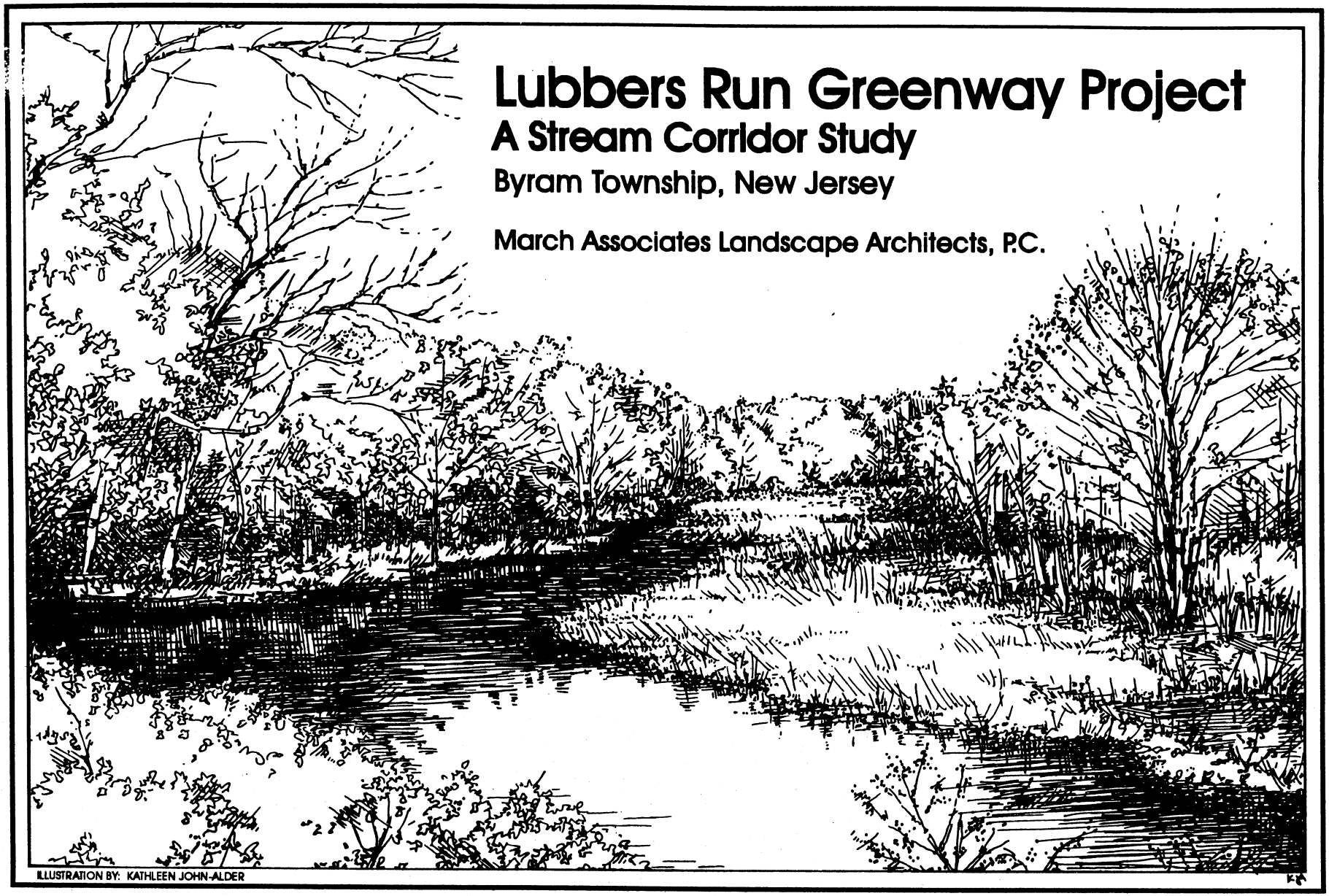
Lubbers Run Greenway Project
A Stream Corridor Study
Byram Township, New Jersey
March Associates Landscape Architects, P.C.
ILLUSTRATION BY: KATHLEEN JOHN-ALDER

Lubbers Run Greenway Project
A Stream Corridor Study

Prepared for:

Byram Township Environmental Commission
10 Mansfield Drive
Stanhope, NJ 07874
201.347.2500

Prepared by:

March Associates Landscape Architects, P.C.
P.O. Box 41
Princeton, NJ 08542
609.448.9520

Acknowledgements:

Jean Marie Hartman, PhD.
Rutgers, The State University of New Jersey

Dave Pifer
Upper Raritan Watershed Association

Note:
This document was prepared with the aid of a grant from the New Jersey Department of Environmental Protection, Office of Environmental Services.

Table of Contents

List of Tables and Figures

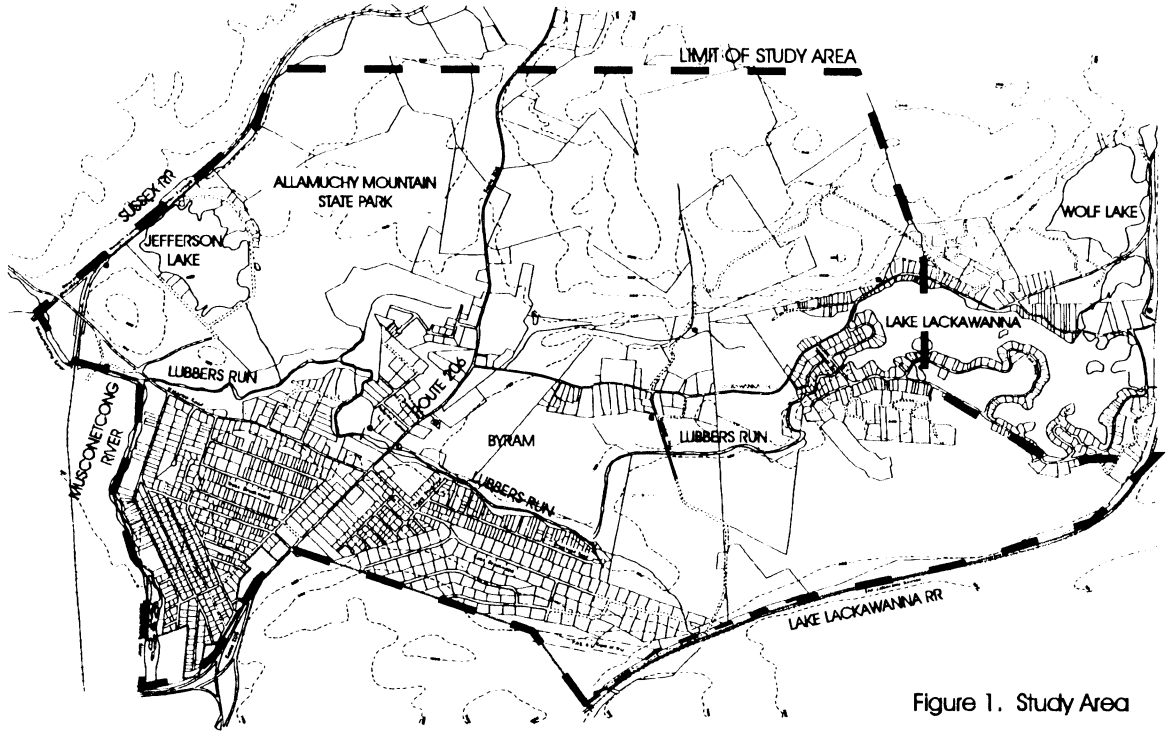

Figure 1. Study Area

1. Introduction

This study, consisting of three main parts, was commissioned by the Byram Township Environmental Commission. The first part of the study documents the existing natural resources associated with a two-mile stretch of Lubber's Run, running from Lake Lackawanna to the Musconetcong River (See Figure 1) and includes mapping critical areas of the watershed. The second part is a greenway park plan, designed to connect points of historic and cultural interest using the Lubber's Run stream corridor and existing and proposed trails. The third part makes recommendations on how to preserve critical ecological areas identified on the Critical Areas Map.

Lubber's Run contains nearly pristine areas of overwhelming natural beauty. The waterway in the study area takes many forms. At places it is a wide marsh, a rocky, bubbling stream, or impounded by beaver dams. The presence of beaver dams make this dynamic stream system even more unpredictable.

This segment of Lubber's Run connects two Natural Heritage "Priority Site" areas, which contain some of the most important sites in the state for endangered and threatened species of plants, animals and ecosystems. Most of the surrounding land is wooded, residential land or vacant land available for development. Siltation and degradation of the water quality from development pose a threat to the integrity of the stream corridor.

Of immediate concern is the impact of future development on this two-mile stretch of stream. Of particular concern is the Route 206 corridor adjacent to Lubbers Run, including the construction of a shopping center, proposed widening of Route 206, and concept planning for a "Town Center".

Unlike some other communities, Byram is taking a proactive approach in the identification, recognition, and preservation of this stream and it's view sheds before they are destroyed. It is the desire of the Environmental Commission to incorporate the stream as a greenway, or linear park, through the center of town that connects the two natural heritage priority sites.

Objectives of the three parts of the study are:

Part 1. Document the existing natural resources and formulate a Critical Areas Map

- Study the natural features of stream corridor including watershed, drainage areas, wetlands, flood plains, soils, and vegetation.

- Identify critical view sheds, especially at gateways.

- Perform a visual analysis of existing gateways, trails, and existing manmade features.

Part 2. Prepare a greenway park plan

- Design a stream corridor greenway that can accommodate habitat preservation, trails, and passive recreational opportunities.

Part 3. Make recommendations on how to preserve critical ecological areas

- Make recommendations to improve the visual appearance of the stream corridor, which includes plantings, etc.

- Improve water quality within the watershed by recommending best management practices for existing and future development.

- Explain preservation techniques including easements, acquisition, and public and private programs.

- Suggest the types of ordinances that should be enacted to promote environmentally sensitive development of vacant lands within the watershed.

