SECTION 3 – SITE REPORTS

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3.0 Description of Site Reports

For each of the fifty MESIC sites, as well as the Meadowlands-wide category, a site report is presented that contains general site information including: site category; location; current land use; location; size; current ownership (where applicable); and a brief site description. The site reports contain site-specific citations and abstracts of documents cataloged or collected during the data investigation. The citations and abstracts are listed under the appropriate data categories for each of the sites.

The format for the citations is as follows:

#. Author(s). Report Title. Report Publisher or Project Owner (if applicable). Date. [Source #] Abstract.

Certain documents (e.g. EIS's, base studies) have information pertaining to multiple data categories and/or sites. These reports are repeated under the appropriate categories and/or sites and marked with an "*****". In addition, many citations within the Meadowlands-wide site report are also relevant to the other sites in terms of general baseline information. Each of the fifty sites' site reports reference the Meadowlands-wide Survey, Maps, and GIS data category as containing relevant information.

3.1 Data Sources

The citations contained in the site reports are designated with one of the following numbers to identify the point of contact or the corresponding source for access to a particular document:

[1] MERI Library – electronic files
Contact: Tammy Syrek-Marshall
Meadowlands Environmental Research Institute
1 DeKorte Park Plaza
Lyndhurst, NJ 07071
(201) 460-2808
tsyrek@meadowlands.state.nj.us

[1a] MERI/NJMC Staff
Contact: Kirk Barrett
Meadowlands Environmental Research Institute
1 DeKorte Park Plaza
Lyndhurst, NJ 07071
(201) 460-2802
kbarrett@meadowlands.state.nj.us

[2] USACE – NYD regulatory files: 1992 – present
Contact: James H. Cannon
USACE – New York District, Western Permits Section
26 Federal Plaza, 19th Floor
New York, NY 10278
(212) 264-0185
james.h.cannon@nan02.usace.army.mil

[2a] USACE – NYD Project Management Plan
Contact: Bryce Wisemiller
USACE – New York District, Project Management Division
26 Federal Plaza, 21st Floor
New York, NY 10278
(212) 264-5797
bryce.w.wisemiller@usace.army.mil

[3] EnCap Golf Holdings, LLC
Contact: Jeffrey W. Cappola
DeCotiis, Fitzpatrick, Cole & Wisler, LLP
Glenpointe Centre West
500 Frank W. Burr Boulevard
Teaneck, NJ 07666
(201) 907-5234
jcappola@decotiislaw.com

[4] USFWS
Contact: John Staples
U.S. Fish and Wildlife Service – New Jersey Field Office
Ecological Services, Region 5
Pleasantville, NJ 08232
(609) 646-9310
john_staples@fws.gov

[5] Rutgers University
Contact: Jean Marie Hartman
Rutgers University, Department of Landscape Architecture
93 Lipman Drive, Blake Hall
New Brunswick, NJ 08901
(732) 932-6785
jhartman@rci.rutgers.edu

[6] The Louis Berger Group, Inc.
Contact: Mark Renna
The Louis Berger Group, Inc.
100 Halsted Street
East Orange, NJ 07018
(973) 678-1960 ext. 485
mrenna@louisberger.com

3.2 Site Reports

Following are the site reports for the fifty MESIC sites, as well as Meadowlands-wide.

EXISTING RESTORATION, PRESERVATION, AND/OR MITIGATION SITES

SITE #1 – BELLEMEADE MITIGATION

Category: Existing Restoration, Preservation, and/or Mitigation Site

Location: Bordered on the west by the New Jersey Turnpike – Western Spur, on the east by Lyndhurst Riverside Marsh and the Hackensack River, and to the north by Berry's Creek in Lyndhurst, Bergen County.
Latitude/Longitude: 40.78553 / -74.08970

Current Land Use: Tidal marsh

Size: 21 acres

Current Ownership: NJMC

Site Description: The Bellemeade Mitigation site was restored in the 1990's and includes two marsh areas separated by a tributary that runs from Kingsland Creek to Berry's Creek. Prior to restoration, the sites were both undeveloped and supported a monoculture of common reed (*Phragmites australis*). The low marsh area (approximately seven acres in size) is located west of the tributary and is dominated by smooth cordgrass (*Spartina alterniflora*). The low marsh area was created in approximately 1993 through the excavation of previously placed dredged material. The site was graded with a two percent slope and then planted with *S. alterniflora*. The high marsh area, created in approximately 1996, was mowed and replanted with saltmarsh hay (*Spartina patens*). Currently the low marsh site continues to be dominated by *S. alterniflora* with inclusions of *Phragmites*. The high marsh area is dominated by *Phragmites* and spikegrass (*Distichlis spicata*), with inclusions of *S. patens,* tall cordgrass (*Spartina cynosuroides*)*, S. alterniflora*, and *Salicornia* species.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

