

4. PLAN FORMULATION – ECOSYSTEM RESTORATION

Plan formulation for ecosystem restoration along the Passaic River at Long Hill Township was conducted simultaneously with flood damage reduction plan formulation. Restoration plan formulation was also performed in accordance with the six-step planning process of the P&G, as well as other Corps policies and planning guidance. The below discussions of restoration plan formulation describe the results of each step in the planning process. Discussions begin with specification of problems and opportunities for ecosystem restoration along the Upper Passaic at Long Hill Township.

4.1 Problems and Opportunities-Ecosystem Degradation/Restoration

As discussed in Section 2 of this Feasibility Report, the Upper Passaic River Basin has significant natural resources, including (1) aquatic habitat in the river and its tributaries, and (2) wetland and upland habitats in the riparian corridors of these waterways. However, development has significantly reduced the extent of these natural systems and has limited their functionality.

4.2 Planning Objectives and Constraints and Key Assumptions

The following discussions identify critical objectives, constraints, and assumptions used during plan formulation for ecosystem restoration along the Upper Passaic River at Long Hill Township.

4.2.1 Planning Goals And Objectives

The Federal objective in ecosystem restoration activities is to contribute to National Ecosystem Restoration (NER). The restoration of habitats to less-degraded, more-natural conditions must be consistent with Federal, State and local laws and policies, and technical, economic, environmental, regional, social, and institutional considerations. Recommended plans should avoid, minimize, and then mitigate, if necessary, adverse project impacts to the environment. They should also maximize the efficiency and effectiveness of restoration expenditures, avoid adverse social impacts, and meet local preferences to the fullest extent possible. In pursuit of the goal to restore degraded ecosystems in Long Hill Township, the following restoration objectives were established:

- Increase biodiversity of habitat,
- Restore under-represented habitat;
- Restore habitat for rare or special-interest species;
- Stabilize/protect existing desirable wetland habitats;
- Reduce common reed (*Phragmites australis*);
- Improve water quality; and
- Increase recreational opportunities (as a secondary consequence of restoration activities).

4.2.2 Planning Constraints

The formulation and evaluation of restoration options was constrained by a variety of considerations. As with flood damage reduction plan formulation, plan formulation for ecosystem restoration must recognize the following constraints:

- **Technical Constraints:** including the need for restoration options to be: (1) sound, safe, and acceptable solutions, (2) based on sound engineering practice, (3) realistic and state-of-the-art, (4) consistent with existing local plans, and (5) complete and not dependent on future projects.
- **Economic Constraints:** including the need to the requirement to conduct a cost effectiveness and incremental cost analysis to identify the plans which are the most efficient means to achieve various levels of restoration outputs (i.e., the “best buy” plans).
- **Environmental Constraints:** including the need to maximize the positive outcomes of restoration action and the need to avoid, minimize, and mitigate adverse effects. Environmental constraints also include the need for plans to: 1) be evaluated in a systems context in order to improve the ability of the features to function as self-sustaining systems; 2) be formulated in consideration of intended and unintended effects, both on and off of the project site; and 3) be formulated recognizing the attainable restoration state, given the influences of human activities and culturally induced changes in the landscape which are likely to persist and influence system conditions after project completion.
- **Regional and Social Constraints:** including the need for plans to: (1) weigh the interests of State and local public institutions and the public at large, and (2) consider the potential impacts of the project on other areas and groups.
- **Institutional Constraints:** including the need for plans to: (1) be consistent with existing Federal, State and local laws, (2) be locally supported, (3) provide public access to the project in accordance with Federal and State laws and regulations, and (4) find overall support in the region and state.

4.2.3 Critical Assumptions Guiding Plan Formulation

Critical assumptions guiding plan formulation for ecosystem restoration are similar to those described in Section 3 for flood damage reduction:

- The project will be designed based on a 50-year project life.
- A Preconstruction Engineering and Design phase that will include development of a Design Documentation Report and Plans and Specifications will follow the feasibility phase.
- Prevailing Federal discount rate (5.625) will be utilized in cost/benefit estimation.
- Ecosystem degradation will continue in the absence of Federal action.

