A LOCAL LAW TO AMEND SECTIONS 92-1.1 AND 92-1.4

OF THE TOWN CODE RELATING TO

VETERAN'S EXEMPTIONS

WHEREAS, the State of New York and County of Westchester have amended the Alternative Veterans Exemption and for Cold War Veterans Exemption amounts; and

WHEREAS, the Town of Pound Ridge would like to amend its Town Code to be consistent with such amended amounts as applied to the Town portion of real property taxes.

NOW THEREFORE, the Town Board of the Town of Pound Ridge hereby ordains and enacts as follows:

SECTION 1. Section 92-1.1 of the Town Code of the Town of Pound Ridge is hereby amended as follows:

Section 92-1.1 Veterans E**xemption.**

A. Exemption granted. The Pound Ridge Town Board hereby resolves that it does not intend to adopt a local law which will deny exemptions to the veterans of this Town and the exemptions as provided therein will be applied to those eligible taxpayers of the Town of Pound Ridge.

B. Alternative veterans exemption.

(1) The following ~~set of~~ exemptions are ~~updated with the new increased maximums~~ established in § 458-a of the Real Property Law and shall be applicable to those eligible veterans in the Town of Pound Ridge:

(a) War veterans. Qualifying residential real property shall be exempt from taxation to the extent of the lesser of either 15% of the equalized assessed value of such property, or the product of ~~$54,000~~ ***$75,000*** multiplied by the latest state equalization rate for the assessing unit.

(b) Combat zone veterans. In addition to the exemption provided by Subsection B(1)(a) of this section, a qualifying combat veteran shall be exempt from taxation to the extent of the lesser of either 10% of the assessed value of such property, or the product of ~~$36,000~~ ***$50,000*** multiplied by the latest state equalization rate for the assessing unit.

(c) Disabled veteran. In addition to the exemptions provided by Subsection B(1)(a) and (b) of this section, a qualifying veteran receiving compensation for a service-connected disability shall be exempt from taxation to the extent of the lesser of either the product of the assessed value of such property multiplied by 50% of the veteran's disability rating, or the product of ~~$180,000~~ ***$250,000*** multiplied by the latest state equalization rate for the assessing unit.

(2) The maximum exemptions will fluctuate from year to year as equalization rates change pursuant to the provisions of § 458-a of the Real Property Tax Law, as amended.

SECTION 3. Section 92-1.4 of the Town Code of the Town of Pound Ridge is hereby amended, in relevant part, as follows:

Section 92-1.4 Cold War Veterans Exemption

C. Exemptions granted; limitations.

(1) Qualifying residential real property shall be exempt from taxation to the extent of 15% of the assessed value of such property; provided, however, that such exemption shall not exceed ~~$54,000~~ ***$75,000*** or the product of ~~$54,000~~ ***$75,000*** multiplied by the latest state equalization rate of the assessing unit, or, in the case of a special assessing unit, the latest class ratio, whichever is less.

(2) In addition to the exemption provided by Subsection C(1) of this section, where the Cold War veteran received a compensation rating from the United States Veterans' Affairs or from the United States Department of Defense because of a service-related disability, qualifying residential real property shall be exempt from taxation to the extent of the product of the assessed value of such property, multiplied by 50% of the Cold War veteran disability rating; provided, however, that such exemption shall not exceed ~~$180,000~~ ***$250,000*** or the product of ~~$180,000~~ ***$250,000*** multiplied by the latest state

equalization rate of the assessing unit, or, in the case of a special assessing unit, the latest class ratio, whichever is less.

(3) If a Cold War veteran receives either a veterans exemption under § 92-1.1 of this chapter, authorized by § 458 of the Real Property Tax Law or an alternative veterans exemption under § 92-1.1 of this chapter, authorized by § 458-a of the Real Property Tax Law, the Cold War veteran shall not be eligible to receive an exemption under this section.

Section 3. Severability.

The invalidity of any word, section, clause, paragraph, sentence, part or provision of this local law shall not affect the validity of any other part of this local law that can be given effect without such invalid part or parts.

Section 4. Effective Date.

This Local Law shall take effect immediately upon its adoption and filing with the Secretary of State.

NOTE: Material to be deleted is shown with a strike through. New material to be added is shown in underlined, bold italics.

HTW | HOCHERMAN TORTORELLA & WEKSTEIN LLP

Attorneys at Law
Geraldine N. Tortorella (NY, CT)
Adam L. Wekstein (NY)
Noelle C. Wolfson (NY, CT)

Henry M. Hocherman, Retired

April 6, 2022

Via Federal Express Delivery and Electronic Mail

Hon. Kevin Hansan, Supervisor
and Members of the Town Board
Town of Pound Ridge
179 Westchester Avenue
Pound Ridge, New York 10576

Re: Pound Ridge Golf Club – Additional Chemicals for Use on Golf Course

Dear Supervisor Hansan and Members of the Town Board:

This firm represents Eastwoods LLC, owner of the Pound Ridge Golf Club (the "Golf Course"). The approvals for the Golf Course included approval of a Groundwater, Surface Water and Stormwater Monitoring Plan (the "Monitoring Plan") and, as part of the Monitoring Plan, an Integrated Turfgrass Pest Management Plan (the "ITPMP") (prepared by A. Martin Petrovic, Ph.D., dated December 11, 1998 and last revised April 15, 2002). The ITPMP is Appendix I to the Monitoring Plan. (One hard copy of the Monitoring Plan with the ITPMP is enclosed for the Board's convenience.) I am writing because the Golf Course desires to update the ITPMP to expand the list of chemicals approved for use on the Golf Course.

The ITPMP prepared by Dr. Petrovic serves as a "maintenance blueprint" for achieving a healthy, pest-resistant, golf-playing surface with minimal impact on the environment, including water resources. Among other things, the ITPMP outlines a program of fertilizer and pest control options and other maintenance practices to be followed on the Golf Course. The ITPMP also identifies specific chemicals that may be applied to the greens, tees and fairways. In 2011, the Golf Course obtained approval to amend the list of approved chemicals to add and remove a few items.

The introduction to the ITPMP approved by the Town states that "a fertilizer and pest control program must show flexibility to deal with two very important variables, weather and nature." (ITPMP, page 3). It is an accepted maxim among golf course superintendents that a healthy turf is dependent on a dynamic and flexible ITPMP. Insect, weed and disease pests can develop a tolerance to chemicals, similar to the way in which bacteria have developed resistance to antibiotics. Turfgrass can be irreparably damaged in a matter of days by a fast-spreading or aggressive insect or disease. A golf course superintendent must be vigilant in monitoring and scouting the tees, greens and fairways, sometimes on a daily or more often basis, for these pests, or conditions conducive to their emergence or spread, and have ready access to a comprehensive suite of insecticides, fungicides and herbicides that he/she can swiftly apply to contain such threats.

The importance of a healthy turf cannot be overstated. Diseased turf poses a threat to the environment by reducing the stability of soils, increasing the potential for erosion and the need for more fertilizers and/or pesticides to be applied to reverse the condition. Still further, damaged turf impairs the playability of the Course and jeopardizes the very essence of the business.

In recent years, the Pound Ridge Golf Course Superintendent, Mr. Branko Zdravkoski, has had diminishing success with the chemicals that have been approved for use on the Golf Course. Among other things, he has had to apply certain chemicals more frequently than in prior years due, in part, to the persistence of insects, weeds and diseases. More applications mean the use of more product. (Not surprisingly, the ITPMP and sound business practices favor minimizing the number of chemical applications.) These are tell-tale indicators that the chemicals are declining in their effectiveness and that pests may be developing a tolerance to them. To address the situation, Superintendent Zdravkoski has identified alternative chemistries that he would like to use on the Golf Course, which he believes will more effectively and efficiently address the insects and diseases and relieve stress on the turf.

We have consulted chemistry and agronomy experts regarding the challenges being encountered by Superintendent Zdravkoski and whether the chemicals he proposes to add to his toolbox are suitable for the Course and the environment, namely environmental chemist Stuart Cohen, Ph.D., CGWP, President of Environmental & Turf Services, Inc.,[1] and agronomist and environmental scientist Steve McDonald, President of Turfgrass Disease Solutions. Dr. Cohen and Mr. McDonald agree that the chemicals currently approved for use are unnecessarily underinclusive, that limiting the chemicals that may be used on the Course is the antithesis to current day integrated pest management best practices and that expanding the chemicals that can be used on the Course will strengthen the ITPMP and Mr. Zdravkoski's ability to continue to address conditions on the Golf Course in a manner that poses little, if any, risk to the environment. Submitted herewith is a Table of new chemicals the Golf Course would like to have the flexibility to use on the Course. All of the pesticides in the Table have been approved by the United States Environmental Protection Agency ("US EPA") following an extensive and intensive review of the toxicological, ecological and chemistry data,[2] as well as by the New York State Department of Environmental Conservation ("NYSDEC") following its review and approval.

As currently written, the ITPMP requires that new chemicals to be used on the Golf Course undergo a risk assessment pursuant to a currently accepted methodology. To satisfy this requirement, Dr. Cohen and his staff screened the new chemicals in the Table for their risk to water resources by calculating the "Field Environmental Impact Quotient" ("FEIQ") for each one using the "Environmental Impact Quotient ("EIQ") calculator." The EIQ calculator is a screening-methodology used to evaluate a pesticide's potential impacts to the environment and human health. Each chemical in the Table has a low or very low FEIQ score, meaning that it does not pose a significant risk to the environment or human health. On that basis, Dr.

[1] Dr. Cohen has joined the Golf Course Consultant Team because Dr. Petrovic is semi-retired and declined to work on this application because of the potential need for long distance travel to meetings.
[2] According to Dr. Cohen, typically, the US EPA approves pesticides for use only after 50-120 studies are conducted and reviewed by the EPA, and after potential risks have been assessed.

Cohen has concluded that the chemicals in the Table are suitable for use on the Golf Course. A copy of Dr. Cohen's report, which describes the screening methodology and the results of his analysis, is submitted herewith.

Importantly, we know of no prohibition on the use of the chemicals in the Table by any other property or business owner in Pound Ridge, including the Rockrimmon Golf Club, or any other golf course in Northern Westchester. (In fact, representatives of NYSDEC have specifically stated to Superintendent Zdravkoski and his predecessor, former Superintendent Will Heintz, that no agency or body other than NYSDEC has jurisdiction to regulate the use and application of pesticides in New York State.) The only limitations on the use of the chemicals of which we are aware are that the chemicals must be applied at the rates and under the conditions set forth on the manufacturer's product labeling, limitations established by the US EPA and the NYSDEC that apply uniformly to all users of the products.

In the course of identifying new chemicals for use on the Golf Course, Superintendent Zdravkoski has reassessed the utility of currently approved chemicals. He has determined he will no longer use several of them because they are obsolete, more environmentally sensitive products have become available and/or they have not been effective in combating insects and disease on the Course. Therefore, based on the Superintendent's assessment, the Golf Course proposes to discontinue use of the following chemicals previously approved for use: benefluralin, benefin, bensulide, fenoxaprop, MSMA, trifluralin, acephate, bendiocarb, chlorpyrifos, isofenphos, indoxacarb, chloroneb, cyproconazole, etridiazole, flutolanil, fosetyl-al, thiophanatemethyl, bacillus licheniformis, cyfluthrin, ethofumesate, fluroxypyr, MCPA, MCPP, sulfentrazone, topramezone, and triclopyr.[3] Dr. Cohen and Mr. McDonald concur that effective alternatives to these chemicals are available and should be used.

The Golf Course will continue to analyze groundwater, surface water and stormwater samples annually pursuant to the Monitoring Plan.

The Monitoring Plan and ITPMP were approved more than fifteen years ago. The Golf Course has learned a lot and much has changed in that time. We believe those documents warrant further discussion and review. In the spirit of transparency, we want to let the Board know that we plan to make a separate submission regarding further amendments to the Monitoring Plan and ITPMP to reconcile inconsistencies with NYSDEC jurisdiction and bring the Monitoring Plan and ITPMP in line with prevailing practices and procedures in the industry and among golf courses in the Westchester County Region, including in Pound Ridge, in the near future.

[3] To avoid confusion, once the Board has acted on this request, we will develop an updated, comprehensive schedule of all chemicals that may be used on the Golf Course.

Kindly schedule this request to expand the chemicals approved for use on the Golf Course to include the pesticides on the enclosed Table for discussion at the next available Town Board meeting. (We can be available for the Board's April 12, 2022 meeting if that works for the Board.) Our team looks forward to discussing this request further with the Board at that time.

Respectfully yours,

Hocherman Tortorella & Wekstein, LLP

By: _____
Geraldine N. Tortorella

GNT:mc
Enclosures
cc: *Via Electronic Mail (with enclosures)*
Les Maron, Esq., Deputy Supervisor
William P. Harrington, Esq.
Jason Pitingaro, P.E.
Mr. Darren Wang
Stuart Cohen, Ph.D., CGWP
Mr. Steve McDonald
Mr. Branko Zdravkoski
John Benvegna, PG(NY), CPG

S:\# MATTERS\Eastwoods 0101\Pound Ridge Golf Club 001\Letters\Town Board Chemicals List 4-6-22.docx

HTW | HOCHERMAN TORTORELLA & WEKSTEIN LLP

Attorneys at Law
Geraldine N. Tortorella (NY, CT)
Adam L. Wekstein (NY)
Noelle C. Wolfson (NY, CT)

Henry M. Hocherman, Retired

April 7, 2022

Via Electronic Mail (chiefofstaff@townofpoundridge.com)

Nicole Engel, Chief of Staff
Town of Pound Ridge
179 Westchester Avenue
Pound Ridge, New York 10576

Re: Pound Ridge Golf Club – Additional Chemicals for Use on Golf Course

Dear Nicole:

Enclosed is a short Environmental Assessment Form that relates to the materials we submitted to the Town Board yesterday regarding the Pound Ridge Golf Club. Kindly add it to yesterday's submission. Thank you.

Respectfully yours,

Hocherman Tortorella & Wekstein, LLP

By: Geraldine N. Tortorella

GNT:mc
Enclosure
cc: *Via Electronic Mail (with enclosure)*
Hon. Kevin Hansan, Supervisor
Les Maron, Esq., Deputy Supervisor
William P. Harrington, Esq.
Jason Pitingaro, P.E.
Mr. Darren Wang
Stuart Cohen, Ph.D., CGWP
Mr. Steve McDonald
Mr. Branko Zdravkoski
John Benvegna, PG(NY), CPG

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Short Environmental Assessment Form
Part 1 - Project Information

Instructions for Completing

Part 1 – Project Information. The applicant or project sponsor is responsible for the completion of Part 1. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification. Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information.

Complete all items in Part 1. You may also provide any additional information which you believe will be needed by or useful to the lead agency; attach additional pages as necessary to supplement any item.

Part 1 – Project and Sponsor Information

Eastwoods LLC -- Pound Ridge Golf Club

Name of Action or Project:

Amendment of Integrated Turfgrass Pest Management Plan to add pesticides to the approved list for use on the Pound Ridge Golf Club.

Project Location (describe, and attach a location map):

18 High Ridge Road. West side of High Ridge Road south of Upper Shad Rd. and north of the Connecticut border. Tax Id - 9316-18.9

Brief Description of Proposed Action:

Approvals issued for the Pound Ridge Golf Club are conditioned upon compliance with a Groundwater, Surface Water and Stormwater Monitoring Plan of which an Integrated Turfgrass Pest Management Plan (ITPMP) is a part. Eastwoods LLC would like to add pesticides to the list of chemicals that can be applied on the Golf Course pursuant to the ITPMP. The ITPMP, as currently written, requires that new chemicals be screened according to an accepted methodology. Eastwoods is submitting the screening results, performed by environmental chemist Stuart Cohen, Ph.D., CGWP, and seeking amendment of the ITPMP to include the new pesticides.

No construction or other form of land disturbance is proposed.

Name of Applicant or Sponsor:	Telephone: 914-421-1800, Ext. 1
Eastwoods LLC, c/o Hocherman Tortorella & Wekstein, LLP (Geraldine N. Tortorella, Esq.)	E-Mail: g.tortorella@htwlegal.com

Address:

One North Broadway, Suite 400

City/PO:	State:	Zip Code:
White Plains	NY	10601

	NO	YES
1. Does the proposed action only involve the legislative adoption of a plan, local law, ordinance, administrative rule, or regulation? If Yes, attach a narrative description of the intent of the proposed action and the environmental resources that may be affected in the municipality and proceed to Part 2. If no, continue to question 2.	☑	☐
2. Does the proposed action require a permit, approval or funding from any other government Agency? If Yes, list agency(s) name and permit or approval: Potentially -- Planning Board, Water Control Commission	☐	☑

3. a. Total acreage of the site of the proposed action? +/- 170 acres
   b. Total acreage to be physically disturbed? 0.00 acres
   c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? +/-170 acres

4. Check all land uses that occur on, are adjoining or near the proposed action:

5. ☐ Urban ☐ Rural (non-agriculture) ☐ Industrial ☑ Commercial ☑ Residential (suburban)
   ☐ Forest ☐ Agriculture ☐ Aquatic ☐ Other(Specify):
   ☐ Parkland

	NO	YES	N/A
5. Is the proposed action,			
a. A permitted use under the zoning regulations?	☐	☑	☐
b. Consistent with the adopted comprehensive plan?	☐	☑	☐

	NO	YES
6. Is the proposed action consistent with the predominant character of the existing built or natural landscape?	☐	☑

	NO	YES
7. Is the site of the proposed action located in, or does it adjoin, a state listed Critical Environmental Area?		
If Yes, identify: _____	☑	☐

	NO	YES
8. a. Will the proposed action result in a substantial increase in traffic above present levels?	☑	☐
b. Are public transportation services available at or near the site of the proposed action?	☑	☐
c. Are any pedestrian accommodations or bicycle routes available on or near the site of the proposed action?	☑	☐

	NO	YES
9. Does the proposed action meet or exceed the state energy code requirements?		
If the proposed action will exceed requirements, describe design features and technologies:		
N/A	☐	☐

	NO	YES
10. Will the proposed action connect to an existing public/private water supply?		
If No, describe method for providing potable water:		
N/A -- Existing water supply will not change	☐	☐

	NO	YES
11. Will the proposed action connect to existing wastewater utilities?		
If No, describe method for providing wastewater treatment:		
N/A -- Existing form of wastewater treatment will not change.	☐	☐

	NO	YES
12. a. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places?	☑	☐
b. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory? No construction or land disturbance is proposed.	☐	☑

	NO	YES
13. a. Does any portion of the site of the proposed action, or lands adjoining the proposed action, contain wetlands or other waterbodies regulated by a federal, state or local agency?	☐	☑
b. Would the proposed action physically alter, or encroach into, any existing wetland or waterbody?	☑	☐
If Yes, identify the wetland or waterbody and extent of alterations in square feet or acres: _____		

14. Identify the typical habitat types that occur on, or are likely to be found on the project site. Check all that apply:

☐ Shoreline ☑ Forest ☐ Agricultural/grasslands ☐ Early mid-successional

☑ Wetland ☐ Urban ☑ Suburban

	NO	YES
15. Does the site of the proposed action contain any species of animal, or associated habitats, listed by the State or Federal government as threatened or endangered?	☑	☐
16. Is the project site located in the 100-year flood plan?	☑	☐
17. Will the proposed action create storm water discharge, either from point or non-point sources?	☑	☐
If Yes,		
a. Will storm water discharges flow to adjacent properties?	☐	☐
b. Will storm water discharges be directed to established conveyance systems (runoff and storm drains)?	☐	☐
If Yes, briefly describe:		
18. Does the proposed action include construction or other activities that would result in the impoundment of water or other liquids (e.g., retention pond, waste lagoon, dam)?	☑	☐
If Yes, explain the purpose and size of the impoundment:		
19. Has the site of the proposed action or an adjoining property been the location of an active or closed solid waste management facility?	☑	☐
If Yes, describe:		
20. Has the site of the proposed action or an adjoining property been the subject of remediation (ongoing or completed) for hazardous waste?	☑	☐
If Yes, describe:		

I CERTIFY THAT THE INFORMATION PROVIDED ABOVE IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE

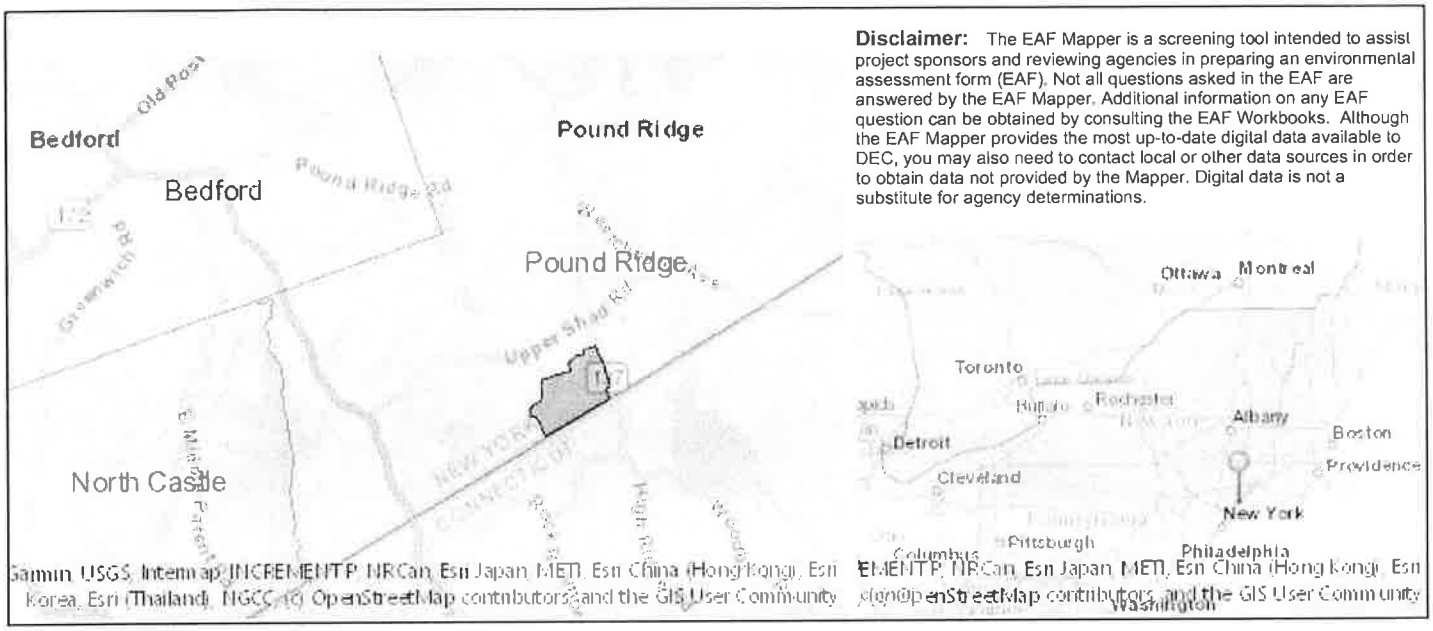
Applicant/sponsor/name: Geraldine N. Tortorella, Esq., attorney for Eastwoods LLC Date: April 6, 2022

Signature: Geraldine N. Tortorella Title: Attorney

PRINT FORM

EAF Mapper Summary Report

Thursday, April 7, 2022 9:56 AM



Disclaimer: The EAF Mapper is a screening tool intended to assist project sponsors and reviewing agencies in preparing an environmental assessment form (EAF). Not all questions asked in the EAF are answered by the EAF Mapper. Additional information on any EAF question can be obtained by consulting the EAF Workbooks. Although the EAF Mapper provides the most up-to-date digital data available to DEC, you may also need to contact local or other data sources in order to obtain data not provided by the Mapper. Digital data is not a substitute for agency determinations.

Part 1 / Question 7 [Critical Environmental Area]	No
Part 1 / Question 12a [National or State Register of Historic Places or State Eligible Sites]	No
Part 1 / Question 12b [Archeological Sites]	Yes
Part 1 / Question 13a [Wetlands or Other Regulated Waterbodies]	Yes - Digital mapping information on local and federal wetlands and waterbodies is known to be incomplete. Refer to EAF Workbook.
Part 1 / Question 15 [Threatened or Endangered Animal]	No
Part 1 / Question 16 [100 Year Flood Plain]	No
Part 1 / Question 20 [Remediation Site]	No

POUND RIDGE GOLF CLUB

TABLE OF PROPOSED NEW PESTICIDES
(April 4, 2022)

FUNGICIDES (11)
Fluazinam
Fluopyram
Fluoxastrobin
Fluxapyroxad
Mandestrobin
Mefentrifluconazole
Metconazole
Myclobutanil
Polyoxin d zinc salt
Pydiflumetofen
Tebuconazole

INSECTICIDES (1)
Lambda-cyhalothrin

GROWTH REGULATORS (2)
Flurprimidol
Prohexadione-Ca

Environmental & Turf Services, Inc.
11510 Georgia Avenue, Suite 240
Wheaton, MD 20902
301.933.4700 ets@ets-md.com

April 4, 2022

QUANTITATIVE RISK EVALUATION OF POUND RIDGE GOLF CLUB NEW PESTICIDES

The Environmental Impact Quotient (EIQ) calculator was used to evaluate the potential risks to the environment and humans of the use of newly-proposed pesticides[1] on the Pound Ridge Golf Club. The new pesticides are listed in the table. All but one of the proposed pesticides have a field use EIQ ("FEIQ") rating of very low (i.e., "v. low"). (The risk rank for one fungicide is 'low'.) Based on their very low rating, all of the proposed pesticides are recommended for use on the golf course in accordance with the product labeling. The following narrative provides the background information on the EIQ methods and results.

Background

The EIQ calculator is the basis for the Tier 1 Field Use Environmental Impact Quotient (FEIQ) calculator, which was initially developed by the New York State's Integrated Pest Management Program (NYSIPM) in 1992 (Kovach et al., 1992).

The EIQ calculator is a generally accepted screening-level model that semi-quantitatively evaluates the potential for pesticide impacts to both the environment and human health. The EIQ is continuously maintained by the NYSIPM Program. The most recent update to the online calculator was in March of 2022. In addition, the NYSIPM Program added new pesticides, also in March of 2022, to the EIQ *Table 2*, which is a spreadsheet found on the NYSIPM website that provides EIQ ratings for newer products. However, the EIQ *Table 2* does not provide individual results for the three basic components that combine to form the EIQ, explained below. At the time we accessed the online calculator, not all of the new pesticides that are on the EIQ's *Table 2* spreadsheet were provided in the online calculator. Therefore, we had to request that the NYSIPM director provide the results for the basic components for a few of the proposed pesticides.

The results of the calculator are intended to semi-quantitatively identify pesticide impacts to both the environment and human health. The term "semi-quantitative," in this context, indicates the fact that although the calculations are done quantitatively, specific doses are not calculated.

[1] "Pesticides" is a generic term used to refer to any product that claims to kill or mitigate a pest: fungicides, herbicides, insecticides, disinfectants, growth regulators, etc.

The EIQ method for calculating pesticide impacts takes into account the following three basic components: consumer risk, farm worker risk, and ecological fate/risk. The consumer component includes exposure of the consumer to the pesticide, as well as any ground water effects (i.e., a leaching component). Farm worker risk includes the assessment of both applicator and picker exposure (i.e., farmer), which is equivalent to a golfer or athlete, as well as chronic toxicity. Lastly, ecological risk (which includes a runoff component) is assessed by examining the aquatic and terrestrial effects to fish, birds, bees, and arthropods.

The FEIQ calculator requires two types of user-provided information: percent active ingredient (% a.i.) and the application rate (e.g., oz/1000 ft^2). The EIQ equation is listed below (Kovach et al., 1992). This equation is based on the three basic components referred to above which are material factors that go into producing the EIQ rating; however, the formula cannot be used directly to quantify pesticide concentrations and risks because the variables are not presented in a quantitative (dose-specific) manner.

(eqn 1) $EIQ=\{C[(DT*5)+(DT*P)]+[(C*((S+P)/2)*SY)+(L)]+[(F*R)+(D*((S+P)/2)*3)+(Z*P*3)+(B*P*5)]\}/3$

Where DT = dermal toxicity, C = chronic toxicity, SY = systemicity, F = fish toxicity, L = leaching potential, R = surface loss potential, D = bird toxicity, S = soil half-life, Z = bee toxicity, B = beneficial arthropod toxicity, P = plant surface half-life.

Application of the FEIQ/EIQ to the Pound Ridge Club

The percent active ingredient and the rate of application are input into the EIQ calculator for a particular pesticide selected from the dropdown list on the website, one at a time. The results provide an overall field use rating value (i.e., FEIQ) for the pesticide, as well as risk ratings for the individual consumer, worker, and ecological components. The values for each component can then be compared in a semi-quantitative manner. The lower the value the lower the risk, e.g., a rating <25 implies very low risk, and a rating >200 implies very high risk.

The Field Use EIQ is determined by multiplying the EIQ by the percent active ingredient and the application rate (lb/A). Thus, the Field Use EIQ (FEIQ) can be used to guide the development of different management strategies.

(eqn 2) EIQ Field Use Rating (FEIQ) = EIQ x % active ingredient x Application Rate (lb/A)

Determination of the FEIQ

The Superintendent, Branko Zdravkoski, provided to Environmental & Turf Services, Inc. the percent active ingredient, the application rate, the number of applications, the areas of applications, and the target pests for each of the proposed-for-use pesticides (see the table below). There are 14 pesticides in the table that are proposed for use: 11 fungicides, one insecticide, and two growth regulators. All pesticides in the table were evaluated in order to obtain the FEIQ results.

We calculated the Field EIQ value for each pesticide in the table by multiplying the EIQ value by the percent active ingredient and the application rate (lb/A, see the formula above). The FEIQ values are associated with risk categories, e.g., v. low, low, etc. All of the proposed pesticides have a low to very low FEIQ risk ratings.

CONCLUSIONS AND RECOMMENDATIONS

We recommend all pesticides in the table for use in accordance with the product labeling. We further recommend that pesticides be rotated for use to help prevent pests from becoming immune/resistant to the pesticide, which in turn will help provide for healthy turf.

