Management Recommendations

Bunker access road, east side of property, fall 2003

Introduction

Findings from the biophysical assessment of the Olin Powder Farm were synthesized with concerns and ideas expressed by the Land Trust and other community groups to create a vision for a permanently protected nature park on the property. The vision presented here balances habitat conservation and water quality protection with public access and passive recreation.

Management recommendations to accomplish this vision are divided into two sections: recommendations for park development and recommendations for park stewardship. Development recommendations, which include establishing an organizational infrastructure for park advocacy, dealing with issues of park ownership, and designing minimum impact trail systems, must be addressed first. It will be important throughout the park development process for park advocates to unite under one vision and present well thought-out and consistent proposals to the Olin Corporation and the Town of Hamden. Recommendations for park stewardship are designed to preserve the natural integrity of the property and written as maintenance tasks to be implemented once a park is established.

At the end of each recommendation section, outlined below, is a matrix that prioritizes recommended management steps. Recommendations are ranked according to importance and cost. The general classifications high, medium, low, and none are assigned to provide the managers with a gross estimate of cost. Those recommendations marked as having no cost involve passive management recommendations; those with low cost involve administration and time allocation; those with medium costs involve basic material purchases (such as signs) and consulting fees; and those with high costs involve construction or removal of structures. Importance refers to how strongly we recommend the action. For example, there are some recommendations that we do not feel are vital to successful park development and stewardship, while others are absolutely necessary. A ranking of high indicates that we strongly recommend the action; medium indicates that we feel the action is important and low indicates that the action should be considered optional. In the conclusions section, recommendations are compiled into one matrix according to the sections they occur in, as well as outlined in a timeline of tasks for park development and stewardship.

110 Recommendations for Park Stewardship

111 Diversity of Native Species and Habitats

1. Forest Resource
    a. Forest Structure
    b. Invasive Plant Species
    c. Regeneration and Recruitment
    d. Fire
2. Wildlife
    a. Habitat Maintenance
    b. Habitat Creation

120 Water Quality and Edge Habitat

1. Water and Sediment Quality
2. Stormwater Management
3. Upland and Wetland Species Diversity

127 Balancing Recreation, Safety, and Aesthetics

1. Trail Maintenance
2. Facilities Maintenance
3. Invasive plant species
4. Park hours

5. Fencing

6. Dumping

7. Enforcement

Recommendations for Park Development

Introduction

The first step towards park development is the creation of a representative organization with the mission to develop, promote, and implement a vision for the Olin Powder Farm property. Interested community and government parties need to approach the Olin Corporation with a unified, coherent and well thought out plan for land acquisition. The property's end use and ownership must be determined before development can occur. This section of the management plan outlines the vision that emerged from our research and community discussions, and suggests steps to take towards organizational development, ownership decision, and park creation. It also suggests ways to expedite the process, such as working around contamination in a two-stage development process.

Organizational Development and Ownership

1. Two-Stage Park Development

2. Ownership Recommendation
   - Advocate for Regional Water Authority ownership

3. Organizational Recommendations
   - Form a volunteer park development coalition
   - Form a long-term Olin Powder Farm task force for park oversight

4. Public Education and Outreach Recommendations
   - Create an OPF Web site
   - Consult community leaders and present at community meetings
   - Attend Town of Hamden meetings where open space and economic development in southern Hamden is being discussed

5. Partnerships with Schools Recommendations
   - Create a site lesson plan that addresses local curriculums
   - Address school transportation and safety concerns
   - Build required facilities for outdoor education

1. Two-Stage Park Development

The public's wishes and the Hamden Land Conservation Trust's requests come together to create a vision for a permanently protected nature park with passive recreation opportunities for a diverse, densely populated and underserved area of Hamden. The proposed management plan for this park places watershed protection for the Lake Whitney reservoir water supply system, natural area protection, and visitor safety as priorities.

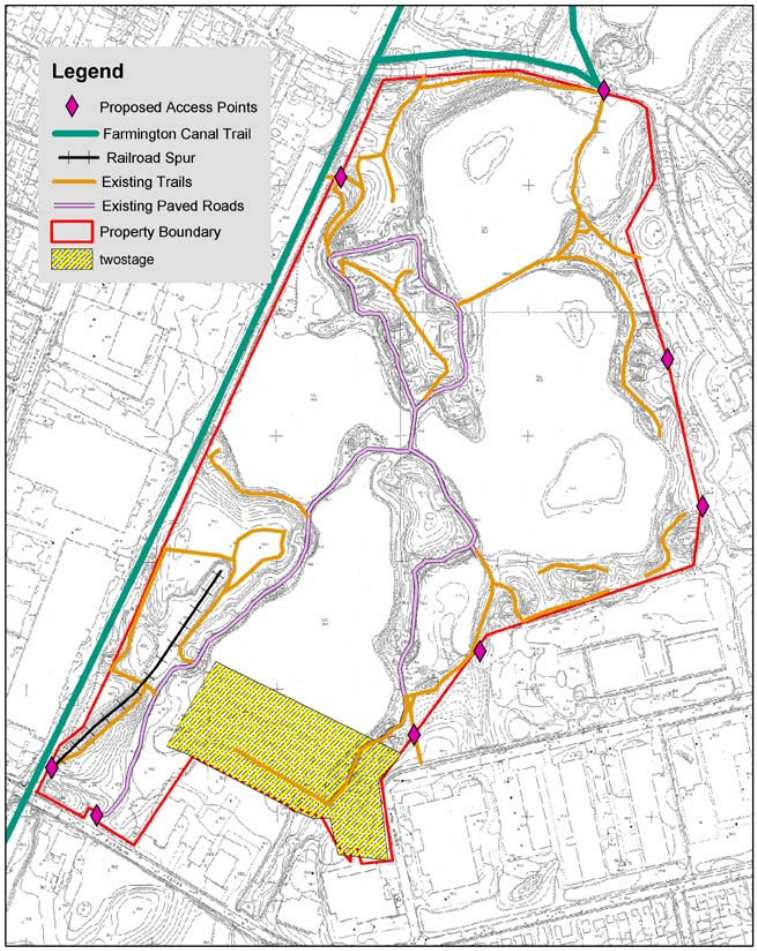


Figure M19: Two-Stage Park Development
Areas shaded in yellow could be restricted until adequately remediated, while the rest of the land could be developed into a park.

In order to accelerate park development in light of limited funds for remediation and oversight, we recommend the park be developed in two stages. Areas of known contamination can be set aside, and the balance of the property investigated for contamination using current testing methodologies and standards. Once the majority of the site is deemed safe for public use, we recommend clearly delineating and barricading the contaminated areas in the southeast corner (**Figure M19**) and developing the rest of the park as soon as possible.

This acceleration will reduce the risk of public apathy and disappointment that could result from a decades-long wait for complete remediation.

Ray Frigon, the analyst at the DEP assigned to the Olin Powder Farm, has said that a two-stage development process for the park is possible.[1] The battery waste area and Anixter corner of the property are the two locations identified by Mr. Frigon as areas known to have severe contamination that may take some time to remediate. (see **Figure M4** for more information on contamination in these areas). By closing off the areas of

[1] Personal communication with Ray Frigon, CTDEP, fall and winter 2003.

known contamination (shaded yellow in **Figure M19**) the park development process can be expedited. Mr. Frigon has said it is possible to create a safe recreation venue, without full-site remediation, as long as there is no significant contamination found on the rest of the site.

2. Ownership Recommendation

- **Advocate for Regional Water Authority ownership**

Trustees of the Hamden Land Conservation Trust have expressed their preference that the RWA be the future owner of the property and the HLCT hold a conservation easement. This preference is based on the organizations' shared conservation agendas and long-term horizons in planning and management decisions. The Hamden Land Conservation Trust currently holds a conservation easement on other RWA land.

The South Central Connecticut Regional Water Authority currently owns only about five percent of the Lake Whitney watershed, mostly in a narrow strip along the reservoir and the Mill River, and is interested in acquiring more, to enable better protection of the water supply.

Permit-based public recreation is available on eight Regional Water Authority-owned properties (see section on the Regional Water Authority). The RWA must apply to the Department of Public Health (DPH) for any recreational activity proposed on its land, and must follow watershed protection guidelines set internally. In particular, the DPH applies limits to the number of users based on an expected average number of users per day and a maximum anticipated users per day. Special emphasis is given to the number of picnickers on the property. It is much more feasible for the RWA to receive DPH assent for trail use if trails are already established on the property upon acquisition. Recreation options could include passive, non-motorized recreation that does not require major capital improvements.

3. Organizational Recommendations

- **Form a volunteer park development coalition**

Our stakeholder assessment showed strong interest among a broad spectrum of community groups in transforming the Olin Powder Farm property into a park. At present, however, there is no single organized body or network specifically focused on advocating for transformation of the OPF site into a park. The formation of a coalition of representatives from interested parties could help in organizing efforts to accomplish the goals of transfer of ownership to a party that would allow the site to become a public park, and enactment of a two-stage park development plan. Interested parties might include neighborhood associations, local and regional environmental groups and officials from the Town of Hamden Planning Office and Open Space Commission.

- **Form a long-term Olin Powder Farm task force for park oversight**

Once it is assured that the site will become a public park, we recommend the formation of a task force to oversee long-term park development and funding for the Olin Powder Farm property. The taskforce should comprise representatives from major stakeholder groups, such as the future owner(s) of the property, the Hamden Land Conservation Trust, the South Central Connecticut Regional Water Authority, the Connecticut Department of Environmental Protection (depending on whether the site clean-up is on-going), the Town of Hamden and any community network dealing with the issue. Major stakeholders involved in the task force will change over time, depending on the changing roles of the different groups. The task force should meet on a regular basis to oversee park development and maintenance. Responsibilities will include prioritizing stages of development based on price and cost, and hiring qualified personnel or getting volunteers for the different tasks involved in park development and maintenance. Different committees and associated groups could emerge from this task force as needed to oversee volunteers, park maintenance and outreach.

4. Public Education and Outreach Recommendations

One of the exciting things about the OPF site is that different aspects of it appeal to a large variety of interests. Structures relating to the local and national history of the region such as the bunkers used by Winchester Repeating Arms Company to store gunpowder for World War I, the railway spur and its connection to the Farmington Canal Heritage Trail, and the manually-controlled dam on Treadwell Street are of historical interest. There is also a wealth of resources for teaching about New

England forest ecology. Located on the central plateau of the site is an old oak-hickory forest, dating back to the 1880's. The ponds provide wonderful opportunities for viewing and learning about waterfowl, reptiles and amphibians (such as turtles and frogs) and other wildlife such as muskrats, which have been seen swimming in the ponds. The floating bog islands and nearby swamp can be used to teach wetland ecology and the role that wetland ecosystems play in water yield and quality. The ponds provide a wonderful visual opportunity to explain how settlement reservoirs work and how drinking water is provided for the towns of New Haven and Hamden. In an effort to take advantage of the resources offered on the site for public education, we recommend the following:

- **Create an Olin Powder Farm Website**

Creation of an OPF website will serve as a source of information about the property and development proposals. Interactive features that allow community groups to provide input on park developments and post events to a public calendar would further encourage a sense of community around the property.

- **Consult community group leaders and hold presentations at community meetings**

We recommend that the Hamden Land Conservation Trust engage other community groups in its Olin Powder Farm efforts. Connections and networking should be used to unite stakeholder groups and create a broader constituency in favor of park development. We recommend that the HLCT form relationships with the leaders of the other community and neighborhood groups.

