



**UPPER ROCKAWAY RIVER WATERSHED
FLOOD CONTROL AND ECOSYSTEM RESTORATION STUDY
MORRIS COUNTY, NEW JERSEY**

ECOSYSTEM RESTORATION SCREENING REPORT



JANUARY 2004

**Prepared by: U.S. Army Corps of Engineers
New York District
Planning Division
26 Federal Plaza
New York, New York 10278-0090**

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LIST OF ACRONYMS AND ABBREVIATIONS

District	New York District, United States Army Corps of Engineers
ERTAC	Ecosystem Restoration Technical Advisory Committee
ESRI	Environmental Systems Research Institute, Inc.
GIS	Geographic Information System
GPS	Global Positioning System
H&H	Hydrology and Hydraulics
NEA	Northern Ecological Associates, Inc.
NEPA	National Environmental Policy Act
NJDEP	New Jersey Department of Environmental Protection
Report Study	Ecosystem Restoration Site Screening Report Upper Rockaway River Watershed Flood Control and Ecosystem Restoration Project
TMDL	Total Maximum Daily Loads
QA/QC	Quality Assurance/Quality Control
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service



1.0 INTRODUCTION

The purpose of this Ecosystem Restoration Site Screening Report (Report) is to identify potential restoration areas and conceptual restoration plans for the United States Army Corps of Engineers (USACE), New York District's (District), Upper Rockaway River Watershed Flood Control and Ecosystem Restoration Study (Study). The District was authorized by the U.S. House of Representatives Committee on Transportation and Infrastructure resolution dated May 7, 1997, to identify recommendations in the interest of water resources development, including flood control and ecosystem restoration. The Upper Rockaway River Expedited Reconnaissance Study (USACE 1998) determined it was in the public's interest to further evaluate the possibility of ecosystem restoration measures in the Upper Rockaway watershed. This Report documents the process implemented to identify and evaluate potential restoration sites and actions within the Upper Rockaway River watershed. In addition, this Report includes a preliminary conceptual restoration design and cost estimate for five of the top ranked sites.

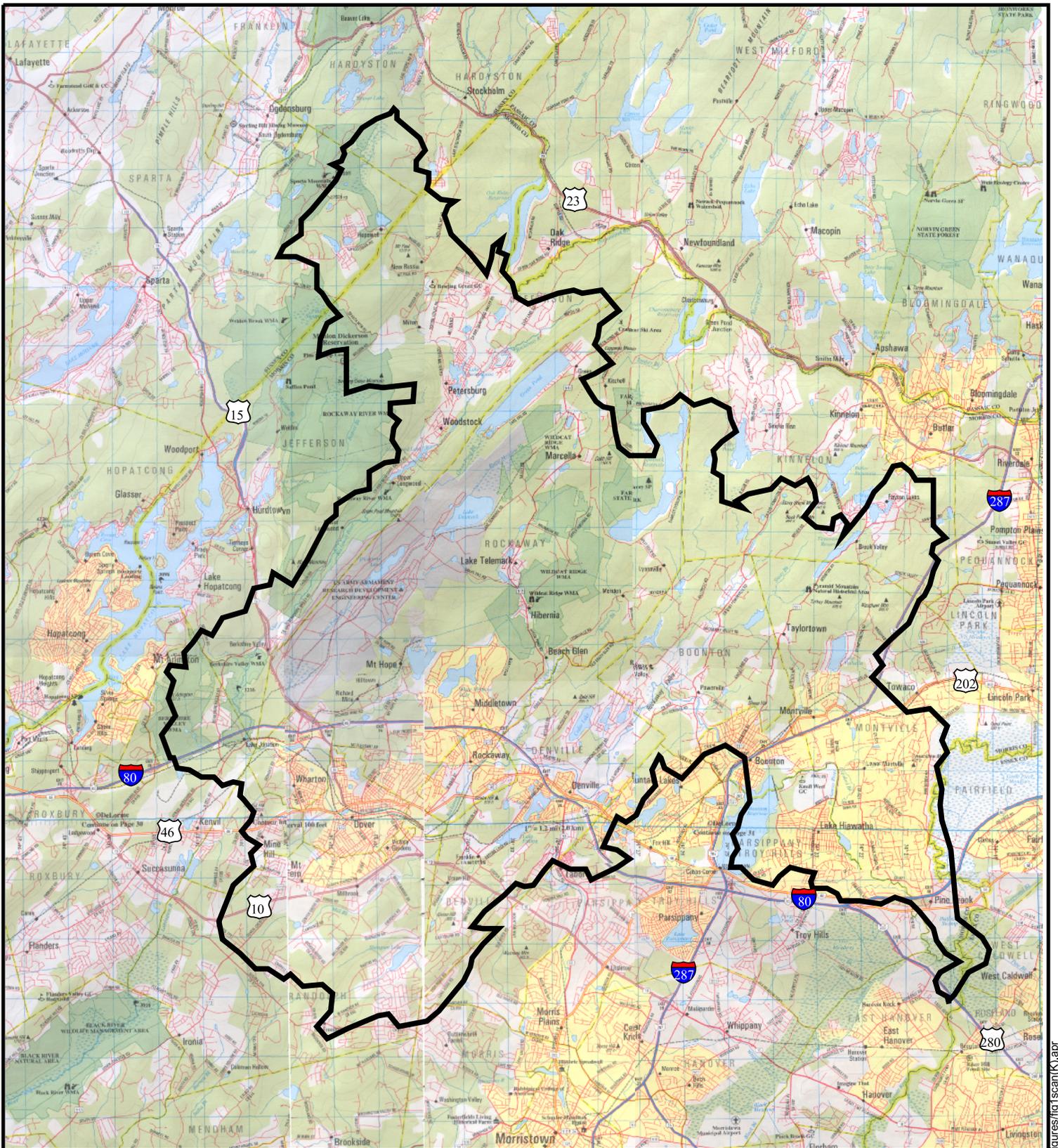
This Report is divided into five sections. Section 1 provides a characterization of the Study area, explains the problems and opportunities, identifies the Study goals and objectives, and identifies planning constraints and local participation efforts. Section 2 identifies potential restoration sites, presents the methods used to identify ecosystem degradation, and identifies potential restoration actions throughout the watershed. Section 3 presents the evaluation of ecosystem restoration sites including the development of a ranking matrix. Section 4 presents conceptual ecosystem restoration designs and Section 5 provides a preliminary cost estimate.

1.1 STUDY AREA CHARACTERIZATION

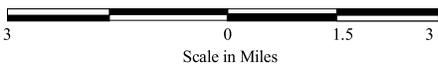
The Study area is located in north-central New Jersey, in the west-central portion of the Passaic River Basin, Morris County, New Jersey (Figure 1). In general, the topography of the watershed consists of steep hills in the northwestern section and low-lying areas in the eastern portion. The headwaters of the Rockaway River originate in Jefferson Township, and flow in a southwesterly and then in an easterly direction before emptying into the Boonton Reservoir, also known as the Jersey City Reservoir. The upper reach of the Rockaway River, hereinafter referred to as the Upper Rockaway River, flows through Jefferson Township, Borough of Wharton, Dover, Borough of Rockaway, Rockaway Township, Denville Township, Boonton Township, and Boonton. Several tributaries drain into the Upper Rockaway River above Boonton Reservoir, including Russia, Green Pond, Beaver, Burnt Meadow, Hibernia, Jackson, Den, Mill, Stony, and Crooked brooks (USACE 1998).

Surface water quality varies within the Upper Rockaway River watershed and is considered minimally to moderately impacted, with a few severely impaired areas. Water quality is particularly impaired in more developed or urbanized communities, due in part, to an increase in impervious surfaces, the loss of riparian buffer zones, and non-point source loading from drainages, roads, and surface runoff (Rockaway River Watershed Cabinet 2000). Elevated fecal coliform levels, increased nitrates and phosphates, and turbidity due to suspended sediments are common indicators of impairment in the river. However, reaches of Green Pond Brook, Beaver Brook, Mill Brook, Crooked Brook, and Jackson Brook drainages are classified as trout





Study Location



Scale in Miles

Source: Delorme, New Jersey Atlas & Gazetteer, 1999

Figure 1. Location of Upper Rockaway River Basin, Flood Control and Ecosystem Restoration Study Area.

production waters, indicating that high quality waterways do still occur in the watershed (Rockaway River Watershed Cabinet 2001).

The Upper Rockaway River watershed drains approximately 87,558 acres of land and is comprised of 7,119 acres of waterbodies and wetlands, 25,280 acres of developed land, and 55,159 acres of vegetated land (Table 1). Wetlands in the Study area are typically associated with rivers, streams, lakes, and ponds and include freshwater marshes, forested wetlands/swamps, scrub-shrub wetlands, wet meadows, bogs, and fens. Non-maintained vegetated areas, wetlands and uplands, constitute a significant and complex ecosystem of fish and wildlife habitats, including coniferous and deciduous forests, open meadows, scrub-shrub areas, and floodplains, as well as cold, cool, and warmwater fisheries.

Table 1. Summary of Land Use in the Upper Rockaway River Watershed.

Land Use	Area (Acres)
Water/Wetlands	
Brush-Dominant and Bog Wetlands	957
Forested Wetlands	1,585
Lake/Pond/Reservoir	4,311
Non-Tidal Marshes	138
River Channel	128
Vegetated Land	
Maintained ¹	2,310
Forested ²	51,605
Military Reservation (mixed types)	1,200
Undifferentiated Barren Lands	44
Developed Land	
Mined	483
Industrial ³	3,547
Residential ⁴	19,611
Transportation/Communication/Utilities	1,639
TOTAL	87,558

¹ Maintained land includes athletic fields (schools), cropland and pastureland, orchards, vineyards, nurseries, horticultural area, recreational, and other agricultural areas.

² Forested land includes brushland/shrubland, coniferous forest, coniferous/deciduous forest, deciduous forest, and deciduous/coniferous forest.

³ Industrial land includes altered lands and commercial services.

⁴ Residential land includes mixed urban developed land and other urban developed land.

Source: New Jersey Department of Environmental Protection (NJDEP), Geographic Information System (GIS) land use analysis on CD-ROM, 1996.



1.2 PROBLEMS AND OPPORTUNITIES

Valuable natural resources have been lost in the Study area as a result of urban, residential, commercial, and industrial development. The filling of wetland and aquatic habitats for development has directly impacted the amount of wetland habitat and has modified natural hydrologic regimes resulting in a reduction in plant, animal, and habitat diversity and abundance; decreased water quality; and the introduction and encroachment of invasive plants species.

Changes made to the natural channel morphology of the Upper Rockaway River and its tributaries due to development have accelerated streambank erosion. This disturbance of sediments and degradation of the riverbanks increases turbidity, leading to the degradation of wetland plants and sensitive aquatic fauna. In addition, sediment deposits can bury vegetation downstream or in the floodplain areas when high waters recede.

Poorly designed facilities and communities act as non-point sources of pollution and contribute to the overall water quality of the Upper Rockaway River. Stormwater unable to seep into the ground or overflowing from malfunctioning stormwater retention basins may flow directly into the river. In addition, stormwater runoff transports contaminants from suburban and urban properties (e.g., petroleum products and fertilizers.) into the river.

Flooding is also a significant issue of concern in areas of the Upper Rockaway River watershed. While flooding is a naturally occurring event along rivers and streams, these events can often be exacerbated by human alterations to natural flood storage areas, such as vegetated floodplains and wetland complexes. Additionally, historic land uses such as past mosquito control measures, channelizing the river, and filling wetlands increases the severity of flood events.

As a result of these problems in the Upper Rockaway River, there is a significant need to restore areas within the watershed. In addition, the degradation that has occurred throughout the watershed provides ample opportunity to alleviate the problems and restore the natural ecosystem. Specifically, the restoration of vegetated wetlands and/or floodplains will create more diverse, better functioning, and ecologically valuable areas that can support a greater number of plant and animal species, by providing a variety of sources of food and shelter/cover. Similarly, efforts to restore the river's natural hydrology will provide a number of benefits including the retention of stormwater, a reduction in storm surge velocity, and the minimization of streambank erosion through natural stabilization. In addition, restoration of wetlands and floodplains in the Study area would allow floodwaters to recharge groundwater aquifers.

1.3 RESTORATION GOALS/OBJECTIVES

A USACE ecosystem restoration planning project is bound by requirements and directives in order to ensure consistency for Federal projects. Restoration actions must improve the value and functions of the ecosystem and must also be formulated in a system-wide context to improve the likelihood of long-term success.

According to the USACE Planning Guidance Notebook (ER 1105-2-100) (USACE 2000), one of the recommended types of restoration is the improvement of degraded ecosystem structure and



function, particularly in wetlands, floodplains, and aquatic systems. Possible improvements recommended by USACE policy included restoring floodplain function by reconnection of oxbows to the main channel; restoring more natural stream channel conditions including riparian vegetation, pools, riffles, and additional structure; modifying obstructions to fish passage, including dam removal; modifying dams to improve dissolved oxygen levels or temperature; and, restoring conditions conducive to native aquatic and riparian vegetation (USACE 2000).

The primary goal of this Study is to restore biodiversity and ecological functions in the Upper Rockaway River watershed, while satisfying Federal, regional, state, and local interests in the most cost-effective and incrementally justified manner. In order to meet this goal, the District identified several objectives in accordance with Section ER 1105-2-100 of the Planning Guidance Handbook. Specifically, Section ER 1105-2-100 of the Handbook provides directives that all USACE ecosystem restoration studies and projects must follow to ensure that they meet the Federal interest (USACE 2000). The following policies/directives were used to develop the objectives for this Study:

- **Scarcity of Habitat.** Increase the amount and quality of habitat types that are rare or endangered, and/or improve habitat utilized by rare or endangered fish and wildlife species.
- **Extent of Benefit.** Improve the watershed as a whole in order to maximize benefits of restoration.
- **Restoration of Former Habitat.** Reintroduce or reestablish habitat types in locations of known, but degraded, historical habitat.
- **Duration of Benefits.** Create benefits that are long-term and self-sustainable, and that require minimal additional human interference to produce the desired benefits over a long period of time.
- **Ecological.** Restore features with natural ecological functions and benefits, such as high quality fish and wildlife habitat, good water quality, or controlled erosion.
- **Technically Feasible.** Adhere to sound, scientific and engineering reasoning, and create realistic plans within the context of the existing environmental and social setting of the restoration area.

Additional evaluation and technical criteria that Federal restoration studies/projects must address include a definable indicator of success, quantifiable outputs of restoration impacts, social acceptability of the project, efficiency of implementation, cost-effectiveness, and effectiveness of achieving the identified goals and objectives. USACE technical directives also require that any restoration studies/projects avoid areas of known contamination.

1.4 PLANNING CONSTRAINTS

There were several constraints that the District considered during the restoration planning process, including engineering, environmental, institutional, public, and financial.

- **Engineering** constraints involve integrating the restoration and flood control components of the Project in terms of coordinating the timing and location of construction activities, and



developing plans that are sound, safe, and acceptable solutions in compliance with sound engineering practice.

- **Environmental** constraints direct plans to: 1) not unreasonably impact environmental resources; 2) first consider avoidance, followed by minimization, mitigation, and replacement; and, 3) incorporate measures to restore significant environmental resources where opportunities exist.
- **Institutional** constraints include compliance with the National Environmental Policy Act (NEPA) and coordination with other government agencies, such as the United States Fish and Wildlife Service (USFWS), and NJDEP during the planning of restoration activities.
- **Public** constraints include notifying the public regarding proposed activities, holding public meetings, and addressing the concerns of the public regarding restoration activities.
- **Financial** constraints include finding a local sponsor to participate in cost sharing for the Study, and developing conceptual plans that the local sponsor is willing to endorse.

These constraints were addressed through careful planning and open communication with the public, other government agencies, and the local sponsor.

1.5 LOCAL PARTICIPATION

In order to promote scientific analysis and open discussion of the issues related to ecosystem restoration in the Upper Rockaway River watershed, an Ecological Restoration Technical Advisory Committee (ERTAC) consisting of local people who have knowledge and expertise about the natural resources within the Study area was assembled. Specifically, the District contacted and encouraged a number of local groups/organizations (i.e., Rockaway River Watershed Cabinet and the Friends of the Rockaway River), state agencies, interested individuals, and local officials who are involved with the Upper Rockaway River to take an active role on the ERTAC. The goals identified for the ERTAC by the District included identifying additional restoration sites and further refining the existing sites, determining potential restoration actions for each of the potential restoration sites, assisting in the development and application of an ecological ranking matrix for the restoration sites, and providing local insight and representation throughout the process.

An official letter of invitation was sent to approximately 150 individuals and four ERTAC meetings were held.

- **June 24, 2003.** Summarized past USACE efforts in the Study area, explained the USACE's policy regarding restoration activities, and sought input on restoration concerns and recommendations.
- **July 8, 2003.** Presented the methods for identifying restoration goals along the river, and discussed draft evaluation parameters that would be used to rank the restoration sites.
- **August 4, 2003.** Discussed the preliminary rankings for the ecosystem restoration sites.
- **September 5, 2003.** Finalized the ranked matrix scores and agreed on the "top" five sites recommended for conceptual design.



Organizations that participated, including representatives of Rockaway Township, members of Denville's Environmental Commission, NJDEP Watershed Management Program staff, and U.S. Fish and Wildlife biologists, provided valuable technical expertise and local background information. A copy of the invitation letter and mailing list, as well as copies of all the meeting agendas, technical handouts, and meeting minutes are provided in Appendix A.



2.0 ASSESSMENT OF RESTORATION OPPORTUNITY

Ecosystem restoration is the act of returning an impaired or degraded ecological system to the original, natural state, resulting in an increase in function and value of the area. The purpose of ecosystem restoration is to improve the ecological benefits and functions of an area such that they are better than what existed prior to human interference. The success of ecosystem restoration can be measured in terms of a diverse selection of native plants and animals, the ability of the area to sustain larger numbers of indicator species or more biologically desirable species, and the ability of the restored area to continue to function and produce the desired outputs with a minimum of human intervention. However, consideration must also be given to ensure that restoration actions will not cause negative impacts to neighboring areas (i.e., increased flooding downstream, creation of nuisance mosquito populations). Restoration activities must also avoid or minimize impacts to areas of optimal or high quality habitat and areas of known contamination during construction.

2.1 IDENTIFICATION OF RESTORATION SITES

This section describes the process that the District and ERTAC used to identify potential restoration sites within the watershed.

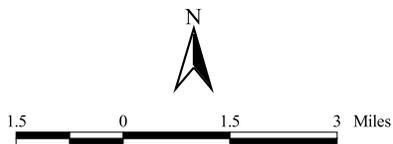
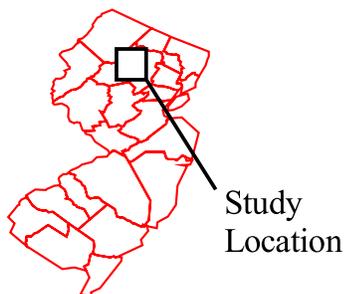
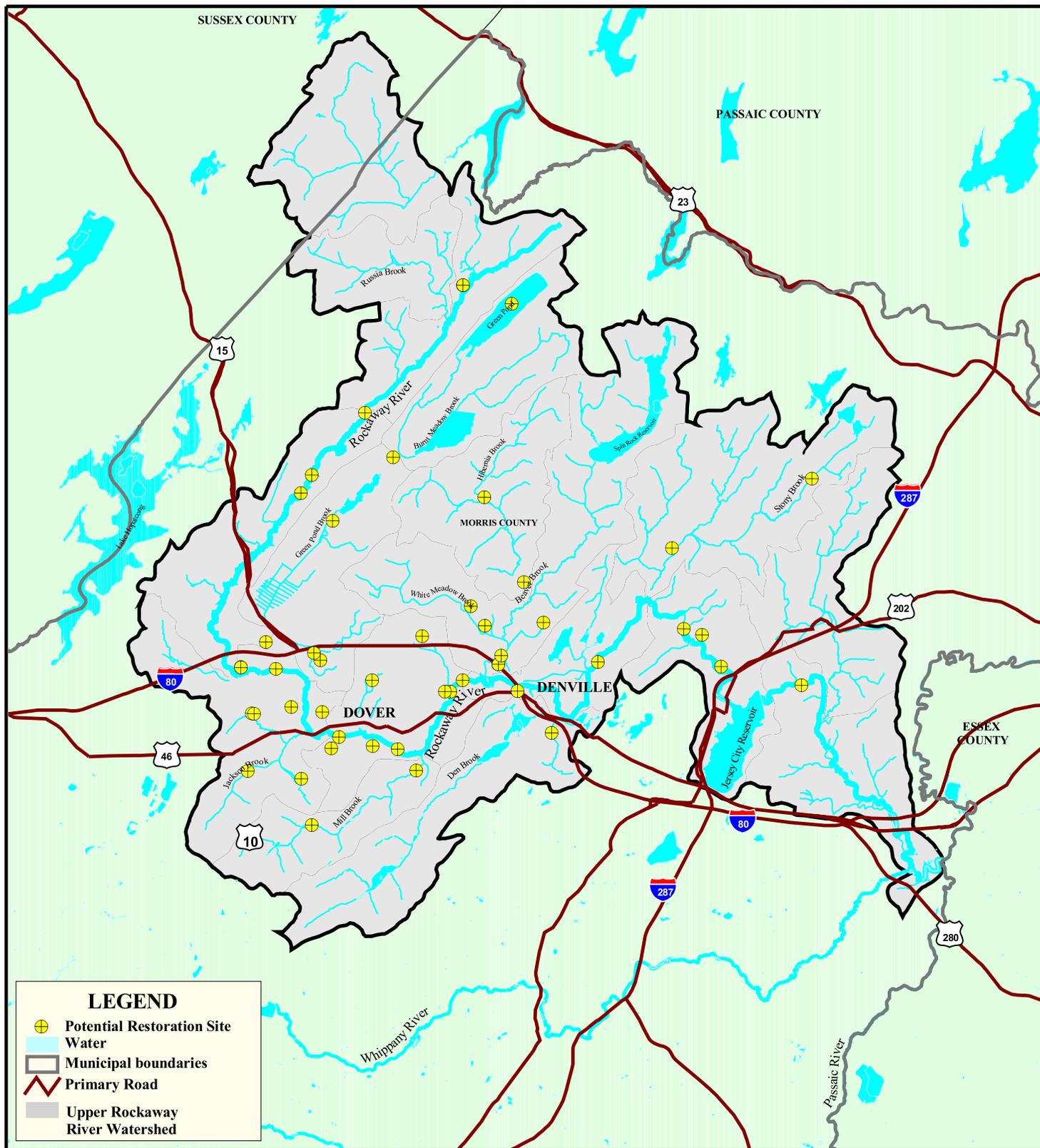
2.1.1 Preliminary Identification of Potential Restoration Sites Report

The purpose of the District's *Preliminary Analysis of Restoration Sites Report* (USACE 2002) was to identify potential ecosystem restoration sites within the Upper Rockaway River watershed. Specifically, it was determined that there are economically feasible opportunities throughout the Upper Rockaway River Basin for resolving ecological degradation problems that threaten fish and wildlife habitat. Consequently, the USACE proposed to develop an ecosystem restoration plan to restore the hydrology and plant/animal communities of selected areas within the Upper Rockaway River Basin to a less degraded condition. This initial report was developed through a series of discussions with ERTAC, limited site visits, and a thorough review of existing reports/studies, surveys, and maps of the Upper Rockaway River watershed.

Based on the results of the ERTAC meetings and data collection effort, the report identified a total of 45 sites within the watershed as potential restoration sites (Figure 2). Although the USACE had not yet conducted a detailed analysis of each site, it was determined that each of the sites may benefit from one or more of the following restoration actions.

- **Stream Corridor and Water Quality Improvements.** This restoration action could include projects that stabilize and/or restore streambanks using native species and bioengineering techniques; create or widen vegetated buffers utilizing native species; improve and maintain water quality and trout populations; install stormwater detention devices to filter runoff; and/or, dredge or remove debris to restore natural stream depths. Benefits associated with this restoration action include increased water quality, additional wildlife and aquatic habitat, and improved recreational opportunities and aesthetics.





Source: Environmental Systems Research Institute, Inc.
 ESRI Data & Maps, 1999 CD-ROM;
 NJDEP GIS Resource Data
 CD-ROM Series 1, Volume 3, 1996

Figure 2. Potential Restoration Sites Associated with the Upper Rockaway River Basin, Flood Control and Ecosystem Restoration Study.

- **Restoration and/or Creation of Riparian Wetlands.** This restoration action specifically targets projects that restore or create wetlands or restore floodplain hydrology through the removal of fill material, establishment of vegetated buffers, and/or plugging of ditches created for mosquito control. This restoration action typically results in improved water quality, improved or additional wildlife and aquatic habitat, and improved aesthetics.
- **Stormwater Management.** This restoration action could include projects that incorporate stormwater detention and water quality treatment practices. This restoration action often results in increased water quality by minimizing pollutants from urban areas.
- **Bridge and Dam Restoration and/or Removal.** This restoration action may include projects that stabilize embankments around bridges or involve the restoration or removal of minor dams. This restoration action could result in improved wetland/stream hydrology, increased water quality, and improved fish and wildlife habitat.

All of the restoration actions and sites presented in the *Preliminary Identification of Potential Restoration Sites* report identify locations of impairment that should be addressed, including sources of water quality impairment or fish and wildlife habitat degradation. While each site may have merits for restoration, many do not meet the goals and objectives established for this Report, and therefore do not warrant Federal interest. These potential restoration sites would be better addressed at the local level.

2.1.2 Additional Sites

Although the *Preliminary Identification of Potential Restoration Sites* report (USACE 2002) provided a comprehensive assessment of potential restoration sites in the Study area, it was completed in June 2002. Therefore, in order to supplement their previous effort and to identify any new areas of concern that might warrant ecological restoration, the District requested additional suggestions from the ERTAC and local officials. Based on this request, two new potential restoration sites were added to the Report:

- **Site MB-3, Middle Rockaway Sub-Basin, New Site** – This site, identified by members of the ERTAC during the July 8th meeting, is located along Mill Brook near the intersection of Mountainside Drive and Grist Mill Road, Randolph Township. The site exhibits signs of significant streambank erosion and destabilization (refer to photographs in Appendix A, July 8th Meeting). The ERTAC recommended that this site be added to the ranking matrix and that preliminary investigations be made to determine potential restoration actions.
- **Site LW-1, Longwood Lake, New Site** – This site, identified by representatives of the local community, is located in Jefferson Township. According to residents, siltation in the Lake has been occurring at an increased rate, attributed in part to accelerated development upstream and along the lakeshore. The ERTAC agreed to add this site to the ranking matrix, and requested that preliminary investigations be made to determine potential restoration actions.



2.2 IDENTIFICATION OF ECOSYSTEM DEGRADATION

In order to evaluate the 47 potential restoration sites, it was necessary to further define and characterize the type and severity of ecosystem degradation at each of the sites in terms of the degradation problems associated with the entire watershed. In other words, the District identified the primary areas of ecosystem degradation in the Upper Rockaway River watershed so that proposed restoration activities at the individual sites would benefit, to the maximum extent possible, the entire watershed. This approach also fulfilled one of the primary objectives of this Study: improve the watershed as a whole in order to maximize restorative benefits. The following sections present the techniques used to identify the primary areas of ecosystem degradation within the entire watershed and individual restoration sites.