References:

Kovach, J., C. Petzoldt, J. Degni, and J. Tette. 1992. A Method to Measure the Environmental Impact of Pesticides. *New York's Food and Life Sciences Bulletin*, 139:1–8. Available at: www.nysipm.cornell.edu/publications/EIQ

Grant, J. A. 2010-2020. Calculator for Field Use EIQ (Environmental Impact Quotient). New York State Integrated Pest Management Program, Cornell Cooperative Extension, Cornell University. Available at: https://nysipm.cornell.edu/eiq/calculator-field-use-eiq/

Pesticides Proposed for Use at Pound Ridge GC - Environmental Impact Quotient (EIQ) and FEIQ

CHEMICAL	% Active Ingredient	Rate (oz/M)**	EIQ	Field EIQ[ϫ]	FEIQ Rating††
FUNGICIDES (11)					
Fluazinam	40	0.5	23.3	12.7	v. low
Fluopyram[§]	1.19	3	17.83	1.7	v. low
Fluoxastrobin	40.3	0.275	56.2	17	v. low
Fluxapyroxad[§]	14.33	0.47	23.16	4.2	v. low
Mandestrobin[§]	43.4	0.3	30.67	10.9	v. low
Mefentrifluconazole[§]	34.93	0.4 – 0.8	25.33	9.64 - 19.3[‡]	v. low
Metconazole	50	0.367	24.0	12.0	v. low
Myclobutanil	19.7	1.2 - 2.4	24.0	30.9	low
Polyoxin d zinc salt	2.5	4.04	24.6	6.8	v. low
Pydiflumetofen[§]	18.3	0.1	16.00	0.8	v. low
Tebuconazole	21.4	1.0	40.3	23.5	v. low
INSECTICIDES (1)					
Lambda-cyhalothrin	9.7	0.230	44.2	2.7	v. low
GROWTH REGULATORS (2)					
Flurprimidol	5.6	0.413	31.8	2.0	v. low
Prohexadione-Ca	27.5	0.092	8.7	0.6	v. low

**All application units were converted to oz/M (ounces/1000 sq ft) for simplicity of this table. If a range of applications were given both application rates were used for the assessment. Appendix A shows the label units and application rates provided by the superintendent.

[ϫ] The FEIQ can be calculated using the EIQ value: FEIQ = EIQ * % a.i. * rate (lb/A).

†† "Rating" in this context, means qualitative risk. The ratings are based on the values: <25 = very low (v. low); <50 = low; 50-99 = moderate (mod); 100-199 = high; and 200+ = very high (v. high)

[§] The EIQ values for these pesticides are listed in the *Table 2* spreadsheet on the NYSIPM website or were provided by the NYSIPM (i.e., mandestrobin).

[‡] The lower value (9.64) field EIQ for mefentrifluconazole is for the lowest application rate of 0.4 oz/M and the higher value (19.3) is for the higher application rate of 0.8 oz/M.

STUART Z. COHEN, Ph.D., CGWP

President, Senior Environmental Scientist

EDUCATION

Ph.D., Physical Organic Chemistry, George Washington University, Washington, DC, 1984 (dissertation research at NIADDK/National Institutes of Health).
B.A., Chemistry, University of Maryland, Baltimore County, 1975.
(Related graduate and undergraduate coursework at Johns Hopkins U., Georgetown U., and Furman U.)

At least 14 short courses in the CORMIX and iSTREEM point source surface water discharge models, habitat preservation/enhancement, chemical carcinogenesis (one full semester course, one short course), chemical engineering, golf course drainage, soil microbiology, contaminant hydrogeology, physical organic chemistry, endocrine disruptors, soil ingestion in risk assessment, nanotechnology risks, and golf course design. Trained in FIFRA Good Laboratory Practices (with a focus on field studies).

Foreign Language: Limited working proficiency in German.

CERTIFICATIONS

Certified Ground Water Professional #196522, National Ground Water Association (since 1992).
CPR and First Aid Training-Red Cross, 1993 & 1996.
NITON XRF Spectrum Analyzer – Thermo Scientific, 1998 & 2008 (for heavy metals in soils).
Professional Fertilizer Applicator (PFA 0675), 2014-2015.

EXPERIENCE

1991 to Present: President, Environmental & Turf Services, Inc., Wheaton, MD.

Responsible for supervising and conducting field studies and risk assessments for pesticides and fertilizers used on turf and in agriculture (specializing in freshwater and coral reef systems and a variety of aquifer types); water quality monitoring studies; lead and arsenic contamination assessments and best management practices for firing ranges; environmental fate and effects issues under TSCA (including QSAR); carbon footprint analyses; drinking water Health Advisory Levels; environmental site assessments in real estate transactions; and expert testimony. Extensive experience with public risk communication. Disciplinary strengths include soil and aquatic metabolism, photochemical reactions, bioaccumulation assessment, hydrolysis reactions, and partitioning.

1994 to 1999: Instructor for the NRA on environmental management at shooting ranges. (See "Abstracts, Posters, and Presentations" below).

1986 to 1990: Manager, Ground Water and Environmental Programs, Biospherics Incorporated, Beltsville, MD.

Managed programs to evaluate ground water and environmental contamination by pesticides, lead, and hazardous wastes. Managed environmental programs for golf course environmental impact assessments and for real estate transactions, including study design, risk assessments, placement of monitoring wells, soil gas analysis, unsaturated zone modeling, etc. National Priority List site (Superfund) Project Manager.

1976 to 1986: Chemist and Ground-Water Team Leader, Office of Pesticides and Toxic Substances, Environmental Protection Agency, Washington, DC.

One of EPA's key scientists for the development and implementation of pesticides in ground water programs. Managed $1.4 million budget. Co-chaired the National Well-Water Survey Steering Committee. Senior physical scientist on all pesticides in ground water regulatory actions. Director of ground water studies. Main interagency and international contact on pesticides in ground water. Synthesized interdisciplinary risk assessments for several chemicals over a two-year period. Conducted DBCP and EDB ground water risk assessments, which led to bans of all soil uses in 1979 and 1983, respectively. Developed biorational pesticides testing guidelines. Exposure assessment of heptachlor in milk in Hawaii. Co-developed testing guidelines and regulations for new chemicals under TSCA§ 5.

1980 to 1987: Guest Worker in organic chemistry at the Laboratory of Chemistry, NIADDK, National Institutes of Health (NIH), Bethesda, MD. (One year full-time: '81-'82, part-time: '80-'81 and '82-'87.)

1975 to 1976: Research Technician, The Johns Hopkins University School of Medicine, Department of Immunology, Baltimore, MD. Prostaglandin and antibody radioimmunoassays.

HONORS & AWARDS

Society of Environmental Toxicology and Chemistry Presidential Citation for Exemplary Service, 2015. EPA Special Achievement Awards (two cash awards) for work in ground water contamination by pesticides, 1983-1985. EPA Bronze Medal for the ethylene dibromide ground water assessment, 1984. James Buchannan Duke Honor Scholarship, 1972.

PROFESSIONAL MEMBERSHIPS & ACTIVITIES

- Society of Environmental Toxicology and Chemistry (SETAC), North America (NA) and Chesapeake-Potomac Regional Chapter (CPRC). Chairman of the SETAC-NA TSCA Reform Dialog Group, 2014-2017. Co-Chair of Public Outreach Committee, 2014-2018.
- National Ground Water Association: Ground Water Protection and Management Committee, Chairman, 1991-1993; committee member 1989-1996.
- Int'l Union of Pure & Applied Chem. (IUPAC) commission member 1985-1995; Titular (voting) member, Commission on Agrochemicals, 1990-1995 (assoc. member 1985-1990). Symposium co-chair for the August, 2014 Int'l Congress of Pesticide Chemistry.
- American Chemical Society: Environmental Chemistry, Agrochemicals, and Medicinal Chemistry Divisions; Chemical Society of Washington.

REGISTERED TRADEMARKS

CarbonSave®: co-developed the first carbon footprint calculator and energy efficiency analyzer for golf courses.

SHORT COURSE/SEMINAR/WEBINAR INSTRUCTOR

2014-2015. Co-led a seminar on risk assessment science for Congressional (House) staff (2014), followed by a round table discussion for the Members of the House Energy & Commerce Committee (2015).

2012. Watershed Resource Management: Requirements and Benefits for Your Course (co-instructor), half-day seminar for the Golf Industry Show, Las Vegas.

2009. Water Issues in Land Use Permitting: Overcoming a Sea of Bad Information. Webinar presentation September 18, 2009, as part of the American Society of Golf Course Architects (ASGCA)/Rainbird Education webinar.

2007 & 2008. Develop and Implement a Water Quality Monitoring Program. Seminar instructor for the GCSAA (Golf Course Superintendents Association of America) Conference and Show, Anaheim, CA, San Diego, CA (local chapter), and Orlando, FL.

2004. Hydrolysis: Understanding & Predicting the Degradation of Organic Compounds in Water. Short course instructor at the 2004 NGWA Ground Water Expo, Las Vegas, December 13, 2004.

1994-1999: shooting range seminars (see "Abstracts, Posters, and Presentations" below).

INVITED INTERNATIONAL PROFESSIONAL TRAVEL

Rome (Italy, 2004). Invited lecturer at the "World Symposium on Lead in Ammunition".

Copenhagen (Denmark, 2003). Invited lecturer (two lectures) to the conference, "Non-Agricultural Use of Pesticides: Environmental Issues and Alternatives".

Basel (Switzerland, 2002). Presented platform summary for one of two poster presentations regarding amphibian toxicology and risks at the 10th IUPAC Int'l Congress on the Chemistry of Crop Protection.

Vienna (Austria, 1998). Invited lecturer to the IBC conference, "Pesticide Residues in Water".

London (England, 1998). Invited lecturer to the IBC conference, "Pesticides and Their Impact on the Aquatic Environment."

São Paulo (Brazil, 1996). Invited lecturer (two lectures) to the IUPAC/GARP Workshop, "Pesticide Uses and Environmental Safety in Latin America." The topics were milk contamination on Oahu and pesticides in ground water in the U.S.

London (England, 1996). Invited lecturer to the IBC conference, "An Update on the Pesticides in Water Issue." (A followup lecture was presented at Zeneca in Jealott's Hill.)

Budapest (Hungary, 1995). Invited lecturer at 5th European Conference on Chemistry & The Environment.

Bangkok (Thailand, 1992). Invited lecturer (2 lectures) to the Thai Department of Agriculture/IUPAC Workshop, "Assessment and Management of Risks from Pesticide Use in SE Asia".

IUPAC. Members of the Agrochemicals Commission met in different countries each year to write scientific papers. I participated in the following meetings: *Lyon, France* (1985); *Barrie, Ontario* (*Canada*, 1986); *Boston, MA* (*USA*, 1987); *Lund, Sweden* (1989); *Hamburg, Germany* (1991); *Bangkok, Thailand* (1992); *Lisbon, Portugal* (1993); *Berkeley Springs, WV* (*USA*, 1994); *Guildford, England* (1995).

Rehovot/Bet Dagan (Israel, 1991). Two lectures at the Volcani Institute: for the Weed Science Society of Israel and the Department of Chemistry of Pesticides and Natural Products.

Hamburg (Germany, 1990). Workshop discussion leader, Subtopic Co-Organizer, and poster presenter at the Seventh International Congress of Pesticide Chemistry.

Lyon (France, 1989). "Impact of Golf Courses on Ground Water Quality: A Focus on Pesticides," for a symposium organized by the INSA (l'Institut National des Sciences Appliquees de Lyon) and l'Institut International de Gestion et de Genie de l'environment.

West Berlin (Germany, 1985). "Monitoring Ground Water for Pesticides in the U.S.A.," a published symposium sponsored by the Institute of Water, Soil, and Air Hygiene of the Federal Dept. of Health.

JOURNAL & BOOK PUBLICATIONS

Petrovic, A.M., T.C. Cambareri, N.L. Barnes, and S.Z. Cohen. 2022. Nitrogen Rate, Irrigation and Rainfall Impacts on Groundwater Nitrate Levels in Sandy Coastal Golf Courses. *Int'l Turfgrass Soc. Res. J.* [under review].

Burns, C.J., S.Z. Cohen, and C. Lunchick. 2015. Neurodevelopmental Disorders and Agricultural Pesticide Exposures. *Environ. Health Perspect.* 123(4):A79. Letter to Editor, in response to Shelton et al., 2014, *Environ. Health Perspect.* 122(10):1103-1109.

Baris, R.D., S.Z. Cohen, N.L. Barnes, J. Lam, and Q. Ma. 2010a. Quantitative Analysis of Over 20 Years of Golf Course Monitoring Studies. *Environ. Tox. and Chem.* 29(6):1224-1236.

Baris, R.D., S.Z. Cohen, N.L. Barnes, J. Lam, and Q. Ma. 2010b. Quantitative Analysis of 20-plus Years of Golf Course Monitoring Studies. *Golf Course Mgmt*., 78(11):82-94.

Cohen, S.Z. and N.L. Barnes. 2009. EPA and OSHA Compliance Guide For Small Arms Ranges: A Focus on Lead (3rd edition). Environmental & Turf Services, Inc., Wheaton, MD.

Cohen, S.Z, Q. Ma, N.L. Barnes, and S. Jackson. 2008. Pesticide and Nutrient Modeling, Chapter 9, pp.153-170. *In*: Beard, J.B. and M.P. Kenna (eds.), Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes, CAST Council for Agricultural Science and Technology, Ames, Iowa.

Cohen, S.Z. 2004. "The Special Case of Pesticides: Science and Regulation", Environmental Claims Journal, 16(1/Winter):55-68.

Durborow, T.E., N.L. Barnes, S.Z. Cohen, G.L. Horst and A.E. Smith. 2000. "Calibration and Validation of Runoff and Leaching Models for Turf Pesticides, and Comparison with Monitoring Results," in Fate and Management of Turfgrass Chemicals, ACS Series 743, J.M. Clark and M.P. Kenna, eds., pp. 195-227, American Chemical Society, Washington, D.C., 2000.

Cohen, S.Z., A.J. Svrjcek, T. Durborow, N.L. Barnes. 1999. Water Quality Impacts by Golf Courses. *J. Environ. Qual.*, 28(3):798-809.

Cohen, S.Z. 1997. "Environmental Compliance and Liability For Outdoor Shooting Ranges - Potential Problems and Feasible Solutions," Outdoor Range Source Book, National Rifle Association of America, Fairfax, VA.

Cohen, S.Z., L. Lindstrand, N.L. Barnes and T. Durborow. 1997. EPA and OSHA Compliance Guide For Small Arms Ranges: A Focus on Lead, Environmental & Turf Services, Inc., Wheaton, MD.

Racke, K.D., M. W. Skidmore, D.J. Hamilton, J.B. Unsworth, J. Miyamoto and S.Z. Cohen. 1997. "Pesticide Fate in Tropical Soils," Pure & Applied Chemistry, 69(6):1349-1371, International Union of Pure and Applied Chemistry.

Cohen, S.Z. 1996. Pesticides in Ground Water in the United States: Monitoring, Modeling, and Risks from the U.S. Perspective. *J. Environ. Sci. Health*, B31(3):345-352.

Cohen, S.Z., R.D. Wauchope, A.W. Klein, C.V. Eadsforth and R. Graney. 1995. Offsite Transport of Pesticides in Water: Mathematical Models of Pesticide Leaching and Runoff, *Pure & Applied Chem.*, 67(12), 2109-2148, International Union of Pure and Applied Chemistry.

Cohen, S.Z., T.E. Durborow, and N.L. Barnes. 1993. "Ground Water and Surface Water Risk Assessments for Proposed Golf Courses," in Fate and Significance of Pesticides in Urban Environments, ACS Series 522, K.D. Racke and A.R. Leslie, eds., 214-227, American Chemical Society, Wash. DC.

Barnes, N.L., T.E. Durborow, S.Z. Cohen, A.J. Svrjcek, and M.J. O'Connor. 1993. Conservative Ground Water and Surface Water Risk Assessments for Golf Courses in Vermont. *Proceedings of the Focus Conference on Eastern Regional Ground Water Issues*, September 27-29, 1993, Burlington, VT, Ground Water Mgmt Book 16 of Series, 531-548, National Ground Water Association, Dublin, OH.

Cohen, S.Z., S. Nickerson, R. Maxey, A. Dupuy, and J.A. Senita. 1990. A Ground Water Monitoring Study for Pesticides and Nitrates Associated with Golf Courses on Cape Cod. *Ground Water Mon. Rev.*, 10(1), 160-173.

Cohen, S.Z. 1990. Pesticides in Ground Water: An Overview. *Environmental Fate of Pesticides*, Vol. 7 in series: Progress in Pesticide Biochemistry and Toxicology, D.H. Hutson and T.R. Roberts (Eds), 13-25, John Wiley & Sons Ltd.

Pignatello, J.J., and S.Z. Cohen. 1990. Environmental Fate of Ethylene Dibromide in Soil and Ground Water. Invited paper for *Rev. Environ. Contam. Toxicol.*, 112, 1-47.

Lorber, M.N., S.Z. Cohen, and G.D. DeBuchananne. 1990. A National Evaluation of the Leaching Potential of Aldicarb: Part 2. An Evaluation of Ground Water Monitoring Data. *Ground Water Mon. Rev.*, 10(1), 127-141.

Lorber, M.N., S.Z. Cohen, S. Noren, and G.D. DeBuchananne. 1989. A National Evaluation of the Leaching Potential of Aldicarb: Part 1. An Integrated Assessment Methodology. *Ground Water Mon. Rev.*, 9(4), 109-125.

Aharonson, N., S.Z. Cohen, N. Drescher, T.J. Gish, S. Gorbach, P.C. Kearney, S. Otto, T.R. Roberts, and J.W. Vonk. 1987. Potential Contamination of Ground Water by Pesticides-An International Assessment. *Pure and Appl. Chem.,* 59(10), 1419-1446.

Cohen, S.Z., C. Eiden, and M.N. Lorber. 1986. Monitoring Ground Water for Pesticides in the USA. *In* Evaluation of Pesticides in Ground Water, W.Y. Garner, H.N. Nigg, and R.C. Honeycutt, (eds.), American Chemical Society, 170-196, Washington, DC.

Cohen, S.Z., S.M. Creeger, R.F. Carsel, and C.G. Enfield. 1984. Potential for Pesticide Contamination of Ground Water Resulting from Agricultural Use. *In* Treatment and Disposal of Pesticide Wastes, American Chemical Society Symposium Series 259, R.F. Krueger and J.N. Seiber, eds., 297-325, Washington, D.C.

Enfield, C.G., R.F. Carsel, S.Z. Cohen, T. Phan, and D.M. Walter. 1982. Approximating Pollutant Transport to Ground Water. *Ground Water*, 20(6), 711-722.

Zweig, G., S.Z. Cohen, and F.S. Betz. 1982. EPA Registration Requirements for Biochemical Pesticides, with Special Emphasis on Pheromones. *In:* Insect Suppression with Controlled Release Pheromone Systems, Vol. I, M. Beroza and A.F. Kydonieus, eds., CRC Press, Boca Raton, FL.

Haque, R., J. Falco, S.Z. Cohen, C. Riordan. 1980. Role of Transport and Fate Studies in the Exposure, Assessment, and Screening of Toxic Chemicals. *In:* Dynamics, Exposure and Hazard Assessment of Toxic Chemicals, R. Haque, ed., Ann Arbor Science, Ann Arbor, MI.

Cohen, S.Z., G. Zweig, M. Law, D. Wright, W.R. Bontoyan. 1978. Analytical Determination of N-nitroso Compounds in Pesticides by the United States Environmental Protection Agency. A Preliminary Study. *In:* Environmental Aspects of N-nitroso Compounds, E.A. Walker, M. Categnaro, L. Griciute, R.E. Lyle, eds., International Agency for Research on Cancer, Lyon, France.

Adkinson, N.F., T. Barron, S. Powell, and S.Z. Cohen. 1977. Prostaglandin Production by Human Peripheral Blood Cells in Vitro. *J. Lab. Clinical Med.,* 90(6), 1043-1053.

ABSTRACTS, POSTERS, PRESENTATIONS, AND WEBINARS

Cohen, S.Z. August, 2020. Soil Sequestration of the Herbicide MSMA. Presented at the American Chemical Society National Meeting & Exposition, Fall 2020.

Cohen, S.Z. and L.A. Cohen. August, 2020. Kinetics and Mechanism of Hydrolysis of Substituted (Trifluoromethyl)Imidazoles. (Presented at the American Chemical Society National Meeting & Exposition, Fall 2020.

Cohen, S.Z. August 25, 2019. Biphasic Sorption and Transformation are Key Factors in the Complex Environmental Fate of the Herbicide Monosodium Methylarsonic Acid (MSMA) (AGRO #27). Presented at the American Chemical Society National Meeting & Exposition, Fall 2019.

Cohen, S.Z. November 16, 2017. Communicating Turf Pesticide Risk Assessment Science to the Public: Lessons Learned (Poster #PC021). Society of Environmental Toxicity and Chemistry (SETAC) NA 38th Annual Meeting, Minneapolis, MN.

Cohen, S.Z. August 24, 2017. Communicating Turf Pesticide Risk Assessment Science to the Public: Lessons Learned (AGRO #376). Presented at the American Chemical Society 254th Annual Meeting, Washington, DC.

Cohen, S.Z. February 22, 2017. How to Talk About Turf Chemical Risks in Your Community. Presented at the Mid-Atlantic Association of Golf Course Superintendents 2017 Education Seminar, Columbia, MD.

Cohen, S.Z., S. Haefner, L.J. Thibodeaux, C.A. Jones, and W.M. Williams. August 24, 2016. Three Estuarine and Marine Mixing Scenarios for Pesticide Risk Assessment: A Proposal (AGRO #293). Presented at the 252nd American Chemical Society National Meeting, Philadelphia, PA.

Cohen, S.Z., and J.D. Walker. August 24, 2016. QSARs, Computational Chemistry, and Computational Toxicology in Environmental Risk Assessment: Overview and Historical Perspective (AGRO #276). Presented at the 252nd American Chemical Society National Meeting, Philadelphia, PA.

Cohen, S.Z. January 21, 2016. How to Talk About Turf Chemical Risks in Your Community. Presented as a Golf Course Superintendents Association of America webinar.

Cohen, S.Z., T. Augspurger, P.D. Guiney, et al. November 2, 2015. Making Science Matter for Congress: The SETAC NA TSCA Reform Dialog Group. Presented at the Society of Environmental Toxicology and Chemistry (SETAC) 36th Annual Meeting, Salt Lake City, UT.

Cohen, S.Z., S. Haefner, and L.J. Thibodeaux. October 26, 2015. A Conceptual Approach to Creating Three Estuarine Mixing Scenarios for Pesticide Risk Assessment. Presented at the US EPA Environmental Modeling Public Meeting (EMPM), Crystal City, VA.

Gobas, F., S. Haefner, and S. Cohen. 2014. Bioaccumulation Risk Assessment of Pentachloronitrobenzene: 1. Basis for Lessons Learned (Abstract AGRO353). Presented at the August 2014 IUPAC International Congress on Pesticide Chemistry in San Francisco, CA.

Gobas, F., S. Cohen, and S. Haefner. 2014. Bioaccumulation Risk Assessment of Pentachloronitrobenzene: 2. Lessons Learned (Abstract AGRO354). Presented at the August 2014 IUPAC International Congress on Pesticide Chemistry in San Francisco, CA.

Haefner, S.M., S.Z. Cohen, and N.L. Barnes. August 23, 2012. Urban Stressors for Pesticide Endangered Species Assessments: Should Recent Nutrient TMDLs and Laws be Considered? Presented at the American Chemical Society (AGRO Division) 244th National Meeting in Philadelphia, PA.

Carroll, M., G. Felton, T. Turner, P. Landschoot, M. Goatley, J. Derr, N.L. Barnes, and S.Z. Cohen. April, 2012. Home Lawn BMPs to Reduce Runonff and Fertilizer Use in the Chesapeake Bay Watershed: A Compost and Microclover Demonstration and Technology Transfer Project. Presented at the SETAC/CPRC meeting, College Park, MD.

Cohen, S.Z. December 8, 2011. State and Local Fertilizer Restrictions Driven by Water Quality Impacts: The Status, The Science (and its Misuse), and the BMPs. Presented at the NPMA and PLANET Lawn Care Summit, Aventura, FL.

Cohen, S.Z., A.J. Harding, R. Baris, N.L. Barnes, Q. Ma, G. Pohll, S. Wheatcraft, and J. Bahme. November 17, 2011. Modeling Ground Water Contamination by Soil Fumigants in Hawaii and California: Soil Loading and Fate Input are Critical for Validated Predictions. Presented at the SETAC North America 32nd Annual Meeting, Boston, MA.

Cohen, S.Z., A.J. Harding, N.L. Barnes, G. Pohll, S. Wheatcraft, and J. Bahme. August 29, 2011. DBCP and TCP in Ground Water in California and Hawaii: Comparison of Vadose Zone and Saturated Zone Modeling with Monitoring Results. Presented at the American Chemical Society 242nd National Meeting in Denver, CO.

Cohen, S.Z., A.J. Harding, N.L. Barnes, G. Pohll, and S. Wheatcraft. May 3, 2011. Ground Water Contamination by DBCP and TCP in Hawaii and California: Part 1. Unsaturated Zone. Presented at the National Ground Water Association's Ground Water Summit in Baltimore, MD.

Pohll, G., S.W. Wheatcraft, S.Z. Cohen, A.J. Harding, and N.L. Barnes. May 3, 2011. Ground Water Contamination by DBCP and TCP in Hawaii and California: Part 2. Saturated Zone Flow and Transport Model. Presented at National Ground Water Association's Ground Water Summit, Baltimore, MD.

Cohen, S.Z. March 10, 2011. Turfgrass Restrictions Driven by Regulatory Science: A Focus on the Chesapeake Bay and Beyond. Presented at New England Regional Turfgrass Conference and Show.

Cohen, S.Z. December 2, 2010. Turfgrass Restrictions Driven by Regulatory Science: A Focus on the Chesapeake Bay and Beyond. Presented at Lawn Care Summit (NPMA and PLANET), Atlanta, GA.

Cohen, S.Z., A.J. Harding, N.L. Barnes, K.B. Ingram. March 21, 2010. Carbon Footprints and Turf Management: Carbon Emissions and Sequestration for Golf Courses. Presented at the American Chemical Society/AGRO Division 239th National Meeting, San Francisco, CA.

Hoch, S.L. (Brownstein Hyatt Farber Schreck), S.Z. Cohen and A.J. Staples (Golf Resource Group, Inc.). February 12, 2010. Global Warming and Golf: The Science, Potential Impacts, and Energy Conservation Opportunities. Before the World Conference on Club Management, Golf Industry Show, San Diego, CA.

Baris, R., S.Z. Cohen, N.L. Barnes, J. Lam. February 9, 2010. A Critical Review of Water Quality Impacts by Golf Courses: Updates and Trends. Before the GCSAA Education Conference and GIS, San Diego, CA.

Cohen, S.Z. and Q.L. Ma. August 19. 2009. Urban BMPs Can Protect Water Quality: Non-Pesticides as Models for Pesticides. Presentation before the Division of Agrochemicals, American Chemical Society 238th National Meeting, Washington DC.

Cohen, S.Z. August 18, 2009. Modeling Pesticide Risks: Start with Ground Water, Go to Turf, and Keep Going. Presentation before the Division of Agrochemicals, American Chemical Society 238th National Meeting, Washington DC.

Q.L. Ma and S.Z. Cohen. August 17, 2009. Improving Model Performance via Model Parameterization – A Focus on RZWQM. Presentation before the Division of Agrochemicals, American Chemical Society 238th National Meeting, Washington DC.

Cohen, S.Z. April 29, 2009. Protecting Listed Species in Non-Agricultural and Urban Settings. Presented at the Crop Life America (CLA) and Responsible Industry for a Sound Environment (RISE) spring conference, Crystal City, VA.

Baris, R., Q.L. Ma and S. Cohen. December 9, 2008. Buffer Widths and Removal Efficiencies for TN, TP, and TSS: Models for Pesticides? Presented before the Environmental Modeling Public Meeting, Crystal City, VA.

Baris, R., S.Z. Cohen, J. Lam, N.L. Barnes and Q.L. Ma. November 18, 2008. A Meta Analysis of Water Quality Impacts by Golf Courses: Monitoring Results and Environmental Significance. Presented at SETAC North America 29th Annual Meeting, Tampa, FL.

Cohen, S.Z. October 29, 2008. Comments on Food Web Modeling and Long Range Transport to the FIFRA Scientific Advisory Panel. Presented on behalf of AMVAC Chemical, Crystal City, VA.

Cohen, S.Z., A.K. Smith, K. Morris, B. Leinauer, and T. Delaney. August 14, 2008. Outdoor Water Efficiency Criteria of the Draft Single-Family New Home Specification: Technical and Policy Questions, Concerns, and Suggestions. A technical presentation to EPA's Office of Water, regarding anticipated restrictive guidance on water use for turf and ornamental plants. Alexandria, VA.

Cohen, S.Z., J. Lam, Q. Ma, J. Grant, A.M. Petrovic, B. Branham, T. Fermanian, T. Voigt, and C. Throssell. November 14, 2007. A Screening-Level Risk Evaluation Program for Golf Course Superintendents: Enabling Site-Based Risk/Benefit Considerations. Presented at the SETAC North America 28th Annual Meeting, Milwaukee, WI.

Baris, R.D., J. Lam, S.Z. Cohen, and N.L. Barnes. November 12, 2007. Water Quality Impacts by Golf Courses: a Metastudy. Poster #MP 93, presented at SETAC North America 28th Annual Meeting, Milwaukee, WI. Environmental & Turf Services, Inc., Wheaton, MD.

Cohen, S.Z. October 23, 2007. Environmental Chemistry in an Environmental Risk Assessment Context: Case Studies of Dibromochloropropane, Pentachloronitrobenzene, and Organoarsenical Pesticides. Presentation before the Department of Chemistry & Biochemistry, University of Maryland, Baltimore Campus.

Cohen, S.Z. September 17, 2007. Develop and Implement a Water Quality Monitoring Program. Presented at GCSAA Regional Seminar before the Golf Course Superintendents Assoc. of San Diego.

Ma, Q., S.Z. Cohen, and D. Haith. June 12, 2007. A Comparison of PRZM, RZWQM, and TurfPQ for Modeling Turf Pesticides. Presented before the Environmental Modeling Public Meeting (EMPM), Office of Pesticide Programs, EPA, Washington, DC.

Lam, J. and S.Z. Cohen. November, 2006. "Prediction of Pesticide Toxicity to Amphibians: Testing a Preliminary Screening Equation and EPA's 'ICE' Equations with New Data" presented at SETAC (Society of Environmental Toxicology and Chemistry) North America 27th Annual Meeting, Montreal, Quebec, Canada, November 5-9, 2006.

Cohen, S.Z., Q. Ma, N.L. Barnes, and S. Jackson. January 24, 2006. "Pesticide and Nutrient Modeling" presented at CAST Water Quality/Quantity Workshop on Perennial Grasses Used in Urban Landscapes, Las Vegas, NV.

Cohen, S.Z., M.W. Klemens and M. Klein. November 14, 2005. Amphibian Risk Assessment, Risk Management, and Habitat Conservation for Golf Course Developments. Presented at SETAC North America 26th Annual Meeting, Baltimore, MD.