- Present the plan to the Planning Board and Council to seek adoption of the study into the Township's Master Plan.

During the course of this study, the work in progress was presented to the public several times. A class of landscape architecture students from Rutgers University, under the direction of Dr. Jean Marie Hartman, participated in initial research for this report. After studying the Lubber's Run watershed the students presented their ideas to the public at an Environmental Commission meeting in the fall of 1996. This study acknowledges the initial conceptual work of the students. In addition, it presents an understanding of the natural resources in the area, recommends a greenway park and trails, and finally, suggests ways to maintain the resources in the future.

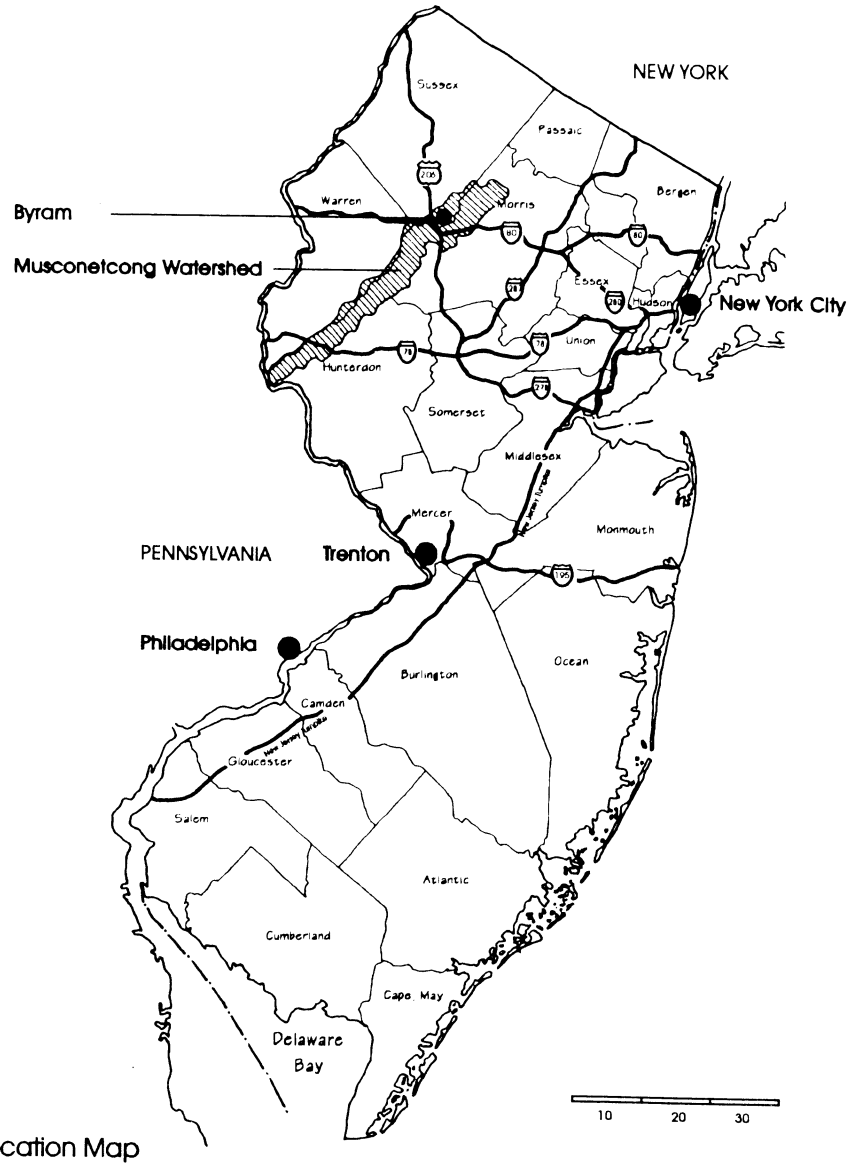

Figure 2. Location Map

2.1 Regional Context

Byram Township is located in Sussex County in the New Jersey Highlands geographic region. Sussex County is in the northwestern corner of the state next to Morris and Warren Counties (see Figure 2), bordering the States of Pennsylvania and New York.

Byram is located only 50 miles from New York City, and Interstate Highway I-80 runs east-west 1/2 mile to the south of the study area. U.S. Highway Route 206 runs north-south and bisects the Township. Byram's greatest land use is vacant, potentially developable land, and it will no doubt experience increasing development pressure.

The New Jersey State Development and Redevelopment Plan designated Byram Township as Resource Planning and Management areas PA-4 and PA-5. PA-4 is a rural planning area, which includes large areas of undeveloped land with sparse residential, commercial and industrial developments scattered throughout. These rural areas are not intended to offer strong economic centers, but rather to protect agricultural and environmentally sensitive features.

The objective of the PA-5 designation is to protect environmentally sensitive features by guiding development into centers and establishing community development boundaries and buffers around those boundaries.

According to the New Jersey State Development and Redevelopment Plan, dated June 12, 1992, Byram falls into an area that should "...Preserve and enhance historic, cultural, open space, and recreational lands...by identifying these resources and using preservation, conservation and other programs and techniques to guide growth in locations and patterns that protect them." In addition, the plan states that, "...market driven sprawl development and the "ratables chase" continue to inhibit our efforts to protect these resources...".

Stanhope and Hopatcong, located next to Byram, are regional centers, which are oriented toward growth and provide employment and services for a region. As such, the intent of the State Plan is that towns like Byram should use the regional commercial and employment facilities in these areas rather than try to create their own.

This riverway study is in conformance with the objectives of the New Jersey State Development and Redevelopment Plan, and especially with the Area 5 goals of protection of environmentally sensitive features.

The Township of Byram Comprehensive Master Plan, prepared by Louis Berger & Associates, Inc. supports the objectives of the State Plan in Section II, Goals, Objectives, and Policies. The goal for the environmental resource section is stated as:

"Maintain the essential rural character and amenity of the Township by guarding against degradation and destruction of woodlands, steep slopes, lakes and waterways, areas of natural beauty, sensitive environmental areas, productive agricultural areas and important historic places."

Both this goal and the seven objectives which follow it in the Master Plan serve as the basis for adoption of this study as part of the Master Plan.

A Natural Resource Inventory Plan dated June, 1994, and prepared by the Byram Township Environmental Commission, provides an extensive analysis of the environmental features of the Township. History, geology, natural habitats, endangered species, soils, and other characteristics are discussed in great detail. This document served as a basis for this study, and should be referred to for detailed maps and descriptions of natural features.

2.2 Lubber's Run Watershed Description

A watershed is a an area of land that collects rainwater and drains it to water bodies like rivers, lakes, and streams. The Lubber's Run watershed lies within the larger Musconetcong Watershed (see Figure 3), in the Highlands Physiographic Region. The sub-watershed for Lubber's Run is delineated on USGS topography maps and shown in Figure 4.

The Musconetcong Watershed Association serves as an educational resource for the watershed. According to their brochure, the watershed boasts high water quality, the state's largest lake, and large groundwater resources. It encompasses 157.6 square miles and ultimately flows into the Delaware River. The Musconetcong River is currently under study for Wild and Scenic River designation.

2.3 Existing Features

The land within the study area is mostly wooded and mainly zoned for residential development. Undeveloped residential land is typically zoned for lot sizes ranging from 1 to 5 acres in size. Developed residential areas have lots ¼ to ½ acres in size. Residential development directly adjacent to Lubber's Run is located near Lake Lackawanna, and at East Brookwood. See Figure 5.

Land within the study area that is zoned or developed as commercial/industrial use is largely located along Route 206. Commercial/industrial uses include restaurants, a landscape nursery, and a junkyard. Adjacent to the stream along the west side of Route 206 is a new sewage pump station. The lot next to the pumping station is vacant.

Existing community facilities within the study area are the municipal complex, the municipal park, a school, and several cultural and historic features. The municipal complex, park, and school are located together along Lubber's Run on Mansfield Road, creating a community core in an ecologically critical