2.2.1 Watershed Analysis

To assist in the identification of ecosystem degradation throughout the watershed, eight river reaches were identified based on aerial photograph interpretation and ERTAC input. River reach boundaries were established in places where there were distinct changes in the water flow, or in places where the river had formerly been connected to floodplains or tributaries. In addition, reaches of the river that exhibited similar morphologic characteristics, such as similar topography, sinuosity, flow speed, surrounding land use, or water quality, were grouped together to facilitate evaluation. The following river reaches were identified for the Study area:

Reach 1 – Longwood Lake to West Dewey Avenue (Wharton)

Reach 2 – West Dewey Avenue to JCP&L Weir (Dover)

Reach 3 – JCP&L Weir to North Salem Street (Dover)

Reach 4 – North Salem Street to Beach Street (Rockaway)

Reach 5 – Beach Street to Diamond Spring Road (Denville)

Reach 6 – Diamond Spring Road to Bush Road (Boonton)

Reach 7 – Bush Road to Powerville Dam

Reach 8 – Powerville Dam to Boonton Gorge

Assessment of the river reaches involved discussions with the ERTAC, interviews with knowledgeable local residents, and the review of scientific literature, water quality reports, aerial photographs, and historic accounts to determine the predominant ecological impacts associated with each reach of the river. The impacts considered to be the most common and/or significant among all the river reaches, individually and combined, included sedimentation, high river flow velocities, degraded fish and wildlife habitat, and impaired hydrology.

In addition to the identification of the primary ecological impacts, the river reach analysis enabled the District to assess cumulative impacts. For example, a number of river reaches have high flow velocities associated with impaired hydrology due to filling of floodplains, or manipulation of the tributaries and river. These reaches experience increased bank erosion,



turbidity, and sedimentation from surface runoff. As the adverse impacts in one river reach combine with another river reach and so on, they collectively produce more severe degradation problems in the downstream reaches of the watershed. Based on this analysis, it was determined that the cumulative impacts from multiple upstream sources in the Upper Rockaway River pose the biggest concern to the overall health of the watershed.

2.2.2 Geographic Information System Analysis

As part of the process to identify ecosystem degradation in the Study area, the District conducted a Geographic Information System (GIS) analysis. Specifically, digitized data from the New Jersey Department of Environmental Protection (NJDEP 2001) and aerial photographs (NJDEP 1995, NJDEP 1997) were carefully evaluated. Information regarding known and mapped contaminated sites, impaired surface and groundwater, and rare/threatened/endangered fish and wildlife habitat within the watershed was reviewed. Any potential restoration site that was located within the general vicinity of a known contaminated site was eliminated from further consideration in the Study.

2.2.3 Preliminary Site Visits

The District visited the majority of the 47 sites in order to observe indicators of site-specific ecosystem degradation. Due to the large number of sites and the vast area of the watershed, these initial site visits were limited to “windshield” surveys and involved identifying dominant habitat types and major areas of disturbance (i.e., filled wetlands, eroded streambanks, disturbed shorelines, blocked and/or constricted flow, etc.) from the road. In addition, the field team talked with local residents to determine historic environmental conditions and restoration actions that were considered to be the most important to the local community. Information collected during the preliminary site visits provided valuable insight into environmental impacts and assisted in the identification of possible restoration actions. Field trip reports and photographic records obtained during these site visits are presented in Appendix B.

2.2.4 ERTAC Coordination

The District asked ERTAC members to identify areas and types of ecosystem degradation such as disconnected hydrology, filled wetlands, streambank erosion, channelized areas and high flow conditions that may occur in the watershed. Ecological degradation issues were identified and discussed at the ERTAC meetings and included the flashiness of the river in certain reaches, sedimentation in lakes, erosion of streambanks, and fill activities. In addition, many ERTAC members were able to provide additional information on individual inputs of road runoff, and other discreet non-point pollutant discharges from upstream sources. However, in accordance with USACE guidelines/regulations regarding Federal ecosystem restoration projects, the District is not able to address concerns related to road runoff and non-point source pollution as part of this Study.



2.3 IDENTIFICATION OF POTENTIAL RESTORATION ACTIONS

The next step following the identification of potential restoration sites and the watershed's primary ecosystem degradation concerns, was to identify appropriate restoration actions. Accordingly, the District developed a number of different ecological restoration actions that fulfill the restoration goals and objectives of the Study based on professional experience, ERTAC input, agency consultation, site-specific conditions, and current scientific literature

The approach most commonly used to address restoration of multiple sources and areas of ecological degradation from a watershed perspective is to focus restoration actions in places of adequate size and scope, and that address cumulative effects from upstream impairments. Therefore, both the District and ERTAC agreed that any impact, either positive or negative, that occurs in the headwaters or upper reaches of the main river channel is likely to affect the entire length of the system. Discussions at the ERTAC meetings, site visits, and a review of relevant literature indicated that the tributaries and headwaters of the Upper Rockaway River (i.e., upstream of Wharton Borough) in Rockaway Township were not as significantly impacted as downstream reaches. However, the reaches between Wharton Borough and Dover are subject to sedimentation, bank erosion, and other impacts associated with urban development and were identified as the most significantly impaired surface waters in the watershed. Therefore, potential restoration actions that can be implemented in upstream reaches of the mainstem, and that will benefit the watershed as a whole, should be identified.

Other factors that the District considered during the development of the restoration actions include the likelihood of success, extent of watershed and downstream benefits, duration of sustainable benefits, and the ability to obtain the necessary permits. The types of restoration actions proposed for the Study include:

- **Streambank Restoration and Stabilization** is a restoration action that reduces streambank erosion and the downstream flow of eroded sediment by using biodegradable erosion control fabric and native plantings. This action can be used in areas of excessive bank erosion along the Upper Rockaway River, and will improve fish and wildlife habitat by creating additional food sources and refuge space.
- **Freshwater Wetland Restoration** is a restoration action that mimics the ecological benefits once provided by the natural habitat by creating/restoring a freshwater wetland in an area of historic wetlands. This action typically includes removing fill material, contouring the slopes to the appropriate elevations, and planting the area with native wetland plant species. This action will improve the diversity and abundance of plant and wildlife species and create additional recreational opportunities.
- **Floodplain Restoration** is a restoration action that allows water to flow onto historic floodplain communities by removing anthropogenic impediments, such as dikes or berms. This action improves fish and wildlife habitat, and restores wetland hydrology.
- **Stream Channel Restoration** is a restoration action that diversifies aquatic habitat by restructuring the river channel configuration. This action is often used to rehabilitate



channels that have been degraded by dredging, sedimentation, or bank armoring. Benefits associated with this action, include improved fish habitat, as well as improved stormwater retention and filtration.

- **Fish Habitat Restoration** is a restoration action that improves degraded fish habitat by installing in-stream devices such as rock weirs, stream barbs, or woody debris. In many sections of the river, historic fish habitat has been lost or degraded by streambank armoring, or loss of natural vegetative cover. This action provides benefits to fish and wildlife species by creating additional food sources and a more diverse habitat (riffles, pools, overhanging banks) for shelter and reproduction.
- **Restoration Dredging** is a restoration action that improves aquatic habitat and water quality by excavating surplus sediment from behind dams, or from lakes and ponds which have decreased in depth due to additional sediment loading. This action improves water quality by restoring the natural depth to a lake or pond, and may also prevent downstream impacts that would occur if the dam were to be damaged or destroyed.
- **Fill Removal** is a restoration action that can improve natural hydrologic flow and fish/wildlife habitat, and decrease downstream erosion by excavating fill material from areas of historic placement/disposal. This action will improve the diversity and abundance of plant, fish, and wildlife species; improve aesthetics; and, create additional recreational opportunities.
- **Stream Debris Removal** is a restoration action that can improve water quality, and fish and wildlife habitat by removing and disposing of natural and anthropogenic rubbish in the river channel. This action typically includes garbage removal, clearing of downed trees, and the elimination of construction rubble. Benefits associated with this action include improved fish and wildlife habitat and aesthetics.



3.0 EVALUATION OF ECOSYSTEM RESTORATION SITES

The next step after identifying potential restoration sites was to evaluate the numerous ecosystem restoration sites and actions in the Upper Rockaway River watershed. To accomplish this, the District created a matrix that facilitated the evaluation and ranking of the sites based on the benefits that the restoration action associated with each site would provide. The following sections document the ecosystem restoration evaluation process, and Appendix C provides several examples of the ranking matrix during its development, including the District's and ERTAC's final scored ranking matrices.

3.1 RANKING MATRIX

A multi-disciplinary approach was used to develop the ranking matrix and included identifying pertinent ranking elements, determining a method to score each restoration site and its associated restoration action, and ranking the sites based on their individual scores.

3.1.1 Restoration Ranking Elements

The restoration ranking elements are an essential component of the ranking matrix and are necessary to score the potential restoration sites. Ranking elements were developed by the District in consultation with the ERTAC, and were based on a number of ecological considerations (including site conditions), an analysis of watershed benefits, and conformity with Study objectives and goals. In addition, the ranking elements are directly linked to the proposed restoration action at each site and reflect the desired benefits that could be achieved by implementing that action. For example, a restoration action associated with "Streambank Restoration and Stabilization" would result in a decrease in sedimentation and non-point source pollutants.

The District prepared the draft ranking elements based on recurring ecological impacts observed within the watershed, and Federal requirements under the USACE's technical directives. The draft elements were presented to the ERTAC, discussed at the meetings, and revised based on their recommendations. The final ranking elements included:

- **Decrease in sedimentation and non-point source pollutants** involves reducing the amount of sediment carried downstream and improving fish and wildlife habitat and water quality. In addition, fewer pollutants would be transported throughout the system; however, this is not a Federal objective for this Study and was only considered a secondary benefit.
- **Restore native fish and wildlife habitat** involves restoring ecologically degraded or disturbed areas and significantly improving fish and wildlife habitat in areas historically known to support more diverse and abundant populations.
- **Improve historic hydrologic connection** involves reintroducing natural waterflow into areas of historic inundation through the manipulation of the existing environment, and restoring wetlands as well as fish and wildlife habitat.



- **Expand rare or endangered species habitats** involves increasing areas of suitable habitat for rare/threatened/endangered species within the watershed, and fulfilling a number of Federal objectives related to fish and wildlife species and habitat restoration.
- **Meet Federal interest** involves maximizing the number of Federal Technical Directives that an action fulfills, thus aiding in the acquisition of funding and ultimately the feasibility of implementing a project. Examples of Federal interest concerns include system-wide benefits, support of pertinent government rules and regulations (i.e., Wetlands Protection Act, Clean Water Act), and resource significance.
- **Provide secondary benefits in the public's interest** involves identifying benefits that are not considered direct ecological benefits associated with a proposed restoration action. Several secondary benefits such as increased flood storage capacity, recreational opportunity, and aesthetics were included in the initial ranking process, per the ERTAC's request.

3.1.2 Evaluation/Scoring Method

A restoration ranking matrix was developed for the Study that incorporated all the information generated. The matrix included the names of the 47 potential restoration sites, the proposed restoration action for each site, and the restoration ranking elements. The District developed an evaluation method that would determine the ability of each restoration site to satisfy the six ranking elements. Specifically, if the proposed restoration action would decrease sedimentation in downstream areas of the watershed the site would receive a "v" in the box on the matrix. If the action would not result in a decrease in downstream sedimentation, the site would receive an "X" in the box. Finally, if it was difficult to determine whether the action would result in any discernible change in downstream sedimentation, a "---" was put in the box on the matrix (Appendix C). The evaluation was based on site-specific information gathered through preliminary site visits, GIS analysis, aerial photographic interpretation, ERTAC discussions/input, and historic environmental conditions.

Following this evaluation process, a score was calculated for each site. In order to calculate the scores a value of +1 was assigned to each "v", a value of -1 was assigned to each "X", and a value of 0 was assigned to each box with a "---". A total score for each site was generated by adding the values across the matrix for each site (Table 2). Based on this scoring method, the highest possible score for a site would be +6 and the lowest possible score would be -6.

3.1.3 Ranking of Restoration Sites

The District provided blank copies of the completed restoration ranking matrix to all the ERTAC members and asked them to individually evaluate and score the restoration sites (Appendix A), and to submit their completed matrix for inclusion in the Report. In addition, the District completed their evaluation and scoring of the restoration sites independently of the ERTAC members.



Table 2. Example Scoring of Restoration Ranking Matrix.

Restoration Site	Primary Restoration Action	Decrease Sediments	Restore Fish and Wildlife	Improve Historic Hydrology	Expand RTE Habitats	Meet Federal Interest	Provide Secondary Benefits	Total
Site A	Floodplain restoration	V	V	V	---	V	---	4/6
Site B	Pond dredging	V	---	---	X	---	V	1/6
Site C	Streambank restoration	V	---	X	---	---	---	0/6

Although not all ERTAC members completed the matrix, a draft ERTAC matrix that included a score for each of the restoration sites was developed based on comments and suggestions made during the August 4th, 2003, ERTAC meeting. This draft matrix was then reviewed by the ERTAC members during the September 5, 2003, meeting and following some minor modifications, was approved as the ERTAC’s final scored matrix (Appendix C).

Two sites, BM-1 and BM-2, were not assigned a score by either the District or ERTAC due to a lack of site-specific information. Both these sites are located within the perimeter of the Picatinny Arsenal and were not investigated as part of this Report due to limited access associated with security restrictions. In addition, the District was not able to conduct site visits at sites MB-3 and MR1-7 until later in the Study. However, this information was not available to the ERTAC; consequently, the ERTAC was unable to assign a score to these two sites. Therefore, these two sites only have a District score and do not have an ERTAC or combined score.

The ERTAC’s scored matrix was combined with the District’s scored matrix to generate a total, combined score for all the restoration sites. This total score equals the sum of the ERTAC and USACE scores, with a maximum score of +12 and a minimum of -12. This combined, final matrix was then sorted so that the sites were listed in order of their scores, highest to lowest. A total of 22 sites scored greater than zero (Table 3).

3.2 IDENTIFY PRIORITY SITES

Due to the amount of time and effort spent developing the ranking elements and matrix, the District decided that the restoration priority sites that would provide the maximum benefits to the system, if restored, included the sites that scored the highest in the matrix. In particular, the District and ERTAC decided that all the potential restoration sites with scores greater than 50% of the maximum combined score (a score of 7 or higher) should be considered priority restoration sites for the Upper Rockaway River watershed (Figure 3). These sites include:

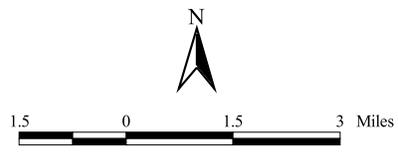
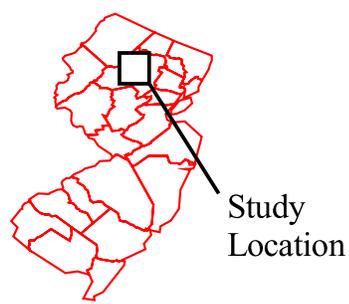
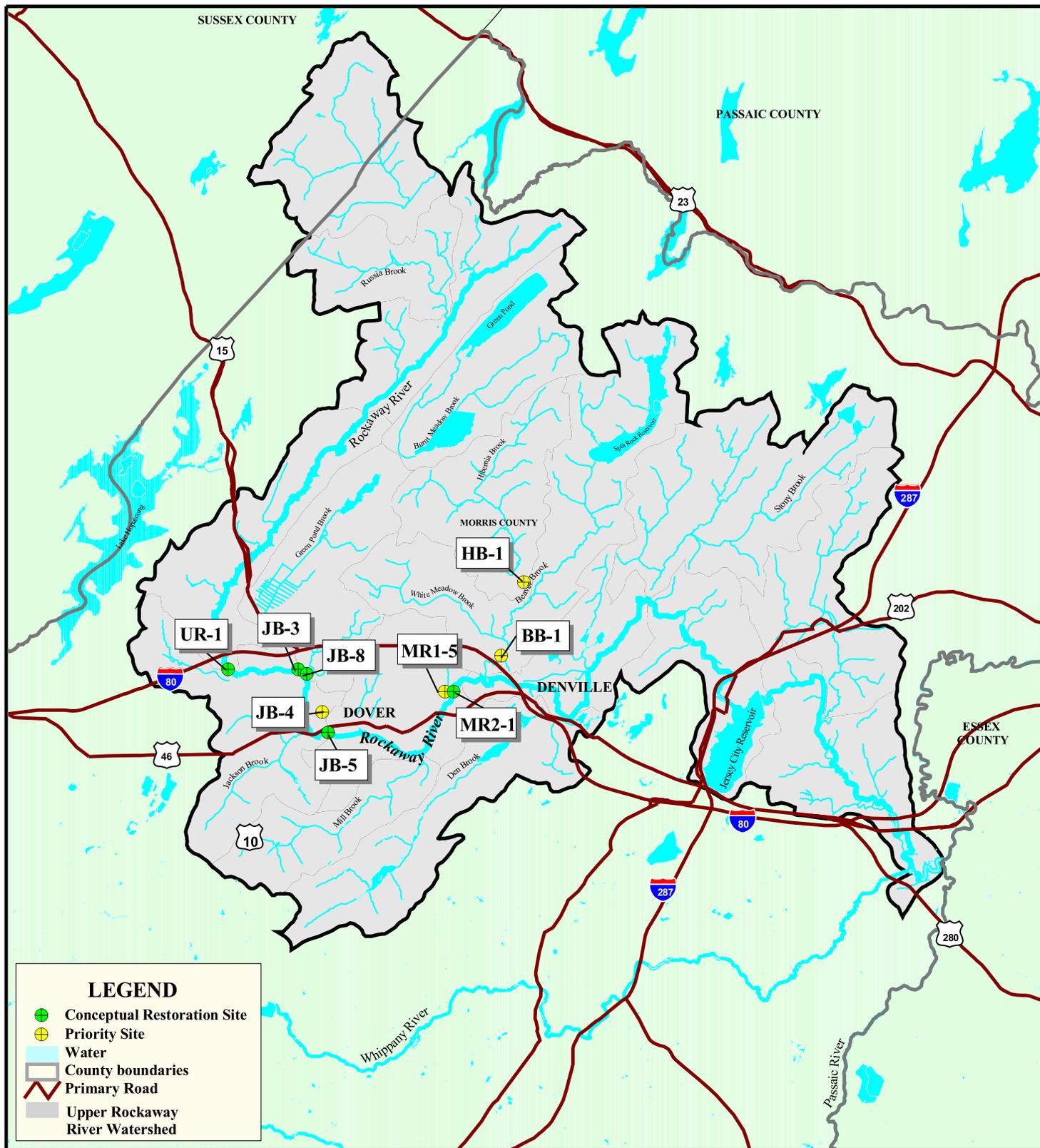
1. UR-1– GPU Energy/Morris County Properties
2. JB-3 – Burnt Meadow Brook- River Woodland Reserve



Table 3. Scored and Sorted Matrix: Sites that Scored Greater than Zero.

SITE ID	RESTORATION SITE NAME	RESTORATION ACTION	ERTAC SCORE	USACE SCORE	COMBINED TOTAL SCORE
UR-1	GPU Energy/Morris County Properties	Wetland Restoration	+ 6	+ 6	+ 12
JB-3	River Woodland Reserve - Burnt Meadow Brook	Floodplain Restoration	+ 5	+ 5	+ 10
JB-5	Drainage 652 - Dover	Floodplain Restoration	+ 4	+ 6	+ 10
JB-8	Drainage 646 - Wharton	Wetland Restoration	+ 5	+ 5	+ 10
MR2-1	River Woodland Reserve	Wetland Restoration	+ 5	+ 5	+ 10
MR1-5	Rockaway River Corridor Enhancement	Floodplain Restoration	+ 5	+ 4	+ 9
BB-1	Hampton Inn Site	Fill Removal	+ 5	+ 4	+ 9
JB-4	Drainage 633 - Dover	Stream Channel Restoration	+ 3	+ 5	+ 8
HB-1	Drainage 530 - Rockaway Twp.	Wetland Restoration	+ 4	+ 4	+ 8
LR-3	Plane Street Re-Greening	Streambank Restoration	+ 3	+ 3	+ 6
MR1-6	Jackson Ave. Park	Streambank Restoration	+ 2	+ 3	+ 5
MR2-3	Denville - River Corridor Enhancement	Floodplain Restoration	+ 3	+ 2	+ 5
DB-1	Den Brook Fill Site	Fill Removal	+ 3	+ 2	+ 5
MR1-3	River Greenway - Dover	Fish Habitat Restoration	+ 3	+ 1	+ 4
MR2-2	Banzai Steakhouse/ Gearheart Auto	Fish Habitat Restoration	+ 3	+ 1	+ 4
JB-1	Washington Forge Pond	Restoration Dredging	+ 2	+ 1	+ 3
MR1-1	Drainage 639 - Dover/Rockaway Twp.	Streambank Restoration	+ 1	+ 2	+ 3
GP-1	Drainage 331 - Rockaway Twp.	Wetland Restoration	0	+ 3	+ 3
JB-6	Drainage 660 - Mine Hill Twp.	Streambank Restoration	0	+ 2	+ 2
JB-7	Drainage 681 - Randolph Twp.	Streambank Restoration	0	+ 1	+ 1
LR-1	Griffith Park	Streambank Restoration	0	+ 1	+ 1
LR-2	Drainage 590 - Boonton	Streambank Restoration	0	+ 1	+ 1
<hr/>					
<i>BM-1</i>	<i>Drainage 444 – Rockaway Twp.</i>	<i>Unknown</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>
<i>BM-2</i>	<i>Drainage 479 – Rockaway Twp.</i>	<i>Unknown</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>
<i>MB-3</i>	<i>New Site (Not Named)</i>	<i>Streambank Restoration</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>
<i>MR1-7</i>	<i>Drainage 613 – Denville Twp.</i>	<i>Streambank Restoration</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>





Source: Environmental Systems Research Institute, Inc.
 ESRI Data & Maps, 1999 CD-ROM;
 NJDEP GIS Resource Data
 CD-ROM Series 1, Volume 3, 1996

Figure 3. Priority Restoration Sites for the Upper Rockaway River Basin, Flood Control and Ecosystem Restoration Study.

3. **JB-5** – *Drainage 652 Dover*
4. **JB-8** – *Drainage 646 Wharton*
5. **MR2-1** – *River Woodland Reserve*
6. **MR1-5** – *Rockaway River Corridor Enhancement*
7. **BB-1** – *Hampton Inn Site*
8. **JB-4** – *Drainage 633 Dover*
9. **HB-1** – *Drainage 530 Rockaway Township*

The top five ranked sites had scores equal to, or greater than, 10 (greater than 83% of maximum score) and were advanced to conceptual restoration design (see Section 4). The remaining four priority sites provide a number of ecological benefits and could still be considered for future restoration actions. The following text provides a brief description of each of these sites.

Site MR1-5 (Rockaway River Corridor Improvement Site) is located upstream of Main Street in Rockaway Borough, and downstream of the Route 46 Bridge. Former floodplains have been impacted by the creation of parking lots and highways improvements, and the riparian buffer zone in this area has been reduced in width. Restoration of an approximately 100-foot-wide riparian buffer would improve water quality in this reach by reducing streambank erosion and sediment loading, as well as the transport of non-point pollutants from the roadways and nearby commercial and residential properties. In addition, the riparian buffer would improve fish and wildlife habitat by providing shade over the river thus reducing water temperatures, and providing a sheltered/protected travel corridor for a variety of mammals.

Site BB-1 (Hampton Inn Site) is located on Morris Avenue in Denville Township and includes an area of fill material adjacent to a forested wetland with multiple drainages into Beaver Brook. The area's natural hydrology and vegetation has been disturbed by nearby development activities. The filled upland areas should be excavated and replanted with native vegetation to restore the historic floodplain wetland. Additionally, a stormwater management plan should be developed to address inappropriate stormwater drainage into Beaver Brook.

Site JB-4 (Drainage 633 Dover) is located within Dover and Rockaway townships, and includes the Bowlby Pond area. The pond's drainage has been disturbed by construction of the Rockaway Town Square Mall. Specifically, drainages that previously flowed through the area have been culverted and/or diverted. Restoration activities could include reconnecting the natural drainages, and/or daylighting or improving the outfall channel connection. These actions would enhance the system by reducing velocities and sediment entering the Rockaway River, restore natural hydrology in the Bowlby Pond, and greatly enhance fish and wildlife populations in the area.

Site HB-1 (Drainage 530 Rockaway Township) is an approximately 0.5 mile reach of the river located in Beach Glen, Rockaway Township. The former Hewlett Packard site, which is situated adjacent to Beaver Brook, has experienced streambank erosion, loss of a riparian buffer zone, and wetland disturbance and filling. Although on-site investigations were limited due to fenced private property, both the District and ERTAC ranked the site as a priority wetland and/or



riparian corridor restoration project. Restoration activities at this site would include streambank stabilization through appropriate bioengineering techniques and native plantings, in-stream fish habitat improvements, and possible wetland restoration.

Other Sites

In addition to the sites identified above, the ERTAC requested that an additional four sites be considered priority sites as part of the District's Report. Although these sites did not have a combined score greater than 50%, the District agreed to present these sites as areas suitable for future ecological restoration activities.

Site LR-3 (Plane Street Re-Greening) is located in the Town of Boonton, near the Municipal Public Works garage on Plane Street, and includes a vacant asphalt lot. This site is located immediately adjacent to the river and was likely a former floodplain. Restoration activities at this site would include removing the asphalt, excavating the fill material, and planting the area with native plant species resulting in improved fish and wildlife habitat. However, potential contamination and ecological exposure/risk is a major concern associated with this action. Therefore, contamination testing would be necessary prior to any restoration activities at this site.

Site MR1-6 (Jackson Avenue Park) is located in the Borough of Rockaway. Streambank destabilization and erosion, caused by heavy use by recreational fishers and excessive grazing by Canada geese, has been identified as the primary ecological concern within the Park. Stabilization of the shoreline using natural filter fabrics, biodegradable erosion control devices (i.e., coconut coir logs), and native riparian planting would help to maintain the integrity of the shoreline and deter Canada geese. In addition, a stabilized fishing access location should be established to reduce impacts to the shoreline caused by repeated use. This project could also be presented as a hands-on learning event for the community, to educate local homeowners about proper methods of shoreline protection throughout the Rockaway River watershed.

Site MR2-3 (Denville-River Corridor Enhancement) includes an approximately reach of the Upper Rockaway River from downtown Denville to the Boonton Township line. In general, this reach of the river is considered to be healthy, with a rich diversity of fish and wildlife species, and protected open space. However, day-to-day activities at local businesses and residences are negatively impacting the system, through inappropriate garbage and waste disposal or poor lawn management, for example. Restoration of streambank vegetation and education of the public regarding impacts to the river would likely reduce these impacts.

Site DB-1 (Den Brook Fill Site) is located in Denville Township and partly in Parsippany Troy-Hills. Fill material from the construction of Route 80 and Route 46 has been placed in the floodplains associated with Den Brook, and has degraded the water quality as well as the fish and wildlife habitat in this area. The fill material should be removed and the area should be replanted with native vegetation to restore the historic floodplain wetland.

As previously discussed, four potential restoration sites did not receive a combined total score. However, the District and ERTAC members discussed potential restoration actions associated



with these sites based on the limited information that was available at the time. The following text provides a brief summary of these discussions.

Sites BM-1 (Drainage 444) and **BM-2** (Drainage 479) are located in the Picatinny Arsenal and are both associated with Green Pond Brook. Lake Denmark and Picatinny Lake both appear to currently provide adequate fish and wildlife habitat, but according to members of the ERTAC with first-hand knowledge of the area, riparian and other habitat improvements could be implemented. The ERTAC recommends that restoration planning efforts be undertaken at the Picatinny Arsenal to improve downstream habitat in the Rockaway River. Additional studies will be required to fully evaluate these sites and develop appropriate restoration actions.

Sites MB-3 (New Site - Unnamed) is located on Mill Brook near the intersection of Mountainside Drive and Grist Mill Road in Randolph Township, and **MR1-7** (Drainage 613) is located near Franklin Avenue in Rockaway and Denville Township. While these sites do not appear to present substantial areas for ecological restoration, additional investigation would be required to adequately identify the extent of restoration potential.