Ma, Q., S.Z. Cohen and N.L. Barnes. August 31, 2005. Modeling Offsite Transport of Turf-Applied Pesticides: Model and Data Needs. Presentation before the 230th American Chemical Society national meeting, Washington, DC.

Cohen, S.Z. September 9, 2004. The Science Underlying Best Management practices for Shooting Ranges: A Focus on Lead and Arsenic. Invited presentation before the World Symposium on Lead in Ammunition, Rome, Italy.

Cohen, S.Z., N.L. Barnes, S.S. Reid and Q. Ma. August 26, 2004. Turf Pesticide and Fertilizer Impacts on Watersheds: Monitoring and Modeling Case Studies in a TMDL, Water Quality Criteria, and Ecoregional Context. Presented at 228th American Chemical Society National Meeting, Philadelphia.

Cohen, S.Z. September 10, 2003. Water Quality Impacts by Golf Courses and Mitigation Measures, with a Focus on MSMA. Presented at Florida Turfgrass Assn 2003 Conference and Show, Tampa, FL.

Cohen, S.Z., N.L. Barnes, S.S. Reid, and Q. Ma. November, 2002. Integrated Water Quality Risk Assessment for a Proposed Golf Course Near Salt Lake City: Focus on Pesticides, Phosphorus, and Amphibians. Poster presented at 23rd Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC), Salt Lake City, UT.

Cohen, S.Z. August, 2002. Risk Assessments for Golf Course Pesticides: 1. Special Considerations for Modeling. Poster presented at 10th IUPAC International Congress on the Chemistry of Crop Protection, Basel, Switzerland.

Reid, S.S., S.Z. Cohen, J. Julian, S. Julian, J. Ferrigan, and J. Howard. August, 2002. Risk Assessments for Golf Course Pesticides: 2. New Methodologies to Estimate Amphibian Toxicity of Turfgrass Chemicals. Poster presented at 10th IUPAC International Congress on the Chemistry of Crop Protection, Basel, Switzerland.

Reid, S., J. Julian, S. Julian, J. Ferrigan, S. Cohen, J. Howard, and Q. Ma. November, 2001. Potential Amphibian Risks in Vernal Pools to Golf Course Chemicals Using PRZM/EXAMS Models: Part 1. Toxicity Assessment. Poster presented at SETAC 22nd Annual Meeting, Baltimore, MD.

Cohen, S., Q. Ma, and S. Reid. November, 2001. Potential Amphibian Risks in Vernal Pools to Golf Course Chemicals Using PRZM/EXAMS Models: Part 2. Exposure Assessment. Poster presented at SETAC 22nd Annual Meeting, Baltimore, MD.

Ma, Q.L., S.Z. Cohen, and S.S. Reid. October, 2001. Watershed/Basin Scale Golf Course Risk Assessments: Model Scenario Development. Poster presented at Soil Science Society of America 2001 Annual Meeting, Charlotte, NC.

Reid, S. and S. Cohen. October, 2000. A New Tool to Predict Lead Mobility in Shooting Range Soils. Poster presented at U.Mass Amherst, 16th Annual International Conference on Contaminated Soils, Sediments and Water.

Cohen, S.Z. October, 1996. The Fate, Occurrence, and Risks of Pesticides in Surface Water and Ground Water – The U.S. Perspective. Lecture presented at IUPAC GARP Workshop on Pesticides: Uses and environmental Safety in Latin America, Sao Paulo, Brazil.

Cohen, S.Z. 1994-1999. Environmental Assessments. Instructor of 2-hour segment of National Rifle Association's 5-day course, “Range Development”; given 12-15 times, various cities, 1994-1999.

Cohen, S.Z. July 10, 1998. The U.S. Approach to Predicting, Evaluating and Mitigating Human Risks from Pesticides in Drinking Water. Lecture presented at the IBC UK Conference on Pesticide Residues in Water, in Vienna, Austria.

Cohen, S.Z. November 17, 1993. Potential Impacts of Turf Chemicals on Ground Water. Lecture presented at New England Recertification Seminar, sponsored by Turf Specialty, Inc., Wachusett Country Club, Boylston, MA.

Cohen, S.Z. November 2, 1993. Environmental Considerations in Golf Course Development. Lecture presented at the Public Golf '92 Conference, Chicago, IL.

Cohen, S.Z. October 17, 1993. Introductory Overview presented as moderator of "Ground Water Quality in the Agricultural Environment: The Nitrate Question," an NGWA 1993 Management Strategy Workshop at the NGWA National Convention, Kansas City, MO.

Cohen, S.Z. September 27, 1993. Risk Assessment in Golf Turf: A Focus on Water Quality Impacts. Lecture presented at Florida Turfgrass Association Annual Conference & Show, Tampa, FL.

Cohen, S.Z. September 27, 1993. Risk Assessment in the Lawn Care Industry: A Focus on Water Quality Impacts. Lecture presented at Florida Turfgrass Association Annual Conference & Show, Tampa, FL.

Cohen, S.Z., T.E. Durborow, and N.L. Barnes. July 23, 1993. Ground Water and Surface Water Risk Assessments for Proposed Golf Courses. Invited paper before the International Turfgrass Society Quadrennial Meeting, Palm Beach, FL.

A total of 5 lectures delivered at Ohio Turfgrass Foundation and Midwest Regional Turf Foundation conferences in 1992 on two topics: water quality, and risk assessment issues for golf courses.

November, 1992. Two lectures presented at conference sponsored by IUPAC and the Thailand Department of Agriculture. (Assessment and Management of Risks from Pesticide Use in SE Asia): "Bioaccumulation of Crop Residues in the Food Chain - A case study of Heptachlor Epoxide in Milk in Hawaii" and "Modeling Pesticide Transport to Ground Water".

Cohen, S.Z. April, 1992. Modeling the Runoff and Leaching of Pesticides Applied to Turfgrass. Invited paper at Agro Division of American Chemical Society's 203rd National Meeting, San Francisco, CA.

September 16, 1991. Lecturer in a workshop, "Golf Course Development on Hawaii," sponsored by the Office of State Planning Honolulu.

Cohen, S.Z. and T. Durborow. April 1991. Ground Water & Surface Water Contamination by Golf Courses: Fact and Fiction. Presented at 201st American Chemical Society National Meeting (Agro 53) Atlanta.

Cohen, S.Z. August 5-10, 1990. The Occurrence of Pesticides in Ground Water in the United States: Extent and Toxicologic Significance. Poster No. 9D-08, presented at 7th International Congress of Pesticide Chemistry. Hamburg, Federal Republic of Germany; ISBN No. 3-924763-25-9.

Senita, J.A. and S. Z. Cohen. 1990. A Soil Gas and Ground Water Study for GY-81 in a Florida Citrus Grove. Presented at 1990 Cluster of Conferences, Kansas City, MO; National Water Well Association (currently NGWA); Dublin, OH.

Lorber, M.N. S.Z. Cohen, S. Noren, and G.D. Debuchananne. 1990. A National Evaluation of the Leaching Potential of Aldicarb. Presented at the 1990 Cluster of Conferences, Kansas City, MO; National Water Well Assoc. (currently NGWA), Dublin, OH.

1987-1990. Lecturer for the Executive Enterprises Institute at their Pesticide Registration educational seminars, Washington, D.C.

Cohen, S.Z. February, 1990. The Cape Cod Ground Water Study: Implications for the Future. *61st International Golf Course Conference and Show Proceedings*, Golf Course Superintendents Assoc., Lawrence, KS, 1990, presented in Orlando, FL.

1989. Lectures on the impact of golf course pesticides and fertilizers on ground water quality given in 1989 at Anaheim, Pinehurst, NC, and Lyon, France before various golf course associations and research institutions.

Cohen, S.Z. and J.A. Senita. 1988. Extent of Pesticide Plumes in Ground Water in the U.S. Third Chemical Congress of North America; American Chemical Society meeting, AGRO III, Ontario, Canada.

Cohen, S.Z. 1987. Pesticides in Ground Water from Normal Use-A Focus on Turf. *58th Int'l Golf Course Conference and Show Proceedings*, Golf Course Superintendents Assoc'n of America, Lawrence, KS.

Jungclaus, G.A. and S.Z. Cohen. 1986. Hydrolysis of Ethylene Dibromide. 191st American Chemical Society National Meeting [ENVR 6], New York, NY.

Cohen, S.Z. April 7, 1986. Pesticides in Ground Water. Environmental and Water Issues in the Northeast - Training Seminar, sponsored by Golf Course Superintendents Association of America, Cape Cod, MA.

Cohen, S.Z. 1985; Monitoring Ground Water for Pesticides in the USA. 189th American Chemical Society National Meeting; PEST 34; Miami Beach, FL. Similar presentation also made to a European conference in West Berlin, sponsored by the Federal Republic of Germany, Dept. of Health.

Cohen, S.Z. 1984. EDB in the Subsurface Environment-Ground Water and Soil Results. 188th Annual Meeting of the American Chemical Society (Committee on Environmental Improvement), Philadelphia, PA, 1984. Similar presentation at the Fifth Annual Meeting of the Society of Environmental Toxicology & Chemistry, Arlington, VA.

Cohen, S.Z., S.M. Creeger, R.F. Carsel, and C.G. Enfield. September, 1983. Potential for Ground Water Contamination by Pesticides Resulting from Agricultural Uses. Presented in different forms 6 times, 186th National Meeting of American Chemical Society (Pest 89); Senate Office Building conference.

Cohen, L.A., S.Z. Cohen, and H. Kimoto. August, 1982. Photochemical Perfluoroalkylation of Imidazoles. Abstracts of 10th International Symposium of Fluorine Chemistry, Vancouver, British Columbia.

PROCEEDINGS, GOVERNMENT, AND MISCELLANEOUS PUBLICATIONS

Cohen, S.Z. July 2016. Overestimates of Aquatic Impacts by Pesticides under the Endangered Species Act. Pesticides, Chemical Regulation, and Right-to-Know Committee Newsletter, 17(3):12-13. American Bar Association, Section of Environment, Energy, and Resources.

Cohen, S.Z., N.L. Barnes and S.M. Hoover. May 12, 2017 (Revised May 17, 2017). Review of "Final Report Wekiva River Basin Nitrate Sourcing Study" with a Focus on Turf Fertilization. Written on behalf of The Environmental Research and Education Foundation. (One key topic was nitrogen and oxygen isotope ratios.)

Cohen, S.Z., Q. Ma, N.L. Barnes, and S. Jackson. 2008. Chapter 8: Pesticide and Nutrient Modeling, *In*: Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes, A Proceedings of CAST series, Special Publication No. 26, Council for Agricultural Science and Technology (CAST), Ames, IA.

Cohen, S.Z., 2004. Golf Course Developments: Frequently Occurring Environmental Claims and Issues. *Land Development,* 17(1):8-11.

1987-2002. "Agricultural Chemical News" (sole author), a scientific news column in the quarterly journal Ground Water Monitoring and Remediation (formerly Ground Water Monitoring Review), published by the National Ground Water Association.

Cohen, S.Z. June 3-6, 2000. Testing Your Outdoor Range–Using the Right Tools. Proceedings of the Fourth National Shooting Range Symposium, Phoenix, AZ.

Cohen, S.Z., A. Svrjeck, T. Durborow, and N. L. Barnes. November 1997. Water Pollution Minimal from Monitored Courses. *Golf Course Management*, 65(11):54-68.

Cohen, S.Z. May 1995. Agriculture and the Golf Course Industry: An Exploration of Pesticide Use. *Golf Course Management*, 63(5):96-104.

Cohen, S.Z. and T.E. Durborow. February 1994. Watershed Findings: Pesticides Test Well. *Golf Course News*, 5 (2), pp. 1 and 24-27.

October 18, 1993. A Priority Ranking Scheme for Ground Water Contamination Potential. Lead author as Chairman of the Ground Water Protection Subcommittee of the National Ground Water Association.

Cohen, S.Z. Spring, 1993. Ground Water Protection and Management Committee Explores Priority Ranking Scheme. Invited editorial appearing in 'Briefings', a National Ground Water Association quarterly newsletter.

Cohen, S.Z. April, 1991. Ignorance Can Cost You Bliss: ESAs for Private Clubs. *Club Director* (National Club Association), 9(4):9-12.

Cohen, S.Z. February, 1990. The Cape Cod Study. *Golf Course Management*, 58(2):26-44.

Gowland, P.A. and S.Z. Cohen. 1990. Dry Cleaners: A Possible Source of Subsurface Contamination. *Ground Water Management: Proceedings of the 1990 Cluster of Conferences*, National Water Well Assoc. (currently NGWA), 901-908, Dublin, OH.

Hess, A. and S.Z. Cohen. August 7, 1989. Pesticides and Nitrates in Ground Water: An Introductory Overview for the Office of Technology Assessment's Report to Congress. Contract No. J3-4815, Office of Technology Assessment, Washington, DC and Biospherics Incorporated, Beltsville, MD.

Weaver, M.F., S.Z. Cohen, and J.J. Pignatello. 1988. Environmental Chemistry of Ethylene Dibromide. *In*: Proceedings of the Agricultural Impacts on Ground Water - A Conference, National Water Well Association, 169-190, Dublin, OH.

September, 1986 and October 8, 1986 (respectively). "Alachlor Special Review Technical Support Document," and "Notice of Preliminary Determination to Cancel Registrations of Alachlor Products Unless the Terms and Conditions are Modified", coauthor with several other EPA staff of both publications; Federal Register 51(195):36166-36172.

Cohen, S.Z. March 1985. DBCP Use on Certain Pineapple Fields on Maui - Implications for Potential Drinking Water Contamination. Exposure Assessment Branch TS-769C, Office of Pesticide Programs, EPA, Washington, DC.

Task manager of a four-aquifer, soil/ground water study of four pesticides by the California Dept. of Food & Agriculture: Pesticide Movement to Ground Water; 3 related volumes have been published.

October 11, 1983. Conducted a ground water contamination assessment for EDB, resulting in the Sept., 1983 emergency suspension by EPA: work summarized in the EDB Position Document 4 and the Federal Register 48:46228-46248.

Cohen, S.Z. August 1981. DBCP in Ground Water in The Southeast. Exposure Assessment Branch TS-769C, Office of Pesticide Programs, EPA, Washington, D.C.

March, 1981. Project officer of work by G. Carter, J. Ligon, and O. Dickerson (Clemson U.); Study of DBCP Ground Water Contaminant Residue in Soil and Ground Water in South Carolina.

June, 1979. Project Officer of EPA Contract 560/12-79-001: Hendry, D.S. and R.A. Kenley; Atmospheric Reaction Products of Organic Compounds, EPA.

January 10, 1979. Coauthor of environmental fate testing guidelines in "Discussion of Premanufacture Testing Policy and Technical Issues; Request for Comment" (EPA), Federal Register 44, 16251-16280.

PUBLIC TESTIMONY *(Partial List - Updates available on request)*

Provided expert testimony regarding the impact that a golf course project may have on possible ground water and surface water quality by nutrients and pesticides. Expert testimony hearing before an administrative law judge in the town of Wilson, Wisconsin Department of Natural Resources, June 2018.

Expert testimony (individual plus part of an expert panel) in opposition to a proposed ban of turf pesticides before the Montgomery County Council (Maryland), 2015. (Dr. Cohen was a plaintiff in a subsequent lawsuit against the ordinance, 2016.)

Expert testimony before the local zoning commission on behalf of The Gunnery School (Connecticut) regarding pesticides and nutrients, 2012.

Expert testimony before the Zoning Board of Appeals regarding nutrient contamination on behalf of the Maidstone Golf Course, East Hampton, NY, 2012.

Expert testimony, deposition, and report on ground water contamination by 1,2-D and 1,2,3-TCP in a ground water contamination case before the Superior Court in San Francisco, 2012 (Saldana et al.).

Expert testimony provided in a FIFRA data compensation case September 2009 regarding use of water quality monitoring data in risk assessments.

Prepared expert report (2009) and rebuttal report (2010), and gave a deposition in a ground water contamination case in California for the US Department of Justice.

Gave a deposition (2009) and planned to give expert testimony for City of Redlands, California, re: TCP.

Gave a deposition and testified at trial in Circuit Court for the Town of Hampstead, Carroll County, Maryland (2009), regarding water use by a golf course.

Prepared expert report (March, 2007), gave a deposition, and planned to give expert testimony re: ground water contamination by DBCP and TCP on Maui (Hawaii Water Service Co.; settled).

Testified as percipient witness and provided litigation support on a pesticide ground water contamination case in Federal District Court, Honolulu, Hawaii, 2004 (Akee et al.) involving DBCP.

Provided expert testimony, reviews of hearing depositions and other trial support for a proposed firing range facility in Washington State in 1998. (ETS also produced an extensive BMP plan for this project facility.)

Testified on the environmental persistence and mobility of DBCP and EDB for the City of Fresno (1995).

Testified before several planning and zoning commissions and state agencies from 1991-present in New York, California, Connecticut, Colorado, Minnesota, Maryland, Hawaii, etc.

Testified before the Montgomery County, Maryland Planning Board and the Board of Appeals four times in 1991 and 1992 on two proposed golf courses.

Testified before an arbitration panel on a leaking UST case in Washington, D.C., 1992.

Deposition given on a leaking UST case before the District Court, City and County of Denver, State of Colorado, Columbia, Maryland, May 26, 1992.

Testified in Superior Court, Barnstable MA, in a golf course ground water contamination case, 1991.

Testified before the Baltimore County Zoning Commission on the potential for lead to migrate from shot and contaminate surface water and ground water; Towson, MD, April 1991.

Testified before the City and County Council of Honolulu several times on environmental risks of golf courses; 1990, 1991.

Expert witness on EDB for the Department of Justice in the United States District Court, Northern District of Florida - Tallahassee Division (three depositions in February 1989 and January 1990).

Testified (invited) on pesticides in ground water before the Senate Committee on Environment and Public Works (Sens. Burdick, Durenberger, et al.); Washington, DC, June 10, 1988.

Testified on environmental risks and ground water assessment of pesticides before the Vermont Environmental Board pursuant to Vermont Act 250; Williston, Vermont, May 3, 1988.

Testified on EDB in ground water before the Superior Court of the State of Washington, Mt. Vernon, Washington, October 8, 1987.

Deposition given on EDB in ground water before the Superior Court of the State of Washington, Rockville, MD, May 22, 1987.

Testified (invited) on pesticides in ground water before Senator Leahy's Committee on Agriculture, Nutrition, and Forestry; Washington, D.C., April 29, 1987.

Testified on DBCP in ground water in the FIFRA imminent hazard suspension hearing before Administrative Law Judge Harwood; Washington, D.C., August 1979.

Appeared as a speaker or panel member in a total of 16 public hearings, press conferences, briefings of state legislators, and public advisory committee meetings from 1976 to 1986 during tenure at EPA.

N. LAJAN BARNES, P.G.
Senior Hydrogeologist

EDUCATION

M.S., Hydrogeology, Texas Tech University, Lubbock, Texas, 1980 (degree awarded 1983). MASTERS THESIS: "Local Study of the Coalmont Aquifer in the North Park Basin, Colorado."
B.S., Geology, Texas Tech University, Lubbock, Texas, 1978.
University of Hawai'i Hilo, Hilo, Hawai'i, 1972-74.
FIFRA Good Laboratory Practices training, 1990 and 2000.
Dozens of short courses, etc. – See "Additional Coursework" below.

CERTIFICATIONS

Registered Professional Geologist, Commonwealth of Pennsylvania, #PG-002427-G, 1995.
Registered Professional Geologist, State of Wyoming, #PG-3013, 1998.
Registered Professional Geologist, State of Utah, #5220697-2250, 2002.
Registered Professional Geologist, State of Texas, #232, 2003.
Registered Professional Geologist, State of New York, #000915, 2018.

First Aid Training - Red Cross, 1993, 1996, 1999, 2002, 2006.
CPR Training - 1981, 1982, 1984, 1985, 1993, 1995, 1999, 2001, 2002, 2004, 2006, 2008, 2011.
NITON Spectrum Analyzer (field device to measure heavy metals in soils) - NITON Corporation, 1998, 2002, 2008.

EXPERIENCE

1991 to Present: Project Manager/Senior Hydrogeologist, Environmental & Turf Services, Inc., Wheaton, Maryland.

Project manager for all ground water investigations. Models include PRZM-GW, PELMO (German modification of PRZM), Attenuation Factor, LEACHM, SCI-GROW, and iSTREEM. Conducts computer simulation modeling of chemicals leaching to ground water, field geology assessments, field hydraulic conductivity measurements using the GUELPH® permeameter, environmental site assessments for real estate transactions, soil and ground water sampling, interviews, records searches, report writing, proposal writing, and project management. Manages and selects subcontractors for implementation of all ground water and surface water monitoring studies. Assists in determination of water supply and irrigation demands for golf courses. Evaluates all water quality monitoring lab results and quality control data: insecticides (includes fumigants), fungicides, herbicides, nematicides, and inorganics.

1990 to 1991; 1994: Project Manager/Hydrogeologist, Maryland Department of the Environment, Hazardous and Solid Waste Management Administration, Baltimore, Maryland. Responsible for the management of State and Federal hazardous waste site investigations and assessments. Also, responsible for site inspections, sampling plans and remediation of RCRA facilities. Coordinate activities between responsible parties and their contractors for implementing all aspects of technical investigations and assessment studies including on-site drilling and sampling of monitor wells.

1987 to 1990: Geologist, BTA Oil Producers, Midland, Texas. Responsible for outside prospect evaluation, maintained field development, received and maintained mudlog reports, evaluated land sale properties, produced maps, and conducted log analyses. Computer experience on PC in spreadsheet application and IBM mainframe.

1980 to 1986: Advanced Geologist, Marathon Oil Company, Midland, Texas. Responsible for geologic development in the Anadarko Basin, Oklahoma. Served as team member or liaison on projects involving multi-disciplinary teams. Responsible for numerous oil and gas production well sites in Texas, New Mexico, and Oklahoma. Directly supervised geologic well drilling operations including sample description and analysis, casing point selections, and borehole electric logging. Performed characterization analysis of reservoirs using porosity, permeability, reservoir geology, fluid contacts, and pressure data. Mapped geologic formations utilizing cross-sections, drill samples, and borehole logs.

1979 to 1980: Lab Assistant, Texas Tech University, Lubbock Texas. Responsible for water analysis, computer analogs for aquifer systems, computer modeling of aquifer system using Prickett and Lonnquist's Selected Digital Computer Techniques for Groundwater Resource Evaluation.

Summer 1979: Field Hydrogeologist, U.S. Geological Survey, Littleton, Colorado. Responsible for water sampling and testing for pH, temperature, and conductance. Performed pump and pressure tests in monitor wells and artesian wells respectively to determine aquifer characteristics and basin analysis in the North Park Basin, Colorado. Thesis work.

REGISTERED TRADEMARKS

CarbonSave® - helped develop the first carbon footprint calculator and energy efficiency analyzer for golf courses.

PUBLIC TESTIMONY/PRESENTATIONS

AFWA – Association of Fish & Wildlife Agencies, St. Louis, MO, 2014.
IWLAA – Isaac Walton League Association of America, Lincoln, NE, 2012.
Addressed Park Officials, City of Arlington, Texas, April 30, 2013.
Planning Board Presentation, Village of Croton-on-Hudson, May 22, 2012.
Informational Presentation to Citizens - Pre-Public Meeting, Comus, MD, April 6, 1999.
Public Meeting Presentation - Water Appropriations Hearing for MDE, Comus, MD, April 27, 1999.
Deposition given for leaking UST before District Court, City and County of Denver, State of Colorado, Columbia, Maryland, May 27, 1992.
Deposition given for Marathon Oil Company concerning migration of gas reserves in the subsurface in Midland, Texas, early 1980's.

JOURNAL & BOOK PUBLICATIONS

Petrovic, A.M., T.C. Cambareri, N.L. Barnes, and S.Z. Cohen. 2022. Nitrogen Rate, Irrigation and Rainfall Impacts on Groundwater Nitrate Levels in Sandy Coastal Golf Courses. *Int'l Turfgrass Soc. Res. J*. [under review].

Baris, R.D., S.Z. Cohen, N.L. Barnes, J. Lam, and Q. Ma. 2010. Quantitative Analysis of Over 20 Years of Golf Course Monitoring Studies. *Environ. Tox. and Chem.* 29(6):1224-1236.

Durborow, T.E., N.L. Barnes, S.Z. Cohen, G.L. Horst and A.E. Smith. 2000. “Calibration and Validation of Runoff and Leaching Models for Turf Pesticides, and Comparison with Monitoring Results,” in Fate and Management of Turfgrass Chemicals, ACS Series 743, J.M. Clark and M.P. Kenna, eds., pp. 195-227, American Chemical Society, Washington, D.C., 2000.

Cohen, S.Z., A.J. Svrjcek, T. Durborow, N.L. Barnes. 1999. “Water Quality Impacts by Golf Courses,” J. Environ. Qual., 28(3):798-809.

Cohen, S.Z., L. Lindstrand, N.L. Barnes and T. Durborow; EPA and OSHA Compliance Guide For Small Arms Ranges: A Focus on Lead, Environmental & Turf Services, Inc., Wheaton, Maryland, 1997.

Barnes, N.L., T.E. Durborow, S.Z. Cohen, A.J. Svrjcek, and M.J. O'Connor. 1993. "Conservative Ground Water and Surface Water Risk Assessments for Golf Courses in Vermont" in Proceedings of the Focus Conference on Eastern Regional Ground Water Issues. NGWA, Ground Water Management Book 16 of the Series.

Cohen, S.Z., T.E. Durborow, and N.L. Barnes; "Ground Water and Surface Water Risk Assessments for Proposed Golf Courses" in Fate and Significance of Pesticides in Urban Environments, American Chemical Society 214-227 Series 522, K.D. Racke and A.R. Leslie, eds., Wash. D.C., 1993.

SCIENTIFIC PRESENTATIONS

Barnes, N.L. 2014. Implementing A Shooting Range BMP Plan: A Focus on Risk Assessment and Risk Management, presented to the Hunting and Shooting Sports Participation Committee during the Association of Fish & Wildlife Agencies annual meeting, St. Louis, MO.

Carroll, M., G. Felton, T. Turner, P. Landschoot, M. Goatley, J. Derr, N. LaJan Barnes, and S. Cohen. 2012. Home Lawn BMPs to Reduce Runoff and Fertilizer Use in the Chesapeake Bay Watershed: A Compost and Microclover Demonstration and Technology Transfer Project. SETAC - NFWF poster presentation, University of Maryland, College Park, April 23, 2012.

Barnes, N.L. 2001. Hydrogeologic Factors Required to Ensure the Delivery of a Safe and Plentiful Water Supply. Invited presenter at Rural Community Assistance Program (RCAP) 2001 National Rural Policy Conference, Washington, D.C., October 25, 2001.

Cohen, S.Z. 1998. Pesticides in Surface Water and Ground Water in the U.S.: Monitoring Results, Potential Human Health Risks, and New Regulatory Initiatives, presented before the IBC UK Conference, Pesticides & Their Impact on the Aquatic Environment, London, England, March 17, 1998.

Barnes, N.L., T.E. Durborow, S.Z. Cohen, A.J. Svrjcek, and M.J. O'Connor. 1993. Conservative Ground Water and Surface Water Risk Assessments for Golf Courses in Vermont. Presented at the Focus Conference on Eastern Regional Ground Water Issues, Burlington, Vermont, September 27-29, 1993.

MEMBERSHIPS

National Ground Water Association
(Association of Ground Water Scientist and Engineers)

HONORS & AWARDS

Full scholarship summer program, OSU, 1990.
Certificate of Appreciation for Outstanding Participation as an Instructor, MDE’s 1990 Ground Water Training Program.

ADDITIONAL COURSEWORK

Continuing Education Courses to maintain PG certifications annually, 1991-Present.
Plant-Soil Interaction Seminar, Golf Industry Show, Orlando, FL, February 4, 2014.
Phosphorus-Must It Always Equal Zero, Golf Industry Show, Orlando, FL, February 5, 2014.
Dye-Tracer and Geophysics Field Program, NGWA, San Antonio, TX, May 2, 2013.
Sustainability & Conservation: "Green Golf" by GCSAA webcast, May 24, 2011.
Peer Reviewed NGWA Best Suggested Practices for GW Sampling March 4-9, 2011.
QED webinar low flow pumps webinar, December 16, 2010.
Science-based Guidance for the Identification and Evaluation of PBTs and POPs, SETAC. Webinar, June 15, 2010.
Trends in G-W Sampling: A Comparison of GW Sampling Methods, webinar, January 27, 2010.
Phosphorus Fert. & Pollution (webinar, EIG & AAT), January, 12, 2010
Emerging Pollutants in the Water Supply (Geosyntec webinar), October, 20, 2009.
GW Flow & Chemical Transport in Fractured Rx. (#821 webinar) NGWA, November 18, 2008.
Niton XRF Training (Spectrum Analyzer) (1 day - 8 hr) Baltimore, MD, August, 5, 2008.
Introductory Statistics for Environmental Professionals - NGWA, Orlando, FL, December, 2007.
Aquifer Testing for Improved Hydrogeologic Site Characterization - NGWA Ground Water Expo - Orlando, FL, December, 2007.
SAWS Field Trip - NGWA Ground Water Summit, San Antonio, TX, 2005.
Management of Karst Aquifers - The Center for Cave and Karst Studies, San Antonio, TX, 2002.
Aquifer Tests: Operation and Parameter Estimation – NGWA, Milwaukee, WI, 2000.
Strategies of Effective Writing – EEI Communications, Silver Spring, MD, 2000.
Micropurge Low-Flow Purging and Ground Water Sampling -- The Nielson Environmental Field School, Inc., 1998.
NITON Spectrum Analyzer -- NITON Corporation, 1998, 2002, and 2008.
Pesticide Root Zone Model Release 3.0 Training -- EPA, Athens GA, 1997.
Ground Water Protection & Management of Public Drinking Water Supplies & Aquifers - Baltimore, MD, 1995.
National Ground Water Sampling Symposium -- Washington D.C., 1992.
Principles of Subsurface Contaminant Fate and Transport Modeling -- NGWA, San Diego, CA, 1992.
Ground Water Investigations -- EPA, Baltimore, MD, 1991.
FIFRA, Basic Good Laboratory Practices, Quality Associates Inc., Columbia, MD, 1991 and 2000.
Monitor Well Design -- Maryland Department of the Environment (MDE), co-instructor, 1991.
Hazmat 1A Awareness -- MDE, Baltimore, MD, 1990.
Hazardous Materials Incident Response Operations (OSHA 40-hour health and safety training) -- EPA, Edison, NJ, 1990.
Practical Approaches to Ground Water Hydrology and Contamination (taught by Drs. Pettyjohn & Prickett) -- OSU, Stillwater, OK, 9 hours graduate credit (after degrees), 1990.
OSHA 8-hour health and safety training refresher 1991, 1992, 1993, Dec. 1994, 1996, 1997, 1998, 1999.
Plus 60+ other geological and geophysical short courses, conferences, and workshops between 1980 and 1990.

