

APPENDIX 15
ORGANIC GOLF COURSE MANAGEMENT PLAN

SDEIS Organic Turfgrass Management Plan

for

Highmount Golf Club

at

The Modified Belleayre Resort at Catskill Park

Prepared For:

Crossroads Ventures LLC

Prepared by:

The LA Group P.C.

and

**Dr. A. Martin Petrovic
Professor of Turfgrass Science**

March 2011

INTRODUCTION

This Draft Management Plan has been prepared in accordance with the SEQRA Scoping Document and the Agreement in Principle for the Modified Belleayre Resort at Catskill Park project.

It is intended to serve as a template for the Management Plan to be implemented when the Highmount Golf Club begins operations. The Management Plan will be updated annually.

Prior to the start of operations at the Highmount Golf Club, this Draft Management Plan will be updated to include additional products and technologies that are consistent with the requirements of the Agreement in Principle, and that have become available since the preparation of this Draft Management Plan.

The Management Plan will consist of two main parts. The first part (sections 1 through 7 of this Draft) will contain the actual Management Plan. The second part (sections 8 through 14 of this Draft) will be used for record keeping of the various information that is required to be collected and maintained as the Plan gets implemented during the year, as well as a year-end certification of compliant implementation of the plan by the Technical Review Committee.

The following is the 2011 Draft Plan template set forth in the SDEIS. *Italicized and bolded text within the Draft Plan is intended to provide directions for the preparation of future annual Plans to be implemented for the Highmount Golf Club.*

(INSERT PLAN YEAR)

ORGANIC GOLF COURSE MANAGEMENT PLAN

HIGHMOUNT GOLF CLUB

(Insert Highmount Golf Club Logo)

(For each annual update of this plan the Technical Review Committee will provide the following certification.)

CERTIFICATION OF COMPLIANCE

The Highmount Golf Club Technical Review Committee hereby certifies that this Organic Management Plan to be implemented during the year _____ is compliant with the terms and conditions of the Agreement in Principle and NYSDEC SPDES Permit No. _____ (effective date _____).

Chairman's Name and Title

Signature

Date

SUMMARY OF CURRENT PLAN CHANGES TO PREVIOUS YEAR PLAN

(This Plan will be updated on an annual basis based on the previous year's management successes and failures, availability of new products and equipment, improved agronomic practices and other factors.)

This section of the annual Plan shall present a summary of the changes contained in the plan for the year it is to be implemented.)

**_____ (current year) CHANGES TO _____ (previous year) ORGANIC
MANAGEMENT PLAN**

(1)

(2)

(3)

(4)

Table of Contents

	Page
Certification of Compliance of Current Year Plan.....	i
Summary of Current Plan Changes to Previous Year Plan.....	ii
Section 1 Background Information – “Organic” Requirements.....	1
Section 2 Organic Golf Course Technical Review Committee.....	3
2.1 Committee Members	
2.2 Authority of the Committee and Documenting Committee Involvement	
Section 3 Approved Products, Prohibited Products and Procedures for Special Use Exemptions.....	6
3.1 Approved Products	
3.2 Prohibited Products	
3.3 Special Use Exemptions	
Section 4 General Organic Management Practices To Be Implemented	9
4.1 Pre-Construction Detailed Plans and Specifications	
4.2 Operations	
4.2.1 Cultural and Mechanical Practices	
4.2.2 Monitoring and Thresholds	
4.2.3 Biological and Other Non-chemical Controls	
4.2.4 Watershed Contamination Prevention Best Management Practices	
4.2.5 Wildlife and Habitat Considerations	
4.2.6 Golfer Outreach and Education	
4.2.7 Worker Training	
Section 5 Potential Diseases and Control Strategies	18
5.1. Diseases More Likely to Occur	
5.1.1 Typhula Blight (Gray Snow Mold)	
5.1.2 Microdochium Patch (Pink Snow Mold)	
5.1.3 Dollar Spot	
5.1.4 Brown Patch	
5.2. Diseases Less Likely to Occur	
5.2.1 Pythium Blight	
5.2.2 Leaf Spot and Melting Out	
5.2.3 Take All Patch	
5.2.4 Summer Patch	

5.3.	Other Diseases	
Section 6	Potential Insects and Control Strategies	28
6.1	Insects More Likely to Occur	
6.1.1	White Grubs	
6.1.2	Black Cutworms	
6.2	Insects Less Likely to Occur	
6.2.1	Sod Webworm	
6.2.2	Chinch Bugs	
6.3	Other Insects	
Section 7	Potential Weeds and Control Strategies	34
7.1	Weeds Most Likely to Occur at High Densities	
7.1.1	Annual Bluegrass	
7.1.2	White Clover	
7.2	Weeds Likely to Occur, But at Lower Densities	
7.2.1	Dandelion	
7.2.2	Plantain	
7.2.3	Mouse-ear Chickweed	
7.2.4	Crabgrass and Other Summer Annual Grasses	
7.3	Other Weeds	
Section 8	Records of Amendments Implemented Including Special Use Exemptions	38
Section 9	Pest Monitoring Reports	39
Section 10	Cultural Practices Records	40
Section 11	Pest Control Application Records	41
Section 12	Water Quality Monitoring Records	42
Section 13	Committee Inspection and Audit Reports	43
Section 14	Year-end Certification of Compliant Implementation	44

SECTION 1 BACKGROUND INFORMATION – ‘ORGANIC’ REQUIREMENTS

The November 2003 Draft Environmental Impact Statement (DEIS) for the original Belleayre Resort at Catskill Park project included two technical appendices that dealt with the management of golf course turf on two proposed golf courses. These were DEIS Appendix 14, Integrated Turf Management Plan, and DEIS Appendix 15, Fertilizer and Pesticide Risk Assessment. The modified Belleayre Resort at Catskill Park project that was the subject of the 2010 Supplemental DEIS (SDEIS) no longer included the previously proposed Big Indian Country Club, but included a modified design for the Highmount Golf Club.

In September 2007 Crossroads Ventures entered into an Agreement in Principle (AIP, Agreement) with New York State Department of Environmental Conservation (NYSDEC), New York City Department of Environmental Protection (NYCDEP) and various non-governmental organizations (NGOs). One of the Crossroads Ventures’ requirements under the AIP was to prepare an Organic Management Plan for the Highmount Golf Club located at the Wildacres portion of the Modified Belleayre Resort at Catskill Park project. This document has been prepared to meet that requirement.

More specific AIP requirements pertaining to the golf course turf management and the content of this plan included the following.

- *For the purposes of this Agreement, “organic golf course management” means operating and maintaining a course by using biological, cultural and mechanical practices that foster soil health, maintain biodiversity and the watershed ecology while ensuring playable golf course turf, without the use of synthetic chemicals.*
- *Organic management of the Wildacres Golf Course [Highmount Golf Club] will be achieved and maintained by implementing a management approach that places on the site the fewest inputs necessary to provide a sustainable, high quality and nationally recognized golf course operation. To assure organic golf course operation at Wildacres, an annual Organic Management Plan will be developed, implemented and revised as necessary; a dynamic list of approved and prohibited substances will be complied with; and an Organic Golf Course Technical Review Committee will be established to oversee implementation.*

After issuance of all permits necessary for the construction of the modified project, an Organic Golf Course Technical Review Committee (the Committee) was created by the NYSDEC. The Committee is composed of five (5) members, including: a representative of the NYSDEC, who chairs the Committee; a representative of the NYCDEP and the superintendent of the Highmount Golf Club or a Crossroads’ designee until the superintendent is hired. In addition, Crossroads and the NGO signatories to the Agreement through the National Resources Defense Council (NRDC) have each identified an expert in turf management and/or organic turf management, to serve on the

Committee. The authority and procedures that will be followed by the Committee are described in more detail in Section 2 of this Management Plan.

The implementation of an organic management plan for the Highmount Golf Club is also controlled by NYSDEC under its State Pollution Discharge Elimination System (SPDES) program, and the SPDES permit issued for the development project that included the golf course. The Agreement in Principle also speaks to the organic management of the golf course as it relates to the project SPDES permit issued by NYSDEC.