- **Attend Town of Hamden meetings where open space and economic development in southern Hamden is being discussed**

Attendance at town meetings will reinforce to town decision makers the level of community support for open space protection. Local government agencies and groups that hold such meetings include Town Planning and the Natural Resources and Open Space Commission, as discussed in the section on the Town of Hamden.

5. School Partnership Recommendations

- **Create a site lesson plan that addresses local curricula**

The Olin Powder Farm site could become an important local outdoor destination for school groups if lesson plans were created and activities laid out that tie in to the school curriculum directly. Such lesson plans should be created by regional high school teachers, who often advise middle school and elementary school teachers on science issues. Field trips could connect to multiple disciplines such as political history, geology,

natural history, earth science, biology and ecology. Since teachers in the school system often have to change the courses they teach from year to year, developing a permanent, on-site curriculum would allow new teachers to plan field trips for the classes with minimal additional work.

We recommend that a volunteer group of local educators be formed to create simple on-site lesson plans for elementary, middle and high school curricula. Such a group should be composed of high school science teachers, educators from regional universities (especially Southern Connecticut State University, which has been involved in redesigning regional science curricula) and other local education volunteers in the district. Having resources such as clear maps of the site and its trail systems, an interpretive trail with placards, field guides, and digital cameras or binoculars for different lesson plans would all increase the appeal of the site for local educators. If teachers knew that the necessary equipment for the lesson plans would be provided onsite, it would lessen their preparation time and facilitate use of the site.

For elementary and middle schools, the lesson plans should tie-in with science "kits". These kits are kept in the school district central office and provide detailed instructions for teachers on how to teach nationally standardized science topics. This approach has been successfully employed by the Whitney Water Center in New Haven.

For high school students, scavenger hunts for information provided by placards in the interpretive trail system on the site should be designed, as well as other simple lesson plans that tie directly into specific required courses. Project SEARCH is a regional high school program that teaches students about water quality and land use testing. Programs could be designed to be applicable to the SEARCH curriculum, as was done at the Kellogg Environmental Center in Derby, Connecticut.

A list of potential projects and research opportunities on the site should be generated for after school and summer interns. The site could take advantage of community service hours in terms of upkeep and curriculum development. Field guides for the site including a plant species guide, a wildlife species guide and photos should be made available. Such a guide could utilize the species lists in the Appendices of this management plan. By having a set of pre-designed lesson plans for field trips that are directly relevant to local curriculum, schools will be able to take full advantage of the outdoor education opportunities provided by the OPF site.

- **Address school transportation and safety concerns**

The largest barrier to outdoor education in the Hamden and New Haven school districts is the lack of buses for field trips. With the recent increase in safety concerns, buses must remain on site during field trips in case there is a need for evacuation of the students. This severely limits the number of buses available in the districts for field trips. One of the exciting things about the Olin Powder Farm is its proximity to the Farmington Canal Trail, which older school groups could use to walk to the site for field trips. For younger children who would need to come by bus, a safe place for the unloading and loading of

buses is necessary. Such a spot could be provided at the parking lot of the Mustard Seed School on Leeder Hill Drive where the proposed main access gate is located.

In a further effort to make the application for a field trip easy for teachers, all the information that is required for the field trip request form should be provided in an informational brochure about the site. Such information would include clear health and safety rules for the site, a liability statement for the site and a map describing the facilities on the site. The brochure should include a map of the property with a list of classroom suggestions. The Central Office for Hamden and New Haven Schools should be consulted in the development of such a brochure.

- **Build required facilities for outdoor education**

In order for teachers to use the OPF site as a field trip destination, outdoor education facilities must be located on the property. For a detailed discussion of recommended facilities, please see the Facilities section.

Recommendation Matrix for Organizational Development and Ownership

The list of recommendations generated for the organizational development section is provided below. Recommendations are organized according to importance and cost:

Recommendation	*Importance*	*Cost*
Two-Stage Park Development	High	High
Advocate for Regional Water Authority ownership	High	Low
Form a volunteer park development coalition	High	Low
Form a long-term Olin Powder Farm task force for park oversight	Medium	Low
Create an Olin Powder Farm Web site	Medium	Low
Consult community leaders and present at community meetings	High	Low
Attend Town of Hamden meetings where open space and economic development in southern Hamden is being discussed	High	Low
Create a site lesson plan that addresses local curriculums	Medium	Low
Address school transportation and safety concerns	Low	Low
Build required facilities for outdoor education	Low	High

Recreation and Trails

Overall, we recommend passive recreation options that cause minimal soil and habitat disturbances, while creating a place that is attractive and safe for a diverse group of users. As discussed in the Hamden open space section, there are few local passive recreation venues for neighbors of the Olin Powder Farm. Based on responses from stakeholder surveys and discussions, a list of recreation interests for the site was generated. Specific recommendations are listed here, and discussed in further detail below.

1. Recreation
    - Allow walking, hiking, running, cross-country skiing, and snowshoeing on all trails
    - Allow dog-walking on leash
    - Prohibit the use of the ponds
    - Prohibit motorized vehicles
    - Prohibit off-trail use
    - Prohibit bike and rollerblade access
    - Prohibit fires and smoking

2. Trail Development
    - Use existing trails when possible and minimize the development of new paths, especially paved paths
    - Test for wetland soils
    - Minimize the development of impervious surfaces
    - Follow Department of Public Health standards for trail and facilities development
    - Repair and maintain existing paved paths
    - Post trail map and trail use signs at major junctions
    - Clear paths of debris and remove and monitor nearby snags
    - Connect to existing regional trails and open space
    - Create an interpretive trail
    - Fix bridges

1. Recreation Recommendations

These low-impact, passive recreation options allow human use of the park without substantially diminishing its value as a natural area by causing further erosion or habitat disruption. It will be important to discourage off-trail use. Signs along developed trails should encourage visitors to stay on the trail.

- **Allow walking, hiking, running, cross-country skiing, and snowshoeing on all trails**

These are all low-impact, passive recreation options that stakeholders expressed interest in participating in on the Olin Powder Farm.

- **Allow dog-walking on leash**

The option to walk dogs on site will be a function of site ownership. The Regional Water Authority does not allow dogs on its property, for public health reasons. As well-behaved dogs on leash do not cause substantial damage, it would be reasonable to permit dogs on site if RWA is not the owner.

- **Prohibit the use of the ponds**

Following RWA recreation rules, outlined in **Appendix H**, we recommend that all use of the ponds, including swimming, fishing, ice-skating, and boating be prohibited for safety and public health reasons. These rules must be enforced. Of particular importance are elimination of fishing and swimming, in which park users could come into contact with residual contamination that would otherwise pose no health threat. Boating could be considered if the construction of a dock did not disturb soil and pond sediment. This may be difficult to do, and quite expensive, and should not be a priority. Signs reading "no fishing," "no swimming," etc… should also educate visitors about the role the ponds on site have in improving the quality of the public drinking water supply.

- **Prohibit motorized vehicles**

Motorized vehicles, such as ATVs and motor bikes, can exacerbate erosion problems and be hazardous to visitors. Erosion caused by ATVs and dirt bikes on site leads to pond siltation and soil destabilization, it impedes native regeneration, and facilitates invasive species colonization by exposing mineral soil. For safety reasons, and to protect wildlife, motorized vehicles should be prohibited.

- **Prohibit off-trail use**

Off-trail hiking can disturb wildlife, trample plants, and also has the potential to cause

erosion on steep slopes. Again, signage will play a crucial role in educating visitors about erosion, water quality and the importance of staying on trail.

- **Prohibit bike and rollerblade access**

Many of the tour participants, teachers consulted and older residents from the Whitney Center retirement complex have expressed a concern about bicycle and rollerblade access. While we feel that the prohibition of this use may exclude some people, particularly younger users, who we were not able to survey, we recommend prohibiting biking and rollerblading for erosion control, safety and habitat preservation purposes. When you allow bike and rollerblade access, no matter how limited, you have created an access point for off-trail bikers and ATV users. Existing trails are currently too narrow for division into lanes for fast and slow traffic, and additional impervious surface development is discouraged. If bikes and rollerblades were reconsidered at a later stage of park development due to public demand, we recommend providing access in only one location—at the southwestern corner of the site off of the Farmington Canal Trail. The former railroad spur could easily be converted into a paved trail that connects to the paved figure eight trail around Pond A and the central forested section of the site. The railroad spur is in an already disturbed area and paving it would present minimal habitat disturbance, if any.

- **Prohibit fires and smoking**

Prohibition of smoking and open fires on site will be important measures to prevent forest fires. Further discussion is provided in the Forest Structure section.

2. Trail Development Recommendations

The proposed trail system in **Figure M20** highlights the physical assets of the site and offers several opportunities to sit and enjoy nature. Benches and picnic tables should be installed at strategic locations, as discussed in the following section on park facilities. A comprehensive trail map should be developed and made accessible online and on signs and kiosks throughout the property. The trail map should identify points of ecological and historical interest, which can provide incentive to visit the site, as well as educational opportunities.

- **Use existing trails when possible and minimize the development of new paths, especially paved paths**

As illustrated in **Figure M20**, an extensive network of trails already exists on the site. The paved trails that once served to transport gunpowder from the train to the storage bunkers on site create handicap access to several of the ponds and serve as the skeleton for a larger trail network comprising existing dirt footpaths, or “desire lines” created by

current users. Many of these narrower dirt trails are associated with existing breaches in the fence (see section on Property Location and Boundary), and wind their way through forests and around ponds to some of the best scenic vistas on the property.

We recommend maintaining dirt trails that do not show signs of erosion and are on slopes less than 10 percent. These, combined with the existing paved trails, create an impressive trail network that would require only a few additions to connect disjointed segments, take advantage of scenic viewpoints, and to connect the entire trail network to the Farmington Canal Trail. Our proposed additions appear in **Figure M20**.

Existing trails greater than 10 percent in slope should be retired, closed off from public use with temporary means – such as flagging tape and signage – so that they can be recolonized by vegetation. Eroding trails would benefit from the installation of water bars or rolling grade dips, two techniques that slow water flow, allow deposition of sediments, and prevent further erosion.

For the new sections of the trail, management may want to consider a pervious, but still handicap accessible surface, such as packed gravel. Such a surface would also discourage rollerbladers and bikers.

- **Test for wetland soils**

Federal, state, and local laws require approval of any development within 200 feet of inland wetland and watercourses. The Town of Hamden Inland Wetland and Watercourses Commission, discussed in the Stakeholders section, is the regulatory agency that issues permits for any development, including trail and facilities development. Because wetland areas in Connecticut are strictly defined by soil type, the first step in complying with regulations and receiving a permit for development is to hire a soil scientist to assess wetland soils on site.

- **Minimize the development of impervious surfaces**

Michele Ardolino, recreation supervisor at the Regional Water Authority, suggests minimizing the use of impervious surfaces for trails, and uses Department of Public Health standards to site parking facilities at a distance that will minimize the effects of runoff from these surfaces.

Parking facilities should be located off-site and make use of existing infrastructure. Please see the Access section.

