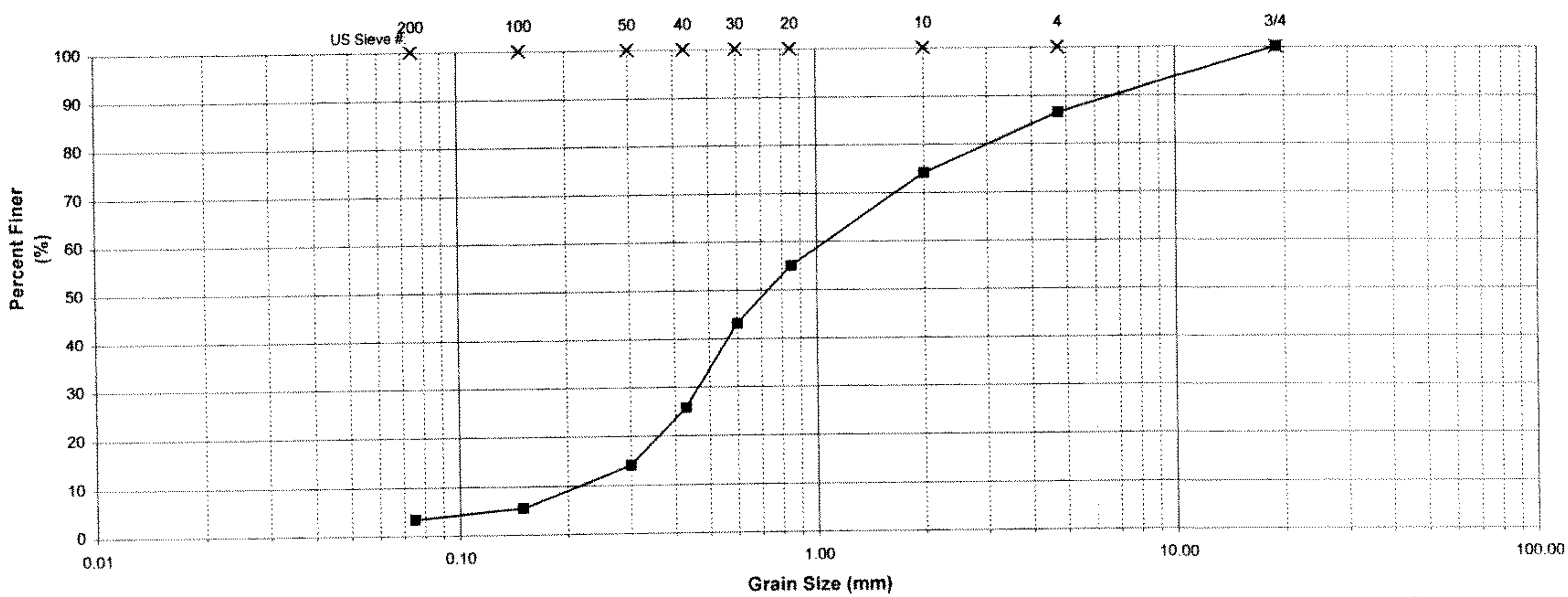
ANALYST: J. SIMPKINS

Seive Analysis of Fine and Coarse Aggregates by ASTM Method C136-95a

US Seive#	Seive Size (in)	Seive Size (mm)	Mass of Soil Retained on Each Sieve (g)	Total Mass Passing Seive (g)	Total Passing Seive (%)	Size Scale (Unified) (g)	Size Scale (Unified) (%)	Size Scale Description (Unified)	Size Scale Description (Unified) TOTALS	%
3/4	0.7500	19.00	0.00	198.20	100.00	0.00	0.00	Coarse Gravel and Larger		
4	0.1870	4.75	27.00	171.20	86.38	27.00	13.62	Fine Gravel	TOTAL- GRAVEL & LARGEI	13.62
10	0.0787	2.00	24.50	146.70	74.02	24.50	12.36	Coarse Sand		
20	0.0331	0.85	37.90	108.80	54.89					
30	0.0234	0.60	23.50	85.30	43.04					
40	0.0165	0.43	34.50	50.80	25.63	95.90	48.39	Medium Sand		
50	0.0117	0.30	23.20	27.60	13.93					
100	0.0059	0.15	17.00	10.60	5.35					
200	0.0029	0.08	4.20	6.40	3.23	44.40	22.40	Fine Sand	TOTAL - SAND	83.15
pan			6.40			6.40	3.23	Silt & Clay	TOTAL - SILT & CLAY	3.23
Total (dry sample)			198.20			198.20	100.00			

Sample Wet Weight,g 300G

Particle Size Distribution Report



ECOTEST LABORATORIES INC.
377 SHEFFIELD AVE. N. BABYLON NY 11703
(631) 676-2217

LAB NO. 284448.02

DATE ANALYZED: 10/9/2008

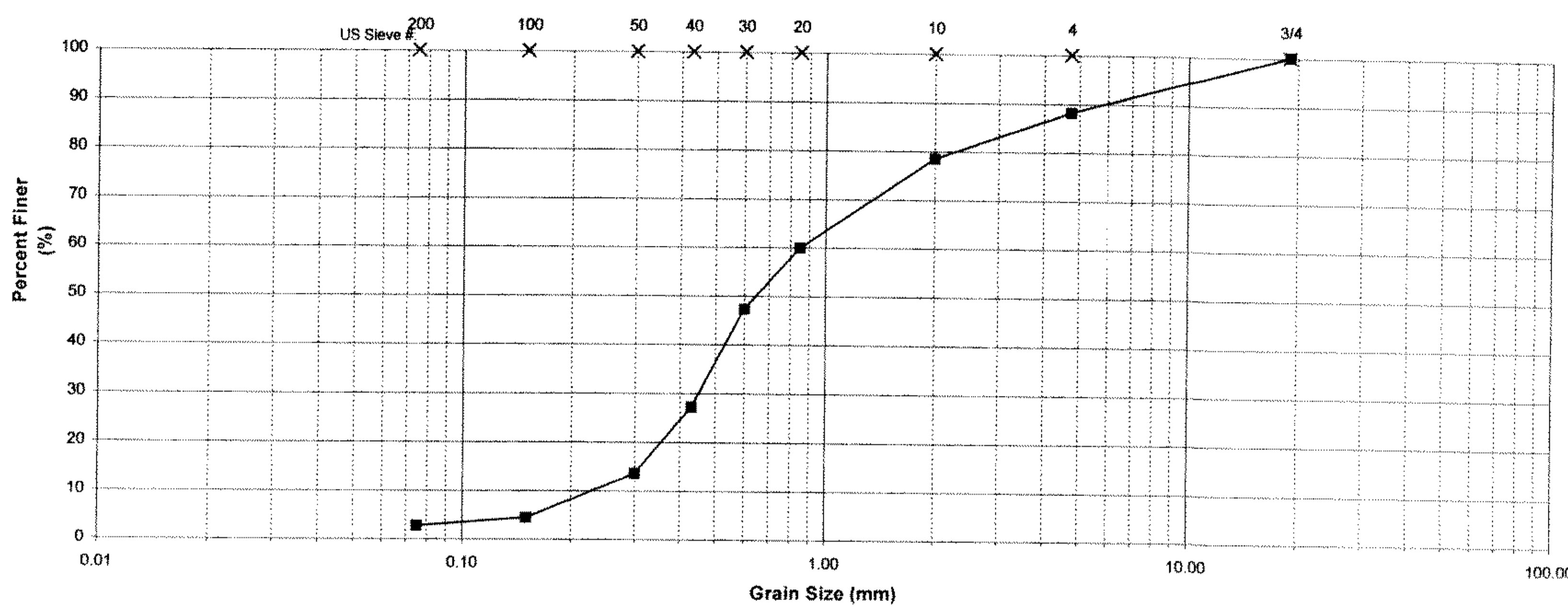
Sample | Wet Weight.g 300g | Sample | Weight.227.8Gg | CLIENT EEA | ANALYST: J. SIMPKINS