4.3 Potential Restoration Sites

Seven potential restoration sites were identified during the reconnaissance phase of this study. These sites were carried forward into this feasibility study. Early in the feasibility phase, additional coordination was conducted with local stakeholders and with the non-Federal project partner (NJDEP). This coordination in conjunction with additional field investigation confirmed that these seven sites represent the sites of greatest restoration potential within the study area. These sites are profiled below, and their locations are shown in Figure 4-1.

Site 1: South of Rolling Hill Road. The South of Rolling Hill Road site is a former swim club with a small artificial lake (approximately 1-acre in size) and a smaller drainage retention basin located northeast of the lake. The site is approximately 10 acres in size. A forested wetland area is located to the south of the site. The area adjacent to the lake has been modified. Soil piles were observed on the northeastern and southeastern sides of the lake. The discharge from the lake has also been modified. Vegetation adjacent to the eastern and southern sides of the lake consists of small trees and shrubs. The northern and western sides of the lake consist of the former beach areas and have been highly disturbed.

Site 2: Warren Township Former Golf Course. This site is located in Warren Township, Somerset County, New Jersey. The site is a former golf course, which has been unused for approximately 25 years. The site is approximately 60 acres in size. The twenty acres located adjacent to the Passaic River are suitable for potential restoration activities. Warren Township and the County of Somerset own the property on either side of this site. The southern two-thirds of the site consists of a mixture of wetland/upland fields and small forested areas. The northern third of the site consists of ponded areas adjacent to the Passaic River and a utility right-of-way, which crosses the site in a northeast to southwestern direction.

Site 3: Poplar Drive, Laurel and Cedar Avenues. The Poplar Drive, Laurel and Cedar Avenues site consists of the area South of Laurel Avenue and west of Poplar Drive. The area consists of wetland and upland forest. The closer to the Passaic River the more mature and wetter the flood plain forest becomes. There are three residential dwellings on the southern side of Laurel Avenue and two residential dwellings on the western end of Cedar Avenue. Vegetation has been disturbed in the areas adjacent to these dwellings. The majority of this site consists of undeveloped forested area, which floods on a regular basis.

Site 4: Morristown Road. The Morristown Road Site consists of the area south of the railroad tracks, southeast of the utility right-of-way, west of Morristown Road and north of a forested area. The site is predominantly covered with wet fields surrounded by a tree/shrub line. A utility road cuts across the northern section of the site.

Site 5: Passaic River Reach. The Passaic River Reach site starts northern side of the Passaic River, opposite the Warren Township site and runs along the Passaic River to the north to approximately 1,000 feet east of Main Avenue. This area consists of mature flood plain forested wetlands along the entire reach except utility right-of-way, which consists of modified wetlands. This site consists of mature flood plain forest and is presently owned and preserved by the County of Morris.

Site 6: Valley Road/Warren Road Utility Corridor. The Valley Road/Warren Road Utility Corridor site consists of a utility right-of-way starting at the intersection of Valley Road and Warren Avenue and continuing southwest to Main Avenue. The site consists of modified