- **Follow Department of Public Health standards for trail and facilities development**

As outlined in the section on park development, trails should not be developed on slopes greater than 10 percent, and trails around the perimeter of the ponds need to minimize the risk of sediments falling into the water. These standards are not enforceable on private

land, and many uses that do not comply can be grandfathered in if ownership were to begin as private and switch to public (i.e. the RWA, while the ideal owner in the end, may be subject to stricter regulation and facility development standards than a private owner, such as the land trust); however, it is recommended that RWA take over the land as soon as possible, implying that DPH standards would have to be considered. Regardless, it is probably in the public's best interest that any owner adhere to the standards.

- **Repair and maintain existing paved paths**

In order to be handicap accessible, current paved paths need to repaired in sections where the asphalt has deteriorated. We recommend repair over replacement, as the latter may cause greater soil and habitat disturbance, and be more expensive. We believe the only additional asphalt needed on site is to fix existing asphalt paths.

- **Post trail map and trail use signs at major junctions**

Permanent signs indicating appropriate trail uses and instructions for users to stay on the trails should be posted at major junctions. Signs showing maps of the trail system at various junctions will help users to avoid getting lost on the various loop trails throughout the property.

- **Clear paths of debris and remove and monitor nearby snags**

Trail edges should be surveyed for potentially dangerous standing dead trees and wires—remnants of former electricity infrastructure on site. These snags and wires should be removed, and any debris on trails removed before trails are open to the public.

- **Fix bridges**

Trail development in the northwestern section of the property will be impossible without reconstructing bridges. There are two locations along the trails circumnavigating the ponds where bridges used to exist over the water flowing between ponds D and E, and ponds E and F. Currently, all that remains are the steel posts of the former bridges.

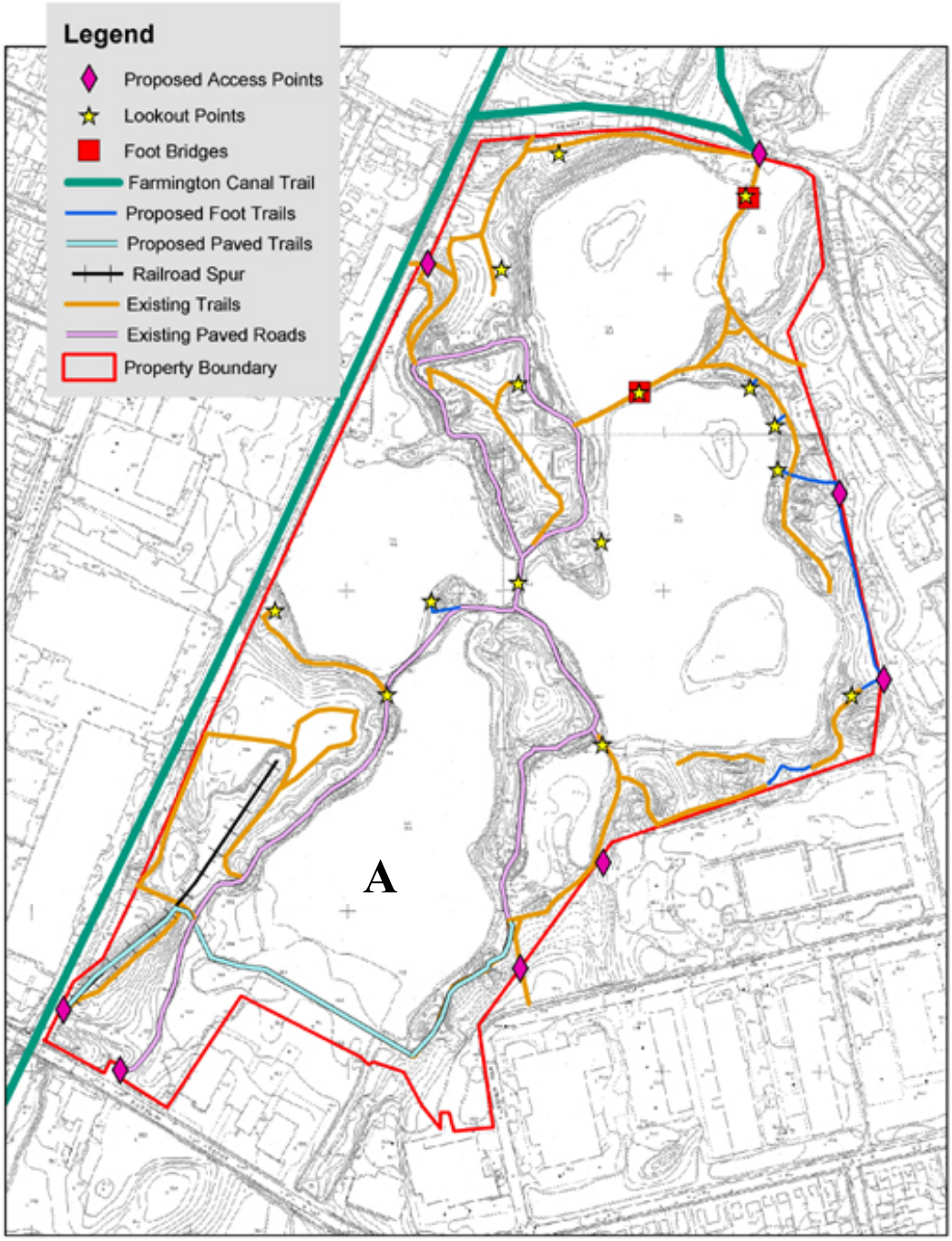


Figure M20: Proposed Trail System
The dark blue lines are proposed new dirt paths, and the light blue lines are proposed new paved paths, one of which completes a loop around Pond A (once remediation is complete), and one of which could eventually connect to the Olin Powder Farm to the Farmington Canal trail and be designated as the handicap entrance.

- **Connect to existing trails and open space**

The preservation of the Olin Powder Farm will make a significant contribution to the existing network of open space in this region of Hamden. It provides a southern extension of the habitat and source water protection provided by RWA land north of Treadwell Street. This corridor can aid in the safe travel of wildlife species, and help to further improve water quality. Secondly, the Farmington Canal Greenway, which can serve a similar corridor function for mobile wildlife, also provides a corridor for human use that can bring walkers, runners, bikers, and others to the Olin Powder Farm site. The Connecticut Department of Environmental Protection should be consulted about potential funding opportunities for green space adjacent to the Canal trail.

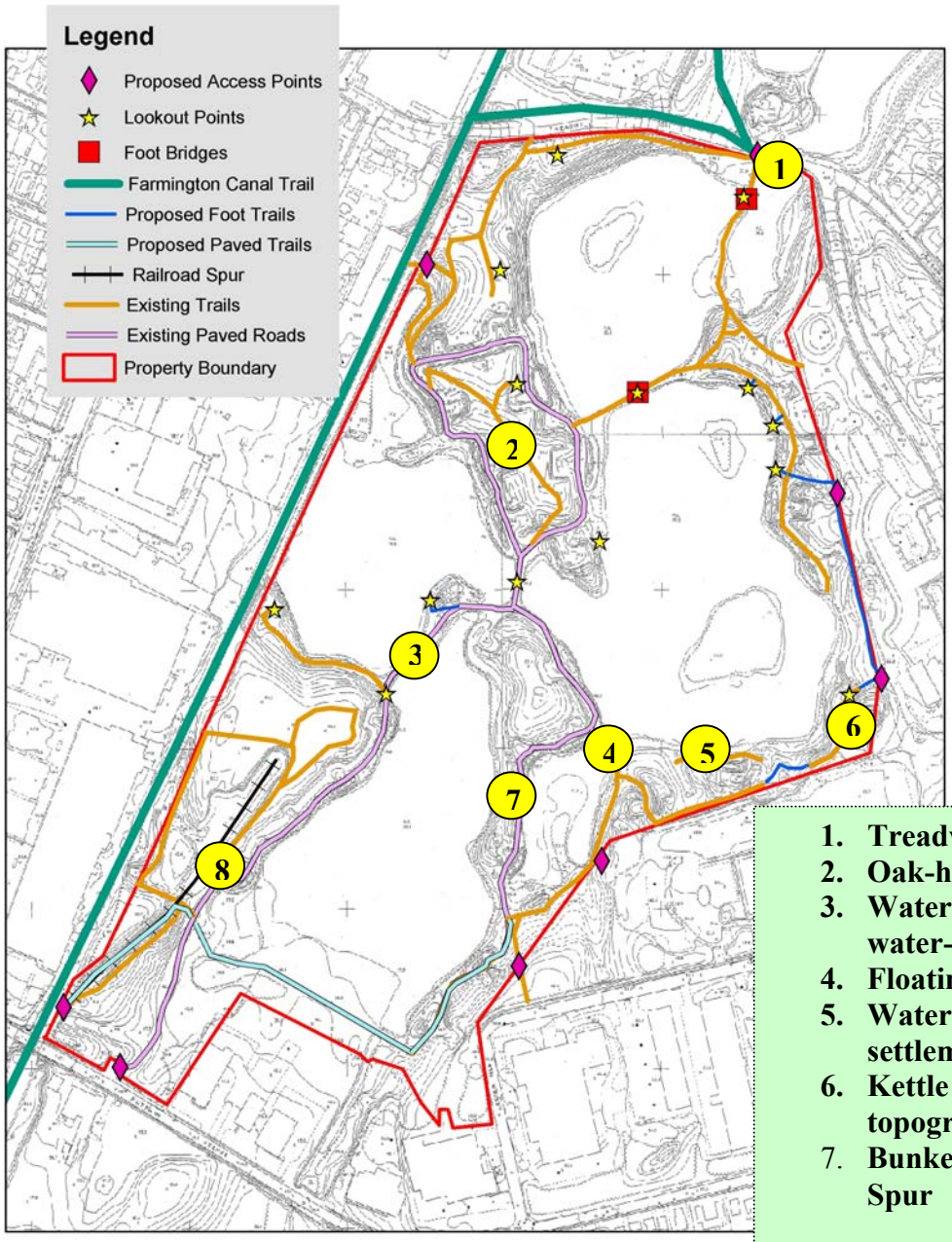
If the budget allows, we recommend pruning some of the trees on slopes adjacent to ponds to provide Canal trail users impressive views of the property and its water bodies, which may draw passers-by onto site. Finally, the Mill River Watershed Association has proposed a trail that could easily be connected to the OPF site and increase use, and therefore the safety of the site.

- **Create an interpretive trail**

The OPF site contains a number of unique and significant natural and political features which should be highlighted for public education. We recommend highlighting these features through the creation of an interpretive trail. This would involve putting a series of informational placards with pictures and writing describing the various topics at pre-selected sites along the trail network. Suggested topics and spots for these information/educational placards are provided in **Figure M21**. The information for the placards can be gleaned from a variety of different sources, including this Management Plan and other references regarding local history and ecology. Volunteers with expertise in different areas could be found to design each placard. A brochure with a map of the informational trail should be provided at the main entrance.

Figure M21: Interpretive Trail Map

Yellow markers show recommended locations for various placards.