3.3 ERTAC RESTORATION RECOMMENDATION

Following the analysis of potential restoration sites and actions, the District and ERTAC discussed other issues of concern in the watershed. In particular, both groups agreed that the stormwater management policies for the watershed should be reviewed, updated, and strictly enforced by each township in an effort to reduce impacts to the areas water quality and ecological resources. Although it is not part of this Study, the ERTAC requested that the District provide a few recommendations for a watershed management plan for the Upper Rockaway River. The following text provides an initial list of some items that could be considered during the development of a watershed management plan; however, this should not be considered a complete and thorough assessment.

- Outdated stormwater containment devices in the watershed should be upgraded/updated and regularly maintained.
- An environmental outreach program should also be established to educate private property owners about watershed-friendly home and lawn maintenance as an effort to reduce non-point source pollution, particularly in areas where engineered stormwater management systems would not be effective.
- Erosion control protocols or the implementation of Total Maximum Daily Loads (TMDLs) should be required and enforced during all construction activities.
- Guidelines should be established to limit residential and commercial land disturbance and fertilization.
- Impervious surfacing should be reduced as much as possible, and surface water infiltration into groundwater aquifers should be promoted during new development.
- A riparian buffer and set-back zone of at least 25 feet should be established along the banks of the Upper Rockaway River and its tributaries.
- Regular monitoring of surface water and ecosystem quality through chemical, biological, and physical sampling should be encouraged to help identify impairments to the watershed.



- Coordinate with nearby communities and municipalities in the watershed to implement and enforce consistent watershed protection policies.



4.0 ECOSYSTEM RESTORATION CONCEPTUAL DESIGNS

Conceptual restoration designs were completed for the five highest scored sites. The District performed on-site field surveys to characterize the existing environmental conditions at each proposed restoration site, and to assist in the development of the most effective conceptual restoration design for each site.

4.1 RESTORATION SITE FIELD SURVEYS

The District and USFWS conducted field surveys at the five highest scored restoration sites in October 2003. Data collection efforts involved the following: the identification of dominant plant species in the overstory, understory, and herbaceous layer; the characterization of existing site conditions including soils and hydrology; identification of fish and wildlife species and/or evidence of their presence; and observation of stream characteristics such as flow, depth, width, substrate, as well as bank height, slope, and general condition. Appendix D includes copies of field data forms (wetland and stream) and photographic documentation obtained during the field surveys.

Information obtained during the field surveys was used to further evaluate the various sites in terms of engineering and environmental constraints, and the likelihood of restoration success/failure. Engineering constraints indicate whether or not the proposed restoration action would be difficult to construct considering factors such as site access, equipment storage, site security, or additional water storage/diversion needs. Environmental constraints indicate whether or not the proposed restoration action would adversely impact existing ecological communities. Lastly, the likelihood of failure evaluates whether or not the proposed restoration would be likely to fail based on best professional judgment. The results of this final evaluation (Table 4) further ranked the top five sites based on site-specific information and best professional judgment.

Table 4. Scored and Sorted Matrix: Sites Scored Greater Than Zero.

FACTOR	Site UR-1	Site JB-3	Site JB-5	Site JB-8	Site MR2-1
	Wetland Restoration	Floodplain Restoration	Floodplain Restoration	Wetland Restoration	Wetland Restoration
Total Combined Score	12	10	10	10	10
Engineering Constraints	1	3	3	2	3
Environmental Constraints	1	2	3	2	3
Likelihood of Failure	2	3	3	3	3
Final Score	16	18	19	17	19

Key: 1 = high or many; 2 = moderate; 3 = low or few



Based on the final evaluation matrix, the top five sites were re-ranked based on their overall scores: MR2-1, JB-5, JB-3, JB-8, and UR-1. Not only did the additional information enable the identification of possible constraints, it significantly assisted in the design of the most practical and beneficial restoration action at each site.

4.2 CONCEPTUAL RESTORATION DESIGN

Incorporating information gathered during the field surveys, the District prepared initial conceptual restoration designs for sites MR2-1, JB-5, JB-8, and UR-1. The following section details the proposed conceptual restoration designs for the identified priority sites.

4.2.1 JB-5: Drainage 652 Dover

Site JB-5 is an approximately 3.23 acre asphalt parking lot located in downtown Dover behind the Krauzer's food store on North Warren Street. The site is bordered by the Rockaway River to the north, the Krauzer's store to the east, a number of buildings and parking lots to the south, and a chain link fence to the west. The site includes a narrow strip of the Rockaway River and the existing municipal parking lot.

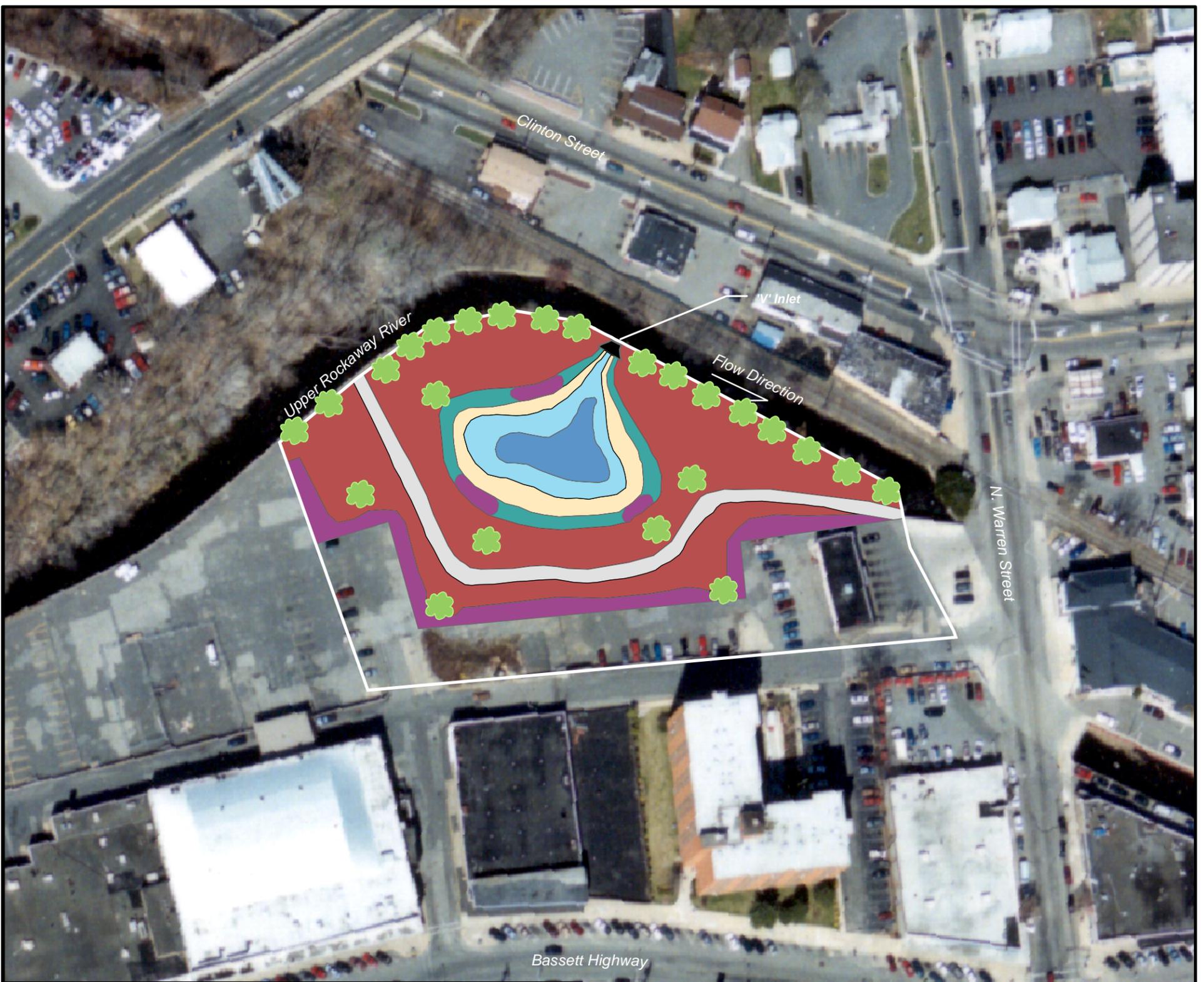
Existing Conditions

In the past, the site was a pond (known as Dover Mill Pond) that was used to power an iron-working mill, and a parking lot associated with an outdoor movie theater and parking garage (Friends of the Rockaway River 1998). With the exception of a narrow, approximately 3-foot-wide, vegetated area located along the river's edge, the entire area of the restoration site is surfaced with asphalt. On-site vegetation is extremely limited, and includes tree-of-heaven (*Ailanthus altissima*), American elm (*Ulmus americana*), sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), Virginia creeper (*Parthenocissus quinquefolia*), frost grape (*Vitis riparia*), and reed canary grass (*Phalaris arundinacea*). According to the USFWS Planning Aid Report (Appendix E), the upper reaches of this site may contain potential bog turtle habitat, and the wood turtle has been documented in the vicinity of the site.

Proposed Restoration

The proposed restoration action at this site would involve the removal of the asphalt; excavation of the underlying fill material to create a narrow channel, small pond, and emergent wetlands; and, reestablishing areas of upland herbaceous and scrub-shrub vegetation (Figure 4). A V-shaped inlet will be established through the existing concrete wall, which will allow regular water exchange between the river and the created pond. The side slopes would be contoured to enable planting native emergent wetland plant species. The excavated fill material will be used on-site to create an elevated walking path, allowing controlled access to the restored site, and aesthetic enhancement. In addition, topsoil would be added to the site to promote a healthy growth of herbaceous and scrub-shrub cover. As recommended by the USFWS, a butterfly garden and wildlife garden may be created within the restoration site to enhance butterfly usage in the area.



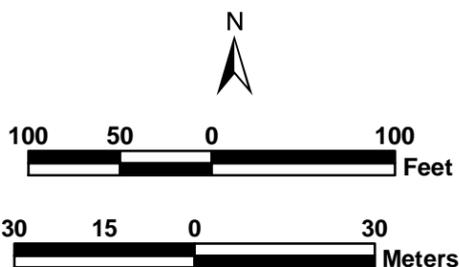


Existing Environment



LEGEND:

- | | |
|-----------------------------|---------------------|
| Created Herbaceous | Created Path |
| Created Herbaceous/Slope | Created Scrub-shrub |
| Created Open Water | Created Rock |
| Created Palustrine Emergent | Created Deep Water |
| Individual Tree Plantings | |



Source: Natural Color Aerial Photography, USACE 2000.

Figure 4. Site JB-5: Conceptual Restoration Design for the Upper Rockaway Flood Control and Ecosystem Restoration Study.



U.S. Army Corps of Engineers
New York District, 26 Federal Plaza
New York, NY 10278-0090

Date:

11/05/03

Primary benefits associated with restoring this site include the reintroduction of historic fish and wildlife habitat to a highly urbanized environment, restoration of historic hydrologic patterns, expansion of rare butterfly habitat within Dover, and a potential reduction in sedimentation to downstream resources. The proposed design may also promote the expansion of bog turtle habitat. Secondary benefits that could be attained include aesthetic and recreational improvements, as well as the advancement of the local community's plan for beautification of the area (Friends of the Rockaway River 1998).

Additional surveys and documentation of existing features will be required prior to the development of the final restoration plan at this site. Surveys that may be required in the future include a site-specific topographic survey, geo-technical surveys, soil surveys, site assessment and/or soil contaminants testing, and cultural resource survey. In addition, the final restoration plan/design could incorporate the establishment of a butterfly garden with native nectar producing plants if an assessment of butterfly habitat usage within the area indicates that this effort would be warranted.

4.2.2 MR2-1: Middle Rockaway Sub-basin #2- River Woodland Reserve

Site MR2-1 is an approximately 3.71 acre parcel of land located in Rockaway Borough near the intersection of Main Street and Franklin Avenue. Situated south of a lumberyard, the site is characterized as a vacant, disturbed upland that is bordered by the Rockaway River on the north and west, a railroad track on the east, and a forested area to the south.

Existing Conditions

A circular dirt path outlines a disturbed upland area in the center of the site. The site also includes an early successional meadow in the southern portion, and a forested "edge" community along the river. Near the center of the path is a manhole cover for the local sewage authority. A number of trails extend from the dirt path to the water's edge, allowing recreational fishermen access to the river and exacerbating streambank destabilization in some places.

The primary ecological features of the restoration site include the disturbed upland community, the riverbank, the meadow, and the surrounding forest. The disturbed upland area is sparsely vegetated with mugwort (*Ambrosia vulgaris*), common mullein (*Verbascum thapsus*), and various other species commonly found on recently disturbed sites. The riverbank consists of a 30 to 50-foot wide, dense forested buffer predominantly vegetated with boxelder (*Acer negundo*), willows (*Salix* spp.), silky dogwood (*Cornus amomum*), smooth sumac (*Rhus glabra*), multiflora rose, and silver maple. Dominant vegetation associated with the meadow community includes Queen Anne's lace (*Daucus carota*), calico aster (*Aster vimineus*), and rough-stemmed goldenrod (*Solidago rugosa*). The surrounding forest primarily consists of oaks (*Quercus* spp.) and maples. The site currently may provide some habitat along the riverbanks for the state listed threatened wood turtle (USFWS 2003). In addition, the Federally listed threatened bog turtle has historically been identified on the site, and the state endangered bobcat (*Felis rufus*) has also been identified in the area (USFWS 2003).



Proposed Restoration

The proposed restoration action at this site will include excavation of the disturbed upland (potential fill material) to appropriate floodplain elevations, creation of channels and ponding areas, planting of native emergent wetland and submerged aquatic vegetation, planting upland scrub-shrub/forest and herbaceous vegetation, and creating a grass parking area (Figure 5). In order to reduce the velocity of flow through this reach of the river and to diversify the habitat type, a narrow channel will be created, parallel to the Rockaway River, to ensure a constant flow of water entering and exiting the newly restored system. Emergent wetland and submerged aquatic habitats will be created in conjunction with the new channel, and upland herbaceous and forest/scrub-shrub areas will be planted in the adjacent uplands. All excavated material will be reused on-site to create a consolidated and structured parking area and access path for recreational fishing. Potential areas of threatened or endangered species habitat will be identified and avoided or improved during all restoration activities.

The primary benefit of this restoration action will be an increase in fish and wildlife habitat, including rare or endangered species habitat. Additionally the restoration will establish a number of native habitat types rarely found nearby in the watershed. Improved hydrologic function will also be established by restoring the connection between the disturbed upland and the river. Secondary benefits will include site improvements for recreational fishing use and enhanced aesthetics.

Additional surveys and documentation of existing features will be required prior to the development of the final restoration plan at this site. Surveys that may be required in the future include a site-specific topographic survey, wetland delineation survey, fish and wildlife surveys, soil surveys, site assessment and/or soil contaminants testing, and cultural resource survey. In addition, a qualified herpetologist will be required to identify potential threatened or endangered turtle habitat prior to the development of the final restoration plan. Also, the exact use and location of the sewage line associated with the observed manhole cover must be investigated.

4.2.3 JB-3: Burnt Meadow Brook- River Woodland Reserve

Site JB-3 is an approximately 2.52 acre parcel of land that consists of a narrow vegetated berm, disturbed upland, and remnant forested floodplain. The site is located in Wharton, near the Shop Rite shopping complex located on West Clinton, and is bordered by the Rockaway River to the west, disturbed upland communities to the north and northeast, and a forested wetland to the south and southeast.

Existing Conditions

Based on the site visit, it appears that the river was channelized through this area in the past and that the excavated material was side-cast along the eastern bank of the river to create an artificial earthen berm and/or exaggerated streambank. The berm is approximately 25 feet wide and between 6 to 8 feet above the normal river surface, and there is no evidence that the river water is able to breach the berm. These past activities have significantly altered the hydrology in this



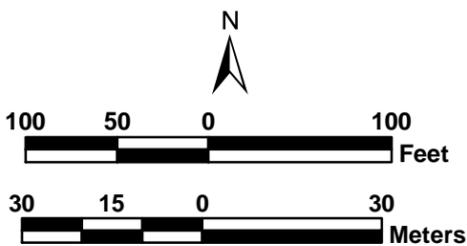


Existing Environment



LEGEND

- Created Forest/Scrub-shrub
- Created Herbaceous
- Created Mowed Grass
- Created Open Water
- Created Palustrine Emergent
- Existing Road
- Created Open Water/Submerged Aquatic Vegetation
- Created Scrub-shrub



Source: Natural Color Aerial Photography, USACE 2000.

Figure 5. Site MR2-1: Conceptual Restoration Design for the Upper Rockaway Flood Control and Ecosystem Restoration Study.



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area and have adversely impacted the former floodplain. As a result, the Rockaway River flows very quickly downstream through this narrow channel.

Key ecological features of this restoration site include the vegetated earthen berm, the Rockaway River, remnant floodplain, and adjacent upland communities. The berm is moderately vegetated with pole-sized red maple, American elm, redbud (*Cercis canadensis*), beech (*Fagus grandifolia*), and sycamore trees. Multiflora rose (*Rosa multiflora*) was the dominant understory species, and the groundcover/herbaceous vegetation includes silky dogwood, sensitive fern (*Onoclea sensibilis*), white snakeroot (*Eupatorium rugosa*), and poison ivy (*Toxicodendron radicans*). The former floodplain/riverbed habitat, located to the east of the berm, is extremely rocky and is sparsely vegetated with the same species composition and structure as the berm. There is a notable absence of understory and herbaceous growth in this floodplain area. Wood turtles have been documented at the site, and potential bog turtle habitat may occur on or adjacent to the proposed restoration site; focused surveys may be necessary in the future (USFWS 2003).

Proposed Restoration

The proposed restoration action for this includes improving native fish and wildlife habitat diversity, reestablishing historic hydrology, and reducing high velocity flows and downstream sediment loading during storm events. Specifically, fish and wildlife habitat improvements include the removing the earthen berm, placing the excavated material on the disturbed upland areas, and replanting the area with herbaceous ground cover (Figure 6).

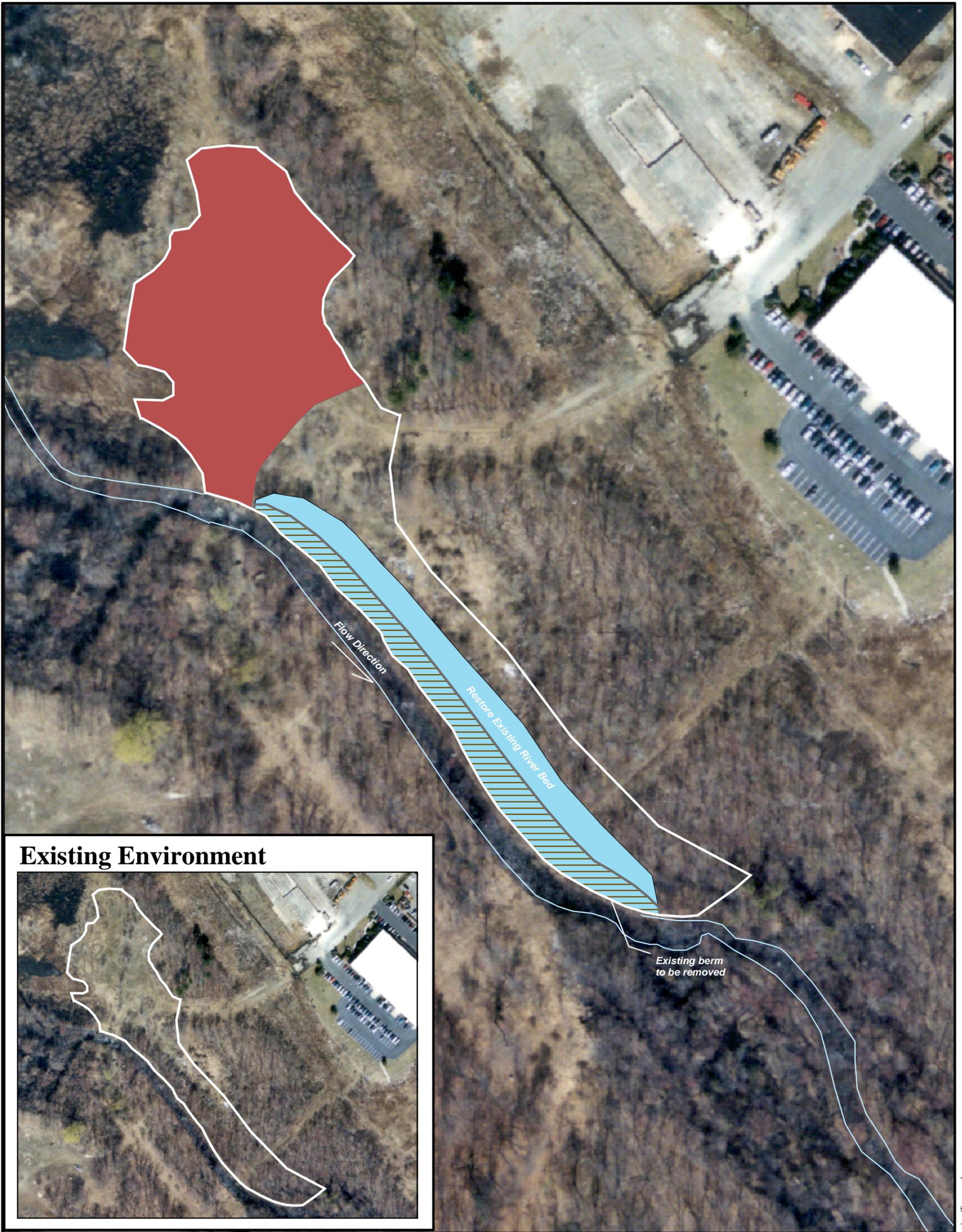
The proposed restoration action will significantly improve fish habitat by restoring the original streambed and floodplain and adding a diversity of habitats that are not currently available. The widening of the current riverbed through the removal of the berm will also provide secondary benefits such as a reduction in water velocities, and reestablishment of natural water and sediment storage in the floodplain during storm events.

Additional surveys and documentation of existing features will be required prior to the development of the final restoration plan at this site. Surveys that may be required in the future include a site-specific topographic survey, wetland delineation survey, fish and wildlife surveys, soil survey, site assessment and/or soil contaminants testing, and cultural resource survey. In addition, a qualified herpetologist will be required to identify potential threatened or endangered turtle habitat prior to the development of the final restoration plan.

4.2.4 JB-8: Jackson Brook Sub-basin- Drainage 646 Wharton

Site JB-8 is an approximately 3.9 acre parcel of land located on an active powerline right-of-way in Wharton, near the intersection of Mount Pleasant Avenue and West Clinton (Route 15). The site is bordered on the northeast by the West Clinton Bridge, on the east by Green Pond Brook, on the south by the Rockaway River and a large forested wetland, and on the northwest by the roller rink parking lot. The site is dominated by common reed (*Phragmites australis*), a highly opportunistic, fast colonizing plant species that is regularly found in disturbed wetland areas.



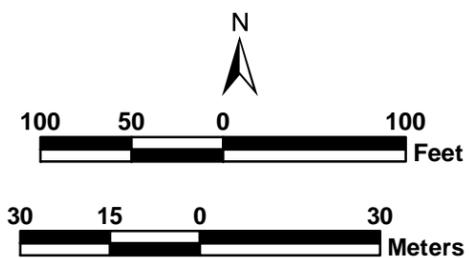


Existing Environment



LEGEND

- Created Open Water
- Created Herbaceous
- Area of Existing Berm



Source: Natural Color Aerial Photography, USACE 2000.

Figure 6. Site JB-3: Conceptual Restoration Design for the Upper Rockaway Flood Control and Ecosystem Restoration Study.



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Existing Conditions

Construction of the powerline has created habitat conditions that favor the growth and establishment of common reed. Common reed grows in very dense stands that can grow up to 15 feet tall, thus shading out other wetland plant species and reducing an area's fish and wildlife habitat diversity and abundance. Over time, common reed stands create a thick fibrous mat that continues to increase in thickness, elevating the area's ground surface and further discouraging the growth of other wetland plants.

Currently, the area receives surface water runoff from the adjacent roller rink parking lot and the surrounding roads. In addition, it is likely that the Green Pond Brook provides an intermittent source of hydrology during storm, or high water, events. However, there is no evidence of a stream channel or drainage ditch within the site, nor were any springs/seeps observed. It is assumed that the site historically was a forested floodplain associated with Green Pond Brook.

The diversity of on-site vegetation is limited, and predominantly consists of common reed. Other plant species were observed in small pockets near the northern tip of the site, adjacent to the brook. Dominant species in these areas include marsh pepper knotweed (*Polygonum hydropiper*), jewelweed (*Impatiens capensis*), arrow tearthumb (*Polygonum sagittatum*), and straw-colored nutsedge (*Cyperus strigosus*). Red maple (*Acer rubrum*) is the dominant overstory species in the adjacent floodplain. Potential bog turtle and wood turtle habitat may exist in the vicinity of the proposed site, and wood turtles have been documented in this stretch of the river (USFWS 2003).

Proposed Restoration

The proposed restoration action at this site will include removal and off-site disposal of the common reed; excavation and removal of the root mat; installation of slope stabilizing, biodegradable filter fabric; excavation of a series of ponds connected by one meandering channel; and, (Figure 7). Native emergent vegetation would be planted in the restored floodplain to enhance fish and wildlife habitat and to reduce sedimentation to the downstream reaches. Similarly, the area between the restored emergent and open water wetlands and the Roller Rink parking lot will be graded and planted with scrub-shrub vegetation.

Primary benefits associated with this restoration action include an increase in fish and wildlife habitat diversity, restored hydrologic connection, reduced transport of upland sediment and non-point source pollutants to downstream reaches, and an increased area of potential rare turtle habitat. Secondary benefits include an increase in temporary water storage, a reduction in required vegetation maintenance within the right-of-way, and an improved aesthetic viewshed.

Additional surveys and documentation of existing features will be required prior to the development of the final restoration plan at this site. Surveys that may be required in the future include a site-specific topographic survey, wetland delineation survey, fish and wildlife surveys, soil survey, site assessment and/or soil contaminants testing, and cultural resource survey. In addition, a qualified herpetologist will be required to identify potential threatened or endangered turtle habitat prior to the development of the final restoration plan.



Mount

Clinton Street

Flow Direction
↓

Upper Rockaway River

Existing Environment

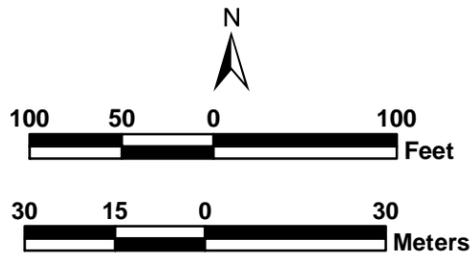


Flow Direction
↘

Green Pond Brook

LEGEND

- Created Open Water
- Created Palustrine Emergent
- Created Scrub-shrub



Source: Natural Color Aerial Photography, USACE 2000.

Figure 7. Site JB-8: Conceptual Restoration Design for the Upper Rockaway Flood Control and Ecosystem Restoration Study.



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4.2.5 UR-1: GPU Energy/Morris County Properties

Site UR-1 is an approximately 8.6 acre parcel of land that is located in Roxbury Township and consists of a shallow pond and a narrow vegetated berm. The site is bordered by Mill Pond Road to the west, the West Dewey Avenue Bridge to the northwest, the Upper Rockaway River to the north, and forested areas to the east and south. The area surrounding the site includes a small community of approximately 10 residences at the southern end of Mill Pond Road and to east of the pond.

