4. FAIRMOUNT (EAST/WEST) PARK MASTER PLAN

Fairmount Park System

Natural Lands Restoration

Master Plan

Skyline of the City of Philadelphia as seen from George's Hill.

4.A. TASKS ASSOCIATED WITH RESTORATION ACTIVITIES

4.A.1. Introduction

The project to prepare a natural lands restoration master plan for Fairmount (East/West) Park began in October 1997. Numerous site visits were conducted in Fairmount (East/West) Park with the Fairmount Park Commission (FPC) District #1 Manager and staff, community members, Natural Lands Restoration and Environmental Education Program (NLREEP) staff and Academy of Natural Sciences of Philadelphia (ANSP) staff. Informal meetings at the Park's district office were held to solicit information and opinions from district staff. Additionally, ANSP participated in the NLREEP Technical Advisory Committee (TAC) meetings in March and October 1998. These meetings were used to solicit ideas and develop contacts with other environmental scientists and land managers. A meeting was also held with ANSP, NLREEP and FPC engineering staff to discuss completed and planned projects in or affecting natural lands in Fairmount (East/West) Park. A variety of informal contacts, such as speaking at meetings of Friends groups and other clubs, and discussions during field visits provided additional input.

ANSP, NLREEP and the Philadelphia Water Department (PWD) set up a program of quarterly meetings to discuss various issues of joint interest. These meetings are valuable in obtaining information useful in planning restoration and in developing concepts for cooperative programs. As a result of these meetings, PWD staff reviewed the list of priority stream restoration sites proposed for Fairmount (East/West) Park.

4.A.2. Community Meetings

As part of the planning process, NLREEP held two community meetings and conducted a community mapping initiative to solicit citizen attitudes and information on park use and conditions. ANSP participated in these activities and used information from them in planning restoration activities.

The first meeting on the restoration of the natural lands of Fairmount (East/West) Park, held on 19 October 1999, introduced interested community members to NLREEP and the project. The goals of NLREEP were identified and the ANSP was introduced as the consulting team hired to assess the natural areas of the park and recommend areas to be restored. At this initial meeting, the existing conditions of the park were summarized, based on ANSP's year-long study of natural conditions. Slides of the fauna and flora were shown and natural areas of good quality were identified. Current environmental problems in the park were identified and explained, and the types of restoration activities which were being considered to address these were discussed. The initial list of proposed restoration activities and a draft map of restoration sites were distributed. The sites were categorized into habitat types and their function in the environment was explained to the public. After the ANSP presentation, ANSP team members met with residents in breakout sessions in order to gain information about how they use the park, to obtain feedback on proposed restoration activities and to solicit suggestions for additional sites or activities. These comments from the participants were noted and used in the final nomination process.

The final meeting with interested community members in Fairmount (East/West) Park, held on 19 January 2000, focused on the recommended high priority restoration sites. The sites proposed for restoration were summarized with pictures depicting areas to receive restoration. The team also commented on what the sites might look like after the restoration work was completed. Slides of comparable restorations were shown. ANSP took the final comments from the public and made necessary adjustments to the restoration site nomination list. At this point the list was finalized and delivered to NLREEP.

4.A.3. Community Mapping

4.A.3.1. Overview

The gateway to Fairmount (East/West) Park, in Center City Philadelphia.

In an effort to further involve community members in the restoration planning process, and to augment the technical information about the park system's natural environments prepared by the ANSP, NLREEP undertook a "community mapping" initiative in Fairmount (East/West) Park. The idea of community mapping was to actively engage residents of the neighborhoods adjacent to Fairmount (East/West) Park in helping FPC staff and the ANSP team members better understand how the park is used, both currently and historically. The purposes of the community mapping initiative were:

- To increase the effectiveness of restoration activities within the park.
- To increase the FPC staff awareness of the community's use of the park.
- To increase the community's understanding of the park's natural areas.
- To better inform decision-making about which restoration activities should occur and where.

The community mapping initiative occurred in the fall of 1999 and involved interested neighbors, led by FPC staff, in walks through sections of Fairmount (East/West) Park. Participants noted human impacts on the park by mapping key indicators of use, such as trash, graffiti and invasive vegetation. During the mapping initiative, community members also noted other positive and negative uses of Fairmount (East/West) Park. Specific results of the community mapping initiatives were provided to the ANSP to aid in the selection of potential restoration sites and activities. A general overview of the way the park is used, as determined by the mapping exercises, was shared with community members at the public meetings about natural lands restoration activities in Fairmount (East/West) Park.

4.B. Fairmount (East/West) Assessment and Restoration Planning

4.B.1. Executive Summary

Fairmount (East/West) Park encompasses 2,400 acres stretching from Center City to the mouth of Wissahickon Creek. The park covers an area of 3.8 square miles and is part of the 1,812 square mile Schuylkill River drainage area. The park area represents approximately 0.2% of the Schuylkill's drainage area. As one of the nation's oldest urban parks, it was formally begun in 1863, but can trace its roots to 1812 and the founding of the Fairmount Water Works, adjacent to the present-day Philadelphia Museum of Art. The Fairmount section supports virtually the full range of park uses, and management and planning must consider competing or complementary needs of these different activities. The park contains historical structures of exceptional importance, active and passive recreation is supported by a range of facilities, and the park is notable for its small gardens and outdoor sculpture. A number of other institutions, such as the Zoological Society of Philadelphia and the Mann Center for the Performing Arts are within or adjacent to the park. The park hosts a variety

of events, particularly on West River and Kelly drives and around the Belmont Plateau. The Horticultural Center provides a focus for environmental education in the park, as will the proposed environmental education center located near Strawberry Mansion. The Schuylkill Expressway (Interstate 76) and several railroads run through the park, and many drives and other streets within the park serve as important commuting routes.

The landscapes of the park represent overlays of several design styles. The informal "pastoral style," which is evident in much of the park, combines parts of the pre-park landscape, parts of the 1876 Centennial Exposition design, and various later modifications. Small parts of the park show more formal designs such as the West Park Concourse, which dates from the 1876 Exposition, and the Benjamin Franklin Parkway, built in the early 20th century. These informal and formal design styles have been further modified by the subsequent incorporation of the variety of buildings, roads and other facilities.

Significant natural lands are retained within this matrix of styles and land uses. Excluding the Schuylkill River and banks, these natural lands occupy about 24% of the land area of East and West parks, combined. The natural lands occur in a variety of settings. Much of the natural land is forests along ravines and Schuylkill River slopes in both East and West parks. Natural lands are also present along unmaintained edges of roads and railroad lines. Woods and meadows have grown in formerly built areas or mown areas, especially at the edges of ravines. Disturbance to soil and hydrology of sites with fill and demolished buildings is likely to affect vegetative regrowth. Some manmade sites have important natural functions and are also treated as natural lands. For example, Concourse and Centennial lakes, located in West Park, provide marsh and open water habitat for a variety of plants and animals.

There are nearly 10.8 miles of river/stream within the park boundaries, including 3.8 miles of the mainstem Schuylkill River (which was not included in the assessment) and many small 1st and 2nd order tributaries that flow directly into the river. These small streams tend to be impacted by the highly designed landscape. Unlike most of the stream valley parks (Pennypack, Wissahickon, Cobbs, Tacony, and Poquessing), which are heavily impacted by urban runoff from outside the park, the impacts on the small streams in Fairmount (East/West) Park tend to originate within the park boundaries.

The recommendations for natural land restoration to be done as part of NLREEP were based on the findings of an extensive assessment of vegetation, stream channels, and a number of groups of animals. ANSP and NLREEP staff worked with other Park staff and users to define problems, potential restoration sites and appropriate restoration techniques. Community input was sought through informal contacts, a community mapping initiative in which community members and NLREEP staff toured the park and mapped different uses and locations of disturbance, and by two public meetings. Based on these assessments, potential restoration activities at different sites were identified and prioritized with respect to expected ecological benefit, costs, likelihood of success, and other factors which affect the value of the projects.

As a result of the history and management of the park, natural lands range from relatively high quality areas – older forest fragments in ravines and small streams arising in the park – to low quality sites, such as patches of regrowth on disturbed soils and tributaries draining highly urban areas. Virtually all the natural lands are affected by the managed park areas. The size and shape of many patches results in large amounts of edge, which makes them vulnerable to invasive species and other impacts. The large amounts of mowed areas on the plateaus reduces infiltration and increases storm water runoff and erosion.

Given the mix of uses of the park and the conditions of the natural lands, major objectives for restoration of Fairmount (East/West) Park are:

- Amelioration of effects of managed park lands on natural areas. Enlarging forest patches and increasing riparian buffers around streams are key activities to do this, along with a variety of other measures, including control of invasive plants, replanting of natives, stream bank stabilization and construction of berms and water bars to reduce slope erosion.
- Integration of environmental restoration with historical interpretation within the park.
- Enhancement of important natural sites within the park to improve their ecological condition.
- Enhancement of the natural lands of the park as sites for community use and environmental education without compromising their natural value. This is particularly appropriate in the vicinity of the Horticultural Center, Concourse and Centennial lakes, and near the planned Environmental Education and Visitor Center.
- Improvement of some sites of recent regrowth in the park to reduce dominance by exotic and invasive plants and to encourage succession of native species.
- Budgetary constraints make it difficult for Park staff to keep up with management and maintenance of park lands. Therefore, high maintenance restoration projects will likely be difficult to maintain in the future. Restoration planning should encourage practices which decrease maintenance needs (e.g., reduced mowing, practices to reduce erosion) and can use volunteer efforts.

Because of the extent of the landscaped/built parts of Fairmount (East/West) Park, management practices are critical. While this plan specifies recommendations for management of sites adjacent to critical natural lands, definitions of planning, maintenance, and construction practices for the entire park is beyond the scope of the NLREEP planning. Recognition of the importance of natural lands and impacts of management and construction on these lands is essential to the long-term viability of these natural areas. Practices that will be especially important are:

- Consideration of natural lands and streams in the placement of new structures, roads, trails, etc.
- Use of best management practices in new construction and maintenance, to minimize storm water runoff, erosion and other impacts.
- Implementation of landscaping and turf management procedures to increase infiltration and reduce storm water runoff.
- Consideration of impacts of horticultural practices on natural lands, especially the potential invasion of natural areas by introduced plants.

Woods are located mainly in the ravines and slopes of Fairmount (East/West) Park. Tulip poplar/American beech woods is the most common forest type in the park. A variety of other native tree species is found in the park, especially in the larger woodlands and in riparian forests. Spicebush, arrowwood, poison ivy and grapes are the most common native shrubs and vines. Various non-native trees (tree-of-heaven, princess tree, Norway maple), shrubs (obtuse-leaved privet, multiflora rose), vines (oriental bittersweet, Japanese honeysuckle), and herbs (garlic mustard) are common as well, especially along disturbed edges and in recent regrowth. The woods support a variety of animals, but most patches are too small to sustain large populations of forest birds. Enhancement of these woods should focus on the largest patches, such as around Chamounix woods, the Recycling Center woods, George’s Hill and the Laurel Hill Ravine woods. Many of the recommended restoration activities are aimed at enhancing these woods by enlarging them, buffering them by various activities along their edges, controlling invasives, and planting native species. Deer

are not common in Fairmount (East/West) Park, and impacts of deer on existing vegetation and on restoration projects is not currently a problem. Deer monitoring should be instituted to determine whether deer populations increase to problem levels.

Protection and enhancement of significant areas is an important objective in the park. Meadow management such as the development of meadows through exotic control, reduction of frequent mowing and/or planting, combined with a periodic mowing regime or tree cutting to maintain meadows, is recommended in several areas, such as George's Hill, the nursery fields near the Recycling Center woods, and near Cliffts and Smith Playhouse. Enhancement of these sites will improve the overall quality of these areas, which contain a mix of meadows, woods and small wetlands or tributaries, and improve habitat quality for a variety of animals.

Centennial and Concourse lakes support a variety of aquatic plants and organisms, including the red-bellied turtle, a state-listed threatened species. Protection and enhancement of the lakes would promote local biodiversity. Control of invasive species (e.g., purple loosestrife and common reed), and enlargement of buffer zones around the lakes are recommended to improve these sites. The value of other habitats, such as seeps, wetlands and good quality stream channels, should be recognized and these habitats should be preserved. Additionally, some of the landscaped areas were found to provide wildlife habitat and enhancement of these is warranted. For example, the west bank of the Schuylkill River supports several species of birds which prefer riparian tree canopy habitats.

Fifteen of the seventeen small streams in Fairmount (East/West) Park originate inside the park. In addition, West Park has two manmade lakes and the Philadelphia Water Department owns a large reservoir and ponds within East Park. While several of the streams are impacted by urban runoff from outside the park, the majority of these small streams is affected by more localized impacts, including lack of riparian forest, invasive plants, road drainage, poorly designed culverts, debris dumps, and trail crossings. In addition, nearly every stream in West Park is impacted by the Schuylkill Expressway and rail lines that result in the lower portions of the streams being placed in underground culverts. While this impacts the streams, several wetlands have been created as a result of the streams backing up at the culverts and depositing sediments. In addition, several impressive waterfalls were probably obscured or covered-up by the expressway construction. Analogously, the streams in East Park are placed in culverts under Kelly Drive and routed underground to the Schuylkill River.

A stream is only as healthy as the watershed from which it flows. While many of the watersheds of streams in Fairmount (East/West) Park are mostly within the park, they show the effects of urbanization. This is due to the existence of many impervious surfaces within the park (roads, parking lots, and buildings) and the fact that mowed grass surfaces do not provide significant infiltration, thereby having a similar impact on hydrology as impervious surfaces. The flows in the streams of Fairmount (East/West) Park are flashy. The vast amount of impervious surfaces and mowed grass in the watershed restricts rainwater from following its normal path of infiltration to ground water. Groundwater is depleted, causing low base flows (perennial, dry-season flows) in most streams, while storms generate more runoff which leads to increased storm flows. These changes to stream flow have altered stream channels to the point where some streams and portions of streams in Fairmount (East/West) Park are unstable and do not provide quality aquatic habitat. Non-point source pollution (e.g., fertilizers, oil, antifreeze) presumably affects park tributaries because of runoff from roads, buildings and lawns. The two streams which flow from outside the park are affected by urban runoff, including combined-sewer overflows (CSOs) which affect water quality.

Because of the prime importance of watershed conditions in affecting the streams of the park, many of the terrestrial restoration activities will have direct benefits to the stream channels, particularly reduction in mowed areas, enlargement of woods and meadows, control of storm water

on plateaus and slopes, and gully repair. A number of restoration activities are recommended for stream channels and banks. Riparian planting is recommended for several tributaries, while more intensive restoration is recommended for some sites with severe, local problems. Trampling of slopes is a problem, especially in East Park. Improved trail use, for example, by clearing and improving poorly maintained steps, would be beneficial and should be addressed in trail planning.

Boathouse Row and the proposed viewshed into Lemon Hill.

Because of the historical importance of Fairmount (East/West) Park to the city, linkage between natural land restoration and historical interpretation is of particular importance in these parks. Several activities can address natural lands restoration goals and enhance the interpretation of the historical houses. These include developing open views between houses and the river and other houses ("viewsheds"), and meadow management in areas near houses. The viewsheds will reinforce the link between the houses and the river which guided the development of the historical landscape. Meadows more closely approximate use of outlying lands during the period of historical occupancy of the houses. These activities serve natural restoration goals of increasing unusual habitats and reducing runoff. Since establishment of viewsheds involves cutting trees on slopes, this activity is recommended only where it will not conflict with goals of enhancing significant woodlands. Lemon Hill is recommended as the initial site for viewshed work, both because of the lower amount of natural woods around it, and because of its historical importance.

Fairmount (East/West) Park is an important community resource for active and passive recreation. Development of environmental education and participation as a component of community use will enhance the parks and local communities. Most of the recommended activities provide opportunities for such participation. In particular, restoration is recommended at sites near the Horticultural Center and the planned Environmental Education and Visitor Center near Strawberry Mansion, since these sites can provide foci for education. Restoration of disturbed slopes and reforestation of the current tennis court area near Strawberry Mansion is recommended. In West Park, restorations around Concourse Lake, Centennial Lake, the Belmont and Lansdowne tributaries will improve the ecological value of these sites, enhance these areas for community use, and provide opportunities for environmental education.

Fairmount (East/West) Park combines a tremendous variety of uses and provides access to natural lands near the center of Philadelphia. The image of the woods of Fairmount (East/West) Park growing adjacent to the city center has been a defining symbol of Philadelphia as inheritor of Penn's vision of a "greene country towne." Restoration activities in this park will enhance these natural lands, which are a core part of the City of Philadelphia.

4.B.2. Introduction

Fairmount (East/West) Park encompasses 2,400 acres which begins in Center City and stretches to the mouth of the Wissahickon Creek. As one of the nation's oldest urban parks, it was formally begun in 1863, but can trace its roots to 1812 and the founding of the Fairmount Water Works, adjacent to the present-day Philadelphia Museum of Art. The rise of the city as a national

Fairmount Water Works.

industrial center, coupled with the large and rapid influx of people and the consequent rise in material wealth created the need for increased public space to accommodate the increase in leisure time. The birth of the city park answering the needs of a diverse population is best exemplified by the creation of Central Park in New York City. However, the development of parks and public open spaces began in the early part of the 19th century by early proponents such as Andrew Jackson Downing, and the writers of that era who lamented the loss of wilderness in the wake of progress.

In the early 19th century, the threat to urban water supplies by burial grounds gave rise to the rural cemetery. These landscape gardens became vastly popular (The Horticulturalist, July 1849) and advocates of city parks began to point to their popularity as evidence of the need to provide public open space in the city. Concurrently, the city was also experiencing the ravages of an expanding industrial economy and its concomitant pollution. The pollution became so threatening to the city fathers that they began to explore ways of protecting drinking water while also providing much sought-after open space for recreation. Hence, the formation of the Fairmount Park system began with state law and grew into the present system, today comprising approximately 9,000 acres.

The landscape of Fairmount (East/West) Park, however, has a much older history, stretching back to the Lenape Indians who inhabited parts of the banks of the Schuylkill River. Although it is easy to think of the founding of Pennsylvania by William Penn as the beginning of the European chapter of the region's history, the region was affected by earlier exploration and settlement by the English, Swedes and Dutch. The first recorded voyage into the present-day Delaware Bay was under the direction Henry Hudson, who sailed the Half Moon into the Bay in 1609 (Johnson 1914). The Dutch were also interested in the Delaware and by 1623 had established Fort Nassau on the site of present-day Camden (Johnson 1914), which probably marked the beginning of the early trading with the Lenape. Soon after, the Swedes became interested in trading possibilities on the Delaware and, over a 17-year period, 12 expeditions were undertaken under the government of Johan Printz, Royal Governor of New Sweden. The Swedish colony was focused on trade. However, by 1644 a correspondence by Printz to Sweden reported "we have no beaver trade with the Indians, but only maize trade." By 1650, a water mill for wheat was in place on Cobbs Creek and the shift in emphasis from trade to agriculture seems to have begun. The lower part of the Schuylkill River from the falls to the mouth was subdivided by Swedish law, under the right of conquest. An early map of the area shows Swedish settlement dividing the lands into four "townships:" Moyamensing, Passyunk, Kingsessing, and Wicaco. For the most part the land had been taken from the Lenape Indians and settlement had begun (Fig. 4.B.1).

What was the "primeval forest" of William Penn? We can get glimpses of this forest from his journal. However, it must be remembered the native Americans also controlled and changed the landscape to meet their needs. The Lenape were primarily farmers who supplemented their diets with hunting, gathering, fishing and periodic trips to the sea. The Lenape lived in woodlands communities, that is, villages of up to 40 individuals were within clearings in the woods, often developed by girdling trees to provide openings in the canopy. The Lenapes manipulated the understory of the forest using fire to promote the herbaceous layer of the forest floor, therein favoring large game animals such as whitetail deer. The forest, encountered by the Dutch and Swedes, and later William Penn and the English, was unlike anything in their European experience,

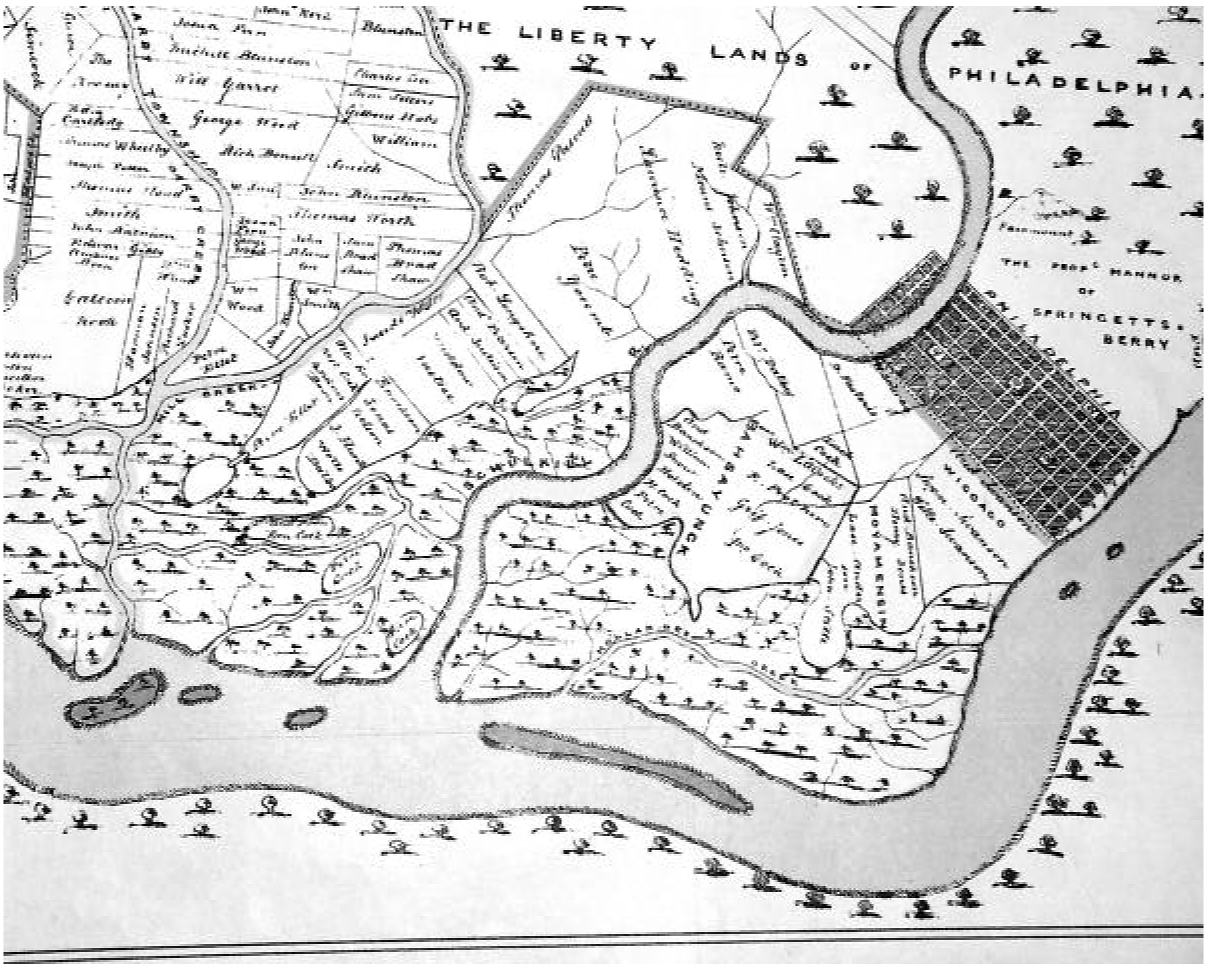

Figure 4.B.1. A map of the improved parts of the Province of Pennsylvania, 1681 by Thomas Holme. Please note Fairmount at the top right of the map.

for their lands had long before been cut for agriculture, and those forested lands which remained were often protected by royal decree.

The vast forested land, with ample game to hunt for food astonished the early immigrants. Soon the stories of milk and honey began to circulate back to Europe and more people began to arrive and cut more forest. In 1681, the plan for Philadelphia was laid upon the early settlements of the Dutch and Swedes and inevitably upon the Lenape who "sold" their right to live upon their land to both the Swedes and English.

Penn writes descriptions of the forest, often contrasting it to what he knew in England.

> The country itself, its soil, air, water, seasons, and produce, both natural and artificial, are not to be despised. The land containeth divers sorts of earth, as land, yellow and black, poor and rich; also grave, both loamy and dusty: and in some places a fast, fat earth, like that of our best values in England, especially inland brooks and rivers:.....Wildman (1944, p.11).
>
> The waters are generally good: for the rivers and brooks have mostly gravel and stony bottoms, and in numbers hardly credible. We have also mineral waters, which operate in the same manner with those of Barnet and North Hall, not two miles from Philadelphia. Wildman (1944, p.12).
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> The natural produce of the country, of vegetables, is trees, fruits, plants, flowers. The trees of most note are the black walnut, cedar, cypress, chestnut, poplar, gum-wood, hickory, sassafras, ash, beech, and oak of divers sort, as red, white, and black, Spanish, chestnut, and swamp, the most durable of all; of all which there is plenty for the use of man.
>
> The fruits I find in the woods are the white and black mulberry, chestnut, walnut, plums, strawberries, cranberries, hurtle berries, and grapes of divers sorts. The great red grape, now ripe, called by ignorance the fox-grape, because of the relish it hath with unskillful palates...
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> Of living creature, fish, fowl, and the beats of the wood, here are divers sorts, some for food and profit, and some for profit only: for food as well as profit, the elk, as big as a small ox; deer, bigger than ours; beaver, raccoon, rabbits, squirrels; and some eat young bear and commend it. Of fowl of the land there is turkey (forty and fifty pounds weight) which is very great, pheasants, heath-birds, pigeons, and partridges in abundance. Of the water, the swan, goose, (white and gray) brands [brants], ducks, teal, also the snipe and curloe, and that is great numbers; but the duck and teal excel, nor so good have I ever eaten in other countries. Of fish there is the sturgeon, herring, rock, shad, cat'shead, sheep's head, eel, smelt, perch, roach; and inland rivers trout, some say salmon above the falls.

Is it any wonder people where lured to this new land with such promises of plenty? Penn continues:

> As to outward things, we are satisfied, the land good, the air clear and sweet, the springs plentiful, and provision good and easy to come at; an innumerable quality of wild fowl and fish. O, how sweet is the quiet of these parts, freed from the anxious and troublesome solicitations, hurries, and perplexities of woeful Europe!

So with Penn and his "Holy Experiment" began the great migration of diverse people to the Delaware Valley. They came because of the availability of affordable land, relative plenty of available food already being produced and the laws which supported a form of ethnic diversity unknown to most areas in the colonies (William Penn's report to the Free Society of Traders, August 1683).

By 1681, the rise of English power along the Delaware, and for that matter, the eastern seaboard of the present United States, was well along. Settlement for agriculture had become firmly in place for the Boston Bay area and Tidewater South (Stilgoe 1988). The vast and relatively quick

transformation of the native forests into an intricate system of villages and roads all connecting to Philadelphia would begin in earnest with William Penn's Holy Experiment. Settlement of the area was influenced by the experiences of a generation of New World settlers of multiple ethnicity. Crops were being planted and supplies were readily available. What began in the 17th century as self-sufficient farming became a fast-growing industrial city responding to the vast numbers of people coming from Europe (Fig. 4.B.2). As people entered the city, a greater demand was placed on the nearby resources. As forests were cut for the plantation fields, there was a ready market in nearby Philadelphia for the wood. John Bartram perhaps summarized the rapidity with which the forest was cleared in his correspondence to Peter Collinson (1741, ANSP Archives):

> Indeed most of our curious native plants, shrubs and trees is destroyed for 80, 90, 100 miles back this year. I went up Schuylkill toward ye mountain to gather ye shugar maple seeds where grew a fine grove of them whose fallen tops lay so thick upon ye ground that I took another course 30 miles to gather some particular forest seeds I gathered there but the trees was cut down and ye land cleared and clouthed with green corn.

Strawberry Mansion.

As the city grew, environmental problems associated with rapid growth began to threaten the population. Beginning in the 1750s, Philadelphia's elite began to build houses along the banks of the Schuylkill River to escape the extremes of the city, primarily in the summer. Country villas continued to be built for over 60 years with an increasing number of inhabitants using them as year-round residences (HABS-PS-6183). By 1821, many factors, including stagnant water caused by the construction of the Fairmount Dam (1821-1822) increased pollution on the river and began to contribute to the decline in popularity of the villas.

A major industrial development began in 1812 when the city purchased land along the Schuylkill "Faire Mount" to build a new water works replacing the inadequate system on Center Square (Rivinus 1967). A large basin was carved out of the mount and pumps began to fill the new reservoir which, by gravity, would provide the growing city with a reliable water supply. As the city grew, its edge became ever closer to the Fairmount Water Works making this area accessible to the growing population of residents who were beginning to have more and more time available for leisure activities.

In 1821-1822, a dam was built on the Schuylkill River and the energy from water-driven turbines was used to fill the reservoir. A canal system, begun in 1822, improved the river's navigability. Canal segments, including 32 dams and 103 locks, accommodated the drop in elevation from Port Carbon to Philadelphia. The canal was located along the west bank of the river, in the area now occupied by West River Drive. Soon the railroad followed, paralleling the canal along the river's flat stream sides. Together the canal and railroad carried farm produce, timber, manufactured goods, passengers, and coal to fuel the region's rapid growth (Fig. 4.B.3) (McConnell 1979).

As the city grew and demand for water increased, industrial and commercial pursuits were in direct conflict with providing clean water. During this time, Lemon Hill estate became available and the city purchased the property in 1844 (Rivinus 1967), more for protecting the water supply than for providing increased area for pleasure. However, Lemon Hill was an informal public space and very much appreciated by the rising middle class who had increased leisure time. On September 20, 1855, an ordinance was passed by city council officially creating a public park. The ordinance read "devoted and dedicated to public use, as a park, the Lemon Hill estate to be known as Fairmount Park" (McCormick 1971). Additional properties were purchased by the City or given to it (e.g., Sedgely in 1856, George's Hill in 1868). In 1867 the political impetus was present to successfully pass into law the creation of the Fairmount Park Commission.

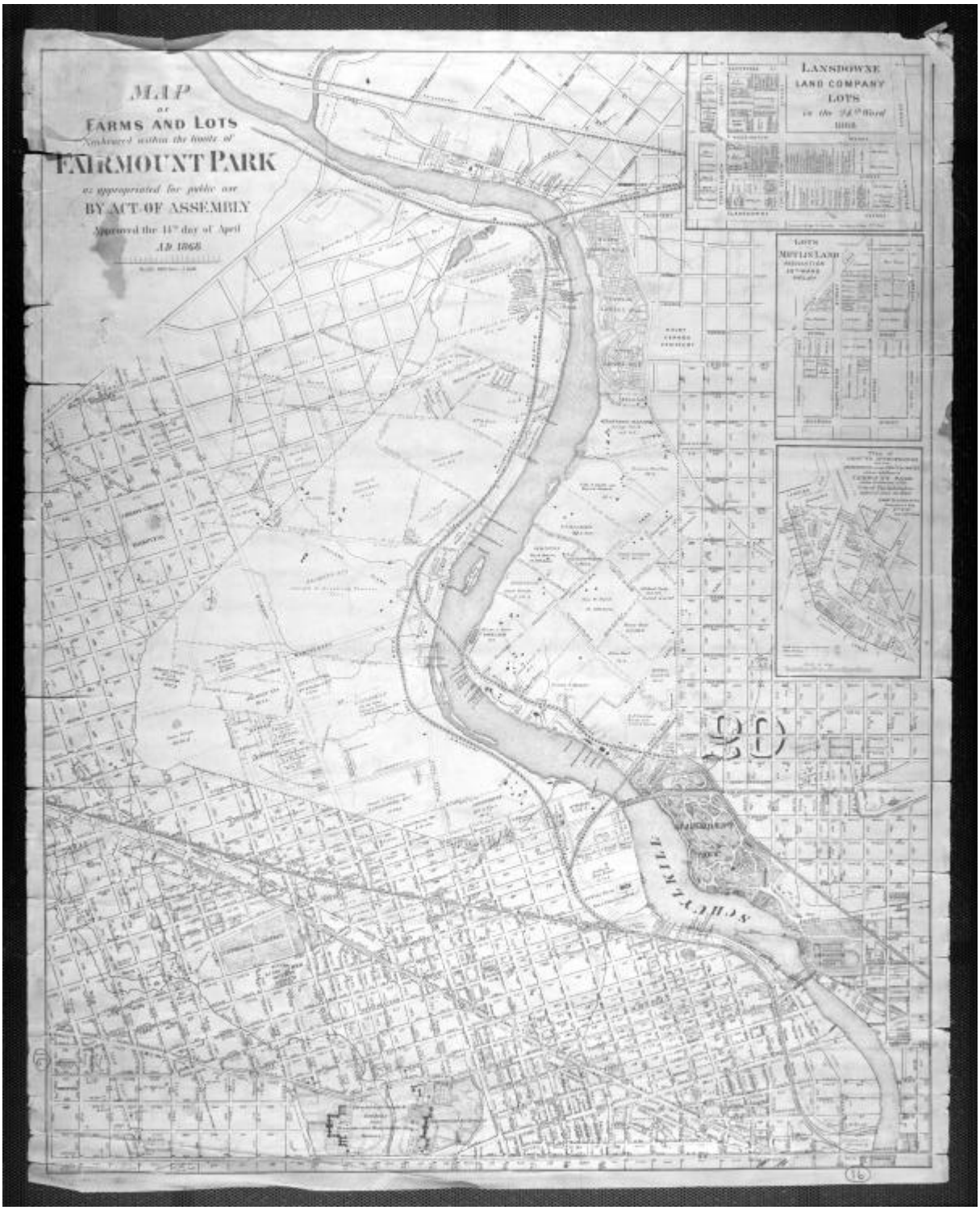

Figure 4.B.2. 1868 map showing the farms and lots within the newly approved expansion of Fairmount Park surrounded by the neighborhoods of a rapidly growing City of Philadelphia.

