MOREHOUSE FARM PARK

DRINKING WATER QUALITY MANAGEMENT PLAN

FINAL DRAFT: SEPTEMBER 2006

MMI #1811-05

Prepared for:

Town of Weston
Weston, Connecticut

Prepared by:

Milone & MacBroom, Inc.
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773

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Section 1

1.0 INTRODUCTION

1.1 Purpose of Drinking Water Quality Management Plan

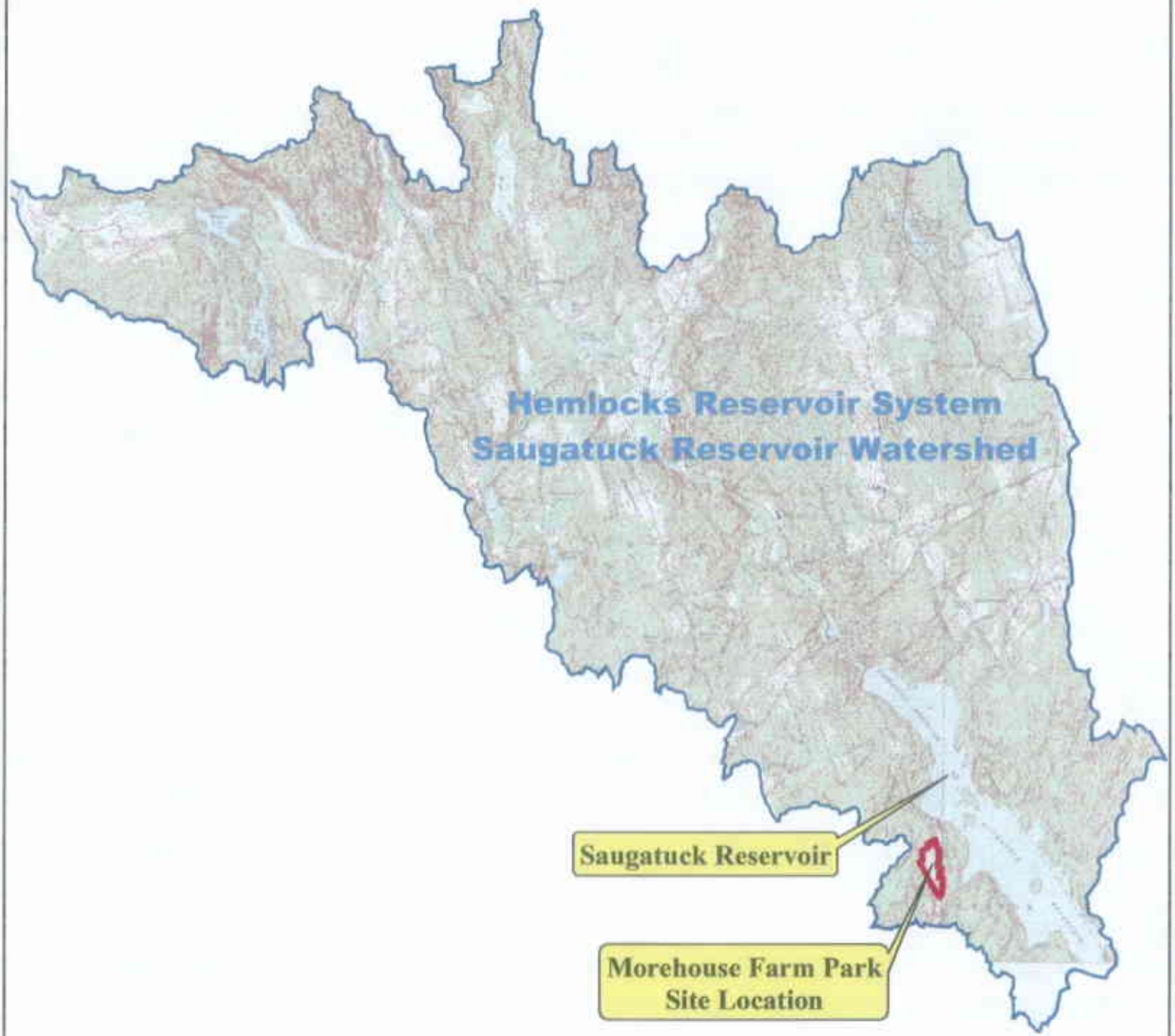
Morehouse Farm Park (MFP) is a seasonally-used recreational facility owned and operated by the Town of Weston, Connecticut. MFP is comprised of athletic fields, parking areas, and an access road. Refer to Appended Figure 1 for a site plan.

MFP is located west of the Saugatuck Reservoir, an active public water supply source for Aquarion Water Company. Because the site is located in the watershed of the reservoir, and the Town of Weston is a regulated water utility due to its operation of a water system at the Town Hall / school complex, MFP lies on regulated public water supply watershed land. Figure 1-1 depicts the site in relation to the reservoir and its watershed.

The subject Drinking Water Quality Management Plan (DWQMP) was developed in accordance with the requirements of part 11 (c) of Consent Order DWD 04-157-274. As specified in the Order, *"a draft water quality management plan is a plan that maximizes efficient and effective management practices at the Morehouse Farm Park site to protect the Saugatuck Reservoir and promote the public health, safety and welfare."* The goal of the DWQMP is to ensure that activities associated with daily operations and existing conditions of MFP will not adversely impact water quality within the Saugatuck Reservoir and its watershed.

1.2 Drinking Water Quality Management Plan Background

Drinking water consumption can directly affect public health if source water quality is compromised. Drinking water that is contaminated at the source can endanger and increase risks to public health. Meanwhile, reliance on treatment technology alone to remove contaminates of concern has increasing technical and financial limitations.



Engineering, Landscape Architecture and Environmental Science MILONE & MACBROOM® 99 Realty Drive Cheshire, Connecticut 06410 (203) 271-1773 Fax: (203) 272-9733 www.miloneandmacbroom.com	**Morehouse Farm Park** **Drinking Water Quality Management Plan**		**LOCATION:** **Weston, Connecticut**	
	MMI#: 1811-05 MXD: H:fig1_1.mxd SOURCE: DEP Bulletin No.40	N Site Location & Saugatuck Reservoir Watershed	DATE: 09/07/06 SCALE: NTS	SHEET: **Figure 1-1**

Therefore, source protection is a vital component of the EPA Source Water Collaborative strategy. Source protection serves as the initial barrier to contaminants entering drinking water supplies, increasing the efficiency and cost effectiveness of available treatment, while maintaining the relatively low cost of public water to the consumer.

DPH believes that a locally based comprehensive planning mechanism is necessary to provide adequate drinking water source protection to public source water areas. In concept, the DWQMP is a tool for long-term public health protection and sustainability of the State's public drinking water supplies that provides a public voice for each watershed community. To date, few locally based, comprehensive, stakeholder-involved, implementation planning tools exists with the intent of protecting the State's drinking water quality. The MFP DWQMP will be one of the first.

1.3 Development of Plan

As the manager of the MFP site, the Town of Weston Parks & Recreation Department is responsible for overseeing the development of the DWQMP, and subsequent implementation of the plan. A technical advisory committee was convened by the Parks & Recreation Department to develop the plan. The advisory committee includes stakeholders with keen interest in the project site and the Saugatuck Reservoir, ranging from a local resident, to local and state governmental agencies:

- Mr. David Ungar, Director, Town of Weston Parks & Recreation Department;
- Mr. Woody Bliss, First Selectman, Town of Weston;
- Mr. Cory Attra, PE, Chair, Town of Weston Conservation Commission;
- Ms. Paula Pendleton, Connecticut Department of Public Health (DPH) Drinking Water Division;
- Mr. Ernie Albin, Resident and Neighbor of MFP, Town of Weston;
- Ms. Sally Harold, The Nature Conservancy;

- Mr. Brian Roach, Aquarion Water Company; and
- Ms. Sue Jacozzi, Westport-Weston Health District.

Meetings with the technical advisory committee were held on January 18, March 1, and April 24, 2006. Copies of meeting minutes are included in Appendix A.

This DWQMP was developed in accordance with guidelines and recommendations in the U.S. Environmental Protection Agency (EPA) document entitled *"Draft Handbook for Developing Watershed Protection Plans to Restore and Protect Our Waters,"* dated October 2005; and guidelines of the DPH as included in the presentation *"Drinking Water Quality Management Planning,"* presented in May 2006. According to the DPH presentation, the following elements of a DWQMP are possible and/or recommended:

1. Community based, allowing for community empowerment
2. Development of planning and implementation team
3. Stakeholder identification and involvement
4. Local municipal and public water system partnerships
5. Water quality tracking and protection measures
6. Proactive local land use planning and strategies
7. Best management practices
8. Preservation and protection of critical land areas
9. Public water and sewer identified growth areas
10. Low impact development techniques
11. Stormwater management and controls
12. Recreational opportunities
13. Water quality controls for existing development
14. Nonpoint source management
15. Water quality education
16. Integration of other water quality programs

17. Implementation components
18. Ongoing implementation team meetings

Because these elements are possible for plans of many scales (with some watersheds encompassing many communities), some would not apply to the MFP DWQMP. In particular, elements 8, 9, and 10 are not applicable to MFP, as they pertain to developable land and numerous separately-owned parcels in entire watersheds.

1.4 Plan Objectives

Early in the development of the DWQMP, it was determined that the plan must include a list and description of any and all present and future on-site activities and processes at MFP site, an analysis and evaluation of the potential hazards any of these activities and/or processes may pose to drinking water supply of the Saugatuck Reservoir, and a description of control measures, emergency plans and corrective actions needed to address each identified activity and/or process at the site. Identified activities and processes to address in the plan included the following:

- Storm water design, measures, maintenance, control and treatment;
- Chemical application, use, handling, and storage;
- Fuel use, handling, and storage;
- All other processes involved in field maintenance;
- Impervious surface design and maintenance,
- Ball field design;
- Roles, responsibilities, and enforcement of plan and processes;
- Periodic water quality testing, monitoring, and reporting program;
- Potential future change of use of the parcel from its current recreational use;
- Future adjustments to address water quality degradation;
- Emergency spill control and containment;
- Parking and vehicle restrictions;

- Activities allowed including restrictions and controls;
- Signage and visitor notification concerning site restrictions and sensitivity; and
- Waste collection, control, and disposal.

The DWQMP must identify the roles and responsibilities of the individuals or groups that would assure implementation and compliance with the plan.

1.5 Schedule for Plan Development and Implementation

The Consent Order specifies the following timetable for plan development and implementation:

- *10/31/2006 – Draft Drinking Water Quality Management Plan due*
- *1/30/2007 – Deadline for public meeting and public comments*
- *6/2/2007 – Final Drinking Water Quality Management Plan due*
- *10/20/2007 – Deadline for Implementation of Management Plan*

As required by the Consent Order, this Draft DWQMP has been prepared before the deadline of October 31, 2006.

1.6 Exclusions and Limitations

Early in the process of developing the DWQMP, it was realized that the plan does not, and can not, address land use and activities located beyond the boundaries of MFP. This is an important distinction because the watershed of the Saugatuck Reservoir is 22,212 acres in size, compared to the 33 acres in the MFP site. However, even with its small contribution to the entire watershed, activities on MFP have the potential to affect water quality.

As a separate effort, the Town of Weston has implemented a program to monitor ground water levels at private water supply wells located west of MFP, and at a bedrock observation well located on the MFP site. This monitoring program was designed to evaluation potential impacts of irrigation water withdrawals on the bedrock aquifer. While this remains a topic of interest to the Town and the neighbors, it does not have any bearing on the development and implementation of this DWQMP. The Parks & Recreation Department should be contacted for additional information about the ground water level monitoring program.

1.7 Plan Updates

The Consent Order specifies that the DWQMP must be updated a minimum of ten years after the initial development. Thus, the Parks & Recreation Department will be charged with reconvening a technical advisory committee before the year 2017. However, the option remains to update and amend the DWQMP as needed before then. Provisions for more frequent updating are discussed in the applicable sections of this DWQMP.

Section 2

2.0 WATERSHED INVENTORY

2.1 Historical Land Use

MFP is located at 478 Newtown Turnpike in Weston, Connecticut. The site is approximately 33 acres in size, and was owned and operated by the Morehouse family prior to its sale to the Town of Weston in 2002. Historically, the site was occupied by two buildings, a dirt access road, and several open grass fields as explained below. Appended Figure 2 illustrates these pre-existing conditions.

The open fields were historically used for tree farming. The tree farm was characterized by natural growth of native grasses between the rows of low grade hardwoods. No record of chemical controls for the fields is available. The property was minimally maintained to categorize the land use as agricultural, thus minimizing taxation of the property.

The majority of the site was wooded with an intermittent stream and wetland corridor along the western boundary, an exposed bedrock ridge on the eastern boundary, and steep grades towards the south southeast of the site. The eastern boundary is bordered by State Highway Route 53, also known as Newtown Turnpike.

A single family residence was located in the southwest section of the property off of Newtown Turnpike. A one-story barn was located approximately 300 feet northeast of the residence. The improved driveway leading to the residence and barn was approximately 10 feet wide and consisted of wheel compacted soil. The access road continued north through the open fields along the western boundary, then continued northeast through the property.

2.2 Hydrology

The entire MFP site lies within the Saugatuck River drainage basin. The Saugatuck River drainage basin is identified as basin #7200 and is 22,200 acres. The sub-watershed that MFP lies within is much smaller. Figure 2-1 illustrates the sub-watershed and delineates the drainage basins for the northern and southern watercourses associated with the site.

The delineated sub-watershed of MFP and the surrounding residential area has an area of 317 acres, which is approximately 1.5% of the total Saugatuck River drainage basin. The focus of the DWQMP is directly related to this sub-watershed and will focus on this area, as opposed to planning for the entire Saugatuck River drainage basin.

The MFP watershed includes two watercourses to the northeast and southeast of the site that eventually empty into the Saugatuck Reservoir. The first watercourse flows through the southern portion of the site and the second is located approximately 120 feet north of the site. The watersheds of each stream have been delineated and are depicted on Figure 2-1. The watersheds were delineated from the exit point from MFP, upstream to their respective headwaters. The northern stream's watershed is approximately 134 acres, and the southern stream's watershed is approximately 72 acres in size.

The stream flowing through the southern portion of the site is formed by two unnamed tributaries located to the west of the site. The first unnamed tributary has a southerly flow parallel to MFP. Its headwater wetland system is located along the western boundary of MFP west of the central sediment basin. The second unnamed tributary flows from the northwest across Blue Spruce Circle. The headwater to the tributary is located within an isolated wetland system approximately 1,000 feet west of MFP.

Total Watershed = 317 acres
Total MFP Watershed = 32 acres
% MFP Land within Impacted Watershed = 9%

NS-1
OF-2
OF-1
12 acres
13 acres
S-1
134 acres
7 acres
S-3
S-2
72 acres
Saugatuck Reservoir
Western Unnamed Tributary
Unnamed Tributary
Blue Spruce Cir

Legend

Property Line

Sub-Basins

- Saugatuck Basin
- Southern Stream Basin
- Northern Stream Basin
- NS-1 Watershed
- S-1 Watershed
- S-3 Watershed

1 inch equals 600 feet

0 300 600 1,200 Feet

MILONE & MACBROOM
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773 Fax (203) 272-9733

REVISIONS

Watercourses in Vicinity of Site with Sub-Watersheds

Morehouse Farm Park
Drinking Water Quality Management Plan

Weston, Connecticut

PAS	PAS	BM
DESIGNED	DRAWN	CHECKED

SCALE: 1:7,200

DATE: Sept 2006

PROJECT No: 1841-05

MXD NAME: H:\Fig2_1.mxd

FIGURE 2-1

SHEET No.

The two tributaries converge approximately 400 feet upstream from the southwest corner of MFP. The stream continues to the east across southern portion of the site into a three-foot by two-foot culvert that transitions to a 24-inch reinforced concrete pipe. The pipe crosses under Newtown Turnpike and discharges to a watercourse that eventually flows to the Saugatuck Reservoir.

The northern watercourse does not enter MFP, but does receive water from the northern two fields through the stormwater system. The watercourse flows from southwest to northeast approximately 200 feet north of the MFP property line. The headwaters to the watercourse are located within a wetland located approximately 700 feet west of MFP.

2.3 Review of the Saugatuck Reservoir Source Water Assessment

The Connecticut DPH, in conjunction with the Department of Environmental Protection (DEP), completed a *Source Water Assessment Report – An Evaluation of the Susceptibility of Public Drinking Water Sources to Potential Contamination*, for the Saugatuck Reservoir in May 2003. Appendix B contains a copy of the report.

The source water assessment plan (SWAP) was completed in accordance with the requirements of the 1996 amendment to the Safe Drinking Water Act. The SWAP assessment was intended to provide Aquarion Water Company consumers information about their drinking water sources, potential contamination to those sources, and steps to prevent contamination.

The report identifies properties with underground storage tanks (USTs), failing septic systems, improper waste disposal, and/or commercial/ industrial sites that store or use chemical or generate hazardous waste. As stated in the report, the assessment can be used to target and implement enhanced source water protection measures such as inspections, land use regulations, land acquisitions, septic system maintenance, and education.

The Hemlock Reservoir System was reviewed by the DPH during 2002. The reservoir system includes the Saugatuck Reservoir. The complete Hemlocks Reservoir System has a watershed of approximately 36,946 acres of land in Bethel, Danbury, Easton, Fairfield, Newtown, Redding, Ridgefield, and Weston. In general, these lands were found to have a low risk of contamination form any identified potential sources of contamination.

Using the guidelines set within the SWAP report, MFP is a low risk potential for contamination to the Hemlock Reservoir System. The park does not contain a UST, septic system, chemical waste, or generate hazardous waste. The park does have small quantities of waste storage in trash barrels, as discussed in Section __. These barrels are emptied daily by park personnel and disposed at an off-site facility. MFP does not contain a dumpster.

The SWAP report lists recommendations and opportunities to lower the risk level of the Hemlock Reservoir System. Table 2-1 is a summary of the recommendations from the SWAP report.