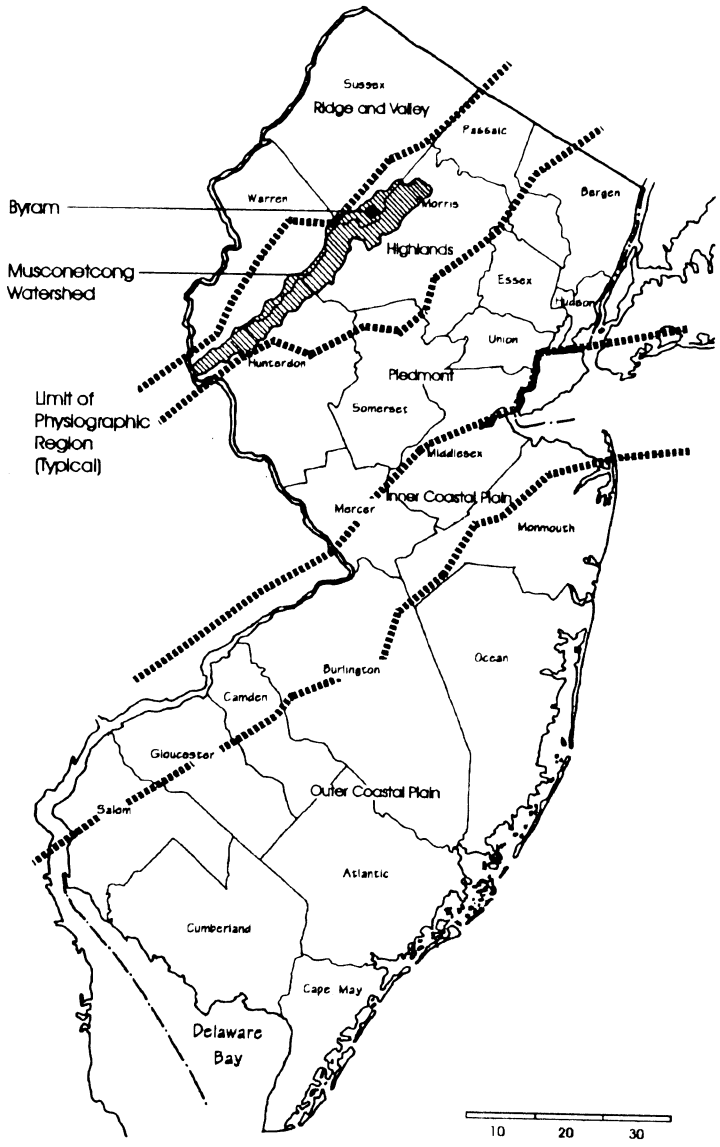

Figure 3. Watershed and Physiographic Boundaries

Figure 4. Sub-Watershed Map

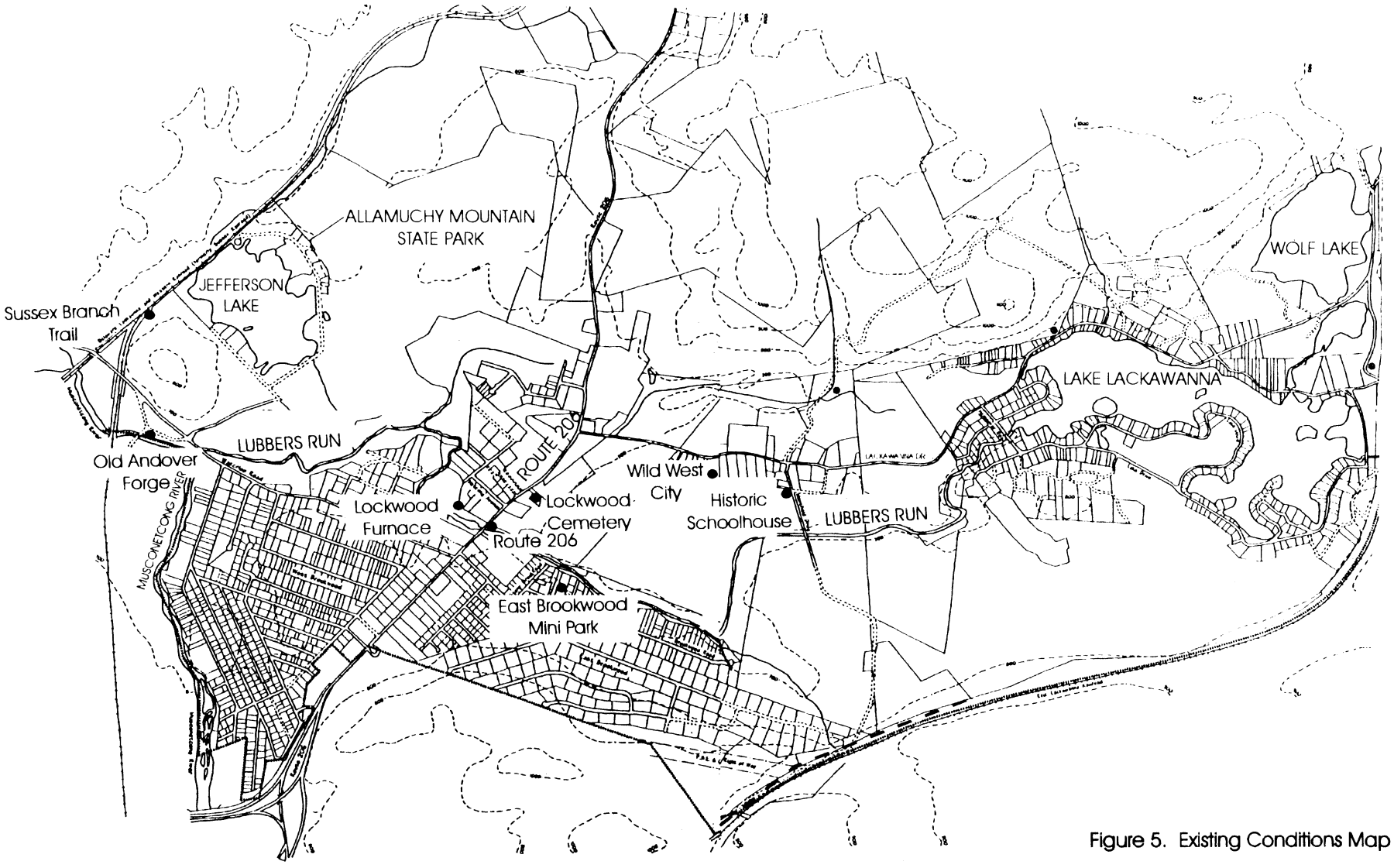

Figure 5. Existing Conditions Map

Figure 6. Trail from School to Rail Trail

Figure 7. Trail from Lake Drive to Mansfield Drive

portion of the study area. A new sewer and associated easement have been constructed between Lubber's Run and the municipal complex. This easement has potential as a walking trail, which links to the trails located on the Wild West property, but also has the potential to bring increased development pressure to the study area.

Existing cultural and historic sites within the study area can be linked by trails along or near Lubber's Run. They are listed below.

- The historic schoolhouse located near the municipal complex on Mansfield Road, which now functions as the township historic center.

- Lockwood Cemetery on the east side of Route 206; an early 19th century cemetery.

- Ruins of Lockwood Forge on the west side of Route 206; an old mill site located on Lubber's Run.

- Old Andover Forge; a bloomery forge from1804 of which the the foundation remains.

- Wild West City, a western theme amusement park open May to October located on Lackawanna Drive adjacent to Lubber's Run.

- East Brookwood Mini Park, a half-acre community park in poor physical condition.

- Waterloo Village; site of a mid-18th century iron works and a mid-19th century stop-over on the Morris Canal.

- Allamuchy State Park; an open space preservation area.

- Route 206, which was the first chartered turnpike in the state.

- Sussex Branch Trail on the bed of the Delaware, Lackawanna, and Western RR built about 1853. It's construction represented the largest railroad fill ever built. This railroad engineering wonder is now an important hiking trail and is called the "Cut Off".

The existing trail system in Byram is well developed and well maintained. The Erie Lackawanna rail hike forms a wide "U" to the north of the township. It offers an excellent opportunity for hiking. A trail connection using the existing greenway of Lubber's Run would close the "U" and form a large circuit hike.

Presently there is a trail near the school on Mansfield Drive that leads from the "Cut Off" trail to the Lubber's Run greenway. (See Figure 6). This trail is in excellent condition. This portion of the trail transgresses a critical habitat, however, and should not be developed any further to prevent habitat destruction. No interpretive signs, furniture of any kind, etc. should be added to the trail.

One section of the Lubber's Run greenway has

Figure 8. Lubber's Run Marsh Condition

Figure 9. Municipal Complex seen from the School

Figure 10. Route 206 at Lubber's Run

an existing trail system. Wild West City, west of the municipal complex, has trails in excellent condition. With the proper easements, this section of trails could be used in a greenway trail system to connect the two ends of the Erie Lackawanna hike.

Two trail sections are needed in order to make the proposed circuit trail comlete. One runs from Mansfield Drive near the municipal complex and follows the sewer easement to the Wild West City trails. The other is from Wild West City trail system across Route 206 all the way to the Erie Lackawanna rail trails near Andover Forge.

Another existing trail worthy of mention begins at Lake Drive and leads to Mansfield Drive across from the municipal park. This is a beautiful trail which follows a ridge above Lubber's Run and leads to beaver habitat. It runs through land owned by the New Jersey National Trust and the Lackawanna Land Trust. The trail is in excellent condition. See Figure 7.

A visual analysis of Lubber's Run revealed, for the most part, pristine natural beauty (Figure 8). Very few exotic/invasive vegetative species were seen. Visually disruptive areas are: the municipal complex, the municipal park, the school, the landscape nursery, and the residences near Lake Lackawanna.

Specific problems at the municipal complex are the presence of large amounts of underutilized asphalt and industrial uses such

as a domar and recycling facilities. Not only are these uses unsightly, they are potential non-point pollution sources. See Figure 9.

The municipal park is maintained almost completely in lawn. The edge of the park adjacent to Lubber's Run is especially sensitive, and the lawn in this area should be revegetated with native plants for a minimum of 50' along Lubber's Run. The school has large amounts of lawn and playing fields, but because there is a buffer of native vegetation between the fields and the stream, no remedial action is needed. This area provides a good example of how the municipal park should look.

The visual assessment at the school raised concerns about the large areas devoted to playing fields. Is this amount of lawn devoted to playing fields necessary? To the extent that the fields are not being used they should not be maintained as lawn.

The landscape nursery located along Route 206 is a visual intrusion on the gateway at the Lubber's Run crossing. Buffering of this site is clearly needed. The new sewage construction along Route 206 also requires a buffer. Next door to the vacant lot on which the sewage construction is located, is the junkyard. A simple strip planting of native vegetative in front of the fence would improve the Route 206 corridor near Lubber's Run.

Figure 11. Waterloo Road Gateway

Many of the residences in the Lake Drive area near Lake Lackawanna, are maintained as mown lawn all the way up to Lubber's Run. Some reforestation is clearly needed along the stream to protect Lubbers Run from fertilizer runoff and sediment from runoff. Homes in East Brookwood have a better relationship to the stream; they are wooded lots with a vegetative buffer near the stream. They can serve as an example of how to maintain a residential lot in close proximity to a stream.

Gateways to Byram are Route 206 (Figure 10), Mansfield Drive, Waterloo Drive, and the dam at Lake Lackawanna. Views were examined where Lubber's Run crosses each of these roads. The view at Mansfield Road was generally good but the park needs buffer plantings, as mentioned above. Waterloo Road (Figure 11) is exceptional and every effort should be taken to maintain the views that exist now. Lackawanna Drive offers good views of Lake Lackawanna, the source of Lubber's Run. At the dam itself, views can be enhanced by additional plantings near open areas to frame critical views.

2.4 Critical Areas

Environmentally critical areas were mapped for Lubber's Run in order to define limits for a greenway park. Criteria for preservation are shown in Table 1. See Figure 12.