Figure 4.B.3. 1893 William N. Jennings photograph (Miller et al. 1983) of Water Works dam, covered bridge, railroads, water tower and canal and locks. Beginning in 1819 the river began to change drastically. By 1833 the river was fully developed and a major hub of industry.

In the following decade the Commission earnestly began to acquire land on the west bank of the Schuylkill River so that by the nation's centennial, the Commission could boast 2,000 acres of land dedicated to enjoyment by the public. The Centennial Exposition was the next major change in the landscape: 900 acres were dedicated to the celebration of the 100th birthday of the country (Klein 1967; Fig. 4.B.4). A vast number of buildings were erected and roads, trolleys and railroads were also constructed to accommodate the Centennial Exposition (McCormick 1971). This further changed the landscape—trees needed to be removed, streams were rerouted and piped so that when President Grant came for opening exercises a huge complex attesting to American industry and agriculture was present. One-fourth of the population of the country came to the Exposition, attesting to the industrial might of the new country. During this time, it became apparent that Philadelphia needed to be ever-vigilant in protecting its water supply for present and future generations.

When the Exposition closed and the majority of the buildings were dismantled, the Park Commissioners were left with a large barren open area to be managed. According to a Commissioners' report of 1899, on 23 June 1887, in the dedication ceremonies for the John Welsh Memorial, on the site of the Centennial Main Hall, George H. Boker, President of the Park Commission, said: " The buildings which once blazed with the sights and rang with the music of the Centennial celebration became desolate, and one by one they were removed from the land, leaving behind them an arid desert of packed and unproductive earth" (McCormick 1971).

Many changes to the park continued though the turn of the century. World class art was sited in the park, sports fields began to occupy the flat open plateaus, ever decreasing the amounts of natural lands, and in the middle of the last century, the Schuylkill Expressway was established through the park. The automobile had always had an effect on the park; however, construction of the expressway had an immediate and long-term negative impact on the environmental health of Fairmount (East/West) Park.

From the early years, the forests of what is now Fairmount Park had been cut for fuel, and for timber to supply the nearby city. Large tracts of forest had been cut prior to the Centennial. Jesse George, owner of the land around George's Hill, stated, "When the old Permanent bridge was built, we furnished a great part of the lumber from the forest which covered the whole slope between here and the river." However not all the forests were clear cut, and trees of substantial size survived in the natural areas in the park (McCormick 1971). "In East and West Parks, an area of 2,400 acres, there are 34,000 trees ranging from 18 to 21 feet in circumference, 70,000 trees less than 18 feet in circumference, and 200,000 shrubs and vines. The Sweet Briar Vale, Lansdowne Valley, Belmont Valley and Belmont Glen are totally natural" (Keyser 1872, cited in McCormick 1971).

Also adding to the disturbance of the landscape were several water works (pumping stations, reservoirs, and water intakes) including Belmont, Spring Garden and George's Hill. Together with walks, roads, and buildings, the landscape after the Centennial was one highly disturbed by development. Today, some of the original forests remains. However, they are mostly regrowth with few trees over 100 years old. The slopes in East Park are thinly forested on fragile soils on cliff slopes which were mined in the 18th century (Halprin 1999). They remain, however fragile, the majority of native vegetation present in the park. George's Hill and Chamounix forest are two additional forested areas of natural lands.

Chamounix forest and the adjoining forest near the Recycling Center form a dense forest mass. Together with the open lawns and sports fields, there are large expanses of natural areas which form a good third growth forest. George's Hill, another remnant of Penn's woods, circles the Mann Center for the Performing Arts. When viewing the city center from high on the plateau, these two forests are the only visible remnants of the vast forest which covered Pennsylvania in William Penn's time.

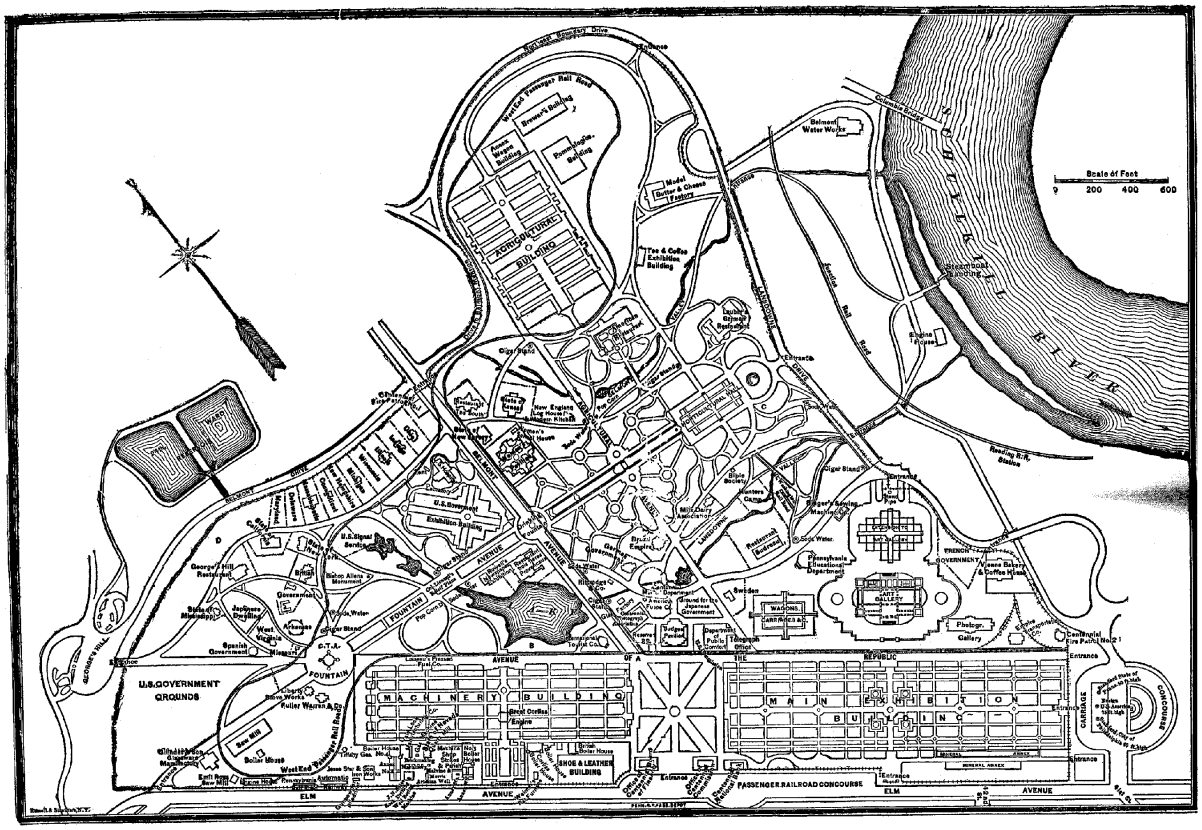

Figure 4.B.4. Map of the grounds of the Centennial Exposition in Fairmount Park, from the original published in the Philadelphia Inquirer, May 10, 1876. Elm Avenue is now South Concourse Drive. Note the George's Hill Reservoir in the northwest part of the area and Centennial Lake near the center of the map.

4.B.3. Existing Conditions Inventory and Assessment

4.B.3.1. Introduction

Existing and new information collected as part of the 1998 inventory are discussed in Chapter 4 of Volume I. The comparison of information among parks provides strong evidence for pervasive disturbance throughout the Fairmount Park system, as well as individual differences among parks. In this section, more site-specific information on conditions in Fairmount (East/West) Park are presented. This section focuses on condition and disturbance of vegetation in the park, faunal occurrence, and condition of stream channels as determined by the 1998 stream field walk. This information formed the basis for selecting sites and specifying restoration activities to be done at these sites.

4.B.3.2. Vegetation and Flora

Fairmount (East/West) Park was surveyed as part of the 1998 assessment by the Academy of Natural Sciences of Philadelphia, and the results of that assessment, as well as suggested restoration activities for the natural lands based on existing conditions and land use history, are provided in the following text. These supplement the vegetation classification maps (Section 4.F.3) and list of plant species recorded in the park (Appendix A-1.1). Sites visited in Fairmount (East/West) Park represent a variety of habitat types which include forests, non-forested areas such as meadows and edges, slopes, wetlands, lakes, and riparian zones.

This park contains approximately 2,400 acres, with 24% of the area classed as natural lands, while 59% is landscaped (mowed lawn, recreational fields, buildings, etc.), and the remaining 17% consists of the Schuylkill River and small ponds. The historical significance of this park is great, as it includes the Fairmount Water Works, a number of significant 18th and 19th century houses, and 900 acres which were landscaped for the 1876 Centennial Exposition. The designed landscape is still prevalent in this park both in the form of gardens and recreational areas, such as ball fields and picnic areas. The park contains a number of roads and highways which have fragmented its natural areas. The number and extent of buildings, fields and roads leads to a large amount of disturbed land and edge relative to the natural areas. The forests in the park are small, discontinuous areas which often support non-native aggressive plant species. Deer do not present a problem in this park, as they do in Wissahickon and Pennypack, although small numbers have been seen in the park in recent years. However, Fairmount (East/West) Park has its own set of disturbances including highways, Canada geese, active recreation and general misuse. Soil disturbance from earlier buildings, excavation, agriculture and fill no doubt affects current vegetation, although this is difficult to assess. However, high quality habitats do exist in this park, which is located so close to Center City Philadelphia.

East Park (the park east of the Schuylkill) is home to the East Park Reservoir (which is controlled and maintained by the Philadelphia Water Department), Kelly Drive and many of the 20 historic mansions and park houses which play an integral role in the history of this City. Much of East Park consists of disturbed steep slopes, which overlook the Schuylkill River and Kelly Drive, and ball fields, picnic areas and playgrounds, which occupy much of the plateaus at the top of the slopes. The slopes are often overgrown with exotic plant species, have extensive bare areas from erosion and trampling, as well as litter and trash dumping.

West Park includes the site of the Centennial Exposition of 1876, including the two remaining buildings, Ohio House and Memorial Hall. The numerous buildings in West Park, including the Mann Center for the Performing Arts, the Horticultural Center, the Zoological Society of Philadelphia, and park houses, have all restricted the amount of natural lands, impacted the health of the forest and increased the level of human disturbance in the park.

A wooded slope in East Park.

Woods are located mainly in the ravines and slopes of Fairmount (East/West) Park. Because of the clearing for the Centennial Exposition, the larger wooded areas in West Park lie outside, mostly north, of the Centennial site. The assessment revealed that the most commonly occurring vegetative community type within the wooded areas of the park was a tulip poplar (*Liriodendron tulipifera*)/American beech (*Fagus grandifolia*) association, with a shrub layer of spicebush (*Lindera benzoin*) and viburnum species (*Viburnum* spp.). Non-natives such as obtuse-leaved privet (*Ligustrum obtusifolium*) and multiflora rose (*Rosa multiflora*) were also found in these areas. Herbaceous species associated with this community type included spotted jewelweed (*Impatiens capensis*), may-apple (*Podophyllum peltatum*) and the non-native garlic mustard (*Alliaria petiolata*). Poison ivy (*Toxicodendron radicans*) was the most common vine found in the wooded areas of the park, but the non-native oriental bittersweet (*Celastrus orbiculatus*) and Japanese honeysuckle (*Lonicera japonica*) were also found invading the woods at many sites. Many of the recommended restoration activities are aimed at enhancing these woods by enlarging them, buffering them by various activities along their edges, controlling invasives, and planting native species.

The area located between Ormiston Mansion and Kelly Drive, in East Park, is one of the most undisturbed patches of woods. The edges of the woods are inundated with exotics such as Japanese honeysuckle (*Lonicera japonica*), oriental bittersweet (*Celastrus orbiculatus*), and Japanese knotweed (*Polygonum cuspidatum*). However, the interior of the woods is healthy and if the edge is managed to control exotics, the interior will remain diverse. Species found here include a canopy of mixed oak (*Quercus* spp.), hickory (*Carya* spp.), American beech, and red and sugar maples (*Acer rubrum* and *A. saccharum*). Understory species found in these woods are spicebush, pawpaw (*Asimina triloba*), Viburnum species (*Viburnum* spp.) and devil's walking stick (*Aralia* sp.). Native herbs, such as may-apple, yellow trout-lily (*Erythronium americanum*) and sensitive-fern (*Onoclea sensibilis*) are common in this area, as were the non-natives garlic mustard and saplings of Norway maple (*Acer platanoides*). Virginia creeper (*Parthenocissus quinquefolia*), an aggressive, native vine, was also found in the woods.

West Park has many more acres of natural land than East Park, and contains four large tracts of forest, George's Hill woods, south of Wynnefield Avenue, Chamounix woods located north and west of the stables, the Recycling Center woods located south of Chamounix Drive and north of the Schuylkill Expressway, and Roberts Hollow, located north of Falls Road.

George's Hill woods, is the most disturbed of the large wooded areas. There was a reservoir located at the top of the hill, and much of the existing woods occur on formerly cleared or disturbed land. Yard waste, trash dumping, erosion issues and graffiti have impacted this area and made it a target for invasion by non-native aggressive species such as multiflora rose, English ivy (*Hedera helix*), and Japanese honeysuckle. Native vines including Virginia creeper and poison ivy are invading the woods. The dominant canopy species are exotic and include tree-of-heaven (*Ailanthus altissima*), princess tree (*Paulownia tomentosa)* and Norway maple.

The forest north and west of the Chamounix stables stands out as being one of the healthiest stands of woods in West Park. The canopy is comprised primarily of mixed oak species (*Quercus* spp.), American beech, tulip poplar, and hickory species. The understory is dense in this area, due to

a lack of a deer population, and is represented by various native shrub species such as azalea (*Rhododendron periclymenoides*), flowering dogwood *(Cornus florida*), viburnum and spicebush. No dense vine growth was found during the assessment of Chamounix woods, and the herbaceous layer was dense. There is a small patch of multiflora rose that should be removed before it has the opportunity to invade this healthy woods.

The Recycling Center woods are not as disturbed as George's Hill, but do not have the diversity of the Chamounix woods. The canopy is represented by a tulip poplar, American beech and Norway maple association. Patches of umbrella magnolia (*Magnolia tripetala*) occur in these woods. The understory is a mixture of natives such as jewelweed, viburnum species and spicebush, and exotics including Japanese knotweed, lesser celandine (*Ranunculus ficaria*) and sycamore maple (*Acer pseudoplatanus*). Yard waste and trash originating from the Recycling Center are prevalent in this area and the exotic species are taking advantage of the canopy gaps.

Robert's Hollow is across Falls Road from Chamounix woods and contains many of the same species, such as mixed oaks and hickories. Early successional native trees, such as ash, black cherry (*Prunus serotina*) and box elder (*Acer negundo*) were also found throughout Roberts Hollow. The shrub layer is dominated by spicebush and devil's-walking-stick (*Aralia spinosa* and *A. chinensis*), and several small patches of viburnum also exist in these woods. Invasion of these woods by non-natives is apparent, as Norway maple and tree-of-heaven saplings were found in abundance in the understory. The canopy has many large gaps and the exotic vine Japanese honeysuckle and the native poison ivy are taking advantage of the available light caused by these gaps. The herb layer is dominated by a mixture of garlic mustard and spotted jewelweed (*Impatiens capensis*). Removing the exotic species from the woods to protect the stands of high quality forest is recommended. Planting large trees will also aid in closing the canopy gaps which are admitting light to which aggressive vine species respond.

For the purpose of this assessment, non-forested uplands includes meadow and edge habitats. Meadows are important breeding sites for birds and insects and can be improved greatly by infrequent maintenance. A high quality meadow, including small areas of meadow wetland, was found in East Park, located north of the railroad tracks and south of Reservoir Drive. The vegetation was a mixture of native herbaceous species such as goldenrods (*Solidago* spp.) and Indian hemp (*Apocynum cannabinum*) and exotics herbs such as Canada thistle (*Cirsium arvense*). A small patch of common reed (*Phragmites australis*) was also found in this meadow. Box elder saplings were abundant as was the exotic vine Japanese honeysuckle. Several different species of butterflies were found in this meadow on the day the assessment was performed. Promoting vegetation to attract insects, such as milkweed and butterfly weed, would increase the overall biodiversity of this rare habitat type. Control of trees and exotics is recommended to maintain this area as meadow and enhance native biodiversity. A meadow has also developed around the old George's Hill Reservoir. This area is surrounded by highly disturbed woods and edges, and several restoration activities are recommended to maintain the meadow and enhance the surrounding area.

Edges of woods are highly disturbed and the predominant species found in edge habitats include Japanese honeysuckle, poison ivy, oriental bittersweet, grape species (*Vitis* spp.) multiflora rose, wineberry (*Rubus phoenicolasius*) and tree-of-heaven. The edges, which are often located next to roads and open spaces, are also heavily impacted by trash dumping or accumulation. Mile-a-minute (*Polygonum perfoliatum*) occurs in edge habitats in West Park (e.g., near Chamounix Mansion). The prevalence of exotics in these edge habitats reduces their value to wildlife and impacts the interior of adjacent woods. Recommended restoration activities in these sites include control of exotic species, planting to develop herbaceous, shrubs, or wooded buffer zones on the edges, and development of hedgerows (e.g., by conifers) to shade forest interiors.

Slopes, such as those in East Park, are vegetated by exotic vine and tree species such as Japanese honeysuckle, oriental bittersweet, multiflora rose, and native vines including poison ivy. The exotic tree-of-heaven occurs commonly on disturbed slopes, as does paper mulberry (*Broussonetia papyrifera*). Many slopes are badly eroded in Fairmount (East/West) Park. This is caused in part by the maintenance of the land at the top of the slope. The manicured lawn does not effectively slow down water from rainfall and the slopes become eroded from the runoff. This situation is further exacerbated by the lack of native vegetation on the slopes and opens up areas for exotic plant species, which are able to survive in degraded habitats. The soils on these slopes are thin due to disturbance, and much of the vegetation on the slopes is indicative of poor habitat quality with invasive vines and trees comprising much of the flora. However, since these slopes were not recently cut, there are areas which contain mixed oaks, hickories and American beech, such as the site between Ormiston Mansion and Kelly Drive. Recommended activities for slopes include enhancements of the tops of slopes (wooded or meadow strips, berms, etc.) to decrease runoff, gully repair, control of exotics and some replanting of native species.

Wet habitats in this park are categorized as marshes or lakes. Cattail (*Typha latifolia*), common reed marshes, and skunk cabbage (*Symplocarpus foetidus*) are the most common wet habitat types. Wetlands dominated by sedges and grasses are rare in this park. A small wetland, located between Belmont Drive and Belmont Avenue in West Park, is an example of a high quality wetland habitat. This is a small wetland located on a small, relatively undisturbed tributary. Skunk cabbage, blue vervain (*Verbena hastata*), asters (*Aster* spp.), jewelweed and sensitive fern (*Onoclea sensibilis*) dominate the herbaceous layer. The native silver maple (*Acer saccharinum*), along with weeping willow (*Salix babylonica*) and bald cypress (*Taxodium distichum*), which were presumably planted, make up the canopy trees of this wetland.

Several manmade waterbodies, Centennial Lake and Concourse Lake, are located west of Belmont Avenue in West Park. These lakes are heavily impacted by such disturbances as Canada geese, trash dumping, exotic vegetation, and mowing of the adjacent land. Species commonly found in and around the lakes include common reed, cattail, purple loosestrife (*Lythrum salicaria*) and sweet-scented water lily (*Nymphaea odorata*). Fanwort (*Cabomba caroliniana*), an uncommon introduced aquatic plant, was found to be abundant in the ponds, along with coontail (*Ceratophyllum demersum*).

Riparian zones are found along the small tributaries to the Schuylkill River and are often mowed to the edge of the stream bank. However, several small floodplains were found in West Park which appeared to be relatively undisturbed. An example of such a floodplain is located between Belmont Drive and Belmont Avenue. Tree species such as sassafras (*Sassafras albidum*), tulip poplar, mixed oaks and black walnut (*Juglans nigra*) are abundant along the small tributary in this section of West Park. However Japanese honeysuckle is beginning to take advantage of a small canopy gap and will soon dominate the herbaceous layer if not controlled. High quality floodplains must be protected from invasion by exotic vines and herb species, which appear to be the biggest threat to diversity in these habitats. Typical floodplain species include Japanese knotweed, garlic mustard, lesser celandine, spotted jewelweed, stinging nettle (*Urtica dioica*), silver maple, box elder, sycamore (*Platanus occidentalis*), and red maple. Revegetation of mowed riparian zones and control of exotics is recommended in these areas to improve stream channels and to enhance native biodiversity.

4.B.3.3. **Community Mapping Results**

The community mapping initiative in Fairmount (East/West) Park focused largely on how people use, or disabuse, this unique urban park. Participants noted many positive features of Fairmount (East/West) Park, including the beautiful views to and from the Schuylkill River, the

colonial era mansions, the remaining structures from the Centennial Exposition, and the large amount of public sculpture. Also positively noted is the presence of the Mann Center for the Performing Arts, Robin Hood Dell, Horticulture Center, Smith Memorial Playground and the site of the future Fairmount Environmental Education and Visitor Center. The community mapping also noted the mature forests, meadows, wetlands and streams as positive indicators of natural ecosystems in an urban park.

One of the negative features mapped is the presence of trash throughout the park, although it was noted that trash blows into the park at certain locations and that special events held in the park can result in excessive trash. It was also noted that more dump sites occur in West Park and that the dumping which occurs at these sites often appears to be contractor waste. Participants voiced concern that some of the material dumped at the sites may include hazardous waste, which would be detrimental to the natural environment. Participants commented on the location and condition of 'rogue,' or unofficial, trails, noting that some are used to access bus stops adjacent to the park's boundary. Some individuals felt that clearing overgrown trails would increase the user's sense of safety.

Participants noted that a large amount of illegal parking occurs on the grass in both East and West parks. Some of this parking is associated with large special events, however, a considerable amount occurs when individuals park on the grass while using the park. Individuals noted that many people may not be aware that it is illegal to park on the grass and that activities such as car washing and oil changing can adversely affect the environment. Party sites were found scattered throughout East and West parks, generally in areas that do not attract legitimate park users. Participants also noted with concern locations of illegal activity such as prostitution.

It was positively noted that there is a minimum amount of graffiti throughout Fairmount (East/West) Park, and that which is present occurs mainly on structures and bridges. Participants were also pleased to note that East and West parks lack evidence of damage by fire or all-terrain vehicles (ATVs). The absence of abandoned cars in the parks was also identified, along with an acknowledgment that the 92nd Police District is prompt in removing them when they do appear.

In summary, the community mapping initiative undertaken in Fairmount (East/West) Park provided valuable information about park uses that aided in the selection of natural lands restoration sites.

4.B.3.4. **Fauna**

The following sections provide specific information on the fauna of Fairmount (East/West) Park, as indicated by the ANSP 1998 inventory and other sources of information. This information is important in determining links between disturbance, vegetation, and fauna, which are used to select restoration sites and activities. The information also indicates significant sites which need to be protected because of faunal occurrence.

Birds. Fairmount (East/West) Park was surveyed for birds on 13, 15, 16 and 19 June 1998. One of the largest segments of the Fairmount Park system, Fairmount (East/West) Park harbors extensive bird life and, more importantly, has the potential to be an even more significant bird sanctuary if bird-friendly management techniques are adopted.

Surprisingly little historical information was found in a review of the birds found in Fairmount (East/West) Park. While many area birders are familiar with small sections of the park, no historical documents exist on the birds of East and West parks. Additionally, none of the people consulted for information on the birds of Philadelphia (e.g., Ed Fingerhood) had sufficient long-term experience to interpret trends or identify particularly rich areas. Certainly, reforestation since the Centennial Exposition has benefitted forest song birds.

The Fairmount (East/ West) Park section was used by a total of 59 species (49 probable breeders), some of which were uncommon in the rest of the park system. A total of 174 individuals of the indicator species was observed during the survey (see Appendix A-2.2 in Volume III). Non-breeding species encountered included Double-crested Cormorants, Laughing Gulls, Herring Gulls, a White-throated Sparrow (19 June - below Belmont Plateau), a Prothonotary Warbler (13 June - below Belmont Plateau), and a Winter Wren (15 June - West River Drive).

East Park is relatively small, highly modified for recreational purposes, contains many of the park's mansions, and is characterized by highly fragmented habitats. Additionally, this section contains the Philadelphia Water Department's East Park Reservoir. Bird life along the Schuylkill River is almost entirely absent due to the extensive mowed areas and lack of shrub habitat. The one exception is Canada Goose, which is found in abundance year-round. Habitats found in East Park include small woodlands along the ridge, mowed picnic areas, recreation areas, and some edge habitat between all of these areas. The most notable natural area in East Park is the field located west of the Amtrak rail corridor, near the Cliffts ruins. This area has probably not been mowed for at least five years and is in an early stage of succession. Birds found here included Great-horned Owl, House and Carolina Wren, Willow Flycatcher, Common Yellowthroat, Yellow Warbler, Orchard and Baltimore Orioles. Less than two miles from the Philadelphia Museum of Art, this is a remarkably diverse habitat and a good example of what many parklands could revert to if returned to a less-frequent mowing cycle.

West Park is considerably larger than East Park, retains many landscape characteristics of the Centennial Exposition, and is highly fragmented. But it also holds the most potential as a wildlife refuge. Although some areas have reverted to forest since the Centennial Exposition, severe fragmentation has resulted in vine- and exotic-dominated woodlands. Deer are apparently rare or absent from the entire area, and some sections support diverse understory vegetation. However, the size of woodlots probably limits the diversity of forest birds. Landscaped areas predominate, and the proliferation of mowed areas prevents native habitat - whether forest or field - from returning. Consequently, the area is far less valuable to wild birds than it could be given its tremendous size. One of the most surprising aspects of the census was the abundance of riparian-zone specialist birds that use the strip of vegetation between the Schuylkill River and the West River Drive bike path. No other area in the park system harbored such a high density of Warbling Vireos, Orchard Orioles, and Yellow Warblers.

The forests between Belmont Plateau and Sweetbriar Mansion, uphill from I-76 (Chamounix and Recycling Center woods), is a relatively large section of forest. Some of the species encountered here were Wood Thrush, Blue-gray Gnatcatcher, Red-eyed Vireo, and Scarlet Tanager.

Mollusks. There is a good historical record of land snails in Fairmount (East/West) Park (see Volume I). More species (16 native species) were recorded in these parks than in any other park area except the Wissahickon. Based on the 1998 survey and comparison with historical records, the Fairmount (East/West) Park section has experienced a great decline in native species of land snails and an increase in introduced species. The 1998 inventory found only two or three native species, including one species not previously reported. Two introduced species had been recorded in the park, one (*Subulina octona*) only in a greenhouse at the Horticultural Center. Five introduced species not formerly recorded were found in the 1998 survey.

Reptiles and Amphibians. In the 1998 assessment, three species of salamanders, two species of frogs, six species of turtles (one introduced) and two species of snakes were reported. Most of these species are widespread in the overall park system and general region. The red salamander (*Pseudotriton ruber*), which typically occurs in small springs, has become uncommon in the city. It was observed in Montgomery Creek. The red-bellied turtle was found in Centennial and Concourse

lakes. It has been reported from the Schuylkill River north of the park and may occur in the park segment of the river (the Schuylkill River was not surveyed in this study). The red-bellied turtle is restricted to the Coastal Plain in Pennsylvania, mainly along the Delaware and Schuylkill rivers, and is listed as threatened in the State of Pennsylvania.

Comparison of the 1998 assessment and historical records of reptiles and amphibians suggests a major decrease in the diversity of native species in Fairmount (East/West) Park. A number of species of reptiles and amphibians have been recorded in Fairmount (East/West) Park, including five species of salamanders, three species of frogs, four species of turtles, a lizard species, and six species of snakes (see Volume I). For example, there are park records for the dusky salamander *(Desmognathus fuscus)*, a species associated with streams and seeps, the spotted salamander (*Ambystoma maculatum*), a species which breeds in vernal ponds, and the five-lined skink (*Eumeces fasciatus*) and several species of snakes, which occur in woods and other upland habitats. A number of other species reported from Philadelphia probably occurred in the park, as well.

Mammals. No detailed mammal survey was done as part of the assessment. There is good recent historical information on some mammals in the parks (see Volume I) in the records of Fred Ulmer, who worked at the Philadelphia Zoo.

Small numbers of deer have been reported in the East and West parks in recent years by park staff and others. There is little information on trends in the population, although staff thought that their occurrence is fairly recent. Currently, deer browse problems do not appear to be a problem in Fairmount (East/West) Park, although this could change if populations increase.

Feral dogs are present in West Park. They are most frequently sighted near George's Hill where feeding by locals has been reported. Girdling of tree saplings near the George's Hill meadow and woods has been attributed to rats attracted to food left for dogs.

Fish. The Schuylkill River in Fairmount (East/West) Park has a diverse fish fauna, including species of recreational importance. Angling is popular within the park, especially in the vicinity of the Art Museum dam and in East Falls. Important recreational species include alewife and/or blueback herring, carp, brown bullhead, channel catfish, tiger muskellunge, largemouth bass, smallmouth bass, walleye and striped bass. Restoration of anadromous fish is of particular importance in the river. The fish ladder at the Art Museum dam provides access to the river below Flat Rock dam, and there are plans to build a fish ladder at the Flat Rock dam. The current status of anadromous fishes is unclear. While there have been recent reports of American shad (*Alosa sapidissima*) above the Art Museum dam, these may actually be gizzard shad (*Dorosoma cepedianum*). Several flathead catfish (*Pylodictes olivaris*) were observed at the Art Museum fish ladder in 1999 and 2000. This species is native to the midwestern United States, although it has become established in many east coast rivers. While it is of interest to anglers because of its large size, it is reputed to have large, negative impacts on prey species, including species such as redbreast sunfish (*Lepomis auritus*) and bullheads (*Amieurus* spp.). There is a wealth of historical information on fish and fisheries in the Schuylkill River (see Volume I).

No assessments of fishes in the Schuylkill River were made as part of this project, because of the focus of natural lands restoration on the tributaries and terrestrial parts of the park.

No historical information was located on fish in the tributaries and ponds in Fairmount (East/West) Park, and collections were made in these waterbodies, largely as part of the FPC's 1998 Bioblitz public event.

Most of the tributaries in the park are small and are not expected to have a large fish fauna. Based on their watershed size (see Appendix A-6.5), a maximum of 2-3 species would be expected in streams this small. One species, the blacknose dace (*Rhinichthys atratulus*), was collected in

Montgomery Creek, which was recognized by the stream assessment as being of relatively high quality. No fish were collected in the Robert's Hollow tributary or observed in the Chamounix tributary. These are larger streams, but are heavily impacted by storm water runoff. The fish fauna of park tributaries is also probably impacted by culverts at their mouths, under the Schuylkill Expressway and West River Drive, and the steep drop off of the plateaus, which limit access to the upper tributaries.

Several species were collected in Centennial and Concourse lakes (Appendix A-6.5) and in the tributary draining Concourse Lake. Most of these are typical pond inhabitants, most of which are well established following introduction from the midwestern United States. The eastern mosquitofish (*Gambusia holbrooki*) was found in the ponds and stream, as well. This species is native to the southern U.S. and has been frequently stocked for mosquito control. Although its distribution is not well-documented in the Philadelphia area, it has been found at several locations (e.g., Crum Creek Reservoir, FDR Park) It was found in the "moat" surrounding the Japanese Gardens and may have been stocked there.

East Park tributary 3 was sampled in April 2000. Juveniles of three species of sunfish (bluegill, green sunfish and pumpkinseed) were found in the tributary below the small dam. These species are not typical small stream inhabitants, and they probably entered the stream from the nearby Schuylkill River, which provides good habitat for these species. Fish are present in the East Park Reservoir, but their abundance and species composition is not well known. An assessment is planned by the Philadelphia Water Department for summer 2000. The reservoir supports migrating and wintering waterbirds, including fish-eating species. The fishes in the reservoir should be considered in developing management plans for the future use of this reservoir.

4.B.3.5. **Stormwater/Streams**

An impacted tributary in West Park.

Fairmount (East/West) Park covers an area of 3.8 square miles within Philadelphia and is part of the 1,812 square mile Schuylkill River drainage area. The park area represents approximately 0.2% of the Schuylkill's drainage area. There are nearly 10.8 miles of river/stream within the park boundaries, including 3.8 miles of the mainstem Schuylkill River and many small 1st and 2nd order tributaries that flow directly into the river. The mainstem Schuylkill River was not included in the stream assessment (streamwalk /SQI) for several reasons: 1) nearly all of the Schuylkill River drainage area is outside the park and restoration activities within the park would have little impact on the overall ecological health of the Schuylkill River, and 2) the portions of Fairmount (East/West) Park bordering the river are not natural lands, but heavily managed open grass, recreation paths, and roads (e.g., West River Drive and Kelly Drive). Fortunately, there are numerous small streams whose watersheds are primarily within the park boundaries and can therefore be protected or improved through restoration and proper park management. However, only 24% of Fairmount (East/West) Park is considered natural lands and, therefore, these small streams tend to be impacted by the existence of a highly designed landscape with mowed lawns, heavy human use (including numerous recreational fields), manmade ponds, roads and buildings. In summary, unlike most of the other parks (Pennypack, Wissahickon, Cobbs, Tacony, and Poquessing), which are heavily impacted by urban runoff from outside the park, the impacts on the small streams in Fairmount (East/West) Park tend to originate within the park boundaries.