Table 2-1
SWAP Summary and Recommendations

Assessment Category	Conditions as of June 2002	Recommendations
Environmental Sensitivity Factors	Predominate watershed with moderate slopes	Monitor runoff during heaver precipitation events
	Moderate or unknown capacity for algae/plankton growth	Monitor nutrient levels and identify trophic status of unknown waterbodies
Potential Contaminants in Untreated Source Water	None identified	Public outreach for residential best management practices for use of hazardous materials or generation of waste

Table 2-1 (Continued)
SWAP Summary and Recommendations

Assessment Category	Conditions as of June 2002	Recommendations
Potential Risk Factors	Potential contaminant sources in watershed	Inspection of sites periodically and maintain water quality monitoring program for such sites
	More then 50% undeveloped land	Proactively work to insure low-risk development occurs on these parcels
	Major state or interstate roadways through watershed	Monitor road salt and herbicide usage along roadways, and potential spills from vehicles
	Known contaminant release points	Maintain surveillance around release point to insure surface water contamination is not occurring
		Encourage residential inspection and regular cleanout of onsite septic systems and replace USTs with ASTs
Source Protection Needs Factors	20 to 30 percent of watershed owned by public water system	
	Local regulations and zoning initiatives for the protection of drinking water sources do not exist	Establish local watershed protection regulations to protection the drinking water sources
	Comprehensive plans and policies for protection of public drinking water sources does not exist	Develop or enhance local government plans that favor the protection of drinking water sources
	Point source pollution discharge points not present in the watershed area	Support environmental awareness and education with the community

The DWQMP will be used to assist with the protection of the Saugatuck Reservoir as it pertains to land use and daily operations of MFP. The environmental sensitivity factors that most likely relate to MFP include steep slope conditions to the south of the fields which will generate runoff that may potentially impact the trophic status of the reservoir.

Overall, this DWQMP fulfills the proactive recommendations presented in the SWAP report to protect the public from potential pollution sources located on the MFP site that would impair a portion of the Hemlock Reservoir System. The Town of Weston will implement the recommendations set forth in this document, strengthening its dedication to protecting the public from potential drinking water contamination.

2.4 Construction Activities

Local permitting and design of the MFP site was completed in 2003. Construction on the site began in early April 2003 and ended October 2004. The multi-use facility includes four rectangular sports fields overlapping in areas with four baseball/softball playing fields. Access to the fields is from a paved driveway off of Newtown Turnpike, transitioning to a processed stone surface drive and parking area.

The original construction specification was to complete MFP in three construction phases in order to minimize the need for extensive stormwater controls to handle excessive runoff during storm events. Two sedimentation basins were engineered to control storm runoff that would be generated during the three stages.

Ultimately, the subcontractor for the MFP project cleared the entire site in one phase, exposing approximately 28 acres of soil before the sedimentation controls were operational. Following the clearing, heavy precipitation occurred at the site and generated runoff that carried silt to the streams and surrounding wetlands, increasing the sediment load and turbidity into the Saugatuck Reservoir. By clearing the site in one phase, the engineered controls for stormwater runoff were undersized and were not designed for the initial runoff generated during storm events that occurred in the fall of 2003.

An additional sedimentation basin was designed to counteract the clearing of the site in one phase, and is currently located in the center of MFP. Additional silt fencing was also installed surrounding the watercourses and wetlands to prevent runoff from entering until the grading and seeding was completed.

The fields were designed and constructed to minimize ponding and maximize drainage. The playing fields were constructed with a gravel underdrain system that consists of six inches of topsoil over an eight inch gravel blanket on top of a four inch compacted

substrate. Water is collected in four-inch corrugated plastic pipes within the compact substrate, and flows to the outlet structures or basins.

2.5 Existing Conditions

The completed MFP has four baseball/softball diamonds, two with clay infields and two within multi-use fields with grass infields, and the five soccer fields. The fields were designed for multi-use in such a way that two of the baseball fields overlap with three of the soccer fields. At one time the park may hold a combination of sporting activities to maximize the use of MFP by the residents of Weston.

MFP is currently used on a seasonal basis by the residents of the Town of Weston under the program direction of the Town of Weston Parks & Recreation Department. The site is used for day outings and special events for soccer, baseball, little league and softball games. The park is open from sunrise to sunset, and is gated when not in use. Existing conditions of the MFP site are depicted on Figure 2-2.

2.6 Communications

During the technical advisory committee meetings, it was determined that the relationship and lines of communication between Aquarion Water Company and the Town of Weston could be improved. Aquarion Water Company staff formerly inspected sites in the Town of Weston, but no longer do with as much frequency. Likewise, adequate notification to Aquarion Water Company apparently did not occur during construction of MFP, although Aquarion Water Company did review concept plans in the early stages of the project.

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Morehouse Farm Park
Drinking Water Quality Management Plan

LOCATION: Weston, Connecticut

MMI#: 1811-05
MXD: I:\Fig2_2.mxd
SOURCE: DEP Gis Division

N W E S

Existing Conditions

DATE: 9/8/06
SCALE: 1:4,800

SHEET: Figure 2-2

As a result, this DWQMP addresses methods of improving communications pertaining to MFP in applicable sections. Proposed methods of communication include reconvening the technical advisory committee and distributing information to stakeholders.

Section 3

3.0 STORMWATER SYSTEM

3.1 System Design and Construction

Prior to the construction of MFP, stormwater runoff generally flowed in several directions due to the varying topography. Although the stormwater runoff moved off the site in different directions, all stormwater from the site eventually discharged to the Saugatuck Reservoir via the two watercourses described in Section 2.2.

The initial design for the stormwater control system, including two sediment basins, was based on four existing sub-watersheds encompassing the entire property. The four watersheds were modified and subdivided further to analyze the hydrology under proposed conditions. The total combined watershed area delineated was ±73 acres including approximately 41 acres of off-site watershed under both existing and proposed conditions. The watersheds were used to determine the peak flow under existing conditions as well as under proposed conditions with and without detention.

The system was designed based on a TR-20 model to predict stormwater flows. The stormwater basins were designed to attenuate the peak rates of runoff to the existing wetlands and watercourses. The initial design was for two sediment basins based on a three-phase construction of MFP. The rational method was used for designing the required pipe sizes of the proposed storm drainage system with adequate capacity to convey the 25-year storm event. The overall watershed was subdivided into sub-basins to determine the drainage area and stormwater runoff to each catch basin inlet.

The stormwater control system was constructed in 2003. During construction the site was cleared in one phase, causing exposure of soil beyond that which was initially anticipated. Due to field changes to the original planned grading, phasing, and limits of disturbance, the southern sediment basin design calculations were revised to reflect these changes. The results showed that the southern sediment basin was slightly undersized due to the changes

in the construction phasing. In order to mitigate the volume deficit, an additional (third) sediment basin was constructed. The additional basin was designed using the Department of Environmental Protection methodologies set forth in the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control.*

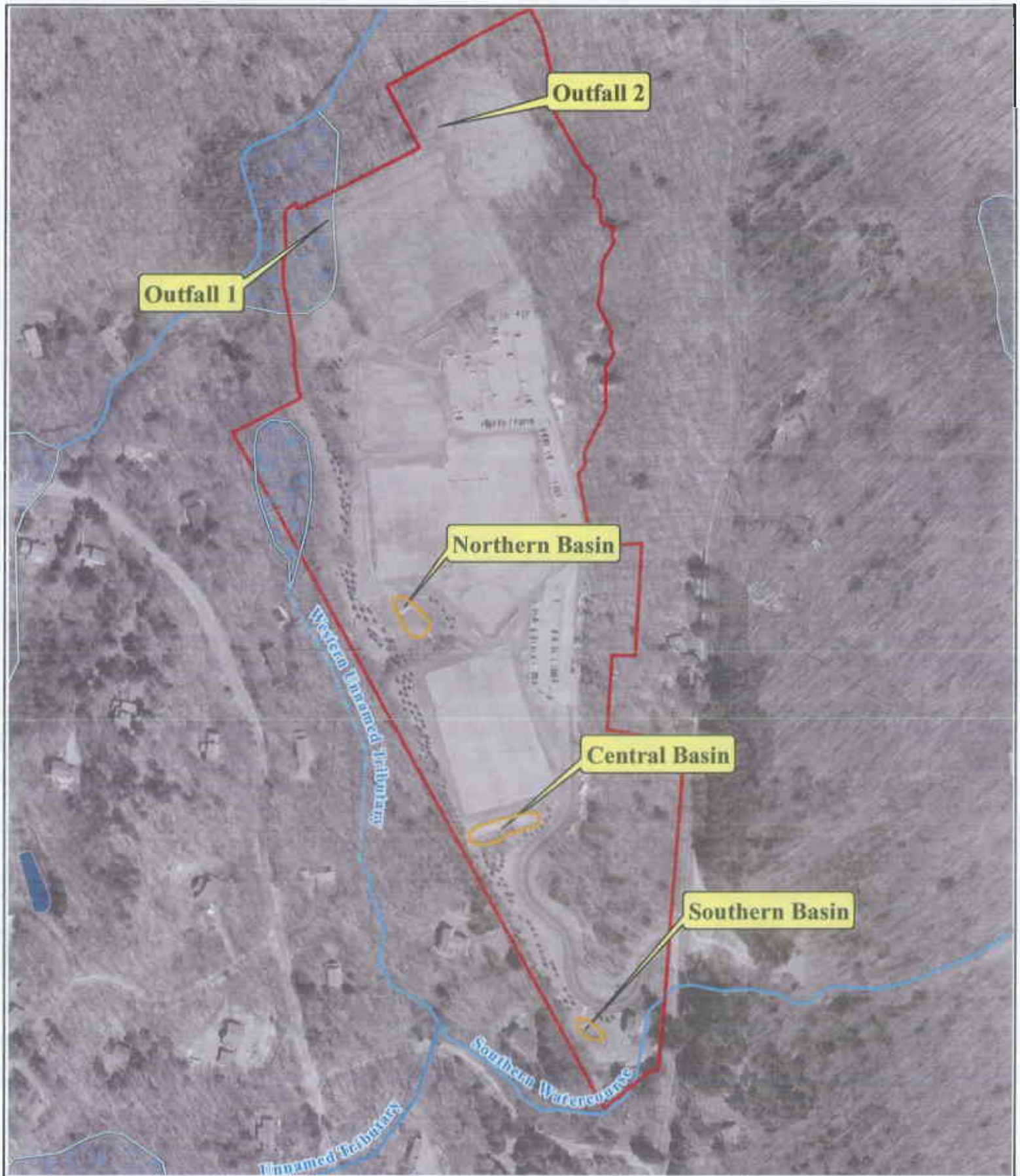
Appended Figure 1 and Figure 3-1 depict the locations of the sediment basins and the outlet structures. For the purpose of this plan, the basins will be known as the "northern basin," "central basin," and "southern basin."

The northern and southern sediment basins were constructed with sediment forebays using riprap filter berm to help remove suspended solids and debris in the stormwater. Stormwater flow rates are detained by use of an outlet control structure containing a V-notch weir with a low flow orifice. Water collected in the basins exits slowly through infiltration to ground water, or through a level spreader device during high flows. There is no direct discharge of water within the basin to the surrounding wetlands or watercourses.

The central basin was constructed originally as a temporary sediment trap and converted to a permanent sediment basin. The basin has a sediment forebay using a riprap filter berm to help remove suspended solids and debris in the stormwater. Stormwater flows out through an overflow device to the drain pipe that runs south under the access road and discharges to the southern sediment basin.

3.2 System Layout

The drainage system for MFP is based on the gravel underdrain blanket that was constructed for maximum drainage of the multi-use fields. The gravel drain system of each fields discharges to its respective sediment basin or outlet structure to minimize



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Morehouse Farm Park
Drinking Water Quality Management Plan

LOCATION: Weston, Connecticut

MMI#: 1811-05
MXD: H:\fig3_1.mxd
SOURCE: DEP GIS Division

N W E S

Stormwater Control System

DATE: 09/07/06
SCALE: 1:3,600

SHEET: Figure 3-1

erosion, reduce suspended sediments, and improve the overall water quality prior to flowing off-site.

The northern basin watershed includes drainage from the three central multi-use fields and a portion of the gravel parking area. The fields drain to the west entering a lateral pipe that runs north south and discharges to the north end of the sediment basin. During high flows, the level spreader discharges to the west.

The central basin watershed includes drainage from the southern multi-use field. An inlet pipe is located on the northwest corner of the sediment basin. The overflow from the basin flows east into the drainage pipe that runs along the access road south discharging to the southern sediment basin.

The southern sediment basin watershed includes the overflow from the central basin, runoff from the central basin to the southern basin and the access road up to the gravel parking area. During high flows the level spreader discharges to the south, eventually entering the southern stream.

The paved section of the access road contains 15 catch basins that are connected to one drain pipe. The catch basins vary in depth, but have a minimum of two feet of space below the invert of the incoming pipe or outlet pipe. The space below the inverts allows the settling of coarse sediment within the catch basin.

The northern two multi-use fields discharge to two outlet pipes. The four-inch PVC pipes are connected to the gravel underdrain system for each field and discharge onto a riprap splash pad and filter berm structure to control erosion of the slope. The flow eventually pools at the northern boundary along the stonewall and slowly infiltrates into the ground water.

3.3 System Inspections

The maintenance of the catch basins and the stormwater basins is important to the long-term quality of the water leaving the site and flowing into the Saugatuck Reservoir system. The removal of accumulated sediment and debris, and the maintenance of the vegetated buffer, are important to the productivity of the system.

Regular, scheduled inspections of the stormwater control system have not occurred subsequent to construction and site stabilization. Instead, inspections have been carried out on an "as-needed" basis. Going forward, system inspections shall be completed by Town of Weston personnel on a regular basis.

The inspection of the stormwater system will be conducted following each storm event having more then one inch of rainfall, and not less then twice per year. An inspection form shall be completed by the personnel and kept on record with the Town of Weston Parks & Recreation Department. A sample of the form is included in Appendix C. The following is a summary of the inspection form contents:

Summary of Inspection Reporting Form

- Name of the person doing the inspection
- Date of the inspection
- Weather conditions at the time of the inspection
- Recent rainfall amounts prior to the inspection
- Catch Basin Number
    - 1. Approximate depth of accumulated sediment
    - 2. Condition of the grate and overall structure
    - 3. Debris inside catch basin
    - 4. Flow or no flow at time of inspection
    - 5. Note if basin needs removal of sediment or not
- Sediment Basins
    - 1. Sediment basin name or number
    - 2. Outlet structure
        - *A. Structural Condition*
        - *B. Flow or no flow*
        - *C. If flow visual color of flow*

- 3. Embankment
  - *A. Condition of vegetation*
  - *B. Debris or invasive vegetation*
  - *C. Erosion or cutting*
- 4. Forebay
  - *A. Water present yes or no*
  - *B. Approximate depth*
  - *C. Clarity of water*
  - *D. Accumulation of sediment or debris*
  - *E. Removal of debris and type of debris*

- Northern Outfalls
  - 1. Flow or no flow
  - 2. Condition of riprap splash pad
  - 3. Embankment erosion or sedimentation
  - 4. Visual color of water
  - 5. Ponding or no ponding
- Stream and Wetlands
  - 1. Flow within stream or wetland
  - 2. Ponding in wetland
  - 3. Visual water quality

If any deficiencies are noted with the stormwater system during the inspections, the person completing the report shall immediately notify the Town of Weston Parks & Recreation Director. The Parks & Recreation Director will determine the necessary actions to correct the deficiency, unless the deficiency entails the dredging of sediment from the forebay of a sediment basin. When the sediment has accumulated to the point where it is approaching the height of the check dam, a report will be made to the Town of Weston First Selectman, who will then arrange for the appropriate sediment removal or repair.

When necessary, the sediment removed from the forebay will be removed with a front-end loader, backhoe or "vac" truck as appropriate. Any areas that maybe disturbed during the operation should be stabilized immediately following the operation. Any woody plant material should also be removed mechanically form the dam of the sediment basins to maintain the structural integrity of the slopes.

The inspection reports will be filed at the Town of Weston Parks & Recreation Department, and an annual summary of the inspection shall be completed and provided to the DWQMP technical advisory committee. Results of the inspection reports may be used by the technical advisory committee to recommend maintenance changes to the stormwater system.

Section 4

4.0 OPERATION AND MAINTENANCE

MFP is devoted primarily to athletic fields and recreation. The infrastructure to support these uses includes a paved access drive, gravel parking area, an irrigation system, and a stormwater collection and treatment system. The operation and maintenance of the park is under the control of the office of The Town of Weston Parks & Recreation Department.

4.1 Schedule, Maintenance, and Signage

MFP is open to the public from dawn to dusk. The access drive is gated and locked during non-operational hours overnight and during the winter season. Boulders have been placed next to the gate to deter the use of ATVs and dirt bikes during the off season and evenings.

When the park is open, local police and park personnel undertake routine patrol of the park. In the winter months, the access road is not plowed, sanded, or salted and the gate remains locked. Town personnel inspect the park periodically during this time to ensure that it is not being used.

Park rules and regulations are posted in two locations, at the entrance to the park and in the parking area. In addition to the rules, a sign has been posted at the gate to the park indicating that the park is located within a public water supply watershed and special care should be taken while on-site to avoid pollution of water resources.

4.2 Potential Areas of Concern

The primary method of mitigating for potential hazards is to avoid the location of these hazards on-site. In general, there is minimal potential for an environmental hazard as caused by the daily use of the park. All employees who are involved in the maintenance and operation of the park, including maintenance contractors, are trained regarding the

safe and appropriate handling of site materials. The Park & Recreation Department maintains a log to verify that training has occurred.

No chemicals, fuels or oils are stored or located on the MFP site. Small quantities are brought on site during maintenance of the landscape and mowing of the fields. The small quantities are contained within approved fuel containers and remain on the vehicles that they arrived in, until they have been removed from the site at the end of the day. Other good housekeeping practices include the following:

- Drip pans are used when refueling lawn mowers trimmers or other equipment, if such operation is necessary;
- Funnels are used when transferring fluids in order to minimize the potential for leaks and spills;
- Empty containers from turf management chemicals or fuel are removed from the site and disposed off-site at appropriate locations;
- Equipment cleaning, wash-down, and repairs occur off-site; and
- Any other rags or other material used during maintenance are removed from the site after use.

Pesticides, herbicides and fertilizers are also kept off-site and are only brought to the park when needed or when they will be applied that day. Any remaining unused chemicals are removed from the site by the end of the day. There is minimal potential for an accidental release that would case an environmental concern pertaining to the reservoir.

In the event that an accidental discharge of any fuel or chemicals occurs on-site, the Weston Fire Department, the Department of Environmental Protection, Department of Public Health, and Aquarion Water Company will be notified immediately. Containment of the spill will begin immediately using available manpower and materials. The vehicles that store the materials will carry absorbent pads and will contain the spill as close as possible to its source and will be removed of as soon as possible. The absorbent materials will be disposed in a proper manner at an approved facility. A list of spill containment and response contractors is provided below.