POUND RIDGE GOLF CLUB
POUND RIDGE, NEW YORK
GROUND-WATER, SURFACE-WATER AND STORM-WATER MONITORING PLAN

Prepared For

U. S. Summit Company

October 2001

Revised March 2002

LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water and Environmental Engineering Services
110 Corporate Park Drive, Suite 112
White Plains, NY 10604
(914) 694-5711

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POUND RIDGE GOLF CLUB
POUND RIDGE, NEW YORK
GROUND-WATER, SURFACE-WATER AND STORM-WATER MONITORING PLAN

1.0 INTRODUCTION

The following Ground-Water, Surface-Water and Storm-Water Monitoring Plan (Plan) is to be initiated in connection with the construction and operation of the Pound Ridge Golf Club (Golf Course), on High Ridge Road in Pound Ridge, New York. As part of the State Environmental Quality Review Act (SEQRA) the proposal for the Pound Ridge golf club has been through a thorough environmental evaluation. The results of this evaluation have been compiled in the DEIS and FEIS for this project, which include various plans and mitigation measures such that the construction and operation of this course, will not result in significant adverse impacts to ground water, surface water or storm-water.

The purpose of this Plan is to ensure that the environmental controls, implemented during the construction and operation of this course, are effective at preventing adverse water quantity or water-quality impacts. This will be accomplished by regular monitoring of ground-water quantity, and ground-water, surface-water and storm-water quality, as described in the following sections.

This Plan describes the general methods for the physical sampling of ground water and surface waters that exist on and in close proximity to the Golf Course. Ten onsite wells and up to ten offsite residential wells will be monitored for ground-water quantity. Five onsite wells and up to ten offsite wells will be monitored for ground-water quality. Four surface-water locations will be monitored, including all locations where surface water enters and exits the Golf Course and Irrigation Pond 1.

The monitoring described in this Plan shall be the responsibility of the Golf Course owner, with oversight by an independent third party auditor. The third party auditor will audit selected monitoring events, summarize the analytical data and prepare all reports. The analytical results of the ground-water and surface-water sampling will be sent directly to the third party auditor. In the event that concentrations of chemical parameters are detected above response levels, the third party auditor will immediately notify the Town and the Golf Course owner. Similarly, in the event that offsite ground-water levels decline to levels that trigger response actions, the third

party auditor will notify the Town and the Golf Course owner. The Golf Course owner will be responsible for implementing the prescribed response action (see Sections 2.6 and 3.7).

2.0 GROUND-WATER QUANTITY MONITORING

The purpose of ground-water quantity monitoring is to observe and report potential onsite and offsite changes in ground-water levels associated with the construction and operation of the Golf Course. Ground-water quantity monitoring will be conducted before, during, and after construction as described below.

2.1 Monitoring Points

The ground-water quantity monitoring program will include the following onsite wells (see figure 1):

TW-1	TW-6
OW-2	OW-7
OW-3	TW-8
TW-4	TW-9
TW-5	Well E

In addition to the onsite wells, a network of neighboring residential offsite wells will also be monitored. The offsite network will include a minimum of 10 neighboring wells from the following areas:

Pound Ridge, New York	Stamford, Connecticut
High Cliff Terrace	Country Club Road
Clear Water Lane	Coventry Road
High Ridge Road	
Old Snake Hill Road	

Fairway Drive, Greens Circle and parts of High Ridge Road in Stamford will be provided with public water by the Golf Course owner and, therefore, monitoring is not proposed in those areas. The specific offsite monitoring points will be established as part of this Plan and will be dependent on which residents agree to make their wells available for monitoring. Once a group

of willing participants has been identified, the residential wells to be monitored will be selected in consultation with the Town and the third party auditor. The selected wells will be based on several factors including the ability to install automatic monitoring equipment in the wells and the location of willing participants relative to the Golf Course property.

2.2 Monitoring Duration and Frequency

The ground-water quantity monitoring program will be implemented before, during and after the Golf Course construction and will continue for the life of the course. The frequency of monitoring will change during the program depending on the phase (baseline or operational monitoring) as described in Sections 2.3 and 2.4. At the end of the third and fifth years of post construction monitoring, a review of the monitoring results will be presented to the Planning Board by the Golf Course owner and third party auditor. After the fifth year of post construction monitoring, the Golf Course owner will have the right to petition the Planning Board to end the monitoring program.

If at any point during the life of the course the monitoring plan is terminated, the Town will have the right to reinstate the program, in response to any of the following:

- the installation and use of a new irrigation well on the Golf Course;
- a water quantity complaint from a resident which, after investigation, is determined to be related to operation of the Golf Course wells; and,
- any exceedance of the 160 gpm maximum allowable pumping rate for the irrigation wells.

2.3 Baseline Monitoring

The purpose of the baseline monitoring is to develop a record of ground-water levels in onsite and the selected offsite wells prior to Golf Course irrigation well use. Baseline monitoring will be conducted in the onsite and selected offsite wells with the use of automatic water-level recorders for a period of two months prior to construction, through construction, and ending once the first irrigation well is pumped. Once the first irrigation well is pumped, the operational water-level monitoring phase will commence.

The automatic water-level recorders will be downloaded once prior to construction, and once a month throughout the construction period. Throughout the Baseline Monitoring Phase, the automatic water-level recorders will be programmed to record water levels at hourly intervals from 6:00 a.m. to 9:00 p.m., and once at 3:00 a.m. Once downloaded, the data from the automatic loggers will be used to generate pre-irrigation baseline profiles. These baseline profiles will in turn be used to formulate safeguards unique to each individual offsite residential well once the irrigation of the Golf Course commences. The safeguards will allow the third party auditor to observe potential reductions of water levels in the offsite residential wells and impose appropriate response actions on the Golf Course owner in the event that the offsite residential wells are adversely impacted by Golf Course irrigation (e.g. reducing or ceasing pumping of the irrigation wells).

A well can produce water as long as its pump is below the lowest point at which the water level is drawn down in the well during normal operation. When the water level is drawn down below the intake of the pump while it is running, not only is there no production of water, but damage to the pump can result. Since the residential wells in the vicinity of the Golf Course are currently yielding water, it can be inferred that water levels in the residential wells do not currently fall below the pump intakes.

Once the irrigation wells commence pumping, it is possible that the ground-water levels in the vicinity of the Golf Course will decline. A reduction in water levels is not a problem for the residential wells, as long as the water levels remain above the pump intake during normal pumping operation. The Baseline Monitoring Phase will be used to determine how close each well is to this critical point (e.g. the maximum level to which the water is drawn down in a well compared to the pump elevation) before the irrigation wells are used. Once an estimate has been made of the capacity for each well to sustain a water-level drop, safeguards will be formulated for the Operational Monitoring Phase to ensure the use of the Golf Course irrigation wells do not impact the operation of the offsite residential wells.

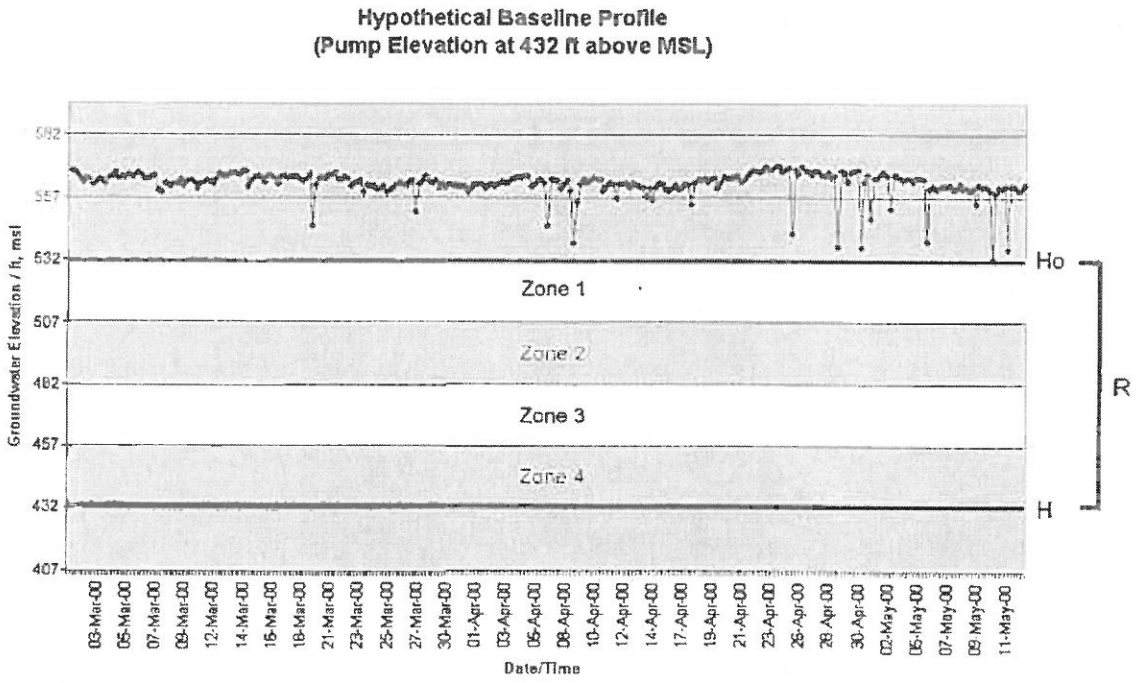
When the ground-water level in a well is plotted against time, the result is a profile of water use and draw down for that well. This pre-irrigation baseline profile will be constructed for every residential monitored well and is unique to each well. The baseline profile captures the effect of pumping on ground-water levels in the well and the well's ability to recharge once

pumping has stopped. The baseline profile will show the lowest water level that the well experienced during the Baseline Monitoring Phase. The difference between the lowest observed water level and the pump elevation is defined as the reserve capacity of the well, which is the level of additional draw down that is possible without impacting the operation of the well. During the Baseline Monitoring Phase, the reserve capacity for each monitored residential well will be quantified.

This baseline analysis is illustrated for a theoretical well in Diagram 1 below — Hypothetical Baseline Profile. In Diagram 1, the water level has been plotted against time to generate the baseline profile. The lowest observed point during the monitoring period occurred on May 9, 2000, and is designated by the symbol H_o. The elevation of the pump intake, which is the lowest level to which the water can be drawn down for a productive well, is indicated by H. The difference between these two elevations is the reserve capacity, denoted by R, which will be unique for each well. This reserve capacity will be used as a benchmark to determine how close a residential well is to being adversely impacted during the Golf Course Operational Monitoring Phase and to prescribe appropriate response actions, if necessary.

The reserve capacity, expressed in feet or inches, is divided into four equal zones. When the H_o level is reduced, it will fall into one of the four zones. Reduction of the H_o level into any one of the four zones will trigger a specific response action, as described in Section 2.6.

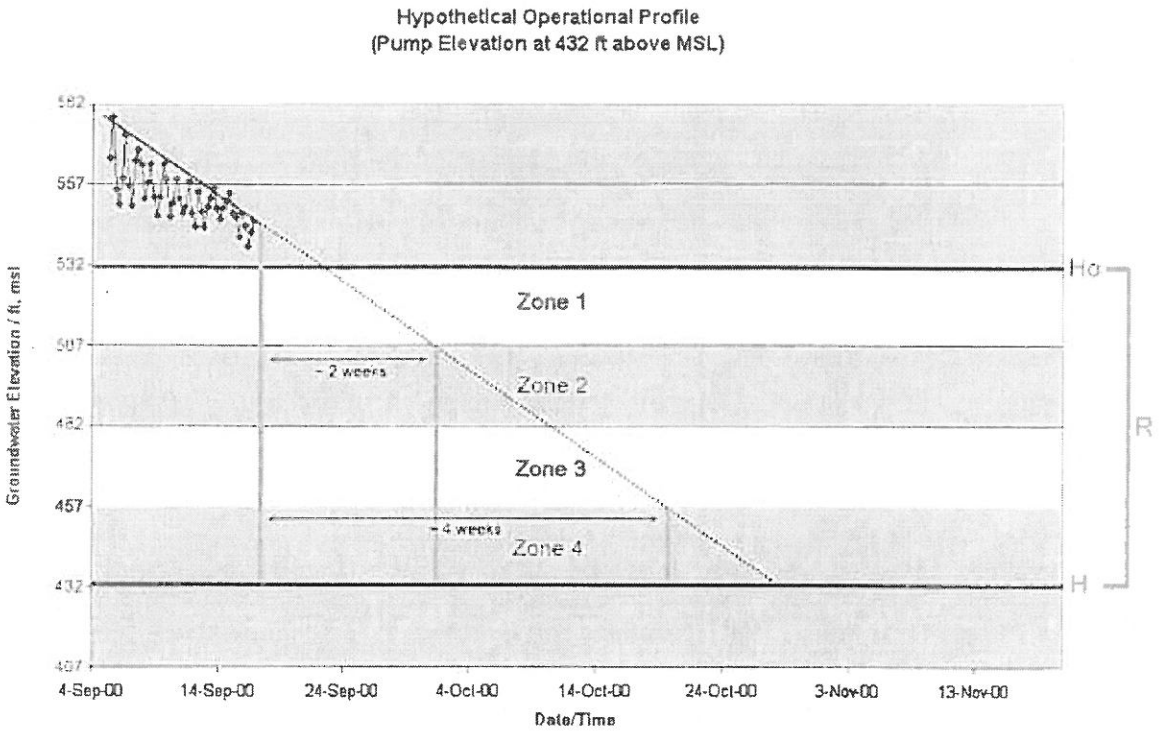
Diagram 1



2.4 Operational Monitoring

The Operational Monitoring Phase will consist of water-level monitoring in accordance with the schedule presented at the end of this section. The Operational Monitoring Phase will also include the development of operational water usage profiles of the residential wells to assist in water resource management. The purpose of the operational monitoring profiles is to detect potential impacts to residential wells at an early stage so that irrigation well pumping rates can be reduced or ceased accordingly. This operational profiling procedure is outlined below and illustrated in Diagram 2 — Hypothetical Operational Profile. This operational profiling procedure allows for standardized monitoring that can be applied to all residential wells while accounting for each well's unique characteristics and reserve capacity.

Diagram 2



When the operational profile has been constructed, a best-fit line is drawn through the "recovery" water levels observed during the last monitoring event. The data logger readings with the highest water level of any given day (e.g. the "recovery" water level) is considered to be representative of the background regional ground-water levels. If the best-fit line is downward-sloping, it indicates that the water in the well is generally being used at a faster rate than it is being replenished. The best-fit line can be extrapolated to gain an understanding of the rate of water-level depletion with respect to time in any given residential well. In this manner, the third party auditor can alert the Golf Course owner about the specific projected time frames at which the water levels are expected to fall into that well's reserve capacity (Zones 1 through 4), thereby requiring the response actions outlined in Section 2.6 to be implemented. If the recovery water levels in a residential well equilibrate with regional ground-water levels, and the best-fit line indicates that water levels are not projected to fall into that particular well's reserve capacity or, the water-level depletion is not related to the Golf Course wells, then no response action would be required.

In Diagram 2 above, the operational profile for a hypothetical well is illustrated. When the best-fit line is plotted (solid line), it is downward-sloping, indicating that the rate of use is greater than the rate of replenishment. When the line is extrapolated (the dotted line) it shows that at current rates of use and recharge, the H_o level will fall into Zone 1 in two weeks and into Zone 4 in four weeks, thereby triggering a response action.

The operational profile provides a quantitative and predictive tool that both the third party auditor and the Golf Course owner can use to effectively manage ground-water resources and prevent impacts to offsite residential wells. For example, using the hypothetical operational profile presented in Diagram 2, rather than wait the four weeks for Zone 4 restrictions to be implemented, the Golf Course owner might find it prudent to decrease its pumping by a smaller amount early to avoid or minimize the pending restrictions.

The operational profile can also be used to determine the effectiveness of the response action implemented by the Golf Course. If the best-fit line through the recovery water levels is upward-sloping following the implementation of a response action, the well is being recharged at a higher rate than it is being depleted, and the implemented response action has been effective.

Operational Water Quantity Monitoring Schedule

Phase	Time Period	Monitoring Frequency
I Grow In	First month	Four times a day - data to be downloaded twice a week
	Second month	Four times a day - data to be downloaded once a week
	Third month through end of grow-in	Four times a day - data to be downloaded every other week
II First Year of Normal Golf Course Operation	First two months	Four times a day - data to be downloaded once a week
	Third month through end of golf season	Four times a day - data to be downloaded every other week
III Every year following the first of Normal Golf Course Operation	Through golf season	Once a day - data to be downloaded once a month

2.5 Monitoring Procedures

The water-level monitoring will be conducted with automated dataloggers from In Situ, Inc. or an equivalent brand. The loggers consist of a small diameter pressure transducer on an electronic cable, which would be lowered into the well and would remain there through the baseline and operational monitoring periods. Prior to placing the logger into the well, it will be sterilized with a mild solution of bleach and water. In addition, all personnel handling the equipment will wear latex gloves. The logger will be secured to the top of the well casing and will be installed so that the well cap can be in place during monitoring. The logger will be set to a depth in each well which will allow it to remain submerged at all times. Data from the logger will be downloaded electronically from a data port on the end of the cable. The data port will be located on the outside of the well casing to eliminate frequent opening of the well cap. Data collection will occur during normal business hours and the homeowner will be notified in advance of the monitoring schedule.

2.6 Response Actions

Any resident who experiences a water quantity problem should notify the third party auditor and the Town Planning Board. The contact information for the third party auditor will be available through the Town at (914) 764-5511, once an auditor has been selected. All complaints will be responded to within 24 hours.

The water levels in the residential wells will be monitored by automatic data loggers in accordance with the schedule presented in Section 2.4. The operational profiles will be generated in the same way that baseline profiles were constructed. An operational profile will be constructed using the highest observed recovery water level for each well for all the days representing the last data period. If the water levels did not fall below H_o level, then no response action is required. However, if the water level in any given well consistently drops below the H_o (e.g. the reserve capacity depicted as Zones 1 through 4 in Diagram 2), it implies that the well may be affected by Golf Course irrigation and might warrant closer scrutiny and/or response actions. The amount of reserve capacity being utilized is proportional to the risk of the well being impacted.

To provide a standard approach that can be applied to all residential wells, the reserve capacity is divided into four equal zones as discussed in Sections 2.3 and 2.4. If during the

Operational Monitoring Phase, the water level in any given residential well falls into Zone 1, there is no immediate risk of the well being impacted, since over 75% of the reserve capacity is remaining. However, continued monitoring and analysis will be required. This will include a review of the residents water usage to determine if the decrease in reserve capacity is related to increased water demand by the residents. If the water level in any given residential well falls into Zone 2, then the pumping rate of the irrigation wells will be reduced by 25% and data from the affected residential well will be downloaded weekly until the well recovers.

If a residential well's water level falls into Zone 3, it implies that less than half of the well's reserve capacity is remaining. If this occurs, the pumping rate of the irrigation wells will be reduced to 50% of the original pumping rate (prior to any rate reductions) and data from the affected residential well will be downloaded weekly until the well recovers. If water levels fall into Zone 4, it implies that less than 25% of the well's reserve capacity is remaining and that the well is in imminent risk of being adversely impacted. If this occurs, the Golf Course irrigation wells will cease pumping, until such time that the affected residential well recovers.

Once an affected residential well has recovered in response to a reduction in irrigation well pumping, the Golf Course may increase the pumping rate weekly, in increments equivalent to 25% of the original pumping rate, as long as no residential wells are affected, as defined above. If, after the implementation of a response action, it is determined that the declining water level in the residential well is not related to the Golf Course wells, then the pumping rate can be immediately restored to full capacity.

If, at any time during the life of the course a new irrigation well is installed, a pumping test with a minimum duration of 72 hours will be conducted. The test would include simultaneous pumping of the new well(s) and the existing irrigation wells. The Golf Course owner, in consultation with the Town and third party auditor, would select onsite and offsite wells to be monitored during the test. Specific details of the test including all proposed monitoring points and pumping rates, would be submitted to the third party auditor and the Town for review and approval before testing can begin. The test results would be summarized in a report and also submitted to the Town and third party auditor for review.

Based on the results of the pumping test, the water quantity monitoring program would be modified, as needed, to include the new irrigation well(s) and any new offsite monitoring points

that are deemed appropriate. All new monitoring points would be monitored in accordance with the protocols discussed in Sections 2.3, 2.4 and 2.5. Baseline profiles, as discussed in Section 2.3, would be generated prior to the pumping test. Drawdown in offsite wells resulting from operation of the Golf Course wells, would be mitigated in accordance with the response actions described above.

In the event a new irrigation well is installed and the water quantity monitoring program has been terminated, then it would be reinstated. The length of the monitoring period would be determined in consultation with the third party auditor and the Town and, would be based on the results of the pumping test and the data generated during the previous monitoring program.

2.7 Reporting

For the water quantity program, status reports will be submitted in accordance with the following schedule:

Phase		Report Submittal
Baseline Monitoring		End of pre-construction and end of construction period.
Operational Monitoring:		
I	Grow-In	Monthly.
II	First Year of Normal Golf Course Operation	Monthly during the golf season.
III	Every year following the first of Normal Golf Course Operation	Beginning, middle and end of Golf Season.

All water-level data will be sent directly to the third party auditor for analysis and report preparation. The reports will include all onsite and offsite water-level data collected since the prior report and an evaluation of that data. The reports will be prepared by the third party auditor with copies of the reports sent to all of the homeowners participating in the offsite monitoring

program and the Golf Course owner. When possible, these reports may be combined with the water-quality monitoring reports which are discussed in the next section.

3.0 WATER-QUALITY MONITORING

An Integrated Turfgrass and Pest Management Plan (ITPMP) was prepared as part of the DEIS and is hereby incorporated into this Plan by reference. A copy of the ITPMP is presented in Appendix I to this Plan. The purpose of the ITPMP is to minimize, to the maximum extent practicable, the potential for water-quality impacts by establishing management practices for safe, controlled fertilizer and pesticide use. In accordance with the ITPMP, fertilizers will be applied in small amounts based on the amount needed by the turf grass. Pesticides will only be used as a last resort after all other pest control measures have failed and pest damage is imminent. In addition, pesticides shown to have a potential to leach concentrations in excess of applicable water quality standards, and thus pose a risk to human health or aquatic life, have been eliminated from the ITPMP and will not be used on the Golf Course. The ITPMP identifies the pesticides to be used on the Golf Course.

The following water-quality monitoring program is intended to monitor the effectiveness of the ITPMP and, to establish procedures for responding to a chemical detection in ground water, surface water or storm-water, in the unlikely event that one should occur.

3.1 Monitoring Points

The monitoring points for the water-quality sampling programs are presented on figure 1 and include the following:

Ground Water	Surface Water	Storm Water
TW-1	UG-1	UG-1
OW-2	DP-1	DP-1
TW-4	DP-2	DP-2
TW-6	Irrigation Pond 1	
TW-9		
offsite residential wells (10 minimum)		

As part of this plan changes to the proposed monitoring points are allowable. However, any proposed changes must be made in consultation with, and with the approval of, the third party auditor.

3.2 Monitoring Duration and Frequency

Water-quality sampling will be conducted for ground water, surface water and storm water, beginning prior to construction of the course and continuing for 10 years after construction. However, under certain conditions, the program can be extended beyond the 10-year time frame or be reinstated after it has ended. A complete discussion of these conditions is presented in Section 3.7.

The sampling frequency will vary throughout the program in accordance with the schedule below. Additionally, the sampling frequency would be intensified during the program in response to a pesticide detection as described in Section 3.7. Sampling of offsite residential wells will be conducted once during baseline sampling and any time there is an onsite detection in ground water.

Water-Quality Monitoring Schedule

Period	Sample Type	Frequency
Baseline	Ground water, surface water, storm water, residential wells	Once prior to construction
Golf Course Grow-In Through the First Three Years	Ground water, surface water	Quarterly
	Storm water	Three times per year, spring, summer and fall
Years Four Through Seven After Construction	Ground water, surface water	Semiannually
	Storm water	Three times per year, spring, summer and fall
Yeas Eight Through Ten After Construction	Ground water, surface water	Annually in the fall
	Storm water	Three times per year, spring, summer and fall

3.3 Baseline Sampling

3.3.1 Ground Water

As part of this Plan, baseline ground-water sampling will be conducted for offsite residential wells and the five onsite wells listed in Section 3.1. The specific offsite wells to be sampled will be the same as those selected for ground-water quantity monitoring and will be dependent on those who agree to make their wells available for monitoring. The sampling network will be established in consultation with the Town and the third party auditor.

The wells will be sampled for the following parameters which include fertilizer components and pesticides previously used on the site and commonly applied to residential lawns. Other pesticides which are proposed for use on the Golf Course, and which are not included on the baseline list and have not been used onsite in the past, will be assumed to have a non-detectable baseline value.

pH	2,4D
temperature	carbaryl
conductivity	chlorpyrifos
nitrate-nitrogen	dicamba
ammonia nitrogen	imidcloprid
chloride	MCPP (mecoprop)
total phosphorus	

The baseline sampling will occur once, and will be conducted prior to construction of the Golf Course.

3.3.2 Surface Water and Storm Water

Baseline surface-water and storm-water samples will be conducted at the onsite locations listed in Section 3.1 which are shown on figure 1. For the purpose of this Plan a storm event will be considered a precipitation event with a rainfall intensity of at least 0.5 inch per hour at the Golf Course. The baseline surface-water and storm-water samples will be analyzed for the same parameters as the ground water and are listed in Section 3.3.1 above. Pesticides not included on the baseline list, and which are proposed for use on the Golf Course but have not been used in the past, will be assumed to have a

non-detectable baseline value. The baseline sampling will be conducted once and will be conducted prior to construction of the Golf Course.

3.4 Operational Sampling

3.4.1 Ground Water

As part of this Plan, operational ground-water sampling will be conducted at the five onsite wells listed in Section 3.1 for the purpose of monitoring the effectiveness of the ITPMP, and to ensure that operation of the Golf Course does not adversely affect ground-water quality.

The ground-water samples will be analyzed for the following parameters:

pH	ammonia-nitrogen
temperature	chloride
conductivity	total phosphorus
nitrate-nitrogen	any pesticide applied within the preceding 120 days

The 120 day time frame for pesticide analytes is based on the characteristics of the proposed chemicals and the quantitative risk assessment presented in the ITPMP. The risk assessment has shown, that when used as specified in the ITPMP, none of the proposed chemicals will leach at concentrations considered harmful to human health or aquatic life. As a result, it is highly improbable that these chemicals could impact ground water, surface water or storm water, 120 days after application. It will be the responsibility of the third party auditor to verify with the Golf Course superintendent what chemicals have been used.

3.4.2 Surface Water and Storm Water

Operational surface-water and storm-water quality samples will be collected from the locations listed in Section 3.1 which are shown on figure 1. The purpose of the sampling will be to monitor the quality of surface water and storm water entering and exiting the site under operating conditions.

The surface-water and storm-water samples will be analyzed for the same parameters listed in Section 3.4.1 Ground Water.

3.5 Sampling Procedures and Quality Assurance/Quality Control

3.5.1 Onsite Ground Water

Onsite ground-water samples are to be collected from four irrigation wells and one observation well. Samples from the irrigation wells will be collected from sample taps located at or near the well head. Prior to sampling, a minimum of three standing volumes of water will be purged from the wells using the installed submersible pumps. The standing volume will be calculated using the static water level, well depth and well diameter. If the wells have been operating prior to and up until sampling and, based on the pumping rate and operating time, have pumped the equivalent of three standing volumes, then additional purging will not be necessary. One observation well (OW-2) is artesian and historically water has flowed over the top of the casing. If this well is flowing at the time of sampling, purging will not be necessary and the samples will be collected from the well using a disposable bailer. If OW-2 is not flowing at the time of sampling, then it will be sampled by low-flow sampling, using a peristaltic pump and a Horiba Model U-22 (or equivalent) flow-through cell, to monitor pH, temperature and conductivity. Once these parameters have stabilized, the samples will be collected directly from the flow-through cell. Stabilization of these parameters is defined as pH varying no more than 0.1 and temperature and conductivity varying no more than three percent. The low-flow sampling will be conducted in accordance with the procedures outlined by the USEPA in a document titled "Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures", published by the Office of Solid Waste and Emergency Response, USEPA, Washington, D.C., April 1996.

3.5.2 Offsite Ground Water

Offsite ground-water samples will be collected from neighboring residential wells as discussed under Section 3.3.1 Baseline Sampling. Prior to collecting the samples, the well pump will be activated by running the water from an inside or outside faucet. The

faucet will be run for approximately 15-20 minutes. If possible, the samples will be collected from the spigot at the pressure tank. If the pressure tank is not accessible, or does not have a spigot, then the sample will be collected from the next closest spigot or faucet, inside or outside of the house. In either case, the sample should be collected while the well pump is operating if possible. In addition, any water conditioning or treatment systems will be bypassed.

3.5.3 Surface Water and Storm Water

Surface and storm-water samples will be collected from the locations noted in Section 3.1 and on figure 1. The surface-water samples will be collected directly in the sample containers by hand, without entering the surface-water body if possible. If it is necessary to enter the water to collect the sample, then the sampler will face the upstream direction and the samples will be collected from the downstream locations first. The surface-water samples will be collected in conjunction with the ground-water samples.

Storm-water sampling will be conducted in order to capture "first-flush" runoff, from a storm event with a minimum intensity of 0.5 inch per hour at the Golf Course. Storm-water samples will not be collected if a storm meeting this condition does not occur during a particular season. The storm-water samples will be collected using automated samplers. To ensure the capture of first-flush samples, the samplers will monitor the baseline water levels at each location and will be programmed to activate in response to a rise in water level. Once triggered, each sampler will collect two composite samples over the following 60 minutes. The samples will be comprised of six aliquots collected at five minute intervals, for a total of 30 minutes for each sample and a volume of two gallons per sample.

3.5.4 Sample Handling and Analysis

All samples will be collected in laboratory prepared containers, which will include chemical preservatives if required. Measurements of pH, temperature and conductivity will be made in the field. Latex gloves will be worn by all persons handling the samples, sample containers or sampling equipment. The gloves will be changed in between each

sampling location. Field instruments will be calibrated at the beginning of each sampling day in accordance with the manufacturers' specifications.

The samples will be collected in the following order:

1. field parameters (pH, temperature and conductivity);
2. pesticides;
3. chloride;
4. nitrogen compounds (ammonia and nitrate); and,
5. phosphorus.