Small tributary in West Park near the Horticultural Center.

Fifteen of the seventeen small streams in Fairmount (East/West) Park originate inside the park. Four streams are in East Park and thirteen are in West Park. In addition, West Park has two manmade ponds and the Philadelphia Water Department manages a large reservoir and basins within East Park. While several of the streams are impacted by urban runoff from outside the park, the majority of these small streams are affected by more localized impacts, including lack of riparian forest, invasive plants, road drainage, poorly designed culverts, debris dumps, and trail crossings. In addition, nearly every stream in West Park is impacted by the Schuylkill Expressway and rail lines that result in the lower portions of the streams being placed in underground culverts for as much as 500 feet. While this impacts the streams, there are several wetlands that have been created as a result of the streams backing up at the culverts and depositing sediments. In addition, several impressive waterfalls were probably obscured or covered-up by the expressway construction. The streams in East Park are impacted by Kelly Drive, resulting in most of the small streams being placed in culverts and routed underground to the Schuylkill River.

A stream is only as healthy as the watershed from which it flows. While many of the watersheds of streams in Fairmount (East/West) Park are mostly within the park, they show the effects of urbanization. This is due to the existence of many impervious surfaces within the park (roads, parking lots, and buildings) and the fact that mowed grass surfaces do not provide significant infiltration, thereby having a similar impact on hydrology as impervious surfaces. The flows in the streams of Fairmount (East/West) Park are flashy. The vast amount of impervious surfaces and mowed grass in the watershed restricts rainwater from following its normal path of infiltration to groundwater. Groundwater is depleted, causing low base flows (perennial, dry-season flows) in most streams, while storms generate more runoff which leads to increased storm flows. These changes to stream flow have altered stream channels to the point where some streams and portions of streams in Fairmount (East/West) Park are unstable and do not provide quality aquatic habitat.

In addition to the physical, water quantity-related problems, several tributaries have severely degraded water quality. Although water quality is not specifically addressed by this restoration plan, it did arise as an issue for this park. A known source of pollution comes from combined sewer overflows (CSOs), which contribute untreated wastewater to the creeks during storm events. The contribution of CSOs in Fairmount (East/West) Park is not as significant as it is in some of the other parks like Cobbs and Tacony. Undoubtedly, other impairments to water quality in the streams in Fairmount (East/West) Park include typical “urban” pollutants such as vehicle fluids (oils, antifreeze) and household and lawn chemicals (detergents, fertilizers, pesticides). Still other impacts to some streams of Fairmount (East/West) Park are the effects of direct trash dumping in the streams. Some streams lack a forested riparian buffer, and in some cases the maintained grass is mowed to the edge of a stream. Stream-side or riparian forests are integral components of a healthy natural area and provide bank stabilization, shading, habitat and are an important source of food for aquatic insects.

A Stream Quality Index (SQI) was developed to reflect the condition of distinct stream reaches throughout the Fairmount Park system. The SQI is based on three important characteristics: 1) stream geomorphology; 2) aquatic habitat; and 3) riparian or stream-side condition. A detailed methodology is provided in Volume I, Section 5.C.4.1.

The resulting index allows for a comparison of the condition of any stream in the Fairmount Park system. Stream geomorphology, aquatic habitat, and riparian condition were weighted evenly and the final scores ranged from 0 to 300 representing bad to good, respectively. The resulting scores were divided into equal categories representing stream quality (Table 4.B.1). In addition, the resulting SQIs for the stream reaches in Fairmount (East/West) Park are presented visually in the Stream Quality maps in Volume II, Section 4.F. The Schuylkill River was not included in the screening level assessment and SQI. The natural lands restoration master plans have placed less emphasis on the main stem tributaries like the Schuylkill River, since conditions in these streams are controlled largely by conditions outside the park and actual restoration would require a watershed-level approach. Most of the park along the Schuylkill River is not considered natural lands, and so these parts of the park were not part of this study.

Table 4.B.1 Stream Quality Index categories and results.

Stream Quality	Stream Quality Index Range	Number and % of Reaches - Fairmount Park System	Number and % of Reaches - Fairmount (East/West) Park
Severely Impaired	0 to 75	11 (3%)	0 (0%)
Impaired	76 to 150	164 (38%)	37 (38%)
Moderately Impaired	150 to 225	248 (58%)	58 (60%)
Slightly or Non-impaired	226 to 300	3 (1%)	2 (2%)
Totals	0 to 300	426 (100%)	97 (100%)

Note: This index and the number of stream reaches does not include FDR Park.

The Stream Quality Map, Volume II, Section 1, illustrates the habitat quality, urbanization impacts, and riparian condition of each stream in Fairmount (East/West) Park, as determined by the screening-level assessment. None of the stream reaches in Fairmount (East/West) Park was classified as severely impaired. The majority of the stream reaches was found to be moderately impaired (60%) or impaired (38%), and two of the three reaches classified as slightly or non-impaired in the entire Fairmount Park system are in West Park. A detailed review of the SQI scores indicates that the impairments tend to be due to low scores in the riparian condition portion of the SQI, rather than in the stream geomorphology or habitat portion of the score. As discussed above, this is due to the fact that many of the small streams in Fairmount (East/West) Park have a majority of their watersheds within park boundaries. However, this park is also heavily managed, and the impacts on these streams tend to be more local problems with riparian conditions (mowing, invasive plants) or small erosion gullies. Therefore, many of the restoration activities are listed as “vegetative” (riparian replanting, wetland improvement/protection, and gully repair), but these are the activities that will most improve the ecological health of these small streams.

West Park. For the most part, the streams in West Park are healthy and should respond positively to restoration and protection activities. Most streams have watersheds primarily within the park boundaries, which protects them from many of the impacts of urbanization. The discussion

below for each of the streams progresses from north to south in the park. The names in parentheses refer to the more common names of the streams.

The northernmost stream, West Tributary 1 (Roberts Run or Reservoir Creek), is actually heavily impacted by urban stormwater and CSOs. Historically, there was a reservoir on this tributary within the park. No activities are recommended for this stream, since there would be little ecological benefit to doing within-park restoration. Similarly, West Tributary 2 (Chamounix) is being heavily impacted by urban runoff and CSOs. The water quality of the stream is degraded with gray water and the streambanks are being eroded around the outfall. The SQI is moderately impaired to impaired. While the impacts to this stream are from outside the park, it is a significant stream and has some restoration possibilities. Therefore, correcting the CSO problem and bank stabilization has been recommended, but given low priority due the expense and minimal possibilities for ecological improvement.

West Tributary 11 (Whitestown Creek) is a very small stream that is dry much of the time, is surrounded by a wooded area dominated by invasive plants, and goes through a culvert under the Schuylkill Expressway. No restoration activities are recommended. Similarly, West Tributary 9b (Greenland Creek) has not been placed on the restoration list since it is an impaired stream with huge eroded banks, a dry streambed lined with rock, and is currently an illegal dumping spot. The rock-lined banks are a very old "designed-landscape" element and there are large amounts of historic fill. The stream runs along a park road for a time.

West Tributary 9a (Ridgeland Creek) was classified as a moderately impaired stream. However, since the assessment was performed, a box culvert was placed in the stream across from the entrance to the Recycling Center. This box culvert is part of a new paved recreation trail across the stream. Erosion has occurred along a bulldozed area above the stream and the box culvert has had a severe impact on the stream. Two things contributed to this severe impact: 1) the bottom of the box culvert was placed at a lower elevation than the original streambed and the stream is adjusting to this new elevation by headcutting or eroding upstream, and 2) the box culvert was put into the stream with no bank protection/erosion measures and Hurricane Floyd created huge scour holes around the culvert. The recommendation for this site would have originally been "protect/monitor," but it is now a high priority site for restoration. Restoration recommendations include creating a natural drop structure in the stream channel at the point of the headcut that is migrating upstream from the culvert and replanting/stabilizing the streambank where it was disturbed near the stream crossing.

West Tributary 7 (Skuttens Run), which is west of the Recycling Center, has been targeted for protect/monitor as well as erosion control where the stream flows alongside the trail. Installing a berm or level spreader to dissipate runoff from the trail and prevent gully erosion is recommended. West Tributary 8 is a tributary to West Tributary 7. Where they join together, there is a good quality wetland dominated by skunk cabbage that should be protected. In addition, just before the stream flows into a culvert under the Schuylkill Expressway there is a large area where flow backs up and a large wetland has been created. This area is recommended for wetland protection and enhancement in the vegetation section of this report.

West Tributary 6 (Belmont Glen Creek) starts as a seep and has several good quality wetlands in its riparian zone. It is therefore recommended as a protect/monitor restoration site. Unfortunately, where the stream crosses a park maintenance road the vegetation has been cleared along the stream channel and soil and dead trees have been piled within the stream channel. Restoration is recommended at this site to remove the dirt piles and trees and replant riparian vegetation. Similarly, West Tributary 5 (Belmont Valley Creek) is recommended as a protect/monitor restoration since most of its watershed is within the park and it is in good shape (moderately impaired to impaired).

However, it does appears to be impacted by stormwater runoff from the Belmont Plateau and park roads.

West Tributary 4 (Montgomery Creek) has two of the only three unimpaired SQI scores within all of the Fairmount Park system. Most of its watershed is within the park boundary, it is not impacted significantly by urban runoff, and it flows through several extensive wetland areas. Unfortunately, portions of the tributary are surrounded by exotic/invasive plants. It is essential to protect/monitor this stream as well as improve its condition through restoration of its riparian vegetation and wetland improvement (listed as "vegetation" restoration activities). This stream is close to the Horticultural Center and will be a great educational tool and monitoring site.

A large gully has formed from a stormwater outfall down to West Tributary 3 (Lansdowne Creek) which is south of the Horticultural Center. The possibility of installing a drop structure (steps or a rock falls) or check dams as an energy dissipater is recommended to prevent the gully from eroding further and to allow stormwater to reach the stream in a less destructive manner. Another possibility, but a more expensive one, is to create a stormwater detention or retention basin for this stormwater outfall on the other side of the Horticultural Center Drive just south of this gully (between the Drive and Lansdowne Avenue). Additional restoration activities recommended for this stream are listed as "vegetation" restoration sites, but are mostly recommended for the benefit of the stream. In 1998, a riparian restoration project was conducted during the Bioblitz public event to control invasives (Japanese knotweed and multiflora rose) and plant native species. Unfortunately, the new plantings were sprayed with herbicides intended to destroy the returning knotweed. Therefore, replanting is again recommended along this stretch of stream. In addition, just downstream a no-mow zone is recommended with more planting of native riparian vegetation.

West Tributary 10 (Warner Creek) has old stonework and steps leading down to a small stream in good condition (moderately impaired). There do not appear to be any significant stormwater or CSO impacts on this stream. The stream is recommended for protect/monitor status due to its good condition. In addition, in-stream trash removal and trail improvement are recommended to make this stream more accessible and pleasant.

The southernmost stream in West Park is West Tributary 14 (Sweetbriar Run). No restoration activities are recommended for this stream since it is surrounded by old fill material, is underground in a culvert throughout much of its length, and has obvious water quality problems.

East Park. In East Park there are four streams which exist entirely within the boundaries of the park. The northernmost stream, located just below Strawberry Mansion Road is East Tributary 4 (Strawberry Mansion Creek) and has an impaired SQI rating for its entire length. The stream falls over bedrock strata before going into a culvert. During high storm flows, water can overflow Strawberry Mansion Drive and flow into this tributary, causing it to overflow at the culvert and flood Kelly Drive. The stream has Japanese knotweed along the banks and various exotic plants near its top. This stream is not recommended for restoration, but it would be useful to coordinate with the Philadelphia Streets Department to address the flooding problems.

East Tributary 3 (Randolph Creek) was heavily impacted by a breaching of the East Park Reservoir. While this stream may never recover from the impacts of this huge inflow of water, it is surprisingly not in terrible shape (impaired to moderately impaired). Near the bottom of the stream, before it reaches Kelly Drive, removal of a small dam (8 ft across and 5 ft high) would allow for more natural sediment transport.

East Tributary 1 (Mount Pleasant Creek) is in good condition with an SQI of moderately impaired to impaired, does not have significant stormwater impacts and is identified as a protect/monitor site. A 50-foot portion of East Tributary 1 from the Fairmount Park Employees

Memorial down to the culvert has been recommended for daylighting. Daylighting refers to the excavation and restoration of a stream that has been buried in an underground culvert, covering, or pipe. When a stream is underground, it does not function as a stream. By daylighting a stream, it is reborn and can then support stream life.

East Tributary 2 (Harrison Creek) has an SQI of moderately impaired to impaired. While no actual stream restoration activities have been recommended for this stream, there are two vegetation restoration activities recommended that will also help the streams condition: replanting/improving the riparian zone and a wetlands creation at the top of the stream near Smith Playground.

4.C. APPLICATION OF RESTORATION GOALS

4.C.1. Overview

The Fairmount (East/West) Park section of the park system supports virtually the full range of park uses, and FPC managers and planners must consider competing and complementary needs of these different activities. The park contains historical structures of exceptional importance, consisting of more than 40 structures, including houses dating from the 17th century, the Fairmount Water Works, Centennial Exposition buildings and many historic landscape features. Active and passive recreation is supported by a range of facilities, including ballfields, tennis courts, bike paths, picnic pavilions, the Smith Memorial playground and building, a golf driving range, a disc golf course and rowing facilities. The park is also notable for its small gardens and outdoor sculpture (e.g., Azalea Garden, Glendinning Rock Garden, Samuel Memorial sculpture garden). A number of other institutions are within or adjacent to the park, including the Philadelphia Museum of Art, Mann Center for the Performing Arts, Robin Hood Dell East, Philadelphia Zoological Society, Japanese Tea House, Horticultural Center, Recycling Center, Boathouse Row, and Philadelphia Water Department facilities (Belmont water intake and filtration plant, East Park Reservoir, pumping stations, etc.), some of which (e.g., Art Museum Waterworks and Belmont Waterworks) predate the formal establishment of the park. The park hosts a variety of events, particularly on the West River and Kelly drives and around the Belmont Plateau. The Horticultural Center and planned Environmental Education and Visitor Center can provide foci for environmental education in the park. The Schuylkill Expressway and several railroads run through the park, and the importance of park drives and other streets within the park as commuting routes has been a persistent concern in managing the park (1983 Master Plan, traffic section).

The landscapes of the park represent overlays of several design styles. The informal “pastoral style,” which is evident in much of the park, combines parts of the pre-park landscape, parts of the 1876 Centennial Exposition design, and various later modifications (tree planting, road building and closing, etc.). Small parts of the park show more formal designs dating from the 1876 Exposition (e.g., around the West Park Concourse) and from the early 20th century (e.g., the Benjamin Franklin Parkway). These informal and formal design styles have been further modified by the subsequent incorporation of the variety of buildings, roads and other facilities mentioned above.

Significant natural lands are retained within this matrix of styles and land uses. Excluding the Schuylkill River and banks, these natural lands occupy about 24% of the land area of the parks. The natural lands occur in a variety of settings. In some places (especially on the Belmont and East Park plateaus), these probably represent relatively recent forests planted to enhance the pastoral landscape concept. Much of the natural land is forests along ravines and Schuylkill River slopes in both East and West parks, some of which predate park incorporation. The history of these sites (e.g., amount of cutting and management) before and after park incorporation varied among sites (see Section 4.B.2). After park incorporation, many of the ravines were probably maintained as forests, often traversed by

pre-existing or new roads and paths (e.g., carriage roads and trolley lines). There are a number of small streams in Fairmount (East/West) Park, which are important natural elements. The smaller streams arise in the park from springs, while several larger streams arise in urban areas outside the park. Natural lands are also present along unmaintained edges of roads and railroad lines. Woods and meadows have grown in formerly built areas, such as in and around the George's Hill Reservoir after its draining and around old trolley lines, or in formerly mown areas, especially at the edges of ravines. A number of structures have been demolished or fallen down, and some areas have been filled (construction rubble, etc.) or regraded. Disturbance to soil and hydrology of these sites is likely to affect vegetative regrowth. Some manmade sites have important natural functions and are also treated as natural lands. For example, Concourse and Centennial lakes provide marsh and open water habitat for a variety of plants and animals.

As a result of the history and management of the park, natural lands range from relatively high quality areas – older forest fragments in ravines and small streams arising in the park – to low quality sites, such as patches of regrowth on disturbed soils and tributaries draining highly urban areas. Virtually all the natural lands are affected by the managed park areas. The size and shape of many patches results in large amounts of edge, which makes them vulnerable to invasive species and other impacts. The large amounts of mowed areas on the plateaus reduces infiltration and increases erosion.

Given the mix of uses of the park and the conditions of the natural lands, major objectives for restoration of Fairmount (East/West) Park are:

- Amelioration of effects of managed park lands on natural areas. Enlarging forest patches and increasing riparian buffers around streams are key activities to do this, along with a variety of other measures, including control of invasive plants, replanting of natives, stream bank stabilization and construction of berms and water bars to reduce slope erosion.
- Integration of environmental restoration with historical interpretation within the park.
- Enhancement of important natural sites within the park to improve their ecological condition.
- Enhancement of the natural lands of the park as sites for community use and environmental education without compromising their natural values. This is particularly appropriate in the vicinity of the Horticultural Center, Concourse and Centennial lakes, and near the planned Environmental Education and Visitor Center.
- Improvement of some sites of recent regrowth in the park to reduce dominance by exotic and invasive plants and to encourage succession of native species.
- Budgetary constraints make it difficult for Park staff to keep up with management and maintenance of park lands. Therefore, high maintenance restoration projects will likely be difficult to maintain in the future. Restoration planning should encourage practices which decrease maintenance needs (e.g., reduced mowing, practices to reduce erosion) and can use volunteer efforts.

Because of the extent of the landscaped/built parts of Fairmount (East/West) Park, management practices are critical. While this plan specifies recommendations for management of sites adjacent to critical natural lands, definitions of planning, maintenance, and construction practices for the entire park is beyond the scope of the NLREEP planning. Recognition of the importance of natural lands and impacts of management and construction on these lands is essential to the long term viability of these natural areas. Practices that will be especially important are:

- Consideration of natural lands and streams in the placement of new structures, roads, trails, etc.
- Use of best management practices in new construction and maintenance, to minimize storm water runoff, erosion and other impacts.
- Implementation of landscaping and turf management procedures to increase infiltration and reduce storm water runoff. These could include less frequent mowing (to retain taller grass with lower runoff rates), construction of berms to retain water, and reduction of soil compaction (through off road parking, etc.).
- Consideration of impacts of horticultural practices on natural lands, especially the potential invasion of natural areas by introduced plants.

4.C.2. General Restoration Activities

4.C.2.1. Exotic Control

Mile-a-minute.

A habitat type that is becoming increasingly common in the Fairmount Park system is the exotic-dominated forest, shrubland and riparian zone. Exotic species are defined as those species which have been intentionally or accidentally introduced into an area outside its natural range. These species are most frequently found in open areas—forest edges, canopy gaps, along streambanks and riparian zones—but also occur in the herbaceous and shrub layer in forests with native canopy species and on disturbed slopes. Exotic species that were found invading natural lands in Fairmount (East/West) Park during the 1998 survey are included in Appendix A-1.1 in Volume III. Exotic species of concern out-compete native plants for resources and can become very aggressive. The control of these species applies to all areas of the park system, since exotic species are well established in each of the parks surveyed. The control of exotic species can be labor-intensive, and volunteer help can be effective. However, volunteer control may not be effective at some sites (e.g., sites with poor access) or for some techniques (e.g., herbicide application). The method of control is dependent upon the species involved and can include cutting, burning, herbiciding and/or covering the area with plastic (DeLoach 1997, FNPCI 1998). Replanting of native species is highly recommended in areas where exotic removal has taken place, in order to increase shade and decrease reestablishment of exotics. However, exotic control is valuable even where planting is not feasible immediately, to prevent further spread into adjacent areas. This is particularly important around areas with restoration plantings. In the list of restoration activities, exotic/invasive control refers to control without planting.

Sites where exotic control has been initiated must be monitored following control. New shoots of exotic growth should be pulled to prevent further invasion. Due to the aggressive nature of most exotic species, it is essential that monitoring activities be well-planned and followed. Repeated application of control measures may be necessary for some species.

4.C.2.2. Planting

Planting of native trees, shrubs or herbaceous species is a primary restoration technique for different habitats throughout the park. While natural regeneration can provide new growth in many

situations, planting can provide more rapid development of shade to reduce growth of exotics, more rapid cover to reduce erosion, and provide species which are unable to colonize the site. Typically, planting is done in sites that have been cleared of exotics. In the classification of restoration activities, it is assumed that control of exotics will be necessary prior to planting in most cases. Planting is also recommended to restore vegetation as part of erosion control on slopes (see Section 1.C.3.3), and following control of other disturbances.

Selection of plants should be based on the habitat conditions of the site. A list of native species which are suitable for this area and the habitat requirements and resource demands for each are given in Appendix C-1 in Volume III. Selection of the type of stock to use (e.g., seeds, plugs, size of tree, bare root or balled root) will depend on the species to be planted, site conditions, site access and other logistical issues (Sauer 1998). Soil preparation, such as tilling and mulching, may be desirable to improve planting success and reduce weeds. Follow-up maintenance, such as watering and weeding, can also increase planting success.

In the categorization of restoration activities, planting is designated where it is the primary restoration activity. Planting is also routinely part of other restoration activities, such as gully repair and wetland creation. *Forest planting* involves planting a mix of trees, shrubs and herbs and is appropriate on newly cleared areas. *Tree planting* is recommended to increase representation of specific tree species, to establish riparian woods on unforested flood plains, to provide shade and cover to control exotics and reduce erosion. *Shrub planting* may be done to improve understory conditions and introduce specific species of shrubs. *Herb planting* is recommended for establishment of meadows and to improve understory diversity in areas where herb diversity has been reduced.

4.C.2.3. **Trash**

In the Fairmount Park system, trash includes a wide and varied array of items. It can range from litter in the form of garbage and picnic litter to dumping of used automobiles, large appliances and short-dumping of construction debris and lawn waste. There are no established dump sites within Fairmount (East/West) Park. There are some areas where dumping occurs, such as around parts of George's Hill, but dumping does not have the impact it does in some of the other parks. Because of the heavy recreational use of the Fairmount section, littering is more of an issue. Trash also washes down the Schuylkill River and builds up in places, such as on the east bank above the Art Museum Dam. Piling of waste is not only unsightly, but it can also compromise ecosystem integrity. Soils will become covered and/or compacted in the area, which will prevent growth of vegetation. Canopy gaps are also created which opens the area to sunlight, providing sites for exotic plant species which thrive in disturbed soils and full sun. Yard waste, containing seeds and root fragments of invasive plants, also adds to the presence of exotic species. Where dumping is persistent, blocking access to such sites is necessary. Cleanup can be an opportunity for volunteer groups, if the clean-up does not require heavy machinery or dangerous equipment. Removal of all debris from the site and proper disposal off site is required. Since the area will most likely be inundated with exotic species, replanting of natives should not begin until the exotics are removed and disposed of off site. Tilling the soil should not be done since an exotic seed bank will be present and this could cause regrowth of exotic species. The soil should not be left exposed or unplanted as this provides aggressive species with the opportunity to invade the area. The site should be replanted with native species that are appropriate for the habitat type which would have naturally occurred in the area. This type of restoration, as with other heavily disturbed areas, needs to be monitored consistently. Any exotics that may grow back, must be killed in order to insure the success of the native plantings.

4.C.3. Habitat-Specific Restoration Activities

4.C.3.1. Forested Uplands

Trolley bridge in Chamounix forest.

Forested uplands have been fragmented in recent years by adjacent construction activities, overall development and park landscaping. Forest regrowth is occurring on some formerly cleared or mowed areas. These sites may show long term effects of the earlier disturbance, and they may be vulnerable to exotic species. Not only does the forested upland habitat type support plants and animals, it also acts as a buffer for storm water runoff and prevents slope erosion.

Fairmount (East/West) Park has numerous patches of woods, but these are heavily affected by exotics and other disturbances due to the large amount of developed parkland, roads, etc., which abut these woods. Increasing the density and diversity of native species in woods is an important goal for restoration in the park. The forested uplands have been affected by a variety of human disturbances. In areas where trash dumping and encroachment of recreational activities are issues, the wooded areas become fragmented, creating open habitat for exotic, aggressive species. Although the canopy in these areas may persist for a while, there will not be any regrowth of the understory and herbaceous layer once exotic species become established.

Restoration in forested uplands is recommended to increase biodiversity of forest flora and fauna. In addition to exotic control, replanting and trash removal, the following activities can be included as restoration actions in the forested upland habitat: protection of high quality areas, repairing gullies and increasing forest area by decreasing the area that is currently mowed or managed, and replanting.

Protection and monitoring are activities that should be performed at sites which are presently considered high quality woods. Protect/monitor (referred to as protect/enhance in chapters 1 and 2) includes monitoring the site for any evidence of exotic species, trash or other disturbances. The goal of the protect/monitor recommendation is to recognize the area as a high quality site and to protect it from development or degradation.

Repairing gullies, which are usually caused by stormwater runoff and vehicle damage, helps to protect the forest from further erosion and allows native plants to regenerate. Control of the source of erosion will be necessary, followed by filling the gully with clean soil and replanting with native tree saplings and shrubs. This soil should not be obtained from another site within the park because it may contain root fragments and seeds of non-native species. Stabilizing slopes by regrading or placing berms at the top to control storm water runoff is usually necessary.

Releasing mowed areas can be done simply by mowing the area less frequently. This creates a tall grass buffer adjacent to forested areas, which aids in erosion control. Over time, if exotics are controlled, succession will occur and a forested area will be present in an area that was formerly turf grass. An example of where this type of restoration should be performed is around Chamounix stables, where encroachment into the forest has occurred, fragmenting the forest and making it more susceptible to invasion by exotic species and erosion.

The benefits of restoration in forested areas include creating habitat and increasing biodiversity, since small patches of woods do not provide suitable habitat for many animal species. Replanting or removal of exotics in any area requires monitoring of the site. Restoration areas should be protected from vandalism by barriers, and community members should be made aware of the restoration and the expected outcomes so they can participate in the monitoring efforts.

4.C.3.2. **Non-forested Uplands/Meadows**

Non-forested uplands restoration includes lands which are not wetlands, forests or riparian zones. More specifically, non-forested uplands includes edges of forests, where invasive and exotic plants can dominate, meadow habitats, where herbs and forbs are dominant, and managed (e.g., mowed) lands which are no longer actively used.

Forest edges in the Fairmount Park system are often highly disturbed as they are typically small and linear and are adjacent to lawns, highways and structures which are often targets for trash dumping and vandalism. These areas are susceptible to invasion by exotic species, which are able to thrive in a broad range of habitat types with varying environmental conditions, especially in unshaded areas. Edges are an example of a place where exotics can outcompete native species for available resources, since some exotics are so aggressive in sunny, disturbed areas. This poses a problem, since the edge of a forest acts as a buffer for the interior of the woods. If the perimeter of the woods hosts exotics and fragmentation of wooded areas continues, the interior of the forest will be negatively impacted, as the seed source for exotics is present. However, if the edge is managed effectively, it can serve as a first line of defense against disturbance in healthy stands of forest. Well-managed edge habitats can also provide foraging areas for some woodland species (e.g., butterflies feeding on flowers) and habitat for a variety of species. Common species presently found along the edge of wooded areas in Fairmount (East/West) Park include non-natives such as tree-of-heaven (*Ailanthus altissima*), princess tree (*Paulownia tomentosa*), Norway maple (*Acer platanoides*), paper mulberry (*Broussonetia papyrifera*), white mulberry (*Morus alba*), multiflora rose (*Rosa multiflora*), wineberry (*Rubus phoenicolasius*), Japanese stilt grass *(Microstegium vimineum*), Japanese honeysuckle (*Lonicera japonica*), oriental bittersweet (*Celastrus orbiculatus*), and natives such as box elder (*Acer negundo*), grape vines (*Vitis* spp.) and poison ivy (*Toxicodendron radicans*). Mile-a-minute (*Polygonum perfoliatum*), an exotic herbaceous vine, is spreading within the park, mainly along edges.

Sedgely meadow.

Meadows are an under-represented habitat type in the Philadelphia area. Where present, they support a wide variety of bird species and invertebrates which may otherwise be absent from an urban setting. These sites are open and are often located near major roads or trails making them accessible to vandals. In many sections of the park, meadows have become a waste disposal ground for vehicles and large appliances. In order to preserve this habitat type in the landscape, we must take an active role in maintaining lands as open meadows and preventing them from succeeding into wooded areas or being destroyed by vandalism.

In an undisturbed area, succession is a natural process in which one group of species replaces another group over a given period of time, following fire or some other natural disaster, which acts as a catalyst. Following the disturbance, grasses, annual herbs and some perennial herbs will typically be the first community type to become reestablished in the landscape. Perennial herbs will increase over time, followed by replacement woody species such as

shrubs and small trees. These, in turn, will be replaced by large trees (including large specimens of some mid-successional species such as tulip poplar, plus late successional species). Eventually, if no other disturbance occurs, a closed canopy will result. In areas of disturbance, where land was used for agriculture or development and where fire has been suppressed, the natural process of succession has been interrupted and exotic plants have outcompeted native species. Exotic species occur frequently in areas of high soil fertility, such as abandoned agricultural fields and disturbed areas. The vegetative community composition is dependent upon the level of disturbance and the length of time that the area has lacked a management regime. It is currently not known whether these exotic-dominated old fields will eventually be replaced by late successional stages with more native species, or whether the exotics can arrest or greatly delay successional patterns.

Non-native forbs such as goutweed (*Aegopodium pedagraria*), garlic mustard (*Alliaria petiolata*), Canada thistle (*Cirsium arvense)*, and lesser celandine (*Ranunculus ficaria*), as well as non-native grasses such as Japanese stilt grass (*Microstegium vimineum*) and Kentucky bluegrass (*Poa pratensis*), take advantage of these open habitats and will outcompete native mustards (*Brassica* spp.), milkweed (*Asclepias syriaca*), butterflyweed (*Aeslepias tuberosa*), native asters, rushes, sedges, and native grasses such as bluestems.

Areas which are not presently used for recreation, but are being mowed could be managed as meadows by mowing infrequently and possibly burning the area to promote plant diversity. Replanting of these areas is also recommended to establish native species and deter exotic species.

Restoration Activities. The actions recommended as part of the restoration plans for non-forested uplands are grouped and described according to their functions in the following paragraphs.

Protection of natural lands is the first step in restoring and maintaining native biodiversity. High quality meadows and forest edges need to be protected from exotic invasion and should also be monitored to ensure against future disturbance. Other types of activities include control of invasive plants, replanting, management to maintain meadows (prevent forest succession), trash removal, control of access, and storm water management. Activities which are similar to those in other habitats are discussed elsewhere in this document.

Protection:

Protect/Monitor- This action is recommended for meadows and edges that presently support native plant and animal species and do not appear to be disturbed. These areas are identified in the restoration site lists (Table 4.D.1) and site assessments (Section 4.E), and should be protected from human impact. They should also be monitored for human disturbance and invasion by exotic species.

Active Management:

Edge Management- The recommendation for edges is to remove the exotic vegetation and replant the area with more appropriate native species. It is also recommended that trash be removed from these areas and gullies be repaired. Gullies lead to erosion and create niches which can only be suitable for exotics. Because edges are located next to roads and developments, gullies caused by storm water runoff are abundant in these areas. It is recommended that the basic storm water runoff issue be addressed and the gullies repaired, as they will have an effect on the interior of the forest if left unrepaired.

Woodford Mansion.

Release-This action is recommended for lands that are currently mowed, but are not actively being used for recreational purposes. Depending on the

adjacent land uses, visual aesthetics, etc., different management regimes may be used for released area. Infrequent mowing of an area will promote the growth of native plant species and prevent succession by trees and shrubs. Any decrease in the frequency of mowing can increase the height and diversity of vegetation and increase water retention. Mowing only once a year will suppress trees, but allow herbaceous cover. These areas can act as buffers to woods, wetlands and riparian zones. Alternately, mowing may be stopped and the area may be planted with trees or shrubs or allowed to revert to forest. Monitoring for invasion by exotic species should be done in release areas. Planting release sites is advisable to reduce open space for exotics. Once areas are released, management options are similar to those for the following activity, meadow management.

Meadow Management-This is recommended to maintain meadow sites The action promotes the protection of established meadows by seasonal mowing, burning, or tree removal. Meadow management encompasses the removal of exotics and the replanting of natives, herbiciding and drill-seeding, prescribed burning, preferably in the spring and managed mowing to be performed once a year. Hand-cutting or girdling of trees can be done to prevent forest succession. This can be done by volunteers and in areas inaccessible to mowers. These activities can enhance existing meadows. These meadows will provide habitat for native fauna and will protect adjacent slopes and forests from the negative impacts of storm water runoff. A management plan for maintaining an area as a meadow must be drafted and followed throughout the year or the area will once again become inundated with exotic species and trash. Barriers and signs should be place around the restored area to make community members and users of the park aware of the many benefits of open meadow habitats and to avoid the perception that these areas have been abandoned.