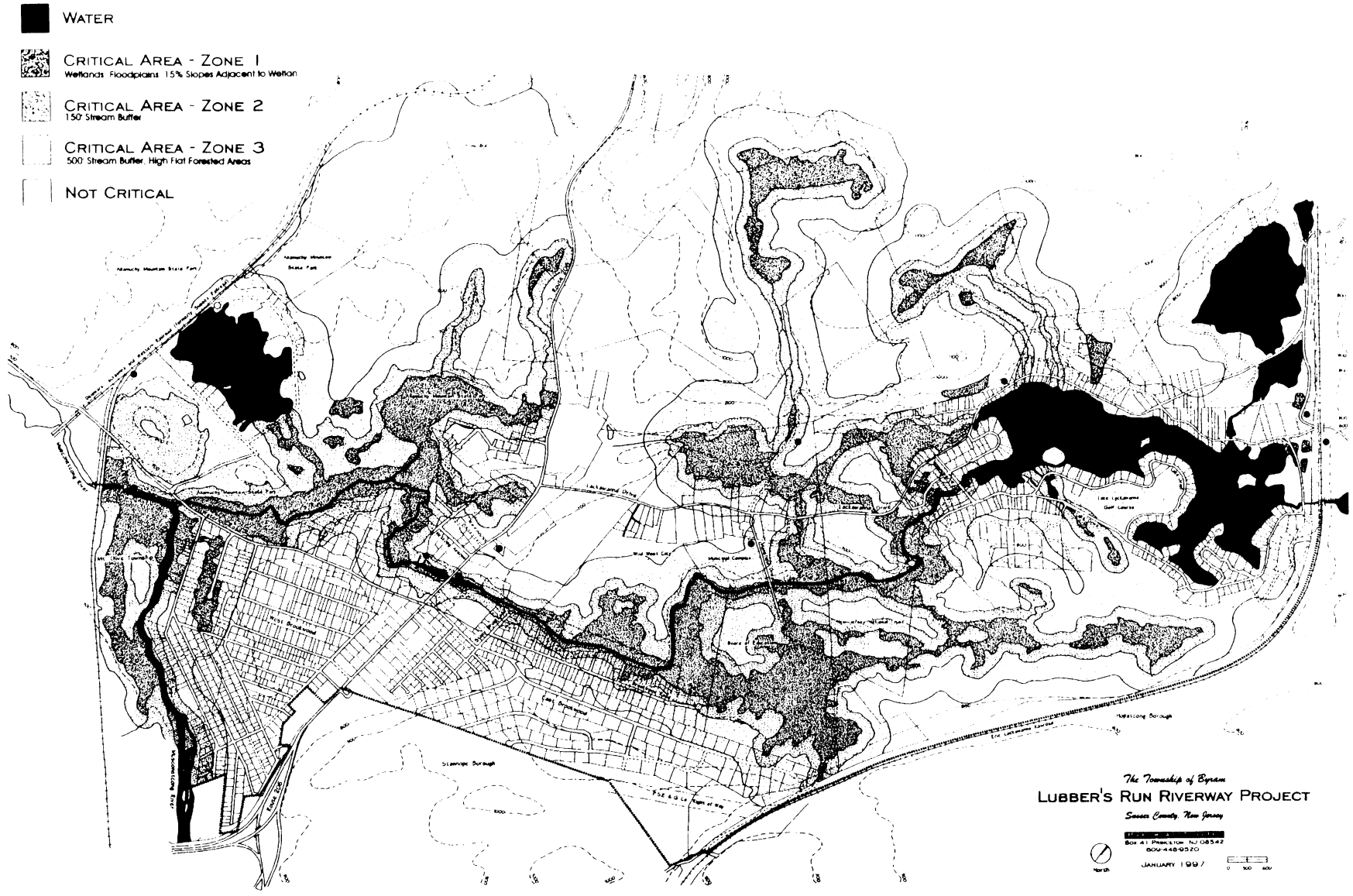

Figure 12. Critical Areas Map

Critical areas in Zone 1 include all wetlands, flood plains, and tributaries feeding in to Lubber's Run. These areas are considered the highest priority for preservation and inclusion in a greenway plan.

Wetlands delineation was taken from State of New Jersey State Department of Environmental Protection (NJDEP) Freshwater Wetland Maps dated March, 1986. Wetland types shown on the map are listed in Table 2. Wetlands shown on the map are regulated by the U.S. Corp. Of Engineers and the NJDEP. For State regulatory purposes, wetlands are classified as either exceptional, ordinary, or intermediate wetlands. Most wetland areas mapped in Byram Township are assumed to be exceptional value. This is based on the presence of critical habitats including threatened and/or endangered species and its listing as a trout maintenance stream. The transition area (buffer) for exceptional wetland areas is a minimum of 150'.

The Natural Heritage Program has identified several sites in Byram Township as being the habitat of Cooper's Hawk (endangered), Wood Turtle (threatened), and Barred Owl (threatened) species. It is illegal to release the exact location of endangered and/or threatened species to the public.

Floodplain areas were taken from U.S. Department of the Interior Geological Survey "Map of Flood prone Areas" dated 1976. Aerial photographs provided by Atlantis Aerial Survey Co., Inc. dated 1993 were used to verify forests and wetlands. When aerial photographs were matched to the base plan (which is taken from the "Official Map" for the Township of Byram), Lubber's Run had obviously shifted course in the large marsh area near the school on Mansfield Drive. The revision date on the "Official Map" is February 16, 1994, but Lubber's Run does not follow the same course as the aerial photograph of almost the same date. This reinforces the notion that the stream system and associated wetlands are a dynamic system. Setbacks that incorporate this condition should be instituted to reduce flooding and property damage.

The presence of beaver dams along Lubber's Run make the stream alignment even more unstable than comparable stream systems without beaver. Any swale or tributary in the area can become beaver habitat at any time because of the migratory nature of these animals. Beaver dams cause flooding of the immediate surroundings and reduce water flow downstream. Setbacks from swales, tributaries, and Lubber's Run itself will protect the habitat for these and other animals. Setbacks will also protect future development from becoming the unwary victim to sudden flooding and changes in the course of the stream over time.

Zone 2 critical areas include wetland transition areas and associated forested steep slopes. Critical areas should also be preserved and included in the riverway park area. The slope analysis is based on United States Geological Survey Maps dated 1943. Because of the erodible nature of the soils in this area, steep slopes are considered 15% or greater. Least critical areas include forested and unforested areas within 500' of tributaries and Lubber's Run and high flat forested areas. The goal of the critical areas map is to identify intact wetland ecosystems for protection.

Table 1. Critical Area Definitions

Zone 1 - Most Critical Area

Wetlands
Floodplains
15% Forested Slopes Adjacent to Wetlands

Zone 2 - Critical Area

150' Stream Buffer

Zone 3 - Least Critical Area

500' Stream Buffer
High, Flat, Forested Areas

Table 2. Study Area Wetland Types

Wetland Type	Description
L2OWhH	Lacustrine/Littoral/Open Water/Diked or Impounded/Permanent (Lake Lackawanna and Lake Wolf)
PFO1A	Palustrine/Forested/Broad Leaved Deciduous/Temporary
PFO1B	Palustrine/Forested/Broad Leaved Deciduous/Saturated
PFO1E	Palustrine/Forested/Broad Leaved Deciduous/Seasonally Saturated
PSS1B	Palustrine/Scrub/Shrub/Broad Leaved Deciduous/Saturated
PSS1C	Palustrine/Scrub/Shrub/Broad Leaved Deciduous/Seasonal
PSS1E	Palustrine/Scrub/Shrub/Broad Leaved Deciduous/Seasonally Saturated
PSS1F	Palustrine/Scrub/Shrub/Broad Leaved Deciduous/Semipermanent
PSS1E/PFO1E	Palustrine/Scrub/Shrub/Broad Leaved Deciduous/Seasonally Saturated Palustrine/Forested/Broad Leaved Deciduous/Seasonally Saturated
R2UB1	Riverine/Lower Perennial/Unconsolidated Bottom/Cobble
R2UB2	Riverine/Lower Perennial/Unconsolidated Bottom/Sand

The Greenway Plan is a corridor of protected public and private land established along this segment of Lubber's Run. It links recreational, cultural, and natural features, provides pathways for people and wildlife, and protects the forests and wetlands. A trail system provides passive recreation opportunities such as hiking, birdwatching, fishing, and cross country skiing.

The proposed Greenway Plan is shown in Figure 13 . In addition to the plan itself, a number of recommendations for ways to protect the mapped critical areas and water quality of Lubbers Run are being made.

Our recommendations are:

- Work with private and public conservation agencies to acquire land and/or protective easements over the proposed greenway that allow public access.

- Locate final trails in the field and form a trails club to monitor the trails and keep them clean.

- Maintain all gateways as shown on the Greenway Plan as high quality views. Improve conditions at the Route 206 gateway as discussed.

- Revise ordinances to include flexible lot sizes, best management practices, stream valley buffers, and forest preservation.

- An interpretive trail, if desired, should be located at the municipal park.

- Access to large tracts of undisturbed wetland areas should be limited.

- Use either the existing municipal complex or proposed town center construction as an example of best management practices for the community.

- Educate the community about the importance of best management practices.

There are several ways to approach preservation of land for a greenway. They include:

- Purchase of the land by a conservation organization.

- Placement of a restrictive conservation easement over a portion of the land, leaving it in it's original ownership.

- Placing the land in a property owner's association with a restrictive conservation easement at the time of subdivision.

There is one area of the proposed Greenway in particular that we recommend be purchased outright. It is the land shown in the Greenway Plan that falls between Route 206 and Allamuchy State Park. Allamuchy State Park representatives expressed interest in this area, but said that it has to be funded through the Green Acres Program. (See page 26 for more information about the program.)

The Green Acres Program requires that the owner of land to be purchased complete an application that states they want to sell the land. Other land within the proposed greenway can be protected by a variety of different means.