Seive Analysis of Fine and Coarse Aggregates by ASTM Method C136-95a

US Seive#	Seive Size (in)	Seive Size (mm)	Mass of Soil Retained on Each Sieve (g)	Total Mass Passing Seive (g)	Total Passing Seive (%)	Size Scale (Unified) (g)	Size Scale (Unified) (%)	Size Scale Description (Unified)	Size Scale Description (Unified) TOTALS	%
3/4	0.7500	19.00	0.00	218.70	100.00	0.00	0.00	Coarse Gravel and Larger		
4	0.1870	4.75	26.00	192.70	88.11	26.00	11.89	Fine Gravel	TOTAL- GRAVEL & LARGEI	11.89
10	0.0787	2.00	21.20	171.50	78.42	21.20	9.69	Coarse Sand		
20	0.0331	0.85	40.60	130.90	59.85					
30	0.0234	0.60	27.60	103.30	47.23					
40	0.0165	0.43	43.90	59.40	27.16	112.10	51.26	Medium Sand		
50	0.0117	0.30	29.90	29.50	13.49					
100	0.0059	0.15	19.80	9.70	4.44					
200	0.0029	0.08	3.80	5.90	2.70	53.50	24.46	Fine Sand	TOTAL - SAND	85.41
pan			5.90			5.90	2.70	Silt & Clay	TOTAL - SILT & CLAY	2.70
Total (dry sample)			218.70			218.70	100.00			

Sample Wet Weight,g 300G

Particle Size Distribution Report



ECOTEST LABORATORIES INC.
377 SHEFFIELD AVE. N. BABYLON NY 11703
(631) 676-2217

LAB NO. 284448.03

DATE ANALYZED: 10/9/2008

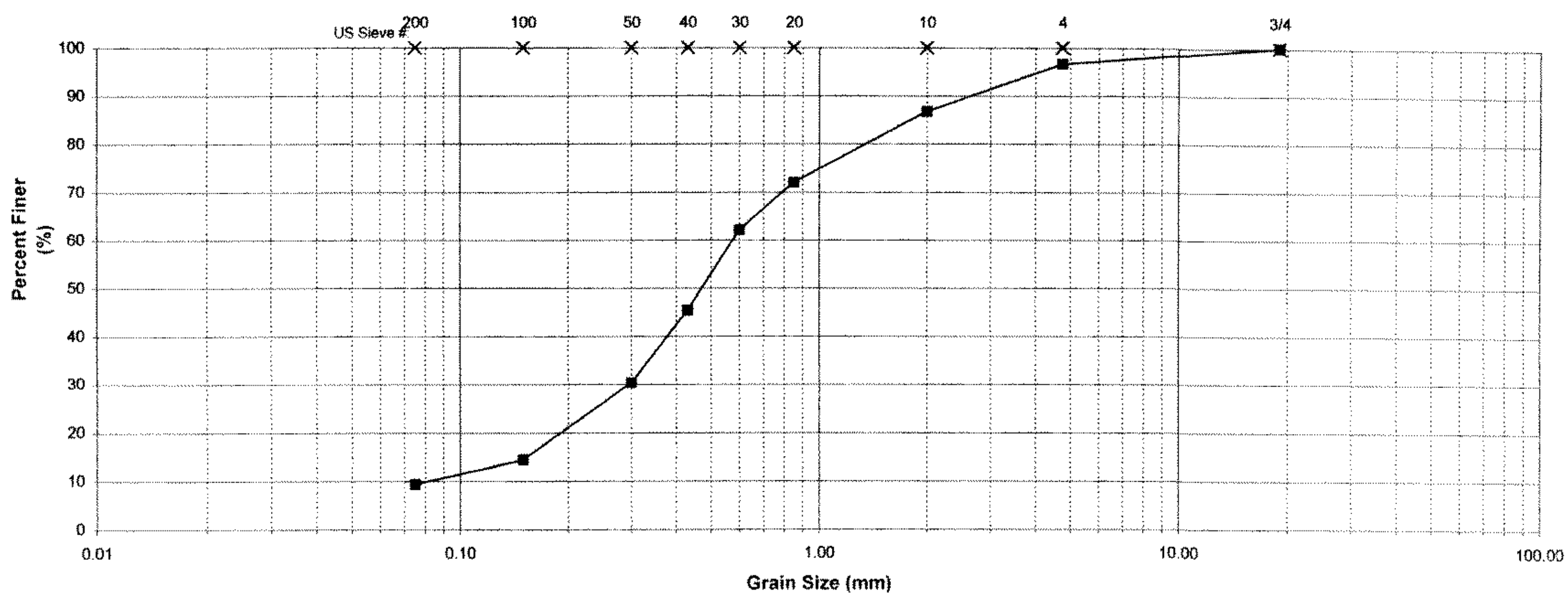
Sample | Wet Weight.g 300g | Sample | y Weight.126.8G | CLIENT EEA | ANALYST: J. SIMPKINS

Seive Analysis of Fine and Coarse Aggregates by ASTM Method C136-95a

US Seive#	Seive Size (in)	Seive Size (mm)	Mass of Soil Retained on Each Sieve (g)	Total Mass Passing Seive (g)	Total Passing Seive (%)	Size Scale (Unified) (g)	Size Scale (Unified) (%)	Size Scale Description (Unified)	Size Scale Description (Unified) TOTALS	%
3/4	0.7500	19.00	0.00	116.60	100.00	0.00	0.00	Coarse Gravel and Larger		
4	0.1870	4.75	4.00	112.60	96.57	4.00	3.43	Fine Gravel	TOTAL- GRAVEL & LARGEI	3.43
10	0.0787	2.00	11.50	101.10	86.71	11.50	9.86	Coarse Sand		
20	0.0331	0.85	17.20	83.90	71.96					
30	0.0234	0.60	11.60	72.30	62.01					
40	0.0165	0.43	19.50	52.80	45.28	48.30	41.42	Medium Sand		
50	0.0117	0.30	17.60	35.20	30.19					
100	0.0059	0.15	18.50	16.70	14.32					
200	0.0029	0.08	5.90	10.80	9.26	42.00	36.02	Fine Sand	TOTAL - SAND	87.31
pan			10.80			10.80	9.26	Silt & Clay	TOTAL - SILT & CLAY	9.26
Total (dry sample)			116.60			116.60	100.00			