Table 4-1
Spill Clean-Up Contractors

Company Name	Location	Phone Number
AET	Bethel, CT	203-744-3477
Clean Harbors Environmental	Milford, CT	203-878-1740
D-TOX Environmental Contractors	Windsor, CT	800-336-3869
Earth Technology	North Haven, CT	203-230-2040
East Coast Environmental Service	New Haven, CT	203-469-2376
ECM / Hudson Maritime Services LLC	Wilton, CT	203-761-6030
Environmental Services Inc.	South Windsor, CT	860-528-9500
Enviroshield Inc.	Stratford, CT	800-394-2268
Hydro-Environmental Technologies Inc.	Prospect, CT	800-347-4384
Tyree Organization Ltd	Brookfield, CT	203-740-8200

Other minor potential pollution sources that are located on the site are the port-o-lets near the center of the site, and 50-gallon trash cans located throughout the site. The portable bathrooms are necessary for sanitary purposes and only pose a minor threat of release. If the bathrooms are tipped over or damaged, the park personnel will notify the contractor immediately and will have them replaced.

The trash cans are used for trash brought to the site by the public during sporting events. Trash can range from food wrappers to cans and bottles. The trash cans are emptied each day at the closing of the park and will have no potential to impact water quality at the site, as leachate will not have adequate time to be generated.

Using these good housekeeping policies and following best management practices minimizes the potential for a spill or release of pollutants onto the ground and into the stormwater system that eventually discharges to the Saugatuck Reservoir.

Section 5

5.0 TURF MANAGEMENT

An Integrated Turf Management Plan was prepared by William M. Dest, Ph.D as part of the approval process in order to avoid potential impacts on surface and ground water quality from the inappropriate use of fertilizer and pesticides. A copy is included as Appendix D. Elements of the plan are summarized in the following sections.

5.1 Turf Maintenance

The fields were seeded in 2004 following construction of the fields. The turf overlies six inches of topsoil that are underlain by an eight-inch gravel bed. The relatively thin layer of topsoil and thick layer of gravel maximize the drainage of the soil to prevent ponding and keeps the roots and grass fertile.

The mowing schedule is controlled by the Town of Weston Parks & Recreation Department. The personnel used for turf maintenance are trained on the procedures that are specific to the attached Turf Management Plan.

Mowing of the fields occurs no more than once every five days. The frequency is reduced as the growth season declines. The initial mowing at the start of the park season is completed as close as possible without causing scuffing or gouging of the turf. Subsequent mowing maintains a height of 2.0 to 2.5 inches. The height is reduced gradually to 1.25 to 2.0 inches from September until the last mowing in mid-November. Grass outside the playing areas is mowed to a height of 3.0 inches.

The turf is not mowed following heavy rainfall or if the grass is wet, to avoid clumping. If clumping occurs, the clumps are removed and spread evenly over the turf. The fields are also mowed in alternate perpendicular directions.

Aeration will be completed twice per year: once in early spring prior to fertilization, and once in the fall when the turf is actively growing. A hollow tine or split spoon will be used to complete aeration of the fields. The corings, taken to a depth of three inches to four inches, will be removed or broken when dry and left on the surface. Areas of heavy use may require topdressing with clean topsoil and reseeded periodically.

The irrigation system consists of three bedrock irrigation wells that pump to an underground storage tank. All utilities for the system are located underground. The irrigation system is fully automated with below-grade PVC transmission lines connected to low flow sprinkler heads. The sprinkler heads are checked by park personnel for leaks and damage. If the heads show signs of damage they are replaced as soon as possible to prevent ponding around the irrigation head that could cause damage to the nearby turf. Irrigation of the turf takes place during early morning hours or at dusk to decrease the amount of water lost to evaporation. Pumping rates and total withdrawals are recorded and filed at the Parks & Recreation Department office.

Irrigating the fields and carefully maintaining the turf height promote growth and increase the density of the grass. A healthy turf decreases the need for pesticides and herbicides. Furthermore, dense grass absorbs more water during rain events and decreases runoff volumes to the storm drainage system.

5.2 Fertilization

Best management practices for nitrogen fertilization include applying nitrogen fertilizer only when the grass is actively growing, returning grass clippings to the turf to recycle plant nutrients, and applying most of the nitrogen required each year from a slow release nitrogen source such as a coated area or a natural organic form.

The amount of fertilizer nitrogen applied to the playing surface will not exceed 132 pounds per acre per year and will be divided into several applications, with no single

application to exceed 44 pounds of nitrogen per acre. The personnel applying the fertilizer will be trained in fertilizer application rules for MFP, and all fertilizer use is recorded and kept on file with the Town of Weston Parks & Recreation Department. The judicious use of nitrogen by trained personnel reduces the risk of nitrogen runoff and leaching to ground water.

5.3 Pesticides and Herbicides

The use of pesticides or herbicides will only occur when mechanical or natural controls of pest infestation fail. Chemical controls have not been used on MFP fields up to the date of this DWQMP, and are not planned for the near future. When or if required, the Town will use the same chemicals for pesticide and herbicides that are used on other municipal properties. Application of chemical controls will follow the label directions and will be applied only to the area infested. The application will be completed by trained personnel. The location of use and the quantity used and will be recorded and kept on file at the Town of Weston Parks & Recreation office.

The following housekeeping and best management practices will minimize the potential for pollution:

- No chemicals will be stored on-site;
- No mixing of the chemicals will be completed within 100 feet of a wetland edge, sediment basin, watercourse, of drainage structure;
- No application when winds exceed 10 mph;
- Containers will be removed immediately following the application from the site and disposed properly;
- Signs will be posted on the main gate and at the location of the application identifying the type of chemical and date of application; and

- A field inspection will be completed by park personnel including the name, date, chemical, weather conditions, type of application, and description of the location of the application.

If it becomes necessary to use them, the pesticides and herbicides will be based on the risk assessment model provided in the Turf Management Plan. The risk assessment was used to select chemicals that have a low potential to runoff or leach to ground water. The following list is from the Turf Management Plan. Only chemicals selected from this list will be used at MFP.

Table 5-1
Selected Pesticides

Herbicides (trade name)	Insecticides (trade name)
2,4-D amine	Acephate (Orthene)
Bensulide (Betasan)	Bendicaocarb (Turcam)
Benefin (Balan)	Bifenthrin (Talstar)
Dicamba (Banvel)	Carbaryl (Sevin)
2,4-DP	Cyfluthrin (Tempo)
Dithiopyr (Dimension)	Fluvalinate (Mavrik)
Fenoxaprop-ethyl (Acclaim)	Lambda-cyhalothrin (Scimitar)
Glyphosate (Roundup)	
MCPP (mecoprop)	
Oxadiazon (Ronstar)	
Pendimenthalin (Pendulum)	
Siduron (Tupersan)	
Triclopyr (Turflon)	
Trifluralin (Treflan)	

Section 6

6.0 WATER QUALITY MANAGEMENT

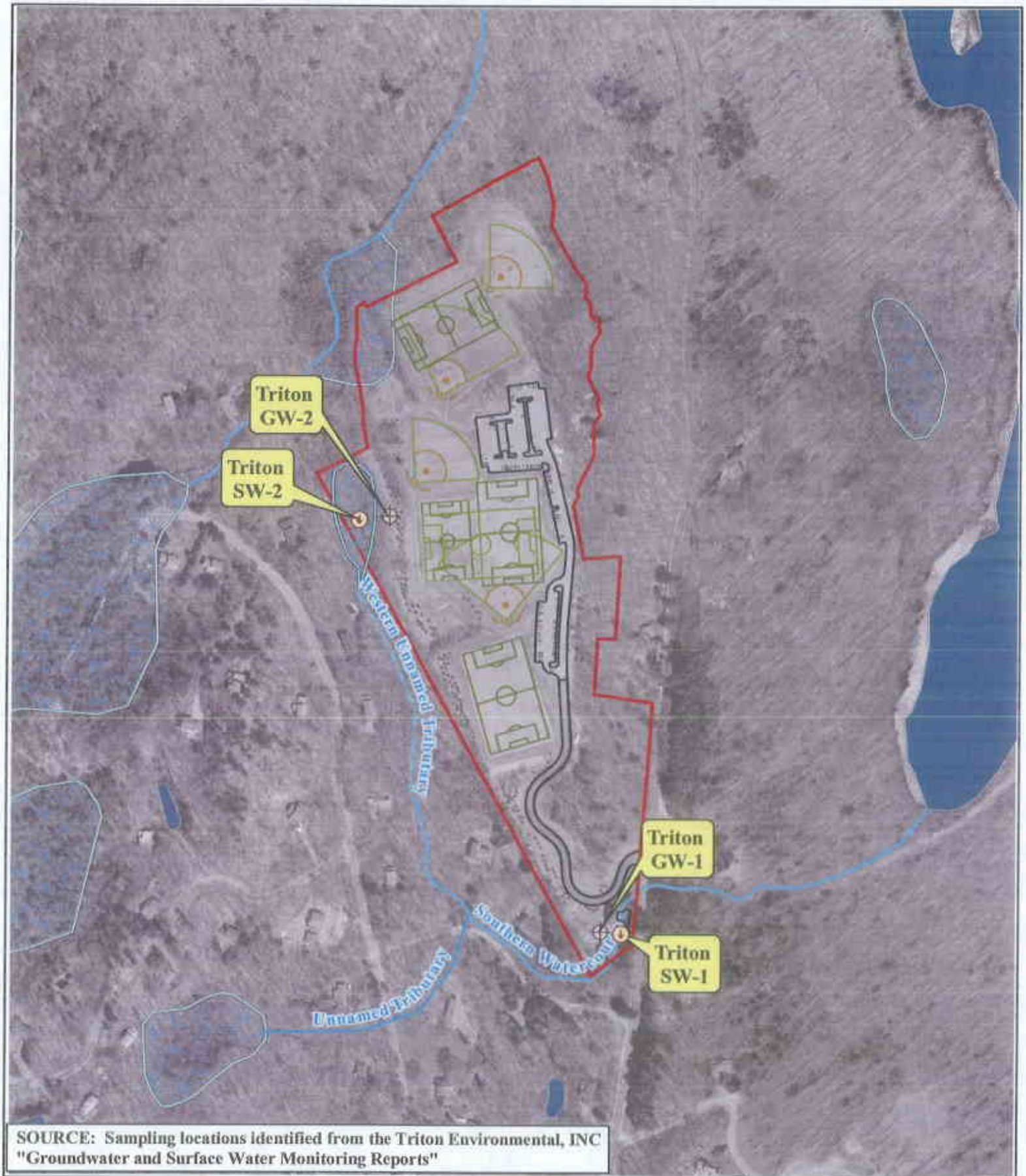
As proposed in this DWQMP, runoff water quality has been mitigated through two types of practices: engineered and best management. Engineered controls have been discussed in Section 3.0 and include the construction of under drainage and a stormwater system that will control flow from the playing fields to three sedimentation basins to prevent runoff from directly entering watercourses. Best management practices were discussed in Sections 4.0 and 5.0 and include the daily operations of the Parks & Recreation Department such as turf management and chemical controls. Section 6.0 describes the performance measures that are proposed to monitor the success of these controls.

6.1 Previous Studies

Triton Environmental, Inc. (Triton) was hired by the Town of Weston in 2003, prior to the start of the construction of MFP, to monitor water quality throughout the construction phase of the project. Triton sampled the site quarterly from 2003 through 2005 and submitted reports to the Town of Weston on January 2004, April 2004, July 2004, November 2004, February 2005, June 2005, and October 2005. Each report is a summary of water quality results from samples collected at two surface water locations (SW-1 and SW-2), and two shallow monitoring wells (GW-1 and GW-2).

Triton installed staff gauges at the surface water locations and grouped the wells in close proximity to the staff gauges. Sampling locations are depicted on Figure 6-1, and were as follows:

- SW-1 – Located within the stream at the south end of the property approximately 60 feet south of sediment basin and west of the existing house. The stream flows southeast from the adjacent residential area through the southern property boundary to the southeast across Newtown Road, eventually discharging into the Saugatuck Reservoir.



SOURCE: Sampling locations identified from the Triton Environmental, INC "Groundwater and Surface Water Monitoring Reports"

Engineering, Landscape Architecture and Environmental Science
MILONE & MACBROOM®
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

Morehouse Farm Park
Drinking Water Quality Management Plan

LOCATION: Weston, Connecticut

MMI#: 1811-05
MXD: H:Fig6_2.mxd
SOURCE: DEP Gis Division

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Trion Monitoring Locations

DATE: 9/8/06
SCALE: 1:4,800

SHEET: Figure 6-1

- GW -1 – Located approximately 20 feet northeast of the SW-1 and southeast of sediment basin.
- SW-2 – Located in wetland along western portion of the site. When ponded water is present, the area drains to the south to an unnamed tributary.
- GW-2 – Located approximately 100 feet east of SW-2 in the upland soils.

The sampling locations were selected to provide a baseline for water quality in the unnamed stream along the western property line and the unnamed stream along the southern property line. The sampling locations did not account for flow to the unnamed watercourse to the north of the site.

The sampling events included analyses for Ammonia, Nitrite, Nitrate, Total Phosphorous, Total Kjeldahl Nitrogen (TKN), Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), Chlorinated Pesticides, and Chlorinated Herbicides. Triton also completed a relative survey of the wells and staff gauges to determine ground water and surface water flow directions. Water levels were recorded during the sample events.

The Groundwater and Surface Water Monitoring Reports provide a brief summary of sample results for each quarter with a brief description of trends observed for each sampling parameter. The reports do not include weather conditions at the time of sampling, including rainfall, snow cover, or if the surface water locations were frozen during the winter sampling events.

Triton concluded that there was a slight increase in parameters during the post-construction sampling event, but the concentrations remained relatively low. There was no direct comparison of the quarterly data in the reports or a conclusion on whether development activities had affected the quality of groundwater or surface water at the site.

The results from the quarterly monitoring reports are summarized in the attached Table 1 and graphed to identify any trends in concentrations by MMI. The data was compared to

State of Connecticut Department of Public Health Drinking Water Standards (DWS) and to typical concentrations identified in the Handbook of Hydrology for comparative reasons.

The resulting concentrations from the pre-construction, construction, and post-construction sampling events were below DWS and within the concentrations for a typical stream. Overall, the sampled parameters had similar concentrations throughout the monitoring period with the exception of TSS, TKN and Total Phosphorous. Pesticides and herbicides were not detected in the samples collected before, during or after construction where applicable. Triton did not analyze for pesticides or herbicides in the two monitoring wells, during or after construction, because the pre-construction results were below detectable limits and the Town of Weston had not applied any pesticides or herbicides during of after construction of the fields.

Nitrate and Nitrite results were well below the DWS of 10 mg/L in all of the samples collected. Total Nitrogen levels were relatively consistent throughout the monitoring period with an average concentration of 1.69 mg/L, a peak concentration of 3.9 mg/L, and a low of 0.71 mg/L. The 3.9 mg/L of Total Nitrogen was completely comprised of TKN, with below detection results for Nitrate and Nitrite.

The peak concentration of Total Nitrogen and/or TKN was observed in the sample collected at SW-1 on April 5, 2004, during the construction period. The sample was collected during a high flow period with a peak observed stage of 2.89 feet, which was 2.6 feet above the next highest stage for SW-1 (0.25). The sample was also collected following a week of rainfall that produced approximately 2.5 inches of rain throughout the State of Connecticut. The second sample during construction was not completed because the stream was dry at the time of sampling.

Two high concentrations of TSS were observed during the monitoring program. Samples collected from SW-2 on December 18, 2003 and January 18, 2005 had a concentration of

360 mg/L and 350 mg/L, respectively. In the remaining three samples for SW-2, TSS had concentrations of below detectable limit, 14 mg/L and 2 mg/L. Samples were not collected during three of the eight sampling events on June 25, 2004, October 18, 2004, and May 25, 2005 because the sampling location was dry at the time of sampling.

Both of the high concentrations of TSS were observed during the winter sampling months, with the first during the pre-construction period and the second during the post-construction period. The organic material located within the wetland may have been disturbed during the sampling event and would cause an increased concentration of TSS. Field notes were not included in the reports indicating if the surface water was frozen at the time of sampling.

In summary, the sampling results provide a baseline water quality analysis of the stream flowing through the site to the southeast, and the wetland to the northwest of the site. The water quality results were below DWS and were within typical water quality concentrations for watercourses. Two high concentrations of TSS were observed at SW-2 on December 18, 2003, prior to construction, and on January 18, 2005, post construction. The high concentrations were not observed at the corresponding downstream sampling location, SW-1, and is likely due to a localized disturbance of debris at the time of sampling at SW-2.

The reports did not include field data noting the weather conditions at the time of sampling. Furthermore, the sampling locations did not account for runoff to the north of the site, or within the southern stream prior to its entrance to the site.

6.2 Recommended Monitoring Program

Water quality monitoring at MFP will be a performance measure. The monitoring program will be an evolving process starting with background baseline data to characterize the existing water quality associated with the site, and continuing through monitoring for the success of best practices. Specifically, the DWQMP monitoring program is designed to evolve as monitoring results are received, rather than requiring a rigid comparison of monitoring results to State water quality criteria. The objective is to avoid making decisions based on comparison of a sample result to a set of absolute numbers. Instead, monitoring will provide trends that can be reviewed, and will call for revisions and maintenance of the DWQMP as needed.

Instead of regulatory control, the DWQMP technical advisory committee will determine if the Best Management Practices and Engineered Controls are operating as designed and are protecting the quality of water entering the Saugatuck Reservoir. It will be the committee's determination if the program is working as designed, and whether the program will need to be expanded, reduced or remain unchanged to determine the water quality impacts of MFP. The Parks & Recreation Department will keep records of the monitoring program progress and provide information to the stakeholders.

Any changes to the monitoring program as proposed through this process will be posted and reviewed by the public. After 30 days of review, the public comments will be taken into consideration by the stakeholders at a technical advisory committee meeting, and an addendum to the monitoring program will be executed. Final approval of any changes will be approved by the Town of Weston prior to implementation.

6.3 Sample Locations

Although they may have served the purpose as outlined by the Conservation Commission approval for site activity, the Triton water quality monitoring program will not provide sufficient data to support this DWQMP. The existing sampling locations, SW-1 and SW-2, do not reflect the hydrology of the surrounding area or runoff from the MFP fields. Furthermore, the sample results from the program did not reflect the stream water quality prior to entering the site or leaving the site, and did not account for discharge to the north of the park.

To support this DWQMP, samples must be collected to identify water quality prior to entering the site, and quality of water leaving the site, to determine if the stormwater controls are operating successfully. In total, six sampling locations are proposed to monitor stormwater flows.

Recall that the stream flowing through the southern portion of the site is formed by two unnamed tributaries located to the west of the site. The first unnamed tributary is located parallel to the western boundary of the site and its headwater wetland system was sampled by Triton, identified as SW-2. The second unnamed tributary flows from the southwest of the site across Blue Spruce Circle. The two tributaries meet approximately 400 feet upstream from the southeast corner of the site. The stream then flows southeast across the site into a culvert and continues under Newtown Turnpike, eventually discharging into the Saugatuck Reservoir.