Existing Conditions

Known locally as Baker's Mill Pond, or simply Mill Pond, Site UR-1 is believed to be a remnant from the Morris Canal era, and may have historically been used as a basin for barge vessels. The Rockaway River flows towards Mill Pond from the north, under the West Dewey Avenue Bridge, and continues in a southeasterly direction. Water exchange between the pond and the river is limited due to an approximately 3–6 foot high, earthen berm that separates the two systems and holds water in the pond at a higher elevation than the river surface. However, during storm events there is some field evidence that the river overflows the berm; and provides an intermittent source of freshwater to the pond. The primary drainage outfall from the pond is a culvert located along the southern border of the pond that drains into a forested wetland community and eventually into Stephens Brook. In addition, there is an approximately 10-foot-wide outlet located at the northern end of the pond, along the eastern side of the berm that drains into the mainstem of the river.

Key ecological features of the restoration site include the shallow open water community of the pond, including areas of open water and emergent wetlands, and the vegetated berm. The emergent wetland vegetation includes arrow arum (*Peltandra virginica*), pickerelweed (*Pontederia cordata*), cattail (*Typha* spp.), and various sedges and rushes. Dominant overstory vegetation on the berm includes red maple, silver maple, American elm, green ash (*Fraxinus pennsylvanica*), southern arrow-wood (*Viburnum dentatum*), and common cottonwood (*Populus deltoides*). The understory is dominated by speckled alder (*Alnus rugosa*) and the groundcover/herbaceous vegetation includes marsh pepper knotweed, jewelweed, arrow tearthumb, white snakeroot, and poison ivy. According to the USFWS (2003), bog turtle and wood turtle habitat may be found near the proposed restoration site.

In general, the pond is shallow and provides very little habitat diversity for fish. Submerged plants or floating leaved plants were observed during the field survey but were not identified due to inaccessibility. Water flow was extremely limited, and the bottom substrate was primarily silts and fine grain material.

Proposed Restoration

Based on the more detailed on-site surveys completed after the restoration ranking, this site is characterized as a functioning, open water/emergent wetland with low-flow conditions. Although there are indications of altered hydrology that may be limiting fish and wildlife



diversity at the site, there appears to be fewer restoration opportunities than what was originally believed to exist.

Preliminary restoration activities identified for Mill Pond based on current site conditions include improving fish and wildlife habitat diversity, as well as reducing high velocity flows and downstream sediment loading during storm events. Fish and wildlife habitat improvements include reconfiguring the elevation of the berm to a consistent height above the river's surface water height; excavating accumulated pond sediments creating areas of deepwater habitat to enhance the diversity of fish habitat and species; and, reconstructing the existing man-made culvert to ensure adequate pond drainage (Figure 8).

Primary benefits associated with the proposed restoration design include improved fish and wildlife habitat, improved hydrology, and decreased sediment loading in downstream areas. Specifically, the proposed restoration activities will allow the pond to retain a greater volume of water during storm events, thus reducing the water velocity and allowing sediments to settle out of the water column before the water re-enters the river. Secondary benefits include additional flood storage and recreational opportunities.

Additional surveys will be necessary to identify the elevations of the reconstructed berm and deepwater habitats prior to the development of a detailed restoration plan. Specifically, detailed hydrologic and hydraulic (H&H) engineering studies, topographic survey, wetland survey, and bathymetric survey are likely to be required.



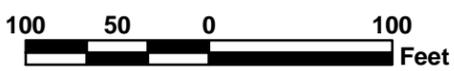


Existing Environment



LEGEND

- Created Open Water/Emergent
- Created Open Water/Submerged Aquatic Vegetation
- Created Deep Water
- Created Scrub-shrub



Source: Natural Color Aerial Photography, 2000, USACE.

Figure 8. Site UR-1: Conceptual Restoration Design for the Upper Rockaway Flood Control and Ecosystem Restoration Study.



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5.0 PRELIMINARY COSTS

Preliminary cost estimates were derived for each of the initial conceptual restoration designs. These estimates are based on unit costs, volume costs, and labor costs established through contacts with engineering and construction firms, past USACE projects, the R.S. Means Site Work and Landscape Data 20th Annual Edition (2001), and best professional judgment based on work experience on other similar restoration projects. These cost estimates are not derived from detailed restoration engineering plans, and therefore these preliminary estimates are subject to change as more in-depth survey and engineering designs are completed. These estimates are intended to provide a comparative cost estimate for the proposed restoration actions.

A number of assumptions were necessary to prepare the cost estimates for the five conceptual restoration sites. Estimated costs for various types of construction activities and services were entered into a costing spreadsheet (Table 5) and the acreage for each of the preliminary restoration designs were identified using GIS. The estimates presented do not include costs associated with real estate acquisition, follow-up monitoring, permitting, detailed engineering designs, or any additional surveying.

Restoration Site JB-5

This restoration action will entail excavation of the asphalt parking lot, excavation of underlying fill material, creation of a pond, and planting of native wetland and upland vegetation, and installation of an elevated pathway. The cost estimate includes a line item for site surveying, excavation and disposal of asphalt, on-site excavation and grading, inlet, channel, and pond creation, and planting of native vegetation. Major assumptions included:

- All of the excavated asphalt material will be disposed of off-site.
- Approximately 75% of the excavated fill material will be re-used on-site to create an elevated pathway.
- Approximately 25% of the excavated fill material will be disposed of off-site.
- General site excavation will reduce the surface elevation between 1 and 1½ feet to grade.
- An approximately 15-foot wide “V” inlet will be created through the existing wall and fortified as necessary with rock to maintain the waterway.
- A small channel will be excavated to connect the created inlet to the pond.
- Pond will be excavated to approximately 3 feet below grade, and the surrounding emergent wetland and transitional wetland/upland area will be excavated to an appropriate grade based on additional on-site surveys.
- Approximately 24 trees with a diameter at breast height of 2 inches will be planted.
- Existing walls and fencing will remain in place.

The total estimated cost of construction of this conceptual restoration design is estimated at \$258,659.



Table 5. Preliminary Cost Estimates for Conceptual Restoration Designs.

Construction Items	Cost/Units		Estimated Restoration Site Construction Costs									
	Units	Estimated Cost	JB-5		MR2-1		JB-3		JB-8		UR-1	
Item Description	Units	Estimated Cost	Quantity	Estimated Cost	Quantity	Estimated Cost	Quantity	Estimated Cost	Quantity	Estimated Cost	Quantity	Estimated Cost
<i>Surveying</i> ¹	Acre	\$ 480	1.84	\$ 883	2.5	\$ 1,200	1.5	\$ 720	3.4	\$ 1,632	3.5	\$ 1,680
Site Preparation												
Clearing ²	Acre	\$ 5,000		\$ -	1.01	\$ 5,050	0.94	\$ 4,700	3.4	\$ 17,000	0.25	\$ 1,250
Thatch Removal & Offsite Disposal ¹	Cubic Yard	\$ 18		\$ -		\$ -		\$ -	8228	\$ 148,104		\$ -
Asphalt Removal & Off-site Disposal ²⁻³	Cubic Yard	\$ 22	1781.12	\$ 39,185		\$ -		\$ -		\$ -		\$ -
Excavation/Grading												
General Onsite Excavation/Hauling/Grading ³	Cubic Yard	\$ 5	5238.11	\$ 26,191	1449.58	\$ 7,248	12140.55	\$ 60,703		\$ -	400	\$ 2,000
Channel Creation/Improvement (3 ft depth)												
Hauling - Onsite ³	Cubic Yard	\$ 3	982.14	\$ 2,946	1539.12	\$ 4,617		\$ -	702	\$ 2,106		\$ -
Pond Creation (3 ft depth)												
Hauling - Onsite ³	Cubic Yard	\$ 3	2946.44	\$ 8,839		\$ -		\$ -		\$ -		\$ -
Grading (\$2/CY) ³	Acre	\$ 3,227	1.4	\$ 4,518	1.29	\$ 4,163		\$ -	2.19	\$ 7,067		\$ -
Hauling/Disposal Fee - Offsite ¹⁻³	Cubic Yard	\$ 23.5	1642.29	\$ 38,594		\$ -		\$ -	2811	\$ 66,059	1573.75	\$ 36,983
Water Control Structures (culverts, etc.) ²	Each	\$ 10,000		\$ -		\$ -		\$ -		\$ -	2	\$ 20,000
Planting												
Planting Emergent Marsh ⁴	Acre	\$ 7,200	0.13	\$ 936	0.26	\$ 1,872		\$ -	2.03	\$ 14,616	2.2	\$ 15,840
Planting Upland Forest/Scrub-Shrub ⁴	Acre	\$ 11,000	1.4	\$ 15,400	0.84	\$ 9,240		\$ -	0.55	\$ 6,050		\$ -
Planting Upland Grass/Herbaceous ³	Acre	\$ 2,243	1.37	\$ 3,073	0.88	\$ 1,974	1.5	\$ 3,365		\$ -		\$ -
Topsoil (1' depth) ³	Cubic Yard	\$ 15	2555	\$ 38,325	1456	\$ 21,840	319	\$ 4,785	4136.75	\$ 62,051	392	\$ 5,880
Tree (2" caliper, 25' spacing) ³	Each	\$ 200	24	\$ 4,800		\$ -		\$ -		\$ -		\$ -
Planting Submerged Aquatic Vegetation ⁴	Acre	\$ 8,200	0.13	\$ 1,066	0.33	\$ 2,706		\$ -		\$ -	0.8	\$ 6,560
SUBTOTAL				\$ 184,756		\$ 59,910		\$ 74,273		\$ 324,685		\$ 90,193
Mobilization/Demobilization ²	%	12%		\$ 22,171		\$ 7,189		\$ 14,855		\$ 2,923		\$ 10,823
Erosion & Sediment Control ¹	%	8%		\$ 14,780		\$ 4,793		\$ 5,942		\$ 25,975		\$ 7,215
Contingency ⁵	%	20%		\$ 36,951		\$ 11,982		\$ 14,855		\$ 64,937		\$ 18,039
TOTAL COST				\$ 258,659		\$ 83,874		\$ 109,924		\$ 418,520		\$ 126,270

Source Key:

¹ Estimate from previous USACE project cost estimate (Port Monmouth, June 1998). Costs were inflated by 20% to reflect inflation since 1998.

² Northern Ecological Associates, Inc. best professional judgement based on work experience on other similar projects.

³ R.S. Means Site Work & Landscape Cost Data 20th Annual Edition (2001).

⁴ Kusler & Kentula (1990) recommended planting densities in coastal marshes

⁵ Per Other USACE Projects

Restoration Site MR2-1

This restoration action will include the excavation of a channel and creation of an emergent wetland and upland ecosystem. Additionally, the conceptual restoration design includes the establishment of a recreational fishing and parking area. The cost estimate includes a line item for site surveying, clearing, general excavation, pond and channel construction, and site grading, and planting of native vegetation. Major assumptions included:

- All excavated material will remain on-site.
- Channel will be excavated to approximately 3 feet below grade, and the associated submerged aquatic vegetation and emergent wetland will be excavated to an appropriate grade based on additional on-site surveys.
- Landscape grasses will be planted to create a fishing path and parking area.
- Topsoil will be placed in upland areas of disturbed soils to a depth of one-foot to support native herbaceous and forest/scrub-shrub plantings.

The total estimated cost of construction of this conceptual restoration design is estimated at \$83,874.

Restoration Site JB-3

This restoration action will include the excavation of the existing berm, relocating the excavated material on-site, and planting native vegetation. The cost estimate includes a line item for site surveying, site clearing, excavation of the berm, and planting of native vegetation. Major assumptions included:

- All excavated berm material will be relocated on-site to an existing, disturbed upland area.
- Topsoil will be placed in upland areas of disturbed soils to a depth of one-foot to support native herbaceous plantings.

The total estimated cost of construction of this conceptual restoration design is estimated at \$109,924.

Restoration Site JB-8

The proposed restoration will include the removal of existing *Phragmites*, excavation of the existing root mat, excavation of ponds and channel, and planting native wetland and upland vegetation. The cost estimate includes a line item for site surveying, clearing, general excavation, excavation of ponds and channel, grading, and planting of native vegetation. Major assumptions included:

- Existing common reed and thatch will be removed off-site.
- Ponds will be excavated to approximately 3 feet below grade, the channel will be excavated to approximately 2 feet below grade, and the associated emergent wetland will be excavated to an appropriate grade based on additional on-site surveys.



- Ponds and channel will be graded to ensure a positive flow (north to south).
- General excavation will reduce the overall site elevation to approximately 1½ foot below existing grade.
- All excavated material will be disposed of off-site.
- Topsoil will be placed to a depth of 1 foot, and erosion control filter fabric will be installed in all excavated areas.
- Scrub-shrub vegetation will be planted.

The total estimated cost of construction of this conceptual restoration design is estimated at \$418,520.

Restoration Site UR-1

This restoration action will include partial excavation of the existing berm, installation of two culverts, excavation of deep-water habitat, and planting of native wetland vegetation. The cost estimate includes a line item for site surveying, excavation and grading of the berm, excavation of deep open water, installation of two culverts, and planting of native vegetation. Major assumptions included:

- Clearing would be limited to the area of the existing berm.
- Excavated berm material will be re-used on-site to fill in low elevations on the berm.
- Excavated sediment removed from the pond will be removed off-site.
- Excavated pond material will require an approximately 25% increase in disposal costs due to in-water excavation.

The total estimated cost of construction of this conceptual restoration design is estimated at \$126,270.



6.0 REFERENCES

- Friends of the Rockaway River. 1998. The Rockaway River & Its Treasured Resources - Visions & Strategies for their Recovery. Morris County, New Jersey. An advocacy plan of the Friends of the Rockaway River. Prepared by Roy Mann Associates, Inc., December 1997, printed in April 1998.
- New Jersey Department of Environmental Protection (NJDEP). 2002. Division of Watershed Management [Online]. Available: <http://www.state.nj.us/dep/watershedmgt/index.htm> [June 2002].
- _____. 1998. Initial Watershed Characterization and Assessment for Watershed Management Area 6 (Upper Passaic, Whippany and Rockaway Watersheds). Prepared by the Division of Watershed Management Northeast Bureau (DWMNEB).
- Rockaway River Watershed Cabinet. 2000. Rockaway River Sustainable Watershed Management Plan. .
- Rockaway River Watershed Cabinet. 2001. Rockaway River Watershed Stream Corridor Analysis. Prepared by Amy S. Greene Environmental Consultants, Inc.
- United States Army Corps of Engineers (USACE). 2002. Preliminary Identification of Potential Restoration Sites, Upper Rockaway River, New Jersey, Flood Control and Environmental Restoration Study. Prepared by USACE, New York District.
- _____. 2000. Planning Guidance Notebook. ER 1105-2-100. Washington, D.C..
- _____. 1998. Expedited Reconnaissance Study, Upper Rockaway River, New Jersey, Flood Control and Environmental Restoration Study. Prepared by USACE, New York District.
- United States Fish and Wildlife Service (USFWS). 2003. Planning Aid Report, Assessment of the Upper Rockaway River, New Jersey, Flood Control and Environmental Restoration Project, Morris County, New Jersey. Prepared by USFWS, Ecological Service, New Jersey Field Office.



APPENDIX A

ECOSYSTEM RESTORATION TECHNICAL ADVISORY COMMITTEE (ERTAC) COORDINATION

- **Invitations**
- **June 24, 2003**
- **July 8, 2003**
- **August 4, 2003**
- **September 5, 2003**
- **General Correspondences**

Invitations

- **Mailing List**
- **Sample Letter**



**UPPER ROCKAWAY RIVER BASIN, NEW JERSEY
FLOOD CONTROL AND ECOSYSTEM RESTORATION STUDY**

**ECOSYSTEM RESTORATION
TECHNICAL ADVISORY COMMITTEE
MAILING LIST**

June 2003

INTRODUCTION

This mailing list provides the names and addresses of the various agencies, groups, and individuals (see listed below) that may be able to provide technical assistance with the identification of ecosystem restoration sites for the Upper Rockaway River Flood Control and Ecosystem Restoration Study located in Boonton, Boonton Township, Denville Township, Dover, Jefferson Township, Randolph Township, Rockaway Borough, Rockaway Township, Victory Gardens Borough, and Wharton Borough, Morris County, New Jersey. This list is divided into the following sections:

- **Section 1.0 Elected Officials** (page 2);
- **Section 2.0 Regulatory Agencies** (page 4); and,
- **Section 3.0 Interested Parties** (page 8).



1.0 ELECTED OFFICIALS

1.1 COUNTY OFFICIALS (PAGE 3)

1.2 LOCAL OFFICIALS (PAGE 3)



1.1 COUNTY OFFICIALS

Frank J. Druetzler
Morris County Board of Freeholders
Administration and Records Building
Court Street
Morristown, NJ 07963

1.2 LOCAL OFFICIALS

Edward Bolcar, Jr., Mayor
Board of Aldermen
100 Washington Street
Boonton, NJ 07005

Timothy D. Doyle, Jr., Chrmn./Mayor
Township Committee
155 Powerville Road
Boonton Township, NJ 07005

Patrick Donofrio
Board of Aldermen
41A Fox Hill Drive
Dover, NJ 07801

Russell Felter, Mayor
Township of Jefferson
1033 Weldon Road
Lake Hopatcong, NJ 07849

Gene Feyl, Mayor
Office of the Mayor
1 St. Mary's Place
Denville, NJ 07834

P. Ted Husa
Denville Town Council
1 St. Mary's Place
Denville, NJ 07834

John Huston, Mayor
Township of Randolph
502 Millbrook Avenue
Randolph, NJ 07869

Joseph L. Lebar, Mayor
Rockaway Borough
1 Main Street
Rockaway, NJ 07866

Richard M. Newman, Mayor
13 Christopher Street
Dover, NJ 07801

John Palovitz, Mayor
Victory Gardens Borough
337 South Salem Street
Victory Gardens, Dover, NJ 07801

William Chegwiddden, Mayor
Wharton Borough
10 Robert Street
Wharton, NJ 07885

Louis S. Sceusi, Mayor
Rockaway Township
65 Mount Hope Road
Rockaway, NJ 07866

Patricia Bujtas
Board of Aldermen
100 Washington Street
Boonton, NJ 07005

The Honorable Rodney Frelinghuysen
U.S. House of Representatives
30 Schuyler Place, 2nd Floor
Morristown, NJ 07960

The Honorable Rodney Frelinghuysen
U.S. House of Representatives
2442 Rayburn House Office Building
Washington, DC 20515-3011



2.0 REGULATORY AGENCIES

2.1 FEDERAL AGENCIES (PAGE 5)

2.2 STATE AGENCIES (PAGE 5)

2.3 COUNTY AGENCIES (PAGE 5)

2.4 LOCAL AGENCIES (PAGE 6)



2.1 FEDERAL AGENCIES

Clifford G. Day
U.S. Fish & Wildlife Service
927 North Main Street, Building D1
Pleasantville, NJ 08232

Don Klima, Director
Advisory Council on Historic Preservation
The Old Post Office Building
1100 Pennsylvania Avenue, NW #809
Washington, DC 20004

Lisa Solberg
USFWS – NJ Field Office
927 North Main Street
Heritage Square, Building D
Pleasantville, NJ 08232

Robert Dieterich
U.S. Environmental Protection Agency,
Region II
Strategic Planning/Multimedia Programs
290 Broadway
New York, NY 10007-1866

Brian Marsh
USFWS – NJ Field Office
927 North Main Street
Heritage Square, Building D
Pleasantville, NJ 08232

Kathy Urquart
USFWS – NJ Field Office
927 North Main Street
Heritage Square, Building D
Pleasantville, NJ 08232

Robert Hargrove, Chief
U.S. Environmental Protection Agency,
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New York, NY 10007-1866

Diana Raichel
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927 North Main Street
Heritage Square, Building D
Pleasantville, NJ 08232

Eric Schrading
USFWS – NJ Field Office
927 North Main Street
Heritage Square, Building D
Pleasantville, NJ 08232

2.2 STATE AGENCIES

Thomas F. Breden, Supervisor
NJ Dept. of Environmental Protection
Natural Heritage Program
501 East State Street, Floor 4
P.O. Box 404
Trenton, NJ 08625

Ron Farr
North Jersey District Water Supply Comm.
1 F.A. Orechio Drive
Wanaque, NJ 07465

Jessica Milose
NJ Dept. of Environmental Protection
Division of Watershed Management
401 East State Street, Floor 7
P.O. Box 418
Trenton, NJ 08625

Charlie Defendorf, P.E.
NJ Dept. of Environmental Protection
Div. of Engineering and Construction
501 East State Street, Floor 1
P.O. Box 419
Trenton, NJ 08625

James Gaffney
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Sabine von Aulock
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Ray Zabihach, Director
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2.4 LOCAL AGENCIES

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Boonton, NJ 07005

Planning Board
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Boonton Township, NJ 07005

Advisory Environmental Committee
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Bricker and Associates
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Boonton Township Engineer
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Township of Denville Administrator
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Carl Bressan, Town Engineer
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Wharton, NJ 07885



Susan Best
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4.0 INTERESTED PARTIES



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Sandy Urgo
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Ledgewood, NJ 07852





DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

June 10, 2003

NAME
ADDRESS LINE 1
ADDRESS LINE 2
CITY, STATE ZIP CODE

RE: Technical Advisory Committee for ecosystem restoration activities in the Upper Rockaway River Basin, Morris County, New Jersey.

Dear Mr./Ms./Mrs.:

The U.S. Army Corps of Engineers (USACE), New York District, has contracted Northern Ecological Associates, Inc. (NEA) to provide technical assistance with the Upper Rockaway River Flood Control and Ecosystem Restoration Study, herein referred to as the Study. The purpose of this letter is to invite local people who have knowledge and expertise about the natural resources of the Upper Rockaway Basin to participate on a Technical Advisory Committee for the ecosystem restoration component of the Study.

Participating on the Technical Advisory Committee may involve a range of activities including attending approximately six meetings, and reviewing technical memorandums and meeting minutes. The goal of the Technical Advisory Committee will be to help develop and employ a detailed restoration site ranking matrix to be used to identify five to ten preferred ecosystem restoration sites based on ecological, social, and engineering factors. This process is critical to the success of the Study, and those participating on the Technical Advisory Committee will be asked to adhere to a very aggressive schedule.

The USACE will be holding the first Technical Advisory Committee meeting on June 24, 2003, from 2:00-5:00 p.m. (see attached agenda) at the Denville Municipal Building. Please visit the USACE, New York District's website (www.nan.usace.army.mil) to access the *Preliminary Identification of Potential Restoration Sites* report and familiarize yourself with the Study. Copies of the report are also available at the Denville Public Library and at the Dover Public Library. If you have any questions, please contact Susan Schneider by e-mail at: Susan.L.Schneider@nan02.usace.army.mil, or Robin Dingle at: rdingle@neapa.com.

We strongly encourage you to take an active role on the Technical Advisory Committee. Your input and expertise is considered a valuable resource and would be greatly appreciated.

Sincerely,

Susan L. Schneider
Environmental Coordinator

cc: P. Tumminello, USACE
R. Dingle/S. Kiernan/K. Edelman, NEA

June 24, 2003

- **Meeting Agenda**
- **Meeting Minutes**
- **Study Contact List**



United States Army Corps of Engineers
Upper Rockaway River Ecosystem Restoration Study
Meeting Agenda
June 24, 2003, 2:00 PM
Denville Municipal Building

I. Introduction

- Introduce the meeting participants.
- Provide a project update regarding the Corps' effort to date:
 - Flood Control
 - Ecosystem Restoration
- Present the purpose and scope of the meeting.
- Identify the goals and objectives of the Technical Advisory Committee's (TAC) participation.
- Identify the schedule/commitments of TAC members.

II. Initiate Restoration Site Ranking

- Present a summary of the *Preliminary Identification of Potential Restoration Sites* report.
- Introduce examples of ecological matrices used for restoration ranking.
- Describe Corps' required technical directives.
- Explain development of a new matrix.
- Identify and discuss variables specific to the Upper Rockaway River Watershed.

III. Meeting Wrap-Up

- Identify necessary TAC contributions.
- Describe Corps obligations for the next meeting.
- Discuss objectives for the next meeting.



**Upper Rockaway River Watershed
Flood Control and Ecosystem Restoration Study**

CONTACT LIST

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US Army Corps of Engineers

New York District

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New York, NY 10278

Paul Tumminello: Project Manager

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Northern Ecological Associates (NEA)

Robin Dingle: NEA Project Manager

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Northern Ecological Associates

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Stroudsburg, Pa. 18360

(570) 476-1644

(570) 476-1649 fax

Kim Edelman: Environmental Scientist

E-Mail: *kedelman@neapa.com*

Shawn Kiernan: Environmental Scientist

E-Mail: *skiernan@neapa.com*

TENTATIVE MEETING SCHEDULE

Wednesday July 9th

Wednesday, July 23rd

Monday, August 4th

All meetings to be held at Denville Town Hall.



Environmental Scientists and Planners

• 134 Broad Street • Stroudsburg, PA 18360 • Phone: (570) 476-1644 • Fax: (570) 476-1649 •

**UPPER ROCKAWAY RIVER WATERSHED ECOSYSTEM RESTORATION STUDY
JUNE 24, 2003, MEETING SUMMARY**

TO: Susan Schneider (USACE)
FROM: Robin Dingle/Shawn Kiernan (NEA)
SUBJECT: Upper Rockaway River Ecosystem Restoration Study
June 24, 2003, Meeting Summary
CC: All members of ERTAC

Following is a list of those individuals that attended the meeting:

Name	Affiliation
Art Harris	Resident of Mountain Lakes
Charles Lenchitz	Resident of Rockaway
Connie Stroh	Resident of Boonton
Lora Bogdany	Denville Environmental Commission
Eric Persson	Resident of Parsippany
N. Rosawia	Resident of Denville
Brad Garie	Resident of Dover
William Swarts	Resident of Denville
Diana Raichel	United States Fish and Wildlife, New Jersey Field Office
John P. Jansen	Township of Denville
Lisa Ryden	Township of Rockaway
Arthur J. Carson	Resident of Denville
Gail Woolley	United States Army Corps of Engineers – New York District
Bob Anderson	Resident of Denville
Paul Tumminello	United States Army Corps of Engineers – New York District
Gene Feyl	Mayor of Denville



**UPPER ROCKAWAY RIVER WATERSHED, NEW JERSEY
ECOSYSTEM RESTORATION STUDY**

Introduction

The primary purpose of the meeting was to seek input from the Ecosystem Restoration Technical Advisory Committee (ERTAC) on the initial list of elements to be used in the creation of a restoration ranking matrix. Approximately 150 citizens, organizations, municipalities, and state and Federal agencies received invitations to attend the initial ERTAC meeting. Prior to the meeting, color copies of the *Preliminary Identification of Potential Restoration Sites* report (Report), February 2002 were sent to the Dover and Denville libraries for public review. The meeting was held at the Denville Town Hall on June 24th at 2 pm.

Mr. Paul Tumminello explained the goals of the meeting, which included the following:

- Provide a project update regarding the Corps' efforts to date for flood control and ecosystem restoration;
- Present a summary of the *Preliminary Identification of Potential Restoration Sites* report;
- Introduce the method for developing a ranking matrix and provide examples; and,
- Identify the ERTAC members' priority elements for ranking restoration project types.

General

Mr. Paul Tumminello, project manager for the US Army Corps of Engineers (USACE) commenced the meeting with an update on activity for the Upper Rockaway River Flood Control and Ecosystem Restoration Study since the Corps' last public meeting in February of 2003. He began by thanking the ERTAC members present and the Town of Denville for the use of the Court Room for the meeting.