Sample	Wet Weight,g	300G

Particle Size Distribution Report



ECOTEST LABORATORIES INC.
377 SHEFFIELD AVE. N. BABYLON NY 11703
(631) 676-2217

LAB NO. 284448.04

DATE ANALYZED: 10/9/2008

Sample Wet Weight.g 300g Sample y Weight.174.7G

CLIENT EEA

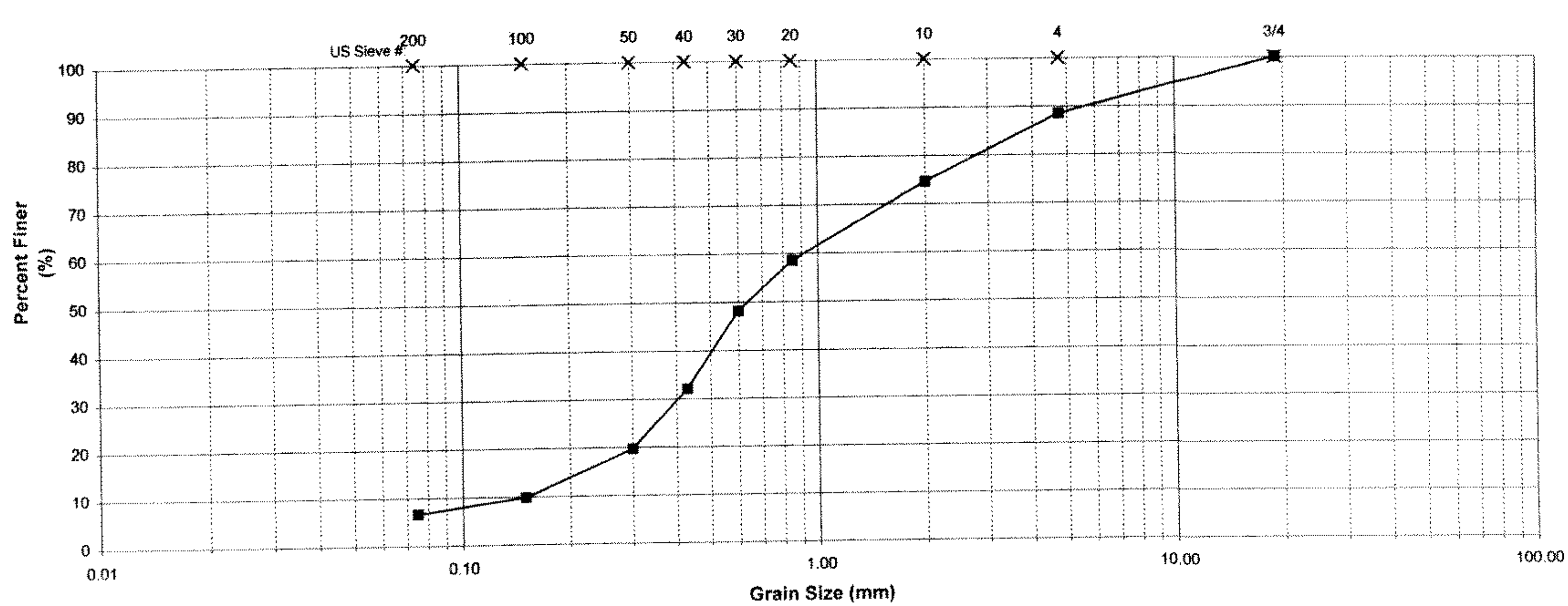
ANALYST: J. SIMPKINS

Seive Analysis of Fine and Coarse Aggregates by ASTM Method C136-95a

US Seive#	Seive Size (in)	Seive Size (mm)	Mass of Soil Retained on Each Sieve (g)	Total Mass Passing Seive (g)	Total Passing Seive (%)	Size Scale (Unified) (g)	Size Scale (Unified) (%)	Size Scale Description (Unified)	Size Scale Description (Unified) TOTALS	%
3/4	0.7500	19.00	0.00	165.90	100.00	0.00	0.00	Coarse Gravel and Larger		
4	0.1870	4.75	19.20	146.70	88.43	19.20	11.57	Fine Gravel	TOTAL- GRAVEL & LARGEI	11.57
10	0.0787	2.00	23.00	123.70	74.56	23.00	13.86	Coarse Sand		
20	0.0331	0.85	26.80	96.90	58.41					
30	0.0234	0.60	17.10	79.80	48.10					
40	0.0165	0.43	26.70	53.10	32.01	70.60	42.56	Medium Sand		
50	0.0117	0.30	20.60	32.50	19.59					
100	0.0059	0.15	16.30	16.20	9.76					
200	0.0029	0.08	5.30	10.90	6.57	42.20	25.44	Fine Sand	TOTAL - SAND	81.86
pan			10.90			10.90	6.57	Silt & Clay	TOTAL - SILT & CLAY	6.57
Total (dry sample)			165.90			165.90	100.00			

Sample Wet Weight,g 300G

Particle Size Distribution Report



ECOTEST LABORATORIES, INC. • ENVIRONMENTAL TESTING
377 Sheffield Avenue, North Babylon, New York 11703
(631) 422-5777 • FAX (631) 422-5770 • Email: ecotestlab@aol.com

284444-
284449

CHAIN OF CUSTODY RECORD

21-22

Client: EEA
Address: 1239 Rt25A Suite 1
Stony Brook NY 11780
Phone: (631)-751-4600 FAX:
Person receiving report: Erin Brosnan
Sampled by: Erin Brosnan
Source: Merokee Pond
Job No.: 08508.03 (NCDPW 4 Ponds)

MATRIX (Soil, Water, etc.)	COLLECTED DATE	COLLECTED TIME	SAMPLE IDENTIFICATION	TOTAL NUMBER OF CONTAINERS	TYPE & NUMBER OF CONTAINERS	QC Pkg Type (If Required)	Accelerated Turnaround Date Required	REMARKS-TESTS REQUIRED
Soil	10/9/02	9:45a	VOC-1	1		A		VOCs
		9:55a	VOC-2	1				
		11:30a	M-S1-CA	3				* Grain Size, TOC, % Moisture
		11:30a	M-S1-CB	3				Metals, Pesticides/PCBs,
		1:30p	M-S2-CA	3				SVOCs
		1:30p	M-S2-CB	3				
		11:30a	M-S1-CC	3				Hold until other samples tested
		1:30p	M-S2-CC	3				if tests required see *
								Temp: 2.2°C
								* Grain Size 1 day Rush
								if ~~over~~ under 90% Sand + gravel
								continue tests for Metals,
								Pesticides / PCBs, SVOCs

Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)	Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)
Erin Brosnan Representing:	10/9/02 15:24	YES NO NA	[signature] Representing:	Representing:		YES NO NA	Representing:
Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:	Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284458.01 10/13/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:.Soil SAMPLE: M-S3-CA

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
% Gravel	%	3.9		101208	0	136-95
% Sand	%	77		101208	0	136-95
% Silt + Clay	%	19		101208	0	136-95

cc:

LRL=laboratory Reporting Limit

REMARKS: Values reported on this page are automatically rounded off to 2 significant figures. For exact results see attachment with detailed data tabulations and chart.

DIRECTOR

rn = 29800 NYSDOH ID # 10320 Page 1 of 1

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284458.02 10/13/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:.Soil SAMPLE: M-S3-CB

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
% Gravel	%	14		101208	0	136-95
% Sand	%	84		101208	0	136-95
% Silt + Clay	%	2.1		101208	0	136-95

cc:

LRL=laboratory Reporting Limit

REMARKS: Values reported on this page are automatically rounded off to 2 significant figures. For exact results see attachment with detailed data tabulations and chart.