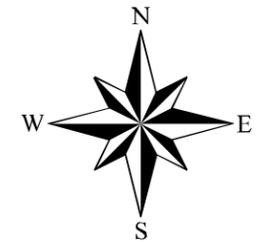


Figure 4-1 Potential Restoration Areas

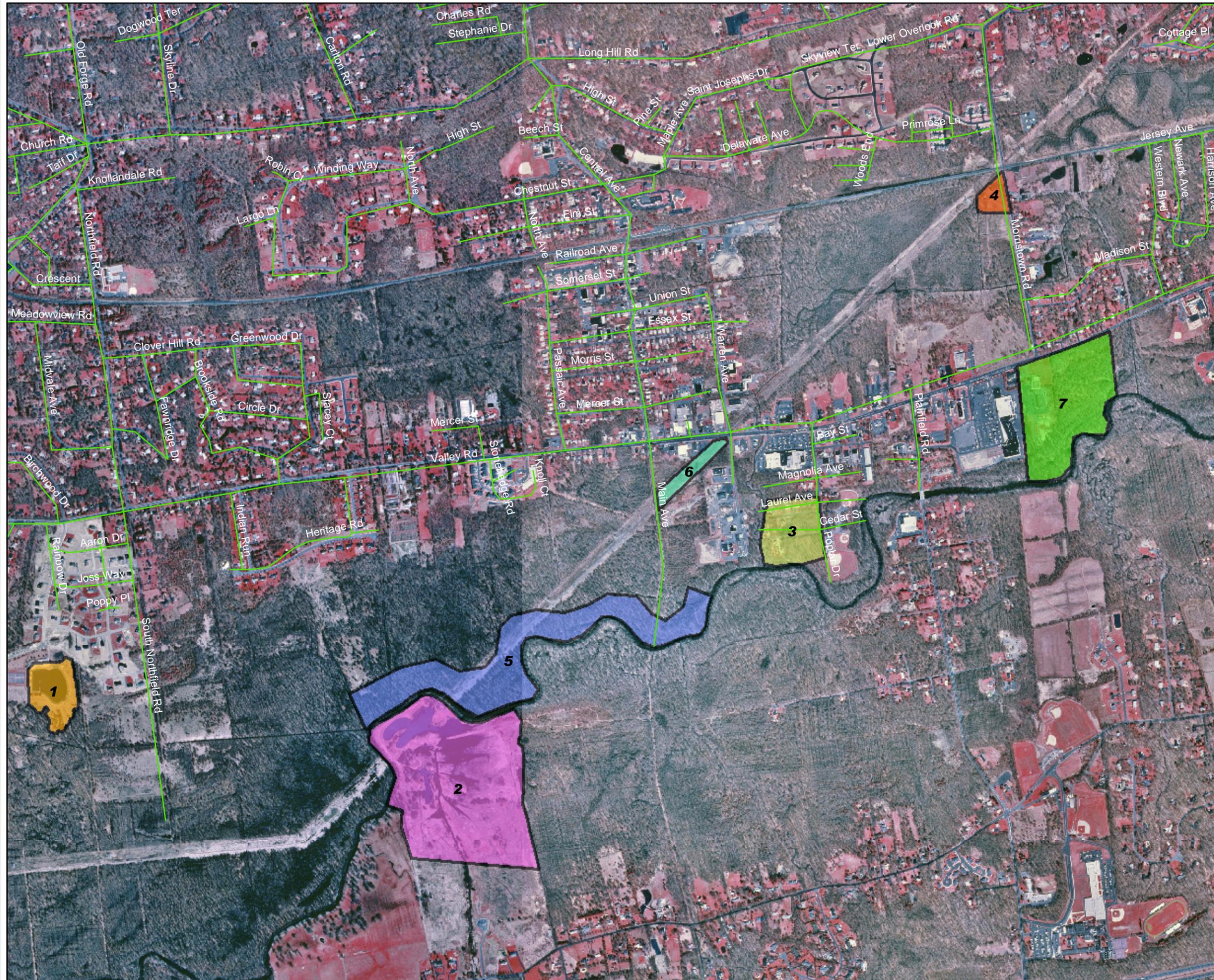
Upper Passaic River & Tributaries Flood
Damage Reduction & Environment
Restoration Feasibility Study

Legend

-  1 - South of Rolling Hill Road
-  2 - Warren Township Former Golf Course
-  3 - Popular Drive, Laurel and Cedar Avenue
-  4 - Morristown Road
-  5 - Passaic River Reach
-  6 - Valley Road/Warren Road Utility Corridor
-  7 - New Long Hill Township Town Hall



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Feet



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emergent and scrub-shrub wetlands. The site is approximately 3.75 acres in size. The majority of the site consists of emergent wetlands, with a small area of scrub/shrub wetlands at the southwestern terminus. This site offers good ecological restoration potential, however, may be restricted due to its current and long term use as a utility ROW. The site is presently over grown with common reed (*Phragmites australis*).

Site 7: Long Hill Township, New Town Hall. The Long Hill Township Town Hall site consists of the new Town Hall, which is presently under construction, adjacent parking areas, recreational fields (soccer/football fields, basketball court, and tennis courts) and a maintenance building. The rest of the site consists of a disturbed area located between the parking lot and the forested area adjacent to the Passaic River. The disturbance was caused by construction activities related to the development of the site.