NJMC acquired the Bellmeade Mitigation site on April 29, 1999.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

1. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

E. Biological Studies – General Environmental

2. **Environmental Concern, Inc. A Quantitative Comparison of the Proposed Wetland Mitigation Site and Impacted Site (C & F Realty, Ltd./Berry Creek Distribution Center). April 1992.** [4] Evaluates the wetland functions lost through impacts at the Berry Creek Distribution Center Development Site in Carlstadt, NJ and compares them to the functions that will be gained from the proposed mitigation project located in Lyndhurst, NJ. Three approaches were used: HEP, WET, and literature validation.

3. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

F. Geotechnical

4. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

G. Hydraulics and Hydrology

5. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

H. Water and Sediments

6. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

7. **TAMS Consultants, Inc. Revised Bellemeade Brackish Wetland Mitigation Plan. June 1987.** [1a] Details the open brackish marsh concept for the Bellemeade site and contains specific engineering and horticultural plans to implement the concept.

SITE #2 – EASTERN BRACKISH MARSH

Category: Existing Restoration, Preservation, and/or Mitigation Site

Location: East of the New Jersey Turnpike – Eastern Spur, south and west of Cromakill Creek, and north of Mori Tract in North Bergen, Hudson County.
Latitude/Longitude: 40.79927 / -74.03556

Current Land Use: Tidal marsh

Size: 77 acres

Current Ownership: NJMC

Site Description: Hartz Mountain Industries restored this site and the Western Brackish Marsh in the 1980's. Prior to restoration, the site was undeveloped, had experienced little or no direct industrial activities, supported a dense monoculture of common reed (*Phragmites australis*), and was not subject to daily tidal inundation. Restoration activities included the excavation of previously placed dredged material, the creation of small upland islands using the excavated material, and planting of native vegetation in the tidal and upland areas. Currently, the intended low marsh areas function as mudflat areas, while the upland island areas support a mix of tree, shrub, and herbaceous species. This site has also been known as the IR-2 Mitigation Site.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Eastern Brackish Marsh is owned by NJMC.

1. **NJMC. Eastern Brackish Marsh Acquisition Information. September 2003.**
   (from http://www.hmdc.state.nj.us/eip/wl-eastern.html)
   Date of Acquisition: March 17, 1999
   Cost of Acquisition: Donated
   Acquired from: Hartz Mountain Industries

C. Site History & Land Use

2. ***Berger, John. The Hackensack Meadowlands. 1991.** [2a] A "Restoration Case Study" of the mitigation site for the Hartz Mountain Project. Gives history of Hackensack Meadowlands and both Hartz Mountain mitigation sites (Eastern and Western Brackish Marshes), and describes mitigation methods. Concludes that mitigation activities enhanced habitat heterogeneity, vegetational diversity, and wildlife utilization.

3. ***Hix, Stephen & Christine Ross (TAMS Consultants, Inc.) Restoration of a Tidal Marsh in the Hackensack Meadowland Region. 1988.** [1] Discusses the methods and preliminary results of a 151 acre wetland restoration project (Eastern and Western Brackish Marshes) ordered by the USACE to offset the filling of 131 acres of brackish wetlands in the Hackensack Meadowlands.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

4. ***Berger, John. The Hackensack Meadowlands. 1991.** [2a] A "Restoration Case Study" of the mitigation site for the Hartz Mountain Project. Gives history of Hackensack Meadowlands and both Hartz Mountain mitigation sites (Eastern and Western Brackish Marshes), and describes mitigation methods. Concludes that mitigation activities enhanced habitat heterogeneity, vegetational diversity, and wildlife utilization.

5. ***Celebrano, M. A Characterization of Sites in the Hackensack Meadowlands District Experiencing Unexplained Decline of *Spartina alterniflora*. HMDC. 1995.** [1a] Compares soils from the Eastern Brackish Marsh, Western Brackish Marsh, Empire Tract, and Metro Media sites to determine if differing soil characteristics effect the growth of smooth cordgrass (*Spartina alterniflora)* seedlings in the first growing season. Soil cores from were analyzed for nutrients, metals, percent organic, grain size, acid-volatile sulfides.