DIRECTOR

rn = 29801 NYSDOH ID # 10320 Page 1 of 1

ECOTEST LABORATORIES, INC. • ENVIRONMENTAL TESTING
377 Sheffield Avenue, North Babylon, New York 11703
(631) 422-5777 • FAX (631) 422-5770 • Email: ecotestlab@aol.com

284458 - 284459

CHAIN OF CUSTODY RECORD

4-5

Client: EEA
Address: 1239 Rt 25A Suite 1
Stony Brook NY 11790
Phone: (631-751-4600 FAX:
Person receiving report: Erin Brosnan
Sampled by: Erin Brosnan
Source: Merokee Pond
Job No. 08508.03 NCDPW

MATRIX (Soil, Water, etc.)	COLLECTED DATE	COLLECTED TIME	SAMPLE IDENTIFICATION	TOTAL NUMBER OF CONTAINERS	TYPE & NUMBER OF CONTAINERS	QC Pkg Type (If Required)	Accelerated Turnaround Date Required	REMARKS-TESTS REQUIRED
Soil	10/10/08	830a	M-S3-CA	3		A		TOC, % Moisture, Grain Size — 24h TAT; If grain size <90% sand then
↓	↓	↓	M-S3-CB	3		↓		Metals, Pesticides/PCBs, SVOCs
↓	↓	↓	M-S3-CC	3		↓		On Hold - Extracts only (Metals, Pesticides/PCBs, SVOCs)

Temp = 1.4°C

Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)	Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)
Erin Brosnan Representing:	10/10/08 10:15	YES NO NA	[signature] Representing:	Representing:		YES NO NA	Representing:
Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:	Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING
377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770
Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.284449.01 10/17/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:0945
MATRIX:Soil SAMPLE: VOC-1

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Vinyl Chloride	ug/Kg	< 5.7		101008	5.681	EPA8260
1,1 Dichloroethene	ug/Kg	< 5.7		101008	5.681	EPA8260
t-1,2-Dichloroethene	ug/Kg	< 5.7		101008	5.681	EPA8260
1,1 Dichloroethane	ug/Kg	< 5.7		101008	5.681	EPA8260
Acetone	ug/Kg	< 57		101008	56.81	EPA8260
ter.ButylMethylEther	ug/Kg	< 5.7		101008	5.681	EPA8260
Methylene Chloride	ug/Kg	< 5.7		101008	5.681	EPA8260
Chloroform	ug/Kg	< 5.7		101008	5.681	EPA8260
111 Trichloroethane	ug/Kg	< 5.7		101008	5.681	EPA8260
c-1,2-Dichloroethene	ug/Kg	< 5.7		101008	11.36	EPA8260
1,2 Dichloroethane	ug/Kg	< 5.7		101008	5.681	EPA8260
Benzene	ug/Kg	< 5.7		101008	5.681	EPA8260
Carbon Tetrachloride	ug/Kg	< 5.7		101008	5.681	EPA8260
Methyl Ethyl Ketone	ug/Kg	< 57		101008	56.81	EPA8260
Trichloroethene	ug/Kg	< 5.7		101008	5.681	EPA8260
Toluene	ug/Kg	< 5.7		101008	5.681	EPA8260
Tetrachloroethene	ug/Kg	< 5.7		101008	5.681	EPA8260
Chlorobenzene	ug/Kg	< 5.7		101008	5.681	EPA8260
Ethyl Benzene	ug/Kg	< 5.7		101008	5.681	EPA8260
Xylene	ug/Kg	< 17		101008	17.04	EPA8260
n-Propylbenzene	ug/Kg	< 5.7		101008	5.681	EPA8260
135-Trimethylbenzene	ug/Kg	< 5.7		101008	5.681	EPA8260
tert-Butylbenzene	ug/Kg	< 5.7		101008	5.681	EPA8260
124-Trimethylbenzene	ug/Kg	< 5.7		101008	5.681	EPA8260
sec-Butylbenzene	ug/Kg	< 5.7		101008	5.681	EPA8260

cc:

LRL=Laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 29540 NYSDOH ID # 10320 Page 1 of 2

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770

Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.284449.01 10/17/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:0945
MATRIX:Soil SAMPLE: VOC-1

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
1,3 Dichlorobenzene (v)	ug/Kg	< 5.7		101008	5.681	EPA8260
1,4 Dichlorobenzene (v)	ug/Kg	< 5.7		101008	5.681	EPA8260
1,2 Dichlorobenzene (v)	ug/Kg	< 5.7		101008	5.681	EPA8260
n-Butylbenzene	ug/Kg	< 5.7		101008	5.681	EPA8260
1,4-Dioxane	ug/Kg	< 110		101508	113.6	EPA8260
% Solids		88		101308	0.1	182540G

cc:

LRL=Laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 29541 NYSDOH ID # 10320 Page 2 of 2

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING
377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770
Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.284449.02 10/17/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:0955
MATRIX:Soil SAMPLE: VOC-2

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Vinyl Chloride	ug/Kg	< 6.0		101008	5.952	EPA8260
1,1 Dichloroethene	ug/Kg	< 6.0		101008	5.952	EPA8260
t-1,2-Dichloroethene	ug/Kg	< 6.0		101008	5.952	EPA8260
1,1 Dichloroethane	ug/Kg	< 6.0		101008	5.952	EPA8260
Acetone	ug/Kg	< 60		101008	59.52	EPA8260
ter.ButylMethylEther	ug/Kg	< 6.0		101008	5.952	EPA8260
Methylene Chloride	ug/Kg	< 6.0		101008	5.952	EPA8260
Chloroform	ug/Kg	< 6.0		101008	5.952	EPA8260
111 Trichloroethane	ug/Kg	< 6.0		101008	5.952	EPA8260
c-1,2-Dichloroethene	ug/Kg	< 6.0		101008	11.90	EPA8260
1,2 Dichloroethane	ug/Kg	< 6.0		101008	5.952	EPA8260
Benzene	ug/Kg	< 6.0		101008	5.952	EPA8260
Carbon Tetrachloride	ug/Kg	< 6.0		101008	5.952	EPA8260
Methyl Ethyl Ketone	ug/Kg	< 60		101008	59.52	EPA8260
Trichloroethene	ug/Kg	< 6.0		101008	5.952	EPA8260
Toluene	ug/Kg	< 6.0		101008	5.952	EPA8260
Tetrachloroethene	ug/Kg	< 6.0		101008	5.952	EPA8260
Chlorobenzene	ug/Kg	< 6.0		101008	5.952	EPA8260
Ethyl Benzene	ug/Kg	< 6.0		101008	5.952	EPA8260
Xylene	ug/Kg	< 18		101008	17.85	EPA8260
n-Propylbenzene	ug/Kg	< 6.0		101008	5.952	EPA8260
135-Trimethylbenzene	ug/Kg	< 6.0		101008	5.952	EPA8260
tert-Butylbenzene	ug/Kg	< 6.0		101008	5.952	EPA8260
124-Trimethylbenzene	ug/Kg	< 6.0		101008	5.952	EPA8260
sec-Butylbenzene	ug/Kg	< 6.0		101008	5.952	EPA8260

cc:

LRL=Laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 29542 NYSDOH ID # 10320 Page 1 of 2

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770

Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.284449.02 10/17/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:0955
MATRIX:Soil SAMPLE: VOC-2

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
1,3 Dichlorobenzene (v)	ug/Kg	< 6.0		101008	5.952	EPA8260
1,4 Dichlorobenzene (v)	ug/Kg	< 6.0		101008	5.952	EPA8260
1,2 Dichlorobenzene (v)	ug/Kg	< 6.0		101008	5.952	EPA8260
n-Butylbenzene	ug/Kg	< 6.0		101008	5.952	EPA8260
1,4-Dioxane	ug/Kg	< 120		101508	119.0	EPA8260
% Solids		84		101308	0.1	182540G

cc:

LRL=Laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 29543 NYSDOH ID # 10320 Page 2 of 2

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770

Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.284449.03 10/17/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:1130
MATRIX:Soil SAMPLE: M-S1-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Tot Organic Carbon	mg/Kg	24000		101408	4545.	EPA415.1
% Moisture		45		101008	0.1	182540G

cc:

LRL=Laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 29544 NYSDOH ID # 10320

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING
377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770
Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.284449.04 10/17/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:1130
MATRIX:Soil SAMPLE: M-S1-CB

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Tot Organic Carbon	mg/Kg	2600		101408	547.9	EPA415.1
% Moisture		27		101008	0.1	182540G

cc:

LRL=Laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 29545 NYSDOH ID # 10320 Page 1 of 1

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770

Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.284449.05 10/17/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790

ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:1330

MATRIX:Soil SAMPLE: M-S2-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Tot Organic Carbon	mg/Kg	250000		101408	21875	EPA415.1
% Moisture		68		101008	0.1	182540G

cc:

LRL=Laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 29546 NYSDOH ID # 10320 Page 1 of 1

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING
377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770
Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.284449.06 10/17/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 (NCDPW 4 Ponds)
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/09/08 RECEIVED:10/09/08
TIME COL'D:1330
MATRIX:Soil SAMPLE: M-S2-CB

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Tot Organic Carbon	mg/Kg	45000		101408	12068	EPA415.1
% Moisture		42		101008	0.1	182540G

cc:

LRL=Laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 29547 NYSDOH ID # 10320 Page 1 of 1

ECOTEST LABORATORIES, INC. *ENVIRONMENTAL TESTING*

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770

Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.284459.01 10/20/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:Soil SAMPLE: M-S3-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Tot Organic Carbon	mg/Kg	53000		101408	8823.	EPA415.1
% Moisture		66		101508	0.1	182540G

cc:

LRL=Laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 29802 NYSDOH ID # 10320 Page 1 of 1

Analytical results relate to the samples as received by the laboratory.

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777• FAX (631) 422-5770

Email: ecotestlab@aol.com Website: www.ecotestlabs.com

LAB NO.284459.02 10/20/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790

ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE:
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830

MATRIX:Soil SAMPLE: M-S3-CB

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Tot Organic Carbon	mg/Kg	8000		101408	1333.	EPA415.1
% Moisture		25		101508	0.1	182540G

cc:

LRL=Laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 29803 NYSDOH ID # 10320 Page 1 of 1

Analytical results relate to the samples as received by the laboratory.

ECO TEST LABORATORIES, INC. • ENVIRONMENTAL TESTING
377 Sheffield Avenue, North Babylon, New York 11703
(631) 422-5777 • FAX (631) 422-5770 • Email: ecotestlab@aol.com

284458 - 284459

CHAIN OF CUSTODY RECORD

4-5

Client: EEA
Address: 1239 Rt 25A Suite 1
Stony Brook NY 11790
Phone: 631-751-4600 FAX:
Person receiving report: Erin Brosnan
Sampled by: Erin Brosnan
Source: Merokee Pond
Job No. 08508.03 NCDPW

MATRIX (Soil, Water, etc.)	COLLECTED DATE	COLLECTED TIME	SAMPLE IDENTIFICATION	TOTAL NUMBER OF CONTAINERS	TYPE & NUMBER OF CONTAINERS										QC Pkg Type (If Required)	Accelerated Turnaround Date Required	REMARKS-TESTS REQUIRED (24h TAT)
Soil	10/10/08	830 a	M-S3-CA	3											A		TOC, % Moisture, Grain Size
↓	↓	↓	M-S3-CB	3											↓		If grain size <90% sand then
			M-S3-CC	3													Metals, Pesticides/PCBs, SVOCs
																	On Hold - Extracts only (Metals, Pesticides/PCBs, SVOCs)

Temp = 1.4°C

Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)	Relinquished by: (Signature)	DATE/TIME	SEAL INTACT?	Received by: (Signature)
Erin Brosnan Representing:	10/10/08 10:15	YES NO NA	Representing:	Representing:		YES NO NA	Representing:
Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:	Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284536.00 10/22/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790

ATTN: PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE: Former Lab No.284458.01
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:Soil SAMPLE: M-S3-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Vinyl Chloride	ug/Kg	< 16		102108	16.12	EPA8260
1,1 Dichloroethene	ug/Kg	< 16		102108	16.12	EPA8260
t-1,2-Dichloroethene	ug/Kg	< 16		102108	16.12	EPA8260
1,1 Dichloroethane	ug/Kg	< 16		102108	16.12	EPA8260
Acetone	ug/Kg	320		102108	161.2	EPA8260
ter.ButylMethylEther	ug/Kg	< 16		102108	16.12	EPA8260
Methylene Chloride	ug/Kg	< 16		102108	16.12	EPA8260
Chloroform	ug/Kg	< 16		102108	16.12	EPA8260
111 Trichloroethane	ug/Kg	< 16		102108	16.12	EPA8260
c-1,2-Dichloroethene	ug/Kg	< 16		102108	32.25	EPA8260
1,2 Dichloroethane	ug/Kg	< 16		102108	16.12	EPA8260
Benzene	ug/Kg	< 16		102108	16.12	EPA8260
Carbon Tetrachloride	ug/Kg	< 16		102108	16.12	EPA8260
Methyl Ethyl Ketone	ug/Kg	< 160		102108	161.2	EPA8260
Trichloroethene	ug/Kg	< 16		102108	16.12	EPA8260
Toluene	ug/Kg	< 16		102108	16.12	EPA8260
Tetrachloroethene	ug/Kg	< 16		102108	16.12	EPA8260
Chlorobenzene	ug/Kg	< 16		102108	16.12	EPA8260
Ethyl Benzene	ug/Kg	< 16		102108	16.12	EPA8260
Xylene	ug/Kg	< 48		102108	48.38	EPA8260
n-Propylbenzene	ug/Kg	< 16		102108	16.12	EPA8260
135-Trimethylbenzene	ug/Kg	< 16		102108	16.12	EPA8260
tert-Butylbenzene	ug/Kg	< 16		102108	16.12	EPA8260
124-Trimethylbenzene	ug/Kg	< 16		102108	16.12	EPA8260
sec-Butylbenzene	ug/Kg	< 16		102108	16.12	EPA8260

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 30425 NYSDOH ID # 10320 Page 1 of 9

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284536.00 10/22/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790

ATTN: PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE: Former Lab No.284458.01
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:Soil SAMPLE: M-S3-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
1,3 Dichlorobenzene (v)	ug/Kg	< 16		102108	16.12	EPA8260
1,4 Dichlorobenzene (v)	ug/Kg	< 16		102108	16.12	EPA8260
1,2 Dichlorobenzene (v)	ug/Kg	< 16		102108	16.12	EPA8260
n-Butylbenzene	ug/Kg	< 16		102108	16.12	EPA8260
1,4-Dioxane	ug/Kg	< 320		102108	322.5	EPA8260
% Solids		31		102108	0.1	182540G

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 30426 NYSDOH ID # 10320 Page 2 of 9

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284536.00 10/22/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE: Former Lab No.284458.01
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:Soil SAMPLE: M-S3-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Bis(2-chloroethyl)ether	ug/Kg	< 480		102008	483.8	EPA8270
1,3 Dichlorobenzene(sv)	ug/Kg	< 480		102008	483.8	EPA8270
1,4 Dichlorobenzene(sv)	ug/Kg	< 480		102008	483.8	EPA8270
Carbazole	ug/Kg	< 480		102008	483.8	EPA8270
1,2 Dichlorobenzene(sv)	ug/Kg	< 480		102008	483.8	EPA8270
Bis(2-chloroisopropyl)ether	ug/Kg	< 480		102008	483.8	EPA8270
N-Nitrosodi-n-propylamine	ug/Kg	< 480		102008	483.8	EPA8270
Hexachloroethane	ug/Kg	< 480		102008	483.8	EPA8270
Nitrobenzene	ug/Kg	< 480		102008	483.8	EPA8270
Isophorone	ug/Kg	< 480		102008	483.8	EPA8270
Bis(2-chloroethoxy)methane	ug/Kg	< 480		102008	483.8	EPA8270
124-Trichlorobenzene (sv)	ug/Kg	< 480		102008	483.8	EPA8270
Naphthalene(sv)	ug/Kg	< 480		102008	483.8	EPA8270
4-Chloroaniline	ug/Kg	< 480		102008	483.8	EPA8270
Hexachlorobutadiene	ug/Kg	< 480		102008	483.8	EPA8270
2-Methylnaphthalene	ug/Kg	< 480		102008	483.8	EPA8270
Hexachlorocyclopentadiene	ug/Kg	< 4800		102008	4838.	EPA8270
2-Chloronaphthalene	ug/Kg	< 480		102008	483.8	EPA8270
2-Nitroaniline	ug/Kg	< 480		102008	483.8	EPA8270
Dimethyl Phthalate	ug/Kg	< 480		102008	483.8	EPA8270
Acenaphthylene	ug/Kg	< 480		102008	483.8	EPA8270
2,6-Dinitrotoluene	ug/Kg	< 480		102008	483.8	EPA8270
3-Nitroaniline	ug/Kg	< 480		102008	483.8	EPA8270
Acenaphthene	ug/Kg	< 480		102008	483.8	EPA8270
Dibenzofuran	ug/Kg	< 480		102008	483.8	EPA8270