4.4 Alternative Restoration Measures

There are a variety of restoration measures which could be employed at the seven potential sites to restore degraded ecosystems. As specified in *Ecosystem Restoration in the Civil Works Program* (ER 1105-2-210), Corps restoration planning should place emphasis on engineering measures to achieve restoration objectives, and hydrologic control rather than land acquisition is also emphasized. Restoration measures that are often employed in combination at Corps restoration projects include the following:

- **Modification of Hydrology:** Hydrologic controls are typically used to restore or enhance degraded wetlands or reduce streambank erosion.
- **Regrading:** Sites can be regraded to maximize desired habitat. Biobenchmark analysis can be employed to develop a grading plan, often in conjunction with hydrologic controls.
- **Bank Stabilization:** A variety of bioengineering techniques can be employed to stabilize streambanks or other slopes that are eroding into surface waters with consequent degradation of aquatic habitats.
- **Control of Undesired or Non-Native Vegetation:** Infestations of undesired or non-native plant species is commonly employed at Corps restoration sites. In particular, common reed (*Phragmites australis*) infestations are often addressed by repeated spraying and burning.
- **Planting of Native Vegetation:** Following clearing of undesired or non-native vegetation, native plants can be planted on restoration sites. Wetland species are also frequently planted in created/enhanced wetlands, often in conjunction with site regrading and/or hydrologic controls.
- **Dredging and Filling:** In some circumstances environmental dredging can be conducted to remove undesired material from restoration sites. This material can be removed from the site or placed and graded at locations appropriate for wetland enhancement.

4.5 Formulation and Evaluation of Alternative Plans

The full spectrum of ecosystem restoration measures were evaluated for their applicability to the seven potential restoration sites along the Upper Passaic River at Long Hill Township. Preliminary restoration options were developed for each site, consisting of combinations of restoration measures that appear to be most appropriate to the existing conditions and restoration potential of each site. The preliminary options for sites were then subjected to an initial screening to evaluate the technical, institutional, and economic feasibility of restoration action at these sites. They were evaluated using the following parameters: potential ecological benefits, potential costs, methods of implementation, requirements for success, real estate considerations, and support of local stakeholders and the non-Federal project partner (NJDEP).

None of the seven sites survived this initial screening. A variety of site-specific technical and institutional considerations led to the elimination of the sites from further investigation. The preliminary restoration options and the considerations that led to their elimination are summarized below.

Site 1: South of Rolling Hill Road. The existing wetlands in the vicinity of the lake may be enhanced and enlarged through hydrologic modification, increasing the area exposed to frequent saturation and inundation. The addition of native emergent wetland vegetation will also enhance function, diversity and overall quality. The area surrounding the stormwater basin could be re-graded to facilitate the development of additional wetland acreage. These newly created wetlands could be designed to provide enhanced water quality treatment and other wetland functions. An enhanced hydrologic connection to the Passaic River flood plain would help to sustain an expanded riparian corridor, provide additional flood surge capacity and improve water quality and habitat. The remaining area between the newly created wetlands and the existing forested area to the south would provide a functioning natural transition to the existing forest. In the future this area would succeed to mature hardwood forest, creating a larger contiguous forest, enhancing the overall wildlife and water quality value of the Passaic River corridor. A second option could include the potential restoration of the southern side of the lake. This would include the removal of existing soil piles, restoration of the former discharge channel into the wetland areas adjacent to the south side of the lake and modification of existing vegetation along the eastern and southern boundaries of the lake.

The lake and drainage basin areas are privately owned. The potential restoration site is privately owned as a recreational facility for the housing development located to the northeast of the site. Permits have been obtained from the New Jersey Department of Environmental Protection for certain regulated activities on the northern and western sides of the lake. Since this property is under private ownership the proposed restoration activities may not be in the interests of the current owners of the site due to the fact that the area is part of their stormwater management plan. For these reasons this site was eliminated from consideration as a restoration area.