Replanting and Exotics Control:

Invasive/Exotic Control- This action is recommended in those areas where there are minor invasive/exotic issues, the removal of which would promote native vegetation regrowth. This does not include any replanting. For example, this is recommended to reduce spread of mile-a-minute.

Remove Exotics/Replant Natives-This action implies that once the exotic plants are removed from an area, the area be planted with appropriate native species. This differs from the invasive/exotic control action as it includes replanting of natives as part of the activity. Herbaceous plants can be established by seeding or transplanting plugs. While the former may be less expensive, the latter is apt to be more successful, especially when competing with exotics species.

In most cases, exotic control and subsequent planting will both be done (in the Cobbs and Tacony master plans, it was assumed that replanting would include control of exotics), and the activity specifically mentions both to clarify the joint actions. However, in some cases, planting could be recommended where prior exotic control is not needed, e.g., to increase diversity in existing meadows.

Remove Structure/Replant Natives- Where a dilapidated manmade structure is impeding the growth of native species, it is suggested that this structure be removed and native plants be put in its place.

Stormwater:

Gully Repair- Concentrated storm water runoff leads to erosion, which in turn can lead to gullies. Meadows and herbaceous borders can slow down storm water runoff and increase infiltration, reducing storm water problems. Thus, meadow management can be an important part of storm water management, especially in landscaped areas where woods are not desired. It is recommended that the storm water be redirected into a wetland or a tall grass buffer to prevent gullying of the landscape. The gully should then be filled in with soil and replanted with native vegetation to stabilize the soil.

4.C.3.3. **Slopes**

Many of the slopes in Fairmount (East/West) Park and the other park sections have been severely eroded due to people walking up and down slopes, trash dumping and storm water runoff from adjacent lawns and streets. Activities which disturb the soil contribute to slope erosion, which will make them unstable and unable to support vegetation. The lack of cover further increases erosion. Storm water runoff exacerbates the problem and creates gullies along the slopes, which serve as obstacle courses for ATVs. Even where slopes are not denuded, the sequence of intermittent storm water runoff and drying may favor invasive species such as Japanese knotweed and common reed.

As part of the restoration recommendations for slopes, activities include regrading some of the highly impacted slopes, replanting with native species, repairing gullies, controlling erosion, and removing trash and exotics. Planting a native meadow at the top of the slope to help control water runoff during storm events, as was described previously, is also recommended. Placing berms at the top of the slope will also aid in decreasing the velocity of the storm water which flows down the slopes toward the stream. This will not only prevent further erosion of the slopes but will decrease the amount of silt that reaches the creek and tributaries.

4.C.3.4. **Riparian Zones**

Riparian zones are areas adjacent to a body of water which are influenced at least periodically by flooding (Mitsch 1993). They serve as ecotones between aquatic and terrestrial communities and are important areas for animal refuge and migration. Plant communities of riparian zones are usually diverse due to the gradients in moisture. Riparian areas are valuable to people because they can slow the flow of water during a storm event and prevent flooding.

In Fairmount (East/West) Park, the areas adjacent to the creeks and ponds have been used by the public as picnic areas, bike trails, and fishing points. The natural vegetation of these riparian zones has been altered in such a way that they are no longer able to function as they should. The restoration activities for riparian zones in this project include removing invasive species, regrading the banks and replanting with native forest corridors at least 35 feet in width (if feasible) to serve as a functional riparian zone.

4.C.3.5. **Wetlands**

Concourse Lake.

Wetlands are defined as transitional lands between aquatic and terrestrial habitats where saturation with water leads to characteristic soil types and plant and animal communities. These areas are biologically rich, and development and potential impacts on wetlands are regulated by the Federal government under the Clean Water Act. According to the U.S. Fish and Wildlife Service (FWS), the following three criteria must be met in order for an area to be considered a wetland for regulatory purposes: 1) the land must be dominated by hydrophytic vegetation; 2) the soils must be categorized as hydric; and 3) the land must be saturated with water for some time during the growing season. There are other biological, physical and chemical factors such as light, temperature, and man-induced disturbances which alter the community composition and overall biodiversity of wetlands.

Wetlands are classified into the following five systems by the FWS; Marine, Estuarine, Lacustrine, Riverine and Palustrine. These systems are partly distinguished from one another based

on their level of tidal influence and also the amount of salinity present from the ocean. Marine systems have saltwater, tidal flows. Estuarine systems are tidal systems with a mix of fresh water and oceanic water producing brackish conditions (this definition is more restrictive than the standard ecological definition, which considers freshwater tidal systems as estuarine as well). Lacustrine wetland systems are defined as permanently flooded lakes, ponds and reservoirs. These areas may be deep and may experience considerable wave action. Riverine systems are defined as wetlands which are contained within a natural or manmade channel. Palustrine systems are defined as vegetated wetlands less than two meters deep which have no tidal influence.

The majority of wetlands found in the Fairmount Park system can be classified as palustrine wetlands, according to the FWS classification system. Larger wetlands in the park (apparent on the aerial photographs used to develop the vegetation maps) are identified on the vegetation maps. Wetlands can be broadly categorized as swamps, marshes, or open water areas (e.g., Concourse and Centennial lakes). Swamps are defined as areas dominated by woody plants, while marshes are unshaded and dominated by herbaceous vegetation. These types may be further categorized on the basis of vegetation cover, which is strongly controlled by the depth and frequency of inundation with water. Marshes were categorized as cattail (*Typha* sp.) marsh, *Phragmites* marsh, intertidal marsh, sedge/rush/grass marshes, and wet meadows. These types roughly follow a gradient from deeper and more frequent inundation to less frequent inundation. The most common wetland type found during this survey was *Phragmites* marsh. Several cattail marshes were also found in the park. Only a few sedge/rush/grass marshes large enough to be mapped were encountered in the survey, although there are small patches of these scattered throughout the park. Wetlands that have been filled or altered as a result of urbanization are common in the Fairmount Park system. It is not uncommon to find wetland vegetation growing in old ponds and manmade ponds which have been largely filled with sediment. Many wetlands are dominated by exotic species. Some areas with wetland hydrology may be maintained as lawns by mowing. Table 4.B.2 illustrates the types of wetlands in the park, the functions of such a habitat type, the restoration recommendations, and the benefits of restoration.

It is especially important to promote and highlight the ecological importance of wetlands in urban settings. Wetlands can provide a number of environmental benefits, including reduction of storm flows by water storage, supply of water during low flow conditions, purification of water (by storage or removal of nutrients and other substances), and support of a variety of plants and animals. The small tributaries in the Fairmount Park system which feed into the larger creeks could benefit from the water purification function that wetlands provide. These wetlands also support numerous plant and animal species that may otherwise be absent from an urban setting. Fairmount Park system tributaries have riparian forests along the floodplains of the main creeks and some small tributaries. Depending on hydrology, some of these floodplain forests could be classified as wetlands, depending on their soils and degree of inundation. Because of the gradation in these characters, the vegetation survey did not distinguish wetland and non-wetland floodplain forests, except where there were marked differences in vegetation (e.g., presence of herbaceous wetland plants), standing water, etc.

In the Fairmount Park system, natural hydrology has been severely altered by development in the watershed and the construction of roads, dams, railroad, and other manmade structures in the channel and floodplain. Historically, the source of water for many wetlands in the park was storm runoff, subsurface flows associate with creeks or rivers, or flows from springs. Development has altered hydrology by increasing the magnitude of peak flows, and decreasing base flows. Sedimentation and incision in floodplains and channels of many of these creeks and decreases in base flows and groundwater flows have severely decreased sources of water for adjacent wetlands. Smaller tributaries which have not been as severely affected by urbanization are capable of providing water to sustain wetlands. Examples of wetlands which are fed by small tributaries include the George's Hill Drive wetland (V27.03) in Fairmount (West) Park. The flow of springs, lakes and

Table 4.B.2. Classification of wetland types in the Fairmount Park system, with relative importance of various types of benefits and major restoration activities.

	Type and Vegetation	Hydrology	Functions					Potential Restoration Activities	Abundance in FPC
			Storm Water Retention	Source at Base Flow	Water Quality	Floral Biodiversity	Faunal Biodiversity		
Open Water									
	Permanent pond	Permanent standing water	Depends on basin capacity	Yes	Yes	Submerged macrophytes, algae	Important to fish and other groups.	Enlargement, habitat improvement, dredging, nutrient control; faunal or floral reintroduction	Small, artificial ponds
	Vernal pond	Seasonal standing water	Variable	Late winter and spring	Variable	Variable	Spawning sites for some reptiles, amphibians, and other groups	Controlling hydrology to produce specific requirements; faunal or floral reintroduction	Rare or absent
Marsh									
	Intertidal	Fluctuating saturation	Little	No	Yes	Variable; supports regionally rare species	Important for fish, birds, other groups	Controlling hydrology	Local
	Phragmites	Variable	Tolerant of occasional inundation	No	?	Low	?	Invasive control and replanting	Fairly common
	Cattail	Permanent, shallow standing water	Tolerant of occasional inundation	Yes	Yes	Low-moderate	Important for some groups	Enlargement, habitat enhancement, exotic control	Fairly common

Table 4.B.2 (continued). Classification of wetland types in the Fairmount Park system, with relative importance of various types of benefits and major restoration activities.

	Type and Vegetation	Hydrology	Functions					Potential Restoration Activities	Abundance in FPC
			Storm Water Retention	Source at Base Flow	Water Quality	Floral Biodiversity	Faunal Biodiversity		
	Sedge-Grass-Rush	Seasonally saturated soil	Intolerant of long periods of standing water; locally small sites with little storage capacity	Yes	Yes	High	Important for some habitat specialists	Enlargement, habitat enhancement, exotic control, floral reintroduction	Some very small patches
	Exotic (Japanese knotweed, lesser celandine)	Variable	Variable	Variable	?	Low	Probably low	Exotic control and replanting	Common
Swamp or Marsh									
	Skunk cabbage	Permanently wet soil	Intolerant of long periods of standing water and storm flows	Yes	Yes	Moderate	Important for some habitat specialists	Maintain hydrology, promote forest cover	Common, mostly small seeps

Table 4.B.2 (continued). Classification of wetland types in the Fairmount Park system, with relative importance of various types of benefits and major restoration activities.

	Type and Vegetation	Hydrology	Functions					Potential Restoration Activities	Abundance in FPC
			Storm Water Retention	Source at Base Flow	Water Quality	Floral Biodiversity	Faunal Biodiversity		
Swamp									
	Large tree dominated: Silver maple, red maple sycamore, box elder, ash, etc.	Intermittently wet soil	Tolerant of short periods of inundation	Yes	Yes	Moderate-High	Important for many groups; depends on amount of standing water, etc.	Maintain hydrology, exotic control and replanting, control erosion, sedimentation	Common on floodplains; gradation with non wetland floodplain forests
	Shrub dominated: alder, buttonbush	Intermittently wet soil	Tolerant of short periods of inundation	Yes	Yes	Can support uncommon species	Important for some habitat specialists	Maintain hydrology, exotic control and replanting, control erosion, sedimentation	Absent?
	Misc.: e.g., lizardtail	Intermittently wet soil	Tolerant of short periods of inundation	Yes	Yes	Can support uncommon species	Important for some habitat specialists	Maintain hydrology, exotic control and replanting, control erosion, sedimentation	Rare (e.g., Rhawn Street wetland)

channels are also some factors that influence or drive hydrology of the wetlands found within the park. Seeps and springs, are found throughout the park, often on slopes of ravines, such as along East tributary 3 (west of East Park Reservoir) in East Park. There are no known natural lakes within the Fairmount Park system, but artificial ponds such as Centennial and Concourse lakes function in much the same way by providing habitat and acting as water holding systems.

Structure/Type of Wetland. Wetlands not only depend on the presence of water, but are also affected by the amount and periodicity of wetting, which is important to consider in regard to restoration and planning activities. The amount of water will determine the floral and faunal composition on the site and the overall functioning of the wetland. Water flow data can usually be obtained by a gauge station or by placing monitoring wells in the area. Classification criteria for hydrologic zones, based on the frequency and duration of inundation or saturation of the soil during the growing season, have been developed by federal agencies and implemented by wetlands scientists. Classifications range from zone 1, areas which are labeled "permanently inundated" to zone 6, which are "intermittently or never inundated." Table 4.B.3 presents a classification system for non-tidal areas.

Wetland Functions. Wetlands are often targets for destruction since they can be easily drained or filled for agricultural purposes or development. The benefits of wetlands are sometimes not obvious and these biologically diverse ecosystems can therefore be regarded as waste areas or areas that attract mosquitoes and pests. Wetland functions are defined as the biological, chemical and physical processes of the wetland, many of which provide direct benefits to human beings. Wetlands play an integral part in the purification of water. They act as a sink for nutrients and metals and can filter the water of sediments and organic matter. They may serve as sites for transformation of nutrients (e.g., from organic nitrogen to inorganic nitrogen gas which is released to the atmosphere) or storage of nutrients. These processes improve overall water quality and provide us with clean drinking water. Wetlands in Fairmount (East/West) Park process subsurface flows as well as stormwater runoff that flood the wetlands. Wetlands are also involved in the process of water storage. They store rain water either from direct precipitation or from storm water runoff which is then slowly released from the wetland. Some of the values associated with this function include flood protection and erosion control. Wetlands are areas of high biological productivity, serve as breeding grounds for many aquatic species, and provide wildlife with refugia and food sources. Many species depend on wetlands, so that regional biodiversity depends on wetlands. These areas are also significant to the commercial fisheries industry as they are critical habitat types for many fish species.

The benefits provided by wetlands will vary with type, size and other site-specific factors. Different types of wetlands will differ in the relative importance of different benefits (Table 4.B.2). For example, the ability to reduce storm peaks by water holding will depend on the storage capacity relative to the size of the storm flow. Areas that have saturated soils (including ponds, swamps and marshes with standing water) require topography or structures (berms, etc.) that allow ponding of storm water. Since some of the wetland vegetation cannot tolerate long periods of inundation, large areas of such wetland would be necessary to store significant quantities of water. Furthermore, storm flows may carry sediments which would be deposited by storms. While this can be considered as a type of filtration, it can fill in wetlands unless there is periodic maintenance to remove sediment. Similarly, the purification functions of wetlands will depend on their size relative to inputs. Wetlands along tributaries, seeps, etc., may be more effective for these functions.

Relevance to Restoration. Although wetlands were once abundant in Philadelphia, in particular in the tidal Delaware River area, these areas have since been filled and/or drained for development. To preserve and restore the natural landscape in the area, we must place special emphasis on wetlands. This includes preserving them from further destruction, implementing actions

Table 4.B.3. USFWS Classification of wetland types on the basis of frequency of inundation.

Zone	Classification	Duration	Comments
1	Permanently inundated	100%	Inundation <6.6. f. mean water depth
2	Semipermanently to nearly permanently inundated or saturated	>75%-<100%	Inundation ≤ 6.6 ft mean water depth
3	Regularly inundated or saturated	>25%-75%	
4	Seasonally inundated or saturated	>12.5%-25%	
5	Irregularly inundated or saturated	≥5%-12.5%	Many areas with this characteristic are not wetlands
6	Intermittently or never inundated or saturated		Areas with this characteristic are not wetlands.

U.S. Army Corps of Engineers, Wetland Delineation Manual, 1987.

to aid them in proper functioning and working to replace lost wetlands. As part of this project, we have identified wetlands in the park boundaries and have offered recommendations for the protection and/or restoration of these lands. Recommendations are based on the size and condition of the existing wetland, the ecological benefits of enlarging or creating a wetland and the feasibility of long-term monitoring, and cost associated issues. For example, a wetland located along a large stream would need to be large and deep in order to store the overflow from the stream as well as storm water. This could prove to be an extremely expensive project, and may not prove to be as beneficial as removing exotics and trash from several existing wetlands. The actions recommended as part of the restoration plans are grouped and described according to their functions in the following text.

Restoration Activities Recommended in Wetlands. Areas of Fairmount (East/West) Park that have already been mapped and verified by ground-truthing as wetlands are sites that should be protected and monitored to ensure against future development in the area. These sites are shown on the Restoration Sites Map in Section 4.F and highlighted on park maps to raise public awareness of the existence and importance of wetlands. This action is recommended for wetlands where little disturbance is evident.

A variety of active restoration activities are recommended for wetlands. Many of these are analogous to activities in other habitats. These include activities designed to reduce damage to wetlands by controlling access or improving trails and structures associated with access, enhancing wetland vegetation, improving hydrology, and enhancing native fauna.

Access:

The following actions address the need for increased or decreased access to an area of the park. Where restoration sites occur on or near sites that are heavily impacted by humans, measures must be taken to protect the existing vegetation and/or the new plantings from the effects of trampling and herbivory.

- *Access areas*. This action refers to the designation of areas to reduce trampling of vegetation and soils of a wetland, while providing access to a recreation spot, creek bank, etc. These areas should be constructed of earth or a material that is difficult to destroy so that they require little maintenance and do not need to be replaced repeatedly.
- *Structural Improvement*. If there is an obvious structure (e.g., a dam, parking lot, etc.) that is impeding water from reaching the wetland, and it is feasible, we are suggesting that these structures be removed to restore the natural hydrology of the area.
- *Trail Improvement*. This is suggested for wetlands that have become part of the trail or have damaged part of the trail due to water overflow.
- *Control Access*. This action would be recommended for high quality wetlands that are functioning properly and are providing habitat for plants and animals suited to wet conditions. Since this habitat type is rare in the Fairmount Park system, wetlands need to be protected when they are found providing high value functions. Controlling public access limits the destruction. This could be done by placing a physical barrier, such as a fence, around the wetland.

Replanting and Exotics Control:

Wetlands can be especially prone to invasion of exotic plants, and several actions are suggested to promote native vegetation and control exotics. Some of the more common problematic species found in the park include: Japanese knotweed (*Polygonum cuspidatum*), Japanese hops (*Humulus japonica*), lesser celandine (*Ranunculus ficaria*), common reed (*Phragmites australis*), Japanese stilt grass (*Microstegium vimineum*), Japanese honeysuckle (*Lonicera japonica*) and oriental bittersweet (*Celastrus orbiculatus*). When attempting to rid an area of exotics, species-specific removal methods need to be researched. Exotic species are aggressive and have demonstrated their ability to grow in a wide variety of habitats under different conditions. Care should be taken when removing these plants from a site to ensure that every part of the plant is removed and disposed of off-site if there is a possibility that it will resprout. To promote native vegetation and decrease the incidence of exotics, replanting the area with appropriate native species after exotics have been removed is recommended. The general recommendations for replanting address those areas in which the native vegetation is sparse due to some factor other than exotic species, such as manmade structures and herbivory.

Invasive/Exotic Control- This action is recommended in those areas where there are minor invasive/exotic issues, the removal of which would promote native vegetation regrowth. This action does not include replanting.

Remove Exotics/Replant Natives- In areas where wetland vegetation is sparse due to the dominance by exotic species, it is recommended that exotics be removed and native wetland species be planted. Removal of exotic species from a wetland and replanting of natives that are appropriate to the region will promote wetlands which are able to support native fauna. This may aid in increasing the level of biodiversity in the area and will promote succession.

Replant Native Herbs- This is recommended in areas where the shrub and canopy layers are well established, but the herbaceous layer is sparse due to human disturbance.

Replant Native Shrubs- In wetlands where the herbaceous and canopy layers are well established, but the shrub layer is sparse due to human disturbance or impacts from deer browsing, replanting of native shrubs is recommended. This adds vertical diversity to the wetland and promotes understory growth.

Replant Native Trees- Recommended in areas that have large canopy gaps due to exotic vines or dead standing trees.

Storm Water/Channel Actions:

Hydrological or topographical modifications are suggested to enhance the water filtering and holding functions of the wetland and to promote high biological productivity.

Berms-Vegetated mounds that act as dikes which are placed in the path of the storm water runoff can be used to promote infiltration and decrease flow velocities. Berms promote the greater infiltration of rainwater into the ground, thereby decreasing storm water runoff and reducing erosion and the occurrence of gullies.

Regrade Banks- Some streambanks which are unstable would benefit by regrading to decrease their slopes. Many of the problems which cause unstable streambanks originate upstream and would require solutions which are not contained within the scope of this project.

Creation/Expansion:

Suggestions for increasing wetland acreage are provided such as expanding existing wetlands by changing management techniques, and creating new wetlands where they do not currently exist.

Release/Widen - A simple management technique that could enhance wetland value is to mow less frequently in areas adjacent to wetlands. Some mowed areas may have wetland hydrology and may support wetland vegetation if frequent mowing is stopped. Mowed grass does not function as well as tall grasses and meadow forbs do in erosion protection. Where appropriate, open fields located next to wetlands should be mowed as infrequently as possible. Allowing natural vegetation to grow in a maintained area increases habitat for wetland species. Where usage is not high, these areas should be taken out of the active management regime, since they would then support diverse wetland plants and serve as refugia for animal species.

Wetland Creation/Expansion- This is recommended in areas that once existed as wetlands or appear to have the hydrology and soils that could support hydrophytic vegetation and are typical of a wetland. To ensure success, the hydrology, soil characteristics and vegetation present need to be examined carefully to determine the appropriate depth and area needed to sustain a healthy wetland. This also requires replanting of the wetland with appropriate native wetland species. Some existing wetlands may be enlarged where the surrounding area could be restored to contain appropriate hydrology and vegetation.

4.C.3.6. **Channel**

Proposed restorations were classified as “channel” type if the activity is intended to restore a stream within its channel or along its banks. The types of “channel” restoration actions include: protect/monitor, trash removal, bank stabilization/regrade/riparian, modify channel, infiltration/berms, detention basin, daylighting, dam modification, dam removal, structural improvements (trails and stormwater), gully repair and prevention, and fish reintroduction. A given restoration site may involve one or more of these actions, depending on site-specific conditions (Volume II, Section 4.E). The overriding objective for channel restoration is to improve in-stream habitat to a more natural state. As discussed in the Restoration Goals, reference streams in rural southeast Pennsylvania served as models of how Fairmount Park system streams should “naturally” function.

Protect/Monitor. A site designated as protect/monitor is either a stream in very good condition or a stream feature of exceptional value (e.g., waterfall). These streams and features should be protected from future destruction or stresses, such as an increased stormwater flow. Highlighting

these areas as restoration sites is meant to assure their ongoing recognition as important, sensitive areas. These sites should be maintained and enhanced with garbage clean-up and graffiti removal when necessary. Signs should be posted to inform the public of the site's significance. Maintenance and signs should increase the public's appreciation and understanding of the area. This is consistent with the goal of increasing public awareness of the scenic, inspirational, and spiritual values of streams.

Trash Removal. The dumping of trash is a problem throughout the park system. Not only is it unsightly and disheartening for park users, trash accumulation in stream channels can be especially problematic. Piles of debris can create dams, altering a stream's normal flow path and causing an unstable channel. Major dumping can cause stream segments to become almost entirely buried and unable to support aquatic life. Sites identified as needing trash removal are generally those with severe dumping. At these sites, removing the debris and preventing future accumulation of debris is recommended. Barriers should be installed at all existing or potential access points on the park edges to prevent further dumping.

Bank Stabilization/Regrade/Riparian. Stream sites selected for this action are those with unstable streambanks that actually require regrading and/or bioengineering techniques. The purpose of this type of action is to locally stabilize the streambank, thus decreasing erosion and the sediment flux downstream. A bank stabilization project can include regrading the streambank to a lower slope, securing natural materials to the bare bank, and planting native vegetation (i.e., herbs, shrubs, trees) to establish a forested stream-side or riparian buffer. In some cases, only replanting of riparian forest may be sufficient to stabilize stream banks. The sites where riparian replanting is to be done, but do not require regrading or engineered stabilization are also very beneficial to stream ecosystem. These are defined as "vegetation" restoration sites rather than "stormwater" sites.

Modify Channel. This is an umbrella term which includes any type of in-stream modification of channel grade or shape. This activity has been recommended in streams that are severely unstable or in highly-erodible gullies. When it is evident that erosion is occurring in the bottom of a channel, further incision can be prevented by making changes within the channel. Options include installing check dams or natural rock falls to prevent the headcutting of the bottom of the channel. This type of channel modification aims to prevent destructive erosion by providing some stability, but not to be so stable as to inhibit the dynamic nature of the stream channel.

Infiltration/Berms. This action promotes infiltration of rainwater into the ground, thereby reducing stormwater runoff and improving groundwater recharge. These projects might include the installation of an infiltration trench (also called retention ponds) or the building of berms (dike-like vegetated mounds) perpendicular to the path of stormwater runoff. An infiltration trench is installed by digging a deep trench, then replacing the soil with a more pervious substrate. These measures would be used in areas where there is excessive stormwater runoff, usually from a paved or mowed surface, causing gullies and increased erosion. The trenches or berms placed in the path of runoff promotes increased infiltration/decreased runoff and decreased flow velocities, resulting in reduced erosion further downslope.

Detention Basin. This action includes the installation of wet or dry ponds to detain stormwater runoff. These basins can help reduce peak flows during storm events, but do not alter the overall volume of runoff. Elevated peak flows can be very destructive to a stream channel, causing incision, eroding banks, and the loss of stream habitat. Where feasible, a detention basin would be placed at the source of excessive runoff, such as a paved parking lot, or near the stream, but should not be placed within the stream's channel. Stormwater runoff would be directed into the detention basin where it is slowly released into the stream system. Besides the reduction in peak flows, detention basins can be designed to provide wetland and pond habitat, if constructed to hold a permanent pool.

A detention basin is not an easy restoration option. It is expensive and it requires a large amount of space, as well as future maintenance.

Daylighting. Numerous streams have been placed underground to allow for the development of Philadelphia. Many of these underground streams extend into the park. Daylighting refers to the excavation and restoration of a stream that has been buried in an underground culvert, covering, or pipe. When a stream is underground, it does not function as a stream. By daylighting a stream, it is reborn and can then support stream life. Most of these underground streams still flow due to groundwater sources and drain into larger streams, such as the Schuylkill River. The flows from these underground streams may provide important contributions to the flows in these larger streams during low-flow or drought periods. Unfortunately, many of these underground streams also receive raw sewage due to combined sewer overflows during storm events and due to incorrectly connected sewage pipes from homes. Therefore, before daylighting a stream, sewage contributions must be considered and eliminated.

Dam Modification/Dam Removal. These actions are intended to improve stream conditions that are impaired by dams. As detailed in the restoration goals, dams have damaging effects on streams. Dams block the passage of fish and other aquatic organisms and cause backwaters that are warm and can become depleted of oxygen. A dam on a stream is analogous to a clogged artery. Many Fairmount Park system dams are falling apart and are a safety hazard as well. Based on ecological benefits, it is recommended that all dams be removed, but this is not feasible for all dam sites. Complete removal may not be desired for historical reasons; leaving a portion of the dam may be desirable in these cases. When dam removal is not possible, a dam modification is recommended, which involves creating one or more V-shaped notches in the top of the dam to allow for better movement of water, sediment, and organisms. Dam removal involves the use of large machinery to remove the manmade elements. Some dams may have underlying bedrock or rock falls, which would remain as a natural waterfall. Mud flats adjacent to the banks would be planted with native vegetation and some bank stabilization measures may be required after demolition. Removing these abandoned dams will serve as a long-term benefit to the stream and will require little to no future maintenance. Excepting those on the Schuylkill River, Fairmount (East/West) Park has only a few, small dams, e.g., on East tributary 3 (west of East Park Reservoir) in East Park, and on Lansdowne Creek (West tributary 3), above the Japanese Garden.

Structural Improvement to Stream Channels. These actions seek to address problems caused by malfunctioning or obstructive structures in or near streams. A main problem with any structure in a stream is that streams are dynamic, while the structure was most certainly constructed to remain static. As a stream moves, transports sediment and acts in its dynamic nature, these structures get in the way and cause problems such as scouring, drastic erosion, and sediment trapping. Stormwater structures such as culverts, pipes, and manholes were found to have become obstructions in streams. These structures also block the flow of debris and garbage in the stream, causing piles of debris that are unsightly and may cause local erosion problems. Any plan to improve a Philadelphia Water Department (PWD) structure will have to be a joint effort between FPC and PWD. Stream crossings on trails can sometimes have a negative impact on the stream. Many times bridges and stream crossings can cause local erosion problems. In addition, many clogged or failed culverts create unstable stream channels, streambank erosion or damage due to constant trampling. The clogged culverts prevent the natural stream flow patterns and cause the stream to back up so that it overflows the trail at times. Any trail improvement related to stream crossings will have to be coordinated with the trails consultants. Improvements might include constructing bridges or better culvert systems and diverting or changing trail routes.

Gully Repair and Prevention. This activity is similar to repairing gullies in the forested uplands, but is specifically meant for repairing/preventing gullies that connect directly to a stream

channel, thereby contributing excess sediment. In general, these gullies are formed by concentrated storm runoff due to roads, trails, or improperly designed stormwater outfalls. Repair of these gullies can range from placing structures within the gullies to prevent them from worsening to correcting the source of the concentrated flows and filling in the gullies. In large gullies where prevention of the high flows is not practical or too expensive, installing check dams, energy dissipation structures, or controlled drop structures may be recommended to prevent the gully from enlarging. However, if it is possible to control or prevent the concentrated flows, the recommendation may be to install berms or detention basins, filling in the gully with soil, and replanting the area with native vegetation.

Fish Habitat Enhancement Techniques. A number of devices have been developed to improve habitat for certain fish. Cover for fish may be provided in pond and lake habitats (D'Itri 1985). Such installations can be as simple as addition of trees, or may involve more complicated artificial structures. These structures can provide attachment sites for algae and invertebrates, spawning sites for organisms (species which attach eggs to hard surfaces or which guard nests in crevices), and cover for both forage fish and predators. These projects may be implemented by volunteers, and organizations and agencies (e.g., Pennsylvania Fish and Boat Commission) may assist in planning and installation.

4.C.3.7. **Faunal Monitoring, Introduction and Management**

Most of the restoration activities are expected to improve habitat for terrestrial and aquatic animals. Some activities directly involve fauna. These include some types of monitoring and introductions.

Deer Monitoring. Currently, deer populations in Fairmount (East/West) park are low, and deer browse problems were not identified. However, deer populations could increase to levels where they would significantly affect vegetation. Monitoring is recommended to determine whether deer increase to problem levels. Monitoring can include surveys of browsing on trees, shrubs and herbaceous plants and compilation of sightings and sign. If problems appear, more intensive assessment, including actual counts, should be done to determine appropriate management needs.

Other Monitoring. While the faunal inventory for this study and other monitoring programs provided a great deal of information on faunal occurrence and abundance, sampling was limited in time and space. Additional monitoring can be valuable in determining occurrence of uncommon species, determining trends in species, and determining response to restoration. The assessment for this study demonstrated decreases in the native fauna in many groups and increases in exotic species in some groups. Sampling of other taxonomic groups would provide additional information on the park fauna. Monitoring programs can be linked to environmental center activities, to park special events and to more thorough scientific collection.

Faunal monitoring would be particularly valuable as part of some restoration activities. Where feasible, baseline and post-restoration monitoring should be defined as part of restoration planning, although in some cases, funding constraints may preclude monitoring. Monitoring of virtually any taxonomic group would be valuable, but certain groups would be particularly informative for different types of restoration, such as butterflies for meadow and edge management; aquatic macroinvertebrates for wetland creation and restoration, and stream channel restoration; reptiles and amphibians for wetland creation and restoration; fishes for dam removal and restoration in larger wetlands and streams; birds for woodland restorations, meadow restoration, and exotic control; and terrestrial invertebrates such as land snails and slugs, ants and earthworms for woodland restoration.

Faunal Introductions. Re-introduction of animal species can restore the natural biodiversity of an area. However, there are some ecological risks to re-introductions which need to be considered. These risks are outlined in the project goals (Section 1.C). Where major restoration of vegetation is

done, faunal re-introductions should typically be undertaken after successful establishment of the vegetation. Many organisms which are mobile or have mobile dispersal stages will colonize restored sites. However, introduction may be necessary for less mobile and habitat-restricted species or for species locally extirpated from an area. For example, reintroduction may be especially appropriate for some species of fish, amphibians (e.g., frogs or salamanders which reproduce in small ponds), or butterflies (see Volume I, Section 4.E.5).

Fish:

Natural colonization of fish to a site is expected where there is an aquatic connection to a source fauna. Introduction is appropriate to stock new, isolated ponds, to restore species extirpated from the colonizing source, and to develop migratory stocks imprinted on the site

Introduction should be made from local sources, so that issues concerning disease and genetic differentiation are insignificant. Also, a nearby source material makes introduction logistically easy. Introduction would need approval by the Pennsylvania Fish and Boat Commission. In addition, collection of fish would be best done under a scientific collecting permit in order to use efficient collecting techniques and to collect enough fish. Introduction could probably be done successfully at various times during the year, but would probably be easiest and most successful in early to mid-spring. At this time, holding and transport of fish would be safer, since lower water temperatures reduces risks of handling mortality. The source and receiving water would be at similar temperatures, easing acclimation. Introduction at this time would also allow spawning during the first year. The specifics of stocking (methods of capture, holding, number, size and stage to stock, etc.) will depend on the species involved.

Amphibians:

Several species of frogs and salamanders are resident in ponds and wetlands and may be unable to recolonize new or enhanced sites because of the isolation of these sites. Several species (e.g., American toad, *Bufo americanus,* and spring peeper, *Hyla crucifer*) reproduce in ponds and use adjacent habitats (marshes, woods, etc.). These species are present, but local in the park (e.g., in the Pennypack and Wissahickon), and would be good candidates for introduction.