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284536.00 10/22/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE: Former Lab No.284458.01
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:Soil SAMPLE: M-S3-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
2,4-Dinitrotoluene	ug/Kg	< 480		102008	483.8	EPA8270
Diethyl Phthalate	ug/Kg	< 480		102008	483.8	EPA8270
4-Chlorophenyl phenyl ether	ug/Kg	< 480		102008	483.8	EPA8270
Fluorene	ug/Kg	< 480		102008	483.8	EPA8270
4-Nitroaniline	ug/Kg	< 480		102008	483.8	EPA8270
N-Nitrosodiphenylamine	ug/Kg	< 480		102008	483.8	EPA8270
4-Bromophenyl phenyl ether	ug/Kg	< 480		102008	483.8	EPA8270
Hexachlorobenzene	ug/Kg	< 480		102008	483.8	EPA8270
Phenanthrene	ug/Kg	< 480		102008	483.8	EPA8270
Anthracene	ug/Kg	< 480		102008	483.8	EPA8270
Di-n-Butyl Phthalate	ug/Kg	< 480		102008	483.8	EPA8270
Fluoranthene	ug/Kg	1000		102008	483.8	EPA8270
Pyrene	ug/Kg	1100		102008	483.8	EPA8270
BenzylButylPhthalate	ug/Kg	< 480		102008	483.8	EPA8270
3,3'-Dichlorobenzidine	ug/Kg	< 4800	*	102008	4838.	EPA8270
Benzo(a)anthracene	ug/Kg	< 480		102008	483.8	EPA8270

cc:

LRL=laboratory Reporting Limit

REMARKS:

*Estimated due to low internal standard recovery, *33%. Low recovery due to interference. QC limit is 50%.

DIRECTOR

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284536.00 10/22/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE: Former Lab No.284458.01
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:Soil SAMPLE: M-S3-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Chrysene	ug/Kg	580		102008	483.8	EPA8270
Bis(2-ethylhexyl)phthalate	ug/Kg	940		102008	483.8	EPA8270
Di-n-octyl Phthalate	ug/Kg	< 480	*	102008	483.8	EPA8270
Benzo(b)fluoranthene	ug/Kg	740	#*	102008	483.8	EPA8270
Benzo(k)fluoranthene	ug/Kg	710	#*	102008	483.8	EPA8270
Benzo(a)pyrene	ug/Kg	580	*	102008	483.8	EPA8270
Indeno(1,2,3-cd)pyrene	ug/Kg	< 480	*	102008	483.8	EPA8270
Dibenzo(a,h)anthracene	ug/Kg	< 480	*	102008	483.8	EPA8270
Benzo(ghi)perylene	ug/Kg	< 480	*	102008	483.8	EPA8270

cc:

LRL=laboratory Reporting Limit

REMARKS: #Results estimated due to unobtainable method requirement of a 50% split between peaks with the same isomers.
*Estimated due to low internal standard recovery, *33%. Low recovery due to interference. QC limit is 50%.

DIRECTOR

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284536.00 10/22/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE: Former Lab No.284458.01
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:Soil SAMPLE: M-S3-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Phenol	ug/Kg	< 480		102008	483.8	EPA8270
2-Chlorophenol	ug/Kg	< 480		102008	483.8	EPA8270
2-Methylphenol (o-cresol)	ug/Kg	< 480		102008	483.8	EPA8270
4-Methylphenol (p-cresol)	ug/Kg	< 480		102008	483.8	EPA8270
2-Nitrophenol	ug/Kg	< 480		102008	483.8	EPA8270
2,4-Dimethylphenol	ug/Kg	< 480		102008	483.8	EPA8270
2,4-Dichlorophenol	ug/Kg	< 480		102008	483.8	EPA8270
4-Chloro-3-methylphenol	ug/Kg	< 480		102008	483.8	EPA8270
2,4,6-Trichlorophenol	ug/Kg	< 480		102008	483.8	EPA8270
2,4,5-Trichlorophenol	ug/Kg	< 480		102008	483.8	EPA8270
2,4-Dinitrophenol	ug/Kg	< 4800		102008	4838.	EPA8270
4-Nitrophenol	ug/Kg	< 4800		102008	4838.	EPA8270
2-Methyl-4,6-dinitrophenol	ug/Kg	< 4800		102008	4838.	EPA8270
Pentachlorophenol (ms)	ug/Kg	< 4800		102008	4838.	EPA8270
3-Methylphenol (m-cresol)	ug/Kg	< 480		102008	483.8	EPA8270

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 30431 NYSDOH ID # 10320

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284536.00 10/22/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE: Former Lab No.284458.01
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:Soil SAMPLE: M-S3-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Lindane	ug/Kg	< 6.5		101808	6.451	EPA8081
Heptachlor	ug/Kg	< 6.5		101808	6.451	EPA8081
Aldrin	ug/Kg	< 6.5		101808	6.451	EPA8081
Heptachlor Epoxide	ug/Kg	< 6.5		101808	6.451	EPA8081
p,p-DDE	ug/Kg	77		101808	6.451	EPA8081
Dieldrin	ug/Kg	< 6.5		101808	6.451	EPA8081
Endrin	ug/Kg	< 6.5	$	101808	6.451	EPA8081
p,p-DDD	ug/Kg	97		101808	6.451	EPA8081
p,p-DDT	ug/Kg	< 13		101808	12.90	EPA8081
Chlordane	ug/Kg	480		101808	25.80	EPA8081
Toxaphene	ug/Kg	< 130		101808	129.0	EPA8081
Endrin Aldehyde	ug/Kg	< 39		101808	38.70	EPA8081
a BHC	ug/Kg	< 6.5		101808	6.451	EPA8081
b BHC	ug/Kg	< 6.5		101808	6.451	EPA8081
d BHC	ug/Kg	< 6.5		101808	6.451	EPA8081
Endosulfan 1	ug/Kg	< 13		101808	12.90	EPA8081

cc:

LRL=laboratory Reporting Limit

REMARKS: $Endrin breakdown (25%) exceeded 15% QC limit.