Recommendation Matrix for Recreation and Trail Options

The list of recommendations generated for the recreation and trail options section is provided below. Recommendations are organized according to importance and cost:

Recommendation	*Importnace*	*Cost*
Allow walking, hiking, running, cross-country skiing, and snowshoeing on all trails	High	Low
Allow dog-walking on leash	Medium	Medium
Prohibit the use of the ponds	High	Medium
Prohibit motorized vehicles	High	Medium
Prohibit off-trail use	High	Medium
Prohibit bike and rollerblade access	High	Medium
Prohibit fires and smoking	High	Medium
Use existing trails when possible and minimize the development of new paths, especially paved paths	High	Low
Test for wetland soils	High	Medium
Minimize the development of impervious surfaces	High	None
Follow Department of Public Health standards for trail and facilities development	High	Low
Post trail map and trail use signs at major junctions	Medium	Medium
Repair and maintain existing paved paths	Low	Medium
Clear paths of debris and remove and monitor nearby snags	Medium	Medium
Connect to existing trails and open space	High	Medium
Create an interpretive trail	Medium	Medium
Fix bridges	Medium	Medium

Access and Parking

Access points to the Olin Powder Farm property should be carefully placed so as to protect the integrity of natural resources on site and to encourage use at the same time. Thoughtful consideration should be given to safety concerns surrounding traffic, both vehicular traffic around the perimeter of the site and pedestrian traffic in the park. First and foremost, entrances must be safe and accessible for a diverse group of users, and should encourage appropriate use of this unique natural space. Recommendations for access and parking are:

1. Main Access Points with Parking
    - Create main public entrances off of Leeder Hill Drive and off of the Farmington Canal Trail behind Stop N' Shop
    - Use existing parking lots
    - Make main entrances handicap accessible
    - Install a board with park rules and a map at the main entrance

2. Other Access Points and Connections to Existing Trails and Open Space
    - Create access to the Farmington Canal Trail
    - Create additional pedestrian entrances off of Treadwell Street, Oregon Street, and behind the Whitney Center
    - Post signs with park rules and hours at all entrances
    - Establish an emergency vehicle entrance on Putnam Avenue
    - Establish a call-system between the site and the fire department

1. Main Access Points with Parking

- **Create main public entrances off of Leeder Hill Drive and off of the Farmington Canal trail behind Stop N' Shop**

After listening to several community groups and members express concern about the heavy traffic on Putnam Avenue, we have decided that the main entrance to the Olin Powder Farm should be located on Leeder Hill Drive so as not to exacerbate a seemingly dangerous traffic situation on Putnam Avenue.[2] As represented in **Figure M22**, the parcel of land currently used by the Mustard Seed School would offer an entrance tucked away from the road, and expose visitors to spectacular views of the ponds upon entering the park. A second main entrance should be developed off of the Farmington Canal Trail behind the Stop N' Shop, where as discussed earlier, we propose the creation of a paved trail to connect visitors to the existing paved trails on site. Both of these entrances should be clearly marked with signs that provide visitors with a trail and park map, and park rules and hours.

- **Use existing parking lots**

We recommend the Mustard Seed School site on Leeder Hill Drive and the Farmington Canal Trail behind the Stop N' Shop on Dixwell Avenue as main entrances because these locations already have exceptionally large parking lots (see **Figure M22**). We recommend that the future owner partner with the property owner of 130 Leeder Hill Drive and the Stop N' Shop to provide parking and access in these locations. A second alternative would be to pave a 20-car lot in the southwestern corner of the Olin Powder Farm site. This may also serve to cap any contamination in this particular area. Capping would likely require an impervious surface, and the runoff from this would further impair water quality of the ponds. Ultimately remediation decisions are to be made by the regulatory agencies and landowner.

- **Make main entrances handicap accessible**

In order to encourage park use by a diversity of people, as well as to comply with federal and state laws for facilities used by public schools, we recommend making the two main entrances handicap accessible. This would require grading on the eastern side from the Leeder Hill Drive entrance.

- **Install a board with park rules and a map at the main entrance**

A board listing the park rules and hours alongside a map of the property and trail system should be provided to users upon entering the park. This will both decrease the

[2] Informal interviews at Whitneyville Civic Association meeting, fall 2003.

likelihood of users getting lost as well as educate users as to appropriate behavior on the site.

2. Other Access Points and Connections to Existing Trails and Open Space

- **Create access to the Farmington Canal trail**

In order to reduce the risk of off-trail bike use, which could result in increased erosion and habitat disruption, we recommend prohibiting bike and rollerblade use. Because the property will ideally connect to the Farmington Canal Trail behind Stop N' Shop and north closer to Treadwell Street, we recommend installing bike racks at these entrances.

- **Create additional pedestrian entrances off of Treadwell Street, Oregon Street, and behind the Whitney Center**

As the access map in **Figure M22** shows, we recommend three additional pedestrian entrances. One off of Treadwell Street which can connect to the proposed foot-path through RWA land associated with the Farmington Canal Trail; a second off of the Farmington Canal Trail on the northern part of the property; and a third behind the Whitney Center. During a focus group with Whitney Center residents, there was support for a trail, but there was also concern about strangers being able to access the Whitney Center property via the Olin Powder Farm. A locked gate was discussed.

- **Post signs with park hours and rules at all entrances**

Every person entering the park should be aware of park rules and hours. For this reason, every entrance should have at least one sign depicting park rules and hours. In this way, people can be educated for responsible behavior within the park.

- **Establish an emergency vehicle entrance on Putnam Avenue and maintain frontage**

Because of fire concerns and other public safety reasons, we recommend using the current locked gate on Putnam Avenue as an emergency vehicle entrance, and maintenance of the paved road leading to it. Keys should be given to the fire department. The Putnam Avenue frontage should be cleaned of trash and planted, so the park does not look rundown from this perspective.

- **Establish a call-system between the site and the fire department**

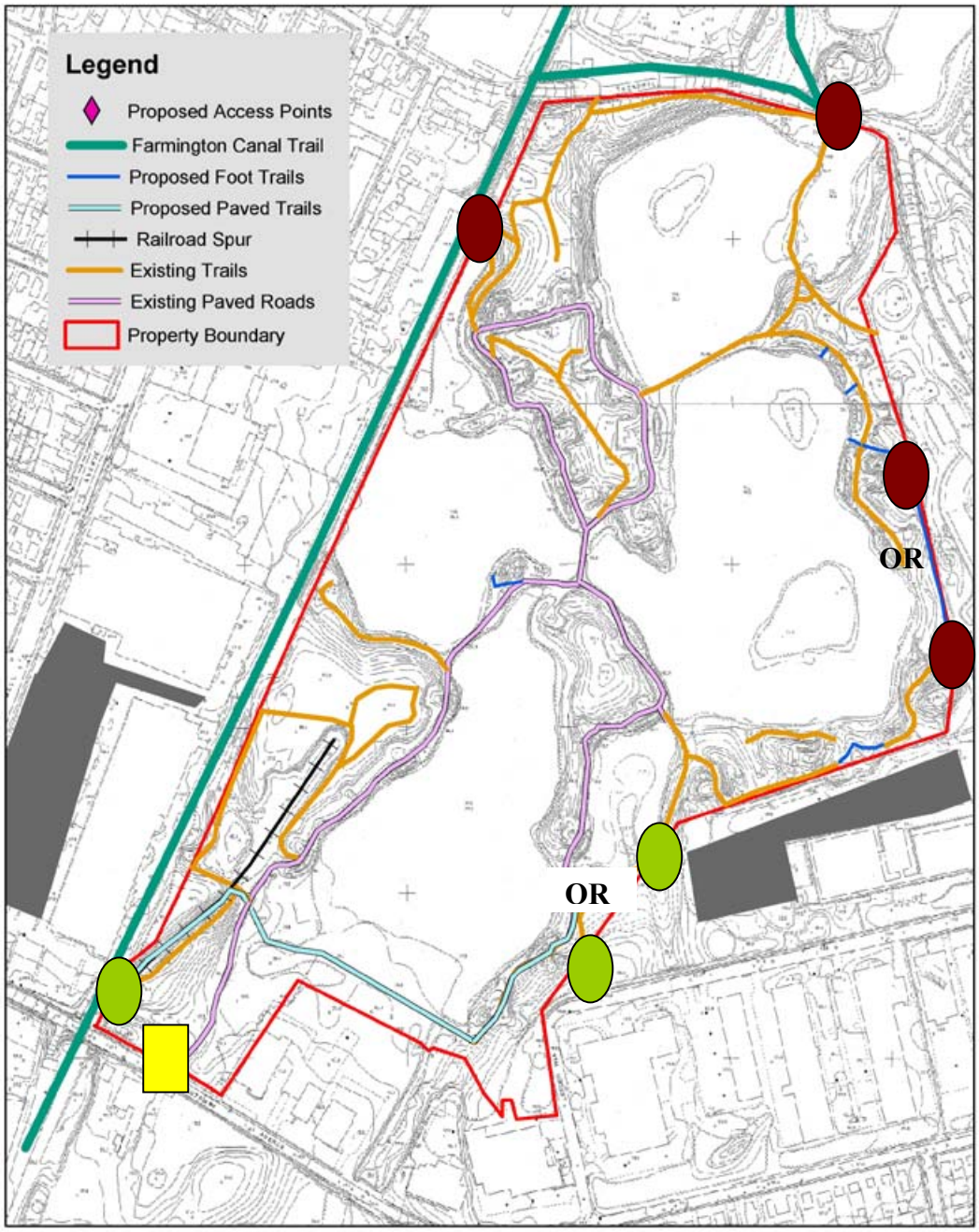
A radio system from the site to the local fire department can minimize fire damage by lessening response time.

Recommendation Matrix for Access and Parking

The list of recommendations generated for the parking and access section is provided below. Recommendations are organized according to importance and cost:

Recommendation	*Importance*	*Cost*
Create main public entrances off of Leeder Hill Drive and off of the Farmington Canal trail behind Stop N' Shop	High	Medium
Use existing parking lots	High	Low
Make main entrances handicap accessible	Medium	Medium
Install a board with park rules and a map at the main entrance	Medium	Medium
Create access to the Farmington Canal trail	High	Medium
Create additional pedestrian entrances off of Treadwell Street, Oregon Street, and behind the Whitney Center	High	Medium
Post signs with park rules and hours at all entrances	High	Medium
Establish an emergency vehicle entrance on Putnam Avenue and maintain frontage	High	Low
Establish a call-system between the site and the fire department	Low	Medium

Figure M22: Proposed Parking Lots and Access Points
Existing parking lots at 130 Leeder Hill Drive, behind the Highville Mustard Seed School, and behind the Stop N' Shop on Dixwell Avenue should be used as main access points to the Olin Powder Farm. Parking lots are marked in gray. Main entrance points are circled in green, additional pedestrian entrances are circled in brown, and the proposed emergency entrance is indicated by a yellow square.



Hiking and cross-country skiing on trails accessible from the Farmington Canal.

Facilities

A limited number of facilities will be necessary early in the Park's development, while others could be established slowly over time to increase use as resources present themselves. The following are recommendations for facilities:

1. Existing Dangerous Structures

2. Basic Facilities
    - Provide bike racks at main entrances
    - Place benches at lookouts

3. Facilities for Future Consideration
    - Provide picnic tables
    - Provide trash bins at entrances, as well as bench and picnic areas
    - Provide restroom facilities
    - Consider the creation of a lookout tower, boardwalk, shelter, and amphitheater

1. Remove or Secure Existing Dangerous Structures

There are still remnants of previous industrial use on site that could pose safety hazards for visitors, such as the building pictured to the right. These should be removed, or fenced off, immediately.

The remnants of this old structure can be found on the shore overlooking Pond D.

2. Basic Facilities

- **Provide bike racks at main entrances**

Since the site will be closed off to bikes, it is important to provide bike racks at the connection to the Farmington Canal Heritage Greenway and the main entrance at Leeder Hill Drive, where bikers will most likely want to access the property. This will allow bikers to safely store their bike while walking on the site.