All samples for laboratory analysis will be cooled to 4°C (39°F) and shipped to the laboratory, via overnight delivery, the same day they are collected. The samples will be analyzed by a New York State certified laboratory, using the most current EPA approved methodology in accordance with the most recent version of EPA's Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846) or, the American Public Health Association's Standard Methods for the Examination of Water and Wastewater.

3.5.5 Quality Assurance/Quality Control

Various procedures will be implemented as part of each sampling event to ensure sample integrity and avoid cross contamination. As indicated in the previous section, latex gloves will be worn by the sampling personnel and changed between each sampling location to prevent cross contamination of the samples. In addition, field instruments will be decontaminated in between samples using deionized water. Ground-water and surface-water samples will be collected directly into the sample containers, or with the use of dedicated equipment. As a result, decontamination of sampling equipment will not be necessary. Storm-water samples will be collected in 1 gallon glass jars using dedicated, automated samplers. In between each storm event, the glass jars will be cleansed using a solution of Alconox soap and water, followed by a tap water rinse, followed by a deionized water rinse.

All sample bottles will be labeled prior to sample collection. The labels will include the following information at a minimum:

- project identification
- sample location
- sample date and time
- required analyses
- preservative (if required)

All field notes including calibration information, field measurements, sample times and any other pertinent sampling information will be recorded on a field data sheet. The field data sheet will also include the project name, the date and, the names and signatures of the sampling personnel. The field data sheet for each sampling event will be maintained by the third party auditor and the Golf Course owner's consultant. In addition to the field data sheet, a chain-of-custody form will be used to track the samples from the point of collection, to the point of analysis. Each sample collected during a specific sampling event will be logged on the chain-of-custody form. The forms will include the same information as the sample bottle labels, in addition to the samplers names and signatures, the signature of the person releasing the samples for shipping, the date and time of shipping, the signature of the person receiving the samples, and the date and time of receipt. Copies of the chain-of-custody form will be maintained by the third party auditor, the Golf Course owner's consultant and the laboratory, and will be included with the analytical report. During shipping, sample coolers will be sealed with custody tape which will indicate if the coolers are opened during shipping.

Quality Assurance/Quality Control (QA/QC) samples including trip blanks and duplicate samples will be collected during each sampling event. One trip blank will be analyzed for every group of samples shipped. One duplicate will be analyzed per sample event and the location will be rotated each time. Field blanks will not be necessary as all of the samples will be collected with the use of dedicated/disposable equipment, or directly from the source into the laboratory containers. If, for some reason, non-dedicated sampling equipment is used requiring decontamination in the field, field blanks will be collected at a rate of one per day.

3.6 Water-Quality Standards

The water-quality standards applicable to this site are those contained in New York State Codes, Rules and Regulations Title 6, Chapter X (6 NYCRR) Parts 700-706, last amended August 1999 and, the NYSDEC's Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1, Ambient Water Quality Standards and Guidance Values and Ground Water Effluent Limitations, dated June 1998. However, most of the pesticide compounds proposed for use on this course do not have water-quality standards or guidance values promulgated under these regulations. In the absence of a water-quality standard, Health Advisory Levels (HALs) will be used as guidance values for ground-water quality and LC50's (lethal concentration) will be used as guidance values for surface-water and storm-water quality.

HALs are risk-based numbers based on the consumption of drinking 2 liters of water a day, containing some concentration of a compound, over a 70-year average life span. The HALs are the maximum concentration of a chemical in water that can be consumed on a daily basis over a 70-year period, without causing increased health risks. The LC50's are the chemical concentrations in surface water at which 50 percent of an aquatic population would not survive.

Table 1 lists the parameters that will be monitored at this site and their respective water-quality standards, HALs and LC50s. The values listed on table 1 will be reviewed annually and updated as necessary, in accordance with the most current version of the applicable regulations and health-related guidance values.

3.7 Response Actions

In the unlikely event of a detection of a pesticide or fertilizer compound in ground water, surface water or storm water or, the occurrence of other conditions as noted below, response actions will be implemented as follows:

Condition	Response Action
1. Any confirmed pesticide detection in onsite ground water, surface water or storm water, below a New York State water-quality standard and 50 percent of a HAL or, for surface water, 1 percent of an LC50 (table 1).	Review chemical usage and compare to ITPMP; determine if proper management practices were followed and if not make necessary adjustments. For onsite ground-water and surface-water detections, increase sampling frequency to monthly for affected monitoring points and the detected compound until the concentration is shown to be stable or decreasing, after which it can be reduced to quarterly. Quarterly sampling would be continued for a period of one year after the pesticide is no longer detectable. For an onsite ground-water detection, sample all other onsite wells and offsite potable wells. Offsite sampling will include those wells contiguous to the Golf Course and would be expanded as necessary based on the sampling results.
2. Any confirmed detection of a pesticide which exceeds a New York State water-quality standard, or 50 percent of an HAL or, for surface water, 1 percent of an LC50, or any confirmed pesticide detection in an offsite potable well. For nitrogen and phosphorus compounds, any confirmed detection above a New York State water-quality standard or any increase in concentration above baseline over three consecutive sampling events.	Implement response actions for Condition 1 plus, suspend use of the detected chemical or product and make any notifications required in accordance with applicable state regulations. The third party auditor will initiate an investigation to determine the cause, identify the extent of the impact and evaluate and implement appropriate remedial options as needed. Under this condition all laboratory analyses would be expedited to the maximum extent possible. Upon completion of the investigation, the suspended product can be reinstated only under the following conditions: • the detected concentration has been below the lower of the New York State water-quality standard, 50 percent of the HAL or, for surface water, 1 percent of the

2. (Continued)	LC50, for a minimum of three months; and, • any offsite detection is determined not to be related to the Golf Course.
3. Three occurrences of the same pesticide, above the lower of a New York State water-quality standard, 50 percent of an HAL, or for surface water, 1 percent of an LC50, in onsite ground water, surface water or storm water, or any combination thereof, associated with separate applications or, any confirmed pesticide detection in an offsite well, the source of which, after investigation, is determined to be the Golf Course.	The detected pesticide would be permanently eliminated from the list of approved chemicals and would no longer be used on the course. The ITPMP would be revised to reflect this change. For the purpose of this response action, subsequent detections associated with a single application would not be counted as a separate occurrence.
4. Any occurrence or continuation of Condition 1 or 2 during the 9th or 10th years of monitoring.	Implement the appropriate response actions as described above and, extend the length of the sampling program beyond the ten-year time frame, for ground water, surface water and storm water, for all sampling locations, for the compounds of concern, until such a time as there have been no pesticide detections or exceedances of baseline inorganic levels for a period of two years, with a minimum sampling frequency for ground water and surface water of quarterly for affected sampling points, and semiannually for non-affected sampling points. Storm water sampling would continue to be conducted three times a year in the spring, summer and fall.
5. The introduction of a new pesticide or fertilizer product on the course which has been screened in accordance with the provisions of the ITPMP for the introduction of new products (see Appendix I), at any time during the life of the course.	If the product is introduced any time during construction through the third year of post-construction sampling, no response is necessary. If the product is introduced anytime during the fourth through the tenth year of post-construction sampling, the monitoring frequency for ground water and surface water for

5. (Continued)	the new product would be increased to quarterly for a period of two years beginning after its first application. If the product is introduced after the 10 year sampling program has ended, then the program must be reinstated for all sampling points, for the new product, for a period of two years, with a minimum sampling frequency of quarterly for ground water and surface water, and three times a year for storm water. In the event of a detection, the two-year time frame would be extended in accordance with the above response actions.
6. The hiring of a new Golf Course superintendent at any time during the life of the course.	If this condition occurs during the first seven years of post-construction sampling then no response is necessary. If this condition occurs during the eighth through tenth years of sampling then the sampling frequency would be increased from annually to semiannually, for all sampling points and parameters, for a period of two years from the time the new superintendent takes charge. During this time, stormwater sampling would continue to be conducted three times a year. If this condition occurs any time after the ten-year sampling program has ended, then the program must be reinstated for all sampling points and all parameters for a period of two years, with the understanding that the two-year period could be extended in accordance with the above response actions in the event of a detection. The minimum sampling frequency during this program would be semiannually for ground water and surface water and three times per year for storm water.

3.8 Reporting

In general, water-quality monitoring reports will be prepared and submitted by the third party auditor within two weeks of receipt of the analytical data to the Town and the Golf Course owner. For the Baseline sampling, a report will also be submitted to the homeowners participating in the program. In the event of any confirmed pesticide detection in ground water or, any onsite detection above an applicable water- quality standard, verbal notification will be made to the Town and the Golf Course owner within 24 hours of receipt of the laboratory results, followed by written confirmation within one week. In the event of a confirmed onsite pesticide detection in ground water, offsite residents on contiguous properties will be notified verbally as soon as possible and arrangements will be made to sample their well. The results of any offsite sampling will be submitted to the Town, the Golf Course owner, and the sampled residents, as soon as possible.

Any time there is a pesticide detection, the subsequent monitoring report will include an assessment as to why the detection occurred, what response actions were initiated and what measures are being taken to prevent a reoccurrence. In addition to the monitoring reports, pesticide use reports will be issued for the life of the course in accordance with the schedule presented in the ITPMP (Appendix I). These reports will be prepared and issued by the third party auditor to the Town and the Golf Course owner to ensure that the ITPMP is being followed.

4.0 DISPUTE RESOLUTION PROCEDURES

In the event of a detected offsite water quantity or water-quality impact or, in response to a complaint of a water quantity or water-quality impact from a homeowner, the third party auditor, in consultation with the Town and/or agronomical consultants will conduct an investigation if appropriate. The purpose of the investigation will be to identify the cause, assess the extent of the impact and, recommend remedial alternatives. The results of the investigation, and recommendations, will be submitted to the Town and the Golf Course owner, as well as the affected homeowner(s). The report will include a recommendation for remedial action, if necessary. In evaluating if remedial action is necessary, the third party auditor will also consider any information provided by the affected homeowner(s), regarding the quantity or quality of their water supply.

Anyone dissatisfied with the recommendations of the third party auditor, particularly with respect to remediation, will have the right to arbitrate the dispute before a panel of arbitrators from the American Arbitration Association. The cost of the arbitration, including attorney's and other professionals' fees, will be borne by the party whose position is not supported by the arbitrators. For example, in an arbitration proceeding brought by a homeowner(s), if the position of the homeowner(s) is supported by the arbitrators, the Golf Course owner will be responsible for any professional fees incurred by them. If the third party auditor's position is upheld by the arbitrators, the homeowner(s) will be responsible for any professional fees incurred or paid for by the Golf Course owner. All costs associated with the initial investigation conducted by the Golf Course owner will be borne by the Golf Course owner, regardless of the final outcome.

dmd
October 19, 2001
Revised: March 28, 2002
reports\summit\gwswmonitoringplan revised rpt

TABLE

TABLE 1

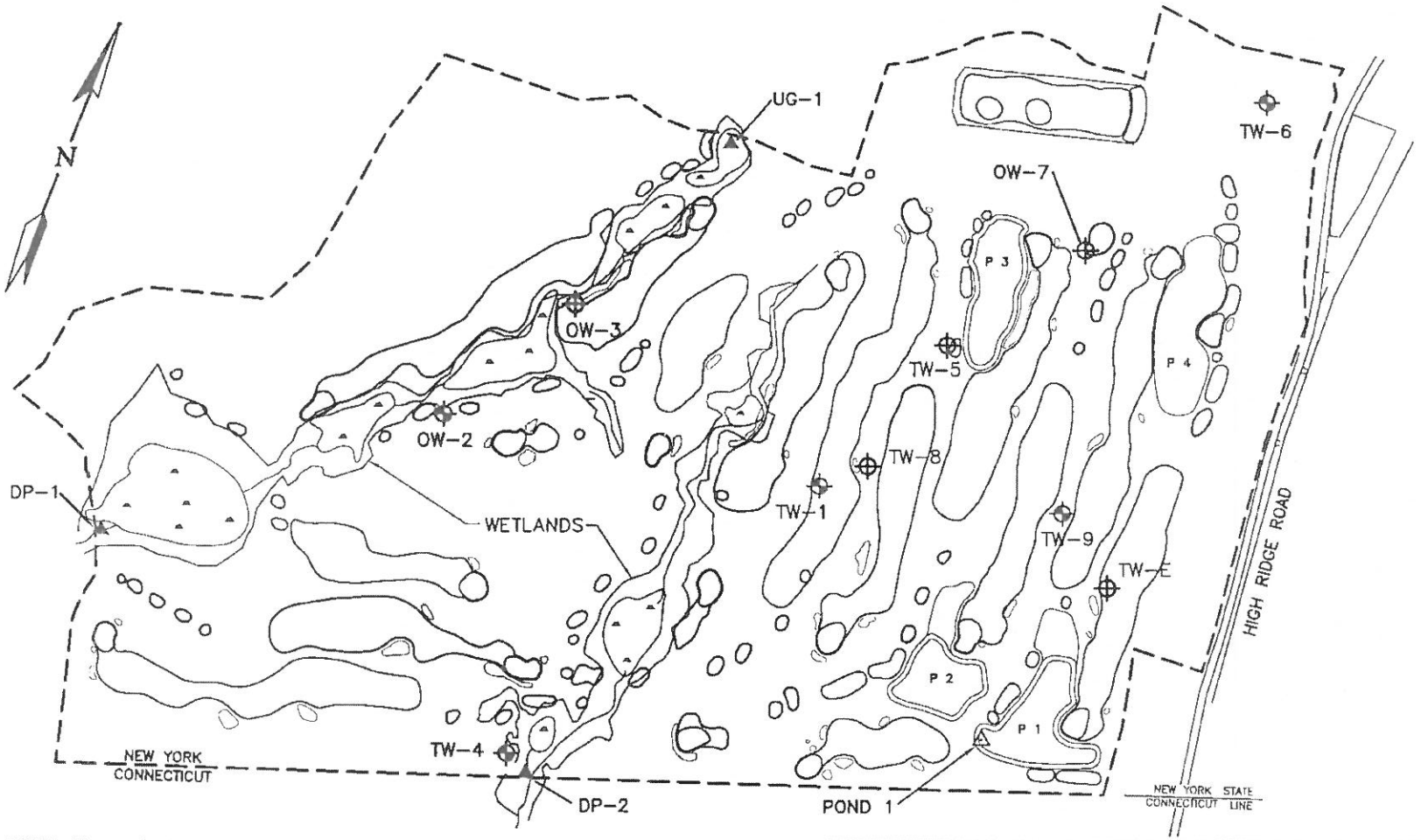
POUND RIDGE GOLF CLUB
POUND RIDGE, NEW YORK

Ground-Water and Surface-Water Quality Criteria

		Ground-Water Criteria			Surface-Water Criteria		
Compound	CAS Number	Ground-Water Standard[1/] (ug/l)[2/]	HAL[3/] (ug/l)	50% of HAL	Surface-Water[1/] Standard (ug/l)	LC50[4/] (ug/l)	1% of LC50 (ug/l)
Pesticides							
2,4-D	94-75-7	50	70	35	50	1,100	11
Prodiamine	29091-21-2	NA	50	25	NA	72,000	720
MSMA	2163-80-6	NA	70	35	NA	1,937	19.4
Iprodione	36734-19-7	NA	280	140	NA	2,250	22.5
Vinclozalin	50471-44-8	NA	175	87	NA	52,500	525
Propamocarb	24579-73-5	NA	700	350	NA	235,000	2,350
Fosetyl-al	39148-24-8	NA	10,000	5,000	NA	14,711	147
Etridiazole	2593-15-9	NA	175	87	NA	4,000	40
Cyproconazole	94361-06-5	NA	350	175	NA	3,211	32.1
Triadimefon	43121-43-3	NA	210	105	NA	1,600	16
Carbaryl	63-25-2	29	700	350	NA	2,328	23.3
Paclobutrazole	76738-62-0	NA	175	87	NA	4,076	40.8
Dicamba	1918-00-9	0.44	200	100	NA	28,000	280
MCPP (mecoprop)	93-65-2	NA	35	18	NA	25,495	255
Imidcloprid	105827-78-9	NA	400	200	NA	105,000	1,050
Inorganics							
pH	NA	6.5-8.5	NA	NA	6.5-8.5	NA	NA
Temperature	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	NA	NA	NA	NA	NA	NA
Nitrate-Nitrogen	NA	10,000	NA	NA	10,000	NA	NA
Chloride	NA	250,000	NA	NA	250,000	NA	NA
Phosphate Phosphorus	NA	NA	NA	NA	NA	NA	NA
Ammonia-Nitrogen	NA	2,000	NA	NA	2,000	NA	NA

1/ 6 NYCRR Chapter X Parts 700-706 March 1998, NYSDEC TOGS 1.1.1, June 1998
2/ Micrograms per liter
3/ Health Advisory Level
4/ Aquatic toxicity - Lethal concentration
NA = Not Applicable

FIGURE



NOTE: Figure is based on proposed routing plan.

SYMBOLS

- ⊕ WELL LOCATION
- ⊕ WELL LOCATION/GROUND-WATER SAMPLING POINT
- TW IRRIGATION WELL
- OW OBSERVATION WELL
- △ DP-1 SURFACE WATER AND STORMWATER SAMPLING POINT
- △ POND 1 SURFACE WATER SAMPLING POINT
- P 1 IRRIGATION POND

0 500
SCALE IN FEET

POUND RIDGE GOLF CLUB
POUND RIDGE, NEW YORK

GROUND-WATER, SURFACE-WATER AND STORM-WATER MONITORING POINTS

DATE	REVISED

PREPARED BY:
LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water and Environmental Engineering Services
126 Monroe Turnpike
Trumbull, CT 06611
(203) 452-3100

DRAWN:	MRV	CHECKED:	JB	DATE:	10/3/01	FIGURE:	1

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APPENDIX I

INTEGRATED TURFGRASS AND PEST MANAGEMENT PLAN (ITPMP) FOR THE POUND RIDGE GOLF CLUB

TOWNS OF POUND RIDGE , NEW YORK

for the FEIS

PREPARED BY

A. MARTIN PETROVIC, PH.D

December 11, 1998
Revised February 26, 2001
Second revision August 28, 2001
Third revision April 15, 2002

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NPURG Evaluation Sheets-Soil Test Results
Pest Scouting Forms

I. INTRODUCTION

The U. S. Summit Company of New York, NY retained A. Martin Petrovic, Ph.D. in March of 1998 to develop The Integrated Turfgrass and Pest Management Program (ITPMP) for the Pound Ridge Golf Club. The ITPMP contains a program of fertilizer, pest control options and other maintenance practices to be used on this golf course. This program was designed to serve as the maintenance blueprint for the Pound Ridge golf course and describes materials used, rates of application and where possible, an expected time of application.

The golf course superintendent will be responsible for implementing this program. In general, golf course superintendents, as a group of professionals, are committed to the preservation of the ecology and the wildlife and share the concern for the preservation of the golf course site's environmental quality.

As with any new or existing golf course, a fertilizer and pest control program must show flexibility to deal with two very important variables: weather and nature. The initial year(s) or grow-in period, that often lasts up to 2 seasons, will require higher than normal annual inputs of fertilizers and limited use of pest control materials in order to promote rapid establishment of cover which reduces soil erosion and minimizes the likelihood of weed infestation.

The basic philosophy of this ITPMP is to produce a healthy pest-resistant golf-playing surface that will have little or no impact on the surrounding environment. Selection and use of fertilizers and pesticides will be based on producing a healthy plant while not contaminating either surface water (via runoff) or groundwater (via leaching). There is little or no evidence that golf courses have or will contaminate surface or ground water (Cohen et al., 1990; Cohen and Durborow, 1994; Petrovic, 1994; Shirk, 1996). The golf course superintendent of the Pound Ridge golf course will utilize every available method to minimize the risk of contaminating any surface water or ground water. Thus, the purpose of this report is to present a site specific analysis that meets the goals of having a healthy pest-resistant golf playing surface that poses little or no threat to the environment on or surrounding this site. The ITPMP conforms to the principles of sustainable resource management developed by Audubon International for golf courses.

The report presented here was compiled from the following information: site specific soil properties provided by the USDA- Soil Conservation Service for Westchester County, New York, the site specific soil report of Marc Beroz, Environmental Resource Associates (October 1, 1996) and soil sample results collected during a site visit (March 24, 1998); review of the site plans including the golf course routing plan of June, 1997, Dye Designs; environmental fate assessment (risk to surface and ground water) of the currently registered pesticides in the state of New York for golf course use by model simulation (NPURG), determination of the anticipated pest complex, and extensive literature search on the environment fate of fertilizers and pesticides, integrated pest management programs and fertility requirements for golf course turf. This report provides an

environmentally sound fertilizer and pest management program to be followed by the golf course management personnel. Any chemical (fertilizer or pesticide) found by this environmental risk assessment to pose a risk to either surface or groundwater quality will not be used on this golf course.

For the pests found to invade the Pound Ridge golf course, there are several pesticides registered for their control. Taking into consideration the need to protect surface and groundwater from contamination and to reduce the exposure of humans and wildlife to highly toxic pesticides, pesticides were selected that have a low potential risk to surface and ground water. The evaluation included determining the potential of each registered pesticide for contamination of water on a soil by soil basis based on soil properties of this site.

II. ENVIRONMENTAL RISK ASSESSMENT

The environmental risk assessment is composed of three parts. First, the surface and ground water contamination (runoff and leaching) potential of all pesticides registered for use on golf courses in New York for the soils of this site was evaluated. Second, the pesticides identified to have either a moderate or a high potential for surface or ground water contamination will not be used on this golf course (note the exception below for the potential use of dicamba, imadicloprid or MCPP). Pesticides with a low potential for both surface and ground water contamination will be used only after all other pest control measures have failed. Third, a worst case estimate of concentration of fertilizer nutrients (nitrogen and phosphorus) and pesticides application to the golf course in surface and ground water will be made. These estimates will be compared to water quality standards (health advisory limit and LC50) to determine the risk to humans and aquatic wildlife.

The assessment of the leaching and runoff potential of each registered pesticide on each soil (see appendix) found on the site was performed by using the National Pesticide/soil database and User decision support system for Risk assessment of Ground and surface water contamination (NPURG). NPURG is a computerized information delivery system developed by the US Department of Agriculture and the Soil Conservation Service based on the GLEAMS model (Leonard et al. 1987). Refer to the appendix for a complete explanation of NPURG and other information related to the pesticides that were evaluated.

This model was developed for row crop agricultural systems where pesticides are applied to the surface of bare soil. Pesticides in a golf course setting are directly applied to the plants, which will tie up much of the pesticide that is applied (Petrovic et al., 1994). Thus, the NPURG model is considered to be a very conservative screening procedure in light of this fact and based on the climatic conditions the model is run under.

NPURG appears to accurately predict the outcome of pesticide leaching based on the results from actual leaching studies of pesticides applied to turfgrass (Petrovic et al., 1994, 1996). As seen in Table 1, the NPURG simulation was found in most cases to predict the probability of leaching (10 out of 12 predictions were correct) or in two cases over predict (dicamba and mecoprop) the

leaching of pesticides applied to turfgrass. Therefore, when the model predicts a low probability for leaching, then in fact leaching is highly unlikely, no impact on groundwater quality. However, when the model predicts a high probability for leaching, in most cases this is real. It is recommended to err on the conservative side for environmental protection. Thus, any pesticide that is predicted to have a high probability for leaching, which could lead to a toxicologically significant concentration of pesticide leaching into groundwater, will be removed from the list of pesticides for use.

Table 1. Comparison of NPURG estimates and actual results from turfgrass studies.

			Results from actual studies	
	Soil	NPURG		Maximum
Pesticide	Texture	Ranking	% leaching	Concentration
				ug/L
2,4-D	sand	high	0.0003-1.4	105
	sandy loam	low	0.0004-0.003	<1
	silt loam	low	0.0004-0.1	25
dicamba	sand	high	0-4.3	56
	sandy loam	high	0.004-0.02	<1
	silt loam	low	0.01-0.2	14
mecoprop	sand	high	0.9-62.1	1200
	sandy loam	high	<1	51
	silt loam	low	<1	60
chlorothalonil				
	sand	low	0	<1
	sandy loam	low	0.0004	<1
	silt loam	low	0.0002-.002	4

Fertilizer nitrate leaching into groundwater will also be evaluated by NPURG. The NPURG model generates an estimated amount of groundwater recharge (amount of precipitation and irrigation that will move through the soil and enter groundwater) based on rainfall plus irrigation amounts.

It is also very likely that NPURG may grossly over predict the runoff of pesticides applied to turfgrass based on the results of several studies of pesticide runoff from turfgrass (Watschke et al, 1989, Harrison et al., 1993, Linde et al., 1995 and Gold et al, 1988). Their results clearly showed that once turfgrass is established there is little water leaving a turfgrass site (approximately 1-22 % of the water that comes in contact with the turf) even when irrigated at a 6 inch/hr. NPURG ranks runoff from bare soil which reflects the erosion potential of a given soil with no vegetation. Once this site has been established with turfgrass, then it is likely that there should not be significant run-off of water that may contain a pesticide or fertilizer nutrient. Erosion will be negligible from this

site once established.

The following are the pre-set conditions that the pesticide/soil fate predictions by the NPURG simulations were determined:

* The pesticide was applied to the surface of a fallow (bare) soil 16, 8, 4, and 2 days before and on the day of the first major rainfall event.

* A 3.5 inch precipitation event was generated every second day for five events, and then a 1.0 inch event every other day for at least four times during the half life period of the pesticide. Total precipitation was 21.5 inches.

* The site had an average overall four per cent slope.

The conditions that these simulations are run under are considered a "worst case scenario". The likelihood of even one 3.5 inch rainfall event other day (irrigation will be less than 1 inch per day) is very small, let alone 5 such events over a 10 day period.

A summary of the pesticide fate as determined by the NPURG analysis for the soils on greens/tees, fairways and roughs is contained in the appendix of this report.

The greens and tees will be built to US Golf Association recommended soil physical properties (sand/peat mixture) to provide a compaction resistant/well drained system to create a healthy pest- resistant playing surface. Based on the NPURG analysis, greens/tees will be built with at least 2.6 % organic matter, by weight, to a depth of at least 12 inches to minimize the potential for pesticide leaching. It is assume that after establishment that all soils on site will have at least a 0.15 inch/hr infiltration rate (SCS Hydrologic groups A and B).

The results of the environmental fate assessment by NPURG showed that no pesticide had a moderate or high potential for runoff (surface water contamination) from any soil on this site. Ten pesticides were found to have a high potential for ground water contamination (leaching). Based on this risk assessment protocol, Table 2 contains a list of pesticides that can be used since they that have both a low potential for surface and ground water contamination.

Table 2. Pesticide found to have a low potential for both surface and ground water contamination on the Pound Ridge Golf Course site.

Pesticide	Class	Pests controlled ^
2,4-D	herbicide	broad-leaf weeds
benefin	"	crabgrass
bensulide	"	"
fenoxaprop	"	"
MSMA	"	" & nutsedge
oxadiazon	"	"
pendimethalin	"	"

siduron	"	"
trifluralin	"	"
glyphosate	"	all weeds
glufosinate	"	"
propamocarb	fungicide	Pythium blight and root rot
etridiazole	"	" "
fosetyl-al	"	" "
propamocarb	"	" "
azoxystrobin	"	", anthracnose, necrotic ring spot, pink snow mold, summer patch, take-all patch
chloroneb	"	gray snow mold
chlorothalonil	"	brown patch, dollar spot, leaf spots, rusts, gray snow mold
cyproconazole	"	brown patch, dollar spot, necrotic ring spot, pink snow mold, smuts, summer patch
flutolanil	"	brown patch, fairy rings, red thread-pink patch, iprodione " Brown patch, dollar spot, leaf spot, pink & gray snow mold
mancozeb	"	anthracnose, brown patch, leaf spots, rusts
PCNB	"	brown patch, pink & gray snow molds
propiconazole	"	brown patch, dollar spot, pink & gray snow molds, red thread-pink patch, smuts, summer patch
thiophanate	"	anthracnose, Brown patch, dollar spot, pink snow mold, summer patch (systemic)
triadimefon	"	Brown patch, dollar spot, pink snow mold, summer patch, gray snow mold (systemic)
vinclozalin	"	brown patch, dollar spot, leaf spots, pink snow mold, summer patch (systemic)
acephate	insecticide	sod webworm, cutworm
bendiocarb	"	white grubs
chlorpyrifos	"	white grubs, bluegrass billbug, Hyperodes weevil, cutworm, sod webworm, chinch bug
carbaryl	"	white grubs, bluegrass billbug, cutworm and sod webworm
isofenphos	"	white grubs, bluegrass billbug,hyperodes weevil, chinch bug
trinexapac-ethyl	plant growth regulator	less growth and water use

paclobutrazol " " and for annual bluegrass control
^ Based on Cornell Cooperative Extension Publication:1998 Pest management Recommendations for Commercial Turfgrass.

The existing golf course has needed to use very little pesticides and it is expected that pesticide use will be continued to be low based on following the ITPMP. Pesticides that have been applied in the 1997 and 1998 are: siduron, dithiopyr, imadicloprid, chlorpyrifos, trichlorfon, metalaxyl, etridiazole, chlorothalonil, 2,4-D, dicamba and MCPP. Based on estimated concentration of pesticides in surface and ground water, four pesticides (2,4-DP, chlorothalonil, chlorpyrifos and thiophanate) exceeded water quality standards and will not be used on the proposed Pound Ridge golf course.

The following list of ten pesticides that are considered to have a high potential for negatively impacting groundwater quality: bentazon, dicamba, ethoprop, fenamiphos, fenarimol, imadicloprid, mecoprop, metalaxyl, trichlorfon and triclopyr. Of this group, only MCPP or dicamba may need to be used since there is not other alternative pest control option for broad leaf weeds like clover on greens and tees and imadicloprid for Hyperodes weevil control. If these pesticides were needed to be used based on scouting, monitoring and threshold exceedences, them they would only be applied as a spot treatment to no more that 0.25 acre per year (for MCPP and dicamba) and only applied when there is not treat of rain forecasted for at least 72 hours (greatly reduces the likelihood for leaching).

III. PESTICIDE MANAGEMENT PLAN

The basic premise underlying this integrated pest management (IPM) plan is that a healthy plant will be most resistant to pest attaches and will recover much faster than less healthy turf. Therefore, the golf course superintendent will the follow standard accepted maintenance practices like proper mowing (height and frequency), topdressing and cultivation for thatch management and compaction alleviation as examples. What follows is a discussion of practices that more directly affect pest problems and are part of the pest management program.