Canada Goose Monitoring and Management: Historically, the Canada goose (*Branta canadensis*) was a common migrant and rare wintering bird in the region. The number of wintering birds increased at least through the 1970s (Hess et al. 2000). This is attributed to changes in migratory patterns, with reduction in migration distances as birds started wintering farther north. This shift apparently started in the 1930s. In recent years, there has been a decline in the number of migratory geese (Hess et al. 2000, Walsh et al. 1999). Canada goose has also become a common breeding bird, breeding in a variety of open sites, including parks, golf courses, and refuges. This started in the 1930s in the mid-Atlantic, but populations have expanded greatly in recent years. The timing and origin of breeding birds is not well-documented. Potential sources of breeding birds include escapees from wildfowl collections (Walsh et al. 1999), wounded or pinioned birds kept as decoys to attract wild birds (Hess et al. 2000), and birds introduced at wildlife management areas to restore populations of the subspecies *B. canadensis maxima* (Brauning et al. 2000). This subspecies (the giant Canada goose) formerly bred in the midwest and was thought extinct until rediscovered in the 1960s. In this area, breeding birds are resident year-round. Resident birds are joined by large numbers of birds in the winter. The origin of these birds is not well known; they could include Arctic nesters, migrants from New England or the northern mid-Atlantic (i.e., derivatives from the new breeding populations), or some locally-bred birds making local movements. Small numbers of snow geese (*B. chen*) and brant (*B. branta*), which breed in the Arctic, are found in winter in the city (e.g., along the Schuylkill River), indicating that the park populations may contain long distance migratory birds.

With their spread into urban and suburban areas, Canada geese have been considered a nuisance in some cases. Aggressiveness by breeding birds and accumulation of droppings are common concerns, but human health risks resulting from bacterial contamination of droppings and ecological effects may be more serious. Geese graze field, wetland and aquatic plants, and they contribute to nutrient enrichment of resting areas. However, the magnitude and effects of nutrient enrichment in local systems are not documented. The relative contributions of resident birds with the larger numbers of migratory and migratory birds is also unknown.

Various techniques have been used to manage concentrations of geese. These include various means of scaring birds (dogs, etc.), shaking eggs, and habitat management to reduce open fields and access to water. Many of the vegetation and storm water restoration techniques recommended for NLREEP, particularly reduction in the amount of mowed area and planting of riparian zones, may reduce suitability for geese. Fencing may also be used to restrict access to water or uplands adjacent to water. This has been implemented by NLREEP and the Philadelphia Water Department along the west bank of the Schuylkill River near the Belmont Water Treatment Plant intakes. Regionally, shifts in hunting seasons have been made to increase harvest of resident birds and decrease harvest of migratory birds.

As a migratory species, Canada geese are protected by federal laws and international treaty; geese are managed by the federal government, e.g., through hunting regulations (season and limits) and maintenance of waterfowl refuges. Therefore, management actions should be coordinated with other agencies. Migratory geese are considered an important resource whose apparent decline has been of concern. Therefore, control of nonresident birds (migrating and wintering birds) is not recommended. Given uncertainties on the relative effects of breeding and wintering birds, there is not enough information to justify active control of breeding geese. However, habitat management techniques, which are consistent with other NLREEP goals, may be an effective approach to reducing goose impacts in the park.

4.D. RECOMMENDED RESTORATION ACTIVITIES

4.D.1. Restoration Site Overview

Recommended restoration activities were selected to address the primary objectives for Fairmount (East/West) Park, which are outlined in Section 4.C. High priority sites (Table 4.D.1) were grouped in a number of clusters, where activities would reinforce each other and enhance particularly significant natural areas within the park.

One of the main objectives in East/West Park is to mitigate impacts of the managed lands to enhance the existing areas of woods. This is recommended near the best quality woods, i.e., around Chamounix woods (West Park), the Recycling Center woods (West Park), George's Hill (West Park) and the Laurel Hill Ravine woods (East Park). Activities recommended for this include enlarging the woods by reducing the mown area where feasible, management of the edges of the woods, control of invasive plant species and replanting native trees.

A second main objective is to mitigate effects of runoff and other disturbances from the landscaped areas on slopes and tributaries. This is important throughout the parks, and is recommended in a number of sites. These activities are particularly important near other restoration sites and in high quality areas, such as the woods discussed above, and Belmont and Lansdowne tributaries. Activities to address this include improvement of riparian buffers along tributaries, such as reduction in mowed area, enlargement of buffers, invasive control and replanting, bank stabilization in a few places, gully repair and enhancement of edges of slopes to increase infiltration and reduce runoff by enlargement of wooded areas, meadow management, and construction of berms.

Table 4.D.1. List of sites in Fairmount East/West recommended by ANSP for restoration by NLREEP. Priority codes are: H=high; M=medium; L=low; HC=high, requires coordination; HD=high, after deer; HP=high protection; HPD=high, protection and restoration after deer are controlled; HT=high trail; HVD=high, volunteer action, other actions after deer are controlled; HV=high volunteer; MC=medium, requires coordination.

Site ID	Restoration Type	Site Name	Location	Priority	Acreage
S1.0	Channel	Warner Creek (W. Trib. 10)	Lansdowne and Cedar Grove Roads	H	2.12
		Action	**Priority**		
		Trash Removal	H		
		Protect/Monitor	HP		
		Structural Improvement (Trails)	H		
S2.0	Channel	Landsdowne Creek (W. Trib. 3)	South of Horticultural Center, North of Lansdowne	H	0.26
		Action	**Priority**		
		Gully Repair and Prevention	H		
		Detention Basin	M		
S9.0	Channel	Montgomery Crk or Belmont Valley (W. Trib. 4)	E. of Belmont Ave., North of Montgomery Drive	H	4.17
		Action	**Priority**		
		Protect/Monitor	HP		
S10.0	Channel	Belmont Valley Creek (W. Trib. 5)	South of Chamounix Dr., east of Ridgeland Mansion	HP	2.55
		Action	**Priority**		
		Protect/Monitor	HP		
S11.0	Riparian Zone	Belmont Glen Creek (W. Trib. 6)	West of Ridgeland Mansion, S. of Chamounix Drive	H	0.43
		Action	**Priority**		
		Trash Removal	H		
		Replant Native Herbs	H		
		Protect/Monitor	HP		
S14.0	Riparian Zone	Skuttens Run (W. Trib. 7)	West of Recycling Center, S. of Ford Road	H	0.90
		Action	**Priority**		
		Infiltration/Berms	H		
		Gully Repair and Prevention	H		
S14.02	Channel	Ridgeland Creek & Skuttens Run (W. Trib. 8)	West of Recycling Center, S. of Ford Road	HP	0.60
		Action	**Priority**		
		Protect/Monitor	HP		
S15.0	Channel	Greenland Creek (W. Trib. 9a)	Just N of Ford Road, S. of Chamounix Drive	H	0.25
		Action	**Priority**		
		Bank Stabilization/Regrade	H		
		Protect/Monitor	HP		
		Modify Channel	H		

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
S16.0	Channel	Mt. Pleasant Creek (E. Trib. 1)	East of Green Drive, SW of East Park Reservoir	HP	0.37
		Action		**Priority**	
		Protect/Monitor		HP	
S18.0	Channel	Mt. Pleasant Creek (E. Trib. 1)	West of East Park Reservoir, E of Mt. Pleasant Dr.	H	0.24
		Action		**Priority**	
		Daylighting		H	
S19.0	Channel	Chamounix (W. Trib. 2)	Just South of Falls Road; NW of Chamounix Road	L	0.38
		Action		**Priority**	
		Bank Stabilization/Regrade		L	
		Structural Improvement (SW)		L	
V1.0*	Park Wide	Reduce mowed area (no mapped polygon)	East and West Fairmount Park	H	
		Action		**Priority**	
		Mow Infrequently to Increase Woods		H	
V1.01	Slope	Schuylkill River Park	Between Art Museum and Parkway	HV	2.87
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		HV	
		Remove Exotics/Replant Native Trees		HV	
V3.0*	Slope	Laurel Hill Forest & Slopes (no mapped polygon)	Between Edgley Drive and Kelly Drive	HV	
		Action		**Priority**	
		Trash Removal		HV	
		Invasive-Exotic Control		HV	
V3.01	Slope	Laurel Hill Woods	North section of Laurel Hill Woods	HV	4.65
		Action		**Priority**	
		Trail Improvement		H	
		Remove Exotics/Replant Native Trees		HV	
		Edge Tree/Shrub Planting		HV	
V3.02	Slope	Laurel Hill Forest	Laurel Hill Forest-Southern section	H	8.00
		Action		**Priority**	
		Release/Widen		H	
		Protect/Monitor		HP	
		Edge management		H	
		Remove Exotics/Replant Native Forest		HV	
		Edge Tree/Shrub Planting		HV	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V3.03	Slope	Laurel Hill Slope		HV	0.85
		Action		**Priority**	
		Gully Repair		HV	
V4.0	Forested Upland	Lemon Hill Viewshed	Directly in front of the Lemon Hill Mansion	H	1.22
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		H	
		Meadow Management		H	
		Remove Exotics/Replant Native Herbs		H	
V4.01	Forested Upland	Lemon Hill Slopes		L	2.71
		Action		**Priority**	
		Remove Exotics/Replant Native Forest Species		L	
		Release/Widen		L	
V4.02	Slope	Lemon Hill/Sedgley Porter Sloped Forest	Between Sedgley Porter Dr. and Kelly Drive	HV	6.62
		Action		**Priority**	
		Erosion Control		HV	
		Remove Exotics/Replant Native Shrubs		L	
V4.03	Non-Forested Upland	Lemon Hill Plateau	Adjacent to Lemon Hill Mansion	H	1.62
		Action		**Priority**	
		Regrade For Storm Water Infiltration		H	
		Meadow Management		L	
V5.0*	Slope	Mt. Pleasant Woods Sites (no mapped polygon)	East of railroad, surrounding Mt. Pleasant.	HV	
		Action		**Priority**	
		Remove Exotics/Replant Native Forest		H	
		Erosion Control		H	
		Edge management		H	
		Meadow management		H	
V5.01	Slope	Mt. Pleasant Slope	Southeast and Northwest of Mansion	HV	9.43
		Action		**Priority**	
		Meadow management		H	
		Erosion Control		HV	
		Edge Tree/Shrub Planting		HV	
		Trash Removal		HV	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V5.02	Viewshed	Mt. Pleasant Viewshed	In front of Mt Pleasant	M	2.41
		Action		**Priority**	
		Cut Forest and Replant Understory		M	
V6.01	Slope	Rockland Woods	Rockland Mansion to Ormiston Mansion	H	17.21
		Action		**Priority**	
		Protect/Monitor		HP	
		Edge Tree/Shrub Planting		H	
		Remove Exotics/Replant Native Forest		HV	
		Trash Removal		HV	
		Trail Improvement		HT	
V6.02	Viewshed	Rockland Mansion Viewshed	In between Rockland House and East River Dr.	L	1.14
		Action		**Priority**	
		Cut Forest and Replant Understory		L	
		Meadow management		L	
V6.03	Non-Forested Upland	Rockland meadow	Between Rockland and Ormiston Mansion	H	3.99
		Action		**Priority**	
		Meadow Management		H	
		Release/Widen		H	
V8.0	Non-Forested Upland	Cliffts Meadow	West of 33rd Street, near Cliffts House	H	8.48
		Action		**Priority**	
		Remove Exotics/Replant Native Herbs		H	
		Meadow Management		H	
V8.01	Non-Forested Upland	Promontory Rock		M	1.50
		Action		**Priority**	
		Meadow Management		M	
V9.0*	Forested Upland	Smith Playground Forest (no mapped polygon)		HV	
		Action		**Priority**	
		Protect/Monitor		HP	
		Invasive-Exotic Control		HV	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V9.01	Riparian Zone	Smith Playground Forest	West of Playground, east of Fountain Green Drive	H	2.38
		Action		**Priority**	
		Trash Removal		H	
		Remove Exotics/Replant Native Shrubs		H	
V9.02	Non-Forested Upland	Smith Playground field	East of Fountain Green Drive	H	4.52
		Action		**Priority**	
		Release/Widen		H	
		Remove Exotics/Replant Native Trees		H	
		Meadow Management		H	
		Remove Exotics/Replant Native Shrubs		H	
V9.03	Wetland	Reservoir Drive Wetland	Northwest of Cliffts House	L	0.30
		Action		**Priority**	
		Remove Exotics/Replant Native Wetland Species		L	
		Wetland creation/expansion		L	
		Structure Building (Boardwalk)		L	
V9.04	Forested Upland	Smith Playground Woods	Smith Playground	M	7.83
		Action		**Priority**	
		Remove Exotics/Replant Native Forest Species		M	
		Trash Removal		M	
V10.0	Riparian Zone	Reservoir Drive Riparian Zone	West of Reservoir Drive by Smith Playground	H	3.26
		Action		**Priority**	
		Invasive-Exotic Control		H	
		Release/Widen		H	
		Remove Exotics/Replant Native Forest Species		H	
		Trash Removal		H	
		Trail Improvement		HT	
V10.02	Wetland	Smith Playground Tributary	Smith Playground trib just above R.R. tracks	H	0.95
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		H	
		Remove Exotics/Replant Native Herbs		H	
V12.0	Non-Forested Upland	33rd Street Tennis Courts	33rd and Susquehanna	H	11.02
		Action		**Priority**	
		Remove structure/Plant native forest species		H	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V12.01	Non-Forested Upland	East Park Reservoir	East Park Reservoir	HP	
		Action		**Priority**	
		Protect/Monitor		HP	
		Remove Exotics/Replant Native Forest Species		M	
		Structural Construction/Improvement		L	
V14.0	Forested Upland	Sedgely Drive Parking Area	Between Poplar Drive and Sedgely Drive	HV	7.77
		Action		**Priority**	
		Slope Stabilization		HV	
		Invasive-Exotic Control		M	
		Remove Exotics/Replant Native Forest Species		M	
		Meadow Management		M	
V14.01	Forested Upland	Sedgley Porter House		M	2.86
		Action		**Priority**	
		Remove Exotics/Replant Native Forest Species		M	
		Trash Removal		M	
V14.02	Non-Forested Upland	Sedgley Porter House meadow	Girard, Sedgley and Poplar Streets	M	0.71
		Action		**Priority**	
		Release/Widen		M	
		Meadow Management		M	
V14.03	Non-Forested Upland	Sedgley Porter House meadow		M	0.33
		Action		**Priority**	
		Trash Removal		M	
		Replant Native Herbs		M	
		Replant Native Shrubs		M	
		Meadow Management		M	
V14.04	Forested Upland	Sedgley Porter House, Poplar St. edge	Along Poplar Street	M	1.12
		Action		**Priority**	
		Trash Removal		M	
		Replant Native Trees		M	
V16.0	Forested Upland	Strawberry Mansion Drive Park	North of Strawberry Mansion	HV	0.63
		Action		**Priority**	
		Invasive-Exotic Control		HV	
		Remove Exotics/Replant Native Shrubs		HV	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V16.01	Slope	Robin Hood Dell Woods		HV	2.81
		Action		**Priority**	
		Invasive-Exotic Control		HV	
		Trash Removal		HV	
V16.02	Forested Upland	Strawberry Mansion Woods	South side of S. Strawberry Mansion Rd.	HV	1.62
		Action		**Priority**	
		Trash Removal		HV	
		Invasive-Exotic Control		HV	
		Remove Exotics/Replant Native Shrubs		M	
		Trail Improvement		HT	
V20.0	Lake	Concourse Lake	South Concourse Road	H	0.47
		Action		**Priority**	
		Trash Removal		H	
		Replant herbs		H	
		Replant shrubs		H	
		Invasive-Exotic Control		H	
		Remove Structure		HC	
V21.0*	Lake	Centennial Lake Sites (no mapped polygon)	West of Belmont Ave	H	
		Action		**Priority**	
		Protect/Monitor		HP	
		Release/Widen Riparian zone		H	
		Trash Removal		HV	
V21.01	Wetland	Centennial Lake	West Park, West of Belmont Avenue	H	2.11
		Action		**Priority**	
		Protect/Monitor		HP	
		Build Access Platform		H	
		Control Access		H	
		Trash Removal		HV	
V21.02	Wetland	Centennial Lake Wetland	North of Centennial Lake	H	0.47
		Action		**Priority**	
		Remove Exotics/Replant Native Herbs		H	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V21.03	Riparian Zone	Centennial Lake Riparian Zone	Surrounding the lake	H	0.36
		Action		**Priority**	
		Release/Widen		H	
		Replant Native Forest Species		H	
		Gully Repair		H	
		Meadow Management		H	
V21.04	Wetland	States Drive Wetland	South of States Drive	M	0.81
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		M	
		Remove Exotics/Replant Native Herbs		M	
V21.05	Riparian Zone	States Drive Floodplain	North of States Drive	M?	0.56
		Action		**Priority**	
		Replant Native Forest Species		M	
V23.0*	Non-Forested Upland	George's Hill Sites (no mapped polygon)	South of Wynnefield Ave.	HV	
		Action		**Priority**	
		Trash Removal		HV	
		Invasive-Exotic Control		HV	
V23.01	Forested Upland	George's Hill Forest		M?	24.81
		Action		**Priority**	
		Remove Exotics/Replant Native Forest Species		M	
V23.02	Forested Upland	George's Hill Undisturbed Woods		H	2.17
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		H	
		Edge Management		H	
		Remove Exotics/Replant Native Trees		H	
V23.03	Non-Forested Upland	George's Hill Old Fields		H	4.86
		Action		**Priority**	
		Invasive-Exotic Control		H	
		Edge Management		H	
		Meadow Management		H	
V23.04	Forested Upland	George's Hill Woodlot	Adjacent to old fields and large woods	H	2.44
		Action		**Priority**	
		Remove Exotics/Replant Native Trees		H	
		Edge Management		H	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V23.05	Slope	Park Side Sloped Forest	Across from Mann Center for the Performing Arts	HV	4.71
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		HV	
		Remove Exotics/Replant Native Trees		HV	
		Gully Repair		HV	
		Trail Improvement		HT	
V23.06	Riparian Zone	Parkside Floodplain Forest		M	4.77
		Action		**Priority**	
		Release/Widen		M	
		Replant Native Forest Species		M	
V24.0	Forested Upland	Recycling Center Forest Reforestation	Southeast of Ridgeland Mansion	H	15.86
		Action		**Priority**	
		Edge Management		H	
		Remove Exotics/Replant Native Trees		H	
		Trash Removal		H	
		Meadow Management		H	
		Invasive-Exotic Control		HV	
V24.01	Non-Forested Upland	Nursery Old Fields	North East of Wellness Center	H	6.41
		Action		**Priority**	
		Edge Management		H	
		Meadow Management		H	
		Gully Repair		M	
		Remove Exotics/Replant Native Shrubs		L	
V24.02	Forested Upland	Army Road Exotic Forest	Northeast of Army Road, Southwest of Recycling Cen	H	2.14
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		H	
		Remove Exotics/Replant Native Trees		H	
V24.03	Riparian Zone	Wellness Center Forest	Wellness Center Forest	H	8.62
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		H	
		Remove Exotics/Replant Native Trees		H	
		Trash Removal		HV	
		Trail Improvement		HT	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V24.04	Wetland	West Tributary 7 Wetland	West of Wellness Center	HP	1.00
		Action		**Priority**	
		Protect/Monitor		HP	
V25.0*	Riparian Zone	Montgomery Drive Sites (no mapped polygon)	Montgomery Ave. and Belmont Drive	HP	
		Action		**Priority**	
		Protect/Monitor		HP	
V25.01	Riparian Zone	Montgomery Drive Wetland	North of Horticulture Drive, South of Montgomery	H	0.98
		Action		**Priority**	
		Remove Exotics/Replant Native Herbs		H	
V25.02	Forested Upland	Montgomery Drive Woods	North of Horticulture Drive, South of Montgomery	H	3.11
		Action		**Priority**	
		Meadow Management		H	
		Remove Exotics/Replant Native Herbs		H	
V26.0	Riparian Zone	Japanese House Woods	South of the Hort Center, north of Lansdowne Drive	M	5.68
		Action		**Priority**	
		Remove Exotics/Replant Native Forest Species		M	
V26.01	Riparian Zone	BioBlitz Planting		HV	0.87
		Action		**Priority**	
		Release/Widen		H	
		Remove Exotics/Replant Native Trees		HV	
		Remove Exotics/Replant Native Shrubs		HV	
V26.02	Wetland	Japanese House Wetlands	East of House and Garden	H	0.42
		Action		**Priority**	
		Remove Exotics/Replant Native Herbs		H	
		Wetland creation/expansion		M	
V26.03	Wetland	Japanese House Wetland	East of Belmont Avenue, West of Japanese House	HV	0.35
		Action		**Priority**	
		Invasive-Exotic Control		HV	
		Remove Exotics/Replant Native Herbs		HV	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V27.0	Forested Upland	Belmont Avenue Woods	West of George's Hill	H	14.72
		Action		**Priority**	
		Trash Removal		H	
		Edge Management		H	
		Remove Exotics/Replant Native Forest Species		H	
		Structural Improvement		HC	
		Remove Exotics/Replant Native Forest Species		HC	
V27.01	Riparian Zone	Belmont Avenue Floodplain	East of Belmont, West of Belmont Mansion Drive	HP	0.82
		Action		**Priority**	
		Protect/Monitor		HP	
		Invasive-Exotic Control		HV	
V27.02	Wetland	Belmont Avenue Disturbed Wetland	North of George's Hill Drive, North of Site 27.1	H	0.26
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		H	
		Protect/Monitor		HP	
V27.03	Wetland	George's Hill Drive Wetland	North of George's Hill Drive, East of Site 27.1	HP	0.95
		Action		**Priority**	
		Protect/Monitor		HP	
		Release/Widen		H	
		Wetland creation/expansion		M	
V28.0	Non-Forested Upland	Belmont Avenue Maintained Field	N. of Wynnefield between Parkside & Belmont Ave.	H	0.71
		Action		**Priority**	
		Meadow Management		H	
		Release/Widen		H	
V30.0	Non-Forested Upland	Chamounix Drive Old Field	South of Chamounix Mansion, East of Cham. Dr.	HV	4.83
		Action		**Priority**	
		Invasive-Exotic Control		HV	
		Remove Exotics/Replant Native Herbs		M	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V30.01	Non-Forested Upland	Chamounix Dr. Maintained Area		H	2.69
		Action		**Priority**	
		Meadow Management		H	
		Replant Native Herbs		H	
		Release/Widen		H	
V31.0	Non-Forested Upland	Greenland Drive Managed Land	In between Greenland and Chamounix Drive	M	7.44
		Action		**Priority**	
		Invasive-Exotic Control		HV	
		Meadow Management		M	
		Remove Exotics/Replant Native Meadow Species		M	
		Release/Widen		M	
V33.0	Slope	Ford Road Woods	South of Chamounix Mansion, North of Ford Rd.	HV	1.21
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		HV	
		Erosion Control		HV	
V35.01	Forested Upland	Trolley Bridge Forest	Ford Rd. and Chamounix Dr.	H	7.81
		Action		**Priority**	
		Remove Exotics/Replant Native Forest Species		H	
		Release/Widen		H	
		Edge Management		H	
V35.02	Wetland	Chamounix Woods Wetland	West of Tennis courts off of Chamounix Road	HV	1.09
		Action		**Priority**	
		Invasive-Exotic Control		HV	
		Protect/Monitor		M	
		Remove Exotics/Replant Native Herbs		M	
V35.03	Forested Upland	Chamounix Forest	Northern end off Chamounix Drive, behind stables	HP	8.02
		Action		**Priority**	
		Protect/Monitor		HP	
		Trail Improvement		HT	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V35.04	Forested Upland	Falls Road Woods	South of the Schuylkill, East of Falls Road	H	8.62
		Action		**Priority**	
		Remove Exotics/Replant Native Trees		H	
		Remove Exotics/Replant Native Trees		H	
V35.05	Forested Upland	Chamounix Woods	Southeast of Mansion	H	37.29
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		H	
		Trash Removal		H	
		Invasive-Exotic Control		H	
		Remove Exotics/Replant Native Herbs		H	
V35.06	Forested Upland	Chamounix Forest		H	35.57
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		H	
		Remove Exotics/Replant Native Trees		H	
		Trail Improvement		HT	
V38.0	Riparian Zone	Robert's Hollow Riparian Zone	South of Neil Drive	L	1.39
		Action		**Priority**	
		Invasive-Exotic Control		L	
		Release/Widen		L	
V38.01	Forested Upland	Robert's Hollow Forest Planting	Southwest portion of Robert's Hollow	H	1.61
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		H	
		Remove Exotics/Replant Native Trees		H	
V45.0	Forested Upland	Horticulture Center Forest	Woods North of the Horticulture Center	L	7.07
		Action		**Priority**	
		Replant Native Trees		L	
		Invasive-Exotic Control		L	
V45.01	Slope	Horticulture Center Slope	North of Horticulture Center, South of Montgomery	HV	1.10
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		HV	
		Trash Removal		M	
V45.02	Wetland	Horticulture Center Wetland	North of Horticulture Center	HV	0.42
		Action		**Priority**	
		Remove Exotics/Replant Native Herbs		HV	
		Remove Exotics/Replant Native Shrubs		HV	

Many of the activities involve revegetation, but seek to control stormwater as well as improve vegetative communities. Trampling of slopes is a problem, especially in East Park. Improved trail use, for example, by clearing and improving poorly maintained steps, would be beneficial and should be addressed in trail planning.

Protection and enhancement of significant areas is an important objective in the park. Meadow management, such as the development of meadows through exotic control, reduction of frequent mowing and/or planting, combined with a periodic mowing regime or tree cutting to maintain meadows, is recommended in several areas, including George's Hill, the nursery fields near the Recycling Center woods, and near Cliffts and Smith Memorial Playground. These sites are near woods, and all three areas are a mix of meadows, woods, small wetlands or tributaries, and disturbed edges. The combination of invasive control, and management of meadows, edges and woods will improve large, diverse areas.

Since most of the tributaries arise within the park, many are in good condition; many have relatively unimpaired channel morphology and have floodplain wetlands or riparian vegetation. Recognition and protection of these sites is important.

Because of the historical importance of Fairmount (East/West) Park to the City, linkage between natural land restoration and historical interpretation is of particular importance in this park. Several activities can address natural lands restoration goals and enhance the interpretation of historical houses. These include developing open views between houses and the river and other houses ("viewsheds") and meadow management in areas near houses. The viewsheds will reinforce the link between the houses and the river which guided the development of the historical landscape. Meadows more closely approximate use of outlying lands during the period of historical occupancy of the houses. These activities serve natural restoration goals of increasing unusual habitats, and reducing runoff. Since establishment of viewsheds involves cutting trees on slopes, this activity is recommended only where it will not conflict with goals of enhancing significant woodlands. Lemon Hill is recommended as the initial site for viewshed work, both because of the lower amount of natural woods around it, and because of its historical importance.

Fairmount (East/West) Park is an important community resource for active and passive recreation. Development of environmental education and participation as a component of community use will enhance the parks and local communities. Most of the recommended activities provide opportunities for such participation. In particular, restoration is recommended at sites near the Horticultural Center and the planned Environmental Education and Visitor Center near Strawberry Mansion, since these sites can provide foci for education. Restoration of disturbed slopes and reforestation of the current tennis court area near Strawberry Mansion is recommended. In West Park, restorations around Concourse Lake, Centennial Lake, the Belmont and Lansdowne tributaries will improve the ecological value of these sites, enhance these areas for community use, and provide opportunities for environmental education.

Fairmount (East/West) Park combines a tremendous variety of uses and provide access to natural lands near the center of Philadelphia. The image of the woods of Fairmount (East/West) Park growing adjacent to the city center has been a defining symbol of Philadelphia as inheritor of Penn's vision of a "greene country towne" (Stevick 1996). Restoration activities in these parks will enhance these natural lands, which are a core part of City of Philadelphia.

4.D.2. General Recommendations for Future Activities

The prior section described specific activities that are recommended for implementation in Fairmount (East/West) Park. In addition to these, a number of other related activities are also recommended. These relate to overall operations in the park, particularly those involving

management of the borders between the designed and natural lands. Some of these are outside the direct purview of NLREEP and should be implemented in cooperation with other groups.

- Damage done to the natural lands by trash dumping is a major problem. Exercising control, through methods such as passive blocking of access points as well as patrolling and/or enforcement of regulations, is necessary to minimize or eliminate the damage.
- Non-native plantings in landscaped areas are often a source of invasion by these plants. An increased use of native plants in landscape settings and avoidance of particularly invasive species, such as Norway maple, is recommended in order to avoid this infiltration of non-native plant species.
- Decreasing the frequency of mowing can result in taller grass and other vegetation which increases water retention and provides better habitat. Implementation of a decreased mowing schedule in places where this does not interfere with other uses is recommended. However, monitoring of the areas of less frequent mowing should be done to ensure that they are not colonized by exotic invasive plants.
- Exotic plant species occur in both landscaped areas and natural lands. However, these species are often patchy in occurrence and may be controlled if addressed early. Occurrence of the species should be monitored throughout the parks
- Dumping of large quantities of logs, leaves and other horticultural waste is damaging and should be controlled. However, logs can be used in woods to increase soil fungus, decrease surface runoff, provide animal habitat and restrict access. Logs can also be used in wetlands and ponds as cover for amphibians and aquatic insects, basking sites for reptiles, and perching sites for birds. Mulch can be used in restoration plantings to improve soil and decrease unwanted plants. Methods of making these materials available for restoration can improve the success of restoration initiatives, while reducing the storage needs for these materials.

4.D.3. Suggested Implementation Schedule

Costs per acre for implementation of the various restoration activities were calculated and used to estimate costs for the restoration activities at the recommended sites. These estimates indicate that most, or all, of the high priority options would be achievable under NLREEP funding and other grants which were submitted for restoration work. As a result, no attempt was made to further develop an implementation schedule, i.e., to further prioritize sites among the high priority sites. Scheduling would depend on optimal times for performing various restoration activities and logistics involved in scheduling volunteers, contracting for commercial work, and making links with other agencies. Some particular considerations for implementation are:

- Some types of restoration, particularly control of invasives, will often require several treatments. Scheduling should allow for multiple treatments at optimal times.
- Scheduling should be done to optimize effectiveness. For example, control of exotics which spread by seed (e.g., garlic mustard, mile-a-minute, and possibly Japanese knotweed) should be done before seed set. Planting of most species is best done in spring or fall to minimize stress on newly planted material. Some species will have particular requirements, necessitating a more specific planting season.
- Scheduling should be done to minimize impacts of implementation. For example, stream bank stabilization in the spring may increase chances of washout by storms and effects on spawning fishes.

- Since many restoration projects are clustered, scheduling is important to avoid impacts on already completed projects and to increase efficiency of implementation.
- A maintenance schedule should be developed for different types of restorations. For replanting activities, several maintenance visits should be made during the first planting season to water new stock, control any invading unwanted plants, and, if necessary, plant additional material. For projects done early in the NLREEP funding period, additional visits will be possible in one or more seasons after planting, when control of invasives and other corrective activities can be done. These maintenance activities are expected to be inexpensive relative to the initial investment in restoration and can greatly increase probability of success and provide information to improve subsequent restoration work.
- Scheduling should allow for implementation of baseline and post-restoration monitoring programs. If such monitoring is not done by NLREEP, scheduling and notification should be done to give outside groups an opportunity to develop monitoring programs.

4.E. RESTORATION SITE ASSESSMENTS

The individual restoration site assessments for Fairmount (East/West) Park are presented on pages II-349 through II-421. The high priority sites are also shown on the Restoration Sites maps in Volume II, Section 4.F.6. The key to codes used in the restoration site assessments is given below.

Option priorities:

HP High priority to protect/monitor

HV High priority, can be immediately implemented by volunteers

HC High priority; coordination with other agencies should be sought to deal with large complex projects, joint responsibilities or regulatory issues.

H High priority, single action for site or multiple, equivalent actions for site

M Moderate priority

L Low priority

N Not recommended

Site Use constraints:

P Near playground, main paths, etc., where safety a potential issue

OM Ongoing mowing

D Likely ongoing disturbance

Fairmount Park Restoration Sites

Fairmount East and West Park

Park: FEW **Restoration Site ID:** S1.0 **Site Name:** Warner Creek (W. Trib. 10)

Location: Lansdowne and Cedar Grove Roads

General Location: West Park

Disturbance/Condition: Trash Dumping

Restoration Category Stream

Restoration Type: Channel **Constraints:** Poor Access

Acreage: 2.12

Site Priority: H **Location Criteria:** Isolated

Description:

This could be a good quality stream if trash were removed, dumping stopped and it were made more easily accessible. The stream was mostly dry at the time of assessment, but it appears to be fed by groundwater. This stream should be protected and monitored.

Restoration Options:

ID	Action	Priority	Proportion
C	Protect/Monitor	HP	100%
B	Structural Improvement (Trails)	H	15%
A	Trash Removal	H	100%

Park: FEW **Restoration Site ID:** S2.0 **Site Name:** Landsdowne Creek (W. Trib. 3)

Location: South of Horticultural Center, North of Lansdowne

General Location: West Park

Disturbance/Condition: Channel Gully

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.26

Site Priority: H **Location Criteria:** Near other cultural resources

Description:

There is a gully leading down to this stream that needs to be repaired. The possibility of installing a drop structure (steps, rockfalls) as an energy dissipater so that the gully does not continue to erode further should be assessed. A drop structure would allow the stormwater runoff to enter the stream in a more controlled way.