- **Place benches at lookouts**

A bench should be placed at each lookout point (see **Figure M23** for lookout points). This is a simple form of infrastructure that has a large impact in making the site attractive for birding, art, and appreciating the scenery. Benches will also help to draw attention to the natural features of the site by giving people the opportunity to spend more time at various spots. Moderate in price, benches also provide great giving opportunities that individuals or community groups supporting the park could donate.

3. Facilities for Future Consideration

All of the facilities recommended in this section would require considerable on-going maintenance and upkeep. Picnic areas must be monitored for appropriate clean-up and refuse control. Trash bins must be regularly emptied and restroom facilities must be maintained and serviced regularly. For this reason, we are recommending the establishment of these facilities only when and if the park has on-going funding and a ranger to oversee maintenance of facilities.

- **Provide picnic tables**

Providing isolated picnic tables on the OPF site near abutting office complexes is one way that the site can appeal to people who work in the area. It is a form of outreach to commuters and will also encourage abutters to keep the areas near the OPF boundary clean. Waste bins should be provided with every picnic table and no eating area should be put near surface waters. In the future, a shelter area with a concrete floor and a group of picnic tables could be established closer to the Putnam Avenue entrance, where it is flat and away from surface water (see **Figure M23**). This is a far better site than the main entrance because it is not near the ponds, so there is less danger of contamination of the water with food or refuse. Also, it is a flat area well suited to construction, and it is already a disturbed area, so clearing a section of land for building would have little negative impact on native vegetation.

- **Provide trash bins at entrances, as well as bench and picnic areas**

It is important to provide multiple waste bins throughout the trail system so that people can be encouraged to dispose of their waste in a responsible manner. Receptacles should be complemented with signs prohibiting littering. Waste bins should be covered so that animals cannot access them and spread garbage around the area.

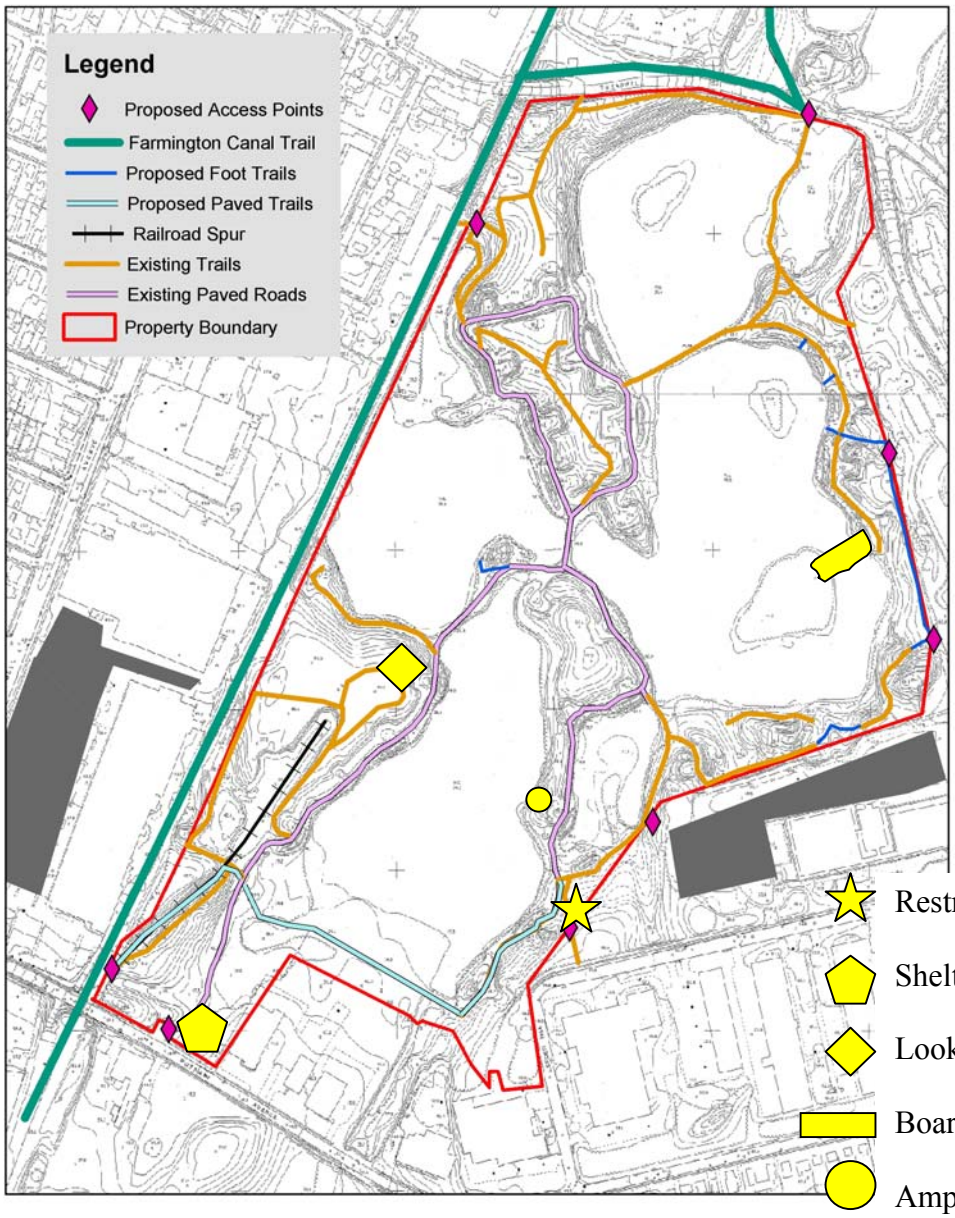
- **Provide restroom facilities**

Restroom facilities are necessary for school groups and will also be useful to users of abutting trail systems. Either portable restrooms or permanent built structures should be provided at a point away from any of the surface water on the site, with rented portable restrooms being a less expensive option. For the recommended location away from the swamp and ponds see **Figure M23**. Signs regarding park rules and maps of trails could also be located near the restroom facilities.

- **Consider the creation of a lookout tower, boardwalk, shelter, and amphitheater**

Other facilities that could be established on the park over time to compliment education outreach include an amphitheater, lookout tower and boardwalk. A bunker on site could be transformed easily into an amphitheater with benches and a small podium could be used both by school groups and other educational outreach events. Some of the high kame ridges serve as nice points for overlooking the entire property. By building a small lookout tower on the site, education on the site's hydrology and topography due to surficial geology could be enhanced. Also, a boardwalk leading out to a floating bog island would provide a close look at this unique natural feature; maintenance of a boardwalk, however, would be quite expensive due to ice heaving.

Figure M23: Potential Locations for Different Facilities on the OPF Site



Recommendation Matrix for Facilities Development

The list of recommendations generated for the facilities development section is provided below. Recommendations are organized according to importance and cost:

Recommendation	*Importance*	*Cost*
Remove or secure existing dangerous structures	Medium	High
Provide bike racks at main entrances	High	Medium
Place benches at lookouts	Medium	Medium
Provide picnic tables	Medium	Medium
Provide trash bins at entrances, and at bench and picnic areas	Medium	Medium
Provide restroom facilities	Medium	High
Consider the creation of a lookout tower, boardwalk, shelter, and amphitheater	Low	High

Summary Recommendations for Park Development

The list of recommendations generated for the park development section is provided below. Recommendations are organized according to importance and cost:

Recommendations	Importance	Cost
Organizational Development and Ownership		
• Advocate for Regional Water Authority ownership	High	Low
• Form a volunteer park development coalition	High	Low
• Consult community leaders and present at community meetings	High	Low
• Attend Town of Hamden meetings where open space and economic development in southern Hamden is being discussed	High	Low
• Two-Stage Park Development	High	High
• Form a long-term Olin Powder Farm task force	Medium	Low
• Create an OPF Web site	Medium	Low
• Create a site lesson plan that addresses local curriculums	Medium	Low
• Address school transportation and safety concerns	Low	Low
• Build required facilities for outdoor education	Low	High
Recreation and Trail Options		
• Minimize the development of impervious surfaces	High	None
• Allow walking, hiking, running, cross-country skiing, and snowshoeing on all trails	High	Low
• Use existing trails when possible and minimize the development of new paths, especially paved paths	High	Low
• Follow Department of Public Health standards for trail and facilities development	High	Low
• Prohibit the use of the ponds	High	Medium
• Prohibit motorized vehicles	High	Medium
• Prohibit off-trail use	High	Medium
• Prohibit bike and rollerblade access	High	Medium
• Prohibit fires and smoking	High	Medium
• Test for wetland soils	High	Medium
• Connect to existing trails and open space	High	Medium
• Allow dog-walking on leash	Medium	Medium
• Post trail map and trail use signs at major junctions	Medium	Medium
• Clear paths of debris and remove and monitor	Medium	Medium

nearby snags		
• Create an Interpretive Trail	Medium	Medium
• Repair and maintain existing paved paths	Low	Medium
• Fix bridges	Medium	Medium
Access and Parking		
• Use existing parking lots	High	Low
• Establish an emergency vehicle entrance on Putnam Avenue	High	Low
• Connect to existing trails and open space networks	High	Low
• Create main public entrances off of Leeder Hill Drive and off of the Farmington Canal trail behind Stop N' Shop	High	Medium
• Create access to the Farmington Canal trail	High	Medium
• Create additional pedestrian entrances off of Treadwell Street, Oregon Street, and behind the Whitney Center	High	Medium
• Post signs with park rules and hours at each entrance	High	Medium
• Make main entrances handicap accessible	Medium	Medium
• Install a board with park rules and a map at the main entrance	Medium	Medium
• Establish a call-system between the site and the fire department	Low	Medium
Facilities		
• Provide bike racks at main entrances	High	Medium
• Place benches at lookouts	Medium	Medium
• Provide picnic tables	Medium	Medium
• Provide trash bins at entrances, as well as bench and picnic areas	Medium	Medium
• Remove or secure existing dangerous structures	Medium	High
• Build restroom facilities	Medium	High
• Consider the creation of a lookout tower, boardwalk, shelter, and amphitheater	Low	High

Recommendations for Park Stewardship

Introduction

Recommendations for stewardship are organized by stakeholder-identified goals and values: diversity of native species and habitats, water quality, and safety and enforcement. This structure emphasizes the interdisciplinary nature of park management, and focuses mangers' attention on the values that have driven the park vision. Again, these management recommendations are the second step, and must follow organizational and park development.

Diversity of Native Species and Habitats

1. Forest Resource
    a. Forest Structure
        - Maintain a diversity of species with varied canopy closure, vertical stratification, and density
        - Actively control invasive plant species
        - Actively regenerate white pine

    b. Invasive Plant Species
        - Control Norway maple
        - Eradicate Japanese knotweed
        - Control Asiatic bittersweet
        - Limit herbicide use
        - Do not eradicate poison ivy

    c. Regeneration and Recruitment
        - Create new gaps as necessary to meet other management objectives
        - Plant white pines on exposed mineral soils if excavation is used in site remediation

    d. Fire
        - Exclude fire on site

2. Wildlife
    a. Habitat Maintenance
        - Maintain snags
        - Maintain areas of dense native understory, and berry and nut producing species for wildlife foraging and habitat
        - Maintain vertical structure of the forest
        - Maintain coarse woody debris on forest floor
        - Control feral cats in order to protect native bird and small mammal populations
        - Evaluate property for species of special concern

    b. Habitat Creation
        - Actively regenerate white pine
        - Create artificial nesting platforms for osprey
        - Create artificial cavity nests for woodpecker species

1. Forest Resources

a. Forest Structure

- **Maintain a diversity of species, varied canopy closure, vertical stratification, and density**

Maintaining natural areas to comprise a multitude of forest structures – with varied canopy closure, vertical stratification, and density – enhances the possibility of supporting diverse wildlife species, fortifies the property as a whole against any one disturbance type, and offers a more comprehensive experience of nature and better opportunities for education than neatly-tended garden parks do. Some examples of structure types already present on site are dense pine and cherry regeneration following a fire, open large-stemmed oak subtended by a full shrub layer, and planted pine stands with little understory or groundstory vegetation.