- *Provisions for implementing the organic golf course management approach set forth in this agreement and Exhibit E will be incorporated into the Crossroads SPDES permit to be issued by the NYSDEC in connection with this project.*
- *Following five years of Wildacres Golf Course [Highmount Golf Club] operation pursuant to this Agreement, the operator may seek approval from the NYSDEC to modify the conditions of its SPDES permit relating to organic golf course operation, provided that the State or federal government or an independent certifying entity adopts and implements an organic golf course program substantially similar to the one set forth in this Agreement and that the operator applies for and receives certification of the Wildacres Golf Course as organic under such a program. In this event, the SPDES permit for the Crossroads project will be modified to incorporate the operator's commitment to continued participation in and compliance with the respective new State or federal or independent certifying program.*
- *Following five years of Highmount Golf Club operation pursuant to this Agreement, Crossroads may seek approval from the NYSDEC to discontinue organic golf course operation and to remove such requirement from its SPDES permit. Should such approval be sought, the NYSDEC will solicit the advice of the Organic Golf Course Technical Committee and will approve such request only if it finds that the operator has demonstrated to the NYSDEC's satisfaction that the operation of the Wildacres Golf Course as a high quality nationally recognized golf course through organic management is infeasible under this provision and that the concerns raised by the operator cannot be adequately addressed through adjustments or modifications to the Organic Management Plan. In the event that NYSDEC finds that the operator has satisfied the above-described conditions for discontinuance of organic golf course operation under this provision, the NYSDEC will modify its SPDES permit for the Crossroads project and include a requirement that the operator implement a state-of-the-art Integrated Pest Management system for the Wildacres Golf Course [Highmount Golf Club] that utilizes the fewest inputs necessary to provide a sustainable, high quality, nationally recognized golf course operation.*

SECTION 2 ORGANIC GOLF COURSE TECHNICAL REVIEW COMMITTEE

2.1 Committee Members

The following individuals comprise the Technical Review Committee for (*insert year*).

NYSDEC Representative (Chairman): _____
Name Title Year Appointed

NYCDEP Representative: _____
Name Title Year Appointed

Golf Course Superintendent: _____
Name Year Appointed

Crossroads Ventures Representative: _____
Name Title Year Appointed

NGO Representative: _____
Name Organization Title Year Appointed

2.2 Authority of the Committee and Documenting Committee Involvement

The Committee will perform the following duties.

- (1) Review the Organic Management Plan prepared by the operator on an annual basis (and any modifications to the Plan as may be sought by the operator) for the purpose of insuring the consistency of the Plan (and any such modifications) with the goals and objectives of the Agreement In Principle and the conditions of the project SPDES permit.
 - The Technical Committee through the Chairman’s signature on page “i” of this Plan provides certification of compliance for the current year plan. Significant changes in the current year Plan from the previous year Plan next is summarized on page “ii” of this Plan.
- (2) Review implementation of the Organic Management Plan at least annually in conjunction with a yearly audit of Plan implementation.
 - Results of Committee Inspections and Audits shall be provided to the golf course superintendent and copies shall be placed into Section 13 of the superintendent’s copy of this Plan when the Committee provides them. Prior to the end of the

calendar year that this plan is implemented, the Committee, via the signature of the Chairman in Section 14 of the golf course superintendent's copy of this Plan, shall certify that the Plan was properly implemented for that calendar year. In addition to the current year's Plan, the golf course superintendent shall maintain, at the golf course maintenance facility, copies of past year plans that are certified as properly implemented. Old plans shall be kept on file for 5 years. The golf course superintendent shall also provide copies of complete year-end plans to the Committee Chairman for their records.

- (3) Review pest sampling methodologies utilized, pest monitoring reports prepared and data regarding type and quantity of inputs applied to control pests. For any inputs approved by the Committee, data that the Committee will review will also include type and quantity of input as well as surface water and shallow groundwater quality output data collected in accordance with the NYSDEC SPDES permit requirements. The Committee will review such other monitoring data (and their sampling methodologies regarding golf course inputs and outputs).

Documentation collected during the year that this Plan is being implemented shall be maintained within the golf course superintendent's copy of this Plan, including the following;

- Section 9 – Copies of Pest Monitoring Reports,
- Section 10 – Copies of Cultural Practices Records,
- Section 11 – Copies of Pest Control Application Records, and
- Section 12 – Copies of Water Quality Monitoring Reports.

- (4) Conduct on-site golf course inspections at reasonable times.
- As stated previously, copies of inspection reports provided by the Committee shall be maintained in Section 13 of the golf course superintendent's copy of this Plan.
- (5) Approve or disapprove: (a) the Organic Management Plan and proposed modifications to such Plan; (b) requests for Special Use Exceptions pursuant to Section 3 of this Plan; (c) additions or deletions to the lists of approved and disapproved products, (pursuant to Section 3 of this Plan) such discretionary authority will be exercised by the Chairperson on the advice and recommendation of the Committee.
- Annual approval and summary of changes will be documented on pages "i" and "ii" respectively.
 - Section 8 of the golf course superintendent's copy of this plan shall include records of amendments implemented, including special use exemptions for the year this plan is implemented.
- (6) Make recommendations to the operator that may, in the judgment of the Committee, assist in achieving the objectives and principles of the Agreement in Principle relating to organic golf course operation.

- (7) Certify, on an annual basis, at its discretion, that the Highmount Golf Club operation is following an organic protocol. Such certification shall be issued only where the Committee has (a) approved an Organic Management Plan submitted annually by the operator and (b) certified, through an annual audit, that the operator has implemented the Organic Management Plan.
- Section 14 of this Plan contains a Committee Certification that the Plan was properly implemented for the year it was prepared.
 - Copies of the current year inspection and audit reports shall be maintained in Section 13 of the golf course superintendent's copy of this Plan.
 - Page "i" of this Plan contains a Committee Certification that the plan derived for the upcoming year is consistent with the Agreement in Principle and the NYSDEC SPDES permit.
- (8) Establish its own procedural rules, consistent with the Agreement in Principle.

SECTION 3 APPROVED PRODUCTS, PROHIBITED PRODUCTS AND PROCEDURES FOR SPECIAL USE EXEMPTIONS

3.1 Approved Products

(From the Agreement in Principle, the following list of products may be used at the Highmount Golf Club consistent with an approved Organic Management Plan. This list shall be updated with each annual update of the Plan.)

The following products may be used under this Plan.

1. Beneficial insects
2. Beneficial nematodes
3. Bt (*Bacillus thuringiensis*)
4. Compost
5. Corn gluten
6. Fish Emulsion
7. Garlic oil/juice
8. Horticultural oils (preferably vegetable-based instead of petrochemical based)
9. Kelp/seaweed extracts
10. Lemon & vinegar formulations
11. Lime
12. Beneficial Microbes and Microbial Derivatives
13. Milky spore
14. Neem
15. 100% Organic fertilizers
16. Pheromone lures
17. Pyrethrin/pyrethrum
18. Rock dust minerals
19. Biopesticides

In addition to the approved products listed above, the operator may also use products on the National List of approved substances established under the Organic Foods Product Act of 1990, and products approved as organic by duly accredited certifying organizations such as the Northeast Organic Farming Association (NOFA) and the Organic Materials Review Institute (OMRI), or products or substances defined as “organic” by any future U.S. or New York State organic golf course regulatory program. Finally, the Organic Golf Course Technical Review Committee may include or exclude any product from the approved products list when such decision is supported by scientific peer-reviewed data and the site-specific needs of the operation.

3.2 Prohibited Products

(From the Agreement in Principle, the following list of products may not be used at Highmount Golf Club unless specifically approved under the Special Use Exemption

process set forth in section 3.3 below. This list shall be updated with each annual update of this Plan.)

The following list of products may not be used at Highmount Golf Club unless specifically approved under the Special Use Exemption process described in Section 3.3, below.

1. All synthetic, chemical pesticides (unless otherwise included on the Approved Products list)
2. Arsenic
3. Biosolids derived from sewage sludge or industrial waste (i.e. *Milogranite*®)
4. Genetically modified products, ingredients, or seeds (Endophytically enhanced seed and improved grass seed cultivars produced through conventional breeding programs are not GM and therefore are permitted.)
5. Piperonyl butoxide and other synthetic ingredients
6. Pyrethroids
7. Tobacco
8. Pesticides dispensed by automatic misting systems

3.3 Special Use Exemption

As set forth below, the operator may seek a Special Use Exemption allowing the application of synthetic agents to prevent or treat disease or pest outbreaks at the Highmount Golf Club. These exemptions may be sought during the preparation of the annual Management Plan or during the course of the year under an existing Management Plan.

The use of synthetic agents as a Special Use Exemption to prevent or treat disease or pest outbreaks may be sought by the operator in the annual Organic Golf Management Plan. NYCDEC, after review by the Organic Golf Course Technical Review Committee, shall approve such use of synthetic agents only when such use is determined to be absolutely necessary to maintain a high quality condition of the course and where organic treatment is determined to be ineffective or unavailable. Such Special Use Exemption shall cover the smallest area practicable and/or be utilized for the shortest time period necessary to address the problem.