Samples will be collected at two locations within this stream and one of its tributaries to identify water quality prior to entering the site and water quality leaving the site. The three proposed locations are depicted on Figure 6-2 and summarized below:

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(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

Morehouse Farm Park
Drinking Water Quality Management Plan

LOCATION: Weston, Connecticut

MMI#: 1811-05
MXD: H:Fig6_2.mxd
SOURCE: DEP GIS Division

N
W E
S

Potential Monitoring Locations

DATE: 9/8/06
SCALE: 1:4,800

SHEET: Figure 6-2

- S-1 – Collected from ponded water in the western wetland west of the central sediment basin level spreader.
- S-2 – Collected from the stream at the southwest corner of the property prior to entering the site.
- S-3 – Collected form the stream just prior to entering the culvert that runs under Newtown Turnpike.

The first proposed site (S-1) is similar to SW-2, but moved downgradient from SW-2, the wetland headwaters to the unnamed tributary to the west of the site. The new site will be located west of the northern sediment basin and its gravel level spreader to provide water quality data during storm flows from the basin.

The second proposed site (S-2) will be located at the southwest corner of the site where the stream flows onto the site. The sample results from S-2 will be used to characterize water quality prior to entering the site and the potential impacts to the stream from the residential area to the west, along with impacts near site S-1.

The final proposed sample for the southern stream (S-3) will be located just prior to the stream entering the culvert under Newtown Turnpike. The sample results will be used to determine if there are any effects on water quality of the southern stream by runoff from MFP prior to flowing off-site. The location will bracket runoff into the stream from the site, and the flow from the central and southern sediment basins level spreaders.

Three additional samples will also be included to evaluate runoff generated from the gravel base under the athletic fields that flow north. Two gravel drains located in the northern portion of MFP discharge to the wetland and eventually into an intermittent watercourse north of the site. The watercourse flows from west to east and eventually discharges into the Saugatuck Reservoir northeast of the site. Three samples will be collected at the following locations:

- OF-1 – Outfall located in the northwest corner of MFP at the corner of the multi-use field.
- OF-2 – Outfall located in the northeast corner of MFP at the northwest corner of the softball field.
- NS-1 – Located approximately 125 feet northeast of the MFP northern property boundary.

The sample results from the outfall locations will provide water quality downstream of the gravel drain system and characterize the potential effects to water quality within the northern watercourse.

6.4 Sample Parameters

The recommended monitoring parameters are based on the potential pollutants from the MFP site. The parameters measured in the field will be used as background controls, and a State-certified laboratory will be used to analyze the laboratory parameters.

Field parameters will include the following:

- pH
- Specific Conductivity
- Dissolved Oxygen
- Turbidity
- Temperature
- Weather Conditions
- Date and Time of Sample

Laboratory parameters will include the following:

- Nitrate
- Nitrite
- Total Phosphorous
- Total Suspended Solids
- Fecal Coliform

Initial monitoring of MFP will include fecal coliform and pesticides to define background concentrations, if present. Once a baseline for water quality has been defined, the monitoring program will be reviewed and evaluated by the technical advisory committee to determine whether the coliform results will be required during future sampling events.

Pesticides will not be analyzed again until they are used on the site. The Town of Weston Parks & Recreation Department will notify the First Selectman, the technical advisory committee, and the contractor that is completing the sampling program at least five days before the pesticide or herbicide application.

6.5 Monitoring Schedule

A phased approach will be used for the monitoring schedule at MFP. The monitoring program will be an evolving process based on the results of the monitoring, which will determine the interval of sampling and parameters.

The initial Phase, identified as Phase 1, will be the baseline water quality sampling at MFP. Once the technical advisory committee and Town of Weston determine that a baseline has been set, Phase 2 will be implemented. Phase 2 will be the bulk of sampling over a defined period. Phase 3 will begin if pesticides or herbicides are applied. The initial three phases will be planned out as part of this DWQMP, but will evolve with additional phases or will remain unchanged based on the future review of the water quality results by the technical advisory committee.

Phase 1 – Baseline Water Quality

Phase 1 will begin the first April following the acceptance of the Draft DWQMP by the Town of Weston and the DWQMP technical advisory committee. The Phase will entail the monitoring of all sampling locations for at least one calendar year. One "round" of sampling includes one dry event and one wet event. The first round of sampling will be conducted between April 1 and April 30; the second between May 1 and June 30; the third between July1 and August 31; and the fourth between September 1 and October 31.

Sample collection from all sites will be attempted, except that sites OF-1 and OF-2 will be excluded during dry events. A dry event will be collected following at least three days of no precipitation. The wet event will be collected within three hours of a storm event that induces runoff if the preceding three days had no precipitation. The weather conditions for the week prior to, and the day of the sampling event, will be recorded.

All of the sampling parameters listed in Section 6.4 will be analyzed in Phase 1, including pesticides and fecal coliform. The eight sets of monitoring results will be compiled and presented in an annual report to the Town of Weston Parks & Recreation Department. In the annual report the results will be compared to State of Connecticut Department of Public Health Drinking Water Standards for comparative reasons only. There will be no enforcement or violations if the concentrations are above State MCLs.

The annual report will be reviewed by the DWQMP technical advisory committee and will be available to the public. The data will be evaluated to determine if a baseline has been established. If it is agreed that a baseline has been established, the monitoring program will move to Phase 2. If more monitoring is required to establish a baseline trend then the program described in Phase 1 will be repeated until a baseline is agreed upon, at which time Phase 2 will begin.

Phase 2 – Standard Water Quality Monitoring Program

Phase 2 of the monitoring program includes a standard practice or monitoring until chemical controls are implemented. The monitoring will be conducted between April 1 and April 30; between May 1 and June 30; between July1 and August 31; and between September 1 and October 31, for a total of four rounds per year of wet and dry samples. The schedule is based on the use of the park during the summer months and lack of use in the winter.

Monitoring parameters will include the parameters listed in Section 6.4, with the exception of pesticides, herbicides, and potentially fecal coliform. Phase 2 will only proceed if chemical controls have not been used at MFP. Fecal coliform will be monitored if the technical advisory committee deems it necessary following the review of Phase 1.

If at any time chemical controls are used at MFP during Phase 2, then Phase 3 will be implemented as part of the monitoring program.

The results will be summarized in an annual report and provided to the DWQMP technical advisory committee. The annual report will be available to the public.

A Five-Year Status Report will be completed after five years of monitoring under Phase 2. The report will be provided to the Town of Weston and the DWQMP technical advisory committee, and will be available for public review. The technical advisory committee will evaluate the report and determine if the program will continue or if the sampling needs to be increased or decreased based on the results. The recommended monitoring program will be either amended within the DWQMP, or repeated based on the review.

Phase 3 – Chemical Controls Implementation

Phase 3 of the monitoring program will be initiated when chemical controls (pesticides and herbicides) are planned for application. The Town of Weston Parks & Recreation will notify the technical advisory committee when these chemical controls are going to be used at MFP. A memorandum will be completed and sent to the technical advisory committee members prior to application of the chemicals. The memorandum will list the planned date of application, type and name of the pesticide or herbicide, volume of the chemical control to be used, and method of application. The memorandum will be kept on record at the Town of Weston Parks & Recreation Department for future reference.

The contractor that is conducting the sampling at MFP will be notified of the date that the chemical controls will be applied on site, and will be sent the memorandum. At this time, the contractor will plan to conduct two rounds of sampling; the first round will be completed within 24 hours of the chemical application and the second round will be completed following the first runoff-generating rain event after the application.

Sampling requirements for Phase 3 will be limited to the chemical used on the site that is included in the list in Section 5.4. The laboratory analysis will be based on the chemical selected, and a laboratory must be contracted that can analyze the chemical. For this reason, laboratories that are not licensed in Connecticut (such as commercial laboratories in other states, as well as universities) are permissible.

If either of the two rounds of sampling indicates that the chemical has entered the surrounding watercourse or wetlands, then additional sampling will need to be completed and the technical advisory committee will be notified. The parameter will be included in the sampling program according to the schedules discussed above, until laboratory analysis demonstrate concentrations below the detection limit or a return to baseline water quality results observed in Phase 1.

6.6 Recommended Actions

Detection of nutrients is anticipated during all phases of monitoring, and therefore these detections can not reasonably be used to preclude any activity or the application of fertilizers. However, consecutive increases in nitrate nitrogen, nitrite nitrogen, or total phosphorus may indicate where fertilization rates or frequency may have been inappropriate. Likewise, increases in total suspended solids or fecal coliform may indicate when runoff or soil erosion may be occurring. Thus, results of the monitoring program may be used by the DWQMP technical advisory committee to recommend changes in the application rate of fertilizers.

With respect to chemical controls, a detection of a specific pesticide or herbicide shall trigger a reduction in subsequent usage of that pesticide. The technical advisory committee shall be reconvened to recommend an appropriate reduction in the usage of the chemical.

Section 7

7.0 FUTURE LAND USE

There are no immediate future plans to change the layout or design of MFP. In the long term, a hiking trail may be constructed along the perimeter of the site. The trail will be completed as a dirt path with minimal clearing and construction. There is no foreseeable impact to runoff water quality based on the minimal footprint of the trail system. If implemented, the Town of Weston Parks & Recreation Department will notify the DPH and other technical advisory committee members, and will provide an update to the DWQMP.

The long-term future of MFP is closely connected to the long-term recreational and institutional needs of the Town of Weston. Although it is currently implausible, another generation could determine that the MFP site is appropriate for a different municipal land use. Any such change in land use would need to be permitted by State and local officials according to the regulatory programs in place at that time. Coincident with the permit process, the DWQMP would need to be revised and updated to reflect the appropriate controls for the proposal land use.

Section 8

8.0 CONCLUSION

The goal of the DWQMP is to ensure that activities associated with daily operations and existing conditions of MFP will not adversely impact water quality within the Saugatuck Reservoir and its watershed. As such, the DWQMP provides procedures and recommendations for stormwater control and treatment; chemical use; fuel use; emergency spill control; impervious surface maintenance; ball field design; periodic water quality testing, monitoring, and reporting program; future adjustments to address water quality degradation; parking and vehicle restrictions; activities allowed including restrictions and controls; signage and visitor notification concerning site sensitivity; waste collection and disposal; roles, responsibilities, and enforcement of plan; and potential future change of use of the site.

The change in land use on MFP from private open space to a public facility is believed to support the community's need for recreational facilities without harming the surrounding watershed or impacting drinking water quality. The DWQMP will ensure that this assertion is correct, while recognizing that the plan can not address land use and activities located beyond the boundaries of MFP.

A public meeting will be held in autumn 2006 and public comments will be compiled and assembled for inclusion in this DWQMP. The deadline for the public meeting is January 30, 2007.

LIST OF REFERENCE MATERIAL

Connecticut Department of Public Health, *Drinking Water Qiality Management Planning, Grass Roots, Community-Based Planning for Drinking Water Source Protection,* 2005 (presentation).

Dest, William, Ph.D, *Integrated Turfgrass Pest Management and Best Management Practice Plan for Athletic Fields, Morehouse Farm Park, Town of Weston*, July 2002.

Milone & MacBroom, Inc., *Existing Conditions Site Plan*, February 2006

Milone & MacBroom, Inc., *Operations and Maintenance Plan*, October 2004

Triton Environmental, Inc., *Groundwater & Surface Water Monitoring Report*, January 2004

Triton Environmental, Inc., *Groundwater & Surface Water Monitoring Report*, April 2004

Triton Environmental, Inc., *Groundwater & Surface Water Monitoring Report*, July 2004

Triton Environmental, Inc., *Groundwater & Surface Water Monitoring Report*, November 2004

Triton Environmental, Inc., *Groundwater & Surface Water Monitoring Report*, February 2005

Triton Environmental, Inc., *Groundwater & Surface Water Monitoring Report*, June 2005

Triton Environmental, Inc., *Groundwater & Surface Water Monitoring Report*, October 2005

U.S. EPA, Draft *Handbook for Developing Watershed Protection Plans to Restore and Protect Our Waters*, October 2005.

Appendix

APPENDIX A
TECHNICAL ADVISORY COMMITTEE MEETING MINUTES

Meeting Minutes

Morehouse Farm Park
Drinking Water Quality Management Plan
Project Kick-Off Meeting
January 18, 2006

Introductions

A sign-in sheet was passed around the table. The following individuals were in attendance:

- David Ungar, Town of Weston Parks & Recreation Department
- Woody Bliss, First Selectman, Town of Weston
- Cory Attra, Town of Weston Conservation Commission
- David Murphy, Milone & MacBroom, Inc.
- Vincent McDermott, Milone & MacBroom, Inc.
- Paula Pendleton, Connecticut Department of Public Health
- Ernie Albin, Neighbor of Morehouse Farm Park (MFP)
- Sally Harold, The Nature Conservancy
- Brian Thompson, Aquarion Water Company
- Sue Jacozzi, Westport-Weston Health District

The following topics were discussed.

Project Objectives and Committee Charge

The following items were distributed:

- Water Quality Management Committee, Committee Charge Statement (D. Ungar)
- List of items to address and a potential schedule (V. McDermott)
- List of important dates and resources (D. Murphy)

V. McDermott presented a list of items that must be addressed and included in the Drinking Water Quality Management Plan ("Plan"). C. Attra urged the committee that all existing data and resources should be included. D. Murphy introduced the recent EPA handbook and mentioned that it emphasizes the use of existing data.

Review of Site and Project

V. McDermott presented a set of maps and described the layout of MFP. Locations of water quality basins, level spreaders, and underdrain plunge pools were indicated. Hydrology and stream flows were described. Runoff directions were discussed.

Goal of the Plan

The goal is to ensure that activities will not adversely impact Saugatuck Reservoir. P. Pendleton described how this was similar to a hazard analysis; areas of additional control will be highlighted, checklists should be developed, and additional best practices should be proposed. V. McDermott added that there needs to be a way to review Plan performance, and noted that this project will codify many of the Conservation Commission's requirements that came out of the hearing process.

A brief side discussion about the private well evaluation ensued. C. Attra remarked that the Conservation Commission probably spent too much time on the well issue and not enough on water quality.

Review of Construction and Phasing

V. McDermott described how the method of construction (single phase instead of smaller phases) was the main problem, coupled with the high rainfall in 2003. Too much of the MFP site was open at once. Interestingly, the construction duration was compressed due to project opposition. Unfortunately, temporary sediment and erosion controls were exceeded during some rain events. B. Thompson agreed in general but believes that impacts were perhaps more significant than described. He believes that detention was insufficient for the phasing, given that it became a single-phase construction project. C. Attra pointed out that the driveway may have been the access for sediment to reach the reservoir.

As a result of this discussion, it was determined that the relationship and communication between the water utility and the developer or Town needs to be improved. Proper notification to Aquarion apparently did not occur, although Aquarion did review concept plans in the early stages of the project. W. Bliss remarked that Aquarion staff formerly visited sites in the Town of Weston, but no longer do. B. Thompson replied that this will improve, going forward. All agreed that the Plan should outline how communication can improve.

Statutes and Regulations

The public health code prohibits discharges within 100 feet of reservoir tributary streams. The 100-foot separation is rather archaic and arbitrary. This discussion segued back to the discussion about notification and communication.

Other Items

P. Pendleton recommended use of the Source Water Assessment Program (SWAP) report and EPA handbook for guidance.

E. Albin inquired about the Plan being applicable only to MFP. The concern is that the streams pass by or through the site after originating elsewhere, and these areas can not be controlled. B. Thompson mentioned that water quality could be monitored above and below MFP. But it is correct that very little control is available in residential areas.

W. Bliss remarked that one concern should be future development elsewhere in the Town of Weston. Another generation could decide that the MFP site is appropriate for a different land use, such as a school. P. Pendleton replied that the Plan could be a long-term tool for the Town. Also, the Consent Order specifies that a ten-year review will occur.

Project Meetings / Schedule

The next team meeting will be on March 1, 2006. Milone & MacBroom, Inc. will distribute existing information and resources before the meeting.

Meeting Minutes

Morehouse Farm Park
Drinking Water Quality Management Plan
Second Kick-Off Meeting
March 1, 2006

Introduction

A sign-in sheet was passed around the table. The following individuals were in attendance:

- David Ungar, Town of Weston Parks & Recreation Department
- David Murphy, Milone & MacBroom, Inc. (MMI)
- Peter Shea, MMI
- Paula Pendleton, Connecticut Department of Public Health
- Ernie Albin, Neighbor of Morehouse Farm Park (MFP)
- Sally Harold, The Nature Conservancy
- Brian Thompson, Aquarion Water Company (Aquarion)
- Sue Jacozzi, Westport-Weston Health District

The following topics were discussed.

Review of January 18,2006 Minutes

The previous meeting minutes were reviewed and discussed. The majority of the minutes were approved by the group with only the following changes.

- Paula indicated that under the Goal of the Plan section the first sentence should read:

The goal is to ensure that activities will not adversely impact Saugatuck Reservoir and the watershed.

- Brian Thompson commented on the following verse under section Review of Construction and Phasing:

W. Bliss remarked that Aquarion staff formerly visited sites in the Town of Weston, but no longer do.

Brian indicated that Aquarion still visits the sites, but Woody Bliss used to have a regular contact with Larry Bingham. Larry Bingham has since left Aquarion but staff members visit the site in the watershed.

There were no other comments on the January 18, 2006 Meeting Minutes.

Review of February Information Packet

The group reviewed and discussed the February Information Packet that MMI compiled. The package contained the following reports and maps:

- Triton Environmental Inc., *Groundwater & Surface Water Monitoring Report*, January 2004
- Triton Environmental Inc., *Groundwater & Surface Water Monitoring Report*, April 2004
- Triton Environmental Inc., *Groundwater & Surface Water Monitoring Report*, July 2004
- Triton Environmental Inc., *Groundwater & Surface Water Monitoring Report*, November 2004
- Triton Environmental Inc., *Groundwater & Surface Water Monitoring Report*, February 2005
- Triton Environmental Inc., *Groundwater & Surface Water Monitoring Report*, June 2005
- Triton Environmental Inc., *Groundwater & Surface Water Monitoring Report*, October 2005
- Milone & MacBroom, Inc., *Existing Conditions Plan,* February 2006
- Milone & MacBroom, Inc., *Operations and Maintenance Plan,* October 2004
- Milone & MacBroom, Inc., *Annual Monitoring Report,* November 2005
- William Dest, Ph.D, *Integrated Turfgrass Pest Management & BMP Plan,* July 2002

There were several comments on the Triton Environmental Inc. (Triton) monitoring reports. In each report under section 1.0 Introduction, Triton states *The Town of Weston, the owner of the site, has converted the site (which formerly consisted of agricultural fields) to athletic fields, under appropriate permits.* The term "*agricultural fields*" was questioned by the group. Ernie Albin explained that the previous owner had planted trees for tax purposes, but the trees were poor quality and were not maintained by the owner. It was decided that the term was adequate for description of the site in the reports.