Restoration Options:

ID	Action	Priority	Proportion
A	Gully Repair and Prevention	H	100%
B	Detention Basin	M	100%

Park: FEW **Restoration Site ID:** S9.0 **Site Name:** Montgomery Crk or Belmont Valley (W. Trib. 4)

Location: E. of Belmont Ave., North of Montgomery Drive

General Location: West Park

Disturbance/Condition: None/Minimal

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 4.17

Site Priority: H **Location Criteria:** Affects ecolog. Significant site

Description:

This stream is one of the better streams in East/West Park, with less human impact than others. The channel is not incised, there are no sewer lines crossing it and the stream should be protected and enhanced.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%

Park: FEW **Restoration Site ID:** S10.0 **Site Name:** Belmont Valley Creek (W. Trib. 5)

Location: South of Chamounix Dr., east of Ridgeland Mansion

General Location: West Park

Disturbance/Condition: Slope Erosion

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 2.55

Site Priority: HP **Location Criteria:** Affects ecolog. Significant site

Description:

This stream is perhaps being impacted by storm water runoff and has periods of dryness. The stream should be protected and monitored.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%

Park: FEW **Restoration Site ID:** S11.0 **Site Name:** Belmont Glen Creek (W. Trib. 6)

Location: West of Ridgeland Mansion, S. of Chamounix Drive

General Location: West Park

Disturbance/Condition:

Restoration Category Stream

Restoration Type: Riparian Zone **Constraints:**

Acreage: 0.43

Site Priority: H **Location Criteria:** Near other restorations

Description:

Unlike many streams within the park, this stream starts as a seep, instead of a culvert. There is a cleared area where dirt, trees, and brush are being dumped into the stream. This dumping should be stopped. The debris should be removed, and the cleared area should be replanted. The site should then be protected and monitored.

Restoration Options:

ID	Action	Priority	Proportion
C	Protect/Monitor	HP	100%
B	Replant Native Herbs	H	30%
A	Trash Removal	H	100%

Park: FEW **Restoration Site ID:** S14.0 **Site Name:** Skuttens Run (W. Trib. 7)

Location: West of Recycling Center, S. of Ford Road

General Location: West Park

Disturbance/Condition: Channel Gully

Restoration Category Stream

Restoration Type: Riparian Zone **Constraints:**

Acreage: 0.90

Site Priority: H **Location Criteria:** Near other restorations

Description:

Erosion needs to be addressed where the stream flows alongside the trail, by maintaining the trail and buffering the stream to help stabilize the banks. The runoff from the trails should be controlled to prevent gullying by creating a berm or level spreader, which would force the water to run off as sheet flow, rather than channelizing, which causes gullies to form.

Restoration Options:

ID	Action	Priority	Proportion
A	Gully Repair and Prevention	H	100%
B	Infiltration/Berms	H	100%

Park: FEW **Restoration Site ID:** S14.02 **Site Name:** Ridgeland Creek & Skuttens Run (W. Trib. 8)

Location: West of Recycling Center, S. of Ford Road

General Location: West Park

Disturbance/Condition: None/Minimal

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.60

Site Priority: HP **Location Criteria:** Near other restorations

Description:

This is a small stream that is not being impacted by stormwater to any great extent. There is a skunk cabbage wetland area that is in good shape and should be protected and monitored, along with the stream.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%

Park: FEW **Restoration Site ID:** S15.0 **Site Name:** Greenland Creek (W. Trib. 9a)

Location: Just N of Ford Road, S. of Chamounix Drive

General Location: West Park

Disturbance/Condition: Erosion/Scour

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.25

Site Priority: H **Location Criteria:** Affects ecolog. Significant site

Description:

This site is across from the entrance to the Recycling Center. There is an area about 66 ft. wide that has been completely bulldozed and a bridge walkway has been built across the stream. Erosion has occurred along the bulldozed area and the stream banks. The stream is headcutting starting from where the bridge walkway has been installed and continuing upstream. This is occurring because the water flowing from upstream is trying to reach the now lower level of the waters downstream due to the area being dug out from construction and erosion. We recommend that this bank and the riparian zone be replanted with native species to control erosion.

It is also recommended that a natural drop structure be created to prevent further downcutting of the stream as the headcut migrates. This drop structure should be a waterfall or steps that reflect the natural surroundings and rocks found in the park.

Restoration Options:

ID	Action	Priority	Proportion
A	Bank Stabilization/Regrade	H	20%
C	Modify Channel	H	100%
B	Protect/Monitor	HP	100%

Park: FEW **Restoration Site ID:** S16.0 **Site Name:** Mt. Pleasant Creek (E. Trib. 1)

Location: East of Green Drive, SW of East Park Reservoir

General Location: East Park

Disturbance/Condition: None/Minimal

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.37

Site Priority: HP **Location Criteria:** Near other restorations

Description:

This is a good quality stream that does not have any stormwater impact. It should be protected and monitored.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%

Park: FEW **Restoration Site ID:** S18.0 **Site Name:** Mt. Pleasant Creek (E. Trib. 1)

Location: West of East Park Reservoir, E of Mt. Pleasant Dr.

General Location: East Park

Disturbance/Condition: None/Minimal

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.24

Site Priority: H **Location Criteria:** Near other restorations

Description:

There is a possibility for daylighting the section of this stream from the Memorial to Fairmount Park Employees down to the culvert (about 50 ft.). This would allow for the underground portion of the stream to be exposed to the open air again, allowing natural stream functions. The Philadelphia Water Department indicated that there were no sewer lines in this area that would interfere with the daylighting project. The site is near Fountain Green Drive, providing easy access to the site for machinery.

Restoration Options:

ID	Action	Priority	Proportion
A	Daylighting	H	100%

Park: FEW **Restoration Site ID:** V1.0* **Site Name:** Reduce mowed area (no mapped polygon)

Location: East and West Fairmount Park

General Location:

Disturbance/Condition: Maintained Lawn/Mowed Field

Restoration Category Vegetation

Restoration Type: Park Wide **Constraints:**

Acreage:

Site Priority: H **Location Criteria:** Affects ecolog. Significant site

Description:

This is a general recommendation to increase the woods in the park wherever possible. No polygon was mapped, as this recommendation applies to many mowed areas of the park. Existing woods in the park are small and heavily affected by edge disturbance (exotic plants, runoff, people, etc.). Even where good quality woods exist, they are generally too small to sustain populations of larger animals (e.g., birds). This recommendation is particularly important around Chamounix Mansion, where some of the larger woods in the park already exist.

Restoration Options:

ID	Action	Priority	Proportion
A	Mow Infrequently to Increase Woods	H	

Park: FEW **Restoration Site ID:** V1.01 **Site Name:** Schuylkill River Park

Location: Between Art Museum and Parkway

General Location: East Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Slope **Constraints:** On Fill

Acreage: 2.87

Site Priority: HV **Location Criteria:** Area with few other restoration opportunities

Description:

The area is highly disturbed, has a high density of exotic vegetation and would benefit by removing the exotics (Japanese knotweed, oriental bittersweet, etc.) and planting native trees and shrubs. Box elder is the dominant tree. The banks of the river are bulkheaded with concrete. Numerous trails run along the banks and through the woods. The entire site has compacted soils and planting will be a challenge. This natural area is in walking distance of Center City and is heavily used. The area will be part of a trail system which will link to Kelly Drive. This area would benefit from a planting of trees or shrubs. Tolerant plants will need to be used, because conditions are not ideal. A lot of construction waste was used to stabilize the slopes so preperation of soil is recommended.

Restoration Options:

ID	Action	Priority	Proportion
B	Remove Exotics/Replant Native Shrubs	HV	65%
A	Remove Exotics/Replant Native Trees	HV	25%

Park: FEW **Restoration Site ID:** V3.0* **Site Name:** Laurel Hill Forest & Slopes (no mapped polygon)

Location: Between Edgley Drive and Kelly Drive

General Location: East Park

Disturbance/Condition: None/Minimal

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage:

Site Priority: HV **Location Criteria:** Near other cultural resources

Description:

This entry describes sites V3.01, V3.02 and V3.03 and does not have a separate mapped polygon. The woods, including the ravine and steeply sloped forest, runs along Kelly Drive up to Edgley Drive. On the flat portion on the top just above the slopes is a disturbed buffer which has the typical problems of trash and invasives. Norway maple and tree-of-Heaven (Ailanthus) along with planted pines line the edge. Japanese knotweed is also present. Construction of new curbing near the mansion has also disturbed the edge.

Around the mansion is a planted landscape with a viewshed which opens a vista to the river and adjacent slopes.

The upper edge of the forest, along the edge of the plateau, shows the most disturbance, with Norway maple and Japanese knotweed as common exotic species. In contrast, the interior of the woods is in better condition.

Restoration Options:

ID	Action	Priority	Proportion
B	Invasive-Exotic Control	HV	25%
A	Trash Removal	HV	100%

Park: FEW **Restoration Site ID:** V3.01 **Site Name:** Laurel Hill Woods

Location: North section of Laurel Hill Woods

General Location: East Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage: 4.65

Site Priority: HV **Location Criteria:** Near environmental Center

Description:

The northern section of the Laurel Hill forest is disturbed along the perimeter of the forest which runs down the slope to Kelly Drive. The interior forest on the slope is healthier, although Japanese knotweed is growing along the tributary. A buffer planting along with exotic removal will protect and enhance the sloped forest and is recommended for this site. One recommendation is a white pine buffer which will shade the edge helping to cut down on vines infiltrating the canopy.

There are stone steps and a trail leading up the ravine from Kelly Drive. The upper part of this trail is in disrepair, so there is no maintained path up to the top of the slopes. This leads to trampling of the upper part of the slope. In addition, runoff from Strawberry Mansion Drive flows over the curb and onto the parth and ravine.

Restoration Options:

ID	Action	Priority	Proportion
C	Trail Improvement	H	5%
A	Edge Tree/Shrub Planting	HV	20%
B	Remove Exotics/Replant Native Trees	HV	30%

Park: FEW **Restoration Site ID:** V3.02 **Site Name:** Laurel Hill Forest

Location: Laurel Hill Forest-Southern section

General Location: East Park

Disturbance/Condition: None/Minimal

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage: 8.00

Site Priority: H **Location Criteria:** Affects ecolog. Significant site

Description:

The forest south of Laurel Hill Mansion has a disturbed edge with Japanese knotweed and Norway maple. However, the forest quickly changes to a healthy system with a stratified understory, so that the area should be protected and monitored. This forest forms a steep ravine leading to a tributary and connects to another portion of woods which leads to Mount Pleasant. Enhancing the edge is recommended to protect the forest. Wherever possible, the mowed area between the road and the woods needs to be released to create tall grass buffer.

Restoration Options:

ID	Action	Priority	Proportion
E	Edge management	H	10%
C	Protect/Monitor	HP	100%
D	Release/Widen	H	15%
A	Edge Tree/Shrub Planting	HV	5%
B	Remove Exotics/Replant Native Forest	HV	5%

Park: FEW **Restoration Site ID:** V3.03 **Site Name:** Laurel Hill Slope

Location:

General Location: East Park

Disturbance/Condition: Slope Erosion

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage: 0.85

Site Priority: HV **Location Criteria:** Near other restorations

Description:

There are erosion gullies on the slope down to Kelly Drive. Extending the edge of the woods (see other restoration activities in this area) will reduce storm water impacts. Gully repair (check bars, etc.) can further reduce gully erosion.

Restoration Options:

ID	Action	Priority	Proportion
A	Gully Repair	HV	20%

Park: FEW **Restoration Site ID:** V4.0 **Site Name:** Lemon Hill Viewshed

Location: Directly in front of the Lemon Hill Mansion

General Location: East Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 1.22

Site Priority: H **Location Criteria:** Near other cultural resources

Description:

This area is presently a narrow strip of disturbed forest. The recommendation is to remove the large trees and manage as a meadow to provide a viewshed to/from the mansion. This will increase presence of early successional plants and assist interpretation of the historic landscape of the area.

Restoration Options:

ID	Action	Priority	Proportion
B	Meadow Management	H	50%
C	Remove Exotics/Replant Native Herbs	H	50%
A	Remove Exotics/Replant Native Shrubs	H	50%

Park: FEW **Restoration Site ID:** V4.02 **Site Name:** Lemon Hill/Sedgley Porter Sloped Forest

Location: Between Sedgley Porter Dr. and Kelly Drive

General Location: East Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage: 6.62

Site Priority: HV **Location Criteria:** Affects ecolog. Significant site

Description:

The Lemon Hill/Sedgley Porter sloped forest is thin and subject to erosion given its steep slope. The soils are thin. There are a number of invasive species in the forest. However, the greatest danger to the slopes is continued erosion, which creates opportunities for more invasives to take root.

Restoration Options:

ID	Action	Priority	Proportion
B	Erosion Control	HV	10%
A	Remove Exotics/Replant Native Shrubs	L	20%

Park: FEW **Restoration Site ID:** V4.03 **Site Name:** Lemon Hill Plateau

Location: Adjacent to Lemon Hill Mansion

General Location: East Park

Disturbance/Condition: Maintained Lawn/Mowed Field

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 1.62

Site Priority: H **Location Criteria:** Near other restorations

Description:

The plateau is a heavily used portion of East Park. A planting on the top of the plateau would help absorb and hold storm water at the top of the slope, lessening impact on the slopes of storm water runoff. This, however, is impractical, so we recommend adding berms to the edges of the plateau so it can slow down the velocity of the runoff as well as hold some of the water at the top of the slope so it can be gradually absorbed.

Care must be taken given the archeological importance of the site.

Maintaining part of the plateau as meadow may reduce storm water runoff.

Restoration Options:

ID	Action	Priority	Proportion
A	Regrade For Storm Water Infiltration	H	1%
B	Meadow Management	L	100%

Park: FEW **Restoration Site ID:** V5.0* **Site Name:** Mt. Pleasant Woods Sites (no mapped polygon)

Location: East of railroad, surrounding Mt. Pleasant.

General Location: East Park

Disturbance/Condition: Trash Dumping

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage:

Site Priority: HV **Location Criteria:** Near other cultural resources

Description:

This site is a large wooded slope forest running from Fountain Green Drive westward to Kelly Drive. This is an opportunity to create open meadows in East Park, increase woodlands and open a viewshed into a historic site. The canopy in this part of the park is being taken over by grape and poison ivy vines. These vines need to be controlled and the lawn waste in the area should be cleared. Barriers may need to be placed at the entrance to the area to stop dumping. This area should then be protected and monitored. In addition there is an opportunity to create more woods by releasing edge along mowed perimeter. There are erosion gullies along the slope in places; improvement of buffer vegetation at the top of the slope, gully repair and replanting can control the erosion.

This site does not have an associated polygon on the map. It is a recommendation for the whole area that includes sites 5.01.

Restoration Options:

ID	Action	Priority	Proportion
D	Edge management	H	
A	Erosion Control	H	
B	Meadow management	H	
C	Remove Exotics/Replant Native Forest	H	

Park: FEW **Restoration Site ID:** V5.01 **Site Name:** Mt. Pleasant Slope

Location: Southeast and Northwest of Mansion

General Location: East Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage: 9.43

Site Priority: HV **Location Criteria:** Near other cultural resources

Description:

The site is on a steep slope typical of East Park. The forest has associated edge problems which are compounded by human trampling. Release of the mowed field along Fountain Green Drive to meadow would improve natural habitat, increase water retention, and assist historic interpretation of Mt. Pleasant. There are gullies on the wooded slope, which should be repaired.

Restoration Options:

ID	Action	Priority	Proportion
D	Meadow management	H	20%
B	Edge Tree/Shrub Planting	HV	20%
C	Erosion Control	HV	5%
A	Trash Removal	HV	100%

Park: FEW **Restoration Site ID:** V6.01 **Site Name:** Rockland Woods

Location: Rockland Mansion to Ormiston Mansion

General Location: East Park

Disturbance/Condition:

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage: 17.21

Site Priority: H **Location Criteria:** Affects ecolog. Significant site

Description:

This site includes the forest and ravine at the northern section of the area which runs from Rockland to Ormiston mansions. This is one of the larger forest sections in East Park. It contains a variety of trees, has large patches of spring ephemeral herbs, and contains several seeps. Exotic control and edge planting would enhance the site and help buffer the woods Edge management should address typical edge problems. Vines are the primary disturbance along the perimeter of the woods. The designed/mowed parkland surrounds the edge and creates an open sunny area advantageous to the growth of vines. The mowed area can be reduced and plantings along the edge may help reduce the spread of vines.

The area has some old hickory, beech and oak tres, but Japanese knotweed and oriental bittersweet have also begun to invade the area. There are a few large canopy gaps where vines are taking over the understory. Devil's walking stick is also found as a common understory tree along the slopes. These exotics should be controlled. After the exotics are removed, native tree and shrub plantings will benefit the site. Edge management is recommended.

There is erosion along the main trail along the tributary, especially upstream of and along side the small dam, where trampling and runoff are creating gullies and bare areas. The erosion should be addressed by replanting and possibly other trail management techniques.

Restoration Options:

ID	Action	Priority	Proportion
B	Edge Tree/Shrub Planting	H	20%
C	Protect/Monitor	HP	100%
F	Remove Exotics/Replant Native Forest	HV	15%
D	Trash Removal	HV	100%
E	Trail Improvement	HT	10%

Park: FEW **Restoration Site ID:** V6.03 **Site Name:** Rockland meadow

Location: Between Rockland and Ormiston Mansion

General Location: East Park

Disturbance/Condition: Maintained Lawn/Mowed Field

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 3.99

Site Priority: H **Location Criteria:** Tied to storm water, watershed restoration

Description:

This area is presently mowed irregularly and does not seem to be used for recreation. The area is a good place for a meadow and it could add visual interest as well as improving water retention and habitat on the plateau. After release, the area must be monitored for invasives.

Restoration Options:

ID	Action	Priority	Proportion
A	Meadow Management	H	100%
B	Release/Widen	H	100%

Park: FEW **Restoration Site ID:** V8.0 **Site Name:** Cliffts Meadow

Location: West of 33rd Street, near Cliffts House

General Location: East Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 8.48

Site Priority: H **Location Criteria:** Affects ecolog. Significant site

Description:

Invasive removal and planting are highly recommended for this site. After exotics are removed, reintroduction of native grasses is recommended to increase the biodiversity in the park. This is an open meadow area especially rare in East Park and is surrounded by disturbed woods. Several species of birds which are uncommon in East and West Park were found in this area. Box elder saplings are invading the meadow. These should be cut to maintain the open meadow. In the northeast section of the open area, there is a small wet area that is mainly comprised of common reed (Phragmites); the Phragmites should be controlled.

Restoration Options:

ID	Action	Priority	Proportion
B	Meadow Management	H	100%
A	Remove Exotics/Replant Native Herbs	H	15%

Park: FEW **Restoration Site ID:** V9.0* **Site Name:** Smith Playground Forest (no mapped polygon)

Location:

General Location: East Park

Disturbance/Condition: Disturbed Floodplain

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage:

Site Priority: HV **Location Criteria:** Near other cultural resources

Description:

This site includes all the sites in the vicinity of the Smith Playground and therefore is not mapped as a separate polygon. If none of the single actions are undertaken, the recommendation is to protect and monitor.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	
B	Invasive-Exotic Control	HV	

Park: FEW **Restoration Site ID:** V9.01 **Site Name:** Smith Playground Forest

Location: West of Playground, east of Fountain Green Drive

General Location: East Park

Disturbance/Condition: Lack of understory/herbaceous layer

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage: 2.38

Site Priority: H **Location Criteria:** Near other restorations

Description:

This area, located north and west of the playground, is a riparian zone that should be replanted with native shrubs. Trash clean-up and vine removal are also recommended.

Restoration Options:

ID	Action	Priority	Proportion
B	Remove Exotics/Replant Native Shrubs	H	10%
A	Trash Removal	H	100%

Park: FEW **Restoration Site ID:** V9.02 **Site Name:** Smith Playground field

Location: East of Fountain Green Drive

General Location: East Park

Disturbance/Condition: Maintained Lawn/Mowed Field

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:** Active Recreation

Acreage: 4.52

Site Priority: H **Location Criteria:** Near other restorations

Description:

This area, located south and east of the playground, is a riparian zone that should be replanted with native trees. Trash clean-up and vine removal are also recommended.

Restoration Options:

ID	Action	Priority	Proportion
C	Meadow Management	H	90%
A	Release/Widen	H	100%
D	Remove Exotics/Replant Native Shrubs	H	5%
B	Remove Exotics/Replant Native Trees	H	5%

Park: FEW **Restoration Site ID:** V10.0 **Site Name:** Reservoir Drive Riparian Zone

Location: West of Reservoir Drive by Smith Playground

General Location: East Park

Disturbance/Condition: Mowed/No Riparian Zone

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:** D

Acreage: 3.26

Site Priority: H **Location Criteria:** Near other restorations

Description:

The riparian zone would benefit from less mowing and from riparian plantings. The dominant trees along the bank are tulip poplar, ash and crabapple. Spicebush and blackberry are widespread in the understory.There is a moderate amount of oriental bittersweet that should be removed before any restoration activities begin. Other exotics, such as multiflora rose, Japanese honeysuckle, and Japanese knotweed should also be controlled.

The area is used by the disk golf course. The trail over the stream leading to a golf basket is eroded and needs to be repaired. The area accumulates trash, which should be removed.

Restoration Options:

ID	Action	Priority	Proportion
A	Invasive-Exotic Control	H	100%
B	Release/Widen	H	10%
C	Remove Exotics/Replant Native Forest Species	H	2%
D	Trash Removal	H	100%
E	Trail Improvement	HT	100%

Park: FEW **Restoration Site ID:** V10.02 **Site Name:** Smith Playground Tributary

Location: Smith Playground trib just above R.R. tracks

General Location: East Park

Disturbance/Condition: Disturbed Floodplain

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:** D

Acreage: 0.95

Site Priority: H **Location Criteria:** Near other restorations

Description:

The site contains a small area of native wetland plants, with exotics in surrounding areas. There is poor access to the area. Control of exotic species and replanting native wetland species would increase the size and value of this wetland.

Restoration Options:

ID	Action	Priority	Proportion
B	Remove Exotics/Replant Native Herbs	H	20%
C	Remove Exotics/Replant Native Shrubs	H	5%

Park: FEW **Restoration Site ID:** V12.0 **Site Name:** 33rd Street Tennis Courts

Location: 33rd and Susquehanna

General Location: East Park

Disturbance/Condition: Abandoned Recreation Facility

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:** Possible open space use

Acreage: 11.02

Site Priority: H **Location Criteria:** Near environmental Center

Description:

Currently, this area has been poorly maintained and the tennis courts are little used. The site is near the planned environmental center, so that this site could be a focus for volunteer activity. Replanting to create a forested site is recommended, since there is relatively little woods in East Park, especially on the plateau. Reforestation will increase biodiversity and would replace impervious surface with forest providing better infiltration of storm water.

Restoration Options:

ID	Action	Priority	Proportion
B	Remove structure/Plant native forest species	H	100%

Park: FEW **Restoration Site ID:** V12.01 **Site Name:** East Park Reservoir

Location: East Park Reservoir

General Location: East Park

Disturbance/Condition: Abandoned Land

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:** not yet owned by park; competing uses

Acreage:

Site Priority: HP **Location Criteria:** Near environmental Center

Description:

East Park Reservoir is no longer used for water supply, although it is still managed by the Philadelphia Water Department (PWD). It is an important migratory and wintering site for waterfowl, including plant eating diving ducks which have become increasingly uncommon in Philadelphia. The pond contains submerged aquatic vegetation and fish, although the fish communities have not been surveyed.

The park should work with PWD to protect this site. Transfer of the reservoir to FPC would allow long term protection and restoration. Reforestation of sections of the berms around the reservoir accompanied with exotic control could improve habitat quality. Additional activities may be valuable in the reservoir itself, but these cannot be specified without more information on the reservoir.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%
F	Remove Exotics/Replant Native Forest Species	M	30%
E	Structural Construction/Improvement	L	100%

Park: FEW **Restoration Site ID:** V14.0 **Site Name:** Sedgely Drive Parking Area

Location: Between Poplar Drive and Sedgely Drive

General Location: East Park

Disturbance/Condition: Maintained Lawn/Mowed Field

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 7.77

Site Priority: HV **Location Criteria:** Near other cultural resources

Description:

Storm water from the overflow parking lot is causing small erosion gullies. These gullies should be filled and replanted. In addition, release of mowed areas, invasive control, and replanting of meadow and forest vegetation over parts of the site would enhance the area. However, because of the relatively small amount of natural land in this area, this is not a high priority.

Restoration Options:

ID	Action	Priority	Proportion
B	Slope Stabilization	HV	10%
C	Invasive-Exotic Control	M	100%
D	Meadow Management	M	15%
A	Remove Exotics/Replant Native Forest Species	M	15%

Park: FEW **Restoration Site ID:** V16.0 **Site Name:** Strawberry Mansion Drive Park

Location: North of Strawberry Mansion

General Location: East Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:** Poor Access

Acreage: 0.63

Site Priority: HV **Location Criteria:** Near other restorations

Description:

In general the woods in and along Strawberry Mansion are thin and impacted by invasive vegetation. A reproducing understory of tree-of-heaven (Ailanthus altissima) has filled in on top of the gas pipe. Vines on the edge are climbing into the trees; these vines include English ivy, which is particularly thick on the south facing slope. Creation of a viewshed is not recommended for this site. The area is not easily accessible to the public given the configuration of roads and the steepness of the site. The site is near the planned environmental center, making this site an attractive focus for restoration. Invasive control together with planting could enhance the area.

Restoration Options:

ID	Action	Priority	Proportion
B	Invasive-Exotic Control	HV	100%
A	Remove Exotics/Replant Native Shrubs	HV	15%

Park: FEW **Restoration Site ID:** V16.01 **Site Name:** Robin Hood Dell Woods

Location:

General Location: East Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Slope **Constraints:** Poor Access

Acreage: 2.81

Site Priority: HV **Location Criteria:** Near other restorations

Description:

This site is near the planned environmental center, so that this would be a good site for restoration. Removal of invasive plants and trash removal would enhance the site.

Restoration Options:

ID	Action	Priority	Proportion
B	Invasive-Exotic Control	HV	100%
C	Trash Removal	HV	100%

Park: FEW **Restoration Site ID:** V16.02 **Site Name:** Strawberry Mansion Woods

Location: South side of S. Strawberry Mansion Rd.

General Location: East Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:** D

Acreage: 1.62

Site Priority: HV **Location Criteria:** Near other cultural resources

Description:

The wooded slopes between Strawberry Hill Drive and South Strawberry Mansion Drive are disturbed, especially along the edge. There are many gaps in the canopy, English ivy is climbing into the canopies of the trees, and vines are advancing inward from the edges. The area is near the planned environmental center and would be a good site for restoration by volunteers. Removal of trash and control of invasives would be primary activities. Replanting of natives would enhance the site as well. However, continued control of invasives may be necessary to maintain the plantings.

Rogue trails along and down the slope are eroding and fragmenting the woods. These trails should be improved or closed.

Restoration Options:

ID	Action	Priority	Proportion
C	Invasive-Exotic Control	HV	100%
A	Trash Removal	HV	100%
D	Remove Exotics/Replant Native Shrubs	M	15%
B	Trail Improvement	HT	5%

Park: FEW **Restoration Site ID:** V20.0 **Site Name:** Concourse Lake

Location: South Concourse Road

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Lake **Constraints:**

Acreage: 0.47

Site Priority: H **Location Criteria:** Near other cultural resources

Description:

This is a man-made structure that presently has large numbers of Canada geese which nest in the vicinity. Removing the trash from the pond and the exotic species purple loosestrife and common reed (Phragmites) are recommended.

The walkway around the lake is in need of repair. One option is to remove the broken concrete, regrade the edge, and replant the bank with native grasses, forbs and shrubs. This option can be done in cooperation with the Park's capital program, with the Park removing the concrete and the planting being done by volunteers using NLREEP planting materials. The concrete on the north side of the lake is generally in good condition, ties to the piping between the ponds, and is used for access, while the concrete on the southern side is in poor condition. Therefore, it is preferable to remove the concrete along the south side and retain the concrete along the north side. Fencing should be placed around new plantings to protect plants from Canada geese.

Restoration Options:

ID	Action	Priority	Proportion
B	Invasive-Exotic Control	H	100%
E	Replant herbs	H	10%
D	Replant shrubs	H	10%
A	Trash Removal	H	100%
C	Remove Structure	HC	100%

Park: FEW **Restoration Site ID:** V21.0* **Site Name:** Centennial Lake Sites (no mapped polygon)

Location: West of Belmont Ave

General Location: West Park

Disturbance/Condition:

Restoration Category Vegetation

Restoration Type: Lake **Constraints:**

Acreage:

Site Priority: H **Location Criteria:** Near other restorations

Description:

This site does not have an associated polygon on the map. These are general recommendations for the whole Centennial Lake area. This site includes polygons 21.01, 21.02 and 21.03. Specific recommendations are listed for these sites.

The overall objectives for the site are to provide a greater buffer of natural lands around the lake, to control exotics and increase biodiversity of native plants in and around the lake, and to repair gullies along the lake edge.

The areas on the southwest side of the lake and surrounding the weeping cherry allee should be mowed less frequently. These buffer areas should be planting with tall grasses. Exotic species, such as purple loosestrife, should be removed from the lake and the floodplain of the tributary feeding the lake. Appropriate species of trees, shrubs and herbs should be planted in wetland along the tributary, along the shore of the lake and in the riparian zone of the lake. Fencing should be placed around plantings to protect them from geese.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	
C	Release/Widen Riparian zone	H	
B	Trash Removal	HV	

Park: FEW **Restoration Site ID:** V21.01 **Site Name:** Centennial Lake

Location: West Park, West of Belmont Avenue

General Location: West Park

Disturbance/Condition: Trash Dumping

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 2.11

Site Priority: H **Location Criteria:** Near other restorations

Description:

This could be an opportunity for volunteers to participate in clean-up activities. Access to the lake, which facilitates dumping, should also be controlled. Residents at the community meeting specifically wanted an area to picnic and enjoy the lake. A bike path has been installed adjacent to the lake and provides easy access to the site. Construction of an overview platform and hard surface picnic area to direct access and reduce trampling of vegetation and compaction of soil is recommended.

Restoration Options:

ID	Action	Priority	Proportion
B	Build Access Platform	H	100%
D	Control Access	H	100%
A	Protect/Monitor	HP	100%
C	Trash Removal	HV	100%

Park: FEW **Restoration Site ID:** V21.02 **Site Name:** Centennial Lake Wetland

Location: North of Centennial Lake

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 0.47

Site Priority: H **Location Criteria:** Near other restorations

Description:

A small forested wetland abuts the north end of the lake. Purple loosestrife should be controlled, and native wetland species should be planted to enhance this area.

Restoration Options:

ID	Action	Priority	Proportion
A	Remove Exotics/Replant Native Herbs	H	30%

Park: FEW **Restoration Site ID:** V21.03 **Site Name:** Centennial Lake Riparian Zone

Location: Surrounding the lake

General Location: West Park

Disturbance/Condition: Mowed/No Riparian Zone

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage: 0.36

Site Priority: H **Location Criteria:** Near other restorations

Description:

Presently, there is approximately a 15 foot buffer of woods surrounding the lake. This includes trees such as black oak, black cherry and slippery elm. The area could be increased by stopping mowing and replanting native trees appropriate for riparian zone conditions. Alternately, if more open areas are desired instead of woods, this area could be maintained as meadow or as a mix of meadows and trees. This area also has one large gully that is in need of repair. Increasing the width of the buffer by reducing the mowed area will reduce habitat for Canada geese.

Restoration Options:

ID	Action	Priority	Proportion
C	Gully Repair	H	10%
D	Meadow Management	H	90%
A	Release/Widen	H	100%
B	Replant Native Forest Species	H	10%

Park: FEW **Restoration Site ID:** V23.0* **Site Name:** George's Hill Sites (no mapped polygon)

Location: South of Wynnefield Ave.

General Location: West Park

Disturbance/Condition:

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:**

Acreage:

Site Priority: HV **Location Criteria:** Near other restorations

Description:

This site does not have an associated polygon on the map. It is a recommendation for the whole area around George's Hill and includes sites, 23.02, 23.03, 23.04, 23.05.

George's Hill is a large forested section of the park close to the Mann Center for the Performing Arts and an outdoor pavilion. This is one of the most highly disturbed forests in West Park. Adjacent old fields connect to the woods and offer an opportunity for enhancement and protection. Trash is found throughout, and cars drive on part of the open mowed areas.

The former George's Hill Reservoir (also known as the 24th Ward Reservoir) was located on this site, and some of the woods and fields are regrowth on the banks of the hill on which the reservoir was built and on the floor of the reservoir.

Restoration Options:

ID	Action	Priority	Proportion
A	Invasive-Exotic Control	HV	
B	Trash Removal	HV	

Park: FEW **Restoration Site ID:** V23.02 **Site Name:** George's Hill Undisturbed Woods

Location:

General Location: West Park

Disturbance/Condition: None/Minimal

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 2.17

Site Priority: H **Location Criteria:** Near other restorations

Description:

These woods have large amounts of vines and other invasive plants. The area probably represents regrowth along the edge of the woods and into formerly mowed areas with landscape tree plantings. Control of vines and invasives and planting of shrubs and trees will enhance this area.

Restoration Options:

ID	Action	Priority	Proportion
A	Edge Management	H	15%
C	Remove Exotics/Replant Native Shrubs	H	30%
B	Remove Exotics/Replant Native Trees	H	30%

Park: FEW **Restoration Site ID:** V23.03 **Site Name:** George's Hill Old Fields

Location:

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 4.86

Site Priority: H **Location Criteria:** Near other restorations

Description:

This area, which was probably formerly mowed or part of the reservoir bottom, has become an old field with native grasses and herbs. Control of invasives and maintenance of field habitat will preserve this floral community and provide a buffer to the woods.