Natural phenomena such as individual-tree death will create new openings, as will the limited management activities recommended below such as invasive plant control. Trees across the site will be allowed to mature and senesce, during which time the forest canopy can be expected to fill in and then slowly break up, allowing light penetration to the forest floor. In the absence of catastrophic disturbance site-wide, desired heterogeneity will continue on site with little human intervention and at minimal cost.

It is undesirable to remove standing dead trees, or snags, because to do so diminishes the complexity of the forest structure. Sanitation removals are unnecessary except where snags pose threats to safety (e.g. along trails).

- **Actively control invasive plant species**

While the overall approach on site should be one of passive management, occasionally active management is appropriate. The Hamden Land Conservation Trust's specific interest in creation of a nature park of native species suggests that active management tools must be used to control invasive plant species, which would otherwise overrun and exclude native plants.

Specific recommendations and target species can be found below in the section on invasive plant species. **Appendix L** provides a more thorough discussion of invasive plant species, and **Appendix M** explains in detail techniques for the removal of target species.

- **Actively regenerate white pine**

White pine (*Pinus strobus)* is an important component of the forests on site, providing thermal cover and structural heterogeneity for animals. Should excavation be chosen as

an appropriate remediation method on contaminated portions of the property, managers can make use of the exposed mineral soils and high light conditions to regenerate white pine stands. Conifer species are often planted edging water bodies, especially those on water company land, because they intercept hardwood leaves in fall, lessening sediment loading in ponds and tannins in water. Planting white pine around pond edges is recommended.

b. Invasive Plant Species

Priority species are those for which management is likely to have a big impact, especially those predicted to spread most aggressively on the site and to disperse out from the disturbed area at the south end of the property and into the native forest. Because many invasive and weedy species are specialists on disturbed sites characterized by open, high-light conditions and disturbed mineral soil, it is expected that as the forest matures they will be less problematic than they are now. The most pernicious species are those that can invade native, intact forests and then competitively exclude native species either by killing them (shading, strangulation) or by preventing regeneration (shading, allelopathy). Control is most critical for Norway maple (*Acer platanoides)*, Japanese knotweed (*Polygonum cuspidatum)*, and Asiatic bittersweet (*Celastrus orbiculatus*). If resources allow, control of more species would be desirable. Appendices provide more thorough discussion of invasive species natural and introduction histories (**Appendix L**), and species-specific management recommendations (**Appendix M**). Use of chemical herbicides is discouraged as a general principle.

It is recommended that no control be done of the native woody vine poison ivy (*Toxicodendron radicans*).

- **Control Norway maple**

Although Norway maple is not given the Connecticut Invasive Plant Working Group's highest ranking as an invasive species of concern, its presence and establishment in natural areas is indeed a concern. Human management can have a major impact on the spread of this increasingly prevalent invader. Unlike most invasive plant species, which establish well on disturbed mineral soils and require open, light spaces, Norway maple has an extremely high shade tolerance, higher than any native maple and nearly all other native plant species. Exceptional shade tolerance makes Norway maple unusually able to invade intact forests, to out-compete native species, and cast shade so deep that only other Norway maples can grow up in it. Control methodologies for this and other species are presented in **Appendix M**.

- **Eradicate Japanese knotweed**

Japanese knotweed is one of the invasive species identified onsite. It is herbaceous, and its characteristic dense colonies intercept all light before it reaches the forest floor. These

conditions make it impossible for other species, notably trees, to germinate and grow; the future of untreated areas of Japanese knotweed invasion is one of dead trees in seas of herbaceous cover. Herbs are poorer moderators of water yield and quality than trees are, so the rise of Japanese knotweed would conflict directly with the watershed protection and stormwater pretreatment objectives for the site articulated by the Regional Water Authority and other users. Details of how to eradicate Japanese knotweed are provided in **Appendix M**.

- **Control Asiatic bittersweet**

Asiatic bittersweet is a third species of top concern on the property. A woody vine that often grows in thickets that climb up into the upper forest canopy, this species can cause individual tree death by strangling or girdling the trees on which it grows, and casting deep shade under which regeneration is greatly limited. It displaces the native American bittersweet (*Celastrus scandens* L.) through competition and hybridization. See **Appendix M** for details on control of invasive plant species. The site does not have significant fuels buildup, but Asiatic bittersweet in particular could act as a ladder; its control will meet not just invasives management objectives but also fire prevention ones.

Invasive Asiatic bittersweet along northern property boundary, fall 2003.

- **Limit herbicide use**

Herbicides can be used in conjunction with manual control methods to accelerate control of invasive plant species; however, the risk exists of non-target effects whenever chemical controls are employed. Because ponds on site contribute directly to the Lake Whitney Reservoir it is important that contamination to the waters by residual chemicals be minimized. Basal-bark and cut-stump treatments are better targeted and therefore

lower risk than foliar herbicide applications. The Connecticut Department of Public Health is the regulatory agency that oversees such uses. Please refer to its standards before starting any herbicide application programs.

- **Do not eradicate poison ivy**

No action should be taken to control poison ivy on site beyond what is done to maintain trails. Though native to Connecticut, poison ivy is a species that many managers attempt to eradicate (most often with herbicides and only limited success) in parks where recreation is emphasized, because most people are susceptible to dermatitis from contact with its leaves, fruits, and stems. No such action is required on the Olin Powder Farm, for reasons detailed below.

The abundance of poison ivy on site is an ephemeral condition. As a species requiring sunny conditions, it will become less abundant as the forest grows up around it. Second, poison ivy is abundant in areas of the property, and it provides useful functions there. The aversion that park users have to this plant is useful for protection of the site as a nature park. The presence of poison ivy will enforce, in a way that no signage could, the rule that people must stay on trails. Third, poison ivy is a native plant species, and as such it is deemed a desired one by the HLCT, both for its inherent value, and for its usefulness to small animals that eat its berries.

Poison ivy at southern end of property, fall 2003.

c. Regeneration and Recruitment

Regeneration and recruitment are the processes by which successive generations of plants establish, develop, and grow up through stages of forest development[3]. These recommendations address the managers' desire to perpetuate forest on the site.

- **Create new gaps as necessary to meet other management objectives**

When the canopy is completely closed little light can penetrate it, so small trees, without photosynthesis-fueling sunlight, do not grow. Gaps in the canopy constitute available growing space that trees, saplings, and seedlings can capture. As mentioned above, it is expected that natural phenomena and incidental gap creation in the achievement of other management tasks (e.g. invasive plant control, removal of dangerous trees) will create adequate gaps to ensure regeneration.

- **Plant white pines on exposed mineral soils, and on fill if excavation is used in site remediation**

As mentioned above, white pine is the recommended species for regeneration on excavated soils. White pine is one of the few evergreen species native to the area, and regenerates well on exposed soils following disturbance.

d. Fire

Traditional human use dating to indigenous people called for forest management by fire, which both killed underbrush that would have inhibited travel and at the same time promoted prolific berry outputs by shrubs such as blueberries and huckleberries. The railway adjacent to the property likely sparked fires onto the site through the late nineteenth and early twentieth centuries. Despite the historic importance of fire to the natural communities on the OPF site, fire is not an appropriate management tool at present.

- **Exclude fire on site**

Fire prevention must be a top management priority, as risk of forest fire is the greatest overall concern to forest health, water quality, human safety, and community acceptance of the OPF as a nature park. Because of the risk of a fire getting out of control, current neighbors and stakeholders would probably find prescribed burning or a "let burn" policy

[3] Barnes, B.V., D.R. Zak, S.R. Denton, and S.H. Spurr. 1998. **Forest Ecology**. New York: John Wiley & Sons, Inc. 774 p.

unacceptable. Reduced visibility and air quality are top safety concerns given the major roads and high-density of the populations abutting the site.

2. Wildlife

a. Habitat Maintenance

- **Maintain snags**

Maintain existing snag trees to promote habitat for primary and secondary cavity nesters as well as for denning small mammals and raptor species requiring perch trees. By allowing standing dead trees to decay in place, essential wildlife habitat will be provided. Trees may also be girdled where appropriate to create new snag trees to replace snags removed for safety reasons.

- **Maintain areas of dense native understory and berry and nut producing species for wildlife foraging and habitat**

Areas of dense native understory vegetation should be maintained to promote habitat for small mammals and ground nesting birds. While areas of dense understory vegetation might appear unaesthetic, it is important to not remove this understory and allow the natural vegetation to provide habitat for many bird and mammal species.

Hard mast (nut-producing) species such as beech, hickory, chestnut and oak can be selectively managed through silvicultural treatments discussed in the forest resources section of this plan. Understory soft mast (berry-producing) species such as mapleleaf viburnum, blueberry, and black cherry respond favorably to opening of the forest canopy.

- **Maintain vertical structure of the forest**

Maintain vertical structure of the forest through the management of uneven-aged forest stands to increase species diversity. The forest structure of the Olin Powder Farm can be maintained in an uneven-aged manner through girdling and selective cutting of the forest canopy. (For more on this topic, see the Forest Structure section.)

- **Maintain coarse woody debris on the forest floor**

Maintain coarse woody debris on the forest floor for amphibian habitats. Allowing downed trees to decay on the forest floor creates habitat for many wildlife species, particularly amphibians. Trees and snags deemed dangerous for park users should be cut and left on the forest floor to decay and provide additional coarse woody debris habitat.

- **Control feral cats in order to protect native bird and small mammal populations**

Wild (feral) cats were observed during the biophysical assessment of the site. Feral cats could potentially decrease the native songbird population through predation and efforts to capture and remove them from the site are recommended. Due to the urban nature of the property, it will likely be difficult to remove cats that are not resident to the site, yet infrequently utilize the property. The local humane society could be consulted to discuss techniques for discouraging feral cats from inhabiting the property.

- **Evaluate property for species of special concern**

Given the relatively undeveloped nature of the site and the current use of the diversity of habitats by numerous wildlife species, it is possible that the site may harbor some species of special concern. This is a State of Connecticut designation afforded to decreasing populations of native wildlife species. If the property does come under the management of the HCLT, it is recommended that a complete inventory be conducted to assess the potential of these species residing on the property so that they can be managed accordingly.

b. Habitat Creation

- **Actively regenerate white pine**

As mentioned above, the continued existence of the native white pine tree species add to the wildlife diversity features of Olin Powder Farm. Refer to forest resource section for more information.

- **Create artificial nesting platforms for osprey**

Osprey will often nest on artificial platforms constructed on tall poles that provide adequate support for nesting materials and young osprey. Nesting platforms are not difficult to construct and can result in the successful nesting of osprey pairs. Contact the state Fish and Game department for detailed information on the construction of osprey platforms.