At the February presentation, concerns had been raised about possible impacts to Lake Estling associated with the proposed flood control alternatives, principally the culvert. Mr. Tumminello indicated that some alternatives that had been previously examined may not be feasible for the Corps to undertake, and smaller projects that would more discreetly target town or borough-specific flooding issues are being investigated. For example, a culvert shorter than previously discussed is being evaluated. Hydrologic modifications near the Powerville Dam, and other areas of hydraulic obstacles, are being examined, as is the construction of a small floodwall near Ogden Avenue in Rockaway to reduce localized flooding. Mr. Tumminello stated that he would be initiating meetings with the local municipalities regarding these smaller, more discreet, flood control options over the summer.

The floor was opened for questions relating to flood control, and the following is a brief summary of the topics discussed.



Impacts of New Jersey's Proposed Stormwater Regulations

The impact of buy-outs of properties in flood-prone areas, the associated loss of developable land, and the reclassification of certain streams for water quality protection were discussed. Mr. Tumminello explained that properties acquired through the buy-out programs of the New Jersey Department of Environmental Protection (NJDEP) and the Corps automatically become "conservation easements".

Impacts of Upstream Reaches

The escalation of development in upstream reaches and increases in surface runoff and erosion were addressed. The ERTAC raised the issue that these upstream sources should be addressed before those that occur downstream, as the impacts are cumulative with each additional influence.

The Corps responded that they have identified areas around the Powerville area, as well as in the headwaters, that would benefit the system if restored.

Denville Mayor Gene Feyl raised the point that some of the flooding problems in the past have been partly due to the release of water from privately managed lakes during floods. He asked if the Corps could keep private dam owners from opening their spillways during storm events, thus increasing the level of water downstream. Mr. Tumminello recommended that the County and Towns collaborate on the development of a stormwater management plan that incorporates suggestions and ordinances for controlling the release of stormwater from private lakes.

Additional Stormwater Storage

The ERTAC also discussed the use of lakes and ponds to detain additional stormwater as emergency storage by managing and manipulating the outfalls. Mr. Tumminello added that this approach may be practical in localized areas, but the intention of the study is to develop widespread flood control for the Upper Rockaway Watershed.

Mr. Tumminello explained that the purpose of this series of ERTAC meetings was specifically to discuss the ecological restoration projects, and not the flood control measures. He then turned the meeting over to Robin Dingle, Project Manager for Northern Ecological Associates (NEA) to speak on the ecological restoration site evaluations.

Restoration Site Ranking Introduction

The next phase of the meeting was to introduce the ERTAC to the proposed method for evaluating, ranking, and prioritizing the 46 potential restoration sites identified in the *Preliminary Identification of Potential Restoration Sites* report. The Army Corps of Engineers and NEA propose the utilization of a ranking matrix, similar to those used to quantify and evaluate the benefits of restoration projects through the Evaluation for Planned Wetlands (EPW), and Habitat Suitability Index (HSI) models. Each of these matrices incorporates site-specific ecological data and weighs the anticipated outputs against the project goals, cost for design, construction, and maintenance, and elements of ecological importance.



Restoration Ranking Goals and Objectives

Robin Dingle introduced the goals of this meeting in the context of developing the matrix and asking ERTAC to begin to identify the key elements of importance by which the proposed restoration sites would be evaluated. Ms. Dingle explained the strict timeline that will be required in order to provide the Corps with a final report by October, and informed the ERTAC of the scheduled meeting dates and contact information for NEA and the Corps. Ms. Dingle asked that the ERTAC review the *Preliminary Identification of Potential Restoration Sites* report and provide any additions, corrections, or changes to the Corps/NEA team before July 4th.

Matrix Development Background

Ms. Dingle introduced Shawn Kiernan, a restoration specialist with NEA, who presented the background to developing a matrix, as well as identified the Corps technical directives established under ER-1105-2-100 and other planning guidance documents. Mr. Kiernan explained that ecological ranking matrices incorporate elements of importance, or variables, by which each of the individually identified restoration sites can be quantifiably assessed. The critical factor for the development of an effective matrix is the early classification of goals for restoration. This process may begin in a broader context, for example, identifying an improvement in water quality or an increase in fish habitat is necessary. As the projects are more discreetly formulated, the goals can also be fine-tuned. For example, the broader element of “increased water quality” may be refined to seek “decreased phosphate in lakes”, “increased dissolved oxygen above dams”, or “lowered turbidity”.

Discussion of Ranking Elements

Input to help derive the proposed elements of ecological importance was sought from the ERTAC. Ms. Dingle and Mr. Kiernan revisited the issues discussed by Mr. Tumminello at the opening of the meeting, including:

- The impact of upstream activities on downstream resources;
- Sedimentation in lakes and erosion of streambanks; and
- The regulation of water flows to reduce impacts.

Shoreline stabilization was identified as an ideal restoration project behind the Denville Firehouse. Regulating flows to reduce stream flashiness was identified as a needed component for any restoration at Powerville Dam and along Berkshire Valley road.

Fish species that ERTAC regularly caught included large and small-mouth bass, trout, and perch, although the local perch population may be declining in recent years. Turbidity, loss of spawning or refuge habitat, and high water velocities are thought to be limiting factors to natural fish stock maintenance. Targeting improvements in fish habitat within urban or suburban areas for enhancement of recreational fishing and biological diversity was identified and discussed. The Canada geese in and around Lake Arrowhead have increased in numbers, and may be damaging streambank vegetation creating erosion hotspots there and elsewhere along the River. There has been an observed increase in great blue herons, and a decrease in red winged blackbirds.

NEA asked if the ERTAC could identify any areas of disconnected hydrology, specifically floodplains that may have been bisected by fill, undersized culverts, or bridges within the study



boundaries. Some members mentioned that behind St. Clare's Hospital there appears to be a floodplain that never seems to flood fully, and recommended that NEA determine whether it is actually a natural aquifer recharge area.

Site Updates

Lisa Ryden, with Rockaway Township, pointed out some sites that had undergone development since the drafting of the Restoration Sites report. Specifically, she indicated that UR-2 currently was undergoing a large-scale residential development project. Near JB-3, between Mt. Pleasant Avenue and Route 15, a new commercial property (Wal-Mart) may have altered some of the hydrology due to the large impervious surface now in place.

Closing

The next ERTAC meeting is scheduled for 7 pm on July 9th at the Denville Town Hall.

Action Items

NEA

- Review and investigate the sites in further detail and identify site-specific restoration opportunities based on ERTAC recommendations.
- Develop draft matrix parameters for discussion at next ERTAC meeting.

ERTAC

- Review the Draft Restoration Report and provide revisions or additional sites to NEA by July 4th.
- Begin to identify elements to be incorporated into the matrix.



July 8, 2003

- **Meeting Agenda**
- **Meeting Handouts**
- **Meeting Minutes**



**United States Army Corps of Engineers
Upper Rockaway River Ecosystem Restoration Study
Meeting Agenda
July 8, 2003, 7:00 PM
Denville Municipal Building**

I. Introduction

- Introduce the meeting participants.
- Re-cap of last meeting.
- Present the purpose and scope of the meeting.

II. River Reach Development

- Explanation of “River Reach” Approach.
- Discussion of “Reach” boundaries.
- Identification of preliminary restoration goals by Reach.

III. Matrix Development

- Determination of preliminary matrix elements.
- Presentation of example projects for discussion.
- Provide initial ranking method.

IV. Meeting Wrap-Up

- Establish “Action Items” for next meeting.
- Schedule date and time of next ERTAC meeting.



Upper Rockaway River Watershed Flood Control and Ecosystem Restoration Study

RESTORATION RANKING MATRIX PRELIMINARY MATRIX ELEMENTS AND RIVER REACHES

Matrix Elements

The Restoration Ranking Matrix will include the list of identified potential restoration sites, developed with the coordination of the ERTAC and presented in the *Draft Preliminary Identification of Potential Restoration Sites* report, and the preliminary Restoration Elements. Restoration Elements are the ecological objectives or benefits that are being targeted and the goals that would be achieved by a successful restoration project. The preliminary restoration elements include the following:

- Decrease in sedimentation.
- Increase in fish and wildlife habitat.
- Improve historic hydrologic connection.
- Expand rare or endangered species habitats.
- Meet Federal interest.
- Provide secondary benefits in the public's interest.

Proposed River Reaches

River Reaches are a method of categorizing segments of a river based on different physical or chemical characteristics. The following are the proposed river reaches for the Upper Rockaway River:

Reach 1 : Longwood Lake to West Dewey Avenue (Wharton)

Reach 2 : West Dewey Avenue to Vail Street Weir (Dover)

Reach 3 : Vail Street Weir to North Salem Street (Dover)

Reach 4 : North Salem Street to Beach Street (Rockaway)

Reach 5 : Beach Street to Pocono Road (Denville)

Reach 6 : Pocono Road to Powerville Road (Boonton)

Reach 7 : Powerville Road to Boonton Reservoir

Proposed Ranking Process

Step 1:

Project	Primary Restoration Action	Decrease Sediments	Increase Fish & Wildlife	Improve Historic Hydrology	Expand RTE Habitats	Federal Interest	Secondary Benefits
Project 1	Floodplain restoration						
Project 2	Pond dredging						
Project 3	Shoreline plantings						

Step 2:

Project	Primary Restoration Action	Decrease Sediments	Increase Fish & Wildlife	Improve Historic Hydrology	Expand RTE Habitats	Federal Interest	Secondary Benefits
Project 1	Floodplain restoration	v	v	v	---	v	---
Project 2	Pond dredging	v	---	---	X	---	v
Project 3	Shoreline plantings	v	---	X	---	---	---

Step 3:

Project	Primary Restoration Action	Decrease Sediments	Increase Fish and Wildlife	Improve Historic Hydrology	Expand RTE Habitats	Federal Interest	Secondary Benefits	Total
Project 1	Floodplain restoration	v	v	v	---	v	---	4/6
Project 2	Pond dredging	v	---	---	X	---	v	1/6
Project 3	Shoreline plantings	v	---	X	---	---	---	0/6

Scoring Key:

v = +1

--- = 0

X = -1

**UPPER ROCKAWAY RIVER WATERSHED ECOSYSTEM RESTORATION STUDY
JULY 8, 2003, MEETING SUMMARY**

TO: Susan Schneider (USACE)
FROM: Robin Dingle/Shawn Kiernan (NEA)
SUBJECT: Upper Rockaway River Ecosystem Restoration Study
July 8, 2003, Meeting Summary
CC: All members of ERTAC

Following is a list of those individuals that attended the meeting:

Name	Affiliation
Art Harris	Resident of Mountain Lakes
William Swarts	Resident of Denville
Lora Bogdany	Denville Environmental Commission
Diane Nelson	Upper Rockaway Watershed Association
Eric Persson	Resident of Parsippany
Connie Stroh	Upper Rockaway Watershed Association
Brad Garrie	Resident of Dover
Art Carson	Resident of Denville
Jennifer Gurdak	NJDEP Watershed Coordinator

Introduction

The Ecosystem Restoration Technical Advisory Committee (ERTAC) met at 7 pm at the Denville Town Hall to discuss the restoration ranking matrix, ranking elements, and the River Reach approach.

Mr. Shawn Kiernan of Northern Ecological Associates explained the goals of the meeting:

- Explain and solicit feedback on the “River Reach” approach;



- Determine the proposed Reach boundaries;
- Present the proposed preliminary matrix elements; and,
- Provide an example of the proposed ranking method.

General

Ms. Robin Dingle, Project Manager for Northern Ecological Associates (NEA), began the meeting and thanked the ERTAC participants for their continued input and assistance. She introduced Shawn Kiernan to begin addressing the meeting agenda. Mr. Kiernan provided a quick recap of the last meeting, held on June 24th, and introduced the topics for discussion. Connie Stroh and Diane Nelson proposed introducing an additional site in Randolph Township, north of Mountainside Avenue located along Mill Brook. The site appears to be significantly eroded, with a steep slope adjacent to the creek (see attached photos). The site will be added as MB-3.

River Reach Development

The concept of applying a “River Reach” approach to the prioritization of restoration sites along the Upper Rockaway River was presented and discussed. Segments of the River that exhibit similar morphologic or physical characteristics would be categorized as unique reaches during analysis. The ERTAC generally agreed that this approach would be acceptable, and the discussion shifted to the boundaries of each of the proposed reaches.

Initially, the following River Reaches and boundaries were proposed:

- Reach 1 : Longwood Lake to West Dewey Avenue (Wharton)
- Reach 2 : West Dewey Avenue to Vail Street Weir (Dover)
- Reach 3 : Vail Street Weir to North Salem Street (Dover)
- Reach 4 : North Salem Street to Beach Street (Rockaway)
- Reach 5 : Beach Street to Pocono Road (Denville)
- Reach 6 : Pocono Road to Powerville Road (Boonton)
- Reach 7 : Powerville Road to Boonton Reservoir

As each was discussed in detail, using maps of the area as visual aids, the ERTAC generally agreed with the boundaries of Reaches 1-5. The ERTAC did recommend that the Vail Street weir be changed to the JCP&L weir. ERTAC members did raise concern about the boundaries of Reaches 5-7, and proposed modifications. The new proposed River Reach boundaries are:

- Reach 1 : Longwood Lake to West Dewey Avenue (Wharton)
- Reach 2 : West Dewey Avenue to JCP&L Weir (Dover)
- Reach 3 : JCP&L Weir to North Salem Street (Dover)
- Reach 4 : North Salem Street to Beach Street (Rockaway)
- Reach 5 : Beach Street to Diamond Spring Road (Denville)
- Reach 6 : Diamond Spring Road to Bush Road (Boonton)
- Reach 7 : Bush Road to Powerville Dam
- Reach 8 : Powerville Dam to Boonton Gorge



Matrix Development

NEA next presented the preliminary matrix elements for discussion. Matrix elements are the goals and objective of ecosystem restoration actions in the Upper Rockaway River, and will be used to rank the proposed projects. The proposed elements include:

- Decrease in sedimentation.
- Increase in fish and wildlife habitat.
- Improve historic hydrologic connection.
- Expand rare or endangered species habitats.
- Meet Federal interest.
- Provide secondary benefits in the public's interest.

Each proposed element was briefly discussed, and the ERTAC generally agreed to the process. Jennifer Gurdak (NJDEP) recommended that the first element include a decrease in all forms of non-source pollutants. Connie Stroh and Diane Nelson recommended that the second element be changed to incorporate not an increase, but a restoration of specifically native fish and wildlife habitats. Based on these comments, the matrix elements have been changed to:

- Decrease in sedimentation and non-point source pollutants.
- Restore native fish and wildlife habitat.
- Improve historic hydrologic connection.
- Expand rare or endangered species habitats.
- Meet Federal interest.
- Provide secondary benefits in the public's interest.

Action Items

NEA

- Develop the GIS database for the Upper Rockaway River restoration projects.
- Complete identification of primary restoration actions for each site.
- Mail a copy of the revised matrix and elements to each attendee for ranking.
- Distribute meeting minutes to ERTAC members.

ERTAC

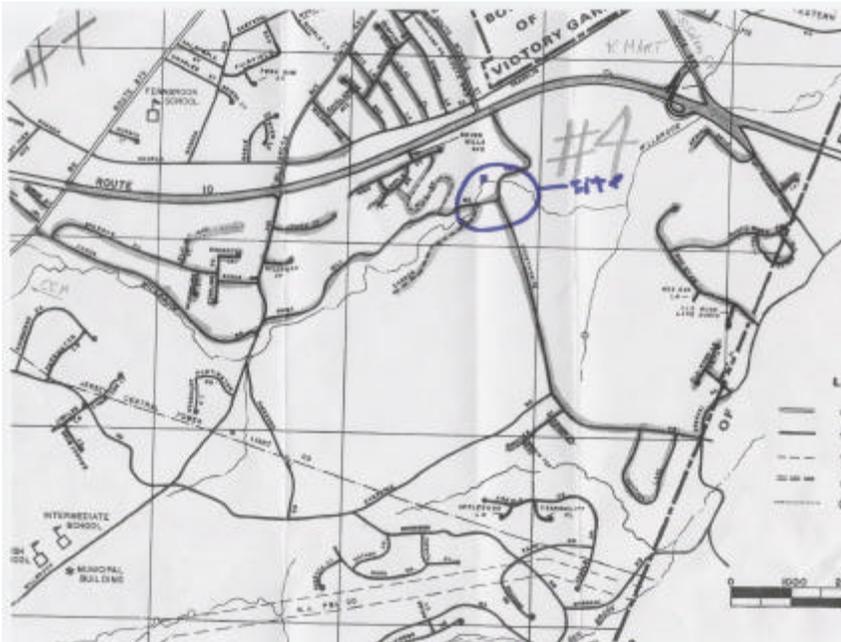
- Begin ranking sites based on revised matrix and elements.



NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE, New York District
Project: Upper Rockaway River Ecosystem Restoration



Photographer:

Date:

Photo No.:

Direction:

Comments:

Location map for site MB-3.



Photographer:

Date:

Photo No.:

Direction:

Comments: Site MB-3 – indicates scale and extent of slope erosion.

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE, New York District
Project: Upper Rockaway River Ecosystem Restoration



Photographer:

Date:

Photo No.:

Direction:

Comments: Downstream slope of site MB-3.



Photographer:

Date:

Photo No.:

Direction:

Comments: Site MB-3, downstream of eroded slope.

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE, New York District
Project: Upper Rockaway River Ecosystem Restoration



Photographer:

Date:

Photo No.:

Direction:

Comments: Site MB-3,
identifying undercut stream
bank.

Photographer:

Date:

Photo No.:

Direction:

Comments:

August 4, 2003

- **Meeting Agenda**
- **Meeting Handout**
- **Meeting Minutes**



United States Army Corps of Engineers
Upper Rockaway River Ecosystem Restoration Study
Meeting Agenda
August 4, 2003, 11:00 AM
Denville Municipal Building

I. Introduction

- Introduce the meeting participants.
- Re-cap of last meeting – July 8th.
- Present the purpose and scope of the meeting.

II. Matrix Ranking

- Re-cap of ranking method.
- Identify eliminated sites (developed or contaminated).
- Review and discuss the individual sites' ranking.
- Discuss additional ranking criteria if necessary.

III. Meeting Wrap-Up

- Establish "Action Items" for next meeting.



Upper Rockaway River Watershed Flood Control and Ecosystem Restoration Project

ID	PROJECT	Report Names	Restoration Action	Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
HW-1	Headwaters of the Rockaway River Sub-basin	Berkshire Valley Sand & Stone Co.	Streambank Restoration							
UR-1	Upper Rockaway River Sub-basin	GPU Energy/Morris County Properties	Wetland Restoration							
UR-2	Upper Rockaway River Sub-basin	Pond-View-Estates	Developed							
UR-3	Upper Rockaway River Sub-basin	Blue Road Bridge	To Be Determined							
UR-4	Upper Rockaway River Sub-basin	Old Bridge Site	To Be Determined							
UR-5	Upper Rockaway River Sub-basin	Old Jersey City Weir	To Be Determined							
UR-6	Upper Rockaway River Sub-basin	Hugh Force/Canal Park	Streambank Restoration							
JB-1	Jackson Brook Sub-basin	Washington Forge Pond	Restoration Dredging							
JB-2	Jackson Brook Sub-basin	Drainage 635 - Mine Hill Twp.	Streambank Restoration							
JB-3	Jackson Brook Sub-basin	River Woodland Reserve - Barnt Meadow Brook	Floodplain Restoration							
JB-4	Jackson Brook Sub-basin	Drainage 633 - Dover	Stream Channel Restoration							
JB-5	Jackson Brook Sub-basin	Drainage 652 - Dover	Floodplain Restoration							
JB-6	Jackson Brook Sub-basin	Drainage 660 - Mine Hill Twp.	Streambank Restoration							
JB-7	Jackson Brook Sub-basin	Drainage 681 - Randolph Twp.	To Be Determined							
JB-8	Jackson Brook Sub-basin	Drainage 646 - Wharton	Wetland Restoration							
MR1-1	Middle Rockaway Sub-basin #1	Drainage 639 - Dover/Rockaway Twp.	Streambank Restoration							
MR1-2	Middle Rockaway Sub-basin #1	McKeel's Brook Drainage	To Be Determined							
MR1-3	Middle Rockaway Sub-basin #1	River Greenway - Dover	Fish Habitat Restoration							
MR1-4	Middle Rockaway Sub-basin #4	Former-Ruis-Property	Contaminants							
MR1-5	Middle Rockaway Sub-basin #1	Rockaway River Corridor Enhancement	Floodplain Restoration							
MR1-6	Middle Rockaway Sub-basin #1	Jackson Ave. Park	Streambank Restoration							
MR1-7	Middle Rockaway Sub-basin #1	Drainage 613 - Denville Twp.	Streambank Restoration							
MR1-8	Middle Rockaway Sub-basin #1	Drainage 572 - Rockaway Twp.	To Be Determined							
MR2-1	Middle Rockaway Sub-basin #2	River Woodland Reserve	Wetland Restoration							
MR2-2	Middle Rockaway Sub-basin #2	Banza! Steakhouse/Gearheart Auto	Fish Habitat Restoration							
MR2-3	Middle Rockaway Sub-basin #2	Denville - River Corridor Enhancement	Streambank Restoration							
LR-1	Lower Rockaway River Sub-basin	Griffith Park	Streambank Restoration							
LR-2	Lower Rockaway River Sub-basin	Drainage 590 - Boonton	Streambank Restoration							
LR-3	Lower Rockaway River Sub-basin	Plan Street Re-Greening	Streambank Restoration							
SB-1	Stony Brook Sub-basin	Drainage 494 - Boonton Twp.	Streambank Restoration							
SB-2	Stony Brook Sub-basin	Taylorstown Reservoir	To Be Determined							
DB-1	Den Brook Sub-basin	Den Brook Fill Site	Fill Removal							
BB-1	Beaver Brook Sub-basin	Hampton Inn Site	Fill Removal							
BB-2	Beaver Brook Sub-basin	Drainage 538 - Rockaway Twp.	Stream Debris Removal							
BB-3	Beaver Brook Sub-basin	Drainage 556 - Rockaway Twp.	Stream Debris Removal							
BB-4	Beaver Brook Sub-basin	Drainage 583 - Rockaway Twp.	To Be Determined							
BM-1	Burnt Meadow Sub-basin	Drainage 444 - Rockaway Twp. (Picatinny)	To Be Determined							
BM-2	Burnt Meadow Sub-basin	Drainage 479 - Rockaway Twp. (Picatinny)	To Be Determined							
BM-3	Burnt Meadow Sub-basin	Drainage 582 - Rockaway Twp. (development)	Developed							
MB-1	Mill Brook Sub-basin	Lower Mill Brook Floodplain	Streambank Restoration							
MB-2	Mill Brook Sub-basin	Morris County College	Streambank Restoration							
MB-3	Mill Brook Sub-basin	New Site (Not Named)	Streambank Restoration							
GP-1	Green Pond Sub-basin	Drainage 331 - Rockaway Twp.	Wetland Restoration							
HB-1	Hibernia Brook Subbasin	Drainage 530 - Rockaway Twp.	Wetland Restoration							
HB-2	Hibernia Brook Subbasin	Lake Ames	Streambank Restoration							
BR-1	Boonton Reservoir Sub-basin	Knoll Country Club	Streambank Restoration							
LW-1	Longwood Lake		Restoration Dredging							

**UPPER ROCKAWAY RIVER WATERSHED ECOSYSTEM RESTORATION STUDY
AUGUST 4, 2003, MEETING SUMMARY**

TO: Susan Schneider (USACE)

FROM: Robin Dingle/Shawn Kiernan/Kimberlee Robertella (NEA)

SUBJECT: Upper Rockaway River Ecosystem Restoration Study
August 4, 2003, Meeting Summary

CC: All members of ERTAC

Following is a list of those individuals that attended the meeting:

Name	Affiliation
Art Harris	Resident of Mountain Lakes
Trecia Ashman	US Army Corps of Engineers – NY District
Diane Nelson	Rockaway River Council
Diana Raichel	US Fish and Wildlife Service – NJ Field Office
Eric Persson	Resident of Parsippany
Lisa Ryden	Rockaway Township Engineer
Brad Garie	Rockaway Township Environmental Commission
Art Carson	Resident of Denville
Jennifer Gurdak	NJ Department of Environmental Protection

The Ecosystem Restoration Technical Advisory Committee (ERTAC) met on August 4th, 2003, at 11am at the Denville Town Hall to discuss the Restoration Ranking Matrix. Mr. Shawn Kiernan of Northern Ecological Associates explained the goals of the meeting:

- Re-cap of Restoration Ranking Matrix
- Complete the ranking matrix

Mr. Kiernan began the meeting and thanked the ERTAC participants for their continued input and assistance. He addressed the meeting agenda, provided a quick recap of the last meeting held on July 8th, and initiated discussion of the Restoration Ranking Matrix.

The ERTAC members were asked at the end of the July 8th meeting to complete a copy of the ranking matrix for restoration sites that they were familiar with. Together NEA and USACE



completed a matrix independently of the ERTAC. USACE/NEA had fully completed the matrix for all 47 restoration sites (attached), and three of the ERTAC members had completed portions of the matrix for sites they were familiar with.

Initially, Mr. Kiernan asked each ERTAC member that had completed rankings to present their scores for discussion. The group realized that undertaking a step-by-step ranking and filling in the matrix elements for each would take considerable time. Ms. Susan Schneider of the Corps suggested reviewing each site listed on the matrix, identifying the sites for further consideration, and explaining why the members of the ERTAC believed that they should continue to be investigated further. Restoration sites were then discussed and placed in three categories: 1) continue to next round, 2) further investigation necessary, and 3) remove from further consideration. Based on the group's comments and discussion, NEA completed a draft matrix (attached) to be reviewed by the ERTAC and finalized at the next meeting.

Potential restoration sites with a score of 0 or less, based on the ERTAC's comments, were removed from further consideration. Sites that received a score between 1 and 6 were flagged to continue to the next level of evaluation, as were sites for which the group could not provide a complete evaluation. A total of 17 sites were flagged for advancement to the next round of ranking, 4 were identified for further investigation, and 27 potential sites were removed from further consideration. Prior to the next ERTAC meeting, sites requiring "further investigation" will be visited by USACE/NEA biologists to determine which restoration actions would be most appropriate.

The following provides the results of the ERTAC group discussion. A more detailed discussion of the meeting comments will be provided in the final document.