A. Pest Management Philosophy

The basic philosophy of this Integrated Pest Management (IPM) program is to produce a healthy pest resistant golf playing surface that will have little or no impact on the surrounding environment. Every available pest management practice will be utilized with the goal of using pesticides as a last resort after all other control options have been followed. A new golf course provides the opportunity to construct a system that is less prone to stress, which is often the main cause of pest damage or invasion of weedy species. This can be accomplished by: 1) establishing grasses that are best adapted for the golf courses and are pest resistant, 2) by providing a soil system to minimize the stress caused by the golfer, and 3) reducing moisture plant stress by having "a state of the art" irrigation system that can provide the necessary amount of water needed by the plant (thus reducing over irrigation which can lead to the potential for ground/surface water

contamination or more pest problems). Thus, the purpose of this IPM Program is to summarize the approach that meets the goals of developing a healthy pest resistant golf playing surface that poses little or no threat to the environment on or surrounding this site.

B. Turfgrass Selection: Performance and Pest Resistance Criteria

Even though there are over 7,500 species in the grass family, only a handful of species is used on golf courses. The main reason for such a few species being used is the relatively short cutting height demands of golf course playing conditions. For greens in New York, only two species could be used, creeping bentgrass (Agrostis palustris) and velvet bentgrass (Agrostis canina). Velvet bentgrass does poorly under even moderate traffic conditions and is not well suited for the Pound Ridge golf course. There are several varieties of creeping bentgrass available. The one best suited for the climate and with good resistance to the major disease problems anticipated at this golf course (Brown patch and Dollar spot) and reduce annual bluegrass invasion will be used at Pound Ridge. A blend of one or more of the following varieties of creeping bent grass will be used on greens: A-4, G-2 or L-93. Tees will be seeded with a blend of Penncross and Southshore creeping bentgrass.

Options for grasses on fairways are somewhat broader. Low quality, slower play golf courses that mow higher than 3/4" can use a mixture of grasses including Kentucky bluegrass (Poa pratenses), fine fescue (Festuca spp.) and perennial ryegrass (Lolium perenne). However, on a golf course of the caliber proposed at Pound Ridge, fairways are to either perennial ryegrass or creeping/colonial bentgrasses. The advantage of perennial ryegrass is that it requires less water, has somewhat less disease problems, is resistant to surface feeding insects (if endophytic varieties are used, which is highly recommended) and does not produce much thatch that can be harmful to turf. Perennial ryegrass, however, is a short lived perennial requiring at least bi-annual over-seeding and is subject to winter kill during prolonged periods of ice cover or hard winters. However, the soils on site favor the growth of creeping bentgrass. Fairways will be established with blend of Pennlinks, Providence or Southshore creeping bentgrass.

Roughs are often established with very low maintenance grasses that are mowed higher than fairways, are not irrigated and require minimal fertilization. This golf course will establish roughs with this in mind using a mixture of fine fescues (red, chewing or hard fescue) that contain endophytes and low maintenance Kentucky bluegrass varieties (like Baron, Bronco, Destiny, Gnome, Merit, Opal, Ram I, or Sophia). A higher percentage (>70%) of Kentucky bluegrass will be used in the primary rough (nearest to the fairway) and more fine fescue (>70%) used in the secondary rough. Endophytic fine fescues (varieties like Jamestown II, Aurora, SR 3000 and Reliant) will be used since they are resistant to surface feeding insects like chinch bug and sod webworm and also resistant to the three common diseases of fine fescue, Red thread, dollar spot and leaf spot. At least three varieties of each species will be used to seed roughs to increase the genetic diversity so as to be ecologically competitive under the ever changing climatic conditions.

C. Target Pests and Pest Control Options

Anticipated Pest Problems

It is fortunate that the site is currently a golf course so that pest problems and management can be better formulated in advance of the reconstruction of this golf course. Based on the current pest problem (information provided by the current golf course superintendent, Peter Kearney), Table 3 contains the anticipated pests the Pound Ridge golf Course will experience.

Table 3. Anticipated pests on the Pound Ridge Golf Course.

Severity	Greens	Tees	Fairways	Roughs
Major Pest Problems	---------- Pythium root rot ----------			
			------ crabgrass ----------	
	---------- snow molds ----------			
	---------- dollar spot ----------			
	Hyperodes			
	clover			
	---------- annual bluegrass ----------			
	---------- Pythium blight ----------			
			grubs	
			---------- broad leaf weeds ----------	
Moderate Pest Problems	---------- Brown patch ----------			
	Summer patch			
	---------- leaf spots ----------			
Infrequent Pest Problems	--anthracnose, Necrotic ring spot --------			
	----- Red thread, rust, smuts ----------			
	- ataenius beetle, chinch bug, cutworms -			

It is anticipated that these pests will occur during the periods shown in Table 4.

Table 4. Occurrence of anticipated pest on the Pound Ridge Golf Course.

	Month(s) of Pest Occurrence								
Pest	Jan-Mar	Apr	May	June	July	Aug	Sept	Oct	Nov-Dec
Diseases									
Anthracnose					XXXXXXXX				
Dollar spot						XXXXXXX			
Brown Patch*			XXXXXXXXXXXXXXXXXXXXXXXXXXX						
Gray snow mold	XXXX								XXXXX
Leaf spots			XXXXXXXX				XXXXXX		
Necrotic Ring spot			XXXXXXX						
Pink snow mold	XXXX								XXXXX
Pythium blight						XXXXXX			
Pythium root rot			XXXXXXXXXXXXXXXXXXXXXXXXXX						
Red thread			XXXXXXXXXXXXXXXXXXXXXX						
Summer patch				XXXXXXXXXXXX					
Insects									
White grubs	XXXXXXXXX					XXXXXXXXXXXXXXXXX			
Cutworms				XXXXXXXXXXXXXXXX					
Ataenius				XXXX		XXXXXXXXX			
Chinch bug				XXXXXXXXXXXXX					
Hyperodes			XXXXXXXXXXXXXXXXXXXXX						
Weeds									
Broad leafs			XXXXXXXXXXXXXXXXXXXXXXXXXXX						
Crabgrass			XXXXXXXXXXXXXXXXXXXXXXXXXXX						
Annual Bluegrass		XXXXXXXXXXXXXXXXXXXXXXXXXXXXX							

* Includes both cool and warm weather brown patch.

The scientific names and biological information for each pest are contained in the following section.

DISEASE PESTS

Four out of the ten pests that are anticipated to occur most often on this golf course are diseases. Fungi cause most diseases that attack turfgrass. The following are descriptions of each of the most prevalent diseases and the "state of the art" IPM practices that will be followed on this golf course:

Brown Patch (Rhizoctonia solani)

This disease occurs under conditions of warm (>85 F) and very humid weather as well as in cool wet weather. It is expected that the warm weather Brown patch will occur in June to August during most years and the cool weather version in April/May and September/October. Conditions that can reduce the severity of this disease are to avoid excessive nitrogen fertilization, to water minimally and provide for good air movement and water drainage. All three of these practices can be followed to some degree. The fertilization program (to follow) will provide optimum level of nutrients for plant growth based on soil tests, grass nutritional requirements and selected tissue testing (nitrogen levels will be maintained below 5.25% N to reduce the likelihood of Brown Patch). Part of the fertilization program will also contain disease suppressive, natural organic fertilizers (i.e. Sustain and Ringer) that have been shown to reduce the incidence of Brown patch by 75 % (Nelson, 1990), thus, reducing the need for fungicides. Irrigation will be provided to supply only the amount needed to replace the amount used by the plant (details to follow). The soils and underground drainage systems on green/tees will provide a well drained soil environment. There is a direct biological control agent registered for use (a Trichoderma spp. bacterial product called BioTrec, has received USEPA and NYDEC approval). It is a granule formulation that has been shown to reduce the incidence of Brown patch and will be used to further reduce the level of turfgrass damage related to Brown patch. It is not recommended that BioTrec will completely replace the need for fungicide applications. Further development of this product may make traditional fungicides controls unnecessary.

The presence of Brown patch can be confirmed by laboratory analysis or by disease detection kits. The golf course superintendent will use one of the diagnostic techniques to determine the need for additional control, namely fungicides. Daily scouting during periods of warm to hot weather is highly recommended and treatments made if the threshold is exceeded (one spot/yd. on greens/tees and two spot/yd. of fairways) and 24-48 hr. weather forecast indicates conditions are still favorable for disease development.

The pesticide selection and application procedure will involve following a program to reduce the chance of developing a strain of fungi resistant to a specific fungicide or class of fungicide. If more than one fungicide is needed to be used to control Brown patch in the same year, then a different type/class of fungicide will be used. If a systemic fungicide is used first (iprodione, propiconazole, vinclozalin) then a contact fungicide would be used next. Classes of fungicides would also be rotated. For every other systemic fungicide application a benzimidazole class (thiophanate) fungicide would be used, then followed by one of the dicarboximides fungicides (iprodione, vinclozalin) or sterol inhibitors (propiconazole and triadimefon). This mixing of classes/types of fungicides will be also followed for all diseases.

Pink Snow Mold (Microdochium nivale)

Pink snow mold is a fungal disease that is favored by temperatures in the range of 32 to 40 F and wet conditions with or without snow cover. It is likely to occur on this site from March-April and again in November-December until the ground freezes in winter on greens/tees/fairways. Avoiding heavy late fall water soluble nitrogen application can reduce the severity (no late nitrogen applications will be made). However, fungicides are the only control method available at this time although there is some disease suppression with the natural organic fertilizers to be used on this golf course. Scouting is not practical for this disease with snow cover. During other cool-wet periods without snow cover, scouting should be followed before a treatment is made. If the threshold of one spot/sq.yd. on greens/tees and two spots/sq.yd. on fairways is exceeded and short term weather forecasts are calling for cool-wet weather (32-40 F), then a fungicide application will be made.

Pythium Blight/Pythium Root Rot (Pythium spp.)

Pythium blight is the most rapidly developing and devastating disease to attack golf courses and if it does occur on this golf course it would be in July and August. It is favored by excessive nitrogen fertilization (the fertilization program outlined in a later section avoids over-fertilization) and very wet (90% humidity for 14 hrs.) and hot weather (>85 F and night temperatures not below 70 F). Poorly drained or over-watered areas often show the disease first.

Death of an entire green, tee or fairway can occur in hours once the pathogen becomes active. Thus, quite often a preventative fungicide program is utilized to reduce the risk of catastrophic damage to the golf course. If preventative measures are not taken, then very frequent scouting of the golf course is required to determine if the disease causing organism is active. Weather has a large effect and it is anticipated that Pythium blight will only occur occasionally on this golf course.

Scouting and weather forecasts will be used to determine an action plan. When temperatures are above 85 F and humidity levels are also high (>90% for at least 14 hrs.), an active scouting plan will be followed. Naturally wet areas of the golf course and sites with poor air movement (i.e. # 18 fairway) will be scouted first to determine if the disease is active. As this course matures, other sites that have shown to be prone to Pythium blight will also be scouted. If

the Pythium blight organism is found to be actively growing on these indicators sites and the 24 hr. weather forecast calls for hot (>85 F) and humid weather to continue, then a fungicide application would be recommended at least on the areas showing the first outbreak (indicator sites). No night watering will be used during this time to reduce the amount of free water on the leaf surfaces necessary for disease infection. Contact fungicides (etridiazole) are most effective for curative treatments as proposed here. If systemic fungicides are to be used then they will have to be applied in advance of the disease outbreak or in this case when temperatures for three days are greater than 85 F and humidity is high (> 90% for the last 14 hrs.). Disease forecasting equipment can be used to predict the time of application.

The cooler weather Pythium root rot occurs at temperatures from 50 to 70 F, under wet conditions. Scouting is difficult for this disease since a plant disease diagnostic laboratory must confirm the presence of this disease. Therefore, if the visual symptoms of this disease are present and laboratory results confirm the active presence of this organism, then a fungicide application to only portions of the site showing symptoms will be made.

Dollar Spot (Sclerotinia homoeocarpa)

Dollar Spot is a foliar disease that is favored by temperatures between 70 and 85 F and too low a level of a nitrogen level in the plant tissue. It will likely be most prevalent disease on this golf courses and would occur on this site from August and September. Dollar spot is easily recognizable, slow to develop and to cause damage. Thus, daily scouting should be used to determine the extent of occurrence and range of this disease on the golf course. Natural organic disease suppressive fertilizers like Ringer Compost Plus and Greens Restore have been shown to reduce the incidence of Dollar spot by 45% (Nelson, 1990) and will be used as part of the fertilization program. Tissue testing will be used to help maintain the nitrogen level (>4.5%) in the plant at a level to suppress disease development.

Damage from this disease even with these cultural controls may exceed the acceptable level on this golf course; thus, fungicide applications are very likely to be needed. Fungicides should be used only when 1) an outbreak in indicator sites has been observed in excess of the threshold (5 spots/sq.yd. for greens/tees and 10 spots/sq.yd. for fairways), when weather conditions still favor disease development (temperatures 70 to 85 F and humid) and plant nitrogen level is below 4.5% N, by weight.

Gray Snow Mold-Typhula Blight

Typhula blight or Gray snow mold is winter disease that requires snow cover to develop. During open or winters with low snowfall, Gray snow mold is seldom a problem. Avoiding excessive nitrogen fertilization in the mid-fall period (which the fertilization program does) reduces the severity
of this disease. Scouting is impractical since snow cover must be present for the disease to develop and treatment on top of snow is not practical. A preventative fungicide program is often used to

insure minimal turf damage from this disease since long term weather predictions are unreliable.

Anthracnose (Colletotrichum graminicola)

Symptoms of this disease can be seen in cool, wet weather but the most likely period of turfgrass damage can be seen in warm weather under drought conditions. Anthracnose is most damaging to annual bluegrass and creeping bentgrass during drought conditions and when the plants are deficient in nitrogen. The fertilization program is designed to provide an adequate level of nitrogen and the advanced technology irrigation system is designed to avoid drought stress conditions. It is therefore likely that this stress induced disease may only be a minor pest problem on this golf course, especially if annual bluegrass encroachment is discouraged and stress levels reduced through proper management (i.e. fertilization, irrigation and the use of compaction resistant/well drained soils on greens/tees).

If this disease does occur it will be during the warm summer months of mid-June through August. A forecasting model has been developed to predict an outbreak of anthracnose and should be used if this disease becomes a continuing problem. Scouting should be done if this disease becomes a recurring problem and will be coupled with the disease forecasting model to determine when to scout/sample to determine if a fungicide application is warranted. A threshold has not been established for anthracnose.

Leaf Spots

There are several fungi that cause the disease known as leaf spot. The symptoms of leaf spot are most often observed in the cool weather of spring months of April and May and again in the fall. Avoiding excessive early spring nitrogen applications can reduce the damage caused by this disease (as noted in the Fertilizer Program, excessive early spring nitrogen fertilization will be avoided).

Necrotic Ringspot

This disease's infection occurs in cool-wet weather of spring (April-May) and is most severe with excessive nitrogen fertilization and over/underwatering. Symptoms often do not appear until summer. Therefore, on areas with a history of Necrotic ringspot, fungicides must be applied in a preventative manner. At this point no other control options are available.

Summer Patch

This disease will most likely be found on this site from June to September. Over fertilization with nitrogen and extremes in water will increase the likelihood of the disease. The damage to the turfgrass plant occurs in April-May, well in advance of the symptoms. Thus, a preventative fungicide program is necessary on sites that have had a history of Summer Patch problems. A fungicide application needs to be made in the spring before June.

WEEDS

It is anticipated that, after the first year of establishment of this golf course, weed problems will tend to be minimal. This is a result of sound golf course cultural/pest control practices that will produce a dense-competitive environment against weed encroachment. Thus, the anticipated weeds on this golf course will be limited to annual bluegrass (potentially on all sites of the golf course) and broad leaf weeds (limited mostly to fairways and roughs). Crabgrass has been a major problem on tees and approaches to greens.

Annual Bluegrass

Annual bluegrass (Poa annua spp. Reptans/annua) is a very common weed that invades golf courses. It is well adapted to short mowing, heavily trafficked sites, soils high in pH and phosphorus, and wet soil/poorly drained conditions. Thus, the management program of this golf course is designed to reduce annual bluegrass competitiveness by: 1) keeping soil pH at 6.5 or below, 2) providing for good drainage where possible, 3) irrigating to a minimum, 4) using compaction resistant soils (like the sand used on greens/tees),5) following a disease/insect management program to maintain a dense turfgrass stand and 6) following a fertilization program that is optimal for the growth of the turfgrasses used here but not too high in phosphorus, which favors annual bluegrass.

Even with all of these measures, annual bluegrass can still invade this golf course. Thus, it is anticipated that some other control measures will be necessary. There are experimental biological control agents for annual bluegrass that may some day be commercially available. Chemical control is limited and generally involves the use of either plant growth suppressants or a traditional herbicide.

Each spring and late August the amount of annual bluegrass for all greens, tees and fairways will be mapped using the weed maps found in section G. When the late August mapping indicates more than 1% of the area contains annual bluegrass plants some form of treatment will be necessary to further reduce its spread.

Broadleaf Weeds

Broad leaf weeds (BLW) commonly occur on established golf course fairways and roughs and thus are considered a major pest problem on these sites. Clover is a commonly occurring BLW that is favored by soil pH around 7 and by dry soils. Thus, on this golf course it would be anticipated that clover would be found on the unirrigated areas (roughs) and has been a current problem on greens. One of the best ways to reduce broadleaf weed problems on golf courses is to produce a dense-competitive turfgrass stand by following the overall turfgrass management program to be used on this golf course: proper fertilization/irrigation practices and reducing pest damage that opens the turf to invasion by weeds. However, broad leaf weeds will most likely still

invade this golf course. Weed population and locations will be scouted and mapped at least twice a year (early June and mid-September). Since broadleaf weeds may be confined to a small area, pesticide applications will only be made on areas with weeds present in excess of the threshold; two weed plants per sq.yd. on fairways and five per sq.yd. on roughs, thus reducing the amount of pesticide applied and limiting the treated area.

Crabgrass

Crabgrass is an annual grassy weed that invades thin turf. Thus, all the cultural practices to be used on the Pound Ridge golf course will encourage a dense stand of turf and reduce the incidence of crabgrass. Practices such as the fertilizing, irrigation and disease/insect control programs to be used on this golf course will produce a dense turf that restricts light from reaching the soil surface. Crabgrass seeds require light for germination or open soil patches at least 2 inches in diameter. These management practices help significantly; however, when a golfer takes a divot the soil is exposed to light and crabgrass seeds can germinate and invade the turf.

There are two herbicidal control programs, preemergence and postemergence. These terms refer to herbicide applications made before or after the crabgrass seeds germinate, respectively. The preemergent herbicides must be applied in advance of the period of germination of crabgrass, usually in April. A problem with this approach is that you are not sure whether crabgrass will be present or not. If it is not present, then the application has been wasted. Preemergent herbicides will only be used on this golf course if during the previous year there was a large infestation of crabgrass. The crabgrass population will be mapped and monitored each fall to identify small areas to treated the following spring.

Postemergent herbicides are few (fenoxaprop-ethyl and MSMA) and require carefully timing for good control. Mapping the amount and location of young crabgrass plants in early summer will be used to determine if small areas will need treatment.

INSECT PESTS

Insect problems anticipated on this golf course are restricted to just a few insects which include Hyperodes weevil on greens/tees and white grubs in fairways. There are grasses that contain endophytic fungi that are resistant to certain surface feeding insects like cutworm, sod webworm and chinchbug. The grasses that will be used in the roughs are endophytic, thus are resistant to the surface feeding insects. Creeping bentgrasses (used on greens/tees) at this time do not contain endophytes and therefore are not resistant to surface feeding insects. Currently there are no turfgrasses resistant to root feeding insects like grubs.

Biological control (biocontrol) options are available for most of the insect pests anticipated on this golf course and will be the first line of control. Only after biological control options have been shown to be ineffective will a synthetic insecticide be used.

One of the best practices to follow in an insect control program is to have a systematic

sampling/monitoring scheme. It has been found that insect pests of turf like cutworms and white grubs do not uniformly cover the entire golf course. In fact it has been shown that grubs are confined to certain parts of the golf course and even small sections of fairways or roughs. Therefore, it is highly recommended that prior to any insecticide application a sampling protocol be followed and treatment be confined to only the areas where the insects are found. The sampling/monitoring maps for insects found in the appendix section will be followed and the procedures discussed under each insect section.

Cutworms

Black cutworms are anticipated to be an infrequent insect problem on this golf course. This insect does not overwinter in New York. Adults each spring fly in from the southeastern U.S., usually arriving in late spring-early summer (May-June). The adults lay eggs that hatch in two to three weeks as small larvae, the destructive phase of this insect. A second generation can hatch later in the summer. Cutworm larvae spend three days in the soil, often in old aerifier holes. At dusk they emerge and feed on the foliage of the grass and the damage is confined to a small zone surrounding their daytime home.

It is unlikely that the entire golf course at any one time will contain cutworms in excess of the action threshold. Action thresholds will be discussed in a later section. Therefore, monitoring and sampling of the population is necessary to substantially reduce the amount of the golf course that will need to be treated. Scouting for this insect will involve a two step process. In May each year, 10 to 20 black light and/or pheromone trays will be placed out on the golf course to attract/collect adult cutworms as they arrive at this golf course. Every other day the number of adult black cutworm adults in each trap will be counted. Two weeks after the adults begin showing up in the traps, the second phase of scouting will commence. This involves placing an irritant solution (soap or pyrethrum) on sections of each green, tee and fairway at bi-weekly intervals through June, July and August. If the number of cutworm larvae exceed one/sq.yd. on greens/tees and five/sq.yd. on fairways, then a control regime will be followed. The smaller the larvae the easier they are to control, so the initial scouting is very important. Also, biocontrols are most effective on small larvae.

The control for cutworms will first rely on a biocontrol method and if this does not give acceptable control (threshold still above limit after one week), then an insecticide will be used. A combination of two biocontrol agents will be applied at one time, the nematode Steinernema carpocapsae (Exhibit) and the bacteria Bacillus thurgingiensis var. kurstaki (BT). Each takes 2 to 7 seven days to kill the cutworm larvae; thus, one week after the application the areas will be sampled with the irritant solution to determine the effectiveness the biocontrols. If populations of cutworm larvae are still in excess of the threshold, a second application of the two biocontrol materials will be made and effectiveness determined one week later. If after two applications of the biocontrol materials the population of cutworm larvae is still above the threshold limit, then a traditional insecticide will be applied. As with the biocontrols, the effectiveness of the traditional insecticides will be evaluated one week after application before any additional treatment will be made.

White Grubs

There are several species of insects that have a destructive larval stage known as white grubs. These include Japanese beetle, Oriental Beetle, Asiatic Garden Beetle and European Chafer. The most destructive stages of these insects are their grub or larval stage in which the third and largest instar occurs later in the fall.

The population of grubs will be determined as follows before any insecticidal treatment will be made. Each golf hole will be mapped once in late July or early August each year for the extent, location and species of grub using the maps found in the appendix. Sampling consists of a crew of 8 to 10 individuals with cup cutters. On fairways and roughs, taking a sample at 20 yd. spacing will follow a grid sampling technique. Greens and tees will be sampled at 20 ft. intervals. The sample involves extracting the turf and top 2-3" of soil and observing the number and species of grubs in each sample. When the threshold of 36 to 48 grubs/sq.yd. is exceeded, then a treatment will be made. Treatments are most effective in early August when the grubs are very small. Spot treatments will be made.

The nematode Steinernema carpocapsae will be used first to control white grubs when found on sites exceeding the threshold. The effectiveness will be determined by repeated sampling the treated sites one week after application. An application will only be made if the grubs are near the soil surface and the soils are moist. A second nematode application will be made if the threshold level is still exceeded. The treated sites will be sampled again. If two nematode applications have failed to lower the white grub population below the threshold level, then an insecticide will be applied to the sites still having populations above the threshold level.

As with the nematode, one week after the traditional insecticide application the grub population will again be sampled on the treated sites and only if threshold levels are still exceeded would an additional insecticide application be made.

Other Insect Pests

There is some likelihood that other insects will attack the grasses found on this golf course. These could include Hyperodes weevil, sod webworm and Ataenius beetle grub. There are biocontrol products (Bt bacteria) available for sod webworm and Ataenius control and will be used as the first line of defense. If control is unsuccessful and these insects are still causing damage, then an insecticide will be used.

IV. ANTICIPATED FREQUENCY, METHOD and RATE of CHEMICALS to be APPLIED to POUND RIDGE GOLF COURSE

Application Procedures

To protect the wetlands, the adjoining properties and the off site water (Doughnut Pond,

Laurel Reservoir and Mianus River) from drift of the pesticide spray, all areas to be treated with pesticides, a shrouded sprayer will be used to apply pesticides. The shrouded sprayer applies the pesticide spray directly on the turf reducing drift to near zero at wind speeds less than 15 mph. Granular application will also be used to reduce the potential for any off-site movement of pesticides and fertilizers via spray drift. No applications of pesticides or fertilizer will be made within 48 hours (72 hours for MCPP, dicamba and imadicloprid or any high risk pesticide to surface or ground water) of a predicted heavy rainfall event (except for imminent threat of rapidly developing diseases like Pythium blight and Brown Patch). Pesticides will only be applied to areas that exceed thresholds and climatic conditions indicated above for each pest so as to minimize the amount of pesticide used. Spot treatments will be the rule not the exception.

Anticipated Frequency

Pesticides: It is nearly impossible to develop a pesticide application schedule in advance of the building of a golf course if the principles of IPM are to be followed. The major premise of an IPM program is to use all options in controlling a pest and when it is necessary to apply a pesticide it must be applied at the right time for optimal control. Only a preventative program could be developed in advance of operating a golf course. Preventative programs are only necessary for a few turfgrass diseases. It would be very likely that an all preventative program would lead to applying fungicides when it was not necessary, increasing the risk of environmental damage and greater likelihood of developing fungi resistant to fungicides. The actual pesticide application program would be expected to be at least fifty per cent of the preventative program shown in Table 5 when all other control measures are followed.

Table 5 is an outline of a preventative pesticide application program for the Pound Ridge Golf Course. None of the pesticides that have a high of ground water contamination are to be used on this golf course (with the exception of MCPP, dicamba and imadicloprid that were shown to not impact water quality, Tables 16 and 17).

Table 5. A preventative pesticide application program for the Pound Ridge Golf Course.

Pesticide	Date of Application	Rate of Application oz(wt) AI/ 1000 sq.ft	Location	Pest Controlled
2,4-D & ~~2,4-DP+~~ (Scotts Broad Leaf Weed Control)	Oct. 1 & 14		F & R*	broad-leaf weeds
2,4-D		0.18		
dicamba (Banvel)	Oct.14	0.05 (no more than 0.25 acres/yr.)	G & T	broad-leaf weeds

MCPP (Mecomcc)	Oct.14	0.37	(same as dicamba)	
prodiamine (Barricade)	April 15	0.28	F,R, GT	crabgrass
or MSMA treat post-emergent crabgrass	June 15		0.8	Spot F & R
iprodione^ (Chipco 26019)	March 15	1.0		pink & gray snow mold
triadimefon^ (Baylaton 25)	April 15	1.0		leaf spots, brown patch
vinclozalin dollar (Curalan DF)	May 15	0.5		Brown patch, spot, leaf spots
dollar iprodione^	June 15	1.		Brown patch, spot
propamocarb^ and (Banol)	June 14	1.5		Pythium blight root rot
fosetyl-al^ (Aliette T & O)	July 7	3.2		"
etridiazole^ (Terrazole)	Aug. 1	1.75		"
cyproconazole^ (Sentinel)	July 14	0.132		Brown patch, dollar spot
triadimefon^ (Bayleton 25)	Aug 7	1.0		Brown patch, dollar spot
iprodione^	Sept 7 (same as above)			

triadimefon^	Nov. 1	1.0		pink & gray snow mold
carbaryl (Seven 80 WSP)	Aug. 1	2.94	F	white grubs
	May 15		G, T	Hyperodes weevil
imadicloprid (Merit)		0.15		
paclobutrazol (Scotts TGR)	April 15 & Sept. 1	0.12	G, T, F	annual bluegrass control

* F=fairway, R=roughs, G=greens, T=tees.
^ fungicides to be used on greens, tees and fairways.

V. Fertilization Program:

Unlike for pesticide programs, it is possible to develop in advance a comprehensive nitrogen fertilization schedule. For other nutrients like phosphorus, potassium, calcium and magnesium, soil test result information will be used to develop the fertilization program. Factors important in the development of such a program include the site specific soil properties, clipping management, nutrient requirements of grass species/cultivar, irrigation plan, desired level of quality, interaction with pest populations and environmental considerations.

The fertilizer nutrients of concern from an environmental perspective are nitrogen (as nitrate) and phosphorus (phosphates). Nitrate can cause a reduction in the quality of water in a drinking water source or cause eutrophication of streams, ponds or lakes. Phosphorus is needed in small amounts by turfgrass and is mostly of concern for surface water eutrophication. This fertilization program addresses the need to protect water quality from fertilizers contaminating surface and ground water.

There has been considerable research on the fate of nitrogen applied to turfgrass (Petrovic, 1990). About half of the applied fertilizer nitrogen is found in the clippings, 30 to 40 % stored in the soil as organic matter, and gaseous loss back to the atmosphere from 0 to 40 % of the applied nitrogen. Thus, there is little fertilizer nitrogen available for either runoff in surface waters or leaching into groundwater. Factors that influence the degree of nitrate leaching are the source of nitrogen, the rate of application, the timing of the application and irrigation practices (Morton et al., 1988). These factors are integrated into the fertilization program to produce a good quality golf course with a low probability of any negative impact on the surrounding environment.

Phosphorus can be a problem in runoff, but in turfgrass situations, runoff from turf seldom occurs due to the high amount of water infiltration into the soil (Harrison et.al., 1993). Phosphorus runoff has been a problem in traditional agricultural production when erosion has occurred or the application of phosphorus was in excess of the amount need for plant growth (based on soil tests). On established turf erosion is eliminated. On the Pound Ridge golf course, phosphorus (potassium, pH modification and other nutrients other than nitrogen) applications will be based on soil test results and plant tissue analysis to insure that the proper amounts be applied to provide for acceptable plant health and avoiding excesses that can lead to contamination of surface water. Soil testing will be done just prior to establishment to determine the amount of phosphorus to apply at seeding/sodding and twice times per year thereafter for maintenance applications. All greens, tees, fairways and roughs will be sampled. Tissue testing will be every four weeks to adjust (fine tune) the fertilization program. Based on preliminary soil test results (see appendix), the phosphorus levels of the soils on this site are very low to low requiring 0.9 to 2.3 lbs. of P2O5/1,000 sq. ft. at establishment or for the first year. The natural organic fertilizers that will be used for most of the fertilization program will supply most of this amount. Soil testing done just prior to seeding will give actual amounts needed on each green, tee, fairway and rough.

Clippings will be removed from the greens and tees, while clipping will be returned in the fairways and roughs. Clipping management was used in developing the nitrogen application rates shown below.