DIRECTOR

rn = 30432 NYSDOH ID # 10320

EcoTest Laboratories Inc
377 Sheffield Ave
North Babylon, NY 11703
631 422-5777

LAB NO.284536.00 10/22/08

Energy & Environmental Analysts, Inc.
1239 Route 25A Suite 1
Stony Brook, NY 11790
ATTN: Erin Brosnan PO#:

SOURCE OF SAMPLE: Merokee Pond, #08508.03 NCDPW
SOURCE OF SAMPLE: Former Lab No.284458.01
COLLECTED BY: Client DATE COL'D:10/10/08 RECEIVED:10/10/08
TIME COL'D:0830
MATRIX:Soil SAMPLE: M-S3-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Endosulfan 2	ug/Kg	< 13		101808	12.90	EPA8081
Endosulfan Sulfate	ug/Kg	< 39		101808	38.70	EPA8081
Aroclor 1016	ug/Kg	< 130		101808	129.0	EPA8082
Aroclor 1221	ug/Kg	< 130		101808	129.0	EPA8082
Aroclor 1232	ug/Kg	< 130		101808	129.0	EPA8082
Aroclor 1242	ug/Kg	< 130		101808	129.0	EPA8082
Aroclor 1248	ug/Kg	< 130		101808	129.0	EPA8082
Aroclor 1254	ug/Kg	< 130		101808	129.0	EPA8082
Aroclor 1260	ug/Kg	< 130		101808	129.0	EPA8082
2,4,5-TP	ug/Kg	< 16		102108	16.12	EPA8151

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 30433 NYSDOH ID # 10320

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MATRIX:Soil SAMPLE: M-S3-CA

Results reported on a dry weight basis

ANALYTICAL PARAMETERS	UNITS	RESULT	FLAG	DATE TIME OF ANALYSIS	LRL	ANALYTICAL METHOD
Barium as Ba	mg/Kg	58		102008	1.612	EPA6010B
Arsenic as As	mg/Kg	8.4		102008	3.225	EPA6010B
Beryllium as Be	mg/Kg	1.5		102008	0.322	EPA6010B
Cadmium as Cd	mg/Kg	3.1		102008	1.612	EPA6010B
Chromium as Cr	mg/Kg	21		102008	1.612	EPA6010B
Copper as Cu	mg/Kg	55		102008	3.225	EPA6010B
Lead as Pb	mg/Kg	420		102008	1.612	EPA6010B
Mercury as Hg	mg/Kg	0.27		101708	0.016	EPA7470A
Nickel as Ni	mg/Kg	17		102008	3.225	EPA6010B
Selenium as Se	mg/Kg	< 3.2		102008	3.225	EPA6010B
Silver as Ag	mg/Kg	< 1.6		102008	1.612	EPA6010B
Manganese as Mn	mg/Kg	220		102008	3.225	EPA6010B
Zinc as Zn	mg/Kg	250		102008	3.225	EPA6010B
Cyanide as CN	mg/kg	< 6.5		101708	6.451	EPA9012A
Chromium hex as Cr	mg/Kg	< 2.6		101708 1230	2.580	EPA7196A

cc:

LRL=laboratory Reporting Limit

REMARKS:

DIRECTOR

rn = 30434 NYSDOH ID # 10320

MEROKEE POND
SVOCs, PESTICIDES, PCBs, METALS

Compounds	UNITS	NYSDEC	MEROKEE	MINIMUM	MEDIAN	MAXIMUM
1,2 Dichlorobenzene(sv)	ug/Kg		< 480			
1,3 Dichlorobenzene(sv)	ug/Kg		< 480			
1,4 Dichlorobenzene(sv)	ug/Kg		< 480			
124-Trichlorobenzene (sv)	ug/Kg		< 480			
2,4-Dinitrotoluene	ug/Kg		< 480			
2,6-Dinitrotoluene	ug/Kg		< 480			
2-Chloronaphthalene	ug/Kg		< 480			
2-Methylnaphthalene	ug/Kg		< 480			
2-Nitroaniline	ug/Kg		< 480			
3,3'-Dichlorobenzidine	ug/Kg		< 4800			
3-Nitroaniline	ug/Kg		< 480			
4-Bromophenyl phenyl ether	ug/Kg		< 480			
4-Chloroaniline	ug/Kg		< 480			
4-Chlorophenyl phenyl ether	ug/Kg		< 480			
4-Nitroaniline	ug/Kg		< 480			
Acenaphthene	ug/Kg	20000	< 480			
Acenaphthylene	ug/Kg	100000	< 480			
Anthracene	ug/Kg	100000	< 480	9.9	67.0	510.0
Benzo(a)anthracene	ug/Kg	1000	< 480	15.9	200.0	2,700.0
Benzo(a)pyrene	ug/Kg	1000	580	15.5	255.0	3,400.0
Benzo(b)fluoranthene	ug/Kg	1000	740	10.1	430.0	5,600.0
Benzo(ghi)perylene	ug/Kg	100000	< 480	16.0	125.0	1,500.0
Benzo(k)fluoranthene	ug/Kg	800	710	18.1	230.0	2,700.0
BenzylButylPhthalate	ug/Kg		< 480	18.8	48.5	480.0
Bis(2-chloroethoxy)methane	ug/Kg		< 480			
Bis(2-chloroethyl)ether	ug/Kg		< 480			
Bis(2-chloroisopropyl)ether	ug/Kg		< 480			
Bis(2-ethylhexyl)phthalate	ug/Kg		940			
Carbazole	ug/Kg		< 480	21.5	70.5	635.0
Chrysene	ug/Kg	1000	580	19.6	220.0	2,900.0
Di-n-Butyl Phthalate	ug/Kg		< 480	17.8	77.4	480.0
Di-n-octyl Phthalate	ug/Kg		< 480			
Dibenzo(a,h)anthracene	ug/Kg	330	< 480	16.0	48.5	480.0
Dibenzofuran	ug/Kg	7000	< 480			
Diethyl Phthalate	ug/Kg		< 480			
Dimethyl Phthalate	ug/Kg		< 480			
Fluoranthene	ug/Kg	100000	1000	12.7	430.0	6,100.0
Fluorene	ug/Kg	30000	< 480	18.3	48.0	480.0
Hexachlorobenzene	ug/Kg		< 480			
Hexachlorobutadiene	ug/Kg		< 480			
Hexachlorocyclopentadiene	ug/Kg		< 4800			
Hexachloroethane	ug/Kg		< 480			
Indeno(1,2,3-cd)pyrene	ug/Kg	500	< 480	14.8	110.0	1,500.0
Isophorone	ug/Kg		< 480			
N-Nitrosodi-n-propylamine	ug/Kg		< 480			
N-Nitrosodiphenylamine	ug/Kg		< 480			
Naphthalene(sv)	ug/Kg	12000	< 480			
Nitrobenzene	ug/Kg		< 480			
Phenanthrene	ug/Kg	100000	< 480	16.1	175.0	1,800.0
Pyrene	ug/Kg	100000	1100	11.8	535.0	7,400.0
2,4,5-Trichlorophenol	ug/Kg		< 480			