Continue to Next Round

- **UR-1:** *Upper Rockaway River Sub-basin- GPU Energy/Morris County Properties*
- **JB-3:** *Jackson Brook Sub-basin- Burn Meadow Brook- River Woodland Reserve*
- **JB-5:** *Jackson Brook Sub-basin- Drainage 652 Dover*
- **MR1-5:** *Middle Rockaway Sub-basin #1- Rockaway River Corridor Enhancement*
- **MR2-1:** *Middle Rockaway Sub-basin #2- River Woodland Reserve*
- **BB-1:** *Beaver Brook Sub-basin- Hampton Inn Site*
- **MR2-2:** *Middle Rockaway Sub-basin #2- Banzai Steakhouse/Gearhart Auto*
- **MR2-3:** *Middle Rockaway Sub-basin #2- Denville-River Corridor Enhancement*
- **DB-1:** *Den Brook Sub-basin- Den Brook Fill Site*
- **LR-3:** *Lower Rockaway River Sub-basin- Plane Street Re-greening.*
- **HB-1:** *Hibernia Brook Sub-basin- Drainage 530 Rockaway Twp.*
- **MR1-7:** *Middle Rockaway Sub-basin #1- Drainage 613 Denville Twp.*
- **MB-3:** *Mill Brook Sub-basin- New Site (Not Named)*
- **JB-1:** *Jackson Brook Sub-basin- Washington Forge Park*
- **JB-4:** *Jackson Brook Sub-basin- Drainage 633 Dover*
- **JB-8:** *Jackson Brook Sub-basin- Drainage 646 Wharton*



- **MR1-1:** *Middle Rockaway Sub-basin #1- Drainage 639 Dover/Rockaway Twp.*

Further Investigation Necessary

- **MR1-3:** *Middle Rockaway Sub-basin #1- River Greenway-Dover*
- **MR1-6:** *Middle Rockaway Sub-basin #1- Jackson Ave. Park*
- **BM-1:** *Burnt Meadow Sub-basin-Drainage 444 Rockaway Twp. (Picatinny)*
- **BM-2:** *Burnt Meadow Sub-basin-Drainage 479 Rockaway Twp. (Picatinny)*

Removed from Further Consideration

- **HW-1:** *Headwaters of Rockaway Sub-basin- Berkshire Valley Sand & Stone Co.*
- **UR-2:** *Upper Rockaway River Sub-basin- Pond View Estates*
- **UR-3:** *Upper Rockaway River Sub-basin- Blue Road Bridge*
- **UR-4:** *Upper Rockaway River Sub-basin- Old Bridge Site*
- **UR-5:** *Upper Rockaway River Sub-basin- Old Jersey City Weir*
- **UR-6:** *Upper Rockaway River Sub-basin- Hugh Force / Canal Park*
- **JB-2:** *Jackson Brook Sub-basin- Drainage 635-Mine Hill Twp.*
- **JB-6:** *Jackson Brook Sub-basin- Drainage 660*
- **JB-7:** *Jackson Brook Sub-basin- Drainage 681 Randolph Township*
- **MR1-2:** *Middle Rockaway Sub-basin #1- McKeel's Brook Drainage*
- **MR1-4:** *Middle Rockaway Sub-basin #1- Former Ruiz Property*
- **MR1-8:** *Middle Rockaway Sub-basin #1- Drainage 572 Rockaway Twp.*
- **LR-1:** *Lower Rockaway River Sub-basin- Griffith Park*
- **LR-2:** *Lower Rockaway River Sub-basin- Drainage 590- Boonton*
- **SB-1:** *Stony Brook Sub-basin- Drainage 494- Boonton Twp.*
- **SB-2:** *Stony Brook Sub-basin- Taylortown Reservoir*
- **BB-2:** *Beaver Brook Sub-basin- Drainage 538- Rockaway Twp.*
- **BB-3:** *Beaver Brook Sub-basin- Drainage 556- Rockaway Twp.*
- **BB-4:** *Beaver Brook Sub-basin- Drainage 583- Rockaway Twp.*
- **BM-3:** *Burnt Meadow Sub-basin-Drainage 582 Rockaway Twp. (development)*
- **MB-1:** *Mill Brook Sub-basin- Lower Mill Brook Floodplain*
- **MB-2:** *Mill Brook Sub-basin- Morris County College*
- **GP-1:** *Green Pond Sub-basin- Drainage 331 Rockaway Twp.*
- **HB-2:** *Hibernia Brook Sub-basin- Lake Ames*
- **BR-1:** *Boonton Reservoir Sub-basin- Knoll Country Club*
- **LW-1:** *Longwood Lake*

Action Items

NEA/USACE

- Schedule next ERTAC meeting.
- NEA to visit and photograph sites in the “*Further Investigation Necessary*” category prior to the next meeting.



ERTAC

- Review the attached scored ERTAC matrix and provide all comments to NEA/USACE no later than September 3rd.



September 5, 2003

- **Meeting Agenda**
- **Meeting Minutes**



United States Army Corps of Engineers
Upper Rockaway River Ecosystem Restoration Study
Meeting Agenda
September 5, 2003, 10:00 AM
Denville Municipal Building

I. Introduction

- Introduce the meeting participants.
- Re-cap of last meeting – August 4th.
- Present the purpose and scope of the meeting.

II. Matrix Ranking

- Re-cap of ranking method and site categorization.
- Discuss and finalize scored matrix from last meeting.
- Review and discuss the individual “Priority” and “Further Investigation” sites’ ranking.
- Identify and rank the top priority sites.

III. Meeting Wrap-Up

- Establish “Next Steps” for ERTAC and USACE/NEA.

**UPPER ROCKAWAY RIVER WATERSHED ECOSYSTEM RESTORATION STUDY
SEPTEMBER 5, 2003, MEETING SUMMARY**

TO: Susan Schneider (USACE)

FROM: Robin Dingle/Shawn Kiernan (NEA)

SUBJECT: Upper Rockaway River Ecosystem Restoration Study
September 5, 2003, Meeting Summary

CC: All members of ERTAC

The following provides a list of individuals who attended the meeting:

Name	Affiliation
William Swarts	Resident of Denville
Connie Stroh	Rockaway River Council
Diane Nelson	Rockaway River Council
Diana Raichel	US Fish and Wildlife Service – NJ Field Office
Lora Bogdany	Denville Environmental Commission
Lisa Ryden	Rockaway Township Engineer
Robert Anderson	Resident of Denville
Jennifer Gurdak	NJ Department of Environmental Protection
Deborah McCartney	Northern Ecological Associates

The Ecosystem Restoration Technical Advisory Committee (ERTAC) met on September 5, 2003, at 11am at the Denville Town Hall to discuss the Restoration Ranking Matrix. Mr. Shawn Kiernan of Northern Ecological Associates explained the goals of the meeting:

- Discuss and finalize the draft ERTAC-scored matrix based on discussions at the last meeting;
- Review and discuss the individual “Further Investigation” sites identified at the last meeting; and,
- Identify and rank the top priority sites.

Introduction

Mr. Kiernan began the meeting and thanked the ERTAC participants for their continued input and assistance. He addressed the meeting agenda (attached), provided a quick recap of the last meeting held on August 4, and initiated discussion of the agenda topics.



At the last meeting, the ERTAC requested that NEA visit sites that were identified as “further investigation necessary”. NEA performed site visits at MB-3 and MR1-7, as well as MR2-1, MR2-2, and MR1-3 on August 28. NEA investigated the potential restoration sites, and photographed site conditions to report back to the ERTAC. Mr. Kiernan presented the findings of the site visits, and sought the ERTAC’s comments on the draft scored matrix.

Matrix Ranking

Prior to the August 4th meeting, the US Army Corps of Engineers and NEA scored each of the 46 proposed restoration sites based on information collected during field visits, geographic information system (GIS) investigations, and discussions with local residents. In addition, a draft scored matrix reflecting the ERTAC’s comments for each site was compiled based on the August 4th meeting discussions. Copies of this draft scored matrix were provided to members of the ERTAC prior to the September meeting.

Prior to the meeting, NEA received written comments from Connie Stroh regarding rare species and property easements. NEA/USACE is incorporating the information provided into the Restoration report. Other members of the ERTAC provided verbal comments on the draft matrix, as well as additional information and guidance on the site selection process and individual restoration sites, during the meeting. After a thorough discussion, the ERTAC agreed that the ERTAC scored matrix accurately reflected their opinions/concerns and it was accepted as final. The scores from the USACE/NEA ranking and from the ERTAC ranking were combined to develop a total score for each site (see attached).

Sites that ranked a combined score of 10 or higher will continue to conceptual restoration design. Additionally, sites that received a total score between 5 and 9 were identified as “Priority Sites”. Although the Priority Sites did not rank the highest in the evaluation parameters established for this study, the importance of restoring or protecting these sites was recognized by the ERTAC and the USACE. Therefore, the Priority Sites identified below will have conservation and restoration recommendations provided in the USACE’s Restoration report.

The following sites will continue to conceptual restoration design based on the ERTAC’s recommendations:

1. **UR-1:** *Upper Rockaway River Sub-basin- GPU Energy/Morris County Properties*
2. **JB-3:** *Jackson Brook Sub-basin- Burnt Meadow Brook- River Woodland Reserve*
3. **JB-5:** *Jackson Brook Sub-basin- Drainage 652 Dover*
4. **JB-8:** *Jackson Brook Sub-basin- Drainage 646 Wharton*
5. **MR2-1:** *Middle Rockaway Sub-basin #2- River Woodland Reserve*

The following sites were identified as “Priority Sites” based on the ERTAC’s recommendations:

1. **JB-4:** *Jackson Brook Sub-basin- Drainage 633 Dover*
2. **MR1-5:** *Middle Rockaway Sub-basin #1- Rockaway River Corridor Enhancement*
3. **MR2-3:** *Middle Rockaway Sub-basin #2- Denville-River Corridor Enhancement*
4. **LR-3:** *Lower Rockaway River Sub-basin- Plane Street Re-greening*
5. **DB-1:** *Den Brook Sub-basin- Den Brook Fill Site*



6. **BB-1:** *Beaver Brook Sub-basin- Hampton Inn Site*
7. **HB-1:** *Hibernia Brook Sub-basin- Drainage 530 Rockaway Twp.*
8. **MR1-6:** *Jackson Ave. Park*

In addition, restoration sites BM-1 and BM-2 are located on Picatinny Arsenal, an active military base. Due to base security restrictions, NEA and ERTAC were unable to conduct an on-site assessment of these areas and were not able to rank these areas in the matrix. Therefore, the ERTAC and USACE decided to identify the importance of restoration and protection of these two sites in the USACE's Restoration report. In addition, the ERTAC specifically requested that site-specific conservation recommendations that could be implemented by the local community or property owners at sites MB2-2 and MR-3 be included in the report.

Action Items

NEA/USACE

- Conduct on-site surveys and prepare conceptual restoration design alternatives for the five highest ranked sites.
- Prepare a Draft Restoration Report explaining the selection process, and providing recommendations for each of the identified "Priority Sites".





ID	PROJECT	Report Names	Restoration Action	PROJECT ELEMENTS						
				Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
HW-1	Headwaters of the Rockaway River Sub-basin	Berkshire Valley Sand & Stone Co.	Streambank Restoration	V	---	X	---	X	X	- 2
UR-1	Upper Rockaway River Sub-basin	GPU Energy/Morris County Properties	Wetland Restoration	V	V	V	V	V	V	+ 6
UR-2	Upper Rockaway River Sub-basin	Pond View Estates	Developed							
UR-3	Upper Rockaway River Sub-basin	Blue Road Bridge	Streambank Restoration	---	---	X	X	X	X	- 4
UR-4	Upper Rockaway River Sub-basin	Old Bridge Site	Streambank Restoration	---	---	X	X	X	X	- 4
UR-5	Upper Rockaway River Sub-basin	Old Jersey City Weir	Dam Modification	---	---	V	---	---	X	0
UR-6	Upper Rockaway River Sub-basin	Hugh Force/Canal Park	Streambank Restoration	V	---	X	X	---	---	- 1
JB-1	Jackson Brook Sub-basin	Washington Forge Pond	Restoration Dredging	V	V	---	X	V	---	+ 2
JB-2	Jackson Brook Sub-basin	Drainage 635 - Mine Hill Twp.	Streambank Restoration	V	X	---	X	---	---	- 1
JB-3	Jackson Brook Sub-basin	River Woodland Reserve - Burnt Meadow Brook	Floodplain Restoration	V	V	V	---	V	V	+ 5
JB-4	Jackson Brook Sub-basin	Drainage 633 - Dover	Stream Channel Restoration	---	V	V	X	V	V	+ 3
JB-5	Jackson Brook Sub-basin	Drainage 652 - Dover	Floodplain Restoration	V	V	V	X	V	V	+ 4
JB-6	Jackson Brook Sub-basin	Drainage 660 - Mine Hill Twp.	Streambank Restoration	V	---	X	X	V	---	0
JB-7	Jackson Brook Sub-basin	Drainage 681 - Randolph Twp.	Streambank Restoration	V	---	X	X	V	---	0
JB-8	Jackson Brook Sub-basin	Drainage 646 - Wharton	Wetland Restoration	V	V	---	V	V	V	+ 5
MR1-1	Middle Rockaway Sub-basin #1	Drainage 639 - Dover/Rockaway Twp.	Streambank Restoration	V	---	X	---	V	---	+ 1
MR1-2	Middle Rockaway Sub-basin #1	McKeel's Brook Drainage	Streambank Restoration	V	---	X	X	---	---	- 1
MR1-3	Middle Rockaway Sub-basin #1	River Greenway - Dover	Fish Habitat Restoration	---	V	X	V	V	V	+ 3
MR1-4	Middle Rockaway Sub-basin #1	Former Ruiz Property	Contaminants							
KEY	V = +1	---	0	X = -1						

ID	PROJECT	Report Names	Restoration Action	Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
MR1-5	Middle Rockaway Sub-basin #1	Rockaway River Corridor Enhancement	Floodplain Restoration	V	V	---	V	V	V	+ 5
MR1-6	Middle Rockaway Sub-basin #1	Jackson Ave. Park	Streambank Restoration	V	---	X	---	V	V	+ 2
MR1-7	Middle Rockaway Sub-basin #1	Drainage 613 - Denville Twp.	Streambank Restoration							
MR1-8	Middle Rockaway Sub-basin #1	Drainage 572 - Rockaway Twp.	Stormwater Management	X	X	X	X	X	X	- 6
MR2-1	Middle Rockaway Sub-basin #2	River Woodland Reserve	Wetland Restoration	V	V	V	---	V	V	+ 5
MR2-2	Middle Rockaway Sub-basin #2	Banzai Steakhouse/ Gearheart Auto	Fish Habitat Restoration	---	V	X	V	V	V	+ 3
MR2-3	Middle Rockaway Sub-basin #2	Denville - River Corridor Enhancement	Floodplain Restoration	---	V	V	---	V	---	+ 3
LR-1	Lower Rockaway River Sub-basin	Griffith Park	Streambank Restoration	---	V	---	X	---	---	0
LR-2	Lower Rockaway River Sub-basin	Drainage 590 - Boonton	Streambank Restoration	V	V	X	X	---	---	0
LR-3	Lower Rockaway River Sub-basin	Plane Street Re-Greening	Streambank Restoration	V	V	---	X	V	V	+ 3
SB-1	Stony Brook Sub-basin	Drainage 494 - Boonton Twp.	Streambank Restoration	V	---	X	X	---	---	- 1
SB-2	Stony Brook Sub-basin	Taylorstown Reservoir	Stormwater Management	X	X	X	X	X	X	- 6
DB-1	Den Brook Sub-basin	Den Brook Fill Site	Fill Removal	V	V	---	---	---	V	+ 3
BB-1	Beaver Brook Sub-basin	Hampton Inn Site	Fill Removal	V	V	V	---	V	V	+ 5
BB-2	Beaver Brook Sub-basin	Drainage 538 - Rockaway Twp.	Stream Debris Removal	X	X	X	X	X	X	- 6
BB-3	Beaver Brook Sub-basin	Drainage 556 - Rockaway Twp.	Stream Debris Removal	X	X	X	X	X	X	- 6
BB-4	Beaver Brook Sub-basin	Drainage 583 - Rockaway Twp.	Stormwater Management	V	---	X	X	---	---	- 1
BM-1	Burnt Meadow Sub-basin	Drainage 444 - Rockaway Twp. (Picatinny)								
BM-2	Burnt Meadow Sub-basin	Drainage 479 - Rockaway Twp. (Picatinny)								
BM-3	Burnt Meadow Sub-basin	Drainage 582 - Rockaway Twp. (development)	Developed							
MB-1	Mill Brook Sub-basin	Lower Mill Brook Floodplain	Streambank Restoration	V	---	X	X	---	---	- 1
KEY	V = +1	---	= 0	X = -1						

ID	PROJECT	Report Names	Restoration Action	Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
MB-2	Mill Brook Sub-basin	Morris County College	Streambank Restoration	V	---	X	X	---	---	- 1
MB-3	Mill Brook Sub-basin	New Site (Not Named)	Streambank Restoration							
GP-1	Green Pond Sub-basin	Drainage 331 - Rockaway Twp.	Wetland Restoration	---	---	V	---	V	---	0
HB-1	Hibernia Brook Subbasin	Drainage 530 - Rockaway Twp.	Wetland Restoration	V	V	V	---	V	V	+ 5
HB-2	Hibernia Brook Subbasin	Lake Ames	Streambank Restoration	V	V	X	X	X	X	- 2
BR-1	Boonton Reservoir Sub-basin	Knoll Country Club	Streambank Restoration	V	X	X	X	X	X	- 4
LW-1	Longwood Lake		Restoration Dredging	V	---	---	X	---	---	0
KEY	V = +1	--- = 0	X = -1							



USACE SCORED

ID	PROJECT	Report Names	Restoration Action	PROJECT ELEMENTS						
				Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
HW-1	Headwaters of the Rockaway River Sub-basin	Berkshire Valley Sand & Stone Co.	Streambank Restoration	V	---	X	---	V	---	+ 1
UR-1	Upper Rockaway River Sub-basin	GPU Energy/Morris County Properties	Wetland Restoration	V	V	V	V	V	V	+ 6
UR-2	Upper Rockaway River Sub-basin	Pond View Estates	Developed							
UR-3	Upper Rockaway River Sub-basin	Blue Road Bridge	Streambank Restoration	V	V	X	---	---	---	+ 1
UR-4	Upper Rockaway River Sub-basin	Old Bridge Site	Streambank Restoration	V	V	X	---	---	---	+ 1
UR-5	Upper Rockaway River Sub-basin	Old Jersey City Weir	Dam Modification	X	X	---	X	---	X	- 4
UR-6	Upper Rockaway River Sub-basin	Hugh Force/Canal Park	Streambank Restoration	V	---	X	X	V	X	- 1
JB-1	Jackson Brook Sub-basin	Washington Forge Pond	Restoration Dredging	X	V	V	X	V	---	+ 1
JB-2	Jackson Brook Sub-basin	Drainage 635 - Mine Hill Twp.	Streambank Restoration	V	V	X	X	V	---	+ 1
JB-3	Jackson Brook Sub-basin	River Woodland Reserve - Burnt Meadow Brook	Floodplain Restoration	V	V	V	V	V	---	+ 5
JB-4	Jackson Brook Sub-basin	Drainage 633 - Dover	Stream Channel Restoration	V	V	V	V	V	---	+ 5
JB-5	Jackson Brook Sub-basin	Drainage 652 - Dover	Floodplain Restoration	V	V	V	V	V	V	+ 6
JB-6	Jackson Brook Sub-basin	Drainage 660 - Mine Hill Twp.	Streambank Restoration	V	V	X	---	V	---	+ 2
JB-7	Jackson Brook Sub-basin	Drainage 681 - Randolph Twp.	Streambank Restoration	V	V	X	---	---	---	+ 1
JB-8	Jackson Brook Sub-basin	Drainage 646 - Wharton	Wetland Restoration	V	V	V	V	V	---	+ 5
MR1-1	Middle Rockaway Sub-basin #1	Drainage 639 - Dover/Rockaway Twp.	Streambank Restoration	V	---	X	---	V	V	+ 2
MR1-2	Middle Rockaway Sub-basin #1	McKeel's Brook Drainage	Streambank Restoration	V	---	X	---	V	---	+ 1
MR1-3	Middle Rockaway Sub-basin #1	River Greenway - Dover	Fish Habitat Restoration	X	V	X	---	V	V	+ 1
MR1-4	Middle Rockaway Sub-basin #1	Former Ruiz Property	Contaminants							
KEY	V = +1	--- = 0	X = -1							

ID	PROJECT	Report Names	Restoration Action	Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
MR1-5	Middle Rockaway Sub-basin #1	Rockaway River Corridor Enhancement	Floodplain Restoration	V	V	V	---	V	---	+ 4
MR1-6	Middle Rockaway Sub-basin #1	Jackson Ave. Park	Streambank Restoration	V	V	X	---	V	V	+ 3
MR1-7	Middle Rockaway Sub-basin #1	Drainage 613 - Denville Twp.	Streambank Restoration							
MR1-8	Middle Rockaway Sub-basin #1	Drainage 572 - Rockaway Twp.	Stormwater Management	V	V	X	X	---	---	0
MR2-1	Middle Rockaway Sub-basin #2	River Woodland Reserve	Wetland Restoration	V	V	V	---	V	V	+ 5
MR2-2	Middle Rockaway Sub-basin #2	Banzai Steakhouse/ Gearheart Auto	Fish Habitat Restoration	X	V	X	V	V	---	+ 1
MR2-3	Middle Rockaway Sub-basin #2	Denville - River Corridor Enhancement	Floodplain Restoration	V	V	---	---	V	X	+ 2
LR-1	Lower Rockaway River Sub-basin	Griffith Park	Streambank Restoration	V	---	X	---	---	V	+ 1
LR-2	Lower Rockaway River Sub-basin	Drainage 590 - Boonton	Streambank Restoration	V	V	X	---	---	---	+ 1
LR-3	Lower Rockaway River Sub-basin	Plane Street Re-Greening	Streambank Restoration	V	V	---	---	V	---	+ 3
SB-1	Stony Brook Sub-basin	Drainage 494 - Boonton Twp.	Streambank Restoration	V	---	X	X	V	---	0
SB-2	Stony Brook Sub-basin	Taylorstown Reservoir	Stormwater Management	X	X	X	X	X	X	- 6
DB-1	Den Brook Sub-basin	Den Brook Fill Site	Fill Removal	V	V	---	---	V	X	+ 2
BB-1	Beaver Brook Sub-basin	Hampton Inn Site	Fill Removal	V	V	X	V	V	V	+ 4
BB-2	Beaver Brook Sub-basin	Drainage 538 - Rockaway Twp.	Stream Debris Removal	X	X	X	X	X	X	- 6
BB-3	Beaver Brook Sub-basin	Drainage 556 - Rockaway Twp.	Stream Debris Removal	X	X	X	X	X	X	- 6
BB-4	Beaver Brook Sub-basin	Drainage 583 - Rockaway Twp.	Stormwater Management	X	X	X	X	X	X	- 6
BM-1	Burnt Meadow Sub-basin	Drainage 444 - Rockaway Twp. (Picatinny)								
BM-2	Burnt Meadow Sub-basin	Drainage 479 - Rockaway Twp. (Picatinny)								
BM-3	Burnt Meadow Sub-basin	Drainage 582 - Rockaway Twp. (development)	Developed							
MB-1	Mill Brook Sub-basin	Lower Mill Brook Floodplain	Streambank Restoration	V	---	X	X	V	V	+ 1
KEY	V = +1	--- = 0	X = -1							

ID	PROJECT	Report Names	Restoration Action	Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
MB-2	Mill Brook Sub-basin	Morris County College	Streambank Restoration	V	---	X	X	---	V	0
MB-3	Mill Brook Sub-basin	New Site (Not Named)	Streambank Restoration							
GP-1	Green Pond Sub-basin	Drainage 331 - Rockaway Twp.	Wetland Restoration	V	V	---	---	V	---	+ 3
HB-1	Hibernia Brook Subbasin	Drainage 530 - Rockaway Twp.	Wetland Restoration	V	V	---	---	V	V	+ 4
HB-2	Hibernia Brook Subbasin	Lake Ames	Streambank Restoration	V	---	X	X	---	---	- 1
BR-1	Boonton Reservoir Sub-basin	Knoll Country Club	Streambank Restoration	---	X	X	X	X	X	- 5
LW-1	Longwood Lake		Restoration Dredging	---	---	X	X	V	V	0
KEY	V = +1	--- = 0	X = -1							

General Correspondences

- **June 25, 2003: E-Mail**
- **July 25, 2003: Letter**
- **August 12, 2003: E-Mail**
- **August 28, 2003: E-Mail**
- **October 8, 2003: E-Mail**

From: Diana_Raichel@fws.gov
Sent: Wednesday, June 25, 2003 12:27 PM
To: Susan.L.Schneider@nan02.usace.army.mil
Cc: skiernan@neapa.com; rdingle@neapa.com
Subject: ranking matrix

Hi Susan. Below is some preliminary input on formulating a ranking matrix for evaluating the potential restoration sites in the Upper Rockaway. These may be weighted, based on what input you get from the local residents and groups.

1. Potential for improving water quality (wetlands, increasing D.O. levels, decreasing N and P levels, etc.)
2. Potential for improving fish and wildlife usage (could tie in with bird watching, fishing - i.e., recreation)
3. Potential for providing recreation opportunities (picnicking, fishing, bird-watching)
4. Potential for improving aesthetics (may or may not tie in with recreation)
5. Potential for enhancing habitat for species of management concern ("RTE") and/or rare habitat types
6. Adjacency to existing target habitat ("contiguity")
7. Potential for restoration to be self-sustaining (little post-restoration management)
8. Cost of restoration efforts (amount of fill to be removed, plantings, invasive plant removal, etc.)

I'm hoping the locals can give more input on opportunities to reduce impervious cover within the 100-year floodplain (e.g., upland areas with abandoned parking lots, etc.). Areas such as these could be converted to a rare cover type - grasslands - which could provide habitat for many lepidopteran species as well as grassland birds while improving flood storage capacity.

Give me call if you have any questions. I'm not sure if I'll be able to attend the meeting in NY next week (although Thai does sound very enticing), so maybe these ideas could be incorporated into your meeting discussion. Also, Shawn mentioned that the meeting date for the next TAC meeting may be changed. Please let me know what the new date will be when you get a chance.

Thanks! Talk to you later-

Diana L. Raichel, Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Ecological Services, Region 5
NJ Field Office
927 North Main street (Bldg D)
Pleasantville, NJ 08232
609/646-9310 x 45
Fax: 609/646-0352

From: Christopher Hellwig [mailto:CHellwig@RandolphNJ.org]
Sent: Tuesday, August 12, 2003 9:48 AM
To: 'skiernan@neapa.com'
Subject: RE: ERTAC Meeting Dates

Shawn,

Here is the easement data produced. If you need anything else please let me know.

Chris Hellwig

-----Original Message-----

From: Shawn Kiernan [mailto:skiernan@neapa.com]
Sent: Monday, August 11, 2003 12:32 PM
To: Cbstroh@aol.com
Subject: RE: ERTAC Meeting Dates

Hi Connie,

I'm very glad that I said "tentatively" in my initial e-mail, as logistics may prevent us from visiting all of the sites as a team... it appears more likely that I will visit the "maybe" sites, and take photos to be discussed at the next meeting.

As for the GIS layer, I think it would be very helpful. If you could ask the planning administrator to contact me, it would be probably be easiest. We have a high-speed connection, and our GIS staff in Portland, Maine (NEA's headquarters) is very proficient at creating new analysis.

I'll be sending out the ERTAC meeting information this week, and (tentatively) it appears that we might just have a meeting on the Friday morning to finalize our 5 restoration sites. We may do some site visits afterwards, but that is still a little up in the air.

Thanks again for all of your help and guidance so far. You've truly been an asset to this project!

Shawn

570-476-1644

From: Cbstroh@aol.com
Sent: Thursday, August 28, 2003 4:15 PM
To: skiernan@neapa.com
Cc: Diane Nelson
Subject: Upper Rockaway Restoration Project

Dear Shawn,

I took a report to the Randolph Township Environmental Commission this week and explained the progress of the project. They agreed that several of the sites that have been removed from the first round should be reconsidered for action. They are MB-2, JB-6 and JB-7. These are all headwaters locations, and we think that any river restoration, to be effective, must begin with the headwaters.

MB-2 is classified FW2-TP, C1 from its source to the Route 10 Bridge.

In addition, there seems to be an error on page 63 regarding JB-7; Jackson Brook is classified FW2-TP, C1, from the source to the boundary of Hurd Park, Dover (the segment that travels upstream from the pond to Route 10). This also is the logic for reconsidering JB-6. Chris Hellwig, Randolph Township Planning Administrator tells me that he sent you information about land ownership in the headwaters reaches of JB-6 and that much of the land is under government control, e.g., the township and/or Morris County.

Regarding JB-7, Morris County has indicated in its report *Jackson Brook Watershed Stormwater Management Plan* that it intends to do some work on the Wallace Brook.

I will bring that report with me to our next meeting on Sept. 5th.