Site 2: Warren Township Former Golf Course. The area adjacent to the ponds consists of upland and wetland forested, scrub shrub and emergent wetlands. The water column in the existing ponds was observed to be very turbid. A small stream, Cory's Brook, bisects the site in a south to north direction. The southern two-thirds of the site consists of fallow fields and discrete areas of mature trees and shrubs. Most of the fields consist of native vegetation with little to no invasive/exotic species -- common reed (*Phragmites australis*) purple loosestrife

(*Lythrum salicaria*). No viable restoration opportunities exist for ecological enhancement in this area.

The northern third of the site, approximately 20 acres in size and consists of former ponds and a utility crossing. Potential for ecological enhancement exists in this portion of the site. The pond area could be deepened and widened to provide enhanced wildlife and vegetation habitats.

The ponds are full of silt and are filled only when the Passaic River and its tributary, Corys Brook, flow at high stages. Improved flow through these ponds could be accomplished by opening of the banks to allow the Passaic River to flow through these ponded areas during normal stages of flow. Additional planting around the pond area would improve the stability of the banks, improve wildlife habitats, and reduce erosion. Corys Brook could also be widened and deepened to allow recreational access to the Passaic River.

Initial meetings and subsequent communication indicated that Warren Township, which owns the property, was not interested in pursuing restoration activities on the site at this time. Therefore this site was dropped from further consideration.

Site 3: Poplar Drive, Laurel and Cedar Avenues. Proposed restoration options would include the removal of the existing residential dwellings and the restoration of forested wetlands in those areas. Due to the local land use no compatible opportunities exist for ecological enhancement in this area.

Site 4: Morristown Road. The site is chiefly undisturbed except for the section adjacent to the railroad track and utility service road where dumping of landscaped material was observed. The majority of this site is a wet field; no restoration would be required. Small piles of landscape material (grass, leaves, and wood chips) were observed in the wetland area. These piles could be removed to enhance the wetland areas. This site should be acquired and left in its natural state and combined with the properties to the south, which consist of wetland forest and open field. The site represents excellent habitat for local flora and fauna. Because acquisition for purposes of preservation is not economically feasible and local sponsor interest is minimal, this site was dropped from further consideration as a restoration area.

Site 5: Passaic River Reach. The Passaic River Coalition and other local environmental groups were contacted by the U.S. Army Corps of Engineers with regard to any potential restoration site located adjacent to the Passaic River. Environmental groups indicated that the Passaic River is in very good ecological condition throughout this river reach. Therefore, no restoration potential exists in this area, and the site was dropped from further consideration.

Site 6: Valley Road/Warren Road Utility Corridor. Restoration opportunities include replacement of the monotypic stand of Common Reed with a more diverse wetland plant community. Enhancement of the vegetative community would result in significant improvements to wildlife habitat in this section of the Passaic River Flood Plain. This site is located at a higher elevation than many of the other possible ecological enhancement sites. Its landscape position allows for more direct influence on the upland community. Its water quality enhancement and treatment function would be high, since it is located closer to possible point and non-point sources, such as roadway runoff.

Were this site chosen for restoration the utility company would have to be involved as they own the right-of-way and continued access is needed to service the towers supporting the high-tension

wires and the underground gas pipeline. This area would be restored with emergent vegetation or a combination of emergent/scrub-shrub vegetation.

This site remains as a potential restoration site for future basin-wide opportunities. However, there are logistical problems with the existing utility right-of-way and there is no local proponent for sponsorship of restoration. This site was dropped from further consideration.

Site 7: Long Hill Township, New Town Hall. The potential exists to establish either a continuation of the adjacent forested wetlands or to develop a transitional habitat (grassland or scrub/shrub) within this disturbed area. The forested area consists of mature forested wetlands. This area possesses some restoration potential. This site remains as a potential restoration site for future basin-wide opportunities. There is, however, no local proponent for sponsorship of restoration and the site was dropped from further consideration.

4.6 Future Restoration Potential

Although the seven potential restoration sites did not survive the initial screening of alternatives, there may be opportunities in the future to restore some of the sites identified in this study. The recently initiated Passaic River, New Jersey Environmental Restoration Study may develop basinwide initiatives that could include some of these sites. For most of the sites, it is likely that restoration action would be feasible (technically, economically, and institutionally). However, a lack of local support for restoration action (by landowners, stakeholders, or potential project partners) and the limited scale of the potential sites led to elimination of most of the restoration sites considered in this investigation.