MEROKEE POND
SVOCs, PESTICIDES, PCBs, METALS

Compounds	UNITS	NYSDEC	MEROKEE	MINIMUM	MEDIAN	MAXIMUM
2,4,6-Trichlorophenol	ug/Kg		< 480			
2,4-Dichlorophenol	ug/Kg		< 480			
2,4-Dimethylphenol	ug/Kg		< 480			
2,4-Dinitrophenol	ug/Kg		< 4800			
2-Chlorophenol	ug/Kg		< 480			
2-Methyl-4,6-dinitrophenol	ug/Kg		< 4800			
2-Methylphenol (o-cresol)	ug/Kg	330	< 480			
2-Nitrophenol	ug/Kg		< 480			
3-Methylphenol (m-cresol)	ug/Kg	330	< 480			
4-Chloro-3-methylphenol	ug/Kg		< 480			
4-Methylphenol (p-cresol)	ug/Kg	330	< 480			
4-Nitrophenol	ug/Kg		< 4800			
Pentachlorophenol (ms)	ug/Kg	800	< 4800			
Phenol	ug/Kg	330	< 480			
a BHC	ug/Kg	20	< 6.5	2.8	6.1	23.7
Aldrin	ug/Kg	5	< 6.5	2.8	6.7	25.8
b BHC	ug/Kg	36	< 6.5	2.8	6.2	76.6
Chlordane	ug/Kg	94	480	17.0	164.5	2,200.0
d BHC	ug/Kg	40	< 6.5	2.8	6.2	58.5
Dieldrin	ug/Kg	5	< 6.5	1.7	5.3	26.0
Endosulfan 1	ug/Kg	2400	< 13	5.6	8.4	22.0
Endosulfan 2	ug/Kg	2400	< 13	5.3	8.0	19.8
Endosulfan Sulfate	ug/Kg	2400	< 39	5.0	18.0	39.0
Endrin	ug/Kg	14	< 6.5	2.8	6.2	30.6
Endrin Aldehyde	ug/Kg		< 39	5.7	18.0	39.0
Heptachlor	ug/Kg	42	< 6.5	0.6	5.4	32.3
Heptachlor Epoxide	ug/Kg		< 6.5	1.0	4.9	31.9
Lindane	ug/Kg	100	< 6.5			
p,p-DDD	ug/Kg	3.3	97	1.4	20.6	550.0
p,p-DDE	ug/Kg	3.3	77	0.6	21.3	150.0
p,p-DDT	ug/Kg	3.3	< 13	0.8	9.5	33.0
Toxaphene	ug/Kg	100	< 130			
Aroclor 1016	ug/Kg	100	< 130	56.0	77.5	130.0
Aroclor 1221	ug/Kg	100	< 130	56.0	77.5	130.0
Aroclor 1232	ug/Kg	100	< 130	56.0	77.5	130.0
Aroclor 1242	ug/Kg	100	< 130	56.0	77.5	130.0
Aroclor 1248	ug/Kg	100	< 130	56.0	77.5	130.0
Aroclor 1254	ug/Kg	100	< 130	56.0	77.5	130.0
Aroclor 1260	ug/Kg	100	< 130	56.0	77.5	130.0
2,4,5-TP	ug/Kg	3800	< 16	7.0	9.9	16.0
Arsenic as As	mg/Kg	13	8.4	0.3	4.7	16.0
Barium as Ba	mg/Kg	350	58	3.3	35.6	88.9
Beryllium as Be	mg/Kg	7.2	1.5	0.2	0.5	1.6
Cadmium as Cd	mg/Kg	2.5	3.1	0.2	1.2	7.8
Chromium as Cr	mg/Kg	30	21	1.7	18.5	132.0
Copper as Cu	mg/Kg	50	55	2.4	32.1	170.0
Lead as Pb	mg/Kg	63	420	9.7	95.5	1,160.0
Manganese as Mn	mg/Kg	1600	220	17.2	110.0	320.0
Mercury as Hg	mg/Kg	0.18	0.27	0.0	0.1	0.8
Nickel as Ni	mg/Kg	30	17	1.1	13.7	47.0
Selenium as Se	mg/Kg	3.9	< 3.2	0.2	1.6	4.8

MEROKEE POND
SVOCs, PESTICIDES, PCBs, METALS

Compounds	UNITS	NYSDEC	MEROKEE	MINIMUM	MEDIAN	MAXIMUM
Silver as Ag	mg/Kg	2	< 1.6	0.3	1.1	5.9
Zinc as Zn	mg/Kg	109	250	10.1	95.5	633.0
% Solids			31			
Chromium hex as Cr	mg/Kg	1	< 2.6	1.1	1.6	2.6
Cyanide as CN	mg/kg	27	< 6.5	2.8	3.9	6.5

red = value near or over state limit
blue = no state limit value in Table 375-6.8 (a)
Minimum, Median, and Maximum values are from testing of 8 ponds
- Tanglewood Pond, Lakeview
- Lofts Pond, Baldwin
- Silver Lake, Baldwin
- Mill Pond, Wantagh
- Cedar Lake, Woodmere
- Twin Ponds, Plandome
- Udall's Mill Pond, Great Neck
- Merokee Pond, Bellmore

MEROKEE POND
VOCs

Compound	Units	NYSDEC	Merokee VOC-1	Merokee VOC-2	MIN	MEDIAN	MAX
1,1 Dichloroethane	ug/Kg	270	< 5.7	< 6	5.7	9.6	23
1,1 Dichloroethene	ug/Kg	330	< 5.7	< 6	5.7	9.6	23
1,2 Dichlorobenzene (v)	ug/Kg	1100	< 5.7	< 6	5.7	9.6	23
1,2 Dichloroethane	ug/Kg	20	< 5.7	< 6	5.7	9.6	23
1,3 Dichlorobenzene (v)	ug/Kg	2400	< 5.7	< 6	5.7	9.6	23
1,4 Dichlorobenzene (v)	ug/Kg	1800	< 5.7	< 6	5.7	9.6	23
1,4-Dioxane	ug/Kg	100	< 110	< 120	110	190	450
111 Trichloroethane	ug/Kg	680	< 5.7	< 6	5.7	9.6	23
124-Trimethylbenzene	ug/Kg	3600	< 5.7	< 6	5.7	9.6	23
135-Trimethylbenzene	ug/Kg	8400	< 5.7	< 6	5.7	9.6	23
Acetone	ug/Kg	50	< 57	< 60	25.3	89	500
Benzene	ug/Kg	60	< 5.7	< 6	5.7	9.6	23
c-1,2-Dichloroethene	ug/Kg	250	< 5.7	< 6	5.7	9.6	23
Carbon Tetrachloride	ug/Kg	760	< 5.7	< 6	5.7	9.6	23
Chlorobenzene	ug/Kg	1100	< 5.7	< 6	5.7	9.6	23
Chloroform	ug/Kg	370	< 5.7	< 6	5.7	9.6	23
Ethyl Benzene	ug/Kg	1000	< 5.7	< 6	5.7	9.6	23
Methyl Ethyl Ketone	ug/Kg	120	< 57	< 60	57	96	230
Methylene Chloride	ug/Kg	50	< 5.7	< 6	0.73	9.3	115
n-Butylbenzene	ug/Kg	12000	< 5.7	< 6	5.7	9.6	23
n-Propylbenzene	ug/Kg	3900	< 5.7	< 6	5.7	9.6	23
sec-Butylbenzene	ug/Kg	11000	< 5.7	< 6	5.7	9.6	23
t-1,2-Dichloroethene	ug/Kg	190	< 5.7	< 6	5.7	9.6	23
ter.ButylMethylEther	ug/Kg	930	< 5.7	< 6	5.7	9.6	23
tert-Butylbenzene	ug/Kg	5900	< 5.7	< 6	5.7	9.6	23
Tetrachloroethene	ug/Kg	1300	< 5.7	< 6	0.33	6.3	23
Toluene	ug/Kg	700	< 5.7	< 6	5.7	9.6	23
Trichloroethene	ug/Kg	470	< 5.7	< 6	5.7	9.6	23
Vinyl Chloride	ug/Kg	20	< 5.7	< 6	5.7	9.6	23
Xylene	ug/Kg	260	< 17	< 18	17	29	68
% Solids			88	84	22	52	88

Minimum, Median, and Maximum values are from testing of 8 ponds

- Tanglewood Pond, Lakeview
- Lofts Pond, Baldwin
- Silver Lake, Baldwin
- Mill Pond, Wantagh
- Cedar Lake, Woodmere
- Twin Ponds, Plandome
- Udall's Mill Pond, Great Neck
- Merokee Pond, Bellmore