Restoration Options:

ID	Action	Priority	Proportion
B	Edge Management	H	15%
A	Invasive-Exotic Control	H	50%
C	Meadow Management	H	85%

Park: FEW **Restoration Site ID:** V23.04 **Site Name:** George's Hill Woodlot

Location: Adjacent to old fields and large woods

General Location: West Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 2.44

Site Priority: H **Location Criteria:** Near other restorations

Description:

The small wooded area is probably a result of release some years ago. Tree planting (e.g., early successional trees at the edge and later successional trees in the interior) will improve this site. Edge management (control of invasives, periodic mowing of a narrow buffer strip) will further help buffer the woods here.

Restoration Options:

ID	Action	Priority	Proportion
B	Edge Management	H	15%
C	Remove Exotics/Replant Native Trees	H	40%

Park: FEW **Restoration Site ID:** V23.05 **Site Name:** Park Side Sloped Forest

Location: Across from Mann Center for the Performing Arts

General Location: West Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage: 4.71

Site Priority: HV **Location Criteria:** Near other restorations

Description:

Two good stands of oaks with native understory (e.g., may-apple) straddle the ravine behind the pavilion across the street from Mann Center for the Performing Arts. There are a number of exotic species in the site, including Japanese knotweed, oriental bittersweet and wineberry. There is also some gully erosion on the site. There should be control of the invasives and gully repair, after which the area between the two communities can be planted with oaks and other native species to enlarge the oak forest.

Trail problems were noticed during field visits along the slopes.

Restoration Options:

ID	Action	Priority	Proportion
B	Gully Repair	HV	10%
D	Remove Exotics/Replant Native Shrubs	HV	15%
C	Remove Exotics/Replant Native Trees	HV	15%
A	Trail Improvement	HT	15%

Park: FEW **Restoration Site ID:** V24.0 **Site Name:** Recycling Center Forest Reforestation

Location: Southeast of Ridgeland Mansion

General Location: West Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 15.86

Site Priority: H **Location Criteria:** Near other restorations

Description:

This area is located close to the Recycling Center. It was categorized as a shrub area, but it has grown over with Norway maple, sycamore maple and multiflora rose in the shrub layer. It contains tulip poplar and beech tree as canopy dominants. Removing the exotics and replanting native trees would close the canopy gaps and prevent further invasion by similar species. The Recycling Center forest is a large disturbed area presenting a good opportunity for forest planting, in conjunction with meadow and edge management and woodlands expansion of the adjacent old fields and open mowed areas. Within the forest and particularly at the eastern edge of the woods closest to the Recycling Center, umbrella magnolia (Magnolia tripetala) is aggressively advancing. Recommended for this area is a planting of red and black oak saplings and other species to the understory. One resident said he knew of several fox dens in this area.

Restoration Options:

ID	Action	Priority	Proportion
E	Edge Management	H	5%
D	Meadow Management	H	10%
A	Remove Exotics/Replant Native Trees	H	3%
B	Trash Removal	H	50%
C	Invasive-Exotic Control	HV	100%

Park: FEW **Restoration Site ID:** V24.01 **Site Name:** Nursery Old Fields

Location: North East of Wellness Center

General Location: West Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 6.41

Site Priority: H **Location Criteria:** Near other restorations

Description:

Abandoned old fields can be enhanced with additional plantings creating better habitat for birds and butterflies. The site contains patches of many exotics, including multiflora rose, Japanese honeysuckle and oriental bittersweet. This may be a good candidate for prescribed burning.

Restoration Options:

ID	Action	Priority	Proportion
D	Edge Management	H	15%
C	Meadow Management	H	20%
B	Gully Repair	M	10%
A	Remove Exotics/Replant Native Shrubs	L	30%

Park: FEW **Restoration Site ID:** V24.02 **Site Name:** Army Road Exotic Forest

Location: Northeast of Army Road, Southwest of Recycling Cen

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 2.14

Site Priority: H **Location Criteria:** Near other restorations

Description:

These woods are predominantly tulip poplar and ash. There are some oaks and hickories, as well. The forest north of this area is in relatively good condition. The exotics (Japanese knotweed, garlic mustard and Japanese honeysuckle) should be controlled from this small patch before they have the opportunity to invade the better section of woods.

Restoration Options:

ID	Action	Priority	Proportion
A	Remove Exotics/Replant Native Shrubs	H	20%
B	Remove Exotics/Replant Native Trees	H	5%

Park: FEW **Restoration Site ID:** V24.03 **Site Name:** Wellness Center Forest

Location: Wellness Center Forest

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage: 8.62

Site Priority: H **Location Criteria:** Near other restorations

Description:

This is mainly a tulip poplar-beech woods, but contains exotic trees such as Norway maple and sycamore maple. It contains a variety of other exotics, including Japanese knotweed. Removal of trash, invasive control and replanting of native trees and shrubs are recommended.

Restoration Options:

ID	Action	Priority	Proportion
B	Remove Exotics/Replant Native Shrubs	H	8%
D	Remove Exotics/Replant Native Trees	H	8%
A	Trash Removal	HV	100%
C	Trail Improvement	HT	5%

Park: FEW **Restoration Site ID:** V24.04 **Site Name:** West Tributary 7 Wetland

Location: West of Wellness Center

General Location: West Park

Disturbance/Condition: None/Minimal

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 1.00

Site Priority: HP **Location Criteria:** Near other restorations

Description:

This site includes the stream and wetland on both sides of the stream. Fish were observed here, and it appears to be a healthy wetland when it was observed in the wintertime. In the summer the area was overgrown with jewelweed and there was hardly any water in it. The recommendation is to protect and monitor the wetland.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%

Park: FEW **Restoration Site ID:** V25.0* **Site Name:** Montgomery Drive Sites (no mapped polygon)

Location: Montgomery Ave. and Belmont Drive

General Location: West Park

Disturbance/Condition:

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage:

Site Priority: HP **Location Criteria:** Near other cultural resources

Description:

This site does not have an associated polygon on the map. These recommendations apply to the whole area and includes restoration sites 25.01 and 25.02.

The recommendation is to enhance this area through several small projects, which include removing exotic species, replanting natives and releasing park land to serve as a buffer around the small stream. See the related sites for more detailed information on this area.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%

Park: FEW **Restoration Site ID:** V25.01 **Site Name:** Montgomery Drive Wetland

Location: North of Horticulture Drive, South of Montgomery

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:** Possible Open Space

Acreage: 0.98

Site Priority: H **Location Criteria:** Near other cultural resources

Description:

This small wet area is part of the larger site V25. It contains Japanese knotweed, which should be removed, and the area should be replanted with appropriate native wetland species.

Restoration Options:

ID	Action	Priority	Proportion
A	Remove Exotics/Replant Native Herbs	H	20%

Park: FEW **Restoration Site ID:** V25.02 **Site Name:** Montgomery Drive Woods

Location: North of Horticulture Drive, South of Montgomery

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 3.11

Site Priority: H **Location Criteria:** Near other cultural resources

Description:

The recommendation for this area is removal of exotics and replanting of a native meadow as a buffer around the woods.

Restoration Options:

ID	Action	Priority	Proportion
B	Meadow Management	H	75%
A	Remove Exotics/Replant Native Herbs	H	75%

Park: FEW **Restoration Site ID:** V26.01 **Site Name:** BioBlitz Planting

Location:

General Location: West Park

Disturbance/Condition: Mowed/No Riparian Zone

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage: 0.87

Site Priority: HV **Location Criteria:** Near other cultural resources

Description:

This area was planted during Bioblitz 98. The mowed area should be reduced, Japanese knotweed should be controlled, and native riparian trees and shrubs should be planted. Stilt-grass (Microstegium) is taking over the stream bank planting, and it should be controlled.

Restoration Options:

ID	Action	Priority	Proportion
C	Release/Widen	H	15%
A	Remove Exotics/Replant Native Shrubs	HV	40%
B	Remove Exotics/Replant Native Trees	HV	40%

Park: FEW **Restoration Site ID:** V26.02 **Site Name:** Japanese House Wetlands

Location: East of House and Garden

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 0.42

Site Priority: H **Location Criteria:** Near other cultural resources

Description:

Remove Japanese knotweed and expand wetland east and west toward the spring.

Restoration Options:

ID	Action	Priority	Proportion
A	Remove Exotics/Replant Native Herbs	H	100%
B	Wetland creation/expansion	M	30%

Park: FEW **Restoration Site ID:** V26.03 **Site Name:** Japanese House Wetland

Location: East of Belmont Avenue, West of Japanese House

General Location: West Park

Disturbance/Condition: Lack of understory/herbaceous layer

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 0.35

Site Priority: HV **Location Criteria:** Near other cultural resources

Description:

The vegetation is comprised of beech, crabapple, sweetgum and pin oak. There is an overall lack of understory vegetation. There is a small patch of Japanese knotweed that should be removed from the site, and the area should be replanted with appropriate native wetland species.

Restoration Options:

ID	Action	Priority	Proportion
B	Invasive-Exotic Control	HV	100%
C	Remove Exotics/Replant Native Herbs	HV	10%

Park: FEW **Restoration Site ID:** V27.0 **Site Name:** Belmont Avenue Woods

Location: West of George's Hill

General Location: West Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 14.72

Site Priority: H **Location Criteria:** Tied to storm water, watershed restoration

Description:

The forest is adjacent to George's Hill and adds to the natural lands in this area in the park providing one of the largest stands of forest in this part of the park. The edge of the forest has the typical problems of East and West Park, such as exotic shrubs and trees (tree-of-Heaven, Japanese honeysuckle, oriental bittersweet and trash dumping. However, the interior of the woods is in relatively good condition, containing tulip poplar, black walnut, slippery elm, red oak, white oak, and shagbark hickory. The woods include springs and streams which were identified as good quality by the stream assessment.

Options A-C: Recommendations for the main wooded area are to remove exotics (mainly on the edge), and replant native forest species (trees, shrubs and herbs). Continued management of the edge (especially control of exotics) after planting is recommended.

Options D and E: At the northern end, vegetation is growing in the unmaintained playhouse parking lot. If this area is not needed for subsequent developments at the Belmont Mansion, removal of the asphalt, control of invasives and replanting natives could improve water retention of the area and increase the size of natural lands here. Future restoration or development of the old parking lot should be coordinated within the park.

Restoration Options:

ID	Action	Priority	Proportion
B	Edge Management	H	15%
A	Remove Exotics/Replant Native Forest Species	H	30%
C	Trash Removal	H	100%
D	Remove Exotics/Replant Native Forest Species	HC	20%
E	Structural Improvement	HC	20%

Park: FEW **Restoration Site ID:** V27.01 **Site Name:** Belmont Avenue Floodplain

Location: East of Belmont, West of Belmont Mansion Drive

General Location: West Park

Disturbance/Condition: None/Minimal

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage: 0.82

Site Priority: HP **Location Criteria:** Near other restorations

Description:

The canopy is comprised of mixed oaks and tulip poplar with an understory of sassafras and devil's walking stick. The associated tributary has been noted as one of the best streams in best condition in West Park. This area should be protected. The site could be enhanced by removing the vines (Japanese honeysuckle and Oriental bittersweet) that are presently invading the canopy, as well as the devil's walking stick.

Restoration Options:

ID	Action	Priority	Proportion
B	Protect/Monitor	HP	100%
A	Invasive-Exotic Control	HV	100%

Park: FEW **Restoration Site ID:** V27.02 **Site Name:** Belmont Avenue Disturbed Wetland

Location: North of George's Hill Drive, North of Site 27.1

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 0.26

Site Priority: H **Location Criteria:** Near other restorations

Description:

Vines such as grape and Japanese honeysuckle are invading the canopy layer of this site and the slopes of the adjacent site V27.03. The shrub layer is comprised mainly of privet and blackberry. Removal of privet and exotic vines is recommended. There are several Norway maples along the edge of the wetland and the slope that should also be removed As this site is associated with one of the high quality streams in West Park, it should be protected and enhanced.

Restoration Options:

ID	Action	Priority	Proportion
D	Protect/Monitor	HP	100%
A	Remove Exotics/Replant Native Shrubs	H	15%

Park: FEW **Restoration Site ID:** V27.03 **Site Name:** George's Hill Drive Wetland

Location: North of George's Hill Drive, East of Site 27.1

General Location: West Park

Disturbance/Condition: None/Minimal

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 0.95

Site Priority: HP **Location Criteria:** Near other restorations

Description:

Species found here include skunk cabbage, silver maple, stinging nettle, sensitive fern, weeping willow, bald cypress and several species of asters. There was standing water at the time of a site visit on October 6 1999. The recommendation is to protect this area and possibly expand it to the east, where a wet meadow presently exists, or to the west, which is currently mowed.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%
C	Release/Widen	H	15%
B	Wetland creation/expansion	M	35%

Park: FEW **Restoration Site ID:** V28.0 **Site Name:** Belmont Avenue Maintained Field

Location: N. of Wynnefield between Parkside & Belmont Ave.

General Location: West Park

Disturbance/Condition: Maintained Lawn/Mowed Field

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:** Possible Open Space Use

Acreage: 0.71

Site Priority: H **Location Criteria:** Near other restorations

Description:

Mowing is done too close to the tributary. The riparian zone should be expanded.

Restoration Options:

ID	Action	Priority	Proportion
B	Meadow Management	H	100%
A	Release/Widen	H	100%

Park: FEW **Restoration Site ID:** V30.0 **Site Name:** Chamounix Drive Old Field

Location: South of Chamounix Mansion, East of Cham. Dr.

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 4.83

Site Priority: HV **Location Criteria:** Near other restorations

Description:

Mile-a-minute should be controlled. Enhancing the existing old field with native herbs is of lower priority.

Restoration Options:

ID	Action	Priority	Proportion
A	Invasive-Exotic Control	HV	25%
B	Remove Exotics/Replant Native Herbs	M	15%

Park: FEW **Restoration Site ID:** V30.01 **Site Name:** Chamounix Dr. Maintained Area

Location:

General Location: West Park

Disturbance/Condition: Maintained Lawn/Mowed Field

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 2.69

Site Priority: H **Location Criteria:** Near other restorations

Description:

The lawn area from the old field to the street tree line should be released. The site should be mowed periodically to retain meadow and control vines and unwanted invasive vegetation.

Restoration Options:

ID	Action	Priority	Proportion
B	Meadow Management	H	100%
A	Release/Widen	H	100%
C	Replant Native Herbs	H	100%

Park: FEW **Restoration Site ID:** V33.0 **Site Name:** Ford Road Woods

Location: South of Chamounix Mansion, North of Ford Rd.

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage: 1.21

Site Priority: HV **Location Criteria:** Isolated

Description:

This forest is comprised of a mixed oak/hickory canopy. The Japanese honeysuckle should be removed, and the area should be replanted with native shrubs. There is also some erosion along the slopes, due to runoff from the street. This water needs to be controlled by installing berms. Restoration should coordinated with that at S15.0.

Restoration Options:

ID	Action	Priority	Proportion
B	Erosion Control	HV	20%
A	Remove Exotics/Replant Native Shrubs	HV	15%

Park: FEW **Restoration Site ID:** V35.01 **Site Name:** Trolley Bridge Forest

Location: Ford Rd. and Chamounix Dr.

General Location: West Park

Disturbance/Condition: Maintained Lawn/Mowed Field

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 7.81

Site Priority: H **Location Criteria:** Affects ecolog. Significant site

Description:

The area presents an opportunity to return park land to natural lands. A double alleeof trees flanks a walk leading to the tennis courts. In coordination with park personnel, some of the mowed area can be released. Much of the fringe of land between the woods and the walk seems under-used, e.g., especially for picnicking. This is a remote area and may better serve as natural lands instead of open mowed areas. There needs to be a concerted effort to control vines and manage the edge. If the forest is allowed to move into the alley of trees, the edge would not be over run with vines if the side nearest the road is mowed.

Restoration Options:

ID	Action	Priority	Proportion
C	Edge Management	H	15%
B	Release/Widen	H	15%
A	Remove Exotics/Replant Native Forest Species	H	35%

Park: FEW **Restoration Site ID:** V35.02 **Site Name:** Chamounix Woods Wetland

Location: West of Tennis courts off of Chamounix Road

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 1.09

Site Priority: HV **Location Criteria:** Affects ecolog. Significant site

Description:

This area is a small skunk cabbage wetland with minimal disturbance. Non-native garlic mustard is prevalent. This should be removed and native herbs should be encouraged. This will require some monitoring to ensure that the garlic mustard does not return. This is a biennial plant which has two different leaf shapes depending on its stage. Land managers need to recognize and remove young plants. While planting of natives could enhance the site, the site already contains native cover.

Restoration Options:

ID	Action	Priority	Proportion
D	Invasive-Exotic Control	HV	50%
B	Protect/Monitor	M	100%
A	Remove Exotics/Replant Native Herbs	M	10%

Park: FEW **Restoration Site ID:** V35.03 **Site Name:** Chamounix Forest

Location: Northern end off Chamounix Drive, behind stables

General Location: West Park

Disturbance/Condition: None/Minimal

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 8.02

Site Priority: HP **Location Criteria:** Near other restorations

Description:

This is perhaps the best forest in West Park. There is a diverse, stratified understory, including shrubs (Viburnum, spicebush, etc.), herbs and reproducing oaks. This area needs to be protected, and the best way is to protect the upper reaches of the forest from further disturbance. Trails need to be repaired, since they are eroding and beginning to cause some damage by fragmenting the forest along the trail edges. The woods are also affected by storm water flows in the stream. However, the tributary originates outside the park and storm water management is difficult.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%
B	Trail Improvement	HT	5%

Park: FEW **Restoration Site ID:** V35.04 **Site Name:** Falls Road Woods

Location: South of the Schuylkill, East of Falls Road

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 8.62

Site Priority: H **Location Criteria:** Affects ecolog. Significant site

Description:

The recommendation for this area is to remove the Japanese honeysuckle and other exotics that have started to invade the canopy layer along the edge.

Restoration Options:

ID	Action	Priority	Proportion
C	Remove Exotics/Replant Native Trees	H	5%
A	Remove Exotics/Replant Native Trees	H	5%

Park: FEW **Restoration Site ID:** V35.05 **Site Name:** Chamounix Woods

Location: Southeast of Mansion

General Location: West Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 37.29

Site Priority: H **Location Criteria:** Near other restorations

Description:

The forest can be enhanced by removing exotics such as tree-of-Heaven (Ailanthus) and Norway maple, and planting native species in its place. The edge can be planted with early successional species such as sassafras, black cherry and sumac to reduce vines. Mile-a-minute vine was observed at two locations within 300 feet of the house. Mile-a-minute removal needs to be a priority.

Restoration Options:

ID	Action	Priority	Proportion
C	Invasive-Exotic Control	H	5%
D	Remove Exotics/Replant Native Herbs	H	10%
A	Remove Exotics/Replant Native Shrubs	H	15%
B	Trash Removal	H	100%

Park: FEW **Restoration Site ID:** V35.06 **Site Name:** Chamounix Forest

Location:

General Location: West Park

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 35.57

Site Priority: H **Location Criteria:** Affects ecolog. Significant site

Description:

A disturbed forest circles a healthy oak forest at the end of Chamounix Drive. The edge is particularly disturbed. Enhancing the edge will protect the interior of the forest. Removal of tree-of-Heaven and Norway maple and replacement with a gradient of native trees of different successional stages is suggested, such as red and black oak in the interior, black gum closer to the edge, and early successional species (e.g., black cherry and sassafras) on the edge. Other exotic species, such as Japanese honeysuckle and multiflora rose, should be removed and native mid-successional shrubs planted in their place.

The trail leading through the woods from the parking area at the top of the slope is eroded. This trail should be repaired in order to protect the woods from fragmentation.

Restoration Options:

ID	Action	Priority	Proportion
C	Remove Exotics/Replant Native Shrubs	H	15%
A	Remove Exotics/Replant Native Trees	H	25%
B	Trail Improvement	HT	1%

Park: FEW **Restoration Site ID:** V38.01 **Site Name:** Robert's Hollow Forest Planting

Location: Southwest portion of Robert's Hollow

General Location: West Park

Disturbance/Condition:

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 1.61

Site Priority: H **Location Criteria:** Isolated

Description:

This area is a mixed deciduous forest comprised of mixed oak and hickory, as well as ash, cherry and box elder. Patches of exotics, including Norway maple, Japanese honeysuckle and wineberry should be removed, with replanting of native trees and shrubs.

Restoration Options:

ID	Action	Priority	Proportion
B	Remove Exotics/Replant Native Shrubs	H	5%
A	Remove Exotics/Replant Native Trees	H	5%

Park: FEW **Restoration Site ID:** V45.01 **Site Name:** Horticulture Center Slope

Location: North of Horticulture Center, South of Montgomery

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage: 1.10

Site Priority: HV **Location Criteria:** Near other cultural resources

Description:

The slopes are highly impacted by dumping. They are eroding and exotic species such as Japanese knotweed and garlic mustard are abundant. Removal of the knotweed and replanting of native shrubs to control the erosion is also suggested.

The edge of the site is used as a dump site for horticultural waste. Dumping may not still occur on other parts of the site, although there are accumulations of trash, including large items. Removal of the trash would enhance the site, but would be difficult because of the size and quantity of trash and difficulty of access to parts of the ravine.

Restoration Options:

ID	Action	Priority	Proportion
A	Remove Exotics/Replant Native Shrubs	HV	25%
B	Trash Removal	M	100%

Park: FEW **Restoration Site ID:** V45.02 **Site Name:** Horticulture Center Wetland

Location: North of Horticulture Center

General Location: West Park

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 0.42

Site Priority: HV **Location Criteria:** Near other cultural resources

Description:

Enhancement of the small wetland will benefit the site, and it is in a prime location for access to the public. This is a small wet area that extends from the road up to fence of the Horticulture Center. The recommendation is to remove the invasives and replant native wetland herbs and shrubs.

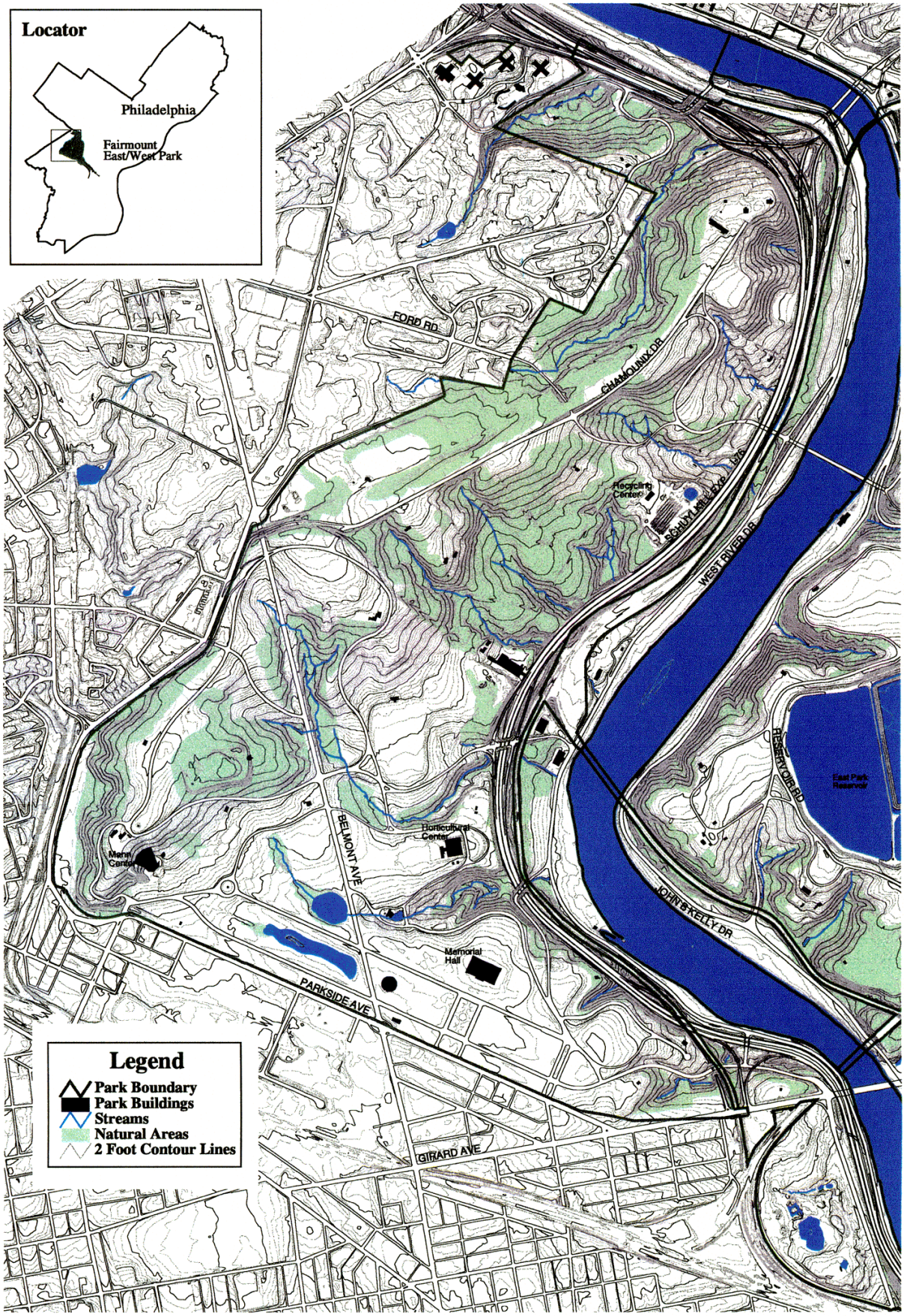
Mile-a-minute, wineberry and garlic mustard are abundant in the area and the mile-a-minute, if not controlled, can easily spread to the designed, as well as the natural lands in the Horticulture Center. These species should be removed and replanting of native wetland herbs and shrubs is encouraged. Followup monitoring to assure control of mile-a-minute and other exotics needs to be done.

Restoration Options:

ID	Action	Priority	Proportion
B	Remove Exotics/Replant Native Herbs	HV	15%
A	Remove Exotics/Replant Native Shrubs	HV	10%

4.F. MASTER PLAN MAPS

The Master Plan Maps for Fairmount (East/West) Park follow.



FAIRMOUNT (WEST) PARK
Natural Lands Restoration Master Plan
PARK BASE MAP

Map 1 of 2

FAIRMOUNT P·A·R·K COMMISSION

N

500 0 500 Feet

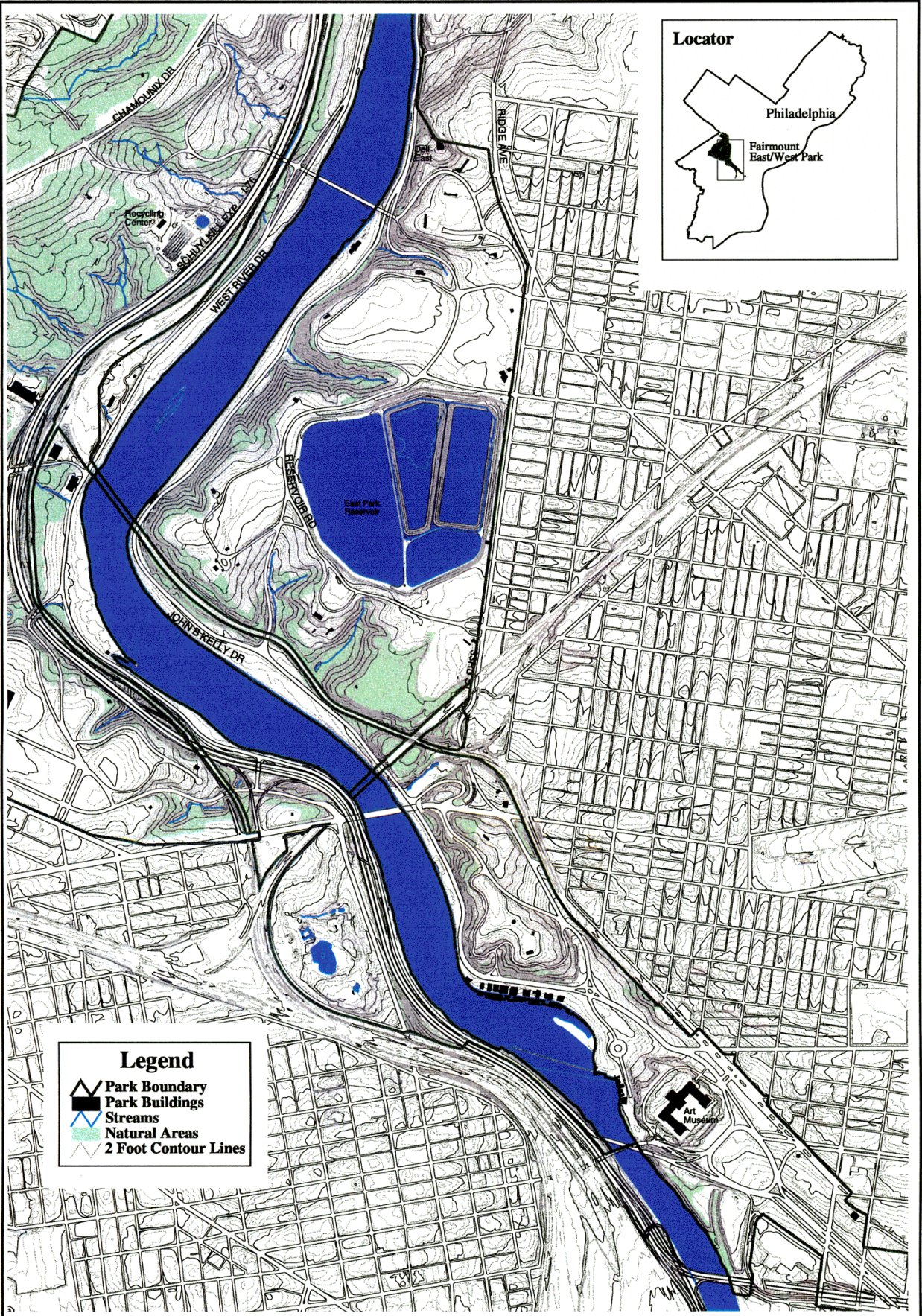
1 inch = 1100 feet

Prepared for: Fairmount Park Commission
Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES
Patrick Center for Environmental Research

Date: June 2000

Base Map Data: Roads from Phila. Water Department Digital Data Set
Park Boundaries from the Phila. Planning Commission with updates by PCER
Hydrology from the Phila. Water Department Digital Data Set with updates from PCER



FAIRMOUNT (EAST) PARK
Natural Lands Restoration Master Plan
PARK BASE MAP

Map 2 of 2

FAIRMOUNT P·A·R·K COMMISSION

N

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Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES
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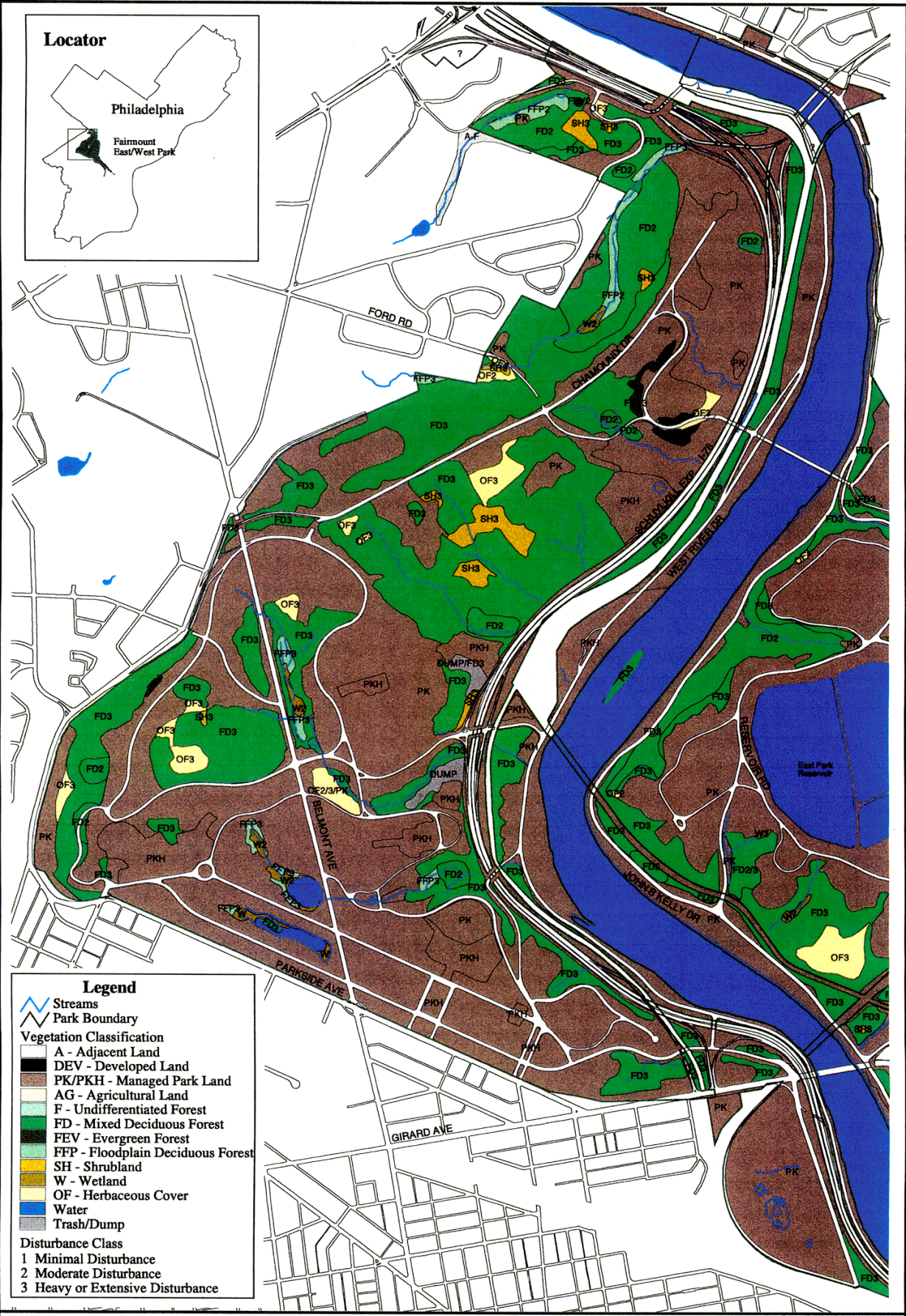