The Triton monitoring reports referenced an "Ecological Assessment Report" completed by Triton in June 2002. Group members asked if the report was available from the Town of Weston. Dave Unger replied that they were currently looking for a copy, and if a copy was not found that the Town would request a copy from Triton directly.

The group then discussed the water quality results provided in the seven Triton reports.

Paula Pendleton questioned the high phosphorous concentrations found in the ground water. David Murphy indicated that the high phosphorous levels detected in the ground water were likely due to purging of the wells during sampling and the detections represented sediment.

Brian Thompson indicated that there was a lack of wet weather and dry weather distinction in the data. The group also indicated that one of the monitoring locations (GW-3) was damaged and there were no results from that location in the majority of the reports. The sampling location was not replaced or moved.

Paula Pendleton and Brian Thompson indicated that after the January 2004 reports, Triton did not sample for pesticides. Dave Ungar replied that the Town of Weston did not apply any pesticides or herbicides on MFP. The Triton reports state that pesticide monitoring would commence when the application occurred.

Overall, it was decided that the Triton reports were good for the construction phase for monitoring water quality at the site, but needs to be expanded for the Drinking Water Quality Management Plan.

Ideas for Operation and Maintenance

Paula Pendleton asked if the Town of Weston was keeping a log book of inspections on the stormwater sediment basins at the site. Dave Unger replied that currently the Town is not inspecting the basins, but will if indicated under the management plan. Paula indicated she would like to see regularly scheduled inspections and analysis of the basins in regular reports. It was decided by the group that the management plan should include reporting requirements for stormwater controls in the management plan.

Dave Unger discussed previous plans for a trail system that would have been constructed on the east and north side of the site. The plans were approved by the Town, but were not implemented due to liability issues. Dave Ungar indicated that the Town will probably not construct the trails. Paula stated that the Department of Public Health would not have an issue with the trail construction because it would likely have no impact on the goal of the management plan.

Dave Unger also indicated that trash is removed from the site daily, that there are portable restrooms available on site, and that during the off-season the site is unused and gated. Dave Ungar also indicated that when the fields are open to the public there are sporting events scheduled for every weekend until the end of the season.

Ideas for Water Quality Monitoring

The group discussed how in the Watershed Management Plan the water quality monitoring program will need to be expanded from what is currently conducted by Triton.

Paula Pendleton asked if private well monitoring should be included in the Watershed Management Plan. David Murphy and Brian Thompson both agreed the focus of the plan should be on the shallow water table and on stormwater runoff from the site into the tributaries to the reservoirs. David Murphy indicated that the residential wells would not be impacted by the use of the fields. Paula Pendleton stated that the plan should address the private wells in a narrative explaining why they are not going to be covered in the plan and include the previous water quality monitoring data that was conducted by MMI in 2005. The group agreed that the narrative should be included in the plan.

Sampling Parameters

Brian Thompson asked what field parameters should be included in the streams that will be sampled under the plan. It was decided that field parameters should include the following:

- pH
- Specific Conductivity
- Dissolved Oxygen
- Turbidity
- Temperature
- Weather Conditions
- Date and Time of Sample

Laboratory parameters should include the following:

- Nitrate
- Nitrite
- Total Phosphorous
- Total Suspended Solids.

The group agreed on the sampling parameters for MFP.

Paula Pendleton and Brian Thompson asked if bacterial analysis should be completed in the surface water samples. David Murphy and Peter Shea were hesitant about adding bacterial analysis because of the likely positive results in the surface water due to the residential landuse upstream of the site. It was decided that bacteria, including a Fecal or E.Coli, results should be analyzed in the plan to provide a baseline of water quality at MFP.

Paula Pendleton asked when the Town of Weston was going to start using pesticides. Dave Ungar indicated that the Town has not used pesticides on the park and are not planning on using them in the near future. Dave Ungar also stated that, if used, the pesticides would be localized and would be watered in following the BMPs listed. Paula Pendleton indicated that she would like to see a formalized plan for pesticide use. David Murphy stated that, if used, testing for pesticides is very expensive and that the analyses for typical pesticides do not have MCLs associated with them. David also stated that currently there are no laboratories in the State of Connecticut that analyze these pesticides. Brian Thompson indicated he would like the plan to have a list of parameters of potential pesticides that could be used on the park. Furthermore, he indicated that Glyphosate (R) should be included in the analysis to provide a baseline for this common herbicide.

Monitoring Locations

Sampling locations were then discussed based on the Triton locations depicted in the quarterly monitoring reports. The group agreed that the monitoring locations in the Triton reports would need to be moved and additional locations are needed in the plan.

The group agreed that samples should be collected at three locations within the unnamed stream to identify water quality prior to entering the site and water quality leaving the site. These locations will help determine if the stormwater controls are operating successfully at the MFP site. The three locations are summarized below:

- S-1 – Collected from ponded water in the western wetland west of the central sediment basin level spreader.
- S-2 – Collected from the stream at the southwest corner of the property prior to entering the site.
- S-3 – Collected form the stream just prior to entering the culvert that runs under Newtown Turnpike. Brian Thompson stated that stream flows should also be monitored at this location.

Briand Thompson also indicated that three additional samples should be included to evaluate runoff generated from the gravel base under the athletic fields. There are two gravel drains, located in the northern portion of MFP, that discharge to the north eventually feeding into an intermittent watercourse north of the site. The watercourse flows from west to east and eventually discharges into the Saugatuck Reservoir northeast of the site. The three samples will be collected at the following locations:

- OF-1 – Outfall located in the northwest corner of MFP at the corner of the multi-use field.
- OF-2 – Outfall located in the northeast corner of MFP at the northwest corner of the softball field.
- NS-1 – Located approximately 125 feet northeast of the MFP northern property boundary.

Monitoring Periods

The group discussed how Triton did not note the weather conditions or time of sampling in their quarterly monitoring report. David Murphy stated that for the Management Plan the weather conditions should be noted in the field notes and samples should be collected during a wet event with runoff present and a dry event without runoff.

Milestones and/or Deliverables for Spring 2006

David Murphy indicated that Milone & MacBroom, Inc. would have an outline and rough draft report for review by the team members by the next meeting. The next meeting was set for April 11, 2006 at 10:30 am at the Town of Weston Town Hall.

Meeting Minutes

Morehouse Farm Park
Drinking Water Quality Management Plan
Third Meeting
April 24, 2006

Introduction

A sign-in sheet was passed around the table. The following individuals were in attendance:

- David Ungar, Town of Weston Parks & Recreation Department
- David Murphy, Milone & MacBroom, Inc. (MMI)
- Peter Shea, MMI
- Paula Pendleton, Connecticut Department of Public Health
- Gerald Iwan, Connecticut Department of Public Health
- Sally Harold, The Nature Conservancy
- Brian Thompson, Aquarion Water Company (Aquarion)
- Woody Bliss, Town of Weston First Selectman
- Cory Attra, Town of Weston Conservation Commission

The following topics were discussed.

Review of March 1, 2006 Minutes

The previous meeting minutes were reviewed and discussed. The minutes where approved by the group with the following comments.

- Gerald Iwan asked if there have been any storm water inspections completed at the site as of March 1, 2006. David Ungar indicated that Triton has completed inspections up to 2003 and sent them to O&G. O&G is currently looking for the reports and when found will forward them to David Ungar. After 2003, formal inspections are completed by Triton during the sampling events. David Ungar is working on getting these reports from Triton.

There were no other comments on the March 1, 2006 Meeting Minutes.

Review of Draft Water Quality Management Plan

A draft of the plan was sent to the group the previous week. The draft was reviewed by the attendees prior to the meeting. Preliminary comments emailed by Paula Pendleton and Cory Attra are hereby incorporated into these meeting minutes.

Several members have editorial and grammatical recommendations for the report, and will be forwarding them for edits in the final draft. Brian Thompson indicated that the Saugatuck Reservoir has a watershed area of 22,212 acres. Paula Pendleton indicated that the official DPH order for the project is DWD 04-157-274.

Paula Pendleton asked if Roundup should be used on the site or removed from the list of potential herbicides. A discussion took place over the history of aquatic applications of Roundup and the MOU for Roundup between the DPH and DEP. The initial reasoning for the monitoring of Roundup was that it is one of the few pesticides that have a MCL for comparison. Gerry indicated that the DPH doesn't want to approve anything that has an MCL. It was suggested that MFP should investigate and consider chemicals that are used by the Town at other sites.

It was discussed if the Town will use the same chemicals for pesticide and herbicides that are used on other sites. David Ungar indicated that the Town rarely uses chemicals for control, and if they do it will be as spot treatments. The Town does not have its own storage for chemicals.

Review of Cory's Comments and Related Discussion

Cory gave a summary of the recommendations listed in his email dated April 23, 2006. Cory questioned if the focus should be just on MFP, if the water quality monitoring is required, and/or how significant it needs to be.

Gerry indicated the focus needs to be on MFP, but agreed with Cory that the plan needs to set forth principles. The idea behind the plan is to state the potential or degree of impact that could be caused from the buildout of the MFP site. If there is a degree of impact, what should happen? What are the consequences or repercussions? This plan should be based on the EU model. However, instead of the utility being the controller, the Town would be the controller.

Cory indicated that the draft was absent of management controls for the Town and wanted to include a section in the final for standard operating procedures for MFP.

The DPH has historically believed that no ballfields should be built on Class II lands. Currently State Legislators are posing the question *why not*, as long as there are proper controls? Can we protect public health and enjoy the land at the same time?

Discussion of the Water Quality Monitoring Program

David Murphy summarized the water quality section of the draft report. Given the discussion of the first part of the meeting, he posed the challenge that some acceptable level of monitoring must be proposed.

Cory echoed an earlier theme that MFP is not the only neighbor of the reservoir; that MFP is not the only contributor to the Saugatuck Reservoir watershed. He wondered what the standards would be for the site, and what would they be compared to. Gerry stated that it was unacceptable to develop the site in the first place, so there needs to be an assessment of impact or lack of impact due to the development. He added that it might be difficult to separate water quality

impacts attributed to MFP from other properties now, but that private lands may be controlled in the future so it was important to establish a baseline.

Brian Thompson indicated that the monitoring program will be used as a *performance measure*. Cory asked which standards would be used. Gerry stated that there were not any standards. The plan is not meant to be a regulatory document, and DPH wants to avoid abject regulation. It will not be appropriate to state that some parameter can not exceed a particular criteria. In other words, "absolute numbers" will not work for the program. The purpose is to create the best possible way to avoid impacts or minimize the degree of impacts. The water quality program will be based around the control dynamics and what can be done to mitigate any potential impacts. The monitoring will provide trends that can be reviewed, and will call for revisions and maintenance of the plan in the future.

Parameters were reviewed. A summary of the draft parameters are as follows:

- pH
- Specific Conductivity
- Dissolved Oxygen
- Turbidity
- Temperature
- Weather Conditions
- Date and Time of Sample

Laboratory parameters should include the following:

- Nitrate
- Nitrite
- Total Phosphorous
- Total Suspended Solids.

Cory asked when the field collection would occur and if it would be based on the applications, i.e. if the Town uses pesticides, will the samples be collected after the application? Cory emphasized the need to link field practices to the sampling dates.

Brian Thompson stated that before application of any chemicals, there needs to be a control or baseline created. A baseline analysis should be completed to provide background conditions to compare. The parameters were agreed upon and the sampling locations were approved. The locations will provide on-site conditions as well as what is coming from adjoining properties.

In conclusion, the monitoring plan will be an open-ended evolving plan that is iterative, and a work in progress, without hard numbers or standards.

Schedule

Cory believes that the Standard Operating Procedures will be a major portion of the final plan and will take a significant time to produce.

The final draft should be available for public review and comments. Woody Bliss stated that in addition to posting the final draft on the Town website, there should be a newspaper article summarizing the plan. Gerry would like to add a section that will describe the public participation in the final plan; the DPH would help with that section.

David Murphy indicated that Milone & MacBroom, Inc. would need comments back from the panel on the draft plan by May 19, 2006 and would have a final draft available for review by the next meeting on June 14, 2006. Following the final draft review, the plan would be put on the Town website for public viewing and a story will be written in the local newspaper. A public meeting to receive any additional comments would be held in September 2006.

APPENDIX B
SOURCE WATER ASSESSMENT REPORT

SOURCE WATER ASSESSMENT REPORT
AN EVALUATION OF THE SUSCEPTIBILITY OF PUBLIC DRINKING WATER SOURCES TO POTENTIAL CONTAMINATION

CT0150011

Aquarion Water Company of Connecticut
Easton Reservoir System

The State of Connecticut Department of Public Health (DPH) in cooperation with the Department of Environmental Protection (DEP) recently completed an initial assessment of the Easton Reservoir System, which is a source of public drinking water that is maintained and operated by the Aquarion Water Company of Connecticut. This one-time assessment is part of a nationwide effort mandated by Congress under the Safe Drinking Water Act Amendments of 1996 to evaluate the susceptibility of all public drinking water sources in Connecticut to potential sources of contamination. DPH began working in partnership with the DEP in 1997 to develop Connecticut's Source Water Assessment Program, which was approved by the U.S. Environmental Protection Agency in 1999. Sources of potential contamination that are of concern to public drinking water supplies here in Connecticut are generally associated with historic waste disposal or commercial, industrial, agricultural and residential properties that store or use hazardous materials like petroleum products, solvents or agricultural chemicals.

The assessment is intended to provide Aquarion Water Company of Connecticut consumers with information about where their public drinking water comes from, sources of potential contamination that could impact it, and what can be done to help protect it. This initial assessment complete will also assist the public water supply system, regional planners, local government, public health officials and state agencies in evaluating the degree to which the Easton Reservoir System may be at risk from potential sources of contamination. The assessment can be used to target and implement enhanced source water protection measures such as routine inspections, protective land use regulations, acquisition of critical land, proper septic system maintenance, and public education. General sources of contamination with the potential to impact the Easton Reservoir System include properties with underground fuel storage tanks, improperly maintained on-site septic systems, improper waste disposal, or commercial/industrial sites that store or use chemicals or generate hazardous wastes.

Easton Reservoir System Source Water Assessment Summary

STRENGTHS

Point source pollution discharge points not present in this watershed area

More than 30% of the watershed area is owned by the public water system

More than 30% of the land in the watershed area exists as preserved open space

Public water system has a comprehensive source protection program.

POTENTIAL RISK FACTORS

Potential contaminant sources present in the watershed

Local regulations or zoning initiatives for the protection of public drinking water sources do not exist

Susceptibility Rating

Rating	Environmental Sensitivity	Potential Risk Factors	Source Protection Needs
Low	X		X
Moderate		X	
High			

Overall Susceptibility Rating: Low

This rating indicates susceptibility to potential sources of contamination that may be in the source water area and does not necessarily imply poor water quality.

Detailed information about the specific factors and information used in establishing this rating can be found in Table 2. Information about opportunities to improve protection in the Easton Reservoir System is also presented in Table 2.

Keeping Connecticut Healthy

State of Connecticut Department of Public Health
Drinking Water Division
410 Capitol Avenue – MS# 51WAT
P.O. Box 340308 Hartford, CT 06134
(860) 509-7333

Produced With Funding Provided By The United States Environmental Protection Agency - May 2003

OVERVIEW - The Easton Reservoir System watershed encompasses some 10,766 acres of land in Easton, Monroe, Newtown, Redding, and Trumbull. Approximately 31.6% of this watershed is owned by the Aquarion Water Company of Connecticut. Public drinking water sources in this system include Easton Lake Reservoir and West Pequonnock Diversion. State-wide satellite imagery developed by the University of Connecticut indicates that undeveloped land and residential properties presently account for approximately 86.7% percent of the land cover in the Easton Reservoir System. Commercial development at 3.4% and agricultural land use at 9.9% account for the remainder of the land coverage in the source water area. Approximately 36.4% of the land in the watershed area is preserved including all watershed land owned by the Aquarion Water Company of Connecticut, state forest and parklands, and municipally or privately held land designated as open space. Information about drinking water quality and treatment is available in the Aquarion Water Company of Connecticut's annual Consumer Confidence Report.

ASSESSMENT METHODS.

The drinking water source assessment methods used by the Department of Public Health Drinking Water Division to evaluate the susceptibility of public drinking water sources to contamination are based on criteria individually tailored to surface water and groundwater sources. The criteria are keyed to sanitary conditions in the source water area, the presence of potential or historic sources of contamination, existing land use coverage's, and the need for additional source protection measures within the source water area. Source-specific data for community and non-community systems were used to determine whether a particular criterion should be rated as low, moderate or high, relative to the risk of potential contamination at the drinking water source. Further, a ranking system was used to compute an average rank for each community drinking water source based on its environmental sensitivity, potential risk of contamination and source protection needs. Watersheds and reservoirs rated as having a low, moderate or high susceptibility to potential sources of contamination generally exhibit the characteristics summarized in Table 1.

Table 1 – General Watershed Area Characteristics and Susceptibility Ratings

Susceptibility Rating	General Characteristics of the Watershed Area*
Low	Low density of potential contaminant sources Lower intensity of land development
Moderate	Low to moderate density of potential contaminant sources Moderate intensity of land development
High	Moderate to high density of potential contaminant sources Higher intensity of land development No local watershed protection regulations Detectable nitrates and/or volatile organic chemicals in the untreated source water during the past three years that are below the maximum contaminant levels allowed by state and federal drinking water regulations

** Note: Not all characteristics may be present for a given susceptibility rating*

Readers of this assessment are encouraged to use the attached glossary to assist in the understanding of the terms and concepts used throughout this report.

Maps representing the location and features of the Easton Reservoir System source water area have not been included with this assessment report because of homeland security concerns.

EASTON RESERVOIR SYSTEM ASSESSMENT RESULTS.

Based on a combination of current reservoir and watershed area conditions, existing potential contaminant sources, and the level of source protection measures currently in place, the source water assessment for this watershed system indicates that it has an overall Low risk of contamination from any identified potential sources of contamination. The assessment findings for the Easton Reservoir System are summarized in Table 2, which lists current conditions in the source water area and recommendations or opportunities to enhance protection of this public drinking water source. A listing of potential contaminant source types in the area, if present, can be found in Table 3. A summary of source water area features is shown in Table 4. It should be noted that this rating does not necessarily imply poor water quality or ongoing violations of the Connecticut Public Health Code.