For land that falls under intense development pressure, such as the "town center" parcel, obtaining a large easement may not be possible. In this case, development that occurs within the Least Critical Areas should be developed using best management practices, as outlined in Section 4 of this report.

Throughout the greenway plan a high priority was given to linking the existing residential communities to the community facilities at the municipal complex core and proposed "town center" along Route 206. As the plan shows, the proposed trail system provides those critical links. One major difficulty is getting residents from the West Brookwood neighborhoods across Route 206. A pedestrian underpass is the most logical solution to this problem, and could be constructed by the New Jersey Department of Transportation when road improvements are made.

Another problem is getting the residents of East Brookwood across Lubber's Run. It is recommended that a pedestrian bridge be constructed at Stony Brook Road to provide direct access for those residents at the time a town center becomes a reality. This bridge

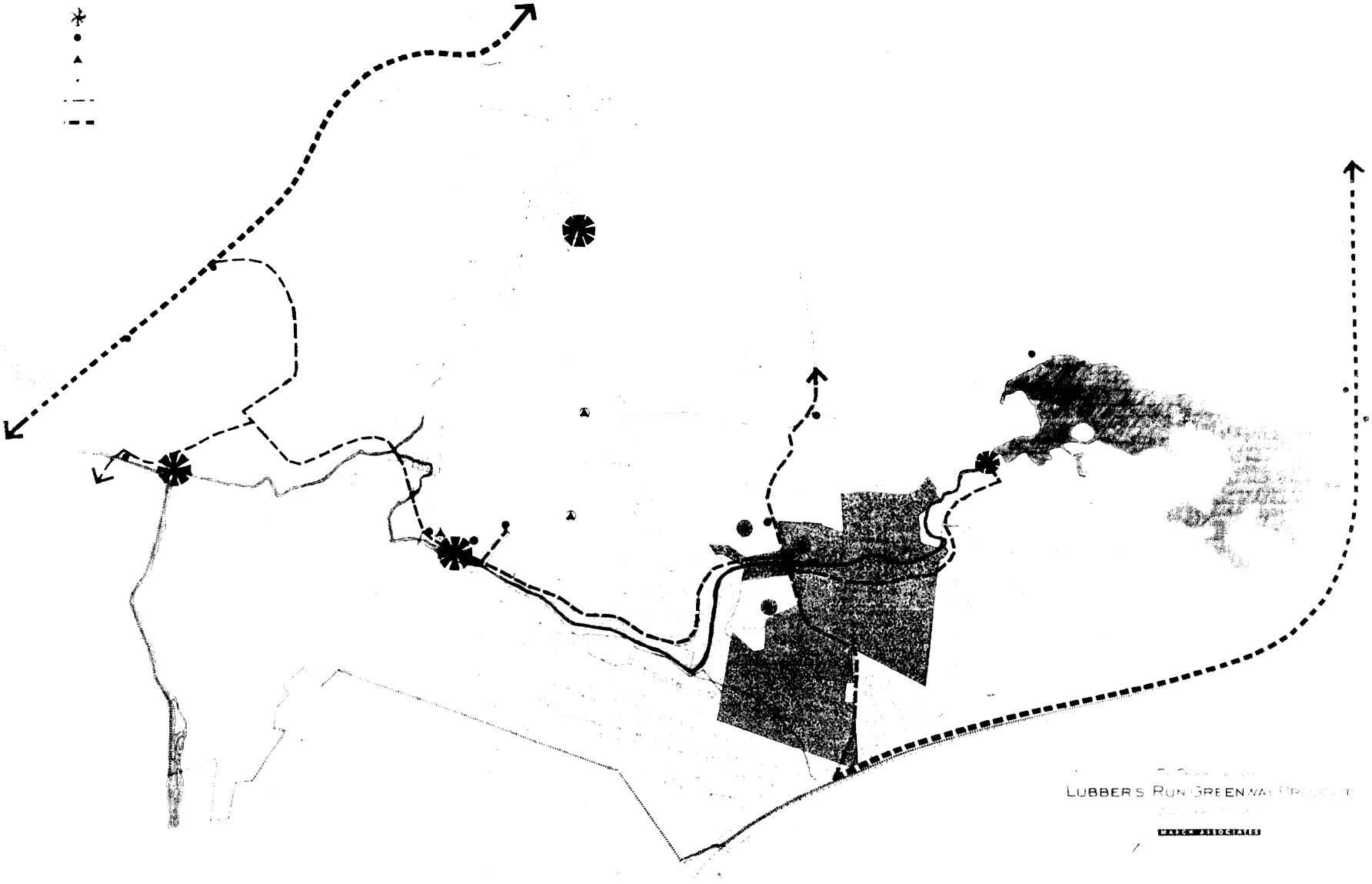

Figure 13. Greenway Plan

can serve to reduce car trips by residents, giving them a pedestrian alternative to new commercial or community services.

Passive recreational uses within the greenway and along Lubber's Run include hiking, bird watching, fishing, and cross country skiing. The proposed trail system will create a circuit hike using the existing Sussix Branch Trail, the "Cut Off", and the Lubber's Run Greenway. The future Highland Trail will also link into this system. Access to the stream at various points along the way will afford more opportunities for bird watching and fishing.

Recreational uses of the water system within the proposed Greenway are restricted due to the shallow depths of the stream and associated marshes. Boating is not feasible, except for canoeing in limited areas and in high water seasons.

Along with the new trail link, it is recommended that the Township organize a volunteer trail club to keep the trails clean and well maintained.

Recommendations for the gateway area at Route 206 are: buffering commercial and industrial uses, opening views to Lubber's Run, and the addition of pedestrian circulation paths. If the roadway is widened, a sensitive approach to bridge construction should be undertaken. The bridge designers should consider period details in the bridge construction and possibly the re-creation of an iron bridge. Preservation of the existing ruins of the Lockwood Furnace located on Lubber's Run near this critical viewshed should be a priority during design and construction of the adjacent roadway.

Eventual development pressures are inevitable. Therefore, it is recommended that ordinances that promote sensitive development of parcels of land containing Critical Areas be passed. These are discussed in Chapter 5 of this report.

It is also recommended that a short interpretive nature trail be constructed in the marsh area at the municipal park. This trail would consist of a boardwalk with interpretive signs explaining the function of wetlands, vegetation, wildlife, and the importance of using best management practices to keep the watershed clean.

Access to all other large tracts of undisturbed wetland areas (particularly behind the intermediate school on Mansfield Drive) should be limited.

Another recommendation is to use the municipal complex as a showcase for best management practices and ecologically sensitive development in the community. While we are not recommending a specific plan, the concept of setting an example for the community is a good one. If it is determined that this is fiscally impossible then future development of the town center area could serve the same purpose.

Finally, it is recommended that Byram Township make an effort to educate land owners, developers, and residents about best management practices. The Township's Engineering and Planning consultants and conservation organizations can help in this effort. Specifics of best management practices are outlined in chapter 4.

Best management practices are special methods to maintain or develop land that help improve the overall water quality in a watershed. In order to understand how these practices can help, it is important to know how water quality is affected by stormwater runoff and the pollutants it carries.

Pollution can occur in one of two forms, non-point source pollution and point source pollution. Point source pollution usually has a specific source, such as a dry cleaning facility leaking solvents in to the environment. Point source pollution, once traced to the source, can be eliminated. Non-point sources, as the name implies, do not come from a specific source and are harder to eliminate. Examples of non-point source pollution include acid rain, oil from streets, trash washed in to storm drains, and lawn chemicals.

Stormwater runoff is the principal carrier of non-point source pollutants. Allowing stormwater to percolate in to the soil over a slow period of time before it enters Lubber's Run will both remove pollutants from the stream and recharge the groundwater. Therefore, reducing the rate of flow of stormwater and making sure it flows over vegetated land rather than through concrete pipes and channels are effective methods of increasing water quality. The following best management practices will help lower the impact of non-point source pollution. These practices can be followed by all existing and proposed development and particularly by individual homeowners.

4.1 Minimum Disturbance and Alternative Landscaping

The maximum amount of existing, native vegetation should be retained on any given property. Woodlands trap and hold water for a relatively long period of time. This allows pollutants to settle out of the water, resulting in cleaner stream water. Water will also run off the site, but at a much slower rate, minimizing flooding.

In order to do this, proposed residential development should provide for forest retention. One method of land development used to conserve woodland areas involves clustering smaller lots together to preserve more existing forest.

The most effective change that existing residents can incorporate into developed areas along Lubber's Run is to allow a large portion of the lot to remain wooded. This is especially important for the area adjacent to the stream for a distance into the property of 25'. If the lot is not currently forested, homeowners should consider reforesting areas that are not actively used.

Manicured lawn areas should be placed strategically where they will be most useful. They should be reduced or eliminated where they are not necessary. Instead of lawn areas, rough cut lawn, meadow plantings or shrub beds should be used. For a rough cut lawn, a 5-7 inch mowing height is recommended. The higher grass, meadow, and shrubs will trap water and slow it down as in a woodland setting.

Wildflower meadow plantings are a popular, alternative to mown lawn. In addition, native grasses and flowers can provide wildlife habitat in all seasons. In the spring and summer, meadows come alive with color. In the fall they produce seed heads which will reseed the meadow and provide food for birds all winter.

Using rough cut lawns, meadows, and shrubs reduces the need for lawn chemicals, which are a source of non-point pollution. They also reduce the need for maintenance because they only need to be mown infrequently.

Where manicured lawn areas are maintained, a minimum two-inch mowing height is recommended. Weeds can be discouraged by leaving your lawn higher than typical, leaving grass clippings in place and avoiding over fertilization and over watering. Pesticide application should be done properly in order to minimize impact on the environment. Figure 16 shows two sections that illustrate minimum disturbance and alternative landscaping.