- **Create artificial cavity nests for woodpecker species**

Drilling holes that mimic natural woodpecker excavations will likely increase the available habitat for primary cavity nesters such as woodpeckers, sapsuckers, and flickers.

Forest Resource and Wildlife Recommendation Matrix

The list of recommendations generated for forest resource and wildlife is provided below.

Recommendations	Importance	Cost
Maintain a diversity of species, varied canopy closure, vertical stratification, and density	High	Low
Actively control invasive plant species	High	Medium
Actively regenerate white pine	Medium	Medium
Control Norway maple	High	Medium
Eradicate Japanese knotweed	High	Medium
Control Asiatic bittersweet	High	Medium
Limit herbicide use	High	Medium
Do not eradicate poison ivy	High	None
Create new gaps as necessary to meet other management objectives	High	None[4]
Plant white pines on exposed mineral soils, and on fill if excavation is used in site remediation	High	Medium
Exclude fire on site	High	Low
Maintain snags	High	None
Maintain areas of dense native understory	High	None
Maintain vertical structure of the forest	High	None
Maintain coarse woody debris	High	None
Control feral cats in order to protect native bird and small mammal populations	Low	Medium
Evaluate the property for species of special concern	Low	Medium
Actively regenerate white pine	Medium	Medium
Create artificial nesting platforms for osprey	Low	Low
Create artificial cavity nests for woodpecker species	Low	Low

[4] Low additional cost; cost of this recommendation is assessed elsewhere throughout the recommendations (e.g. in the estimates for implementation of recommendations to control invasive plants and to remove dangerous trees).

Water Quality and Edge Habitat

Water quality is one of the primary management concerns for the OPF, as identified by the Hamden Land Conservation Trust and the Regional Water Authority (RWA). We recommend a fairly passive management approach based on the previous passive management regimes of the RWA for this property, The RWA did not actively manage (or own) the property prior to 1991 when the old Whitney Treatment facility was last operational. The six interconnected ponds and two obvious wetland areas on the Olin Powder Farm site serve several functions, including filtration of surface water runoff and groundwater entering the ponds. The ponds, bog islands, and surrounding riparian areas also serve as valuable habitat for fish, waterfowl, and amphibians. Management of the area will need to protect water quality and aquatic habitat, but at the same time enhance recreation opportunities on the property, making it a desirable place for both humans and wildlife, and our drinking water supply. After several interviews with RWA officials, research on existing aquatic species, and qualitative assessments of aquatic edge habitat and site-wide soils, our recommendations for managing water quality and aquatic and edge habitat are:

1. Water and Pond Sediment Quality
    - Continue surface and groundwater quality testing
    - Test sediments for pollutants and monitor sediment levels in ponds
    - Educate public on water quality

2. Stormwater Management
    - Clean "fore bay" ponds on a regular basis
    - Reconstruct stormwater drainage pipe on east side
    - Estimate urban runoff and minimize impervious surfaces

3. Upland and Wetland Species Diversity
    - Limit use of bog islands
    - Control erosion

1. Water and Pond Sediment Quality

- **Continue surface and groundwater quality testing**

Water pollution from stormwater has been identified as a greater threat to water quality than pollution from residual contamination on site (see hydrology section). The lower Lake Whitney watershed, where the OPF sits, is highly developed and industrial and stormwater is often discharged directly into surface water from impervious surfaces.[5] Pollutants of concern include:

- *Phosphorus and nitrogen.* High levels have already been recorded and credited with dense blooms of blue green algae in the upper Lake Whitney reservoir. During times of drought or less rainfall, eutrophication, or nutrient loading may be a problem.

- *Sediments*. According to John Hudak, environmental planning manager at the RWA, sediment is one of the most widespread pollutants in urban areas and can carry other pollutants, such as heavy metals. It is therefore of great concern. RWA testing has indicated that there are already high levels of suspended solids in the ponds.

- *Heavy metals*. Lead and cadmium have been found in the battery waste area, but pending remediation the levels at which they're found do not compromise water quality. These compounds also exist in the soil and sediment as a result of dumping on site.

- *Fecal coliform*, which has been detected at higher levels.

- *MTBE*, a component of gasoline, has also been detected at low levels.

As discussed in the hydrology section, the RWA currently tests surface water and has been satisfied with their results. The Olin Corporation monitors groundwater. If possible, along with continued testing, there should be further investigation into the direction of groundwater flow. Severe storm events and flooding or significant changes in the levels of Lake Whitney may alter groundwater levels and direction of flow. Surface waters need to be monitored in compliance with Connecticut Department of Health standards for public drinking water.

- **Test sediments for pollutants and monitor sediment levels in ponds**

[5] Ellum, M.E., and J.P. Hudak. Date unknown. "Effectiveness of Stormwater Treatment Systems Within a Highly Urbanized Watershed." New Haven: South Central Connecticut Regional Water Authority.

Sediment should also be tested for heavy metals and residual contamination. This should be done prior to any consideration of recreation activities that may disrupt pond sediment, such as boating and fishing. There is also the concern that original testing did not adequately address sediment contamination that could affect the health of bottom feeding organisms and dabbling ducks. Increased sediment levels in runoff could lead to the filling of ponds over a period of decades or centuries. Monitoring sediment levels will give managers an idea of how much sediment and at what rate sediment is accumulating. In order to preserve the unique open water habitat of the property it is recommended that human use be restricted to the terrestrial portions of the property and that boating and swimming also be prohibited.

- **Educate public on water quality**

This recommendation implies the use of signage near ponds to explain the importance of OPF hydrology, but also refers to incorporating information about the ponds and the drinking water supply into local curricula and education programs (discussed in the park development section).

2. Stormwater Management

Pretreatment Basins

In preparation for operations at the new Lake Whitney treatment facility, the RWA has been busy constructing artificial pretreatment basins and siltation ponds along the perimeter of Lake Whitney and on the banks of the Mill River where urban runoff is discharged directly into surface waters in at least 60 locations.[6] These basins generally consist of several settlement ponds. For example, the Parkway Plaza Stormwater Treatment System, built in 2000 on the west shore of the Mill River, employs the use of three basins of varying depth. The first basin, where stormwater enters the ponds is the deepest and is where stormwater discharge enters the system. Large suspended solids and floatable material settle or remain in this basin as water flows to the second pond, called the "infiltration basin." This basin is shallower, and separated from the first by a berm, providing another level of filtration. The third pond sits below the water table and is populated with wetland plants and shrubs that remove some nutrients and pollutants. This system is designed to accommodate large storm events.

The ponds on the OPF site serve as a natural variation of these constructed pretreatment basins. The restricted flow caused by the dam at the north end of Pond F helps to increase the retention time of water in the ponds, allowing sediment and large particles to settle out of the water, helping to minimize treatment processes further downstream at Lake Whitney. The Olin Powder Farm ponds do not require an aggressive management regime

[6] Ellum, M.E., and J.P. Hudak. Date unknown.

in order to maintain their function as pretreatment basins for Lake Whitney.[7] They were used prior to 1991 for this purpose with no modifications and helped to reduce the amount of sediment on route to Lake Whitney and the treatment plant there.

Stormwater management will be the primary water quality concern on the Olin Powder Farm site. The site already plays an important role in improving the water quality of the local public drinking water supply. The six interconnected ponds on site provide a natural filtration system for water that will eventually make its way to Lake Whitney and the treatment facility there. It is especially important to maintain the natural functions of this system when inputs to the ponds are almost entirely from urban stormwater runoff, which can be highly polluted.

- **Clean "forebay" ponds on a regular basis**

  Forebay areas are generally the first basins in a stormwater treatment system and need to be periodically cleared of sediment and large debris.[8] The natural forebay areas on the OPF site are at the base of Pond A and at the outfall near Pond B. It is in these areas that stormwater runoff forms pools and large debris settles. We have noticed a significant amount of trash in these areas and recommend that it be removed on quarterly basis, if the park budget allows. In a constructed system this may be down by a skimmer. It could also be done manually. We are not recommending that sediment be dredged.

- **Reconstruct stormwater drainage pipe on east side**

  Maps from the Town of Hamden Engineering Office from the 1970s show the original urban drainage system to the site (see **Figure M17**). The area highlighted in red in **Figure M17** is where we have observed severe erosion caused by runoff not following its constructed path. In addition to fixing the aquaduct here so that runoff from the east side once again enters the site at one point only, given unlimited funds we recommend constructing a forebay pond in this area to treat water before it enters the ponds.[9] Unlike the other main stormwater effluent points on site, this one does not enter the ponds via a wetland.

- **Estimate urban runoff and minimize impervious surfaces**

  An estimate of the urban drainage area, its percent of impervious surface and the amount of runoff the site receives may help managers understand where the pollution is coming from and how much of it enters the ponds. This information could be used for source prevention and public education programs, and for determining how much to invest in stormwater filtration and drainage projects.

---

[7] Personal communication with Tom Chaplik, Vice President of Water Quality, South Central Connecticut Regional Water Authority, fall 2003.
[8] Ellum, M.E., and J.P. Hudak, Date unknown.
[9] Affirmed by John Hudak, Environmental Planning Manager, South Central Connecticut Regional Water Authority, fall 2003.

Current stormwater drainage systems on site are in disrepair, causing severe erosion, as shown in this photo of urban runoff entering Pond C via a stream rather than the intended aqueduct.

3. Upland and wetland species diversity

Healthy uplands are crucial to healthy waterways and consistent water quality and yield, as well as important for stormwater management. Plants accumulate nutrients and even toxins in their tissues, reducing loads into ponds. Diverse uplands – comprising multiple species in more than one age class – are more resilient to natural disturbance than uniform landscapes, and are therefore better able to provide water quality services, including stormwater management and erosion control, reliably. If one species or area of the site is afflicted by a pest or storm event, it will not result in a loss of all forest cover and all water quality benefits.

Maintenance of plant species and habitat diversity is a recommendation repeated throughout this plan, and one that requires little work at the outset. The existing forest offers several age classes, species groups, and habitat types. Should more active management be feasible, regeneration of white pine along pond edges would be desirable

for water quality and habitat diversity objectives. Canopies of evergreen trees intercept deciduous leaf litter before it enters ponds, slowing fill and limiting tannins.

- **Limit use of bog islands**

The three floating bog islands on site are fascinating and rare features of the site. Because of the fragile nature of their soils (discussed in the Soils section), it is recommended that visitor traffic is restricted on the islands. If boating were permitted, the islands should remain off-limits. If a boardwalk were built to allow visitors a closer look at the islands, it should lead to a viewing platform several feet from island shores.

- **Control erosion**

Because soils on site are highly erodible (see Soils section), and the bunker formations add increased erodibility due to their slopes of approximately 45-50 percent, erosion is of great concern. In addition to this, sedimentation can interfere with the natural pretreatment process. Thus, we recommend the following:

Trails throughout the site should be designed to minimize erosion by avoiding slopes greater than 10 percent—a standard recommended by Rod Shaw at Milone and MacBroom, the landscape architecture and planning firm charged with designing sections of the Farmington Canal Trail. Maintenance of upland and wetland species diversity will help to minimize erosion from slopes surrounding the ponds (see the section on Species Diversity).

Sediment disruption within the ponds is also of concern. Contamination from waste sites on the property is suspected to be sorbed to sediments, and therefore, disturbing the sediment and soil could release heavy metals and other pollutants into the water. Given the shallow depth of the ponds, construction of facilities such as docks and piers should be minimal. For the same environmental reasons and to protect the health of park users, water recreation, such as swimming and fishing should be restricted.