The assessment of this and other comparable watershed areas throughout Connecticut generally finds that adopting recommendations similar to those presented in Table 2 could reduce the susceptibility of most surface water sources to potential sources of contamination.

Table 2 Source Water Assessment Findings and Source Protection Opportunities For the Easton Reservoir System

Assessment Category	Conditions as of June 2002	Recommendations and Source Protection Opportunities
Environmental Sensitivity Factors	Predominant watershed topography characterized by gentle slopes Reservoirs have moderate capacity to support excessive growths of algae and plankton	Monitor runoff during heavy precipitation events Monitor reservoir nutrient levels for source waters classified as eutrophic or mesotrophic.
Contaminants Detected in Untreated Source Water	None Click here to review EPA's current drinking water standards	Encourage homeowners to adopt residential best management practices that minimize the use of hazardous materials or generation of hazardous waste in the watershed.
Potential Risk Factors	Potential contaminant sources present in the watershed More than 50% of land for this source water area is undeveloped, which could present a risk if developed inappropriately. Major state or interstate roadways present in the watershed Known contaminant release points present in the watershed	Periodically inspect these sites and maintain a water quality monitoring program consistent with the level of potential risk Proactively work with local officials and developers to insure that only low-risk development occurs within the watershed area Monitor road salt and herbicide usage along these roadways and address potential for hazardous material spills resulting from vehicular accidents Maintain an adequate level of surveillance around contaminant release point sites to insure that surface water contamination is not occurring Encourage residential property owners to inspect and regularly cleanout onsite septic systems and replace underground fuel storage tanks with above ground tanks.
Source Protection Needs Factors	More than 30% of the watershed area is owned by the public water system Local regulations or zoning initiatives for the protection of public drinking water sources do not exist Comprehensive plans and policies for the protection of public drinking water sources do not exist at the local government level Point source pollution discharge points not present in this watershed area	Establish local watershed protection regulations to protect public drinking water sources Develop or enhance local governmental plans and policies that favor the protection of public drinking water sources Support environmental awareness and education within the community.

Inventoried significant potential contaminant sources present in the Easton Reservoir System source water area are listed in Table 3. While these facilities, if present, have the potential to cause surface water contamination; there is no indication that they are doing so at this time.

Table 3 – Summary of Significant Potential Contaminant Types in the Easton Reservoir System Source Water Area

Category	Subcategory	Number of SPCS Types
Waste Storage, Handling, Disposal	Hazardous Waste Facilities	8
	Solid Waste Facilities	0
	Miscellaneous	3
Bulk Chemical, Petroleum Storage	Underground Storage Tanks	0
	Tank Farms	0
	Warehouses	1
Industrial Manufacturing / Processing	Chemical & Allied Production	0
	Chemical Use Processing	1
	Miscellaneous	0
Commercial Trades and Services	Automotive and Related Services	4
	Chemical Use Services	0
	Miscellaneous	0
Miscellaneous	No Identifiable SPCS Type	0
Agricultural Operations	Animal or Livestock Waste Handling	1
	Pesticide Storage or Application	1
Total Number of Contaminant Types		19

Prominent features of the Easton Reservoir System source water area are summarized in Table 4.

Table 4 - Features of the Easton Reservoir System

Location of Watershed Area	Easton, Monroe, Newtown, Redding, and Trumbull
Name of Reservoir(s) and Diversion(s)	Easton Lake Reservoir and West Pequonnock Diversion
Number and Type of Public Drinking Water Reservoirs or Diversions in the Watershed	1 Distribution and 1 Transfer
Trophic Status of Reservoir(s)	2 Mesotrophic
DEP Surface Water Classification	AA
Watershed Area (total acreage)	10,766 acres
Preserved Land in the Watershed [a]	3,919 acres
Predominant Watershed Topography	gentle slopes
General Land Use and Land Cover in the Watershed [b] -Urban - Commercial or Industrial -Urban - Residential -Agricultural -Undeveloped Land	 3.4% 11.3% 9.9% 75.4%
Significant Potential Contamination Sources -Number of inventoried facilities in source water area [c] -Count of inventoried facilities per square mile -Number of contaminant types within inventoried facilities	 20 1.19 per sq mile 19
Number of Contaminant Release Points Inventoried by CTDEP [d]	1

[a] Preserved land includes any combination of land owned by the public water supply, state forest and parklands, and municipally or privately held land designated as open space.

[b] Based on statewide data layer of land use and land cover developed by UCONN Dept of Natural Resource Management Engineering and Connecticut DEP satellite imagery averaged across the entire watershed.

[c] Inventoried facilities reflect the actual number of SPCS sites present in the source water area, which may have more than 1 type of contaminant present at the facility.

[d] Sites or locations with documented accidental spills, leaks or discharges. While these sources, which are cataloged and tracked by the Connecticut DEP, may fall within a public drinking water supply source water area, they may or may not presently be discharging to the environment or causing contamination of a public drinking water source.

Produced With Funding Provided By The United States Environmental Protection Agency - May 2003

State of Connecticut Department of Public Health - Drinking Water Division

SOURCE WATER ASSESSMENT REPORT
AN EVALUATION OF THE SUSCEPTIBILITY OF PUBLIC DRINKING WATER SOURCES TO POTENTIAL CONTAMINATION

CT0150011

Aquarion Water Company of Connecticut
Hemlocks Reservoir System

The State of Connecticut Department of Public Health (DPH) in cooperation with the Department of Environmental Protection (DEP) recently completed an initial assessment of the Hemlocks Reservoir System, which is a source of public drinking water that is maintained and operated by the Aquarion Water Company of Connecticut. This one-time assessment is part of a nationwide effort mandated by Congress under the Safe Drinking Water Act Amendments of 1996 to evaluate the susceptibility of all public drinking water sources in Connecticut to potential sources of contamination. DPH began working in partnership with the DEP in 1997 to develop Connecticut's Source Water Assessment Program, which was approved by the U.S. Environmental Protection Agency in 1999. Sources of potential contamination that are of concern to public drinking water supplies here in Connecticut are generally associated with historic waste disposal or commercial, industrial, agricultural and residential properties that store or use hazardous materials like petroleum products, solvents or agricultural chemicals.

The assessment is intended to provide Aquarion Water Company of Connecticut consumers with information about where their public drinking water comes from, sources of potential contamination that could impact it, and what can be done to help protect it. This initial assessment complete will also assist the public water supply system, regional planners, local government, public health officials and state agencies in evaluating the degree to which the Hemlocks Reservoir System may be at risk from potential sources of contamination. The assessment can be used to target and implement enhanced source water protection measures such as routine inspections, protective land use regulations, acquisition of critical land, proper septic system maintenance, and public education. General sources of contamination with the potential to impact the Hemlocks Reservoir System include properties with underground fuel storage tanks, improperly maintained on-site septic systems, improper waste disposal, or commercial/industrial sites that store or use chemicals or generate hazardous wastes.

Hemlocks Reservoir System Source Water Assessment Summary

STRENGTHS

Point source pollution discharge points not present in this watershed area

20 to 30 percent of watershed area is owned by public water system

More than 30% of the land in the watershed area exists as preserved open space

Public water system has a comprehensive source protection program.

POTENTIAL RISK FACTORS

Potential contaminant sources present in the watershed

Local regulations or zoning initiatives for the protection of public drinking water sources do not exist

Susceptibility Rating

Rating	Environmental Sensitivity	Potential Risk Factors	Source Protection Needs
Low	X	X	
Moderate			X
High			

Overall Susceptibility Rating: Low

This rating indicates susceptibility to potential sources of contamination that may be in the source water area and does not necessarily imply poor water quality.

Detailed information about the specific factors and information used in establishing this rating can be found in Table 2. Information about opportunities to improve protection in the Hemlocks Reservoir System is also presented in Table 2.

Keeping Connecticut Healthy

State of Connecticut Department of Public Health
Drinking Water Division
410 Capitol Avenue – MS# 51WAT
P.O. Box 340308 Hartford, CT 06134
(860) 509-7333

Produced With Funding Provided By The United States Environmental Protection Agency - May 2003

OVERVIEW - The Hemlocks Reservoir System watershed encompasses some 36,946 acres of land in Bethel, Danbury, Easton, Fairfield, Newtown, Redding, Ridgefield, and Weston. Approximately 25.7% of this watershed is owned by the Aquarion Water Company of Connecticut. Public drinking water sources in this system include Aspetuck, Hemlocks, and Saugatuck reservoirs and the Morehouse Brook Diversion. State-wide satellite imagery developed by the University of Connecticut indicates that undeveloped land and residential properties presently account for approximately 87.6% percent of the land cover in the Hemlocks Reservoir System. Commercial development at 0.5% and agricultural land use at 11.9% account for the remainder of the land coverage in the source water area. Approximately 36.8% of the land in the watershed area is preserved including all watershed land owned by the Aquarion Water Company of Connecticut, state forest and parklands, and municipally or privately held land designated as open space. Information about drinking water quality and treatment is available in the Aquarion Water Company of Connecticut's annual Consumer Confidence Report.

ASSESSMENT METHODS.

The drinking water source assessment methods used by the Department of Public Health Drinking Water Division to evaluate the susceptibility of public drinking water sources to contamination are based on criteria individually tailored to surface water and groundwater sources. The criteria are keyed to sanitary conditions in the source water area, the presence of potential or historic sources of contamination, existing land use coverage's, and the need for additional source protection measures within the source water area. Source-specific data for community and non-community systems were used to determine whether a particular criterion should be rated as low, moderate or high, relative to the risk of potential contamination at the drinking water source. Further, a ranking system was used to compute an average rank for each community drinking water source based on its environmental sensitivity, potential risk of contamination and source protection needs. Watersheds and reservoirs rated as having a low, moderate or high susceptibility to potential sources of contamination generally exhibit the characteristics summarized in Table 1.

Table 1 – General Watershed Area Characteristics and Susceptibility Ratings

Susceptibility Rating	General Characteristics of the Watershed Area*
Low	Low density of potential contaminant sources Lower intensity of land development
Moderate	Low to moderate density of potential contaminant sources Moderate intensity of land development
High	Moderate to high density of potential contaminant sources Higher intensity of land development No local watershed protection regulations Detectable nitrates and/or volatile organic chemicals in the untreated source water during the past three years that are below the maximum contaminant levels allowed by state and federal drinking water regulations

** Note: Not all characteristics may be present for a given susceptibility rating*

Readers of this assessment are encouraged to use the attached glossary to assist in the understanding of the terms and concepts used throughout this report.

Maps representing the location and features of the Hemlocks Reservoir System source water area have not been included with this assessment report because of homeland security concerns.

HEMLOCKS RESERVOIR SYSTEM ASSESSMENT RESULTS.

Based on a combination of current reservoir and watershed area conditions, existing potential contaminant sources, and the level of source protection measures currently in place, the source water assessment for this watershed system indicates that it has an overall Low risk of contamination from any identified potential sources of contamination. The assessment findings for the Hemlocks Reservoir System are summarized in Table 2, which lists current conditions in the source water area and recommendations or opportunities to enhance protection of this public drinking water source. A listing of potential contaminant source types in the area, if present, can be found in Table 3. A summary of source water area features is shown in Table 4.

The assessment of this and other comparable watershed areas throughout Connecticut generally finds that adopting recommendations similar to those presented in Table 2 could reduce the susceptibility of most surface water sources to potential sources of contamination.

Table 2 Source Water Assessment Findings and Source Protection Opportunities For the Hemlocks Reservoir System

Assessment Category	Conditions as of June 2002	Recommendations and Source Protection Opportunities
Environmental Sensitivity Factors	Predominant watershed topography characterized by moderate slopes Reservoirs have moderate or unknown capacity to support excessive growths of algae and plankton	Monitor runoff during heavy precipitation events Monitor reservoir nutrient levels in eutrophic or mesotrophic sources and determine trophic status of source waters listed as unknown
Contaminants Detected in Untreated Source Water	None Click here to review EPA's current drinking water standards	Encourage homeowners to adopt residential best management practices that minimize the use of hazardous materials or generation of hazardous waste in the watershed.
Potential Risk Factors	Potential contaminant sources present in the watershed More than 50% of land for this source water area is undeveloped, which could present a risk if developed inappropriately. Major state or interstate roadways present in the watershed Known contaminant release points present in the watershed	Periodically inspect these sites and maintain a water quality monitoring program consistent with the level of potential risk Proactively work with local officials and developers to insure that only low-risk development occurs within the watershed area Monitor road salt and herbicide usage along these roadways and address potential for hazardous material spills resulting from vehicular accidents Maintain an adequate level of surveillance around contaminant release point sites to insure that surface water contamination is not occurring Encourage residential property owners to inspect and regularly cleanout onsite septic systems and replace underground fuel storage tanks with above ground tanks.
Source Protection Needs Factors	20 to 30 percent of watershed area is owned by public water system Local regulations or zoning initiatives for the protection of public drinking water sources do not exist Comprehensive plans and policies for the protection of public drinking water sources do not exist at the local government level Point source pollution discharge points not present in this watershed area	Establish local watershed protection regulations to protect public drinking water sources Develop or enhance local governmental plans and policies that favor the protection of public drinking water sources Support environmental awareness and education within the community.

Inventoried significant potential contaminant sources present in the Hemlocks Reservoir System source water area are listed in Table 3. While these facilities, if present, have the potential to cause surface water contamination; there is no indication that they are doing so at this time.

Table 3 – Summary of Significant Potential Contaminant Types in the Hemlocks Reservoir System Source Water Area

Category	Subcategory	Number of SPCS Types
Waste Storage, Handling, Disposal	Hazardous Waste Facilities	2
	Solid Waste Facilities	1
	Miscellaneous	2
Bulk Chemical, Petroleum Storage	Underground Storage Tanks	18
	Tank Farms	0
	Warehouses	1
Industrial Manufacturing / Processing	Chemical & Allied Production	0
	Chemical Use Processing	0
	Miscellaneous	0
Commercial Trades and Services	Automotive and Related Services	4
	Chemical Use Services	0
	Miscellaneous	0
Miscellaneous	No Identifiable SPCS Type	0
Agricultural Operations	Animal or Livestock Waste Handling	2
	Pesticide Storage or Application	0
Total Number of Contaminant Types		30

Prominent features of the Hemlocks Reservoir System source water area are summarized in Table 4.

Table 4 - Features of the Hemlocks Reservoir System

Location of Watershed Area	Bethel, Danbury, Easton, Fairfield, Newtown, Redding, Ridgefield, and Weston
Name of Reservoir(s) and Diversion(s)	Aspetuck, Hemlocks, and Saugatuck reservoirs and the Morehouse Brook Diversion
Number and Type of Public Drinking Water Reservoirs or Diversions in the Watershed	1 Distribution, 2 Storage, and 1 Transfer
Trophic Status of Reservoir(s)	3 Mesotrophic and 1 Unknown
DEP Surface Water Classification	AA
Watershed Area (total acreage)	36,946 acres
Preserved Land in the Watershed [a]	13,607 acres
Predominant Watershed Topography	moderate slopes
General Land Use and Land Cover in the Watershed [b]	
-Urban - Commercial or Industrial	0.5%
-Urban - Residential	6.9%
-Agricultural	11.9%
-Undeveloped Land	80.7%
Significant Potential Contamination Sources	
-Number of inventoried facilities in source water area [c]	26
-Count of inventoried facilities per square mile	0.45 per sq mile
-Number of contaminant types within inventoried facilities	30
Number of Contaminant Release Points Inventoried by CTDEP [d]	3

[a] Preserved land includes any combination of land owned by the public water supply, state forest and parklands, and municipally or privately held land designated as open space.

[b] Based on statewide data layer of land use and land cover developed by UCONN Dept of Natural Resource Management Engineering and Connecticut DEP satellite imagery averaged across the entire watershed.

[c] Inventoried facilities reflect the actual number of SPCS sites present in the source water area, which may have more than 1 type of contaminant present at the facility.

[d] Sites or locations with documented accidental spills, leaks or discharges. While these sources, which are cataloged and tracked by the Connecticut DEP, may fall within a public drinking water supply source water area, they may or may not presently be discharging to the environment or causing contamination of a public drinking water source.

SOURCE WATER ASSESSMENT REPORT
AN EVALUATION OF THE SUSCEPTIBILITY OF PUBLIC DRINKING WATER SOURCES TO POTENTIAL CONTAMINATION

CT0150011

Aquarion Water Company of Connecticut
Trap Falls Reservoir System

The State of Connecticut Department of Public Health (DPH) in cooperation with the Department of Environmental Protection (DEP) recently completed an initial assessment of the Trap Falls Reservoir System, which is a source of public drinking water that is maintained and operated by the Aquarion Water Company of Connecticut. This one-time assessment is part of a nationwide effort mandated by Congress under the Safe Drinking Water Act Amendments of 1996 to evaluate the susceptibility of all public drinking water sources in Connecticut to potential sources of contamination. DPH began working in partnership with the DEP in 1997 to develop Connecticut's Source Water Assessment Program, which was approved by the U.S. Environmental Protection Agency in 1999. Sources of potential contamination that are of concern to public drinking water supplies here in Connecticut are generally associated with historic waste disposal or commercial, industrial, agricultural and residential properties that store or use hazardous materials like petroleum products, solvents or agricultural chemicals.

The assessment is intended to provide Aquarion Water Company of Connecticut consumers with information about where their public drinking water comes from, sources of potential contamination that could impact it, and what can be done to help protect it. This initial assessment complete will also assist the public water supply system, regional planners, local government, public health officials and state agencies in evaluating the degree to which the Trap Falls Reservoir System may be at risk from potential sources of contamination. The assessment can be used to target and implement enhanced source water protection measures such as routine inspections, protective land use regulations, acquisition of critical land, proper septic system maintenance, and public education. General sources of contamination with the potential to impact the Trap Falls Reservoir System include properties with underground fuel storage tanks, improperly maintained on-site septic systems, improper waste disposal, or commercial/industrial sites that store or use chemicals or generate hazardous wastes.

Trap Falls Reservoir System Source Water Assessment Summary

STRENGTHS

Point source pollution discharge points not present in this watershed area

Public water system has a comprehensive source protection program.

POTENTIAL RISK FACTORS

Potential contaminant sources present in the watershed

Less than 20% of watershed area owned by public water system

Local regulations or zoning initiatives for the protection of public drinking water sources do not exist

Susceptibility Rating

Rating	Environmental Sensitivity	Potential Risk Factors	Source Protection Needs
Low	X		
Moderate		X	
High			X

Overall Susceptibility Rating: Moderate

This rating indicates susceptibility to potential sources of contamination that may be in the source water area and does not necessarily imply poor water quality.