Native plant list

Homeowners should be aware when choosing plants for use in or near environmentally sensitive areas (near existing forests and Lubber's Run), that native species should be planted. Native species reduce the need for chemical use and irrigation because they are usually more tolerant to pests and

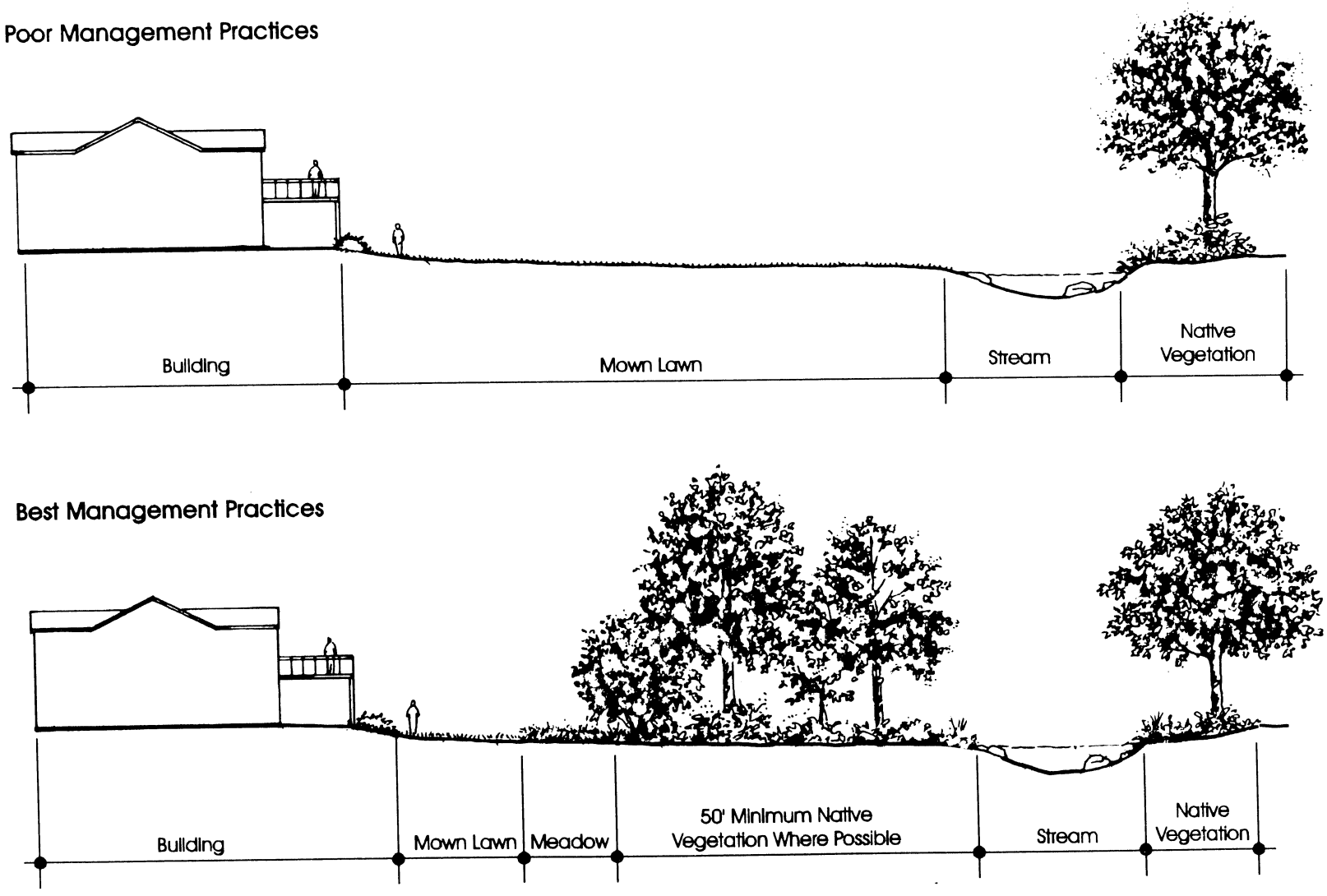

Figure 14. Minimum Disturbance/Alternative Landscaping

Table 3. Recommended Native Plant List

Large Trees		Small Trees & Large Shrubs		Small Shrubs		Groundcovers	
Common Name	*Scientific Name*	*Common Name*	*Scientific Name*	*Common Name*	*Scientific Name*	*Common Name*	*Scientific Name*
Red Oak	Quercus rubra	Ironwood	Carpinus caroliniana	Blueberry	Vaccinium spp.	Virginia Creeper	Parthenocissus quinquefolia
White Oak	Quercus alba	Flowering Dogwood	Cornus florida	Huckleberry	Gaylussacia spp.	Wild Grape	Vitis labrusca
Black Oak	Quercus velutina	Red Dogwood	Cornus stolonifera	Pinxter Flower Azalea	Rhododendron nudiflorum	May Apple	Podophyllum peltatum
Chestnut Oak	Quercus prinus	Gray Dogwood	Cornus racemosa			Violets	Viola spp.
Scarlet Oak	Quercus coccinea	Witchhazel	Hamamelis virginiana			Spring Beauty	Claytonia virginica
Hickories	Carya spp.	Spicebush	Lindera benzoin			Wood Anemone	Anemonella quinquefolia
Red Maple	Acer rubrum	Hop hornbeam	Ostrya virginiana			Jewelweed	Impatiens pallida
Sugar Maple	Acer saccharum	Sassafras	Sassafras albidum			Jack-in-the-Pulpit	Arisaema triphyllum
White Ash	Fraxinus americana	Maple-leafed Viburnum	Viburnum acerifolium			Solomon's Seal	Polygonatum pubescens
American Beech	Fagus grandiflora	Blackhaw Viburnum	Viburnum prunifolium			Wild Sarsaparilla	Aralia nudicaulis
Tulip Tree	Liriodendron tulipifera	Arrowwood	Viburnum dentatum			False Lilly-of-the-Valley	Maianthemum canadense
Black Cherry	Prunus serotina					Asters	Aster spp.
Sweet Birch	Betula lenta					Goldenrod	Solidago spp.
Black Gum	Nyssa sylvatica					Native Grasses	
						Sedges	Carex spp.
						Ferns	
						Skunk Cabbage	Symplocarpus foetidus

Large Trees		Shrubs & Small Trees		Vines		Herbaceous Plants	
Common Name	*Scientific Name*	*Common Name*	*Scientific Name*	*Common Name*	*Scientific Name*	*Common Name*	*Scientific Name*
Norway Maple	Acer platanoides	Barberry	Berberis japonica	Porcelain Berry	Ampelopsis brevipedunculata	Garlic Mustard	Alliara officinalis Arthraxon hispidus
Sycamore Maple	Acer psuedoplatanus	Russian Olive	Eleagnus angustifolium	Oriental Bittersweet	Celastrus orbiculata	Musk Thistle	Carduus nutans
Tree-of-Heaven	Ailanthus altissima	Autumn Olive	Eleagnus umbellata	Climbing Euonymus	Euonymus fortunei	Plumeless Thistle	Corduus acanthoides
Russian Olive	Eleagnus angustifolia	Winged Euonymous	Euonymous alatus	English Ivy	Hedera helix	Spotted Knapweed	Centuria maculosa
Autumn Olive	Eleagnus umbellatus	Privet	Ligustrum spp.	Japanese Honeysuckle	Lonicera japonica	Bull Thistle	Cirsium vulgare
White Mulberry	Morus alba	Bush Honeysuckles	Lonicera spp.	Kudzu	Pueraria lobata	Canada Thistle	Cirsium arvense
Amur Cork Tree	Phellodendron amurense	Common Buckthorn	Rhamnus cathartica	Periwinkle	Vinca minor	Crown Vetch	Coronilla varia
White Cottonwood	Populus alba	European Buckthorn	Rhamnus frangula	Japanese wisteria	Wisteria floribunda, Wisteria sinensis	Beefsteak Mint	Eulalia vimineus
Sweet Cherry	Prunus avium	Multiflora rose	Rosa multiflora			Day Lily	Hemerocallis fulva
		Strawberry-Rasberry	Rubus illecebrosus			Purple Loosestrife	Lythrium salicaria
		Wineberry	Rubus phoenicolasius			Moneywort	Lysimachia nummularia Myoston aquaticum
		Japenese Spiraea	Spiraea japonica			Wild Reed	Phragmites australis
		Coralberry	Symphoricarpos orbiculatus			Japanese Knotweed	Polygonum
						Asian Tearthumb	Polygonum perfoliatum
						Russian Thistle	Salsola iberica
						Johnson Grass	Sorgum halepense