A Special Use Exemption may also be sought during the course of the year, after adoption of the annual Organic Golf Management Plan. When the operator has sought a Special Use Exemption during the course of the year on a non-emergency basis, the failure of NYSDEC and the Organic Golf Course Technical Review Committee to respond within seven days of notice via e-mail and telephone to all five members shall be deemed a granting of the operator's request. Under the circumstances defined below, the operator may make an "emergency request" for a Special Use Exemption. An emergency request, for the purposes of this agreement, is defined as a request that within the judgment of the operator must be acted upon immediately so as to ensure the protection of high quality

playable golf course turf. The NYSDEC and the organic Golf Course Technical Review Committee shall respond to an “emergency request” within forty-eight (48) hours of notice to all five members via e-mail and telephone. When a Special Use Exemption has been sought by the operator as an “emergency request,” the failure of the NYSDEC and the Committee to respond within forty-eight (48) hours shall be deemed a granting of the operator’s request. In seeking any Special Use Exemption, the operator shall provide sufficient information (including photos, if appropriate) setting forth the rationale for the request. Whenever such an exemption is granted by NYSDEC during the course of the year, the exemption shall be included as an approved revision to the annual Organic Golf Course Management Plan, and a copy of the notices to the committee, any other application materials, and approval shall be added to Section 8 of the golf course superintendent’s copy of this Plan.

In the event that the operator uses any synthetic agent after complying with the procedures of this paragraph, such operator is prohibited from claiming in radio, television, internet or print advertising, or otherwise representing to the public either orally or in writing, that it operates an organic golf course. Such prohibition shall remain in effect from the date of application of the synthetic agent until the date the Committee certifies that the operator has for three consecutive years continually implemented an organic management protocol as set forth in this agreement without a Special Use Exemption. The prohibition described in this paragraph shall not be interpreted so as to require the operator to destroy any previously printed materials or to cancel any advertisements for which the operator has previously entered into a binding contract.

For the sections in this plan that discuss individual pests and the non-chemical methods that will be employed to attempt to control pest levels (Sections 5, 6 and 7), there are recommendations for products for which special use exemptions may be sought should they be needed. These suggestions are based on the Pesticide Risk Assessment and Integrated Pest Management plan contained in the November 2003 DEIS.

In accordance with the AIP every effort will be made to successfully operate an organic golf course.

SECTION 4 GENERAL ORGANIC MANAGEMENT PRACTICES

4.1 Pre-construction Detailed Plans and Specifications

Between the time of permit issuance and the commencement of project construction certain steps can be taken to promote a healthy turfgrass growing environment and to increase turfgrass resistance to potential pests. These steps include turfgrass species and cultivar specifications, specifications for greens construction, and design and specifications of the golf course irrigation system.

- Construction specifications for golf course construction shall identify the turfgrass species and cultivars to be planted in and around the golf course including specifications for tees, greens and approaches, fairways, roughs and “native areas”. Specifications shall be developed in consultation with USGA Agronomists and shall make use of the most current National Turfgrass Evaluation Program (NTEP) results with emphasis given to factors such as different disease ratings (i.e. *Typhula* blight, pink snow mold, dollar spot, brown patch), reduced fungicide ratings, poa annua ratings, low maintenance ratings, traffic stress ratings, and other similar factors that will provide a reference of how the turf will perform under the organic management approach.
- All tees, greens and approaches shall be established via seeding and not via sod that could carry diseases, weeds or insects.
- Construction specifications shall require that greens be constructed to USGA standards.
- Construction specifications shall require installation of a state of the art irrigation system that allows for proper zoning areas to be irrigated as well as on-course climate monitoring (temperature, precipitation, pan evaporation, etc.)

4.2 Operations

4.2.1 Cultural and Mechanical Practices

A. Mowing

- Mowing practices shall be similar to other golf courses practicing Integrated Turf Management and appropriate for the turfgrass species on different areas of the golf course.
- As per the management approaches for specific pests included in Sections 5, 6 and 7 of this Plan, mowing heights should be adjusted as needed in response to different pest pressures.

B. Fertilization

- The application of fertilizers shall take into account regular soil fertility testing performed on the golf course.
- The rate of phosphorus, potassium and trace element application shall be based on soil test results and leaf tissue analysis results.
- The frequency of fertilizer applications and the degree of nitrogen “spoon-feeding” shall be left to the best professional judgment of the golf course superintendent.
- Timing of nitrogen applications will be adjusted based on pest pressures for the individual pests described in Sections 5, 6 and 7 of this Plan.
- General guidelines for nitrogen applications are
 - Tees and Greens: 3-4 lbs./M/yr, weekly to biweekly intervals
 - Fairways and Roughs: 2-3 lbs./M/yr, monthly intervals
 - Native Areas: 0.5-1.0 lb./M/yr
- Examples of organic fertilizers and suppliers of organic fertilizers include the following.
 - Sustane®
 - Nature Safe®
 - Roots 1-2-3®
 - Griggs Brothers Foliar All Natural Organic®
 - North Country Organics®

C. Irrigation

- Irrigation practices shall be similar to practices on golf courses practicing integrated turf management, focusing on less frequent and deeper irrigation events to promote root growth.
- Weather information shall be collected on the site to assist in determining irrigation frequencies and amounts.
- As per the management approaches for specific pests included in Sections 5, 6 and 7 of this Plan, irrigation practices should be adjusted as needed in response to different pest pressures.

D. Leaf Surface Moisture Reduction

- Morning dew should be removed first thing in the morning prior to mowing by pulling greens, or preferably by using a triplex roller prior to mowing.
- During period when morning dews are present, wetting agents (i.e. Aquatrols®) should be applied to greens at least once a week at dusk.

E. Aerifying

- Spiking or core aeration should be performed similar to other golf courses practicing integrated turf management.
- Supplemental non-disruptive aerification (i.e. hydrojecting) should be performed on a monthly basis.

F. Topdressing and Overseeding

- Greens shall be lightly topdressed every other week.
- An aggressive overseeding program shall be followed on all areas of the golf course where shoot densities have been reduced from traffic, pests, etc.
- All greens shall be overseeded annually with the originally established grasses.

G. Sodding

- Sodding shall be used to renovate areas heavily damaged by pests. An on-site sod nursery shall be used. One possible site for the nursery is the far end of the practice range.

4.2.2 Monitoring and Thresholds

A. Monitoring (including record keeping)

- Monitoring frequency and scouting patterns shall be similar to other golf courses practicing integrated turf management, with increased monitoring frequency for tees and greens.
- If pest problem arises that could potentially lead to a Special Use Exemption, areas shall be monitored at least daily, and twice a day where rapidly spreading pests are involved.

- Photographs of the affected area(s) shall be taken if an emergency Special Use Extension may be necessary.
- Copies of pest monitoring records shall be compiled in Section 9 of this Plan as they are generated.
- It is desirable, but not mandatory, that Cornell University's TracGolf software is used to track maintenance practices.

B. Thresholds

- Many of the organic pest treatments in this Plan are preventative and pest thresholds are not applicable.
- Pest-specific thresholds are provided in Sections 5, 6 and 7 of this Plan.
- The golf course superintendent, in conjunction with the Golf Course Technical Committee, will consider these thresholds when giving consideration to Special Use Exemptions.

4.2.3 Biological and Other Non-chemical Controls

Potential pests are listed in the following table, with those pests more likely to occur at significant levels indicated in **bold**.

Table 1
Potential Pests of Highmount Golf Club

Diseases

Anthracnose
Brown Patch
 Yellow Patch
 Copper Spot
 Damping-off
Dollar Spot
 Fairy Rings
 Leaf Spots
 Necrotic Ringspot
 Nematodes
Pink Snow Mold
 Powdery Mildew
 Pythium Blight
 Pythium Root Rot
 Red Thread
 Smuts
 Summer Patch
 Take-all Patch
Typhula Blight

Weeds

Crabgrass
 Barnyardgrass
 Foxtails
 Panicum
 Goosegrass
Annual Bluegrass
 Yellow Nutsedge
 Orchardgrass
 Quackgrass
 Wild Onion
 Wild Garlic
 Star-of-Bethlehem
 Chickweed
 Henbit
 Deadnettle
 Speedwell
 Knotweed
 Oxalis
 Spurge
 Black Medic
 Burdock
Clover
 Dandelion
 Dock
 Healall
 Mallow
 Plantain
 Sorrel
 Yarrow
 Buckhorn
 Hawkweed
 Moneywort
 Shepherdspurse
 Thistle
 Wild Carrot
 Yellow Rocket
 Moss

Insects

White Grubs (various)
Black Ataenius
 Bluegrass Billbug
 Sod Webworm
Black Cutworms
 Chinch Bugs
 Hyperodes Weevil

The following is a listing of the products currently proposed to treat the pests more likely to occur at significant levels on the golf course. Specific approaches for individual disease, insect and weed pests are described in Sections 5, 6 and 7 of this Plan, respectively.