FAIRMOUNT (WEST) PARK
Natural Lands Restoration Master Plan
VEGETATION CLASSIFICATION
Map 1 of 2

FAIRMOUNT P·A·R·K COMMISSION

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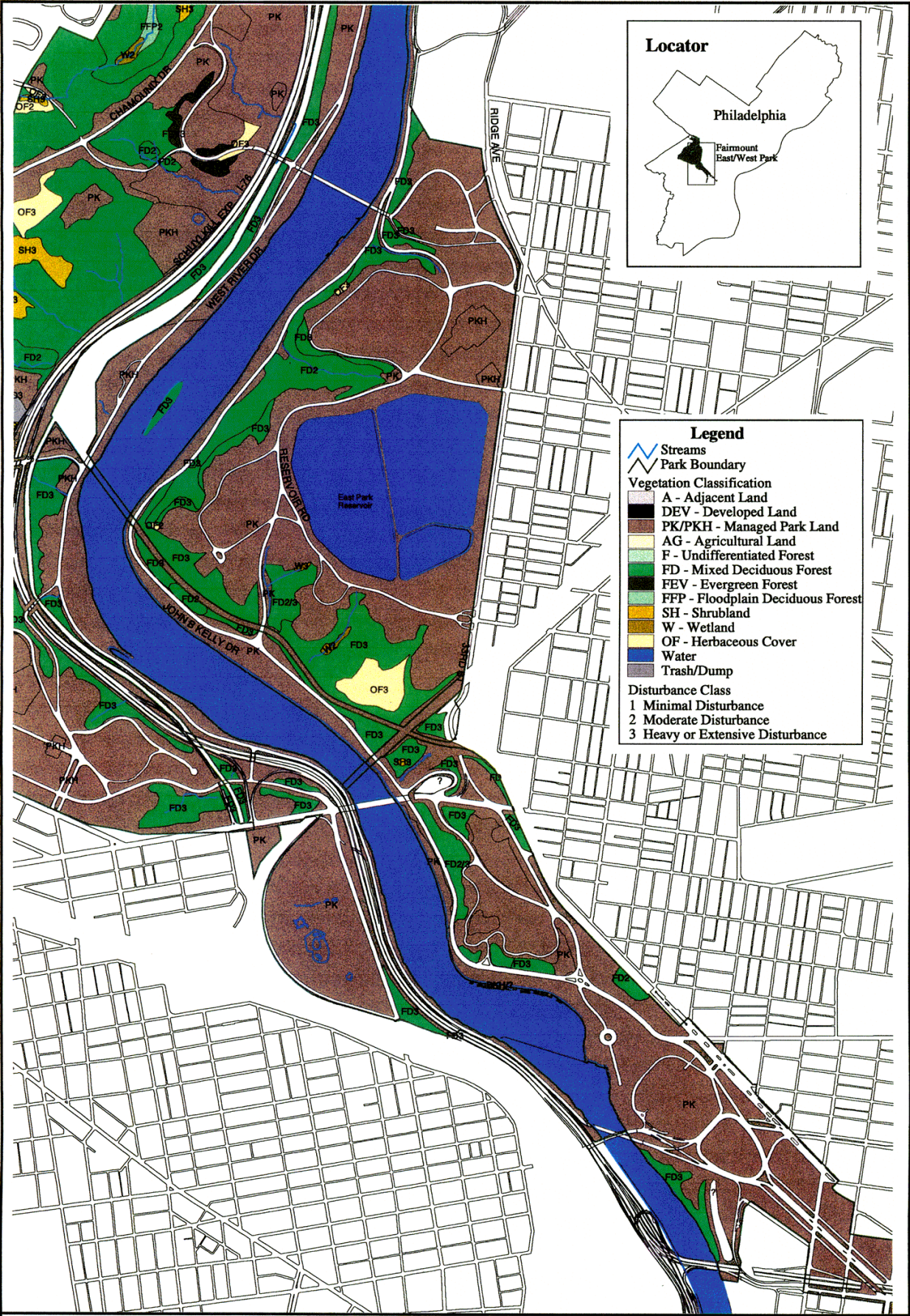

FAIRMOUNT (EAST) PARK
Natural Lands Restoration Master Plan
VEGETATION CLASSIFICATION
Map 2 of 2

FAIRMOUNT PARK COMMISSION

Prepared for: Fairmount Park Commission Natural Lands Restoration and Environmental Education Program

Prepared by: The Academy of Natural Sciences, Patrick Center for Environmental Research

Date: June 2000

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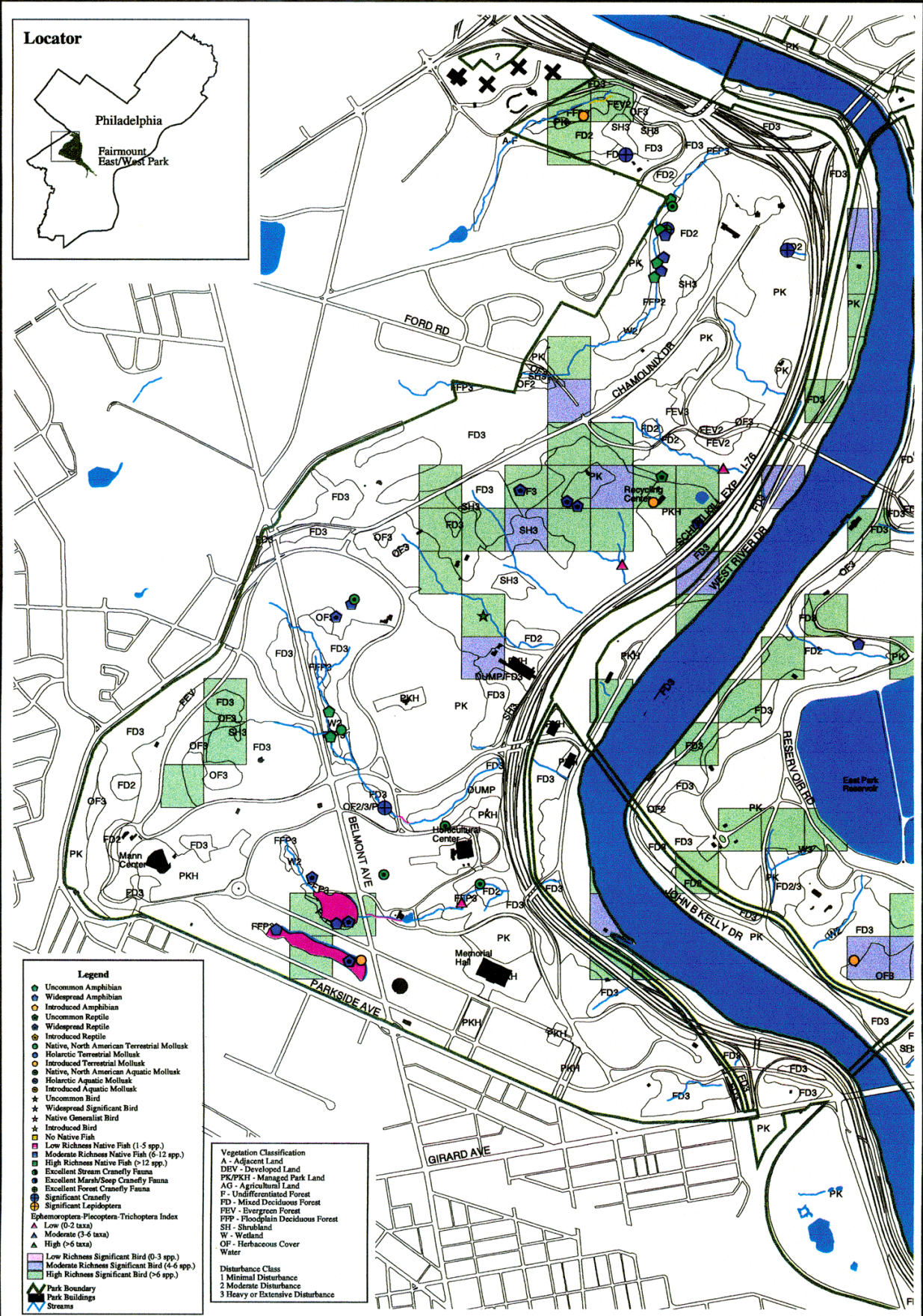

FAIRMOUNT (WEST) PARK
Natural Lands Restoration Master Plan
HABITAT QUALITY
Map 1 of 2

FAIRMOUNT P·A·R·K COMMISSION

N

500 0 500 Feet

1 inch = 1100 feet

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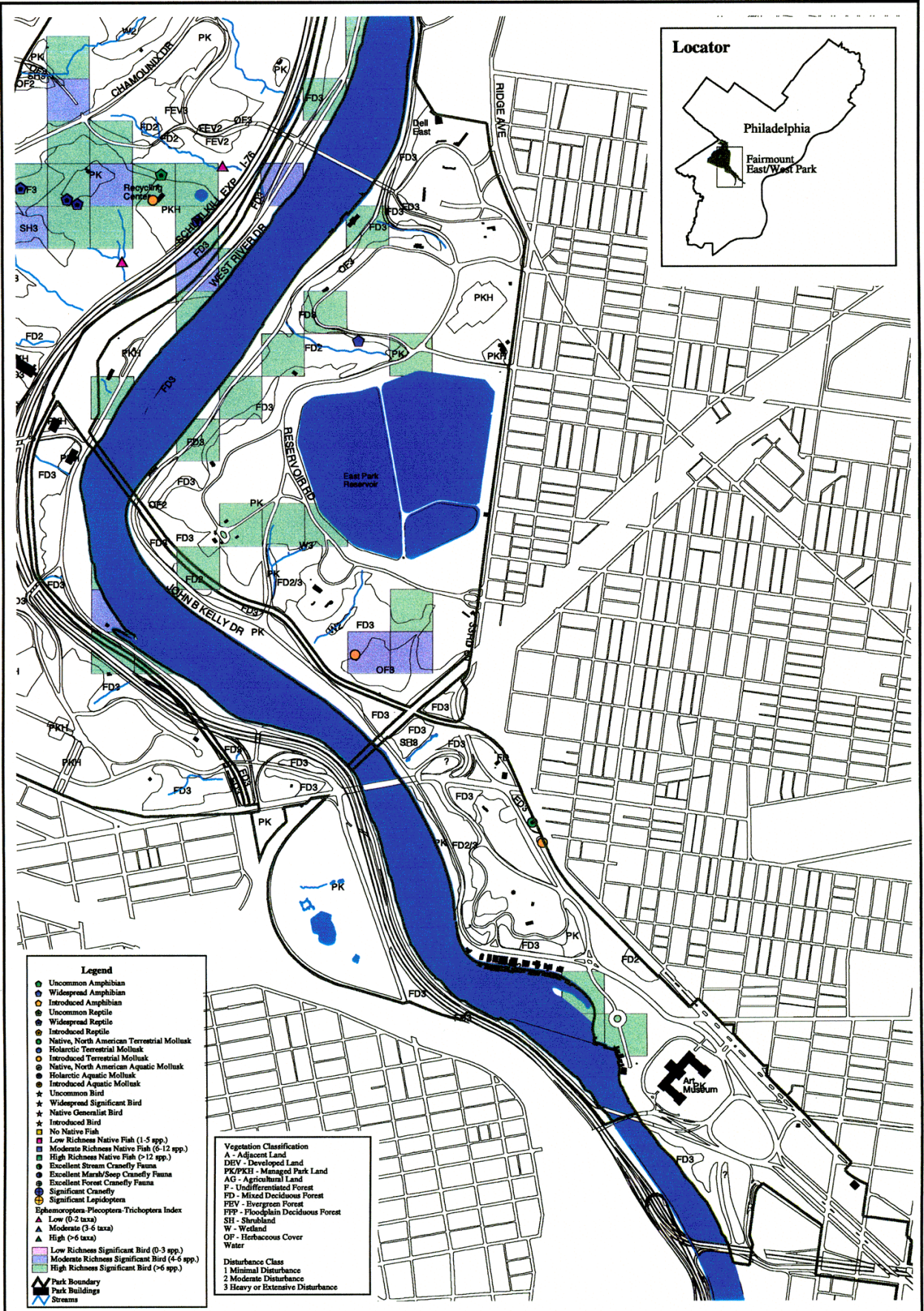

FAIRMOUNT (EAST) PARK
Natural Lands Restoration Master Plan
HABITAT QUALITY

Map 2 of 2

FAIRMOUNT P·A·R·K COMMISSION

N

500 0 500 Feet

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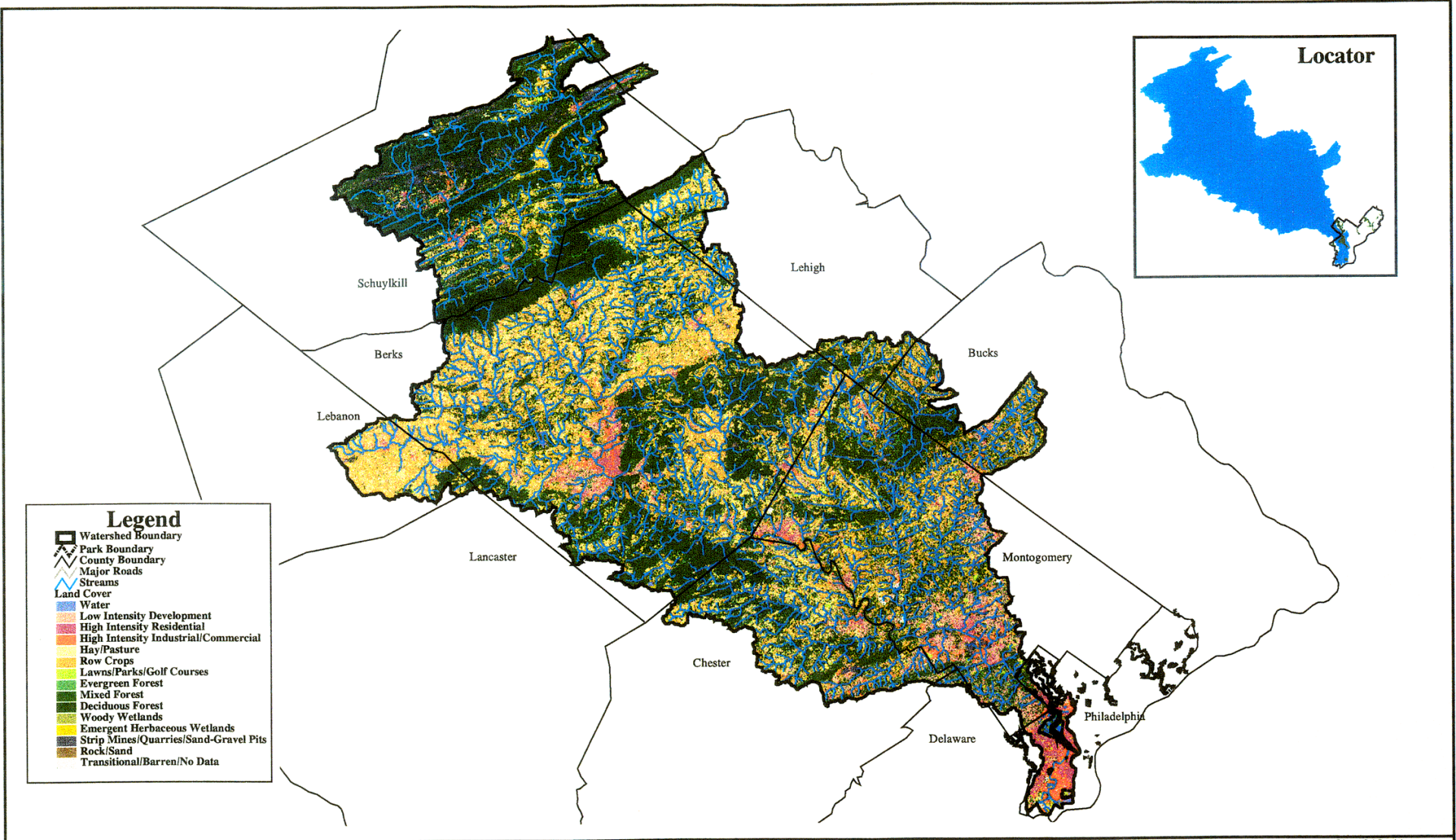

FAIRMOUNT EAST/WEST PARK
Natural Lands Restoration Master Plan
WATERSHED MAP

FAIRMOUNT P·A·R·K COMMISSION

N

20000 0 20000 Feet

1 inch = 45,000 feet

Prepared for: Fairmount Park Commission
Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES
Patrick Center for Environmental Research

Date: June 2000

Base Map Data: Ready from Phila. Water Department Digital Data Set
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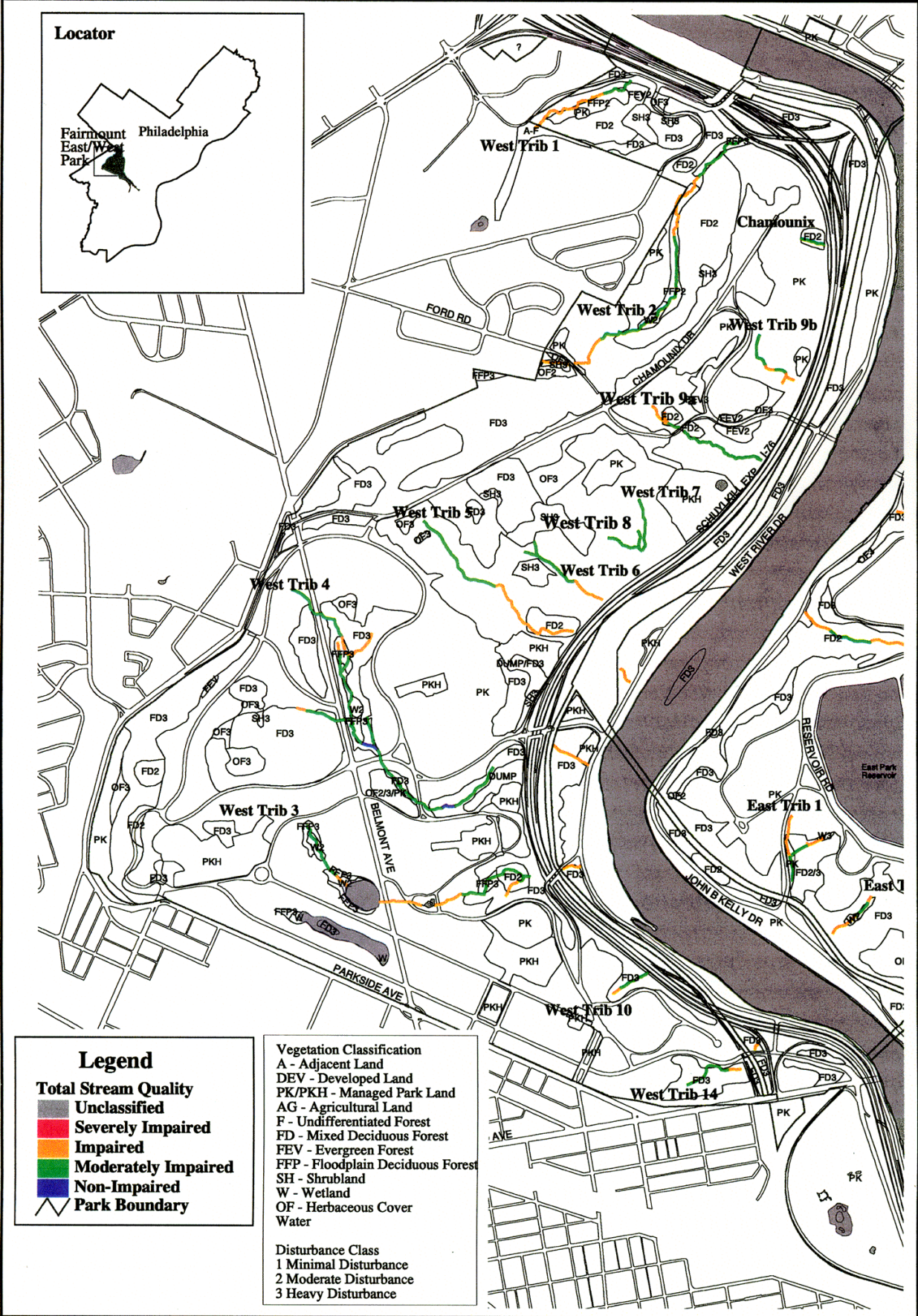

FAIRMOUNT (WEST) PARK
Natural Lands Restoration Master Plan
STREAM QUALITY

Map 1 of 2

FAIRMOUNT P·A·R·K COMMISSION

N

500 0 500 Feet

1 inch = 1100 feet

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Prepared by: The Academy of Natural Sciences, Patrick Center for Environmental Research

Date: June 2000

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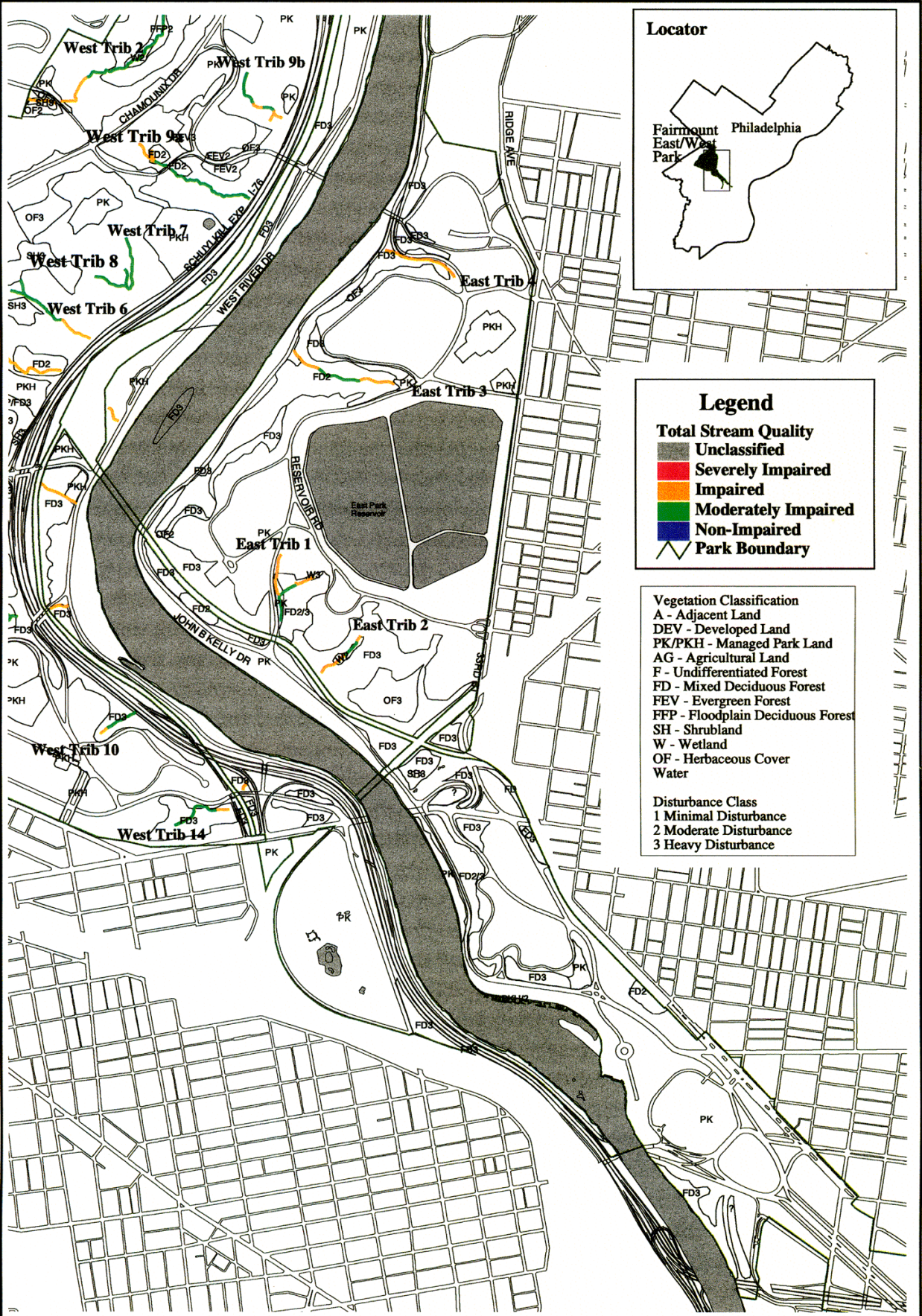

FAIRMOUNT (EAST) PARK
Natural Lands Restoration Master Plan
STREAM QUALITY
Map 2 of 2

FAIRMOUNT PARK COMMISSION

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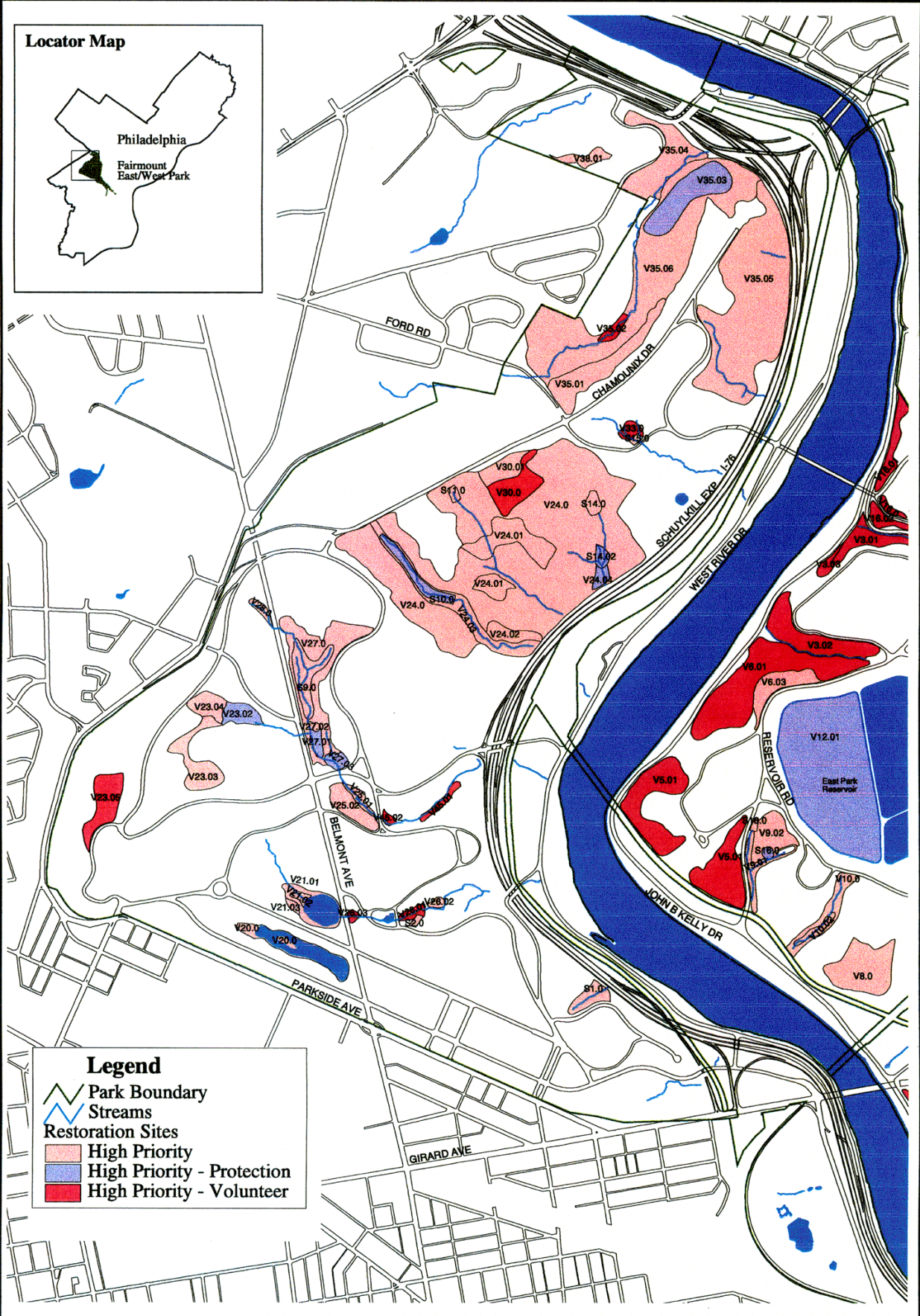

FAIRMOUNT (WEST) PARK
Natural Lands Restoration Master Plan
RESTORATION SITES
Map 1 of 2

FAIRMOUNT P·A·R·K COMMISSION

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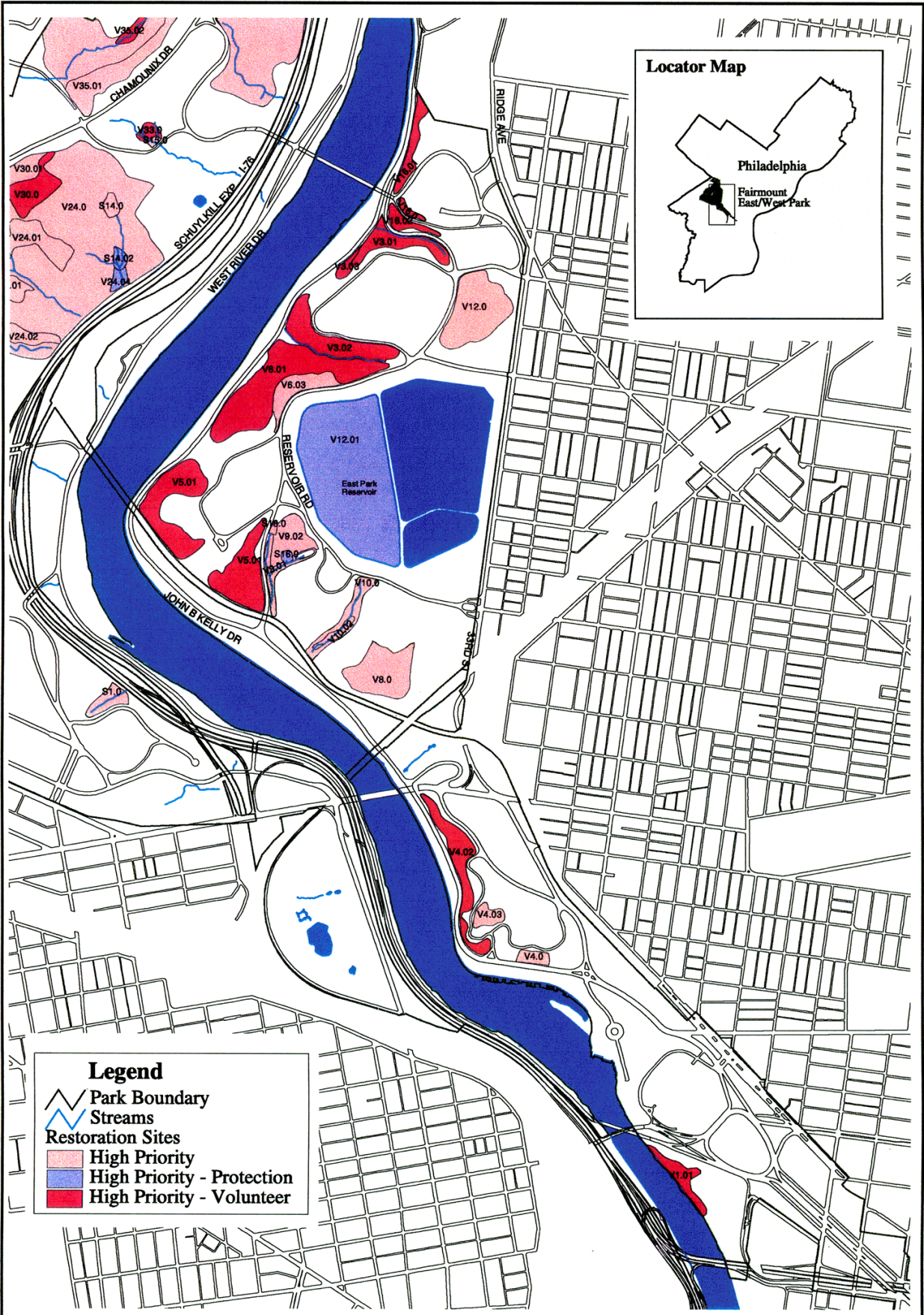

FAIRMOUNT (EAST) PARK
Natural Lands Restoration Master Plan
RESTORATION SITES
Map 2 of 2

FAIRMOUNT P·A·R·K COMMISSION

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