Detailed information about the specific factors and information used in establishing this rating can be found in Table 2. Information about opportunities to improve protection in the Trap Falls Reservoir System is also presented in Table 2.

State of Connecticut Department of Public Health
Drinking Water Division
410 Capitol Avenue – MS# 51WAT
P.O. Box 340308 Hartford, CT 06134
(860) 509-7333

Keeping Connecticut Healthy

Produced With Funding Provided By The United States Environmental Protection Agency - May 2003

OVERVIEW - The Trap Falls Reservoir System watershed encompasses some 9,883 acres of land in Monroe, Shelton, and Trumbull. Approximately 17.6% of this watershed is owned by the Aquarion Water Company of Connecticut. Public drinking water sources in this system include Far Mill, Means Brook and Trap Falls reservoirs. State-wide satellite imagery developed by the University of Connecticut indicates that undeveloped land and residential properties presently account for approximately 86.7% percent of the land cover in the Trap Falls Reservoir System. Commercial development at 1.6% and agricultural land use at 11.6% account for the remainder of the land coverage in the source water area. Approximately 19.7% of the land in the watershed area is preserved including all watershed land owned by the Aquarion Water Company of Connecticut, state forest and parklands, and municipally or privately held land designated as open space. Information about drinking water quality and treatment is available in the Aquarion Water Company of Connecticut's annual Consumer Confidence Report.

ASSESSMENT METHODS.

The drinking water source assessment methods used by the Department of Public Health Drinking Water Division to evaluate the susceptibility of public drinking water sources to contamination are based on criteria individually tailored to surface water and groundwater sources. The criteria are keyed to sanitary conditions in the source water area, the presence of potential or historic sources of contamination, existing land use coverage's, and the need for additional source protection measures within the source water area. Source-specific data for community and non-community systems were used to determine whether a particular criterion should be rated as low, moderate or high, relative to the risk of potential contamination at the drinking water source. Further, a ranking system was used to compute an average rank for each community drinking water source based on its environmental sensitivity, potential risk of contamination and source protection needs. Watersheds and reservoirs rated as having a low, moderate or high susceptibility to potential sources of contamination generally exhibit the characteristics summarized in Table 1.

Table 1 – General Watershed Area Characteristics and Susceptibility Ratings

Susceptibility Rating	General Characteristics of the Watershed Area*
Low	Low density of potential contaminant sources Lower intensity of land development
Moderate	Low to moderate density of potential contaminant sources Moderate intensity of land development
High	Moderate to high density of potential contaminant sources Higher intensity of land development No local watershed protection regulations Detectable nitrates and/or volatile organic chemicals in the untreated source water during the past three years that are below the maximum contaminant levels allowed by state and federal drinking water regulations

** Note: Not all characteristics may be present for a given susceptibility rating*

Readers of this assessment are encouraged to use the attached glossary to assist in the understanding of the terms and concepts used throughout this report.

Maps representing the location and features of the Trap Falls Reservoir System source water area have not been included with this assessment report because of homeland security concerns.

TRAP FALLS RESERVOIR SYSTEM ASSESSMENT RESULTS.

Based on a combination of current reservoir and watershed area conditions, existing potential contaminant sources, and the level of source protection measures currently in place, the source water assessment for this watershed system indicates that it has an overall Moderate risk of contamination from any identified potential sources of contamination. The assessment findings for the Trap Falls Reservoir System are summarized in Table 2, which lists current conditions in the source water area and recommendations or opportunities to enhance protection of this public drinking water source. A listing of potential contaminant source types in the area, if present, can be found in Table 3. A summary of source water area features is shown in Table 4. It should be noted that this rating does not necessarily imply poor water quality or ongoing violations of the Connecticut Public Health Code.

The assessment of this and other comparable watershed areas throughout Connecticut generally finds that adopting recommendations similar to those presented in Table 2 could reduce the susceptibility of most surface water sources to potential sources of contamination.

Table 2 Source Water Assessment Findings and Source Protection Opportunities For the Trap Falls Reservoir System

Assessment Category	Conditions as of June 2002	Recommendations and Source Protection Opportunities
Environmental Sensitivity Factors	Predominant watershed topography characterized by gentle slopes	Monitor runoff during heavy precipitation events
	Reservoirs have moderate to high capacity to support excessive growths of algae and plankton	Monitor reservoir nutrient levels for source waters classified as eutrophic or mesotrophic.
Contaminants Detected in Untreated Source Water	None	
	Click here to review EPA's current drinking water standards	Encourage homeowners to adopt residential best management practices that minimize the use of hazardous materials or generation of hazardous waste in the watershed.
Potential Risk Factors	Potential contaminant sources present in the watershed	Periodically inspect these sites and maintain a water quality monitoring program consistent with the level of potential risk
	More than 50% of land for this source water area is undeveloped, which could present a risk if developed inappropriately.	Proactively work with local officials and developers to insure that only low-risk development occurs within the watershed area
	Major state or interstate roadways present in the watershed	Monitor road salt and herbicide usage along these roadways and address potential for hazardous material spills resulting from vehicular accidents
	Known contaminant release points present in the watershed	Maintain an adequate level of surveillance around contaminant release point sites to insure that surface water contamination is not occurring
		Encourage residential property owners to inspect and regularly cleanout onsite septic systems and replace underground fuel storage tanks with above ground tanks.
Source Protection Needs Factors	Less than 20% of watershed area owned by public water system	Increase ownership or control of watershed area whenever land becomes available for purchase or support land acquisition by public or private conservation/preservation organizations
	Less than 20% of the land in the source water area exists as preserved open space	Support and encourage the acquisition of open space land within the watershed area
	Local regulations or zoning initiatives for the protection of public drinking water sources do not exist	Establish local watershed protection regulations to protect public drinking water sources
	Comprehensive plans and policies for the protection of public drinking water sources do not exist at the local government level	Develop or enhance local governmental plans and policies that favor the protection of public drinking water sources
	Point source pollution discharge points not present in this watershed area	Support environmental awareness and education within the community.

Inventoried significant potential contaminant sources present in the Trap Falls Reservoir System source water area are listed in Table 3. While these facilities, if present, have the potential to cause surface water contamination; there is no indication that they are doing so at this time.

Table 3 – Summary of Significant Potential Contaminant Types in the Trap Falls Reservoir System Source Water Area

Category	Subcategory	Number of SPCS Types
Waste Storage, Handling, Disposal	Hazardous Waste Facilities	4
	Solid Waste Facilities	1
	Miscellaneous	0
Bulk Chemical, Petroleum Storage	Underground Storage Tanks	8
	Tank Farms	0
	Warehouses	0
Industrial Manufacturing / Processing	Chemical & Allied Production	0
	Chemical Use Processing	1
	Miscellaneous	0
Commercial Trades and Services	Automotive and Related Services	2
	Chemical Use Services	0
	Miscellaneous	1
Miscellaneous	No Identifiable SPCS Type	1
Agricultural Operations	Animal or Livestock Waste Handling	0
	Pesticide Storage or Application	1
Total Number of Contaminant Types		19

Prominent features of the Trap Falls Reservoir System source water area are summarized in Table 4.

Table 4 - Features of the Trap Falls Reservoir System

Location of Watershed Area	Monroe, Shelton, and Trumbull
Name of Reservoir(s) and Diversion(s)	Far Mill, Means Brook and Trap Falls reservoirs
Number and Type of Public Drinking Water Reservoirs or Diversions in the Watershed	1 Distribution and 2 Storage
Trophic Status of Reservoir(s)	1 Mesotrophic and 2 Eutrophic
DEP Surface Water Classification	AA
Watershed Area (total acreage)	9,883 acres
Preserved Land in the Watershed [a]	1,948 acres
Predominant Watershed Topography	gentle slopes
General Land Use and Land Cover in the Watershed [b] -Urban - Commercial or Industrial -Urban - Residential -Agricultural -Undeveloped Land	 1.6% 19.7% 11.6% 67.1%
Significant Potential Contamination Sources -Number of inventoried facilities in source water area [c] -Count of inventoried facilities per square mile -Number of contaminant types within inventoried facilities	 13 0.84 per sq mile 19
Number of Contaminant Release Points Inventoried by CTDEP [d]	2

[a] Preserved land includes any combination of land owned by the public water supply, state forest and parklands, and municipally or privately held land designated as open space.

[b] Based on statewide data layer of land use and land cover developed by UCONN Dept of Natural Resource Management Engineering and Connecticut DEP satellite imagery averaged across the entire watershed.

[c] Inventoried facilities reflect the actual number of SPCS sites present in the source water area, which may have more than 1 type of contaminant present at the facility.

[d] Sites or locations with documented accidental spills, leaks or discharges. While these sources, which are cataloged and tracked by the Connecticut DEP, may fall within a public drinking water supply source water area, they may or may not presently be discharging to the environment or causing contamination of a public drinking water source.

APPENDIX C
INSPECTION FORM

Morehouse Farm Park
Inspection Reporting Form

Name: _____ **Date:** _____
Weather at Time of Inspection: _____ **Runoff Present:** _____
Rainfall Preceding Inspection: _____

Catch Basins

CB ID	Depth to Sediment	Condition	Debris	Flow	Notes:
	(feet)	(good, moderate, poor)	(yes/no)	(yes/no)	
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

Sediment Basins

Northern Basin

Outlet Condition	Flow / Description	Debris	Embankment Condition	Erosion	Debris	Ponded Water	Forebay Sediment	Ponded	Clarity
(good, poor)	(y/n, clear etc)	(y/n)	(good, poor)	(y/n)	(y/n)	(y/n)	(depth)	(y/n)	(clear/silted)

Central Basin

Outlet Condition	Flow / Description	Debris	Embankment Condition	Erosion	Debris	Ponded Water	Forebay Sediment	Ponded	Clarity
(good, poor)	(y/n, clear etc)	(y/n)	(good, poor)	(y/n)	(y/n)	(y/n)	(depth)	(y/n)	(clear/silted)

Southern Basin

Outlet Condition	Flow / Description	Debris	Embankment Condition	Erosion	Debris	Ponded Water	Forebay Sediment	Ponded	Clarity
(good, poor)	(y/n, clear etc)	(y/n)	(good, poor)	(y/n)	(y/n)	(y/n)	(depth)	(y/n)	(clear/silted)

Outfalls

Outfall	Flow	Riprap Condition	Erosion	Ponding
#	(y/n)	(good, poor)	(y/n)	(y/n)
OF-1				
OF-2				

Notes: _____

APPENDIX D
INTEGRATED TURF MANAGEMENT PLAN

Prepared for:
Milone & MacBroom
Engineering, Landscape Architecture and Environmental Science
Cheshire, Connecticut

Integrated Turfgrass Pest Management and Best Management Practice Plan for Athletic Fields Morehouse Farm Park Town of Weston Weston, Connecticut

Prepared by:

William M. Dest, Ph.D.
Agronomist/Soil Scientist
July 9, 2002

INTRODUCTION

The integrated turfgrass pest management plan is designed using best management practices to 1) reduce risk of nitrogen movement to groundwater and nitrogen and phosphorus movement to the surrounding wetlands and the Saugatuck Reservoir and 2) minimize the need for pesticides, although some pesticides will be required if pest populations should cause permanent damage to the fields or could thin the turf enough to cause soil erosion. This is to be achieved by 1) identifying the major anticipated pest problems, 2) selecting the pesticides to control the anticipated pest problems using an environmental risk assessment model for pesticide leaching and runoff, 3) using biological control that has proven successful, 4) employing best management practices for nitrogen and phosphorus fertilization, 5) grass species selection, 6) mowing practices that will recycle nutrients and suppress diseases and 7) controlling thatch to reduce disease incidence and insect damage from occurring. The report also presents site specific soil properties of the A horizon from the present site that were used in the environmental risk assessment model and for preparing limestone and phosphorus recommendations for the construction phase of the project, Appendix A.

FERTILIZER PROGRAM

Best management practices for nitrogen fertilization for the proposed playing fields will include 1) applying nitrogen fertilizer only when the grass is actively growing, 2) returning grass clippings to the turf to recycle plant nutrients which will reduce the amount of nitrogen fertilizer and other fertilizer nutrients required, and 3) by applying most of the nitrogen required each year from a slow release nitrogen source such as coated urea, IBDU, or a natural organic form.

The amount of fertilizer nitrogen applied to the playing surfaces will not exceed 132 pounds of nitrogen per acre per year and will be divided into several applications with no single application to exceed 44 pounds of nitrogen per acre. This combined with using most of the nitrogen in slow release forms will reduce the risk of nitrogen runoff, leaching to groundwater and excessive plant growth from occurring. Plants that produce excessive growth are more prone to disease compared to plants in which excess growth is controlled.

Table 1
Fertilizer Programs

Fertilizer Program for Playing Fields Containing Maximum Yearly Amount of Nitrogen

Month	Fertilizer Grade	Lbs. of nutrients/acre N	P_2O_5	K_2O
April/May	[1]31-0-0	22	-	-
June	[2]6-1-3	44	7.3	22
August	6-1-3	44	7.3	22
September	31-0-0	22	-	-
Total yearly amount		132	14.6	44

[1] IBDU - a slow release fertilizer source of nitrogen

[2] Ringer - composted natural organic fertilizer source

Fertilizer Program for Playing Fields Using Minimum Yearly Amount of Nitrogen

Month	Fertilizer Grade	Lbs. of nutrients/acre N	P_2O_5	K_2O
May	6-1-3	44	7.3	22
August	6-1-3	44	7.3	22
Total yearly amount		88	14.6	44

Other slow release nitrogen sources may be substituted for the 31-0-0 and 6-1-3 fertilizer above. These may include sources such as sulfur or polymer coated urea and other composted natural organic fertilizers such as Sustane (5-2-4) and Nature Safe (8-3-5). Composted materials have been shown to suppress certain diseases such as pythium blight, brown patch and dollar spot and are included in the list of sources for this purpose (Nelson, 1992; Nelson et al., 1992).

There may be occasions when additional nitrogen will be required to sustain adequate growth and vegetative cover given the sporting events, level of participation, and intensity of use at the proposed Morehouse Farm Park. Ammonium nitrate (34-0-0) may be used as a supplement to the sources above depending upon the season, rate of growth, periods when the fields are renovated, and the nitrogen supplied by the clippings. The rate of nitrogen from ammonium nitrate can be between 10 to 20 lbs. N per acre at each application but not to exceed 20 lbs. N per acre in any single treatment.

Four hundred thirty five pounds (435 lbs.) of P_2O_5 per acre and 4.5 tons per acre of Dolomitic limestone will be applied to the fields during seedbed preparation and incorporated into the top 6 to 7 inches of topsoil. Applying fertilizer phosphorus during seedbed preparation will increase the soil levels of available phosphorus so that large surface applications of phosphorus will not have to be made to the turf in future years, thus reducing the risk of phosphorus runoff to the adjacent wetlands and the Saugatuck Reservoir although the phosphorus runoff from turfgrasses seldom occurs or has been shown to be in very small amounts when it does occur (Watschke et al., 1989; Harrison et al., 1993).

Nutrient loading rates from surface flow of nitrogen and phosphorus are shown for the present condition and the proposed fields, table 2. Estimates were derived using the Simple Method Equation from Schueler (1987) which utilizes average flow weighted values. The average flow weighted values for woodlands are from Haith et al. (1987), values for underfertilized grassland from McLeod (1984) and values for turf are from Kelling, et al. (1975), Watschke, et al. (1989) and Gross et al. (1990).

The equation used in determining loading rates is:

$$L = [(P)(Pj)(Rv)/12](C)(A)(2.72)$$

in which

L = loading rate lbs. N and P per acre
P = rainfall depth (47.1"/yr.)
Pj = factor that corrects for storms with no runoff (0.9)
Rv = runoff coefficient (0.05) - fraction of rainfall that is converted into runoff
C = flow weighted mean concentration of N and P (mg/l)
A = area of land use type
12 and 2.72 are conversion constants

Table 2

Total Nitrogen and Phosphorus Loading Rates

			Mean Runoff conc (mg/l)		Loading Rates Lbs/year	
	Land use	acres	N	P	N	P
present condition	woodland	18.9	0.19	0.006	1.73	0.05
	[1] grassland	12.6	0.11	0.28	0.67	1.69
				Total	2.40	1.74
[2]post condition	woodland	14.4	0.19	0.006	1.31	0.04
	[1] grassland	8.4	0.11	0.28	0.44	1.13
	turfgrass	7.8	2.00	0.33	7.49	1.24
				Total	9.24	2.41

[1]unfertilized grassland

[2]0.9 acres are comprised of skinned infields and do not contribute to nitrogen and phosphorus runoff.

The loading rate for nitrogen and phosphorus to the adjacent wetland and Saugatuck Reservoir is 0.9 and 4.8% of the maximum yearly amount of nitrogen and phosphorus respectively to be applied to the fields. Further the loading rates represent a small increase from the present condition, therefore should not adversely impact the adjacent wetland. Also, it is likely that some of the nitrogen if it does reach the wetland will be lost to the atmosphere through denitrification, a common function of wetland soils.

The yearly concentration of nitrogen and phosphorus in runoff from the planned Morehouse Farm Park to adjacent wetlands based upon the loading rates in Table 2 will be 0.10 mg/l (milligram per liter) and 0.028 mg/l of nitrogen and phosphorus respectively. Yearly runoff volume is 12 acre inches and is from Mr. Ted Hart, Milone & MacBroom.

SOIL TESTS

Soil samples to determine soil pH and soil available nutrients, particularly phosphorus and potassium, should be taken once every 3 to 4 years from the field. This will determine if additional phosphorus and/or potassium is required above that which is applied in the fertilizer programs outlined above. Also, requirements for a limestone treatment should be based on the results from measuring soil pH to reduce the risk of overliming or not applying sufficient lime to maintain the pH between 6.0 to 6.7. Correct sampling technique is critical for interpreting soil test results.

PESTICIDES AND PEST CONTROL

The anticipated major pest problems for the fields are restricted to just a few insects. These are the Japanese beetle grub and chinch bug. The major anticipated weed problems are the weeds crabgrass and the broadleaf weeds such as clover, dandelion and plantains. Parasitic diseases are not anticipated to be a major problem for the field areas, therefore fungicides will not be required. Even if a disease does occur with the possible exception of pythium, the turf will usually recover with a change in weather conditions.

A monitoring protocol for pest problems will be implemented. The frequency that monitoring is carried out will depend on weather conditions, periods in which the grass is under stress and when individual pest problems are expected to occur. Threshold levels for pests will be used where they have been established, such as for insects. However, threshold levels for weeds in turfgrasses have not been determined nor are they as easily defined as for insects so that a decision to take action using herbicides still remains subjective. There are also other insect problems such as the bluegrass billbug and grubs of the European chafer and Oriental beetle that will be monitored for and controlled should they be sighted. However, they do not occur with the same frequency on turfgrasses in Connecticut as the above-mentioned insects.