Recommendation Matrix for Water Quality and Edge Habitat

The list of recommendations generated for the Water Quality and Edge Habitat is provided below. Recommendations are organized according to importance and cost:

Recommendations	*Importance*	*Cost*
Continue surface and groundwater quality testing	High	Medium
Test sediments for pollutants and monitor sediment levels in ponds	Low	Medium
Educate public on water quality	High	Low
Clean "forebay" ponds on a regular basis	Medium	Medium
Reconstruct stormwater drainage pipe on east side	Low	High
Estimate urban runoff and minimize impervious surfaces	Medium	Low
Limit use of bog islands	High	Low
Control erosion	High	Low

Balancing Recreation, Safety and Aesthetics

Besides stormwater influx, the primary threats to water quality in the six ponds on site will come from park development and recreation use of the property when it is a park. The following recommendations outline steps that can be taken during the development process and in formulating regulations guiding recreational use of the site to protect water quality and the public drinking water supply, as well as terrestrial wildlife habitat:

1. Trail Maintenance
    - Monitor dying and dead trees along all trails
    - Remove Scotch pine along the paved road
    - Limit recreational use to terrestrial portions of the property
    - Keep trails clear of debris
    - Maintain signs

2. Facilities Maintenance
    - Maintain garbage cans, picnic areas, and restrooms

3. Invasive Plant Species Control

4. Park Hours
    - Close park from dusk to dawn
    - Do not install lighting

5. Fencing
    - Maintain fence on a regular basis

6. Dumping
    - Clean existing garbage dumping sites
    - Work with Farmington Canal Heritage Greenway management to reduce dumping between the trail and the Olin Powder Farm property boundary
    - Post “no dumping” signs in areas of observed dumping

7. Enforcement
    - Partner with existing neighborhood and Farmington Canal Trail police patrol
    - Hire a fulltime ranger, if funds permit

1. Trail Maintenance

- **Monitor dying and dead trees along all trails**

Managers should take care to monitor declining and dead trees alongside trails. While the main trunks of these trees can persist, standing firmly, for many years following tree death, as wood decays the branches are more likely to break in high winds.

Snags are often the least recognized wildlife habitat attribute and are perceived as unaesthetic to the untrained eye. In reality, snags provide an essential habitat to many species and should be preserved as an asset to the Olin Powder Farm property. It is recommended that in areas that do not pose any threat to human use, these standing dead trees be left in their natural state. Snags should be removed in areas near trails or areas frequented by people. The removed snags should be deposited off-trail but on the site to serve as coarse woody debris.

- **Remove Scotch pine along the paved road**

Scotch pines are not native and were likely planted in the early 1900s. As they start to decline with age they will become increasingly susceptible to pine wilt disease. Trees killed by pine wilt disease must be removed or they will serve as dispersal points to other trees in the area. Because the majority of the Scotch pine trees are along the paved road, their removal would be a wise management decision both from a forest health and a recreation management perspective, and would be consistent with the management objective to encourage diversity of native species and habitats, so long as alternate nesting and roosting sites exist for native wildlife.

- **Limit recreational use to terrestrial portions of the property**

In order to preserve the unique open water habitat of the property, it is recommended that human use be restricted to the terrestrial portions of the property. Boating and swimming should also be prohibited.

- **Keep trails clear of debris**

As in the management of snag trees, it is recommended that coarse woody debris be left to decompose and provide amphibian and insect habitat on the forest floor, unless where its location poses a safety concern to people, such as on trails.

Active trail maintenance is recommended to clear trails of debris and trash, for safety and aesthetic reasons. According to one of the rangers at East Rock Park, the majority of his time is spent clearing trails.

- **Maintain signs**

Vandalism of signs should be monitored by the ranger or by an assigned enforcement officer. Well-maintained signs will serve to help keep the park safe and clean.

2. Facilities Maintenance

- **Maintain garbage cans, picnic areas, and restrooms**

These facilities require on-going maintenance and should be serviced regularly. Picnic areas must be monitored so that they are kept clean and do not attract wildlife. Garbage cans must be regularly emptied. Restrooms must be regularly cleaned, serviced and plumbing must be kept in good working condition.

3. Invasive Plant Species Control

Control of invasives that create impenetrable thickets should be a priority. The intact areas of the Olin Powder Farm currently offer aesthetically desirable forest structure, with well-developed canopies that are somewhat open underneath. Open oak woodlands of this type have been described as the most popular sort among hikers, preferred to more dense canopies, for they are better-lighted and allow longer sight-lines. Maintenance of this structure is desirable as stewardship of the aesthetic value of the site for recreation. Many of the invasive species on site create thicker or darker forests by casting deep shade (e.g. Norway maple), or by climbing into the crowns of trees, and vining in thickets and mats on top of shrubs and small trees (e.g. Asiatic bittersweet). Control of these species is therefore recommended, with specific guidelines provided in **Appendix M.**

4. Park Hours

- **Close park from dusk to dawn**

Follow city park hours.

- **Do not install lighting**

This is too expensive and not necessary if the park closes at dusk.

5. Fencing

- **Maintain fence on a regular basis**

As discussed in the section of the OPF property location and boundary, most of the property line is delineated by a six- to10-foot chain-link fence, which is topped with three strands of barbed wire. The only exception to this demarcation is directly behind the Whitney Center, where a new fence has been placed approximately 50 feet west of the property line, allowing residents to use this small portion of the woods for passive recreation (see blue line on attached map). There is now a walking path where the old fence used to be. The property line in this section is marked with one-foot wooden stakes labeled "property boundary" that are tied with blue-and-white striped flagging tape. The section behind Whitney Center is also different in that there is no barbed wire topping the new fence.

The barbed wire on the western fence boundary, near the railroad corridor, is often cut or sagging, sometimes hanging from the fence or piled on the ground. Parts of the original fence around the remaining portions of the property have eroded away in sections near the ground, and parts have been folded back or removed completely where it has been breached. There are nearly 20 breaches in the fence, varying in width from one to 20 feet, the largest concentration occurring on the western border. (see **Figure M3**).

- **Remove barbed wire**

If resources allow, the barbed wire should be removed so the site is more welcoming to local residents.

6. Garbage Dumping

- **Clean existing garbage dumping sites**

As outlined in the Site Location and Description section, there are certain areas of the property, and areas adjacent to the property that receive a high volume of dumping. Oregon Street is a dead end street that abuts the property in the northwest corner and large objects, such as couches and railroad ties have been discarded over the hillside so that they are leaning against the OPF fence. Volunteers and paid staff should regularly organize to remove litter from the property.

- **Work with Farmington Canal Trail management to reduce dumping between the trail and the Olin Powder Farm property boundary**

Much of the dumping on the western edge of the property will be discouraged once this section of the Farmington Canal Trail is operational and maintained regularly.

- **Post "no dumping" signs in areas of observed dumping**

Dumping sites identified on the eastern side of the OPF will require more maintenance, after an initial removal of large, and potentially hazardous, items. "No Dumping" signs should be posted, and regular clean-ups scheduled.

7. Enforcement

- **Partner with existing neighborhood and Farmington Canal Heritage Greenway police patrol**

Ideally, Farmington Canal patrol could make a loop around the OPF trails as part of their regular rounds.

- **Hire a fulltime ranger, if funds permit**

Rangers at East Rock Park spend much of their time clearing trails and reminding people to follow the rules, (e.g. keep dogs on leash). A greater security presence may deter illicit behavior on site.[10]

[10] Personal communication, Dan Barvir, East Rock Park ranger, fall 2003.

Recommendation Matrix for Recreation, Safety and Aesthetics

The list of recommendations generated for standing dead trees section is provided below. Recommendations are organized according to importance and cost:

Recommendation	*Importance*	*Cost*
Monitor dying and dead trees along all trails	High	Medium
Remove Scotch pine along the paved road	Low	Medium
Limit recreational use to terrestrial portions of the property	High	Low
Keep trails clear of debris	Medium	Medium
Maintain signs	High	Medium
Maintain garbage cans, picnic areas, and restrooms	High	Medium
Invasive plant species control	Medium	Medium
Close park from dusk to dawn	High	Low
Do not install lighting	High	Low
Maintain fence on a regular basis	Medium	Medium
Remove barbed wire	Medium	Medium
Clean existing garbage dumping sites	High	Medium
Work with Farmington Canal Trail management to reduce dumping between the trail and the Olin Powder Farm property boundary	Medium	Low
Post “no dumping” signs in areas of observed dumping	Medium	Medium
Partner with existing neighborhood and Farmington Canal Heritage Greenway police patrol	High	Low
Hire a fulltime ranger, if funds permit	Medium	High

Summary Recommendation Matrix for Park Stewardship

The list of recommendations generated for the park stewardship section is provided below. Recommendations are organized according to importance and cost:

Recommendations	Importance	Cost
Forest Resources		
• Create new gaps as necessary to meet other management objectives	High	None[11]
• Do not eradicate poison ivy	High	None
• Maintain a diversity of species, varied canopy closure, vertical stratification, and density	High	Low
• Exclude fire on site	High	Low
• Actively control invasive plant species	High	Medium
• Control Norway maple	High	Medium
• Eradicate Japanese knotweed	High	Medium
• Control Asiatic bittersweet	High	Medium
• Limit herbicide use	High	Medium
• Plant white pines on mineral soils if excavation is used in site remediation	High	Medium
• Actively regenerate white pine	Medium	Medium
Wildlife		
• Maintain snags	High	None
• Maintain areas of dense native understory	High	None
• Maintain vertical structure of the forest	High	None
• Maintain coarse woody debris	High	None
• Actively regenerate white pine	Medium	Medium
• Create artificial nesting platform for osprey	Low	Low
• Create artificial cavity nests for woodpecker species	Low	Low
• Control feral cats in order to protect native bird and small mammal populations	Low	Medium
• Evaluate the property for species of special concern	Low	Medium
Water Quality and Edge Habitat		
• Educate public on water quality	High	Low
• Limit use of bog islands	High	Low
• Control erosion	High	Low
• Continue surface and groundwater quality	High	Medium

[11] Low additional cost; cost of this recommendation is assessed elsewhere throughout the recommendations (e.g. in the estimates for implementation of recommendations to control invasive plants and to remove dangerous trees).

testing		
• Estimate urban runoff and minimize impervious surfaces	Medium	Low
• Clean "forebay" ponds on a regular basis	Medium	Medium
• Test sediments for pollutants and monitor sediment levels in ponds	Low	Medium
• Reconstruct stormwater drainage pipe on east side	Low	High
Recreation, Safety and Aesthetics		
• Close park from dusk to dawn	High	None
• Do not install lighting	High	None
• Limit recreational use to terrestrial portions of the property	High	Low
• Monitor dying and dead trees along all trails	High	Medium
• Maintain signs	High	Medium
• Maintain garbage cans and picnic areas restrooms	High	Medium
• Clean existing garbage dumping sites	High	Medium
• Work with Farmington Canal Trail management to reduce dumping between the trail and the OPF property boundary	Medium	Low
• Keep trails clear of debris	Medium	Medium
• Control invasive plant species	Medium	Medium
• Maintain fence on a regular basis	Medium	Medium
• Remove barbed wire	Medium	Medium
• Post "no dumping" signs in areas of observed dumping	Medium	Medium
• Remove Scotch pine along the paved road	Low	Medium