A. Diseases

- Typhula blight (Gray Snow Mold) (1) EcoGuard ® Biofungicide, *Bacillus licheniformis* Strain 3086
(2) Endorse ®, Polyoxin D Zinc Salt
- Microdochium Patch (Pink Snow Mold) (1) EcoGuard ® Biofungicide, *Bacillus licheniformis* Strain 3086
(2) Endorse ®, Polyoxin D Zinc Salt
(3) Spot-Less®, *Pseudomonas aureofaciens* Strain Tx-1
- Dollar Spot (1) EcoGuard ® Biofungicide, *Bacillus licheniformis* Strain 3086
(2) Spot-Less®, *Pseudomonas aureofaciens* Strain Tx-1
(4) Turfshield ® Granules, *Trichoderma harzianum*
- Brown Patch (1) Endorse ®, Polyoxin D Zinc Salt
(2) Turfshield ®, *Trichoderma harzianum*

Note: Ground sprayer application of Spot-Less® is preferred over chemigation.

B. Insects

- White Grubs (1) Hb2 ® Parasitic Nematode – *Heterohabditis bacteriophora*
(2) Azatin XL®, azadirachtin biopesticide
(3) Botanigard® 22WP, *Beauveria bassiana*
(4) Botanigard® ES®, *Beauveria bassiana*
(5) Naturalis L®, *Beauveria bassiana*
(6) Milky Spore®, *Paenibacilluls popilliae*
- Black Ataenius (larvae) (1) Hb2 ® Parasitic Nematode – *Heterohabditis Bacteriophora*
(2) Azatin XL®, azadirachtin biopesticide
(3) Botanigard 22WP®, *Beauveria bassiana*
(4) Botanigard ES®, *Beauveria bassiana*
(5) Naturalis L®, *Beauveria bassiana*
(6) Milk Spore®, *Paenibacilluls popilliae*

- Black Cutworms (1) Conserve®, Spinosad fermentation product
(2) Dipel Pro DF Biological Insecticide Dry Flowable®,
Bacillus thuringiensis
(3) Javelin WG, *Bacillus thuringiensis*

C. Weeds

For this Draft Plan weed control will consist of hand picking for selective removal and the use of a Waipuna® steam and organic foam treatment system for non-selective weed control. Areas of non-selective weed treatment shall be re-seeded or sodded shortly after treatment.

Other treatment products that continue to be evaluated for their effectiveness and that should be considered for weed control when this Plan gets updated include, among others, products derived from corn gluten, clove oil/vinegar and enriched calcium.

4.2.4 Watershed Contamination Prevention Best Management Practices

As per the Agreement in Principle, the stormwater facilities at the Resort have been designed to maximize the use of stormwater runoff for irrigation of the golf course, wherever practicable.

Components of the golf course maintenance facility were designed to prevent watershed contamination from fertilizers and pest control products.

All pest controls will be mixed, loaded and stored in a chemical handling/storage building equipped as follows; a mixing and loading area complete with a closed recycling system for rinse water at the washdown area, and a controlled pest control storage area. Also included within this building is a pest control mixing and recycling area. The area consists of an exterior concrete pad that slopes to the center where there is a grate over a concrete sump. A roof covers the concrete pad. The sump contains a pump that is piped to two 500-gallon above ground storage tanks inside the building. Rinse water from cleaning pest control application equipment will be captured, pumped to the tanks, and stored and reused when future pest control solutions need to be made. Any mixing and filling of pest control application equipment would be made on the same concrete pad. Should any material be released during mixing it will be captured and recycled similar to rinse water. The recycle water holding tanks will be housed within a building on a concrete pad and sufficient containment will be provided in the event of tank leakage. Pest controls will be stored in this building in a separate locked and fireproof area with a “curbed” floor to provide containment of any accidentally spilled materials.

Access to the building will be by the golf course 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

at all times and three times ventilation volume increase when someone enters the building), explosion proof fixtures, emergency shower/eyewash station, and personal protection gear. Hazard communication signage will be placed inside and outside the building. Material Safety Data Sheets on all pest controls stored in the building will be readily available. All personnel using the facility will be trained in safe handling and operation of application equipment and emergency response procedures and contacts.

Any release in the building will be readily contained by dry sorbent materials and safely stored until properly disposed of. Only the amount needed will be loaded in the application equipment. All rinsate material from containers and from the spray equipment will be captured in the system, recycled and reused in the next spray. All pest controls will be stored, handled and applied according to their label instructions. All personal protective measures will be followed.

It is anticipated that only small quantities of pest controls will be stored in the building. All empty pest control containers will be handled and properly disposed of in accordance with label directions.

4.2.5 Wildlife and Habitat Considerations

A. Turf-damaging Wildlife

Some wildlife, such as skunks, moles and Canada geese can produce damage to golf course turf and on occasion may need to be controlled. Mole traps can be used in active tunnels in spring and fall when damage occurs. Skunks searching for grubs and damaging golf course turf should be live-trapped and removed by a nuisance wildlife control operator. Should geese become problematic, there are a number of practices that can be put in place including using dogs, noisemakers, repellents, fencing, wire systems, etc. Control practices should be put in place the first year geese occur on the course.

B. Enhancing Wildlife Habitat

Consideration shall be given to enrolling the golf course in the Audubon Cooperative Sanctuary Program for Golf Courses through Audubon International; 46 Rarick Road, Selkirk, NY 12158, (518)767-9051 Ext. 114.

Annual updates to this section of the Draft Plan should document efforts made towards obtaining certification under this program, or, alternatively, defining at least one wildlife habitat improvement project, approved by the Technical Committee that will be undertaken and completed in the year the Plan is implemented.

4.2.6 Golfer Outreach and Education

It can be expected that golfers will at times experience aesthetic appearance and course playability issues which are below their expectations based on conditions on other golf

courses that they play that are managed non-organically. It can also be expected that many of these golfers will be willing to accept some level of reduced quality knowing that the golf course is being organically managed. It is recommended through this Draft Plan that golfers are reminded that the course is being organically managed. This can be most easily accomplished by signage on and around the golf course, golf clubhouse, and on players' scorecards, materials placed in hotel rooms, etc. Also, it is recommended that some form of informal golfer survey be undertaken to gauge golfers' satisfaction with course conditions, obtain feedback on whether any reduced course conditions were made more acceptable knowing that the course was organically managed, etc. It is envisioned that the resort operator rather than the golf course maintenance staff would be responsible for implementing these recommendations.

Annual updates to this draft plan should report on the past year efforts for golfer outreach and education and the current year's goal for improving these efforts.

4.2.7 Worker Training

The types and amounts of worker training will depend on the number and types of maintenance staff, staff training prior to starting work on the new golf course, staff turnover and hiring of new employees, and availability of new or improved equipment or management practices that occur over time. For the purpose of this Draft Plan it is recommended that all Staff members who will be working on the golf course have training in pest diagnostics so that they can contribute observations made during the performance of their routine duties to the formal scouting/monitoring program that is being implemented on the golf course.

Each annual update to this Draft Plan shall include at least 3 goals for worker training for that year. Training does not have to be limited to formal educational sessions, but can also include such things as attendance and/or presentations at industry conferences, subscriptions to industry publications, etc.

SECTION 5 POTENTIAL DISEASES AND CONTROL STRATEGIES

5.1 Diseases More Likely to Occur

5.1.1 *Typhula* Blight (Gray Snow Mold)

A. Conditions and Symptoms

- Most cool season grasses, bentgrass, annual bluegrass and tall fescue most susceptible
- Conditions favoring disease include:
 - cold temperatures (32-45 F) and prolonged snow cover, more damaging under prolonged deep snow
 - tall turf canopy and heavy cover by tree leaves, straw, etc.
 - high soluble nitrogen applications prior to growth stops in late fall
- Symptoms:
 - initially light brown or gray patches 2 to 4 inches in diameter
 - patches may enlarge to 2 feet in diameter and coalesce
 - may occur with or without snow cover
 - damage usually is minimal in the absence of snow

B. Cultural Management

- Avoid nitrogen applications after October 1 until top growth stops
- Increase drainage
- Control traffic to avoid compaction
- Use snow fences to prevent snow drifts
- In spring rake affected areas, remove debris, lightly fertilize and reseed with soil/seed patch
- Placing heavy layer of compost on dormant turf and removing excess in early spring prior to growth starting may reduce severity

C. Organic Suppression/Control

- EcoGaurd® Biofungicide, *Bacillus licheniformis* Strain 3086
- Endorse®, Polyoxin D zinc salt

D. Organic Threshold

The products above shall be used as preventatives at the discretion of the golf course superintendent in accordance with the product labels.