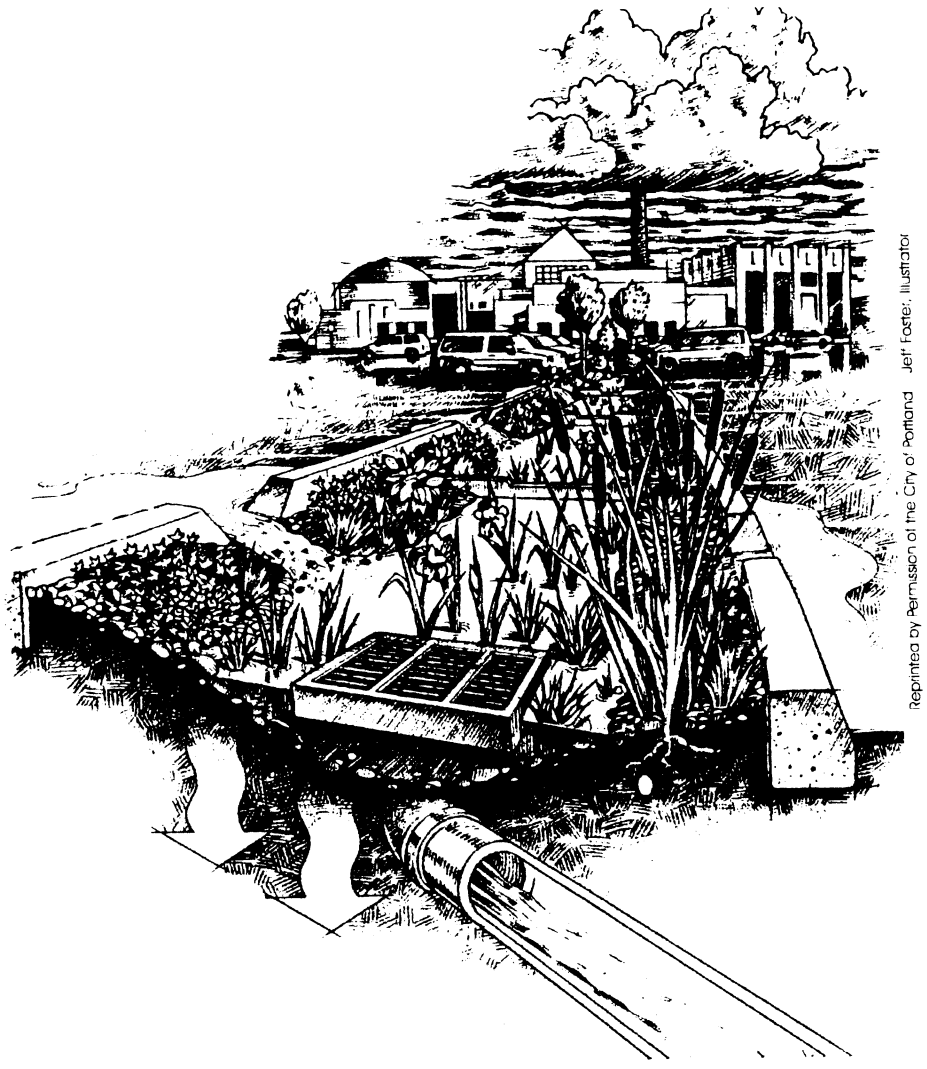

Figure 15 - Illustration of a Bioswale

the climate normally found in the region. When planting near existing forests, use the same types of plants that are already in the forest.

Native plants species are listed in Table 3. Selections should be based on site specific criteria such as sun or shade, soil type, and water availability. Consult your local agricultural extension agent for help in choosing and locating native plants.

In addition to the use of native species, it is essential to avoid the use of exotic/invasive plants adjacent to woodlands and environmentally sensitive areas. Exotic/invasive plants will out compete native species. As a result, native saplings and small woody shrubs will not regenerate the forest, resulting in a monoculture of exotic/invasive plants. Many exotic/invasive species provide little or no food value for wildlife. Table 4 is a list of plants not to use in the landscape near native forests.

4.2 Vegetated Swales and Filter Strips

Vegetated swales and filter strips provide storm water management, increase infiltration, and remove pollutants. While doing so, they also provide food and habitat for wildlife.

Vegetated swales, or "bioswales", are densely vegetated, gently sloping channels. Certain types of vegetation can actually absorb pollutants and prevent erosion. In Figure 15, the bioswale contains storm drain inlets that are elevated. In the event of a major storm, water rises to the level of the inlets and flows through pipes to a detention basin, which

is sized for the larger stom events.

Filter strips are buffer areas that slow storm water runoff, remove pollutants, and provide for added infiltration and sediment removal. They usually consist of native woody plants and shrubs.

4.3 Wet Ponds,Detention Basins, and Infiltration Basins

Land development increases impervious surfaces in the watershed and can cause increases in both the speed and volume of storm water entering the storm drain system, and ultimately, Lubber's Run. This increases the potential for downstream flooding, erosion, sedimentation, and degraded water quality. Three types of storm drain structures that can help reduce the speed and volume of runoff in developed areas are: wet ponds, detention basins, and infiltration basins. When these types of structures are used, runoff can be detained and managed.

Wet ponds allow pollutants to settle out and provide the opportunity for biological activity to speed up water purification. Wet ponds can become ineffective, however, during major storm events. When designed properly, wet ponds can be aesthetically pleasing and can provide the added benefit of habitat for birds and other animals.

Detention basins store water temporarily, releasing it slowly over a period of time which reduces velocity to water bodies. Pollutants have the opportunity to settle out in detention basins, as well. If proper care is used in the design of detention basins, they too can be aesthetically pleasing.

Infiltration basins provide highly pervious temporary storage areas, where water can seep into the ground. They can only be used where the soils have percolation rates suitable for recharge. Maintenance is necessary to keep infiltration trenches operating properly. Sediment must be periodically removed from the basin bottom. Infiltration trenches are useful for small drainage areas and/or sites with limited area for storm drainage.

4.4 Roadway Deicing and Salt Reduction

Road salt kills vegetation and contaminates water, impairing aquatic ecosystems. Limit use of salt where possible. In some cases sand can replace salt. Straight salting should be limited to critical intersections.

4.5 Street Sweeping

Street sweeping can reduce the amount of debris that ends up in Lubber's Run through the storm drain system. It also keeps the storm drain system from becoming clogged. Sweeping is most effective during fall and spring.

4.6 Porous pavements

The use of porous pavement will reduce the amount of runoff from impervious surfaces in developed areas. It allows infiltration of some storm water, but should not be used where the water table is near the surface. Over time porous pavement systems become compacted and their permeability is reduced. Maintenance is required to keep the system functioning. For instance if gravel is used, it should be raked periodically to prevent compaction.

4.7 Vehicle Care/Animal Waste Management

Homeowners are inadvertently responsible for two sources of non-point pollution: automotive chemicals and animal waste. Motor oil, battery acid, gasoline, antifreeze, and etc. should never be poured down a storm drain. They should be recycled or collected as hazardous waste. Anything that enters a storm drain will find its way in to Lubber's Run.

Animal waste is both an agricultural and a residential source of pollution in any watershed. Animal waste can increase the amount of nitrates and bacteria in the local water body and cause beach closures and excessive aquatic weed growth. Pets should not be allowed to defecate on paved surfaces. Animal waste should not be placed in storm drains. Use vegetated areas to walk pets and pick up the waste with a bag. Pet waste can be disposed of in the toilet or trash.

Large geese and duck populations can also damage water quality with excessive amounts of waste. Do not feed them unnatural foods and do not encourage their feeding.

Existing ordinances and master plan goals that promote the protection of critical areas and the water quality in the watershed are already in place. These regulations include local stormwater management regulations and state and federal wetlands regulations.

In Byram Township, the Comprehensive Master Plan lists objectives and goals that support the recommendations for adoption of new ordinances and development guidelines in this study. The stated environmental resources goal in the Master Plan is ..."guarding against destruction of woodlands, steep slopes, lakes and waterways, areas of natural beauty, sensitive environmental areas, productive agricultural areas and important historic places."

Especially pertinent objectives in the environmental resources section of the Master Plan include:

- "Protect stream corridors, wetlands, woodlands, steep slopes, groundwater recharge lakes, and other environmentally sensitive lands and waters through the development of local ordinances."

- "Preserve and maintain major areas of open space."

Additional local ordinances and/or development guidelines need to be included in the Zoning Ordinance of Byram Township as follows:

- Headwater Protection Ordinances
- Stormwater Management Ordinances
- Forest preservation ordinance
- Development Alternatives

5.1 Headwater Protection Ordinances

Headwater protection ordinances should be adopted by Byram Township. This type of ordinance typically includes the requirement for a stream valley buffer, floodplain setback, and protection of slopes of 15% or greater on erodible soils.

State wetland regulations, enforced by the the New Jersey Department of Environmental Protection, already require a transition area for wetlands. These areas establish construction setbacks from wetlands. The size of the transition area is based on the quality of the wetland area. As discussed previously, the setback for exceptional wetlands is 150'.

Local ordinances can be passed in order to reinforce the state wetland regulations by requiring a stream valley buffer. Stream valley buffers constitute construction setbacks along stream corridors, typically based on the slope of the land adjacent to the stream and the type of stream. Stream valley buffers typically range from 50' to 200'.

At a minimum, floodplain setbacks should be at least 25' from the calculated 100' year flood line.

Within these buffers, setbacks, and protection areas, no clearing or grading should be allowed. The ordinance and/or design guidelines for setbacks should specify what construction activity will or will not be allowed in these areas, and when a permit is required.

5.2 Stormwater Management Ordinances

There is an enabling stormwater management ordinance in Byram, which allows the township engineer great flexibility to enforce any design standards. The ordinance states that, "The peak rate of stormwater discharge after development shall not eceed the peak rate of discharge from the property in its natural state." The township engineer and environmental commission must play a key role by asking for bioswales and detention basins rather than standard storm drain systems. Creating a set of design guidelines that illustrate ecologically correct stormwater management details is recommended.

5.3 Forest Preservation Ordinances

A forest preservation ordinance is imperitive in Byram Township, where most of the vacant land is wooded. This ordinance would typically contain provisions for saving existing specimen trees and forests. It would include a requirement for a tree permit before existing trees can be removed. This would apply to homeowners and developers alike, with a permit required for cutting down any live tree

that exceeds a specified minimum caliper. These ordinances must be written such that they include a list of tree species of concern, and list minimum caliper sizes for shade and flowering trees. For example, an exotic/invasive tree such as a Norway Maple would not be regulated. A desirable shade tree 6" caliper or greater, or an understory tree of 3" or greater would need a tree permit before clearing.

Timber harvesting is usually exempt from this type of ordinance when a timber harvest plan is prepared by a qualified forester and submitted for approval.

Forest preservation ordinances typically spell out a minimum percentage of the land that must be retained in forest. This figure is based on land use, so that residential land uses have a higher percentage of the overall tract area required to be preserved in woodlands, and commercial and industrial uses have a lower required percentage of forest retention.

They also include provisions for reforestation plans to be prepared in cases where land is not already forested. A reforestation plan would show where new forests are proposed to bring the parcel up to the minimum percentages mentioned above. A key part of the success of this kind of legislation is maintenance specifications and construction bonds for reforestation areas and the requirement for tree protection measures during construction in the case of existing forest preservation.