The basic fertilization program is shown in Tables 6 and 7.

Table 6. Recommended fertilization program for the greens/tees at the Pound Ridge Golf Course.

First year

April	May	June	July	Aug.	Sept.	Oct.-Nov.	Yr. Tot.
---------- lbs/1000 sq.ft.----------							
IBDU*	IBDU	Ringer or	Ringer or	Ringer	IBDU	IBDU	

		Sustane	Sustane	Sustane			
0.5	0.25	0.5	0.5	0.5	0.5	1.0	3.75 N
		0.4	0.4	0.4		(Sustane)	1.2 P_2O_5
		0.16	0.16	0.16		(Ringer)	0.48 "
	---------- Fertigation ----------						
	0.25	0.5	0.5	0.5	0.5		2.25 N
						Total N	**6.0 (8.0^)**

Future years

IBDU		Ringer or Sustane	Ringer or Sustane	Ringer or Sustane		IBDU	
0.5		0.4	0.4	0.4		0.5	2.2 N
Sustane P_2O_5		0	0.2	0.2	0.2	0	0.6
Ringer	0	0.1	0.1	0.1	0		0.3 "
	---------- Fertigation ----------						
	0.25	0.25	0.25	0.25	0.25		1.25
							Total N 3.45

* Other slow release nitrogen sources could be substituted: methylene urea (Nutralene, Scotts), coated urea (sulfur, resin or polymer coated) and natural organic (Milorganite, Nature Safe). ^ At establishment 2 lbs of N/1,000 sq-ft will be applied as a starter fertilizer.

Table 7. Recommended fertilization program for fairways and roughs for the Pound Ridge Golf Course.

Apr.	May	June	July	Aug.	Sept.	Oct./Nov.	Yearly Total
---------- lbs of Nitrogen/1000 sq.ft.----------							
			Fairways, during establishment				
0.75	0.75	0.75	0.75	0.75	1.0	0.75	5.5 Nitrogen

Fairways, following establishment

~~0.5~~	0.5	0.5	0.5	~~0.5~~	0.5	0.5	2.5 Nitrogen

Roughs, during establishment

0.5	0.5	0.5	0.5	0.5		2.5 Nitrogen

Roughs, following establishment*

0.5		0.5	1.0 Nitrogen

* Roughs will only be fertilized when density drops by 25 %. On areas receiving wood chips an additional 1 to 2 lbs. of nitrogen/1,000 sq. ft./yr will be applied for the first two years after establishment.

The nitrogen application for roughs following establishment consists of clippings being returned to roughs during mowing and from fairways. Sources to be used include any of the following slow release materials: IBDU, methylene urea (Nutralene, Scotts), natural organic (Sustane, Ringers, Milorganite, Nature Safe) and coated urea's (sulfur, resin and polymer). Fertigation is expected to be about half of the nitrogen applied to fairways. In no case will the phosphorus application, associated with the use of natural organic fertilizers, exceed the soil testing recommendation level. Tissue testing will be used on fairways to adjust applications.

Fertigation Program: Apply a small amount of water soluble fertilizer via the irrigation system will be practiced as irrigation water needs to be applied. The irrigation season usually runs from May through September. Tissue testing will be used to determine application amount so as to maintain 3-6 % N in the clippings) in mid-April and ending in late September.

The phosphorus and potassium needs could be met with the addition of Sustain/Ringer for summer applications as noted above. Phosphorus rates must not exceed amounts recommended by soil testing or when tissues levels are between 0.3-0.55 %.

To minimize the potential for airborne transmission (drift) of nitrogen and phosphorus applied in the irrigation water, the irrigation will only be done at wind speeds below the maximum wind speed specification for the irrigation system as designed and built **(to be determined when the final specifications for the irrigation system are made)**. The irrigation system will be linked with a weather station and programmed to only irrigate below a threshold wind speed to reduce the potential for nutrient drift.

These fertilization programs incorporate a balanced approach to fertilization: the amount of each nutrient applied will provide for adequate plant growth, will not over or under stimulate

growth at the expense of disease resistance or weed encroachment, will act in a disease suppressive manner by the use of natural organic fertilizer (Sustane or Ringer) and will not lead to either a significant amount of runoff or leaching because there will not be a large pool of water soluble nitrogen available at one time. This program will avoid several of the major factors that encourage nitrate leaching: there is no late fall fertilization with highly water soluble sources, the nitrogen sources have not been shown to leach from golf course type turf (Petrovic, 1990 and Petrovic, 1991) and the rates of application are low, thus resulting in little soluble nitrogen available for off site transport. Tissue testing will be done bi-weekly during establishment and monthly thereafter on greens, tees and fairways during May-September to assess the nitrogen content. Nitrogen levels will be maintained between a range of 4.5 to 5.25 % N, on a dry weight basis, to reduce both Dollar spot and Brown patch disease. Small amounts of soluble N fertilizer (0.10 lbs. N/1000 sq.ft. from the fertigation system or from normal surface applications) will be applied if N contents drop below 4.5%. If N contents are above 5.25%, any scheduled N applications will not be made. No fertilizers will be applied in advance of inclement weather predictions (48 hr) to further reduce the likelihood or leaching or runoff.

VI. Daily Management Practices

Each golf course is managed differently based on numerous factors. The following is the recommended management routine that is typical of similar golf courses in the Metropolitan New York area.

Mowing: Greens and tees will be mowed 6 to 7 times per week during the major growing portion of the year (May-October). Fairways will be mowed 3 to 5 times per week with clippings left in place in most cases or distributed to the roughs. Roughs will be mowed one to three times per week and clippings left in place.

Clipping Management and Disposal: Clippings collected from greens, and tees will spread in rough areas. Clippings from all other areas will be left in place whenever possible or as the case with fairways (in the rare case when excessive clippings could built up under wet conditions that delay mowing) spread on the adjacent roughs. Clippings will never be placed within 100 feet from any wetland or sensitive area.

Irrigation Management: The modern computer-controlled irrigation system proposed for use on the Pound Ridge golf course is very flexible to be able to irrigate to the amount needed for adequate plant growth while not over irrigating. Over-irrigation can make many disease problems more severe, can lead to a significantly greater likelihood for either pesticide or nitrate leaching into groundwater and runoff into surface waters (Petrovic, 1990 and 1994) and can waste upwards of 50 % more water than is actually needed.

This golf course will apply water based on an estimate of the amount of water used by the turfgrass plant. This irrigation systems will have a weather station linked to the controller that

estimates plant water use and will irrigate accordingly. This proper amount of irrigation will be applied to minimize any environmental impact, reduce the potential for pest problems, reduce the waste of water from excess irrigation and produce a healthy pest-resistant grass. Fertigation will only take place when wind speeds are below the maximum specified for this irrigation system (irrigation heads and operating pressure).

Cultivation: Several times each year, the greens, tees, fairways and trafficked sections of the roughs will be cultivated to alleviate soil compaction caused from foot traffic from golfers and vehicular traffic. The cultivation method used will include shallow core cultivation, deep drill and water injection on greens/tees during the summer months if necessary. A soil penetrometer will be used to judge the need for cultivation. Compacted soils are much more prone to runoff and therefore, cultivation is necessary to protect surface water quality. To reduce the encroachment of annual bluegrass, core cultivation will not be done from the third week of August through September.

Topdressing: Topdressing is a practice of adding a small amount of soil (or sand) to the surface of the turf so as to reduce the development of thatch while smoothing and firming the putting surface. Greens and tees will be topdressed with the same material used to construct the root zone on a bi-weekly interval during most of the growing season.

Equipment Cleaning: A covered wash bay area will be used to clear the routine maintenance equipment. The wash bay will have a sloped floor to the center and a floor drain with a grease/oil and solids (clippings) trap. The sediment collected will be hauled to the proper licensed disposal facility. The wash water will be collected in a 1,000 underground doubled lined storage tank. The stored wash water will be pumped from the tank as needed and sprayed only on roughs for holes 2 and 4.

VII. Monitoring Techniques to Determine the Need for Fertilization and Pest Control Measures.

The following is a description of the procedures to be followed to determine the need for applications of fertilizers and pesticides to this proposed golf course.

Determining Fertilization Applications: Soil testing, tissue testing and visual inspections will be used to determine the need for a fertilization application. Soils testing is used to determine the amount of available nutrients currently found in the soil and the amount of nutrients needed to be applied to provide for healthy plant growth. Soil testing will be used to determine the basic quarterly application rates for phosphorus, potassium, calcium and magnesium. Soil samples will be collected in May, July, September and December on all greens, tees and fairways until it has been determined that certain sections are similar and fewer samples will be necessary. Soil pH modification to a maintain a pH in the range of 5.5 to 7.2 will also be used, based on the quarterly soil testing results.

Bi-weekly tissue testing for the grow-in period and monthly tissue testing thereafter will be used to fine tune the fertilization program so as to provide for optimum plant health, thus reducing the need for pesticides and protecting the environment from over-fertilization with potential water quality contaminants like nitrate and phosphate.

Pest Scouting, Monitoring and Action Thresholds: Scouting is one of the most common disease management practices followed by golf course superintendents. The extent and form of the scouting program varies widely between superintendents. Many superintendents rely on indicator sites or "hot spots" as areas where diseases (or other pests) first occur and use these sites as early warning signs. Many golf courses are now having pest populations mapped during a scouting visit. In this way a more permanent record of pest pressure is recorded and the effectiveness of control options evaluated. The Seven Springs golf course will follow an aggressive scouting program as outlined in the discussion section for each pest. The scouting forms found at the end of this section will be used by this golf course to monitor pest populations.

Monitoring for pests involves determining the location and number of pests or area affected by pests. Thresholds for pest occurrence have been developed for many golf course pests and will be used to determine if a pesticides application is warranted. The table 8 contains action threshold values for most of the pests that are anticipated to occur on this golf course.

Table 8. Pest action thresholds for the Pound Ridge Golf Course.

Pest	Greens/tees	Fairways	Roughs
	---------- #/sq.yd ----------		
Diseases			
Dollar spot	3	9	-
Brown Patch	1	2	-
Pink Snow mold	1*	2	-
Summer patch	UD**	UD	
Take-all patch	UD	UD	
Pythium blight	UD	UD	
Insects			
White grubs	36-48	36-48	36-48
cutworm	1	5	-
Ataenius	180-270	180-270	180
Hyperodes	36	54	72
Weeds			
broadleaf's	1	2	5
crabgrass	1	1	3
ann. bluegrass	1	9	-

_* #/sq.yd. depend on pest. For diseases of Dollar spot and Brown Patch these are the numbers of spots/patches per sq.yd. For insects and weeds it is the number of each organism per sq.yd. ** UD=upon detection, in conjunction with weather conditions.

If environmental conditions favor continued pest pressure, the action threshold has been exceeded and other non-pesticidal options have been tried, then a pesticide will be applied. The threshold values may be changed as pest history on this golf course warrants modification (i.e. too much or too little pest damage at a given threshold).

VIII. Qualification of Golf Course Management and Maintenance Staff

Golf Course Superintendent: Is responsible for the overall management of the golf course maintenance operation and implementation/inspection and verification of the ITPMP . Must be a Golf Course Superintendent Association of America Certified Golf Course Superintendent, with at least 2 years of work in the metropolitan-NY region. Must be trained and have practiced a similar IPM program as proposed here in at least one other position. Must have a minimum of an associate's degree in turfgrass management from an accredited college or university.

Assistant Golf Course Superintendent: will be responsible for implementing the IPM program on a daily bases. Must have at least 3 years of golf course work experience, formal course work in all aspects of pest management (weed science, plant pathology, entomology and IPM principals) and have training in scouting. Must have a minimum of an associate's degree in turfgrass management.

IPM Scout: will be responsible for carrying out the scouting program. Must have a BS or Bachelors of Technology (B.T.) in pest management and at least two years of experience in golf course pest management.

IX. Proposed Storage of Fertilizers and Pesticides

Pesticide Storage: All pesticides will be mixed, loaded and stored in a chemical handling/storage building equipped as follows: a small section for record keeping; mixing/loading area; application equipment washdown area; and pesticide storage space. Access to the building will be by the superintendent, assistant superintendent and trained applicators under the direct supervision of the superintendent. The building will contain heat detectors, fire extinguisher, first aid kit, two stage ventilation (low level ventilation at all times and a three times ventilation volume increase when someone enters the building), explosion proof fixtures, emergency shower/eyewash station and personal protection gear including disposable coverall/suits, gloves, goggles, respirators and hearing protection. Hazard communication signage will be placed inside and outside the building. Material Safety Data Sheets on all pesticides stored/used in building will be readily available. All personnel using the facility will be trained in safe handing and operation of application equipment and emergency response procedures and contacts.

Spills in the building will be readily contained by dry absorbent materials and safely stored until disposed of by a licensed hauler (this also pertains to any sludge/solids from the equipment wash area). Only the amount of pesticide needed will be loaded in the sprayer. All rinseate from containers and from the sprayer equipment will be reused in the next spray or sprayed in a dilute fashion in the roughs. All pesticides will be stored, handled and applied according to the label instructions. All personal protective measures will be followed.

The building will be constructed of non-combustible walls, with a combustible roof. With explosion proof fixtures, fire is unlikely. If a fire does occur, the building will vent heat and smoke through the roof and spraying water on the fire will not be encouraged. The use of a limited amount of fire fighting water is encouraged to reduce the likelihood of environmental damage from a large volume of water and to reduce the amount of contaminated water that will need disposal.

It is anticipated that only small quantities of pesticides will be stored in the building. A general contact fungicide like chlorothalonil or a specialized fungicide like etridiazole (for Pythium control) will be stored in case of an outbreak of a disease posing an imminent threat to the Pound Ridge golf course requiring immediate action. For insect and weed control, insecticides and

herbicides will be purchased and used on an as needed bases. All empty containers will be handled and disposed of by a licensed hauler.

Fertilizer Storage: fertilizers will be stored in a walled off section of the maintenance facility. The floor will be seal and will not contain a floor drain. The concrete for the floor and lowest one foot of the walls will be poured at the same time with out joints so as not to allow water in or out of the storage area. It will be unheated unless liquid fertilizers will be stored. Only small amounts of fertilizers will be stored at any one time, usually no longer than several days (from the time of delivery until it is applied).

X. Potential Impacts of Proposed Pesticide and Fertilization Program on Surface and Ground Water Quality

The potential impacts of the fertilizer program for the Pound Ridge golf course was determine by estimating the amount of runoff (Kellard Engineering) and groundwater recharge (NPURG) for regions of the golf course and the potential loading rates of nitrate, phosphate and pesticides applied to the golf course. NPURG was used to screen pesticide for their risk of surface or groundwater contamination. The results of NPURG indicate that there is a low potential for any pesticide to runoff into surface water or leaching into groundwater based on this site specific analysis. **All estimated values shown below do not take into consideration the filtering capacity of the biofilter system on the Pound Ridge Golf Course which would result in lower concentrations than reported.**

Nitrates in Groundwater

The NPURG model calculates an annual groundwater recharge value for each soil (based on hydrologic group) in relationship to yearly rainfall and irrigation amounts. The NPURG value is an estimate of the amount of water (in inches) that moves deeper than the root zone of plants, in this case 4 feet below the ground. This value represents shallow groundwater recharge not bedrock recharge which is often a much lower value. The amount of nitrate leaching into ground water was estimated based on the per cent of amount applied to greens, tees, fairways and roughs that would leach into groundwater. Petrovic (1990) noted that in most cases the per cent fertilizer leaching from turfgrass is 5 % or less. Estimated nitrate concentrations in groundwater was calculated assuming a 1, 5 and 10 % leaching value of the fertilizer nitrogen applied the coving worst case (10 % of the amount applied), a high amount (5 %) and a well managed system of best management practices to reduce nitrate leaching (1 %, practices followed in the ITPMP). The annual groundwater recharge values for each soil were given for a standard unit of turfed area (1,000 sq-ft). Table 9 contains the estimated concentrations of nitrate in groundwater from the various locations on this golf course.

Table 9. Estimated concentration of nitrate –nitrogen in groundwater at various locations on the fertilized portions of the Pound Ridge Golf Course.

Soil	% Fertilizer Nit. leached	Annual Recharge Inches	Annual Recharge Volume/1,000 sq-ft Liters	Estimated nitrate concentration in ground water mg/Liters
Establishment				
Greens/tees	1	28.3	66, 675	0.54
	5	"	"	2.52
	10	"	"	5.45
Fairways/roughs*				
Udorthents	1	28.3	66, 675	0.37/0.17
	5	"	"	1.87/0.85
	10	"	"	3.75/1.70
Charlton, Chatfield Hollis complex & Woodbridge	1	20. 8	49,005	0.51/0.23
	5	"	"	2.54/1.16
	10	"	"	5.10/2.32
Post Establishment				
Greens/tees	1	28.3	66,675	0.23
	5	"	"	1.17
	10	"	"	2.35
Fairways/roughs*				
Udorthents	1	28.3	66,675	0.24/0.07
	5	"	"	1.19/0.34
	10	"	"	2.38/0.68
Charlton, Chatfield Hollis complex & Woodbridge	1	20.8	49,005	0.32/0.09
	5	"	"	1.62/0.45
	10	"	"	3.24/0.92

- The first number is nitrate concentration in groundwater from fairways and the second from roughs.

The values above are for the fertilized sections of the project site. The remaining parts of this site

will not be fertilized, therefore, will not contribute nitrate to groundwater in any large degree. If the non-fertilized portions of this site are combined with the fertilized portions, an integrated nitrate concentration in groundwater can be estimated for the entire project. Assuming the worst case conditions of having all the fairways and roughs on soils with the greatest amount of nitrate leaching (Charlton, Chatfield & Hollis complex and Woodbridge soils), Table 10 is the estimated nitrate concentrations in groundwater for the entire project (3.0 acres of greens, 3.4 acres of tees, 32.6 acres of fairways, 47 acres of roughs and outer roughs, 87.4 acres of unfertilized land).

Table 10. Estimated concentration of nitrate-nitrogen in groundwater for the entire Pound Ridge Golf Course site.

Nitrate leaching	Nitrate concentration in groundwater mg/Liters	
	At establishment	post establishment
1%	0.18	0.09
5 %	0.90	0.47
10 %	1.80	0.93

All of the above values are far below the drinking water standard for nitrate-nitrogen of 10 mg/L.

Phosphorus in Groundwater

The leaching of phosphorus from turfgrass into groundwater has been shown not occur (Petrovic et.al. 1998) or occurs at a very low rate. Watschke and Mumma (1989) note at only 1 lb. of phosphorus per acre leached from a turfgrass site. Using this loading rate and the groundwater recharge values shown above, Table 11 is the estimated phosphorus levels in groundwater from this golf course.

Table 11. The estimated concentration of phosphorus in groundwater from the fertilized portions of the Pound Ridge Golf Course.

Location	phosphorus concentration (for 1,000 sq-ft) mg/Liter
Greens/tees	0.15
Udorthents	0.15
Charlton, Chatfield Hollis complex & Woodbridge	0.21

As with nitrogen, assuming the non-fertilized section contribute little or no phosphorus to

groundwater, then the estimated concentration of phosphorus in groundwater for the entire site would be 0.10 mg of phosphorus/Liter.

Nitrogen and Phosphorus in Surface Water

The concentration of ammonium, nitrate and phosphorus in surface water was estimated using actual loading rates from turfgrass sites. The low value (0.02 lbs of nitrate-nitrogen/acre, 0.046 lbs. ammonium-nitrogen/acre and 0.052 lbs. of phosphorus/acre) was estimated from the study of Gross et. al., 1990 having a site with a lower potential for runoff (sandy loam soil on 5-7 % slope) that had runoff events from rainfall events from 0.25 inch (7 mm) to 5.4 inches (137 mm). The high potential runoff (0.52 lbs. of phosphorus/acre) study (Watschke and Mumma, 1989) was a site with a clay soil, 9-12 % slope receiving 6 inch/hr. irrigation events to produce runoff. The volume of runoff from the 7 design points on this site for the first flush (0.5 inch of runoff) runoff was determined by Kellard Engineering and used to estimate concentration. These values do not account for any effect the biofilters have on reducing the amount of nitrogen or phosphorus in runoff.

Tables 12 and 13 contains the range in estimated amount of ammonium, nitrate and phosphorus in runoff from the seven design discharge points on the Pound Ridge Golf Course.

Revised Table 12. Estimated concentration of nitrate and ammonium-nitrogen in the first flush (0.5 inch) runoff water from the seven design points for the Pound Ridge Golf Course Project.

Design point	First flush discharge volume, liters	Area of turf, acres	Total area, acres	Range in estimated amount of nitrate-nitrogen in runoff* mg	Estimated amount of ammonium in runoff^, mg	Range in concentration of ntrate-nitrogen in runoff, mg/L	Concentration of ammonium-nitrogen in runoff, mg/L
1	4,627,614	14.500	90.03	131,660 to 658,300	303,818	0.03 to 0.14	0.07
2	4,400,422	34.874	85.61	316,652 to 1,583,260	728,309	0.07 to 0.35	0.17
3	137,240	0.015	2.67	136 to 681	313	0.001 to 0.005	0.002
4	226,678	0	4.41	0	0	0	0
5	269,340	0.509	5.24	4,622 to 23,109	10,630	0.02 to 0.09	0.04
6	68,363	0.212	1.33	1,925 to 9,625	4,427	0.03 to 0.14	0.06
7	40,607	0.055	0.79	499 to 2,497	1,149	0.01 to 0.06	0.03

* Amount of nitrate-nitrogen in runoff from turf ranged from 0.02 lbs/acre (Gross et. al., 1990) to 0.10 lbs. /acre (Watschke and Mumma, 1989). ^ Amount of ammonium-nitrogen in runoff of 0.046 lbs./acre of turf from Gross et.al., 1990.

Revised Table 13. Estimated concentration of phosphorus in the first flush (0.5 inch) runoff water from the seven design points for the Pound Ridge Golf Course Project.

Design point	First flush discharge volume, liters	Area of turf, acres	Total area, acres	Estimated low amount of phospho-rus in runoff* mg	Estimated high amount of phospho-rus in runoff^, mg	Estimated low concentra-tion of phospho-rus in runoff, mg/L	Estimated high concentra-tion of phospho-rus in runoff, mg/L
1	4,627,614	14.500	90.03	342,316	3,291,500	0.07	0.71
2	4,400,422	34.874	85.61	823,305	7,916,398	0.19	1.78
3	137,240	0.015	2.67	6,374	6,125	0.05	0.45
4	226,678	0	4.41	0	0	0	0
5	269,340	0.509	5.24	12,016	115,538	0.04	0
6	68,363	0.212	1.33	5,004	48,115	0.07	0.70
7	40,607	0.055	0.79	1,298	12,485	0.03	0.31

* A low estimated amount of PO4-phosphorus in runoff from turf of 0.052 lbs/acre (Gross et. al., 1990). ^ A high estimated amount of phosphorus in runoff from turf of 0.50 lbs./acre (Watschke and Mumma, 1989).

Pesticides in Surface and Ground Water

The computer model NPURG was used to determined the potential for surface and ground water contamination for the conditions of this site. None of the NYDEC and USEPA registered pesticides for golf courses in New York were considered to pose a risk of surface water contamination. All were considered to have a low risk of surface water contamination, therefore, applying pesticides to Pound Ridge golf course should have no effect on surface water quality. Ten pesticides were determined by the NPURG computer model to have a high risk of contaminating groundwater. ~~Eight~~ Seven will not be used on this golf course. Two (dicamba and MCPP) may be needed on occasion to treat broad leaf weeds (clover) on greens and tees, but only applied in small areas (no more than 0.25 acres per year), and one for grub control (imadicloprid). The three pesticides will only be applied with no threat of rainfall for at least 72 hrs. Therefore, applying pesticides (except for bentazon, ethoprop, fenamiphos, fenarimol, metalaxyl, trichlorfon and triclopyr that will not be applied) to the Pound Ridge golf course should not effect groundwater quality.

By only using pesticides with a low potential for both surface and ground water contamination (except for the three pesticides noted above), it is highly likely that any pesticides would be found in surface or ground water on or off this site. The results from surface and ground water montoring studies of over 30 golf courses in the U.S. support this conclusion. However, in some cases small amount s pesticides could be detected. Therefore, the concentration of pesticides

in surface and ground water was estimated assuming that a moderate amount (0.1 %) of the pesticide applied would enter surface and ground water. Using the application rates of pesticides, found in Table 5, and the values of runoff and ground water recharge used in the nutrient analysis above, Table 14 contains a worst case estimate of pesticide concentration in surface water at the 7 design points. **As expected the estimated concentrations of pesticides in surface water was low.** However, when estimated concentrations were compared to water quality standard for humans (health advisory limit, HAL) or aquatic wildlife (10 % of the LC50), as seen in Table 16, four pesticides (2,4-DP, chlorothalonil, thiophanate and chlorpyrifos) exceeded water quality standards in at least one drainage basin and therefore, will not be used on this golf course. One pesticide was reevaluated for use (imadicloprid) and MCPP and dicamba were also evalueted in Table 16 at a much higher runoff rate (10 % instead of 0.1%) and each was found to be at an estimated concentration below water quality standards and will be used on the Pound Ridge Golf Course. Table 5 has been revised to reflect these changes.

The estimated concentration of pesticides in ground water in shown in Table 15. These values use the pesticide application rates shown in Table 5 and the volume of ground water recharge equal to 370, 146,853 litters (173.4 acres and 20. 8 inches of recharge/yr.). **As expected the estimated concentration of pesticides in ground water was very low.** When compared to the water quality standard for lifetime human consumption (HAL), as seen in Table 17, none of the estimated concentration of pesticides in groundwater exceeded the drinking water standard and only two were about 1 % of the HAL. Thus, the use of pesticides on the Pound Ridge Golf Course should not result in ground water with pesticides in excess of drinking water standards.

Revised Table 14. Estimated concentration of pesticides in the first flush (0.5 inch) runoff water from the 7design points for the Pound Ridge Golf Course project.

Pesticide	Design point	Acres of greens treated*	Acres of tees treated	Acres of fairways treated	Acres of roughs treated	First flush discharge volume, liters	Estimated amount of pesticide in runoff, mg	Estimated concentraion of pesticide in runoff, ug/L
2,4-D & ~~2,4-DP~~	1	0	0	10.715	2.216	4627614	2,935	0.6
	2	0	0	18.614	11.897	4400422	6,926	1.6
	5	0	0	0	0.334	269,340	76	0.3
Prodiamine	1	0.751	0.818	10.715	2.216	4627614	5,018	1.1
	2	2.095	2.268	18.614	11.897	4400422	12,069	2.7
	5	0	0.175	0	0.334	269,340	176	0.7
MSMA	1	0	0	10.715	2.216	4627614	29,215	0.006
	2	0	0	18.614	11.897	4400422	45,703	0.012
	5	0	0	0	0.334	269,340	1,386	0.002
Iprodione	1	0.751	0.818	10.715	0	4627614	16,132	0.004
	2	2.095	2.268	18.614	0	4400422	29,974	0.008
	5	0	0.175	0	0	269,340	915	0.001
Chlorothalonil	1	0.751	0.818	10.7150	0	4627614	50,492	0.011
	2	2.095	2.268	18.614	0	4400422	89,820	0.023
	5	0	0.175	0	0	269,340	2,865	0.004
Vinclozalin	1	0.751	0.818	10.7150	0	4627614	8,066	0.002
	2	2.095	2.268	18.614	0	4400422	14,987	0.004
	5	0	0.175	0	0	269,340	460	0.001
~~Thiophanate~~	1	0.751	0.818	10.7150	0	4627614	18,068	0.004
	2	2.095	2.268	18.614	0	4400422	33,571	0.008
	5	0	0.175	0	0	269,340	1,025	0.001

Table 14. continue.

Pesticide	Design point	Acres of treated greens *	Acres of treated tees	Acres of treated fairways	Acres of treated roughs	First flush discharge volume, liters	Estimated amount of pesticide in runoff, mg	Estimated concentration in runoff, mg/L
Propamo-carb	1	0.751	0.818	10.7150	0	4627614	24,198	0.005
	2	2.095	2.268	18.614	0	4400422	44,961	0.011
	5	0	0.175	0	0	269,340	1,380	0.002
Fosetyl-al	1	0.751	0.818	10.7150	0	4627614	51,621	0.011
	2	2.095	2.268	18.614	0	4400422	91832	0.023
	5	0	0.175	0	0	269,340	2,929	0.004
Etridia-zole	1	0.751	0.818	10.7150	0	4627614	28,231	0.006
	2	2.095	2.268	18.614	0	4400422	52,425	0.013
	5	0	0.175	0	0	269,340	1,609	0.002
Cyproconazole	1	0.751	0.818	10.7150	0	4627614	2,129	0.001
	2	2.095	2.268	18.614	0	4400422	3,949	0.001
	5	0	0.175	0	0	269,340	121	<0.001
Triadime-fon	1	0.751	0.818	10.7150	0	4627614	16,132	0.004
	2	2.095	2.268	18.614	0	4400422	29,974	0.008
	5	0	0.175	0	0	269,340	915	0.001
Carbaryl	1	0	0	10.7150	0	4627614	40,735	0.009
	2	0	0	18.614	0	4400422	76,304	0.019
	5	0	0	0	0	269,340	546	0.001
~~Chlorpyrifos~~	1	0.751	0.818	0	0	4627614	1,593	<0.001
	2	2.095	2.268	0	0	4400422	2,815	0.001
	5	0	0.175	0	0	269,340	511	0.001
Paclobutrazole	1	0.751	0.818	10.7150	0	4627614	1,935	<0.001
	2	2.095	2.268	18.614	0	4400422	3,597	0.001
	5	0	0.175	0	0	751988	66	<0.001

* Based on pesticide application rates and sites found in Section IV.

Table 15. Estimated concentration of pesticides in ground water for Pound Ridge Golf Course.

Pesticide	Acres treated	Estimated amount of pesticide in ground water, mg	Estimated concentration in ground water, mg/L
2,4-D &	79.6	17,725	0.00005
Prodiamine	86.0	29,789	0.0001
MSMA	79.6	78,779	0.0002
Iprodione	39	48,237	0.0001
Chlorothalonil	39	151,010	0.0004
Vinclozalin	39	337,740	0.0009
Propamocarb	39	72,357	0.0002
Fosetyl-al	39	154,358	0.0004
Etridiazole	39	84,415	0.0002
Cyproconazole	39	6,367	0.00002
Triadimefon	39	48,237	0.0001
Carbaryl	32.6	118,566	0.0003
Paclobutrazol	86	12,767	0.00004

Table 16. Estimated concentration of pesticides in the first flush (0.5 inch) runoff water from the 7 design points* for the Pound Ridge Golf Course project as compared to drinking water standard (health advisory limit, HAL) and aquatic toxicity (LC50).