E. Special Use Exemption Parameters

The following are the conditions under which a special use exemption request may be made to NYSDEC/the Organic Golf Course Technical Review Committee.

1. Threshold

After organic control preventative applications are made, when one spot per square yard appears on greens during snow free periods and when weather forecasts are calling for cool-wet weather (32-40 F).

Current field trials have demonstrated the limited effectiveness of organic products to control snow molds (pink and gray). Depending on the severity of snow mold damage in the spring that follows the implementation of this Plan, a special use exemption may be sought for treatment of some or all of the golf course greens in the following year.

2. Candidate Products

Products for which a special use exemption may be sought based on the results of the DEIS Risk Assessment and ITM Plan are propiconazole, quintozone, trifloxystrobin and vinclozolin.

5.1.2 *Microdochium* Patch (Pink Snow Mold)

A. Conditions and Symptoms

- All cool season grasses especially perennial ryegrass
- Conditions favoring disease include:
 - low to moderate temperatures (32-50 F) and wet weather favors activity
 - severe damage under heavy, wet snow on unfrozen ground (snow not necessary)
 - lush turf stimulated by late season application of excessively high amounts of nitrogen fertilizer
 - alkaline soil conditions
- Symptoms:
 - small water-soaked patches 2 to 3 inches in diameter
 - fully developed patches are 3 to 8 inches in diameter
 - some patches may range from one or two feet in diameter and coalesce
 - large patches are most likely to appear in greens or fairways
 - pink coloration of diseased turf at the edge of the patches
 - plants eventually collapse and die
 - mycelium mats the leaves
 - matted leaves have a tan color
 - on close inspection leaves may display a pinkish cast
 - after snow recedes, patches are bleached white and may not have a pink fringe
 - most plants in affected patches under snow are killed

B. Cultural Management

- Use a balanced N-P-K fertilizer in fall, avoid late fall application of K
- Use moderate nitrogen during late summer and fall
- Avoid the use of limestone where soil pH is above 7.0
- Continue to mow late into the fall to ensure that snow would not mat a tall canopy

- Control late fall/winter activities on the course to prevent snow compaction
- Snow fences should be used to prevent snow from drifting onto greens

C. Organic Suppression/Control

- EcoGaurd ® Biofungicide, *Bacillus licheniformis* Strain 3086
- Endorse ®, Polyoxin D zinc salt
- Spotless ®, *Psuedomonas aureofaciens* strain Tx-1

D. Organic Threshold

The products above shall be used as preventatives at the discretion of the golf course superintendent in accordance with the product labels.

E. Special Use Exemption Parameters

The following are the conditions under which a special use exemption request may be made to the Organic Golf Course Technical Review Committee.

1. Threshold

After organic control preventative applications are made, when one spot per square yard appears on greens during snow free periods and when weather forecasts are calling for cool-wet weather (32-40 F).

Current field trials have demonstrated the limited effectiveness of organic products to control snow molds (pink and gray). Depending on the severity of snow mold damage in the spring that follows the implementation of this Plan, a special use exemption may be sought for treatment of some or all of the golf course greens in the following year.

2. Candidate Products

Products for which a special use exemption may be sought based on the results of the DEIS Risk Assessment are propiconazole, quinterozone, trifloxystrobin and vinclozolin.

5.1.3 Dollar Spot

A. Conditions and Symptoms

- Primarily June through October, can be widespread and extremely destructive
- Severity peaks in late spring to early summer and in late summer to early fall
- All cool season grasses susceptible, particularly annual bluegrass and bentgrass
- Conditions favoring disease
 - warm days (60-90 F) and nights over 50 F
 - prolonged leaf wetness
 - dew and high humidity
 - dry soils with low nitrogen fertility
- Symptoms
 - symptoms vary with turfgrass species and cultural practices
 - appears as small, circular, straw-colored spots
 - coarser textured grasses and higher mowing practices, blighted areas are larger

- straw-colored patches 3 to 6 inches in diameter
- patches frequently coalesce and involve large areas of turf
- blades often die back from the tip
- bleached-white lesions that are shaped like an hourglass on grass blades
- hourglass banding often has narrow brown, purple, or black band
- white, cobwebby mycelium covers the diseased patches during early morning hours

B. Cultural Management

- Avoid nitrogen deficiency, drought and night watering
- On greens, remove dew and leaf surface exudates by poling, or preferably triplex rolling
- At least weekly applications of wetting agents at dusk
- Reduce compaction
- Limit thatch to ½ inch
- Mow greens early in the morning after removing dew to speed surface drying

C. Organic Suppression/Control

- Spot-Less® Biofungicide, *Pseudomonas aureofaciens* Strain TX-1
- EcoGuard® Biofungicide, *Bacillus licheniformis* strain SB 3086
- Turfshield® Granules, *Trichoderma harzianum*

D. Organic Threshold

Preventative applications based on calendar and weather forecasts.

E. Special Use Exemption Parameters

The following are the conditions under which a special use exemption request may be made to NYSDEC/the Organic Golf Course Technical Review Committee.

1. Threshold

Recommended thresholds are 3 spots per square yard for tees and greens and 9 spots per square yard on fairways when weather conditions are expected to remain humid and temperatures of 70 to 85°F.

2. Candidate Products

As per the DEIS ITM plan, products that could be used are propiconazole and vinclozolin.

5.1.4 Brown Patch

A. Conditions and Symptoms

- Can occur in all seasons and affect all cool season turfgrasses
- Bentgrass, ryegrass, annual bluegrass and tall fescues most susceptible
- Conditions favoring disease
 - warm conditions (over 75 F) that remain over 60 F into the evening
 - rainy humid weather with prolonged wetness
 - more severe with excessive nitrogen and low phosphorus and potassium
 - more severe on low cut areas
- Symptoms:
 - vary according to host species
 - patches are roughly circular and range from 3 inches to 3 feet
 - outer edge of the patch may develop a 1 to 2 inch smoke colored ring
 - on high-cut turfs, smoke rings are usually not present
 - blades have a blight or dieback from the tip
 - lesions are a light, chocolate brown color, bordered by narrow, dark-brown bands
 - perennial ryegrass, smaller leaf lesions, and tip dieback commonly occurs
 - on bentgrass distinct lesions may not be evident because the leaf blades are too fine
 - early morning hours, a cobweb-like mycelium can develop in sparse to huge amounts
 - late in the season, distinctive circular patches may not appear

B. Cultural Management

- Maintain moderate, balanced fertility based on soil testing
- Minimize leaf wetness where feasible, including watering earlier in the day and removing dew from greens
- Alleviate compaction
- Maintain thatch less than ½ inch
- Raise mowing heights

C. Organic Suppression/Control

- Endorse®, Polyoxin D Zinc Salt
- Turfshield® Granules, *Trichoderma harzianum*

D. Organic Threshold

Preventative applications based on calendar and weather forecast.

E. Special Use Exemption Parameters

The following are the conditions under which a special use exemption request may be made to NYSDEC/the Organic Golf Course Technical Review Committee.

1. Thresholds

One spot per square yard on greens and tees and two spots per square yard on fairways and the 24-48 hour weather forecast indicates conditions are still favorable for disease development.

2. Candidate Products

As per the ITM plan in the DEIS, flutalonil, propiconazole, quintozone, triademefon, or vinclozolin can be used to treat brown patch.