Connie

From: Shawn Kiernan [skiernan@neapa.com]
Sent: Wednesday, October 8, 2003 9:32 AM
To: 'june.hercek@verizon.net'
Cc: Susan.L.Schneider (E-Mail); Dingle (E-Mail)
Subject: RE: Restoration Site Visit

Ms. Hercek,

As you know, Northern Ecological Associates (NEA) has been contracted by the US Army Corps of Engineers to assist with the Upper Rockaway River Flood Control and Ecosystem Restoration Study. Therefore, all activities associated with this study must be approved by the Corps of Engineers, specifically Susan Schneider, the Project Biologist. Consequently, NEA will coordinate directly with Susan regarding your request.

Thank you,

Shawn Kiernan
Environmental Specialist
Northern Ecological Associates, Inc.
134 Broad Street
Stroudsburg, PA 18360
(570) 476-1644
(570) 476-1649 fax

-----Original Message-----

From: june.hercek@verizon.net [mailto:june.hercek@verizon.net]
Sent: Wednesday, October 08, 2003 1:26 AM
To: skiernan@neapa.com
Subject: Restoration Site Visit

Shawn,

Several members of the Rockaway River Watershed Cabinet are interested in visiting the five (5) remaining sites in the Upper Rockaway River project.

They have asked that I contact you to set up a time to meet with you and visit these sites. Is it possible for you to meet with us to visit the sites? If so, could you please provide some possible dates and times.

Thank you,

June Hercek
Executive Director
Rockaway River Watershed Cabinet

From: Tumminello, Paul NAN02
Sent: Thursday, October 16, 2003 4:52 PM
To: Woolley, Gail S NAN02; Schneider, Susan L NAN02
Subject: FW: Upper Rockaway River Flood Protection and Environmental Restoration Study - Cabinet Coordination

Gail, Susan,

FYI. Based upon message below, Cabinet would appear to be looking at an update on the project and a site visit at the same time in December. Is this doable for you?

Paul

-----Original Message-----

From: june.hercek@verizon.net [mailto:june.hercek@verizon.net]
Sent: Wednesday, October 15, 2003 1:12 AM
To: Tumminello, Paul
Subject: Re: Upper Rockaway River Flood Protection and Environmental Restoration Study - Cabinet Coordination

Paul,

A apologize for not getting back to you today. I had a baby boy in August and he is keeping me very busy. I am doing a lot of work from home these days. Please feel free to call me at my home (973) 887-5817.

There is no River Cabinet meeting in November. The next meeting is scheduled for December 10. We currently have no presentation scheduled for the December 10 meeting so we could accommodate an Army Corps presentation on that date. Brad Garie and Connie Stroh of the River Cabinet did provide us with an overview at our September meeting of the remaining five restoration sites. As I indicated with Susan, I am not sure what additional information the Army Corps would provide that Brad and Connie have not provided. However, there may be some new information that can be provided at our December meeting. Please let me know about the December meeting date. We could also coordinate a site visit on this date, weather permitting.

Many thanks,
June Hercek

>

> From: Paul.Tumminello@nan02.usace.army.mil
> Date: 2003/10/14 Tue AM 11:39:30 CDT
> To: june.hercek@verizon.net

> Subject: Upper Rockaway River Flood Protection and Environmental Restoration
> Study - Cabinet Coordination

>

> June,

>

> Hope you are well. I left a message at your office, but am e-mailing you
> also. I know you have been in contact with Susan Schneider of my office
> regarding the restoration sites for the study. You indicated an interest in
> having a site visit and I know have been coordinating a Cabinet meeting date
> for an update on the restoration sites.

>

> I would like to propose that we provide the Cabinet with an update on both
> the flood protection and restoration work and try to couple that with a site
> visit. I will reach out to Gail Woolley and Susan Schneider to get some
> dates. I think a November date is likely given our schedule thru the rest
> of October. Do you have several dates in November that would be good.

>

> Paul Tumminello

> (212) 264-0437

>

>

APPENDIX B

SITE VISITS

- June 11, 2003**
- June 27, 2003**
- July 31, 2003**
- August 4, 2003**

June 11, 2003

- **Site Visit Report**
- **Photo Record**



FIELD TRIP REPORT

Date: June 18, 2003

To: Susan Schneider

cc: Gail Woolley, Paul Tuminello, Diana Raichel

Company: USACE NYD

From: Shawn Kiernan/Robin Dingle

The following is a brief summary of the site visit to the Upper Rockaway River on June 11, 2003. In attendance were Susan Schneider and Gail Woolley of the USACE, New York District, Diana Raichel of the USFWS New Jersey Field Office, and Robin Dingle and Shawn Kiernan of NEA. The purpose of the visit was to familiarize project personnel with the environmental setting of the project area, and to visit some of the identified restoration areas within the Upper Rockaway River watershed. In addition, the team reviewed the location of a proposed flood control alternative that will be addressed in the Environmental Assessment (EA).

The first site visit was to Longwood Lake. According to local recreational fishermen, the lake had been an average of 15' deep in the center and is now approximately 10' deep. Lake trout is stocked privately above the dam, and largemouth bass and sunfish are common, with sunfish being the most frequently caught fish. Brown trout is stocked by the State below the dam. Possible restoration options may include fish passage between the downstream and upstream reaches, and dredging. Immediately below the dam is a private Rod and Reel club, with a wooden bridge crossing the creek. Photographs were taken above and below the dam (see attachment).

The next site visit was to inspect the proposed location of the flood control alternative. The culvert would collect water from Lake Estling and divert it underground beneath the NJ Transit railway line. According to Ms. Woolley, a 500-year storm event would raise water level on Indian Lake by approximately 4'. Photographs were taken of Lake Estling and Indian Lake.

The next site visited was JB-4, a parking lot located behind the Police Station in Dover Township. The River runs adjacent to the parking lot, and the group discussed possible restoration activities, including the removal of sections of asphalt and underlying sediment to an appropriate grade, coupled with plantings, to create a vegetated floodplain. The benefits would include improved fish and wildlife habitat and additional, though limited, flood storage capacity in the center of Town. Photographs were taken and it was agreed that additional investigation was necessary to better characterize the site conditions and quantify potential restoration.

From the Dover parking lot site, the group traveled along channelized parts of the River in downtown Dover and observed the hardened shoreline features. In-stream and adjacent habitat improvements, including the creation of fish resting pools before and after road bridges, interstitial space along the submerged bulkheading, and lunger boxes with emergent vegetation, were discussed. Other enhancement alternatives discussed included the creation of a butterfly nursery by planting appropriate vegetation (milkweed, goldenrods) in disturbed upland areas. Further investigation is necessary to determine the potential of these restoration alternatives.

The group visited the Washington Forge Pond, an impoundment of the River with an extremely low flow. Depth in the Pond has been subject to fluctuation according to local residents, and the shoreline has been partially hardened. Upstream, there appeared to be a small wetland that requires further investigation. Eurasian milfoil and purple loosestrife are the dominant vegetation along the hardened edge. The slow moving water and possible high siltation rate suggest that the Pond may have poor or low water quality. The dam is located adjacent to a former factory building, and drops water into a moderately flowing creek with heavy tree canopy cover. Photographs were taken of each of the observed locations. Directly adjacent to the north bank of the downstream creek is a fenced and asphalted parcel. This site appears to have contamination issues (i.e., presence of a monitoring well), and was likely eliminated from previous scoping efforts. Additional information will be collected so that this area is characterized in the Environmental Assessment.

The group passed a large Common reed marsh behind the Shop Rite and Roller Rink in Wharton off of Rte. 13. This site requires additional investigation.

Action Items:

- 1) Susan gave NEA the USFWS Planning Aid Letter so that NEA could photocopy it and return it.
- 2) Diana requested information on the sub-basin watershed classification used in the Restoration Site Identification Report. NEA will forward that information.
- 3) NEA will provide digital copies of the photographs taken during this field visit to all attendees.
- 4) Susan requested information on the NJ Landscape Project. NEA will forward the link to the Landscape Project's website. <http://www.state.nj.us/dep/fgw/ensp/landscape/index.htm>.

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan
Date: June 11, 2003
Photo No.: 1.
Direction: North

Comments:
View of Longwood Lake, site LW-1, facing North from banks. The lake was formerly approximately 15' deep in the center, and is currently approximately 10' in depth in the center according to local residents.



Photographer: S. Kiernan
Date: June 11, 2003
Photo No.: 2.
Direction: North

Comments:
View of Longwood Lake Dam from the access road for the Rod and Gun Club. Note tree canopy cover downstream of the dam.

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan
Date: June 11, 2003
Photo No.: 3.
Direction: Northeast

Comments:
View of Indian Lake from the NJ Transit railroad line. A culvert currently exists to the right of the people, which connects Indian Lake and Lake Estling.



Photographer: S. Kiernan
Date: June 11, 2003
Photo No.: 4.
Direction: Southwest

Comments:
View of Lake Estling from the NJ Transit rail line. The culvert top is visible (white) beginning at the metal post.

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan
Date: June 11, 2003
Photo No.: 5.
Direction: Northeast
(Upstream)

Comments:
View of site JB-5, located in downtown Dover. The site is currently a municipal parking lot. The Rockaway River is adjacent to the chain link fence on the right. Note the elevation difference between the asphalt parking lot and the small floodplain and River surface.



Photographer: S. Kiernan
Date: June 11, 2003
Photo No.: 6.
Direction: Southwest
(Downstream)

Comments:
View facing downstream of site JB-5.

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan
Date: June 11, 2003
Photo No.: 7.
Direction: East
Comments: View facing upstream of Washington Forge Pond site (JB-1) in Wharton. Note slowing moving water flow and *Eurasian milfoil* near surface.



Photographer: S. Kiernan
Date: June 11, 2003
Photo No.: 8.
Direction: Northeast
Comments: View of Washington Forge Pond facing downstream towards the dam. Note *Loosestrife* and *Eurasian Milfoil* near banks.

June 27, 2003

- **Site Visit Report**

MEMORANDUM

TO: Susan Schneider, USACE NYD

FROM: Shawn Kiernan and Robin Dingle, NEA

DATE: August 5, 2003

RE: **Upper Rockaway River Ecosystem Restoration Site Visit - June 27, 2003**

CC: NEA File CU-200, DO-19

Northern Ecological Associates, Inc. (NEA) biologist Shawn Kiernan and Ecosystem Restoration Technical Advisory Committee (ERTAC) member Brad Garie, conducted site visits to potential restoration locations along the Upper Rockaway River, New Jersey, on June 27, 2003. This memorandum presents a summary of those site visits.

Overview of Sites

Mr. Garie and Mr. Kiernan visited sites UR-1, UR-6, JB-1, JB-3, JB-4, MR1-2, and MR1-3, and investigated additional possible restoration and flood storage sites in the vicinity. The purpose of the site visits was to familiarize the biologists with the possible restoration actions and locations associated with the ranking of restoration alternatives for the US Army Corps of Engineers' Ecosystem Restoration Project for the Upper Rockaway River.

UR-1

At Mill Pond Road, off of West Dewey Avenue in Roxbury Township, the Rockaway River begins a northeasterly turn having completed the run from the headwaters. At this point, the Baker Mill Pond, believed to be a former turning basin for the Morris Canal, creates a wide area allowing sediment to drop out. The pond itself appears to be mostly disconnected from the River mainstem by an earthen pathway on the south side of West Dewey Avenue. A hydrologic reconnection of the system may be possible through the excavation and removal of the earthen constraint. A healthy forested wetland system exists at the end of Mill Pond Road, and may connect to the Stephens Brook pond located near Hopatcong Junction station.

UR-6

The stream corridor between Baker Mill Pond and Washington Forge Pond includes newly built townhouses, the Wharton Department of Public Works facility, Canal Park and the Wharton water supply pumping station, and a naturally functioning floodplain by the utility right of way. The river begins to back up in response to the dam at Washington Forge Pond near Oxford Road, off of Pine Street. This stretch of the River appears to have limited restoration opportunities, though riparian plantings and shoreline stabilization, particularly near the new development, could be established.

JB-1

Washington Forge Pond has been showing signs of increased sedimentation, including decreases in depths and an increase in opportunistic vegetation. Representatives of the local community have recommended dredging the pond to restore the depths. During the site visit, a small patch (less than 1/8th of an acre) of invasive plants was observed on the upstream, northern bank. Purple loosestrife and other opportunistic species were also observed, but in relatively small patches. Restoration dredging may be the recommended alternative to reduce opportunistic vegetation and restore historic depths. However, the increased sedimentation stemming from upstream sources appears to be settling in the slow moving water of the pond. Restoration dredging would provide a short-term solution, and maintenance dredging would be necessary to maintain the depths if the upstream sources of sediment were not addressed.

JB-3

This stretch of the river begins at the Washington Forge Pond dam and flows behind West Dewey Avenue into Dover, and includes the confluence of Rockaway River and Green Pond Brook. The river runs near the LE Carpenter Superfund site and a series of industrial and commercial properties. There is a roughly six foot deep pool between the Washington Forge dam and the industrial buildings near Huff Street. The River then picks up tremendous speed as it flows through a channelized section behind the Shop Rite complex. Mr. Garie explained that the area behind the Shop Rite had been altered, presumably in response to mosquito complaints, and the channel has been deepened and constricted with an earthen berm along the northeastern shoreline that creates a hydrologic disconnection between the river and the former adjacent floodplain. Additionally, a dry and exposed creek bed is visible between the Shop Rite and the earthen berm, and is believed to be the original course of Burnt Meadow Brook. This area presents a number of significant restoration projects.

Additionally within this stretch is a large, multiple acre site along the Green Pond Brook behind the Roller Rink Parking lot overgrown by tall *Phragmites australis*. Removal of the *Phragmites* and re-grading of this site would enhance fish and wildlife habitat. Continuing to the Vail Street (JCP&L) weir, there is a floodplain along the eastern bank that requires additional investigation to determine if it could be restored to hold greater flood storage capacity and increased fish and wildlife diversity.

JB-4

This site includes Bowlby Pond, Black Pond, and the original course of the Burnt Meadow Brook from the current Rockaway Mall. Bowlby Pond has been filled and culverted to its connection with Black Pond. The outfall from Black Pond, which historically connected with the Rockaway River near downtown Dover, has been culverted under the nearby streets with a much smaller outfall than was naturally present. There is a possible restoration of flow from the Rockaway Mall creek into the system, and modification to the existing culverts to allow additional flood storage and fish habitat improvement. The ponds are groundwater fed, and exhibit signs of sedimentation and constriction of flow, as well as increased nutrient inputs from goose droppings and road runoff. This site presents a unique opportunity to attempt reconnection of historic hydrology.

JB-5

Located in downtown Dover, across from the Fire Station, and behind the Krauzers convenience store, this site includes a municipal parking asphalt parking lot. Historically, the site was known as Mill Pond and was filled to create additional land that became a drive-in movie theater. The unused parking lot could be removed along the River and a graded floodplain could be reconstructed to reduce the velocity of the water flowing through the downtown area. Fish and wildlife habitat would be improved, and public access and enjoyment of the river would be enhanced.

MR 1-1

Located in downtown Dover, this section of the Rockaway River is prone to flooding conditions. Much of the downtown area is comprised of residences and businesses located directly along the river, allowing little opportunity for ecosystem restoration. Streambank restoration and native vegetation planting, or potentially some small fish habitat weirs could be installed.

MR1-2

The McKeels Brook and Granney's Brook is currently being investigated by a USACE drainage project. The area includes Clark's Pond, where sedimentation has been identified as an issue. The area observed indicates no significant restoration potential aside from restoration dredging of the pond. Few large disturbance zones could be identified for possible wetland restoration, and the drainage appears to have limited erosion or shoreline scouring requiring streambank restoration. It was agreed that the ERTAC should review the site, and potentially remove it from consideration in the context of the Corps' restoration initiative.

MR1-3

This site includes the river through Dover and into Rockaway Township. The corridor is very similar to site MR1-1 and includes limited restoration potential due to the close proximity of elevated railroad tracks on one side and commercial and residential structures on the opposite bank. Identified as significantly important for restoration by the Friends of the Rockaway River, restoration could entail limited streambank re-vegetation and stabilization using bioengineering devices.

MR2-3

Behind the St. Clare's hospital is a former agricultural field with early successional meadow vegetation that appears to exhibit floodplain characteristics. The site may be an aquifer recharge area, or may be a floodplain that has been filled to create agricultural land, and is no longer actively utilized. Further investigation is necessary to establish if restoration potential exists.

Additional Sites

Mr. Garie also identified possible flood storage sites including the County Concrete facility on Berkshire Valley Road in Kenvil. The active concrete mine includes a number of deep, water-filled pits that could be connected to the river through culverts and may provide additional flood storage capacity.

July 31, 2003

- **Site Visit Report**

MEMORANDUM

TO: Susan Schneider, USACE NYD

FROM: Shawn Kiernan and Robin Dingle, NEA

DATE: August 11, 2003

RE: **Upper Rockaway River Ecosystem Restoration Site Visit – July 31, 2003**

CC: NEA File CU-200, DO-19

Northern Ecological Associates, Inc. (NEA) biologist Shawn Kiernan and Ecosystem Restoration Technical Advisory Committee (ERTAC) member Eric Persson and his brother, David Persson, conducted site visits to several potential restoration locations along the Upper Rockaway River, New Jersey, on July 31, 2003.

Overview of Sites

Mr. E. and D. Persson and Mr. Kiernan visited sites (LR-1, LR-2, and portions of MR2-3) in the Boonton area by boat, and investigated additional possible restoration sites in the vicinity. Eric and David Persson had both grown up on the River, and were able to provide both a historical and ecological context to the changes in the condition of the River since the 1950s. The purpose of the site visits was to identify possible restoration actions and locations for the US Army Corps of Engineers' Ecosystem Restoration Project for the Upper Rockaway River.

LR-1

Griffith Park is located adjacent to the Powerville Dam in Boonton Township. Ecosystem restoration actions are limited at Griffith Park due to its small size. There also appeared to be no ecological restoration actions that would benefit the downstream reach, aside from dam removal or modification.

As a component of potential flood control solutions for the Upper Rockaway River, modifications to the Powerville Dam had been considered. Eric Persson explained a history of the area, providing historic photographs showing the dam and former mill. Although not an ecosystem restoration measure, Mr. Persson recommended a rehabilitation of the dam to ensure that the current environmental and historical features were not lost due to erosion, particularly on the Powerville Road shoreline. The dam currently provides a stable and predictable flow of water downstream. Mr. Persson explained that the dam's stability might be compromised within the next 3-5 years if no rehabilitation action is taken, and a failure of the dam might result in adverse impacts to both the local environment and the Jersey City Reservoir located downstream. The river above the dam, which had been 13.5 feet deep in the 1950s, is currently nine feet deep. Mr. Persson identified sediment within the riverbed as mostly coarse grain, sand/gravel material which he believes is partly associated with upstream road construction (e.g., the Route 80 bridge

renovations and the Diamond Spring Road bridge renovations in Denville) and residential developments. Mr. Persson recommended that the need for rehabilitation of the Powerville Dam be forwarded to the NJDEP Dam Safety Unit for funding.

LR-2

Site LR-2 includes an area upstream of the Powerville Dam that the group investigated by boat. Water depth observed in this area during the site visit water depths varied from 6 to 9.5 feet and wild celery was commonly seen underwater. Bank erosion was obvious in a few sections, but evidence of erosion did not persist for more than 100-200 feet upstream or downstream of the point of disturbance. The bank vegetation in this reach was lacking, partly due to residential development, which abuts the river. Restoration actions appeared to be limited to re-vegetation of the streambank.

MR2-3

The upper reaches of site MR2-3 include a series of privately owned wooded areas with overhanging canopy trees. The system in this reach appears to be healthy and includes wild celery colonies, observed fish and wildlife including snapping turtles and great blue- herons, and a moderate flow rate. Again, evidence of bank erosion was observed for short intervals. Additionally, floating debris, including soda bottles and Styrofoam from upstream sources, has been trapped by shoreline vegetation. Although there are some signs of degradation (erosion and debris), restoration actions for this stretch of the river are minimal, since the system appears to be functioning adequately.

The waterside site visits ended above River Road in Boonton due to a downed tree across the channel. The County Mosquito Control Commission removed the blockages later in the season.

August 4, 2003

- **Site Visit Report**

MEMORANDUM

TO: Susan Schneider, USACE NYD

FROM: Shawn Kiernan and Robin Dingle, NEA

DATE: August 15, 2003

RE: **Upper Rockaway River Ecosystem Restoration Site Visit – August 4, 2003**

CC: NEA File CU-200, DO-19

Northern Ecological Associates, Inc. (NEA) biologist Shawn Kiernan and US Fish and Wildlife Service (USFWS) Biologist Diana Raichel, conducted site visits to several potential ecosystem restoration sites located along the Upper Rockaway River, New Jersey, on August 4, 2003.

Overview of Sites

Ms. Raichel and Mr. Kiernan visited sites (LR-1, LR-3, portions of LR-2, portions of MR2-3) in the Denville and Boonton area by car, and investigated additional possible restoration sites in the vicinity. The site visits took place following an Ecosystem Restoration Technical Advisory Committee (ERTAC) meeting held in Denville. The purpose of the site visits was to identify possible restoration actions and locations for the US Army Corps of Engineers' Ecosystem Restoration Study for the Upper Rockaway River.

LR-1

Griffith Park is located adjacent to the Powerville Dam in Boonton Township. Potential restoration actions at this site include dam modifications/removal, and possible wetland restoration actions within the park. Due to the limited size of the potential site and an existing small wetland community, land-based restoration actions do not appear necessary. Modification of the dam may result in both beneficial and negative ecological impacts, and restoration efforts may be more effective elsewhere along the river.

LR-3

The Plane Street site is located in the Town of Boonton, and includes part of the Boonton Gorge that is characterized by extremely fast flowing water and a series of natural and man-made waterfalls. The field team identified an unused paved area adjacent to the river, which may be a site for restoration if the asphalt and fill material could be removed. Concerns exist regarding restoration in this area due to known, nearby industrial waste contamination sites. Further investigation would be necessary to ensure that restoration activities did not promote contamination of downstream resources, including the nearby Jersey City reservoir.

LR-2

The field team observed portions of site LR-2, which incorporates areas both upstream and downstream of the Powerville Dam. Upstream portions appeared to have slow moving, relatively clear water. Some areas of dense streambank vegetation and others with little or no bank vegetation were observed, particularly near residences. Restoration actions in this area are limited to streambank stabilization measures. However, the system does not exhibit many signs of significant impairment, such as high turbidity or velocity.

MR2-3

The field team observed portions of this site from the road, and performed random site visits within the overall MR2-3 site boundary, including a former agricultural field behind St. Clare's Hospital and portions of the river along the Diamond Spring and River roads. The river runs mainly behind residential developments, and direct access is difficult. Additionally, the River exhibits few significant negative characteristics, and the banks are predominantly vegetated and stable. Unstable banks were observed in a few areas.

APPENDIX C

RESTORATION RANKING MATRIX

- **Ranking Process Handout**
- **Draft Ranking Matrix**
- **Scored Ranking Matrix: ERTAC**
- **Scored Ranking Matrix: USACE**
- **Total Scored and Sorted Ranking Matrix**

Ranking Process Handout



Upper Rockaway River Watershed Flood Control and Ecosystem Restoration Study

RESTORATION RANKING MATRIX PRELIMINARY MATRIX ELEMENTS AND RIVER REACHES

Matrix Elements

The Restoration Ranking Matrix will include the list of identified potential restoration sites, developed with the coordination of the ERTAC and presented in the *Draft Preliminary Identification of Potential Restoration Sites* report, and the preliminary Restoration Elements. Restoration Elements are the ecological objectives or benefits that are being targeted and the goals that would be achieved by a successful restoration project. The preliminary restoration elements include the following:

- Decrease in sedimentation.
- Increase in fish and wildlife habitat.
- Improve historic hydrologic connection.
- Expand rare or endangered species habitats.
- Meet Federal interest.
- Provide secondary benefits in the public's interest.