Insects

Japanese Beetle Grubs

Japanese beetle grubs are a soil inhabiting insect and do most of their feeding in September and October on the roots of grasses. Monitoring for Japanese beetle grubs will begin in mid-July to early August after the adults have laid their eggs. A garden spade or other suitable means can be used in which square foot samples are taken from the top 2 to 3 inches of the surface and the soil just below the turf examined for the number of grubs in each sample. A 4" cup cutter as used on golf courses can also be used as a sampling tool in place of a garden spade. Samples should be taken at approximately 20 foot intervals over the fields. Suggested threshold populations for grubs have been placed at 6 to 20 larvae per square foot before an insecticide treatment is required. However, plant vigor and soil moisture content are factors that can affect threshold populations and will enter into the decision to undertake an insecticide treatment. It takes a greater number of grubs to affect a healthy and vigorous growing turf.

The nematode Heterorhabditis bacteriophora will be used first to control grubs before an insecticide treatment if they exceed the threshold level and are in the early stages of development. Soil moisture must be adequate for its application. Close monitoring for its control will follow. If the grub population still continues to be above the threshold level, then an insecticide treatment will be applied.

Chinch Bug

Chinch bug is a surface feeding insect. Damage is caused by the insect extracting juices from the stems and leaves often killing the entire plant. Damage is in the summer months, June through August, and often gives the appearance of drought injury. There are two generations produced during this time. Monitoring is done at this time by parting the grass between damaged and healthy grass to examine the presence of the insect. Also, a coffee can with both ends removed can be inserted into the turf and filled with water. The chinch bugs, if present, will float to the surface. Threshold levels have been placed between 30 to 50 nymphs per square foot. The selection of endophyte perennial ryegrass cultivars for the field and fine leaf fescues for the surrounding areas will reduce the risk of chinch bug injury. See Grass Species Selection.

Weeds

Crabgrass

Crabgrass is an annual weed that begins to germinate in mid May/early June. Maintaining a dense stand of grass will help in restricting crabgrass populations. Also, crabgrass infestation into the fields can be somewhat reduced if the fields are maintained at a 2 ½ inch mowing height. This reduces light penetration below the canopy and moderates soil temperatures which affects crabgrass seed germination and subsequent seedling development. Further, using a combination of pre and post emergence herbicides to control crabgrass if it becomes a problem reduces the total overall amount of active ingredient of herbicide needed per acre should chemical control be required. A preemergence herbicide spring treatment will only be used if there was a large infestation of crabgrass the previous year. Crabgrass population will be monitored and recorded at the end of each summer to identify areas requiring treatment the following spring. A preemergence treatment the next spring will only be used if crabgrass populations exceed 5% of the field areas.

Broadleaf Weeds

Broadleaf weeds will eventually encroach into the fields. However, monitoring will help in the decision to treat with a herbicide. A means for monitoring weeds can be accomplished by using a simple rating system of 1 through 3 in which 1 = weeds found occasionally in the turfgrass population of less than 10%, 2 = weeds found frequently, or between 10 to 30%, and 3 = weeds abundant in the plant population or greater than 30%. Although the rating is subjective, it will assist in making decisions to 1) chemically treat for weeds, 2) evaluate the success of past herbicide treatments, and 3) make changes in the cultural program to better

provide the turfgrass community with a competitive advantage over the weeds. A weed population rated 1 may not require a herbicide treatment while a rating of 2 or 3 which may seriously affect the surface of the fields resulting in the risk of soil erosion or an unsafe surface to play on would require a herbicide treatment because of the abundant weed population. Broadleaf weed populations will be scouted for in late April/early May and again in August and September. The location of weed populations and species names will be recorded. Spot treatment of weeds that are found only in a few locations in the fields should be employed in place of blanket treatments whenever feasible.

INSECTICIDE AND HERBICIDE SELECTION

A risk assessment model was used for selecting the insecticides and herbicides that can be used on the fields by determining their potential runoff and leaching to groundwater. Pesticides that have a low potential were selected and are shown in table 3. The National Pesticide Soil Data Base and User Decision Support System for Risk Assessment of Ground and Surface Water Contamination (NPURG) was used. It is a computerized system developed by the USDA, SCS based on the GLEAMS model (Leonard et al., 1987) for use in agricultural row crops.

The conditions of the model are:

1. There is a 4% slope.
2. The pesticide is applied to a fallow (bare surface) field 2, 4, 8 and 15 days before a major rainfall event.
3. A rainfall event of 3.5 inches takes place every second day for five events for a total of 17.5 inches of rainfall followed by a 1 inch event every other day for at least 4 times giving a total of 21.5 inches of rainfall over an 18 day period. This far exceeds normal rainfall. However, the model is designed to err on the conservative side for protecting ground and surface water.

A summary of the pesticide fate as a result of the NPURG analysis is shown in Appendix B of the report.

Table 3 - Pesticides with Low Leaching and Runoff Potential

Herbicides	Insecticides
2,4-D amine (many names)[1]	acephate (Orthene)
bensulide (Betasan)	bendiocarb (Turcan)
benefin (Balan)	bifenthrin (Talstar)
dicamba (Banvel)	carbaryl (Sevin)
2,4-DP	chlorpyrifos (Dursban)
dithiopyr (Dimension)	cyfluthrin (Tempo)
fenoxaprop-ethyl (Acclaim)	fluvalinate (Mavrik)
glyphosate (Roundup)	Lambda-cyhalothrin (Scimitar)
MCPP (mecoprop)	
oxadiazon (Ronstar)	
pendimethalin (Pendulum)	
siduron (Tupersan)	
triclopyr (Turflon)	
trifluralin (Treflan)	

[1] Common name (trade name)

GUIDELINES FOR SAFE USE AND HANDLING PESTICIDES

Guidelines for safe use and handling pesticides will be followed to include but not limited to:

1. Pesticides will be selected based on target species. No other pesticides will be applied.

2. The use of pesticides are to be spatially restricted. For example, if white grubs inhabit or are damaging only a single location on a field, then only the location in which they are found or are at the threshold level will be treated (spot treatment). This will substantially reduce the use of pesticides.

3. Pesticides will only be applied during periods when the grass is growing actively.

4. Higher than recommended rates of pesticides will be avoided. Research is showing that present label rates for pesticide may even be reduced. As an example, a strategy of using pre/post herbicide treatments for annual grassy weeds such as crabgrass is shown to reduce overall herbicide use on this annual species.

5. Pesticides should be applied uniformly to the area to be treated by careful equipment calibration and using correct spacing and nozzle heights on boom sprayers if used to apply the materials. Equipment should be calibrated on a periodic basis to maintain correct application rates.

6. Pesticide treatments will be avoided during windy conditions and/or prior to a period a heavy rainfall event is predicted.

7. Application equipment will be maintained and cleaned so that the equipment operates efficiently.

8. Label directions for mixing pesticides will be followed to ensure efficient and safe use. Guidelines for proper disposal of pesticide containers will be followed.

9. Persons using the pesticides will be properly licensed. This is required by state and federal law. Persons have to go through training programs and take examinations to obtain their licenses.

10. Up to date records will be kept on pesticide use to include:
    a) date of pesticide application
    b) common name of pesticide and amount of active ingredient
    c) amount of pesticide applied
    d) location in which pesticide was applied to the field or fields if a spot treatment
    e) size of area treated
    f) type of application method (spray, granular, etc.)

g) weather conditions at the time of treatment and 24 hours following treatment
h) applicator's name and affiliation

Insects and weeds will be controlled using multiple techniques that include 1) accurate pest identification 2) good monitoring techniques, 3) using pest threshold levels where they have been determined, 4) using biological control where it has been found to be successful, 5) grass species selection, and 6) employing sound cultural practices such as careful fertilization, cultivation, mowing and thatch control. This management strategy will reduce pest problems and pesticide use.

GRASS SPECIES SELECTION

Kentucky bluegrass cultivars were selected for the playing surfaces of the baseball fields for their good rating under low maintenance in the National Kentucky Bluegrass Tests, National Turfgrass Evaluation Program. The perennial ryegrass cultivars were selected for high endophyte. Grass varieties with high endophyte have shown to display good resistance to leaf feeding insects such as chinch bug.

The fine leaf fescue cultivars (chewings and creeping red fescue) for seeding in areas outside the playing surfaces such as outside fences and slopes were chosen for their high endophyte. Also fine leaf fescues have a low fertility requirement and have continually shown to persist with minimal or no fertilization whether mowed or left unmowed once established. The fine leaf fescues outside the playing surfaces will additionally serve as sinks for any nitrogen, phosphorus or pesticide that might move in overland flow.

Seed Mixtures

Athletic Field Playing Surfaces (percent seed by weight)

35% Ram I Kentucky bluegrass
35% North Star Kentucky bluegrass
*15% Cutter perennial ryegrass
*15% Elf perennial ryegrass
*high endophyte
Seeding rate = 130 pounds per acre

Areas outside the playing surfaces (percent by weight)

*40% Victory II chewings fescue
*30% Fenway creeping red fescue
30% Discovery hard fescue
*high endophyte
Seeding rate - 260 pounds per acre

The varieties selected for the proposed project should become part of the specifications for building the fields. The varieties selected above may be substituted by other varieties with similar characteristics but the species ratio and seeding rates are to remain the same in each seed mixture. Final cultivar selection will be based on local availability.

The best time to seed cool season grasses is between August 15 and September 30. Soil temperatures are ideal for germination to occur and weeds such as crabgrass (highly competitive in spring to mid-summer seedings if not chemically controlled) is not a problem with seedling development of the cool season grasses seeded at this time of year. The construction schedule should be planned to meet this time period for seeding.

MOWING MANAGEMENT

1. The mowing height for the fields will be maintained at 2 to 2 ½ inches. Grass areas outside the field once established will be mowed at a cutting height of 3 inches. Keeping the fields and areas outside the field at these mowing heights will reduce the ingress of weedy grasses such as crabgrass provided a dense stand of grass is maintained. However it should be recognized that the mowing height will affect the ball to surface properties. High mowing heights reduce the velocity of the ball as it moves across the playing surface.

2. The field will be mowed at 5 to 7 day intervals depending upon the growth rate of the grass. Mowing off an excessive amount of leaf area at a single mowing is to be avoided. Also, mower blades should be kept sharp to avoid injury to the leaf blade. Infrequent mowing and dull mowing blades weaken the plant causing the turf to thin and make it more susceptible to disease and encroachment of weeds.

3. Clippings on the field and surrounds will be returned to recycle nutrients thus substantially reducing the amount of nutrients needed to be applied through fertilization. Returning clippings can reduce the nitrogen requirement by 25 to 30 percent over a growing season. Further, research at the Storrs Experiment Station, University of Connecticut (Dest, 1992) has shown disease suppression of pink snow mold, red thread and drechslera leaf spot diseases on a perennial ryegrass/Kentucky bluegrass sward from returning grass clippings compared to clippings removed (a common practice on many home grounds).

THATCH, SOIL COMPACTION, CULTIVATION, AND FIELD RENOVATION

A field renovation section is added for the multipurpose fields because of intensive use leading to subsequent wear. Periodic renovation in this case is important to maintaining a sustainable grass cover. A lack of grass cover with a subsequent loss of root mass increases the risk of nitrogen leaching due to the mineralization of nitrogen from soil organic matter and applied organic nitrogen sources. Further, the risk of soil erosion is increased.

Excessive accumulation of thatch often occurs with rhizomatous grass species such as Kentucky

bluegrass which provides an ideal habitat for insects and fungal pathogens. The following measures will be employed to control thatch from building up excessive accumulations.

1. The field will be core aerified thoroughly toward the latter part of May to early June and again in late August/early September for the purpose of bringing soil to the surface. The soil cores will be pulverized for topdressing. This practice assists in controlling thatch accumulation. Also core aerification helps in reducing soil compaction which can reduce turf vigor and root development resulting in predisposing the turf to disease. Therefore core aerification performs a dual role. An aerifier with tines spaced on at least 3 to 3 ½ inch centers and with a coring depth of no less than 3 inches or greater should be used. If tines are spaced further apart than this, then several passes over the fields will be required.

2. Dethatching along with core aerification may occasionally be required if thatch accumulation proceeds at a faster rate than decomposition. No more than 3/4 inches of thatch should be allowed to accumulate. A dethatching machine should be employed if greater than 3/4 inches of thatch is beginning to accumulate.

3. Field renovation - Renovate the multipurpose fields on a periodic basis using the following method:

1. Sow 100 pounds per acre of the perennial ryegrass-Kentucky bluegrass seed mixture. The seed mixture should contain 70% perennial ryegrass cultivars and 30% Kentucky bluegrass cultivars. Use cultivars that are rated good under low maintenance. See seed specified in Grass Species Selection, Athletic Field Playing Surfaces.

2. Core aerify 2 times over the fields with the core aerifier specified above.

3. Sow another 100 pounds of the perennial ryegrass-Kentucky bluegrass seed mixture per acre.

4. Pulverize the soil cores and work the pulverized soil cores into the turf using a steel mat.

5. Sow 60 pounds of the perennial ryegrass-Kentucky bluegrass seed mixture using a slit seeder.

6. If renovation takes place in the spring or early summer, treat the fields with siduron if a crabgrass infestation is predicted - see reference to Pesticides and Pest Control.

MAINTENANCE FOR ESTABLISHMENT PHASE (GROW-IN PERIOD)

The use of pesticides during the grow-in period can be avoided if seeding is done in accordance with the recommended seeding rates and the seeding schedule is met. See Grass Species Section. Also it is important to achieve a stand of grass quickly to reduce the risk of soil erosion. The following program is designed to do this.

1. Apply a 1-2-1 ratio fertilizer to the surface of the field prior to seeding to supply 88 lbs. P_2O_5 per acre.

2. Periodic fertilizer treatments should be made during grass establishment with a soluble nitrogen source such as ammonium nitrate or urea applied at a rate to supply 20 Lbs. N per acre at each treatment until the grass is well established and a dense stand of grass is achieved. The period between fertilizer treatments will be between 2 to 4 weeks depending on the rate of growth and development of the grass obtained after each fertilizer treatment. It is important that a grass stand be achieved in a short period of time to reduce soil erosion. Fertilizer treatments at this stage of growth, particularly with nitrogen, are important in achieving this goal. Once the stand of grass is mature, then the fertilizer sources and rates outlined in the fertilizer program should be followed.

3. Mowing - Mowing will begin when the seedlings reach a height of 2 inches on the fields. The grass should be mowed at 4 to 5 day intervals using a reel mower set at 1 ½ inches cutting height (bench setting). Mowing frequency and cutting height are extremely important to shoot development in grasses and result in achieving a good grass cover quickly. The mowing height will be raised once a good grass cover is obtained. Using a reel mower at this stage is extremely important if the goal is to have the fields ready to use within 3 to 4 months of growing weather from seeding.

4. Irrigation - The seeded field should be irrigated with quantities of water each day to replace amounts lost from the surface by evaporation and by transpiration from the plant. This should be done for 3 to 5 weeks following seeding. Adequate moisture is important to reduce seedling loss and achieve a dense grass cover quickly. Water quantities used should be recorded on a daily basis and the amounts adjusted to meet the evapotranspiration demand.

SUMMARY

The Management Plan for the proposed fields and adjacent areas reduces the risk of nitrogen, phosphorus and pesticide movement to groundwater and to the adjacent wetland and the Saugatuck Reservoir by implementation of best management practices and therefore should have no adverse impact on water quality or the adjacent wetland. The components of the plan include 1) grass species and cultivar selection for pest resistance and for those species and cultivars having a minimum nitrogen requirement where feasible 2) seeding rates and schedule, 3) a biological control strategy that is showing promise for disease suppression and controlling white grubs, 4) guidelines for handling and using pesticides, 5) major pest complex of the most often encountered pests found on playing fields and 6) selection of pesticides with a low leaching and runoff potential for use on the proposed fields. However, other maintenance practices are also important to maintaining an acceptable grass cover and safe playing surface such as aerification, proper mowing heights and frequency, careful water use and periodic field renovation to restore the turf cover from either wear or unforeseen injury.

Maintenance of Skinned Area

Skinned Infields

The following work is to be done before each game.

1. Scarify the infields with a scarifier drag (example: nail drag) to relieve surface compaction and decrease hardness.

2. Drag or float the infields to smooth and level the surfaces. Change directions with each pass over the skinned infields. Also rotate starting and stopping points each time the fields are dragged.

3. Water the infields lightly to firm the surface. Hand watering with hose and spray nozzle is the preferred method.

4. Apply soil material to the pitcher's mounds and batter's boxes to fill depressions. Bring to grade with surrounding areas and tamp material until the surfaces are adequately firmed. Remove any loose soil material.

The following work is to be done between game events.

1. Fill depressions and holes in the infields with soil material to bring to grade with surrounding areas. Tamp or roll these areas to adequately firm the fill materials.

2. Maintain the edge at the skin and turf areas level and with a clean and sharp edge. Prevent buildup of a lip by removing infield material accumulated on the grass with a rake or wash off the material using a high pressure nozzle attached to a hose.

Work to be done once per year

1. Cultivate the top three inches of infield material if the surface becomes too compact or if additional materials are to be added.

2. Laser grade the infields and groom.

3. Remove soil material at the edge of the skinned infields and turf if a substantial lip builds up. This may require stripping the sod, removing soil material, regrading and sodding. Soil may also be removed from beneath the sod with a garden spade or fork and the edges tamped. This will depend upon the amount of soil material that has accumulated at the edge between the skinned infield and sod.

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APPENDIX A

July 9, 2002

Soil Test Results
Proposed Athletic Field Complex
Morehouse Farm Park
Town of Weston

Sample ID soil type	vegetation	particle size[1] sand ---	silt %	clay ---	textural class	organic[2] matter %	soil pH	soil available nutrient[3] lb. P/acre	lb. K/acre	[5] Depth of A horizon - inches -
Charlton/[4] Hollis, Sutton	grassland	51.1	33.7	15.2	sandy loam	6.7	4.8	1	87	7.3"
Charlton/	woodland	46.9	38.1	15.0	loam	8.8	4.7	2	82	7.7"

[1] Silt and clay determined by hydrometer method.

[2] Determined by loss of weight on ignition.

[3] Determined by modified Morgan method.

[4] Sample submitted to the laboratory was a composite of the Charlton/Hollis and Sutton soils.

[5] Dept of A horizons are means of 84 samples. Depth ranged from 4 to 12 inches.