5.2 Diseases Less Likely to Occur

5.2.1 Pythium Blight

A. Conditions and Symptoms

- Primarily July and August, affects most cool season grasses, ryegrass most susceptible
- Develops rapidly during nighttime and is among the most destructive turfgrass diseases
- Huge areas of turf can be destroyed within 24 hours, particularly if there are thunder showers at night
- Conditions favoring disease
 - high temperatures (>90 F) and humidity that persists into evening
 - temperatures over 70 F with relative humidity greater than 70%
 - prolonged leaf wetness, poor drainage, and thatchy turf
 - excessive nitrogen fertility and calcium deficiency can exacerbate
- Symptoms
 - often first observed in areas that are shaded, low lying and adjacent to water - where air circulation is poor.
 - kills turf in circular patches, rings, or streaks that follow the water drainage pattern
 - during morning hours turf displays an orange-bronze color
 - there may be a gray smoke ring or grayish-white mycelium on the periphery
 - in low areas patches are brown and all plants usually are killed
 - infected perennial ryegrass develops an oily or dark-gray color
 - leaf blades have a water-soaked appearance
 - blades later collapse, mat together, and turn brown.
 - cottony web of mycelium covers the grass leaves and is visible during early morning hours

B. Cultural Management

- Maintain moderate nitrogen and optimum calcium levels as per soil test results
- Improve drainage and air circulation, including tree removal where necessary.
- Minimize leaf wetness including irrigating early in the day to avoid moist foliage at nightfall

- Avoiding mowing and trafficking susceptible turf when fungal threads are present
- Increase mowing height

C. Organic Suppression/Control

- Spotless ®, *Psuedomonas aureofaciens* strain Tx-1
- Turfshield ® granules, *Trichoderma harzianum*
- Alude ® or Vital ®, Mono and Dipotassium Salts of Phosphorus Acid

D. Organic Threshold

Preventative applications based on calendar and weather forecasts.

E. Special Use Exemption Parameters

The following are the conditions under which a special use exemption request may be made to NYSDEC/the Organic Golf Course Technical Review Committee. Of all of the potential diseases, emergency requests are most likely going to be made for pythium due to its rapid development and spread and potential for widespread damage.

1. Thresholds

Upon first detection at areas most prone to Pythium development and when weather forecasts calls for high humidity (90% for 14 hours) and hot weather (days > 85 F, nights > 70 F)

2. Pesticide Control

As per the ITM Plan in the DEIS, etridiazole, fosetyl-Al, mefenoxam and propamocarb can be used to treat pythium.

5.2.2 Leaf Spot and Melting-Out

A. Conditions and Symptoms

- Cool weather pathogen of bluegrasses that is most active during the spring, autumn and throughout mild winter periods
- May develop in two phases: the leaf spot phase and/or the melting-out phase
- Leaf spot phase
 - distinct purplish-brown, oval-shaped leaf spot lesions with a central tan spot on the leaves
 - heavily infected stand appears yellow or red-brown
 - numerous lesions can coalesce to encompass the entire width of the blade
 - causes a generalized dark-brown blight and die-back from the tip
 - lesions initially are associated with older leaves
 - leaves die prematurely as a result of the invasion
 - once the crown is invaded the disease enters the melting-out phase
- Melting out phase
 - entire tillers are lost

- turf loses density
- most damaging to the stand

B. Cultural Management

- Renovate or overseed resistant cultivars
- Much more destructive under low mowing
- When diseases become evident, increase mowing height immediately
- Avoid spring application of high rates of water-soluble nitrogen fertilizers
- Irrigate deeply and infrequently
- Control thatch by verticutting and/or core cultivation when more than 0.5 inches in depth

C. Organic Suppression/ Control

- EcoGuard® Biofungicide, *Bacillus licheniformis* strain SB 3086
- Endorse®, Polyoxin D Zinc Salt

D. Organic Threshold

Preventative applications based on calendar and weather forecast.

E. Special Use Exemption Parameters

The following are the conditions under which a special use exemption request may be made to NYSDEC/the Organic Golf Course Technical Review Committee.

1. Threshold

Suggested threshold is 10 percent coverage of affected area.

2. Candidate Products

Fungicides that could be used under an exemption, based on the DEIS ITM plan, are iprodione, trifloxystrobin and vinclozolin.

5.2.3 Take-All Patch

A. Conditions and Symptoms

- Conditions
 - spring and fall
 - almost exclusively a disease of bentgrass turf, also infects annual bluegrass
 - cool (<65 F)_ weather
 - prevalent on moist, high pH and nutritionally unbalanced soils
 - coarse textured, sandy low organic matter soils favor disease
 - most common on newly constructed golf courses, particularly those constructed on wooded sites
 - becomes most severe in the second year following seeding

- Symptoms
 - attacks roots and stems, no distinctive leaf spot or sheath lesions
 - initially circular patches only a few inches in diameter and reddish-brown in color.
 - patches may increase to 2 feet or more
 - most patches range from 6 to 18 inches
 - perimeter of the patch usually assumes a bronzed appearance
 - turf eventually turns a bleached or tan color
 - patches frequently appear reddish-brown in color and bronzing may be absent
 - dead bentgrass in the center of the patch may be colonized by weeds if herbicide use is restricted
 - turf in affected areas is easily detached
 - over time pathogenic fungi naturally decline
 - decline phenomenon may occur within 3 years
 - may persist indefinitely where soils are alkaline or irrigation water has a high pH

B. Cultural Management

- Apply acidifying fertilizers
- Maintain balanced fertility based on soil testing
- Improve drainage and alleviate compaction
- Avoid heavy frequent irrigation
- Manganese containing fertilizers may reduce disease

C. Organic Suppression/Control

Maintain soil manganese levels based on annual soil tests.

D. Organic Threshold

None, preventative.

E. Special Use Exemption Parameters

The following are the conditions under which a special use exemption request may be made to NYSDEC/the Organic Golf Course Technical Review Committee.

1. Threshold

Since infection does not readily appear as visible symptoms, the threshold level should be somewhat low, 2-3 spots per square yard on tees/greens and 5-6 spots per square yard on fairways.

2. Candidate Product

Propiconazole should be used when necessary as per the ITM plan in the DEIS.

5.2.4 Summer Patch

A. Causes and Symptoms

- Destructive disease of Kentucky bluegrass, creeping red fescue, and annual bluegrass
- Initially appears as wilted, dark-green or pale areas
- Areas rapidly turn into straw-brown, dead patches resembling dollar spot
- Patches soon increase in size and may become crescent-shaped or remain circular
- Healthy turf may persist in the center of patches producing rings or "frog-eye" symptoms
- Large areas of turf can be destroyed within a 7 to 10 day period
- No distinctive leaf lesions
- Leaves generally die back from the tip
- Plants at the periphery of affected patches display a bronze or copper color
- Generally appears in late June or early July, daytime air temperatures above 88°F
- Most severe on sunny, exposed slopes or other heat-stressed areas
- Most frequent during drought stress following wet weather in late spring
- May flair up following rainy periods in late summer and September
- Soil needs to be moist and root zone temperatures need to exceed 78°F

B. Cultural Management

- Increase cutting height to the maximum acceptable level preferably above 0.25 inch
- Use slow-release acidifying nitrogen fertilizers
- Acidification with ammonium-based N-sources reduces disease severity over time
- Most fertilizer use should be confined to the autumn months
- Core cultivate compacted soils

C. Organic Suppression/ Control

No commercially available products currently exist to treat summer patch.

D. Pesticide Control

Based on results of the DEIS Risk Assessment and ITM Plan, propiconazole and quintozene can be used to treat Summer Patch under special use exemptions.

E. Threshold

Treatment threshold should be approximately 10% coverage of area.

5.3 Other Diseases

The following diseases, which are much less likely to occur on the golf course, should be treated when they exceed thresholds with organic products from the current edition of the Cornell Recommends (current recommendations are in parenthesis); Anthracnose (Endorse®), Fairy Rings (none), Necrotic Ringspot (none), Powdery Mildew (EcoGaurd®), Red Thread (EcoGaurd®, Endorse®), Rusts (none), Smuts (none) and Yellow Patch (Alude®, Vital®).

SECTION 6. POTENTIAL INSECTS AND CONTROL STRATEGIES

6.1 Insects More Likely to Occur

6.1.1 White Grubs (including Black Turfgrass Ataenius larvae)

A. Damage Symptoms

- Heavily infested turf first appears off-color gray-green, and wilts rapidly in the hot sun
- Continued feeding would cause the turf to die in large irregular patches
- Tunneling of the larvae causes the turf to feel spongy underfoot
- The turf can be rolled back like a loose carpet
- Populations may not cause observable turf injury, but predatory mammals such as skunks, raccoons, opossums, and moles or birds may damage turf

B. Monitoring and General Thresholds

Adult Sampling. Adult activity of May/June beetles, masked chafers, European chafers, Oriental beetles, and Asiatic garden beetles can be monitored using light traps. Useful predictive data can be obtained by monitoring beetle captures one to two times a week. Simply plot the number of beetles collected over the date sampled. If the number of beetles collected drops for 7 to 10 days in a row, you can assume that the peak emergence and oviposition time has passed. Most species have eggs that hatch within 14 to 21 days, therefore, grub treatments can be applied 3 to 4 weeks after the peak adult activity was noted, in order to target the young grubs feeding at the soil/thatch interface.