Pesticide	Design point	Estimated concentration of pesticide in runoff, Ug/L	Health advisory limit (HAL), ug/L	% of HAL	LC50, ug/L	% of LC50
2,4-D	1	0.6	70	0.85	4247	0.014
2,4-D	2	1.6	70	2.3	4247	0.038
2,4-D	5	0.3	70	0.43	4247	0.007
Prodi-amine	1	1.1	50	2.2	72,000	0.002
	2	2.7	50	5.4	72,000	0.004
	5	0.7	50	1.4	72,000	0.001
MSMA	1	2.8	70	4.0	1937	0.14
	2	6.9	70	9.9	1937	0.36
	5	1.2	70	1.7	1937	0.06
Iprodione	1	3.3	8	41.25	378	0.87
	2	6.5	8	75	378	1.72
	5	0.8	8	10	378	0.21
Chloro-thalonil	1	10.3	2	515	49	**21.02**
	2	20.2	2	1010	49	**41.22**
	5	2.5	2	125	49	**5.1**
Vinclo za-lin	1	1.6	175	0.91	397	0.403
	2	3.2	175	1.86	397	0.806
	5	0.4	175	0.23	397	0.101

Table 16, continue.

Pesticide	Design point	Estimated concentration of pesticide in runoff, ug/L	Health advisory limit (HAL), Ug/L	% of HAL	LC50, ug/L	% of LC50
Propamo-carb	1	4.9	700	0.70	4076	0.12
	2	9.7	700	1.39	4076	0.23
	5	1.2	700	0.17	4076	0.029
Fosetyl-al	1	10.5	10000	0.11	14711	0.07
	2	20.7	10000	0.21	14711	0.14
	5	2.6	10000	0.026	14711	0.018
Etridia-zole	1	5.7	175	3.26	369	1.54
	2	11.3	175	6.46	369	3.06
	5	1.4	175	0.8	369	0.379
Cyproconazole	1	0.4	350	0.11	3211	0.01
	2	0.9	350	0.25	3211	0.03
	5	0.1	350	0.03	3211	0.003
Triadime-fon	1	3.3	210	1.57	68	4.85
	2	6.5	210	3.1	68	9.56
	5	0.8	210	0.38	68	1.176
Carbaryl	1	8.4	700	1.20	2328	0.36
	2	15.4	700	2.2	2328	0.66
	5	0	0	0	0	0
Paclobutrazole	1	0.4	175	0.23	4076	0.01
	2	0.8	175	0.46	4076	0.02
	5	0.1	175	0.06	4076	0.003
Dicamba^	1	0.0005	200	0.0003	28000	0.000002
	2	0.15	200	0.06	28000	0.0005
	5	0.11	200	0.05	28000	0.0004
MCPP^	1	0.41	35	1.17	25495	0.002
	2	1.22	35	3.49	25495	0.005
	5	0.9	35	2.57	25495	0.004
Imadcloprid^	1	6.16	400	1.54	105000	0.006
	2	18.01	400	4.53	105000	0.017
	5	11.8	400	2.95	105000	0.011

* for design points 3, 4, 6 and 7 had only a small amount of turf (0.282 acres) of the 9.2 acres (only 3 %).
^ A 10 % runoff rate was used instead of 0.1 %.

Table 17. Estimated concentration of pesticides in ground water for Pound Ridge Golf Course as compared to the drinking water standard (health advisory limit).

Pesticide	Estimated concentration n groundwater, ug/L	Health advisory limit (HAL), ug/L	% of HAL
2,4-D	0.05	70	0.07
Prodiamine	0.1	50	0.2
MSMA	0.2	70	0.29
Iprodione	0.1	8	1.25
Vinclozalin	0.9	175	0.5
Propamocarb	0.2	700	0.03
Fosetyl-al	0.4	2100	0.019
Etridiazole	0.2	11	1.81
Cyproconazole	0.02	350	0.006
Triadimefon	0.1	28	0.35
Carbaryl	0.3	700	0.04
Paclobutrazol	0.04	175	0.02
MCPP*	0.03	35	0.09
Dicamba*	0.004	200	0.002
Imadicloprid*	0.32	400	0.08

* A 10 % leaching value was used instead of 0.1 % for the other pesticides.

XI. ITMP Use and Reporting

The golf course superintendent will have the responsibility of implementing the ITMP. Inplimentation will involve developing an operational manual that utilizes the information found in this ITMP. This will be one of the first tasks of the new superintendent once the person is hired and will be completed in advance of the opening of the golf course. At the point of hiring the golf course superintendent will be responsible for implimenation of the ITMP. The operational ITMP will be provided to the Town each year showing additions, changes and deletions to the previous years plan in an summary section. Each year the applicant will provide the Town with report that will include the following information:

1. The materials used at establishment; actual grasses (species and variety) used by location and seeding rate (or sod used) and establishment date, fertilizer materials used (rates and dates of application by location including soil test results), amount of mulch used and location applied, amount of lime if applied to which areas on what date(s). After the first year this section will contain information on any over seeding or sodding that was done the previous year.

2. Irrigation Protocol: how amount of irrigation was determined, weekly summary of

irrigation amount by location.

3. IPM Program: results from pest scouting showing location and amounts of pests by date, table containing all pest control applications (including cultural, biological and chemical control used) listing date, location ,rate of application and material used.

4. Suggested changes to the ITMP: the applicant may upon review of the history of the site suggest changes to the ITMP which may include adoption of new technologies, materials and deletions of materials to be used. Any new pesticide to be considered for use will go through a risk assessment using the currently acceptable method.

5. The use of and reporting of pesticides with a high potential for surface or ground water contamination applied to highly leachable soils (greens and tees) or adjacent to wetlands or biofilters:

   The application of the two herbicides (MCPP and dicamba) will only be considered if 2 or more broadleaf weeds per sq. yard are found on greens and tees.

   The golf course superintendent will notify the Town in writing at least 7 days in advance of the anticipated application date.

   Treatment will be mad to areas that have weeds and will not exceed 025 acres/year and applications will only be made if there is no forcast for heavy rain for a 72 hour period after application.

   The golf course superintendent will notify the Town of the application in the report form. The report will contain the date and amount of application, pesticide(s) used, location of application (map), sq. ft. of the treated area and the weather conditions during aand fo r the 72 hours after application. The report will be sent to the Town within thirty days of any such application.

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POUND RIDGE HIGHWAY DEPT.

MEMO

Date: April 4th, 2022

To: Town Board

From: Highway Dept

Dear Members of the Board,

I am writing this memo to get your permission to advertise for 2 part time flagger/summer help. The pay rate will be $15.00 hr.

Thanks, Vinnie Duffield

Highway Supt.

Town of Pound Ridge
179 Westchester Avenue
Pound Ridge, NY 10576

Maintenance Dept.

Memo

To: Pound Ridge Town Board

From: Jonah Maddock, Maintenance Supervisor

Date: April 8, 2022

Re: Request to hire two summer help positions.

This memo is to respectfully request approval to fill two temporary positions in the Maintenance (Department) for summertime help. Seeking a mid- April through mid-September hire.

Thank you for your consideration of this request.

Respectfully,

Jonah Maddock

Town Clerk's Office

MEMORANDUM

To: Town Board
From: Erin Trostle
Date: April 7, 2022
Re: 2022 NYSTCA Conference

I respectfully request permission to attend the 2022 New York State Town Clerks Association 40th Anniversary Conference, to be held April 24–27, in Albany, NY, at a cost not to exceed $1,100. This amount will cover conference fees, hotel accommodations, meals, and mileage reimbursement.

Town Clerk's Office

MEMORANDUM

To: Town Board
Cc: Vinnie Duffield, Robert Sour
From: Erin Trostle
Date: April 7, 2022
Re: Highway Materials Bids

A bid opening for Highway Materials was held at the Town House on Tuesday, April 5, 2022 at 10:00 am. Bid results are summarized in a table showing the low bids for 2022, along with the accepted bids for 2021 and 2020. I respectfully request on behalf of the Highway Superintendent that the Town Board award the bids in accordance with his recommendations.

Highway Bid Data Sheet

Service	2020	2021	2022
Catch Basin Cleaning			
Vendor	Fred A. Cook Jr. Inc.	Fred A. Cook Jr. Inc.	Fred A. Cook Jr. Inc.
Rates			
Hourly =	$250.00	$300.00	NA
Daily =	$2,000.00	$2,400.00	$2,600.00
Weekly =	$10,000.00	$10,000.00	$12,500.00

Tree Work	2020	2021	2022
Vendor	Barney Zipkin Tree	Barney Zipkin Tree	Barney Zipkin Tree
Service / Rates			
Bucket truck with operator (Daily)	$1,000.00	$1,000.00	$1,200.00
Bucket truck with operator (Weekly)	$5,000.00	$5,000.00	$5,500.00
Bucket truck with operator & chipper (Daily)	$1,400.00	$1,400.00	$1,400.00
Bucket truck with operator & chipper (Weekly)	$6,000.00	$6,000.00	$6,000.00
Chip Truck with operator & chipper (Daily)	$1,000.00	$1,000.00	$1,000.00
Chip Truck with operator & chipper (Weekly)	$5,000.00	$5,000.00	$5,000.00
Stump Grinder with operator (Daily)			$1,000.00
Stump Grinder with operator (Weekly)			$4,800.00

Heavy Equipment	2020	2021	2022
Vendor	AC&S Excavating	AC&S Excavating	AC&S Excavating
Service / Rates			
Large Dump Truck with operator -Daily	$1,000.00	$1,000.00	$1,080.00
Large Dump Truck with operator -Weekly	$5,000.00	$5,000.00	$5,400.00
Large Excavator with operator - Daily	$1,280.00	$1,400.00	$1,480.00
Large Excavator with operator - Weekly	$6,400.00	$7,000.00	$7,400.00
Mini Excavator with operator - Daily	$1,120.00	$1,100.00	$1,120.00
Mini Excavator with operator - Weekly	$5,600.00	$5,500.00	$5,600.00
Excavator & Hydraulic Rock Hammer - Daily	$2,400.00	$2,400.00	$2,600.00
Excavator & Hydraulic Rock Hammer - Weekly	$12,000.00	$12,000.00	$13,000.00
259 Cat Skid Steer with operator - Daily	$1,120.00	$1,100.00	$1,120.00
259 Cat Skid Steer with operator - Weekly	$5,600.00	$5,500.00	$5,600.00

Line Striping	2020	2021	2022
Vendor	Safety Marking	Safety Marking	Safety Marking
Service / Rate			
Double Yellow / Per Mile	$413.00	$418.00	$437.00
Single White / Per Mile	$228.00	$232.00	$248.00

Refuse	2020	2021	2022
Vendor	City Carting	City Carting	City Carting
Service / Rates			
Town House (3 cans) / Per Month	$30.00	$80.00	$85.00
30 yd. as requested / Per Pull	$500.00	$650.00	$689.00
20 yd. as requested / Per Pull	$450.00	$550.00	$589.00
10 yd. once a week pick-up / Per Month	$350.00	$350.00	$374.00
2 yd. once a week pick-up / Per Month	$52.00	$85.00	$91.00

Blacktop picked up per ton	2020	2021	2022
Vendor	Peckham of Bedford Hills	Peckham of Bedford Hills	Peckham of Bedford Hills
Material Per Ton			
Base	$82.30	$84.50	$89.00
Binder	$82.30	$84.50	$89.25
Shim	$98.75	$101.00	$108.00
Top 6f	$82.50	$84.50	$92.50
Top 7	$90.50	$91.50	$100.00
Playground	$90.50	$91.50	$100.00
Curb Mix	$98.00	$98.00	$104.00
Recycled Item 4	$8.00	$8.00	$8.00

Blacktop Laid in Place	2020	2021	2021
Vendor	Kect Const. Co.	Kect Const. Co.	Kect Const. Co.
Per Ton	$92.45	$93.80	$104.80

Aggregates	2020	2021	2022
Vendor	Putnam	Putnam	Putnam
White Item 4 / Per Ton	$24.25	$24.98	$27.00
Vendor	Thalle	Thalle	Thalle
Brown Iten 4 / Per Ton	$25.00	$25.00	$27.00
Vendor	Thalle	Thalle	Putnam
Recycled Item 4 / Per Ton	$18.00	$18.00	$16.00
Vendor	Thalle	Thalle	Thalle
3/4 Trap Rock	$29.00	$29.00	$32.00
Vendor	Putnam	Thalle	Putnam
3/4 Stone / Per Ton	$28.95	$29.00	$31.70
Vendor	Thalle	Thalle	Thalle
3/8 Washed Blue Stone	$30.00	$30.00	$34.00
Vendor	Thalle / Domain	Thalle	Thalle
Rip-Rap 5-6 in.	$32.00	$32.00	$34.50
Vendor	Thalle / Domain	Thalle	Thalle
Rip-Rap 5 or less	$32.00	$32.00	$34.50
Vendor	Thalle	Thalle	Wingdale
Road Sand	$25.00	$25.50	$26.50
Vendor			Thalle
8"-12" Light Stone Fill			$34.50

Town Clerk's Office

MEMORANDUM

To: Town Board
From: Erin Trostle
Date: April 7, 2022
Re: Special Event Permit Application for PRBA Puppy Stroll

The Pound Ridge Business Association (PRBA) has submitted the attached Special Event Permit Application for a Puppy Stroll, to take place on Sunday, April 24, at 10:00 am. The application appears to be in order.

The stroll will begin at the Pound Ridge Veterinary Center and proceed along Westchester Avenue through the Trinity Pass intersection to the crosswalk near the fountain. After crossing, it will turn back down the far side of the street and will end at the Key Bank building, subject to the property owner's approval.

The Police Department has okayed the route and will have an officer present.

TOWN OF POUND RIDGE - SPECIAL EVENT PERMIT APPLICATION

This application is pursuant to Local Law 4 of 1994 regulating special events, street fairs, antiques markets and outdoor arts and crafts sales in the Town of Pound Ridge.

APPLICANT'S NAME: P.R. BUSINESS ASSOC.

ADDRESS: 67 WESTCHERTER AVE

P.R **Business Telephone No.:** LISA MILLER 914-282-9582

Please respond to the following:

1. **Provide the date and times of the event.** Sunday, 4/24/22 (10AM)
2. **What is the nature of the event? Street fair ..... Antiques Market .....**
   Outdoor Arts and Crafts ..... (Other) DOG STROLL
3. **How many vendors will participate?** / N/A
4. **Will there be any banners across the roads?** N/A
5. **What arrangements will be made for traffic control and police protection?**
   SPOKE TO POLICE DEPT ON 4/5/22 OFFICER WILL BE PRESENT.
6. **What arrangements have been made to insure adequate parking for the vendors and visitors to this event? Please provide a detailed description of your plans.**
   NO IMPACT ANTICIPATED
7. **What arrangements have been made to insure adequate parking and pedestrian access to Scott's Corners shops and facilities that will be open during this special event? Please be specific how and where you expect to protect dedicated customer parking spaces in front of stores and businesses.**
   NO IMPACT ANTICIPATED
8. **Have you reviewed your parking and access plans with affected shopkeepers and/or service providers?**
   NO IMPACT ANTICIPATED

TOWN OF POUND RIDGE - SPECIAL EVENT PERMIT APPLICATION – page 2

9. **Parking is not permitted on roads in residential areas adjacent to Scott's Corners. What plans have been made to insure compliance with this restriction?** NO IMPACT ANTICIPATED

10. **Willl there be any entrance fee? If so, how much?** NO

11. **Have arrangements been made to provide sanitary facilities? Please include answers to the following questions in your response:** N/A

    a. **How many portable toilet facilities do you expect to provide?** N/A
    b. **Does the number of planned facilities meet Board of Health standards for the number of visitors expected?** N/A
    c. **Where will they be located?** N/A
    d. **Have you planned for adequate and easily visible signs directing visitors to the locations of toilet facilities?** N/A

12. **Amplified music as special events is not permitted. Please be sure visiting vendors are aware of this restriction.**

13. **You, as the applicant for this permit, are responsible for advising each participating vendor of the requirement to have and display a New York State Sales Tax Certificate at the location of their booth or sales location.**

14. **If food vendors are part of your event, approvals must be obtained from Westchester County Board of Health. Copies of these appropriate approvals must be on file in the Town Clerk's Office prior to the start of the event.**

15. **This application must be signed by the applicant. The applicant's signature attests to the veracity of the statements made in this application and indicates his/her responsibility to comply with the requirements of Local Law Number 4 of the Town of Pound Ridge.**

FOR P.R.B.A. — 4/5/22

SIGNATURE OF APPLICANT — **DATE**

Town Clerk's Office

MEMORANDUM

To: Town Board
From: Erin Trostle
Date: April 7, 2022
Re: Draft Special Event Permit Application Documents

At the end of 2021, Chief Ryan spearheaded an effort to update the Special Event Permit Application form. The new form is longer and more comprehensive, but ultimately it should make the application process smoother for event sponsors while also providing the Town Board with more complete information about proposed events.

I have reformatted the most recent draft version, which incorporates feedback from many town departments, to make it a fillable Word document. Ideally it would eventually become an Adobe form that could be submitted online.

In addition to the application form, I have attached a review form, which would be submitted to various departments and other entities as necessary to get their input (eg, Police Department, Maintenance Department, PRFD, PRVAC, etc.). Also attached is an approval form, which would not be the same thing as a permit. Separating application approval from the granting of the permit would provide a mechanism for ensuring that any conditions the Board might want to impose would be met.

SPECIAL EVENT PERMIT APPLICATION

Pursuant to Section 91 of the Town Code, a Special Event Permit is required for any sale, festival, or other special event that is conducted on Town property; that exceeds the building envelopes in the Business District; or that significantly impacts available public parking, vehicular or pedestrian traffic, or access to public roads.

However, please note that events in the Town Park or at Conant Hall consistent with the designated purpose of those facilities require only a Recreation Department activity permit or a rental agreement, respectively.

Special Event Permit applications and supporting materials must be submitted to the Town Clerk a minimum of sixty days before the event. After reviewing the application, the Town Clerk presents it to the Town Board for approval, which may be subject to conditions that must be met before a permit can be issued. A permit must be issued before the start of the event.

Please direct questions to the Town Clerk (townclerk@townofpoundridge.com; 914-764-5549).

APPLICANT INFORMATION

The ***applicant*** is the individual, group, or entity organizing the event. Examples of applicant ***type*** include nonprofit organization, town board or commission, school club, etc.

Applicant name:	
Applicant type:	
Address:	
Mailing address:	
Phone number:	
Email address:	

EVENT INFORMATION

In addition to indicating event ***type*** (eg, street fair, festival, road race, parade, concert, etc.), please provide a detailed event description. Examples of event ***purpose*** include raising funds, promoting awareness, providing education, building community spirit, promoting local businesses, etc. ***If the event is a fundraiser, the purpose should include information about how the resulting funds will be used.*** Identify all locations where event activity will take place, including parking.

Event name:	
Event type:	
Description:	
Purpose:	

Event date:		Alternate date:	

Event start time:		Event end time:	
Setup start time:		Setup end time:	
Takedown start:		Takedown end:	

Location(s):				
On private property?		Yes		No
Parking location(s):				
On private property?		Yes		No

Road closure(s) requested:	
Closure times requested:	

Admission fee?		Yes		No
Parking fee?		Yes		No

VENDORS/LICENSES

If the answer to any of the questions below is yes, you must also complete the ***Vendor/License Information Form***. If you are unable to complete the form at the time application is submitted, please note that a complete form will be required before the permit can be granted.

Will the event include food and/or beverage vendors?

	Yes		No		Number, if any

Will any food or beverages be served without charge in conjunction with the event?

	Yes		No

Will the event include non-food vendors?

	Yes		No		Number, if any

Will the event include alcoholic beverage vendors?

	Yes		No		Number, if any

Will any alcohol be served without charge in conjunction with the event?

	Yes		No

Will the event include gambling of any kind?

	Yes		No

CONTACTS

Primary contact name:			
Cell phone number:		Email address:	

Primary contact name:			
Cell phone number:		Email address:	

Primary contact name:			
Cell phone number:		Email address:	

LOGISTICS

CROWD MANAGEMENT				
Anticipated attendance:				
Describe crowd control plan:				
Describe perimeter control plan:				
Emergency services be present?		Yes		No
Will event be ADA compliant?		Yes		No
VOLUNTEERS				
Indicate number of volunteers:				
Describe role(s) of volunteers:				
SANITATION/GARBAGE				
Portable toilets provided?		Yes		No
If so, how many?				
Garbage/recycling bins provided?		Yes		No
Describe garbage/recycling plan:				
NEIGHBORHOOD IMPACT/NOTIFICATION				
Will there be noise impacts?		Yes		No
If so, will there be amplified music?		Yes		No
Will there be light impacts?		Yes		No
Have neighbors been notified?		Yes		No

STRUCTURES/UTILITIES

Tents or other structures?	Yes	No
If yes, please describe:		
Water access needed?	Yes	No
If yes, please describe:		
Electricity needed?	Yes	No
If yes, please describe:		
WiFi access needed?	Yes	No
If yes, indicate number of users:		

PROMOTION

Banner permission requested?	Yes	No
If so, indicate location and dates:		
Other signage?	Yes	No
If so, please describe:		

TOWN RESOURCES

Town bus needed?	Yes	No
If so, please indicate time period:		
Barricades or cones needed?	Yes	No
If so, please specify:		
Other town-owned property needed?	Yes	No
If so, please specify:		

OUTSIDE RESOURCES				
Outside bus transportation?		Yes		No
If so, please describe:				
Outside parking assistance?		Yes		No
If so, please describe:				
Other outside resources?		Yes		No
If so, please describe:				

SUPPORTING DOCUMENTS

Please indicate which supporting documents you are providing, including review forms being submitted directly by the reviewers.

				MAPS/PLANS
	Yes		No	Event map (must
	Yes		No	Parking/traffic plan (if separate)
	Yes		No	Weather plan
	Yes		No	Vendor List (and applicable licenses or permits)

				REVIEW FORMS
	Yes		No	Police Department review form
	Yes		No	Highway Department review form
	Yes		No	Maintenance Department review form
	Yes		No	Building Department review form
	Yes		No	Recreation Department review form
	Yes		No	Fire Department review form
	Yes		No	EMS review form
	Yes		No	Other review form

					LEGAL DOCUMENTS
		Yes		No	Insurance certificate(s)
		Yes		No	Indemnity agreement(s)
		Yes		No	Permits/Licenses (other than for vendors)
		Yes		No	**OTHER (specify):**

DEPOSITS/FEES

Damage deposit paid (indicate amount):					
Waiver requested:		Yes		No	
Application fee paid (indicate amount):					
Waiver requested:		Yes		No	

ENDORSEMENT

I certify that I have reviewed all application materials and that the information contained therein is, to the best of my knowledge, accurate and truthful.

I understand that Town Board approval of my application does not constitute a permit; that if the application is approved, I must meet any and all conditions specified by the Town Board before a permit can be issued; and furthermore, that under no circumstances may the event take place unless and until a permit has been issued.

(signature)		(date)
(printed name)		

SPECIAL EVENT APPLICATION REVIEW

EVENT: _____ DATE: _____

I have reviewed the Special Event Permit Application for the event indicated above.

SIGNATURE: _____ NAME: _____

DEPARTMENT:

- ☐ POLICE DEPARTMENT
- ☐ BUILDING DEPARTMENT
- ☐ FIRE DEPARTMENT
- ☐ MAINTENANCE DEPARTMENT
- ☐ RECREATION DEPARTMENT
- ☐ EMERGENCY SERVICES
- ☐ HIGHWAY DEPARTMENT
- ☐ OTHER PLEASE SPECIFY: _____

APPROVAL/CONDITIONS:

- ☐ APPROVED
- ☐ DISAPPROVED
- ☐ APPROVED SUBJECT TO THE FOLLOWING CONDITIONS:

_____

_____

_____

_____

_____

FOR TOWN DEPARTMENTS ONLY:

STAFFING NEEDED:		STAFFING COST:	$
EQUIPMENT NEEDED:		EQUIPMENT COST:	$
OTHER COST ITEMS:		OTHER COST:	$
		TOTAL COST:	$

Please return completed review forms to the Town Clerk (townclerk@townofpoundridge.com).

SPECIAL EVENT APPLICATION APPROVAL

EVENT: _____ DATE: _____

APPLICANT: _____ TIME: _____

The Special Event Permit application for the event specified above has been approved by a resolution of the Town Board with the conditions (if any) specified below.

MEETING DATE: _____

APPROVAL/CONDITIONS:

PERMIT FEE: _____

DAMAGE DEPOSIT: _____

Once the conditions specified above have been met and any required documentation has been provided, a permit may be issued. Events may not take place without a valid permit. Please direct questions to the Town Clerk at 914-764-5549 or townclerk@townofpoundridge.com.

PLEASE NOTE THAT THIS APPROVAL IS NOT A PERMIT.
A PERMIT MUST BE ISSUED BEFORE THE EVENT CAN TAKE PLACE.

Pound Ridge Conservation Board
PROTECTING OUR ENVIRONMENTAL HEALTH AND NATURAL RESOURCES

To: Supervisor Kevin Hansan

From: Ellen Grogan, Conservation Board

Re: Arbor Day Foundation Proclamation
Request for Inclusion on a Town Board Agenda in April

Date: April 3, 2022

In order to retain our status as an Arbor Day Foundation Tree City, Pound Ridge must issue a proclamation signed by Supervisor Hansan stating that the town recognizes and will celebrate Arbor Day - April 29th this year. We are requesting that you include a notice of the proclamation at a Town Board meeting in April. The proclamation suggested by the Arbor Day Foundation is attached.

The Conservation Board will celebrate Arbor Day by giving away 75 sapling trees at The Market on Saturday, April 30 from 11:30 to 2 pm. We will include information about the proclamation with our media outreach and other publicity for this event.

Arbor Day

Whereas, In 1872, J. Sterling Morton proposed to the Nebraska Board of Agriculture that a special day be set aside for the planting of trees, and

Whereas, this holiday, called Arbor Day, was first observed with the planting of more than a million trees in Nebraska, and

Whereas, Arbor Day is now observed throughout the nation and the world, and

Whereas, trees can reduce the erosion of our precious topsoil by wind and water, cut heating and cooling costs, moderate the temperature, clean the air, produce life-giving oxygen, and provide habitat for wildlife, and

Whereas, trees are a renewable resource giving us paper, wood for our homes, fuel for our fires and countless other wood products, and

Whereas, trees in our Town increase property values, enhance the economic vitality of business areas, and beautify our community, and

Whereas, trees, wherever they are planted, are a source of joy and spiritual renewal.

Therefore, I do hereby proclaim Friday, April 29, 2022 as ARBOR DAY in the Town of Pound Ridge,

And I urge all citizens to celebrate Arbor Day in the future and to support efforts to protect our trees and woodlands, and

Further, I urge all citizens to plant trees to gladden the heart and promote the well being of this and future generations.

_____

Kevin Hansan, Supervisor, Town of Pound Ridge

Date: _____

POUND RIDGE
WATER/
WASTEWATER
TASK FORCE

MEMORANDUM

To: Town Board

From: Ali Boak and Ellen Ivens**,**Wastewater Task Force

Date: April 10, 2022

Re: Backup for Request

The Wastewater Task Force respectfully submits the following requests for your consideration and approval.

- Request for not to exceed $3,500 from the WWTF budget towards one day of geoprobe services to verify depth to bedrock at the Old Pound Road site. We have identified potential depth to bedrock discrepancies in some borings and need to verify the depth to bedrock in the field. To that end we need one day of a geoprobe and engineer in the field. The data verification is needed for the mounding analysis (groundwater modelling). WWTF members would also be present during the field work.

- Request to substitute the public relations subcontractor for the WWTF. Sacks Communication was the public relations subcontractor included in the accepted proposal submitted by D&B Engineering but due to personal reasons Sacks Communications is no longer available. Zimmerman – Edelson, a public relations firm out of Great Neck, NY is available and has experience working with municipalities and water/wastewater projects and has previously worked on water infrastructure projects with D&B Engineers. Initial cost for an outreach plan is estimated at $6,000. The services and costs were included within the budget prepared by D&B and approved by the Town Board.

- Request for a resolution to submit an application for funding to Congressman Maloney's FY 23 Community Project. The Deadline for the application is April 15, 2022. Draft language for the resolution has been attached as a separate document.

To: Town Board
From: Ali Boak and Ellen Ivens, Water/Wastewater Task Force
Date: April 10, 2022
Re: Applying for Federal Water/wastewater Funding through Congressman Maloney's Office

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The Water/Wastewater Task Force respectfully request that the Town Board pass a resolution in support of the Town's application for water/wastewater funding available through Congressman Sean Patrick Maloney's Office.

Draft resolution language:

Whereas, solving the water/wastewater problem which has plagued the Scotts Corners' three business zones for more than 30 decades is the top priority for our town.

Whereas, investing in water/wastewater is critical to protecting and raising our resident's quality of life, the prosperity and smart growth of our business district, and the ability of seniors and young families to remain in town.

Whereas, the Town of Pound Ridge seeks funding to build a wastewater treatment and disposal system and to supply fresh water to Scotts Corners, the main commercial and retail area of Pound Ridge.

Whereas, the present situation is unsustainable, limits any future growth in the Scotts Corners area and, if left unaddressed, will lead to future wastewater treatment systems failures. Many of the lots have antiquated wastewater treatment systems that are still in use.

Whereas, the Town of Pound Ridge has historically advanced policies and practices which preserve natural resources, address the dangers of Climate Change and otherwise protect our environment ;

Now, Therefore The Town Board of the Town of Pound Ridge hereby resolves as follows:

The Town Board supports and authorizes the Water/Wastewater's applications to Congressman Sean Patrick Maloney's Office for a community project fund for the purposes of developing a wastewater system in Scott's Corners Business District.

	Kevin	Les	Ali	Carla	Dan	Diane	Other
Boards & Commissions							
Audit Bills				X			
Board of Assessment Review							N/A
Board of Ethics							N/A
Conservation Board				X			
Drug Abuse Prevention Council		X					
Economic Development Committee						X	
Energy Action Committee				X			
Housing Board					X		
Human Rights Advisory Committee			X				
Landmarks & Historic District					X		
OEM	X						
Old Pound Road Committee				X			
Open Space					X		
Planning Board				X			
Police Deparment	X						
Recreation Commission						X	
Water Control Commission		X					
Zoning Board of Appeals					X		
Other							
BCSDNY	X						
East of Hudson Watershed		X					
Environmental Initiatives Advisors							Elyse/Bill Harding
Fire District	X						
Insurance							Harvey Dann
Library Board	X						
New Dawn					X		
Westchester County Shared Services	X						
Sustainable Westchester				X			
WEMS							Dave Ryan
Wireless Communication						X	
Water Wastewater Task Force			X				