5.4 Natural Resource Inventories

New ordinances should include a requirement that a site specific natural resource inventory be submitted with development approval applications. This requirement would include new minor and major subdivisions and site plans.

The natural resourse inventory shows existing natural features and in addition, describes the size, health, and type of stands of trees and individual specimen trees in detail . It would also show soils, manmade structures, roads, historic features, topography, floodplain, required stream valley buffers, wetland transition areas, etc. Based on this map, proposed developers would be required to justify removal of existing specimen trees and forests to accommodate construction.

5.5 Development Alternatives

Ordinances that promote land planning alternatives to standard development are recommended. One example of this type of ordinance is one that allows cluster development, which Byram already has.

Transfer of Development Rights (TDR) programs are a more challenging approach. The purpose of a TDR program is to transfer development rights from land where "...preservation is most appropriate to areas where growth can be better accommodated...". These rights are sold by landowners located in sending, or preservation areas, to potential developers located in receiving, or growth areas. A restrictive easement is then recorded in the legal records over the land that is to be preserved. The easement runs with the land when it is sold.

The Office of State Planning offers technical assistance to municipalities that want to develop TDR ordinances. Prior to adoption of any TDR ordinance, a municipality must have specific reports and plans approved by the Office of State Planning proving the feasibility of the proposed program. The reports must contain detailed economic and infrastructure information. More information about TDR ordinances is contained in the Municipal Land Use Law, Article 15, Transfer of Development Rights.

There are a variety of reasons why open space preservation is good for a community. According to the National Park Service Rivers and Trails Conservation Assistance Program, real property values tend to increase in areas adjacent to or near trails and greenways. Protected areas also add to the quality of life in a community, which increases the value of and demand for all properties in the community.

In most communities, residential homes demand services that require the municipality to spend more money per capita than the tax revenues generate. This results in a deficit. Maintaining public open space lands, including debt service on land purchase and administrative costs, is less expensive to the community than having new residences.

People are spending increasing amounts of money on recreation and eco-tourism. If a landowner were to develop recreational opportunities on lands that are under restrictive easement, the land is preserved while a source of revenue is generated. This may be appropriate for Wild West City.

If conservation organizations are to hold land in Byram Township as part of the greenway plan, the question of public use arises. The policy at the New Jersey Natural Lands Trust, for example, is that "...public access is permitted for passive forms of recreation such as nature observation, hiking, and public education. Public use is rarely discouraged but no facilities except trails are available. Hunting is generally permitted on Trust land except where the Board decides otherwise..."

There are many ways to conserve land. Help is available from private and state organizations. Some of these organizations are listed at the end of this chapter.

Conservation Easements

A conservation easement is a restriction on the use of property. The easement is recorded as part of the deed in the local land records. The right to enforce the restriction is given to a conservation organization or a government agency. The advantage of an easement is that ownership of the land is retained by the landowner.

Conservation easements typically restrict development of the land, including commercial or industrial uses. Typically, they do not restrict current use, recreational use, forestry, or agriculture. However, they may limit the ability to clear woods or modify streams or wetlands on the land. The type of restrictions would be spelled out specifically. In general, the easement is tailored specifically to the particular property and the needs of the owner.

In some cases it is possible to place a restrictive easement on part of the property while retaining the right for limited future development. For instance, it may be viable to retain the right to build a few additonal houses in the future. In this case, landowners should be sure that the acreage of the remaining land (not under easements) meets all development codes for minimum lot size, utility availability, and access.

Easements do provide some federal tax incentives for landowners. One tax incentive is a deduction from the federal income tax for the value of the gift. In this case, the value of the gift is equal to the reduction in the value of the land because of the conservation easement. The value of the land before the easement would be calculated based on its selling price if it were put to the most valuable eonomic use. The value of the land after the easement was placed would be lower, since certain uses would be restricted. The difference between those two figures, the before and after, is the amount of the tax deduction.

There is a limit to how much of the total tax deduction can be taken in one year. The current tax rules allow only 30% of the landowner's annual income to be deducted. The rest of the deduction can be carried forward and deducted against income for a total of five years. As with all tax rules, there are qualifications and exceptions to this deduction, such as alternative minimum tax.

Other tax incentives include reducing capital gains taxes and reducing estate taxes. If a conservation easement is placed over part or all of the land, it decreases the value of the land. Capital gains taxes are based on the difference between the value of the land when it was purchased and the value of the

land when it is sold. If the value of the land is reduced by a conservation easement, capital gains at the time of sale will be reduced.

The same situation is true if family lands are passed to an estate at the time of death. If the land value has been reduced by placement of a restrictive easement, estate taxes will be lower. Federal tax rules are complicated and a tax accountant and/or attorney should be consulted before final decisions are made.

Again, the issue of use by the public is raised. If part of the greenway is to be held by private landowners under a conservation easement, public access for trails shown on the plan must be allowed. Many landowners will raise the issue of liability, which is addressed by the Landowner's Liability Act (2A:42A-2). This act was passed by the New Jersey Legislature in 1968 and was amended in 1986.

The Landowner Liability Act makes an owner exempt from liability of injury or death when access to property by others is for the purpose of sport or recreational activity. Sport or recreational activity is defined, and includes the kind of activity a greenway trail would offer. Hiking, fishing, hunting, etc. are included in the definition of recreational activity. The law states that the immunity from liability is granted whether or not the land is posted and whether or not permission was given for access. The actual law should be obtained and read by landowners, and only applies to property in rural or semi-rural areas.

In a publication dated June, 1988 the New Jersey Conservation Foundation did an analysis of how the law has been tested in the courts since its passage. Between 1972 and 1984, a total of 14 New Jersey cases were reported. The majority of cases were water related and included swimming, skating, and fishing. Only six of the defendents were private landowners. In all cases, the liability law was strictly interpreted, meaning that a landowner must plainly fall within the guidelines of the statute to be granted immunity from liability.

Community Outreach and Education Programs

Community education and involvement is critical to the preservation of local natural resources. Citizens of Byram Township should have an understanding of how their actions directly affect the health of Lubber's Run and its flora and fauna. Community leaders should try to use the resources of the conservation organizations listed above to educate the community. Direct mailings and newspaper articles are effective tools in the education of members of the community. Special events, environmental education in the schools, and organized clean-up days are other ways to reach and educate the community.

Green Acres Purchase Program

(609) 984-0597
Contact: Lisa Lubow
The Green Acres Program acts as a real estate agent for the New Jersey Department of Environmental Protection. This program provides financial assistance to municipalities to preserve open space and develop recreation facilities. This program was created in 1961 through a bond issue for $60 million. Since that time, several bond issues have funded the program. The program provides matching grants and low interest loans (2% interest) for adding lands to state parks, forests, wildlife management areas, and county municipal open space. Green Acres Programs also fund local community park development. Byram Township has already submitted applications to the Green Acres Program for development of Riverside Park and the Township acquired Johnson Park through the Green Acres Program.

The Trust for Public Land

(201) 425-036
Contact: Julie Enger
The Trust for Public Land is a national non-profit conservation organization that acquires land and holds it to preserve open space. In order to acheive their goals, they develop new methods for community ownership of land. The Trust works with community groups, public land management agencies, and landowners.

New Jersey Natural Lands Trust

(609) 984-1339
Contact: Beverly Mazella, Real Estate
Martin Rapp, Land Manger
The New Jersey Natural Lands Trust is a state funded land preservation organization. The Trust, an independent agency within the Division of Parks and Forestry in the Department of Environmental Protection and Energy, was formed by the Legislature in 1968. The trust aquires land through donations from private landowners, developers and environmental organizations. Volunteers help maintain the land and the Trust offers workshops, materials, and speakers to assist in local land protection efforts.

The New Jersey Natural Lands Trust already owns two parcels of land within the limits of this study. They are happy to work with local land conservation organizations. They offer access for hiking trails on their land. Access is provided as long as trails do not interfere with critical habitats.

Division of Parks and Forestry

(609) 292-2733
The Division of Parks and Forestry administers the largest state owned landholdings. They have six programs, including the State Forestry Service. Of particular interest is their reforestation program, which provides extremely low cost saplings and technical assistance for replanting open space areas.

New Jersey Conservation Foundation

(908) 234-1225
The New Jersey Conservation Foundation acquires land for conservation of natural resources and open space throughout New Jersey. The Foundation transfers the land to other orgaiznations or agencies. They also promote and publicize new tecniques to preserve land and encourage appropriate land use.

The Foundation also provides environmental education and serves as an information and reference center.

Local Land Trusts

One way to preserve land is to create a local land trust. The organization would serve the same functions as the land trusts listed above, but it would be run at a local level. The benefit of local control would be the ability to react quickly, and organize clean up and maintenance efforts effectively. The downside is that the organization would require funding and would have to administer legal issues and maintenance of land holdings.

The section of Lubber's Run within the study area is a beautiful, unspoiled resource. Preserving this dynamic stream system as a greenway park will protect critical habitats and ecosystems, increase the quality of life in the community, and enhance opportunities for passive recreation. Through acquisition of land and/or conservation easements, connecting existing trails, and improving the viewsheds at gateways, the community can make this plan a reality.

In addition, using best management practices, educating the community, and working with other communities within the Musconetcong River Watershed will maintain or increase the water quality for everyone.

Some actions that should be taken by the Environmental Commission are:

- Coordinate any improvements to Route 206 near Lubber's Run with the New Jersey Department of Transportation. The project manager at NJDOT must understand the design intent in and near Lubber's Run.

- Seek funding to prepare site and landscape plans for improvements to the municipal park and complex. Look to community resources for implementation of those plans, including volunteer efforts and donated materials.

Work with landowners who wish to donate land or easements and coordinate efforts with outside conservation organizations and the Green Acres Program.

Responsibility for final action rests with members of the Environmental Commission, Planning Board, and Council. They must take legal and fiscal measures to support the establishment of new ordinances and adopt this plan as part of the Master Plan.