Grub Sampling. White grub populations should be assessed when the grubs become large enough to be easily seen (August for the annual grubs and early June for black turfgrass ataenius). Assess by taking square foot samples several places over the turf area. Populations of annual grub species that are less than six grubs per ft² can usually be masked by water and fertilizers. Populations between 10 and 15 per ft² can cause significant turf damage later in the fall, September and October. Of course, populations occasionally reach 40 to 60 grubs per ft² and these levels can cause damage by late August.

Sampling only in the most likely turfgrass habitats can usually reduce time spent doing grub sampling. Most of the annual white grubs seem to prefer grass in sunny areas. The night flying adults are often attracted to streetlights and may lay large numbers of eggs under or near these lights. Black turfgrass ataenius adults prefer to lay their eggs in the compacted, moist, and decaying thatch. The green June beetle prefers sunny, thatchy turf. Japanese beetle adults usually attack high quality turf near favorite food trees and shrubs.

Cornell Cooperative Extension has published the following treatment thresholds for white grubs:

<u>Species</u>	<u>Number of grubs per</u>	
	<u>sq. ft.</u>	<u>core*</u>
Asiatic garden beetle	18-20	2
Black turfgrass ataenius	30-50	3-5
European chafer	5-8	Any
Green June beetle	5	Any
Japanese beetle	8-10	Any
Oriental beetle	8	Any
Northern masked chafers	8-12	Any
May and June beetles	3-4	Any

*10.8 cm diameter soil core of standard golf course cup cutter

Identification of Species: The adults are easily identified to genus but the grubs are the stage usually found in the turf. The grubs are identified by the form, shape, and arrangement of bristles (the raster) on the last abdominal segments. A 10X or 15X hand lens is usually adequate for identification and the common white grub groups can be identified using a raster pictorial key.

Control Options: White grubs seem to be periodic pests, attacking turf areas irregularly from year to year. The major factor influencing development of damaging numbers of grubs is soil moisture and rainfall. In general, in years with normal or above normal rainfall, grub populations increase. Well-maintained turf next to ornamental plants favored by the adults seems to be more commonly attacked. However, masked and European chafer adults do not feed, and these pests build up in well-watered and maintained turf. Black turfgrass ataenius and green June beetle adults seen to be highly attracted to turf with decaying thatch layers.

C. Cultural Management

Water Management - Practically all white grub species require moist soil for their eggs to hatch. The young larvae are also very susceptible to desiccation. In areas where turf can stand some moisture stress, do not water in July and early August when white grub eggs and young larvae are present. On the other hand, moderate grub infestations can be outgrown if adequate water and fertilizer is applied in August through September and again in May when the grubs are feeding.

Fertilization – Fall fertilization will help fall recovery, but avoid spring nitrogen applications that promote shoot growth over root growth.

Overseeding and Sodding – Implement aggressive overseeding to counteract stand thinning and sod with on-site nursery-grown sod where required.

Host Plant Modifications - Certain species of scarab adults prefer specific host plants. Where Japanese beetles are common, do not plant roses, grapes, and lindens along high maintenance turf areas. May/June beetles prefer oaks, and the green June beetles feed on ripening fruits.

D. Organic Suppression/Control

- Hb2 ® Parasitic Nematode – *Heterohabditis bacteriophora*
- Azatin XL®, azadirachtin biopesticide
- Botanigard® 22WP, *Beauveria bassiana*
- Botanigard® ES®, *Beauveria bassiana*
- Naturalis L®, *Beauveria bassiana*
- Milky Spore, *Paenibacillus popilliae*

E. Organic Threshold

Superintendent's discretion.

F. Special Use Exemptions

Special use exemptions should be considered only when the thresholds provided above are being approached or have been exceeded after organic controls have been used.

Based on the DEIS ITM Plan, requests for special use exemptions could include the use of bendiocarb or ethoprop products.

6.1.2 Black Cutworms

A. Damage Symptoms:

- Dig a burrow into the thatch/soil or use existing cracks and crevices or aeration holes
- Emerge at night to clip off grass blades and shoots
- Feeding damage often shows up as circular spots of dead grass or depressed spots that resemble ball marks on golf greens.

B. Monitoring and Thresholds:

- use of a disclosing solution is beneficial in determining population pressure
- if a soap flush reveals 5 to 10 larvae per yd² on golf course fairways, remedial controls would be necessary
- only several cutworm spots on greens may require treatments, threshold of one per square meter

C. Cultural Management

Weed Management - Since this pest is attracted to various broadleaf weeds, reduction of these populations would reduce the attractiveness of the turf environment.

Aeration - Since the larvae have better survival in existing burrows, hold back aeration when significant activity is possible.

Clippings Management - Adults may be included with clippings from greens. Clippings should not be disposed within 100 feet of any green.

D. Organic Suppression/Control

- Conserve®, Spinosad fermentation product
- Dipel Pro DF Biological Insecticide Dry Flowable®, *Bacillus thuringiensis*
- Javelin WG®, *Bacillus thuringiensis*

E. Organic Threshold

Superintendent's discretion.

F. Special Use Exemption Parameters

Special use exemptions should be considered only when the thresholds provided above are being approached or have been exceeded after organic controls have been used.

Based on the DEIS ITM Plan, requests for special use exemptions could include the use of acephate, ethoprop or lambda cyhalothrin products.

6.2 Insects Less Likely to Occur

6.2.1 Sod Webworm

A. Damage Symptoms:

- Generally tunnels are constructed in the soil and thatch, and lined with silk.
- Cut down individual blades of grass
- Eventually gives a sparse and ragged appearance to the turf
- Extensive infestations may lead to irregular brown patches of turf, especially in dry periods
- High populations can literally mow down turf
- Birds are commonly seen feeding where sod webworm populations are high

B. Monitoring and Thresholds:

- Use 1 fluid ounce of lemon-scented dish detergent in 2 gallons of water as a disclosing solution applied over 2-3 square feet of turf and count the number of emerging larvae
- Generally, 5 to 10 larvae per yd² may warrant control on fairways, 2-3 per square yard on tees/greens
- Adults may be captured using an insect net or light trap
- Visual inspection often reveals larger, sawdust-like fecal pellets (=frass) with silk webbing
- Green frass indicates recent or current activity
- Bird feeding may indicate sod webworms, but is not a confirmation of their presence

C. Cultural Management

Irrigation Management - Damage can often be outgrown if water is continually available. Considerable damage may occur if irrigation is not possible during periods of drought,

Fertilization Management – Proper fertilization practices will produce a turf stand better able to withstand some damage from sod webworms.

D. Organic Suppression/Control

- Conserve®, Spinosad fermentation product
- Dipel Pro DF Biological Insecticide Dry Flowable ®, *Bacillus thuringiensis*
- Javelin WG ®, *Bacillus thuringiensis*
- Botanigard 22WP ®, *Beauveria bassiana*
- Botanigard ES ®, *Beauveria bassiana*
- Naturalis L ®, *Beauveria bassiana*
- Azatin XL ®, Azadirachtin biopesticide

E. Organic Threshold

Superintendent's discretion.

F. Special Use Exemption Parameters

Special use exemptions should be considered only when the thresholds provided above are being approached or have been exceeded after organic alternatives have been used.

Based on the DEIS ITM Plan, requests for special use exemptions could include the use of acephate, ethoprop, bendiocarb, lambda cyhalothrin or bifenthrin products.

6.2.2 Chinch Bugs

A. Damage Symptoms:

- Irregular patches of turf begin to yellow, turn brown, and die
- Patches continue to become larger in spite of watering
- Damage generally occurs during hot, dry weather from June into September

B. Monitoring and Thresholds

- Flotation technique – on fringe of damaged area insert an open ended coffee can 2 inches into the soil , fill with water and look for floating adults for 5 to 10 minutes.
- From multiple flotation test locations, more than 20 adults per flotation warrant control, especially if these numbers are encountered in June and July

C. Cultural Controls

Irrigation Management - Since this pest requires hot dry conditions for optimum survival and reproduction, irrigation during the spring and early summer may increase the incidence of natural pathogen spread

Recovery From Damage - Turf with light to moderate damage would recover rather quickly if lightly fertilized and irrigated regularly.

D. Organic Suppression/Control

- Botanigard 22WP ®, *Beauveria bassiana*
- Botanigard ES ®, *Beauveria bassiana*
- Naturalis L ®, *Beauveria bassiana*
- Azatin XL ®, azadirachtin biopesticide

E. Organic Threshold

Superintendent's discretion.

F. Special Use Exemption Parameters

Special use exemptions should be considered only when the thresholds provided above are being approached or have been exceeded after organic alternatives have been used.

Based on the DEIS ITM Plan, requests for special use exemptions could include the use of acephate, ethoprop, bendiocarb or bifenthrin products.