Proposed River Reaches

River Reaches are a method of categorizing segments of a river based on different physical or chemical characteristics. The following are the proposed river reaches for the Upper Rockaway River:

- Reach 1 : Longwood Lake to West Dewey Avenue (Wharton)
- Reach 2 : West Dewey Avenue to Vail Street Weir (Dover)
- Reach 3 : Vail Street Weir to North Salem Street (Dover)
- Reach 4 : North Salem Street to Beach Street (Rockaway)
- Reach 5 : Beach Street to Pocono Road (Denville)
- Reach 6 : Pocono Road to Powerville Road (Boonton)
- Reach 7 : Powerville Road to Boonton Reservoir

Proposed Ranking Process

Step 1:

Project	Primary Restoration Action	Decrease Sediments	Increase Fish & Wildlife	Improve Historic Hydrology	Expand RTE Habitats	Federal Interest	Secondary Benefits
Project 1	Floodplain restoration						
Project 2	Pond dredging						
Project 3	Shoreline plantings						

Step 2:

Project	Primary Restoration Action	Decrease Sediments	Increase Fish & Wildlife	Improve Historic Hydrology	Expand RTE Habitats	Federal Interest	Secondary Benefits
Project 1	Floodplain restoration	v	v	v	---	v	---
Project 2	Pond dredging	v	---	---	X	---	v
Project 3	Shoreline plantings	v	---	X	---	---	---

Step 3:

Project	Primary Restoration Action	Decrease Sediments	Increase Fish and Wildlife	Improve Historic Hydrology	Expand RTE Habitats	Federal Interest	Secondary Benefits	Total
Project 1	Floodplain restoration	v	v	v	---	v	---	4/6
Project 2	Pond dredging	v	---	---	X	---	v	1/6
Project 3	Shoreline plantings	v	---	X	---	---	---	0/6

Scoring Key:

v = +1

--- = 0

X = -1

Draft Ranking Matrix



Upper Rockaway River Watershed Flood Control and Ecosystem Restoration Project

ID	PROJECT	Report Names	Restoration Action	Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
HW-1	Headwaters of the Rockaway River Sub-basin	Berkshire Valley Sand & Stone Co.	Streambank Restoration							
UR-1	Upper Rockaway River Sub-basin	GPU Energy/Morris County Properties	Wetland Restoration							
UR-2	Upper Rockaway River Sub-basin	Pond-View-Estates	Developed							
UR-3	Upper Rockaway River Sub-basin	Blue Road Bridge	To Be Determined							
UR-4	Upper Rockaway River Sub-basin	Old Bridge Site	To Be Determined							
UR-5	Upper Rockaway River Sub-basin	Old Jersey City Weir	To Be Determined							
UR-6	Upper Rockaway River Sub-basin	Hugh Force/Canal Park	Streambank Restoration							
JB-1	Jackson Brook Sub-basin	Washington Forge Pond	Restoration Dredging							
JB-2	Jackson Brook Sub-basin	Drainage 635 - Mine Hill Twp.	Streambank Restoration							
JB-3	Jackson Brook Sub-basin	River Woodland Reserve - Barnt Meadow Brook	Floodplain Restoration							
JB-4	Jackson Brook Sub-basin	Drainage 633 - Dover	Stream Channel Restoration							
JB-5	Jackson Brook Sub-basin	Drainage 652 - Dover	Floodplain Restoration							
JB-6	Jackson Brook Sub-basin	Drainage 660 - Mine Hill Twp.	Streambank Restoration							
JB-7	Jackson Brook Sub-basin	Drainage 681 - Randolph Twp.	To Be Determined							
JB-8	Jackson Brook Sub-basin	Drainage 646 - Wharton	Wetland Restoration							
MR1-1	Middle Rockaway Sub-basin #1	Drainage 639 - Dover/Rockaway Twp.	Streambank Restoration							
MR1-2	Middle Rockaway Sub-basin #1	McKeel's Brook Drainage	To Be Determined							
MR1-3	Middle Rockaway Sub-basin #1	River Greenway - Dover	Fish Habitat Restoration							
MR1-4	Middle Rockaway Sub-basin #4	Former-Ruis-Property	Contaminants							
MR1-5	Middle Rockaway Sub-basin #1	Rockaway River Corridor Enhancement	Floodplain Restoration							
MR1-6	Middle Rockaway Sub-basin #1	Jackson Ave. Park	Streambank Restoration							
MR1-7	Middle Rockaway Sub-basin #1	Drainage 613 - Denville Twp.	Streambank Restoration							
MR1-8	Middle Rockaway Sub-basin #1	Drainage 572 - Rockaway Twp.	To Be Determined							
MR2-1	Middle Rockaway Sub-basin #2	River Woodland Reserve	Wetland Restoration							
MR2-2	Middle Rockaway Sub-basin #2	Banza! Steakhouse/Gearheart Auto	Fish Habitat Restoration							
MR2-3	Middle Rockaway Sub-basin #2	Denville - River Corridor Enhancement	Streambank Restoration							
LR-1	Lower Rockaway River Sub-basin	Griffith Park	Streambank Restoration							
LR-2	Lower Rockaway River Sub-basin	Drainage 590 - Boonton	Streambank Restoration							
LR-3	Lower Rockaway River Sub-basin	Plan Street Re-Greening	Streambank Restoration							
SB-1	Stony Brook Sub-basin	Drainage 494 - Boonton Twp.	Streambank Restoration							
SB-2	Stony Brook Sub-basin	Taylorstown Reservoir	To Be Determined							
DB-1	Den Brook Sub-basin	Den Brook Fill Site	Fill Removal							
BB-1	Beaver Brook Sub-basin	Hampton Inn Site	Fill Removal							
BB-2	Beaver Brook Sub-basin	Drainage 538 - Rockaway Twp.	Stream Debris Removal							
BB-3	Beaver Brook Sub-basin	Drainage 556 - Rockaway Twp.	Stream Debris Removal							
BB-4	Beaver Brook Sub-basin	Drainage 583 - Rockaway Twp.	To Be Determined							
BM-1	Burnt Meadow Sub-basin	Drainage 444 - Rockaway Twp. (Picatinny)	To Be Determined							
BM-2	Burnt Meadow Sub-basin	Drainage 479 - Rockaway Twp. (Picatinny)	To Be Determined							
BM-3	Burnt Meadow Sub-basin	Drainage 582 - Rockaway Twp. (development)	Developed							
MB-1	Mill Brook Sub-basin	Lower Mill Brook Floodplain	Streambank Restoration							
MB-2	Mill Brook Sub-basin	Morris County College	Streambank Restoration							
MB-3	Mill Brook Sub-basin	New Site (Not Named)	Streambank Restoration							
GP-1	Green Pond Sub-basin	Drainage 331 - Rockaway Twp.	Wetland Restoration							
HB-1	Hibernia Brook Subbasin	Drainage 530 - Rockaway Twp.	Wetland Restoration							
HB-2	Hibernia Brook Subbasin	Lake Ames	Streambank Restoration							
BR-1	Boonton Reservoir Sub-basin	Knoll Country Club	Streambank Restoration							
LW-1	Longwood Lake		Restoration Dredging							

Scored Ranking Matrix: ERTAC



ID	PROJECT	Report Names	Restoration Action	PROJECT ELEMENTS						
				Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
HW-1	Headwaters of the Rockaway River Sub-basin	Berkshire Valley Sand & Stone Co.	Streambank Restoration	V	---	X	---	X	X	- 2
UR-1	Upper Rockaway River Sub-basin	GPU Energy/Morris County Properties	Wetland Restoration	V	V	V	V	V	V	+ 6
UR-2	Upper Rockaway River Sub-basin	Pond View Estates	Developed							
UR-3	Upper Rockaway River Sub-basin	Blue Road Bridge	Streambank Restoration	---	---	X	X	X	X	- 4
UR-4	Upper Rockaway River Sub-basin	Old Bridge Site	Streambank Restoration	---	---	X	X	X	X	- 4
UR-5	Upper Rockaway River Sub-basin	Old Jersey City Weir	Dam Modification	---	---	V	---	---	X	0
UR-6	Upper Rockaway River Sub-basin	Hugh Force/Canal Park	Streambank Restoration	V	---	X	X	---	---	- 1
JB-1	Jackson Brook Sub-basin	Washington Forge Pond	Restoration Dredging	V	V	---	X	V	---	+ 2
JB-2	Jackson Brook Sub-basin	Drainage 635 - Mine Hill Twp.	Streambank Restoration	V	X	---	X	---	---	- 1
JB-3	Jackson Brook Sub-basin	River Woodland Reserve - Burnt Meadow Brook	Floodplain Restoration	V	V	V	---	V	V	+ 5
JB-4	Jackson Brook Sub-basin	Drainage 633 - Dover	Stream Channel Restoration	---	V	V	X	V	V	+ 3
JB-5	Jackson Brook Sub-basin	Drainage 652 - Dover	Floodplain Restoration	V	V	V	X	V	V	+ 4
JB-6	Jackson Brook Sub-basin	Drainage 660 - Mine Hill Twp.	Streambank Restoration	V	---	X	X	V	---	0
JB-7	Jackson Brook Sub-basin	Drainage 681 - Randolph Twp.	Streambank Restoration	V	---	X	X	V	---	0
JB-8	Jackson Brook Sub-basin	Drainage 646 - Wharton	Wetland Restoration	V	V	---	V	V	V	+ 5
MR1-1	Middle Rockaway Sub-basin #1	Drainage 639 - Dover/Rockaway Twp.	Streambank Restoration	V	---	X	---	V	---	+ 1
MR1-2	Middle Rockaway Sub-basin #1	McKeel's Brook Drainage	Streambank Restoration	V	---	X	X	---	---	- 1
MR1-3	Middle Rockaway Sub-basin #1	River Greenway - Dover	Fish Habitat Restoration	---	V	X	V	V	V	+ 3
MR1-4	Middle Rockaway Sub-basin #1	Former Ruiz Property	Contaminants							
KEY	V = +1	--- = 0	X = -1							

ID	PROJECT	Report Names	Restoration Action	Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
MR1-5	Middle Rockaway Sub-basin #1	Rockaway River Corridor Enhancement	Floodplain Restoration	V	V	---	V	V	V	+ 5
MR1-6	Middle Rockaway Sub-basin #1	Jackson Ave. Park	Streambank Restoration	V	---	X	---	V	V	+ 2
MR1-7	Middle Rockaway Sub-basin #1	Drainage 613 - Denville Twp.	Streambank Restoration							
MR1-8	Middle Rockaway Sub-basin #1	Drainage 572 - Rockaway Twp.	Stormwater Management	X	X	X	X	X	X	- 6
MR2-1	Middle Rockaway Sub-basin #2	River Woodland Reserve	Wetland Restoration	V	V	V	---	V	V	+ 5
MR2-2	Middle Rockaway Sub-basin #2	Banzai Steakhouse/ Gearheart Auto	Fish Habitat Restoration	---	V	X	V	V	V	+ 3
MR2-3	Middle Rockaway Sub-basin #2	Denville - River Corridor Enhancement	Floodplain Restoration	---	V	V	---	V	---	+ 3
LR-1	Lower Rockaway River Sub-basin	Griffith Park	Streambank Restoration	---	V	---	X	---	---	0
LR-2	Lower Rockaway River Sub-basin	Drainage 590 - Boonton	Streambank Restoration	V	V	X	X	---	---	0
LR-3	Lower Rockaway River Sub-basin	Plane Street Re-Greening	Streambank Restoration	V	V	---	X	V	V	+ 3
SB-1	Stony Brook Sub-basin	Drainage 494 - Boonton Twp.	Streambank Restoration	V	---	X	X	---	---	- 1
SB-2	Stony Brook Sub-basin	Taylorstown Reservoir	Stormwater Management	X	X	X	X	X	X	- 6
DB-1	Den Brook Sub-basin	Den Brook Fill Site	Fill Removal	V	V	---	---	---	V	+ 3
BB-1	Beaver Brook Sub-basin	Hampton Inn Site	Fill Removal	V	V	V	---	V	V	+ 5
BB-2	Beaver Brook Sub-basin	Drainage 538 - Rockaway Twp.	Stream Debris Removal	X	X	X	X	X	X	- 6
BB-3	Beaver Brook Sub-basin	Drainage 556 - Rockaway Twp.	Stream Debris Removal	X	X	X	X	X	X	- 6
BB-4	Beaver Brook Sub-basin	Drainage 583 - Rockaway Twp.	Stormwater Management	V	---	X	X	---	---	- 1
BM-1	Burnt Meadow Sub-basin	Drainage 444 - Rockaway Twp. (Picatinny)								
BM-2	Burnt Meadow Sub-basin	Drainage 479 - Rockaway Twp. (Picatinny)								
BM-3	Burnt Meadow Sub-basin	Drainage 582 - Rockaway Twp. (development)	Developed							
MB-1	Mill Brook Sub-basin	Lower Mill Brook Floodplain	Streambank Restoration	V	---	X	X	---	---	- 1
KEY	V = +1	---	= 0	X = -1						

ID	PROJECT	Report Names	Restoration Action	Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
MB-2	Mill Brook Sub-basin	Morris County College	Streambank Restoration	V	---	X	X	---	---	- 1
MB-3	Mill Brook Sub-basin	New Site (Not Named)	Streambank Restoration							
GP-1	Green Pond Sub-basin	Drainage 331 - Rockaway Twp.	Wetland Restoration	---	---	V	---	V	---	0
HB-1	Hibernia Brook Subbasin	Drainage 530 - Rockaway Twp.	Wetland Restoration	V	V	V	---	V	V	+ 5
HB-2	Hibernia Brook Subbasin	Lake Ames	Streambank Restoration	V	V	X	X	X	X	- 2
BR-1	Boonton Reservoir Sub-basin	Knoll Country Club	Streambank Restoration	V	X	X	X	X	X	- 4
LW-1	Longwood Lake		Restoration Dredging	V	---	---	X	---	---	0
KEY	V = +1	--- = 0	X = -1							

Scored Ranking Matrix: USACE



USACE SCORED

ID	PROJECT	Report Names	Restoration Action	PROJECT ELEMENTS							
				Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS	
HW-1	Headwaters of the Rockaway River Sub-basin	Berkshire Valley Sand & Stone Co.	Streambank Restoration	V	---	X	---	V	---	+ 1	
UR-1	Upper Rockaway River Sub-basin	GPU Energy/Morris County Properties	Wetland Restoration	V	V	V	V	V	V	+ 6	
UR-2	Upper Rockaway River Sub-basin	Pond View Estates	Developed								
UR-3	Upper Rockaway River Sub-basin	Blue Road Bridge	Streambank Restoration	V	V	X	---	---	---	+ 1	
UR-4	Upper Rockaway River Sub-basin	Old Bridge Site	Streambank Restoration	V	V	X	---	---	---	+ 1	
UR-5	Upper Rockaway River Sub-basin	Old Jersey City Weir	Dam Modification	X	X	---	X	---	X	- 4	
UR-6	Upper Rockaway River Sub-basin	Hugh Force/Canal Park	Streambank Restoration	V	---	X	X	V	X	- 1	
JB-1	Jackson Brook Sub-basin	Washington Forge Pond	Restoration Dredging	X	V	V	X	V	---	+ 1	
JB-2	Jackson Brook Sub-basin	Drainage 635 - Mine Hill Twp.	Streambank Restoration	V	V	X	X	V	---	+ 1	
JB-3	Jackson Brook Sub-basin	River Woodland Reserve - Burnt Meadow Brook	Floodplain Restoration	V	V	V	V	V	---	+ 5	
JB-4	Jackson Brook Sub-basin	Drainage 633 - Dover	Stream Channel Restoration	V	V	V	V	V	---	+ 5	
JB-5	Jackson Brook Sub-basin	Drainage 652 - Dover	Floodplain Restoration	V	V	V	V	V	V	+ 6	
JB-6	Jackson Brook Sub-basin	Drainage 660 - Mine Hill Twp.	Streambank Restoration	V	V	X	---	V	---	+ 2	
JB-7	Jackson Brook Sub-basin	Drainage 681 - Randolph Twp.	Streambank Restoration	V	V	X	---	---	---	+ 1	
JB-8	Jackson Brook Sub-basin	Drainage 646 - Wharton	Wetland Restoration	V	V	V	V	V	---	+ 5	
MR1-1	Middle Rockaway Sub-basin #1	Drainage 639 - Dover/Rockaway Twp.	Streambank Restoration	V	---	X	---	V	V	+ 2	
MR1-2	Middle Rockaway Sub-basin #1	McKeel's Brook Drainage	Streambank Restoration	V	---	X	---	V	---	+ 1	
MR1-3	Middle Rockaway Sub-basin #1	River Greenway - Dover	Fish Habitat Restoration	X	V	X	---	V	V	+ 1	
MR1-4	Middle Rockaway Sub-basin #1	Former Ruiz Property	Contaminants								
KEY	V = +1		---	= 0		X = -1					

ID	PROJECT	Report Names	Restoration Action	Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
MR1-5	Middle Rockaway Sub-basin #1	Rockaway River Corridor Enhancement	Floodplain Restoration	V	V	V	---	V	---	+ 4
MR1-6	Middle Rockaway Sub-basin #1	Jackson Ave. Park	Streambank Restoration	V	V	X	---	V	V	+ 3
MR1-7	Middle Rockaway Sub-basin #1	Drainage 613 - Denville Twp.	Streambank Restoration							
MR1-8	Middle Rockaway Sub-basin #1	Drainage 572 - Rockaway Twp.	Stormwater Management	V	V	X	X	---	---	0
MR2-1	Middle Rockaway Sub-basin #2	River Woodland Reserve	Wetland Restoration	V	V	V	---	V	V	+ 5
MR2-2	Middle Rockaway Sub-basin #2	Banzai Steakhouse/ Gearheart Auto	Fish Habitat Restoration	X	V	X	V	V	---	+ 1
MR2-3	Middle Rockaway Sub-basin #2	Denville - River Corridor Enhancement	Floodplain Restoration	V	V	---	---	V	X	+ 2
LR-1	Lower Rockaway River Sub-basin	Griffith Park	Streambank Restoration	V	---	X	---	---	V	+ 1
LR-2	Lower Rockaway River Sub-basin	Drainage 590 - Boonton	Streambank Restoration	V	V	X	---	---	---	+ 1
LR-3	Lower Rockaway River Sub-basin	Plane Street Re-Greening	Streambank Restoration	V	V	---	---	V	---	+ 3
SB-1	Stony Brook Sub-basin	Drainage 494 - Boonton Twp.	Streambank Restoration	V	---	X	X	V	---	0
SB-2	Stony Brook Sub-basin	Taylorstown Reservoir	Stormwater Management	X	X	X	X	X	X	- 6
DB-1	Den Brook Sub-basin	Den Brook Fill Site	Fill Removal	V	V	---	---	V	X	+ 2
BB-1	Beaver Brook Sub-basin	Hampton Inn Site	Fill Removal	V	V	X	V	V	V	+ 4
BB-2	Beaver Brook Sub-basin	Drainage 538 - Rockaway Twp.	Stream Debris Removal	X	X	X	X	X	X	- 6
BB-3	Beaver Brook Sub-basin	Drainage 556 - Rockaway Twp.	Stream Debris Removal	X	X	X	X	X	X	- 6
BB-4	Beaver Brook Sub-basin	Drainage 583 - Rockaway Twp.	Stormwater Management	X	X	X	X	X	X	- 6
BM-1	Burnt Meadow Sub-basin	Drainage 444 - Rockaway Twp. (Picatinny)								
BM-2	Burnt Meadow Sub-basin	Drainage 479 - Rockaway Twp. (Picatinny)								
BM-3	Burnt Meadow Sub-basin	Drainage 582 - Rockaway Twp. (development)	Developed							
MB-1	Mill Brook Sub-basin	Lower Mill Brook Floodplain	Streambank Restoration	V	---	X	X	V	V	+ 1
KEY	V = +1	--- = 0	X = -1							

ID	PROJECT	Report Names	Restoration Action	Decrease Sedimentation	Restore Native Fish and Wildlife Habitat	Improve Historic Hydrology	Expand Rare or Endangered Habitats	Meets Federal Interest	Provides Secondary Benefits in the Public Interest	TOTALS
MB-2	Mill Brook Sub-basin	Morris County College	Streambank Restoration	V	---	X	X	---	V	0
MB-3	Mill Brook Sub-basin	New Site (Not Named)	Streambank Restoration							
GP-1	Green Pond Sub-basin	Drainage 331 - Rockaway Twp.	Wetland Restoration	V	V	---	---	V	---	+ 3
HB-1	Hibernia Brook Subbasin	Drainage 530 - Rockaway Twp.	Wetland Restoration	V	V	---	---	V	V	+ 4
HB-2	Hibernia Brook Subbasin	Lake Ames	Streambank Restoration	V	---	X	X	---	---	- 1
BR-1	Boonton Reservoir Sub-basin	Knoll Country Club	Streambank Restoration	---	X	X	X	X	X	- 5
LW-1	Longwood Lake		Restoration Dredging	---	---	X	X	V	V	0
KEY	V = +1	--- = 0	X = -1							

Total Scored and Sorted Ranking Matrix



ID	PROJECT	Report Names	Restoration Action	TOTAL SCORED		
				ERTAC SCORE	USACENEA SCORE	TOTAL SCORE
UR-1	Upper Rockaway River Sub-basin	GPU Energy/Morris County Properties	Wetland Restoration	+ 6	+ 6	+ 12
JB-3	Jackson Brook Sub-basin	River Woodland Reserve - Burnt Meadow Brook	Floodplain Restoration	+ 5	+ 5	+ 10
JB-5	Jackson Brook Sub-basin	Drainage 652 - Dover	Floodplain Restoration	+ 4	+ 6	+ 10
JB-8	Jackson Brook Sub-basin	Drainage 646 - Wharton	Wetland Restoration	+ 5	+ 5	+ 10
MR2-1	Middle Rockaway Sub-basin #2	River Woodland Reserve	Wetland Restoration	+ 5	+ 5	+ 10
MR1-5	Middle Rockaway Sub-basin #1	Rockaway River Corridor Enhancement	Floodplain Restoration	+ 5	+ 4	+ 9
BB-1	Beaver Brook Sub-basin	Hampton Inn Site	Fill Removal	+ 5	+ 4	+ 9
JB-4	Jackson Brook Sub-basin	Drainage 633 - Dover	Stream Channel Restoration	+ 3	+ 5	+ 8
HB-1	Hibernia Brook Subbasin	Drainage 530 - Rockaway Twp.	Wetland Restoration	+ 4	+ 4	+ 8
LR-3	Lower Rockaway River Sub-basin	Plane Street Re-Greening	Streambank Restoration	+ 3	+ 3	+ 6
MR1-6	Middle Rockaway Sub-basin #1	Jackson Ave. Park	Streambank Restoration	+ 2	+ 3	+ 5
MR2-3	Middle Rockaway Sub-basin #2	Denville - River Corridor Enhancement	Floodplain Restoration	+ 3	+ 2	+ 5
DB-1	Den Brook Sub-basin	Den Brook Fill Site	Fill Removal	+ 3	+ 2	+ 5
MR1-3	Middle Rockaway Sub-basin #1	River Greenway - Dover	Fish Habitat Restoration	+ 3	+ 1	+ 4
MR2-2	Middle Rockaway Sub-basin #2	Banzai Steakhouse/ Gearheart Auto	Fish Habitat Restoration	+ 3	+ 1	+ 4
JB-1	Jackson Brook Sub-basin	Washington Forge Pond	Restoration Dredging	+ 2	+ 1	+ 3
MR1-1	Middle Rockaway Sub-basin #1	Drainage 639 - Dover/Rockaway Twp.	Streambank Restoration	+ 1	+ 2	+ 3
GP-1	Green Pond Sub-basin	Drainage 331 - Rockaway Twp.	Wetland Restoration	0	+ 3	+ 3

ID	PROJECT	Report Names	Restoration Action	ERTAC SCORE	USACE/NEA SCORE	TOTAL SCORE
JB-6	Jackson Brook Sub-basin	Drainage 660 - Mine Hill Twp.	Streambank Restoration	0	+ 2	+ 2
JB-7	Jackson Brook Sub-basin	Drainage 681 - Randolph Twp.	Streambank Restoration	0	+ 1	+ 1
LR-1	Lower Rockaway River Sub-basin	Griffith Park	Streambank Restoration	0	+ 1	+ 1
LR-2	Lower Rockaway River Sub-basin	Drainage 590 - Boonton	Streambank Restoration	0	+ 1	+ 1
JB-2	Jackson Brook Sub-basin	Drainage 635 - Mine Hill Twp.	Streambank Restoration	- 1	+ 1	0
MR1-2	Middle Rockaway Sub-basin #1	McKeel's Brook Drainage	Streambank Restoration	- 1	+ 1	0
MB-1	Mill Brook Sub-basin	Lower Mill Brook Floodplain	Streambank Restoration	- 1	+ 1	0
LW-1	Longwood Lake		Restoration Dredging	0	0	0
SB-1	Stony Brook Sub-basin	Drainage 494 - Boonton Twp.	Streambank Restoration	- 1	0	- 1
MB-2	Mill Brook Sub-basin	Morris County College	Streambank Restoration	- 1	0	- 1
HW-1	Headwaters of the Rockaway River Sub-basin	Berkshire Valley Sand & Stone Co.	Streambank Restoration	- 3	+ 1	- 2
UR-6	Upper Rockaway River Sub-basin	Hugh Force/Canal Park	Streambank Restoration	- 1	- 1	- 2
UR-3	Upper Rockaway River Sub-basin	Blue Road Bridge	Streambank Restoration	- 4	+ 1	- 3
UR-4	Upper Rockaway River Sub-basin	Old Bridge Site	Streambank Restoration	- 4	+ 1	- 3
HB-2	Hibernia Brook Subbasin	Lake Ames	Streambank Restoration	- 2	- 1	- 3
UR-5	Upper Rockaway River Sub-basin	Old Jersey City Weir	Dam Modification	0	- 4	- 4
MR1-8	Middle Rockaway Sub-basin #1	Drainage 572 - Rockaway Twp.	Stormwater Management	- 6	0	- 6
BB-4	Beaver Brook Sub-basin	Drainage 583 - Rockaway Twp.	Stormwater Management	- 1	- 6	- 7
BR-1	Boonton Reservoir Sub-basin	Knoll Country Club	Streambank Restoration	- 4	- 5	- 9
SB-2	Stony Brook Sub-basin	Taylorstown Reservoir	Stormwater Management	- 6	- 6	- 12
BB-2	Beaver Brook Sub-basin	Drainage 538 - Rockaway Twp.	Stream Debris Removal	- 6	- 6	- 12
BB-3	Beaver Brook Sub-basin	Drainage 556 - Rockaway Twp.	Stream Debris Removal	- 6	- 6	- 12

ID	PROJECT	Report Names	Restoration Action	ERTAC SCORE	USACE/NEA SCORE	TOTAL SCORE
MR1-7	Middle Rockaway Sub-basin #1	Drainage 613 - Denville Twp.	Streambank Restoration			
MB-3	Mill Brook Sub-basin	New Site (Not Named)	Streambank Restoration			
BM-1	Burnt Meadow Sub-basin	Drainage 444 - Rockaway Twp. (Picatinny)				
BM-2	Burnt Meadow Sub-basin	Drainage 479 - Rockaway Twp. (Picatinny)				
UR-2	Upper Rockaway River Sub-basin	Pond View Estates	Developed			
MR1-4	Middle Rockaway Sub-basin #1	Former Ruiz Property	Contaminants			
BM-3	Burnt Meadow Sub-basin	Drainage 582 - Rockaway Twp. (development)	Developed			

APPENDIX D

RESTORATION SITE FIELD SURVEYS

- **Site MR2-1**
- **Site JB-5**
- **Site UR-1**
- **Site JB-3**
- **Site JB-8**

Restoration Site MR2-1

- **Wetland Data Form**
- **Water Resources Data Form**
- **Photographic Record**
- **Log Book Records**

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan

Date: 9/22/03

Photo No.: 1

Direction:

Comments:

View of MR2-1 site facing upstream. The River is located to the right behind the trees. Note the dirt/gravel, which extends around 2/3rd of the length of the property.



Photographer: S. Kiernan

Date: 9/22/03

Photo No.: 2

Direction:

Comments:

View of MR2-1 facing downstream (River is on left behind trees) towards picture 1 location. Biologist is standing on a Morris County Sewage Authority manhole cover from 1979 (the location of the sewer line will be considered during design).

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan
Date: 9/22/03
Photo No.: 3
Direction:
Comments:
View facing river from the end of the dirt road at MR2-1. This could be an approximate location of the initial inlet.



Photographer: S. Kiernan
Date: 9/22/03
Photo No.: 4
Direction:
Comments:
Facing the entrance to the site from the dirt road, the railroad tracks are located to the right of the trees.

Restoration Site JB-5

- **Wetland Data Form**
- **Water Resources Data Form**
- **Photographic Record**
- **Log Book Records**

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan
Date: 9/22/03
Photo No.: 5
Direction:
Comments: Facing upstream at site JB-5 in downtown Dover. Note elevation changes between river, floodplain, and wall.



Photographer: S. Kiernan
Date: 9/22/03
Photo No.: 6
Direction:
Comments: View of parking lot area at JB-5. The river is located to the right of the chain link fence.

Restoration Site UR-1

- **Wetland Data Form**
- **Water Resources Data Form**
- **Photographic Record**
- **Log Book Records**

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan

Date: 9/22/03

Photo No.: 7

Direction:

Comments:

View from West Dewey Avenue Bridge facing downstream at site UR-1, Mill Pond. Note river curve and berm structure along the river on the right (near large rock).



Photographer: S. Kiernan

Date: 9/22/03

Photo No.: 8

Direction:

Comments:

Facing Mill Pond behind the berm at site UR-1. Note the wetland communities along the shoreline, and submerged and emergent vegetation.

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan

Date: 9/22/03

Photo No.: 9

Direction:

Comments:
Facing the Mill Pond from the berm with
back to the river.



Photographer: S. Kiernan

Date: 9/22/03

Photo No.: 10

Direction:

Comments:
Facing Mill Pond from the area of a
proposed inlet from the river.

Restoration Site JB-3

- **Wetland Data Form**
- **Water Resources Data Form**
- **Photographic Record**
- **Log Book Records**



Photographer: S. Kiernan

Date: 9/22/03

Photo No.: 11

Direction:

Comments:

View facing upstream at Site JB-3, behind the Shop Rite complex. Note berm and slope to riverbank.



Photographer: S. Kiernan

Date: 9/22/03

Photo No.: 12

Direction:

Comments:

Facing toward the Shop Rite with back to river. Note former riverbed, and construction grade culverts/drainage pipes.

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan
Date: 9/22/03
Photo No.: 13
Direction:
Comments: Facing downstream from bottom of berm. Note rapid water flow and armored opposite bank.



Photographer: S. Kiernan
Date: 9/22/03
Photo No.: 14
Direction:
Comments: View of the former riverbed at a low spot in the berm. Potential location for breach.

Restoration Site JB-8

- **Wetland Data Form**
- **Water Resources Data Form**
- **Photographic Record**
- **Log Book Records**

NORTHERN ECOLOGICAL ASSOCIATES, INC.

PHOTOGRAPHIC RECORD

Company: USACE – New York District
Project: Upper Rockaway River Ecosystem Restoration Study



Photographer: S. Kiernan
Date: 9/22/03
Photo No.: 15
Direction:
Comments:
View of the *Phragmites* at site JB-8, facing upstream towards the West Clinton Avenue bridge. Note the power lines and parking lot drainage.



Photographer: S. Kiernan
Date: 9/22/03
Photo No.: 16
Direction:
Comments:
View of *Phragmites* facing downstream of West Clinton Avenue.

APPENDIX E

US FISH AND WILDLIFE SERVICE PLANNING AID LETTER AND REPORT

Planning Aid Letter

Planning Aid Report