6.3 Other Insects

Conserve® can be used to treat for Annual Bluegrass Weevil while control for Bluegrass Billbug will have to rely on cultural methods at this time.

SECTION 7 POTENTIAL WEEDS AND CONTROL STRATEGIES

Weeds tend to proliferate slower than diseases and insect pests, therefore their potential to produce more rapid detrimental effects to golf course turf is lower. Thus, the probability of Special Use Exemption Requests for herbicide treatments is expected to be lower than the probability of such requests for fungicide or insecticide use.

Currently the availability of non-synthetic controls for turf weeds is very limited as compared to turf diseases and insects. For the purpose of this Draft Plan, two non-chemical control measures are proposed in addition to the cultural practices aimed at attempting to prevent weed occurrence through the promotion of a dense turf stand. Hand picking is proposed for selective weed control. Hand picking is very labor intensive and expensive to implement. For non-selective weed control, this Draft Plan proposes the use of the Waipuna® system which involves the application of hot water and an organic foam that traps the heat from the applied water, and aids in the killing of the treated vegetation. Areas where non-selective control is implemented shall be immediately overseeded or sodded to re-establish the desired turf.

7.1 Weeds Most Likely to Occur at Higher Densities

7.1.1 Annual Bluegrass

Annual bluegrass is most competitive under conditions of close mowing, frequent irrigation, moderate to heavy nitrogen fertilization during cool weather, and moderate soil compaction. Annual bluegrass can be a vector for fungal diseases.

A. Cultural Controls

- Correct any drainage problems.
- Raise height of cut when possible, even a millimeter can help.
- Fertilize to favor desired turf species (for creeping bentgrass, nitrogen fertility should be applied during warmer months).
- If feasible, allow turf to wilt during periods of moisture stress. Annual bluegrass does not have a dormancy mechanism for drought, while other cool-season grasses may become dormant and would recover when irrigated. Annual bluegrass that is allowed to go to the permanent wilting point dies due to the inability to go dormant.
- Avoid turf cultivation during periods when soil temperature has consistently cooled causing annual bluegrass seed to germinate early fall. Maintain maximum shoot density during this time of the year, as annual bluegrass seedlings require space and light to become established.
- Use mowing equipment that causes the least amount of turf wear and soil compaction. Where feasible, collect clippings on tees and greens, especially during the peak seed production period of the year (late spring). Light verticut and collect clippings when seedheads are being produced.

B. ITM Plan Products for Control – Candidates for Special Use Exemptions

- Ethofumesate

7.1.2 White Clover

Physical removal of white clover is not a good management strategy as stolons spread further than expected and portions can be left behind. Good liming and fertilization practices that maintain turf density are desired.

A. Cultural Controls

- Nitrogen fertility is of greatest importance. When the nitrogen level for a particular turf species is not adequate, white clover or other low growing legumes commonly invade.
- Physical removal is recommended only under conditions of very close mowing of 1/4-1/3 inch where pluggers can be used effectively and followed by topdressing and overseeding.

B. ITM Plan Products for Control – Candidates for Special Use Exemptions

Based on DEIS Risk Assessment results and ITM Plan, products that can safely be used to control broadleaf weeds are 2,4-D, Dicamba, 2,4-DP, 2,4-DP MCPA, MCPP and triclopyr, generally in various combination products.

7.2 Weeds Likely to Occur, But at Lower Densities

7.2.1 Dandelion

A. Cultural Control

- Maintain dense turf through adequate nitrogen fertility and disease and insect control to reduce voids in the turf in the spring into which dandelion seed can be disseminated.
- When present in high value areas at low densities physically remove, being careful to include all reproductive vegetative plant parts.

B. ITM Plan Products for Control – Candidates for Special Use Exemptions

Based on DEIS Risk Assessment results and ITM Plan, products that can safely be used to control broadleaf weeds are 2,4-D, Dicamba, 2,4-DP, 2,4-DP MCPA, MCPP and triclopyr, generally in various combination products.

7.2.2 Plantain

A. Cultural Control

- Proper pH and fertility levels should be maintained. Common plantain can compete particularly well where pH is high (>8.0). Areas of lime spills or where irrigation water has a high pH may have more serious plantain encroachment problems. Acidify soil, 6.5 to 7.0, if soil testing so indicates.
- When present in high value areas at low densities physically remove, being careful to include all reproductive vegetative plant parts.

B. ITM Plan Products for Control – Candidates for Special Use Exemptions

Based on DEIS Risk Assessment results and ITM Plan, products that can safely be used to control broadleaf weeds are 2,4-D, Dicamba, 2,4-DP, 2,4-DP MCPA, MCPP and triclopyr, generally in various combination products.

7.2.3 Mouse-Ear Chickweed

A. Cultural Controls

- Decrease shade and improve drainage.
- Physical removal is recommended only under conditions of very close mowing of 1/4-1/3 inch where pluggers can be used effectively and followed by topdressing and overseeding.

B. ITM Plan Products for Control – Candidates for Special Use Exemptions

Based on Risk Assessment results and ITM Plan, products that can safely be used to control broadleaf weeds are 2,4-D, Dicamba, 2,4-DP, 2,4-DP MCPA, MCPP and triclopyr, generally in various combination products.

7.2.4 Crabgrasses and Other Summer Annual Grasses

A. Cultural Controls

- Avoid re-establishing turf from seed at the time crabgrass normally is germinating (soil temperature near the surface of 55°F).
- Avoid verticutting or core cultivation at the time crabgrass is germinating.
- Irrigate to avoid wilting of turf.
- Maintain turf density so that no bare areas greater than two inches by two inches will occur.
- Raise mowing height slightly at the time crabgrass seed is germinating.
- Reduce available nitrogen when crabgrass is most competitive (warmest and most humid weather) via timing and low application rates of soluble nitrogen sources and/or proper selection of slow release nitrogen sources.

B. ITM Plan Products for Control – Candidates for Special Use Exemptions

Based on Risk Assessment results and ITM Plan, products that can safely be used to control annual summer grasses postemergence are, fenoxaprop, MSMA, or dithiopyr.

7.3 Other Weeds

The individual weeds discussed above are very common and have the highest potential to be problematic on the golf course. There are many other weed species that have potential for occurring, and like for the weeds addressed above, cultural methods to prevent their occurrences should focus on remedying the edaphic deficiencies that are producing a competitive advantage to the weed species over the golf course turf.

SECTION 8 RECORDS OF AMENDMENTS IMPLEMENTED INCLUDING SPECIAL USE EXEMPTIONS

- Notices to the Committee
- Applications to the Committee
- Committee Decision Documentation

Record copies of documentation of any Committee-approved changes to this Plan that occurred during the year this Plan was implemented, including documentation of notices/applications for special use exemptions and decision making for such applications, shall be inserted into this section of the Plan at the time documentation is prepared. This record keeping will keep this annual Plan current through the year that it is implemented.

SECTION 9 PEST MONITORING REPORTS

Copies of monitoring data sheets from the year this Plan is implemented shall be inserted into this section of the Plan as they are generated. Any diagnostic records should also be compiled in this section of the Plan, including not only on-site diagnostics, but also any off-site diagnostic laboratory reports.

SECTION 10 CULTURAL PRACTICES RECORDS

Information regarding performance of cultural practice undertaken during the year this Plan was implemented shall be compiled in this section. Information that shall be compiled includes soil test results, dates, locations, names of fertilizer applied, rates of nitrogen, phosphorus and potassium, cultivation activities, irrigation schedule, estimates of turf wetness periods, and mowing frequencies.

SECTION 11 PEST CONTROL APPLICATIONS RECORDS

Information regarding application of pest control products for the year this Plan is implemented shall be compiled in this section. Information that shall be compiled includes dates, product names, rates of application, areas treated, total amounts applied, target pests and efficacies of applications.

SECTION 12 WATER QUALITY MONITORING RECORDS

Copies of all laboratory reports or other measurements of water quality performed to meet the requirements of NYSDEC's SPDES permit that occurred during the year that this Plan is implemented shall be inserted into this section of the Plan.

SECTION 13 COMMITTEE INSPECTION AND AUDIT REPORTS

Copies of reports from all Committee inspections that occurred during the year this Plan is implemented shall be included in this section of the plan.

**SECTION 14 YEAR-END CERTIFICATION OF COMPLIANT
IMPLEMENTATION**

At the end of the calendar year that this Plan was implemented the following certification shall be provided.

The Committee hereby certifies that the Management Plan that was implemented in the year _____ was compliant with the terms and conditions of the Agreement in Principle.

Chairman's Name and Title

Signature

Date