6. ***Hartz Mountain Industries, Inc. Environmental Impact Statement on a Multipurpose Development. October 1978.** [4] Addresses plan to construct a multipurpose development in the HMD. The proposed project included modern retail facilities, office complexes, a residential cluster, and light industrial uses, as well as recreational facilities and corridors of open wetland space.

7. ***McCormick, J. M. and F. R. Cantelmo. Investigation of Unexplained Decline of *Spartina alterniflora* in Northern Portions of the Hackensack Meadowlands District. HMDC. 1995.** [1a] Mainly a literature review on factors which influence survival of smooth cordgrass *(Spartina alterniflora)*. Contains specific review of history of Eastern and Western Brackish Marshes. A small study on the survivability of transplanted *S. alterniflora* was also done.

8. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

F. Geotechnical

9. ***Celebrano, M. A Characterization of Sites in the Hackensack Meadowlands District Experiencing Unexplained Decline of *Spartina alterniflora*. HMDC. 1995.** [1a] Compares soils from the Eastern Brackish Marsh, Western Brackish Marsh, Empire Tract, and Metro Media sites to determine if differing soil characteristics effect the growth of smooth cordgrass (*Spartina alterniflora)* seedlings in the first growing season. Soil cores were analyzed for nutrients, metals, percent organic, grain size, acid-volatile sulfides.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

10. **Berger, John. The Hackensack Meadowlands. 1991.** [2a] A "Restoration Case Study" of the mitigation site for the Hartz Mountain Project. Gives history of Hackensack Meadowlands and both Hartz Mountain mitigation sites (Eastern and Western Brackish Marshes), and describes mitigation methods. Concludes that mitigation activities enhanced habitat heterogeneity, vegetational diversity, and wildlife utilization.

11. ***Hix, Stephen & Christine Ross (TAMS Consultants, Inc.) Restoration of a Tidal Marsh in the Hackensack Meadowland Region. 1988.** [1] Discusses the methods and preliminary results of a 151 acre wetland restoration project (Eastern and Western Brackish Marshes) ordered by the USACE to offset the filling of 131 acres of brackish wetlands in the Hackensack Meadowlands.

12. **TAMS Consultants, Inc. Hackensack Meadowlands Eastern Brackish Wetland Mitigation Plan. July 1986.** [4] Outlines mitigation plan for the Eastern Brackish Marsh site, which includes enhancement of this brackish area along the Cromakill Creek.

SITE #3 – HARRIER MEADOW

Category: Existing Restoration, Preservation, and/or Mitigation Site

Location: Located along the western border of the Meadowlands District, west of the Kingsland Impoundment, south of Erie landfill and north of 1-E landfill in North Arlington, Bergen County. Latitude/Longitude: 40.78632 / -74.11761

Current Land Use: Tidal marsh and pedestrian trail

Size: 76 acres

Current Ownership: NJMC

Site Description: Harrier Meadows is located within the Saw Mill Creek Basin, and was initially part of a large marsh system influenced by Kingsland Creek and Sawmill Creek. The wetland has been cut off from full tidal inundation due to the construction of a pipeline and the New Jersey Turnpike – Western Spur. In the 1960's, the site was bermed and used for rock and soil disposal. Wetland enhancement activities, which were completed in 1998, included the excavation of 20 acres of shallow impoundments that are hydrologically connected to the surrounding Kingsland mudflats. The impoundments were designed to help control the invasion of common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria)*. Spoils from the excavation were used to create higher elevation areas for suitable nesting and resting habitats. Upland improvements included the creation of a scrub-shrub border along the base of the Meadows Path extension on the site's western and southern boundaries, as well as around the margins of the impounded areas. Additional public access features at the site include benches, wildlife viewing blinds, and interpretative signage.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. **GEOD Surveying and Aerial Mapping. As-Built of Harrier Site. 8/24/1998.** [1a] As-built survey of enhancement activities completed in 1998 of Harrier Meadows Site. Contours are at one foot intervals.

B. Real Estate/Ownership

NJMC acquired a portion of the Harrier Meadow site on May 28, 1996, obtaining the remainder on October 8, 1999.

C. Site History & Land Use

2. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Basin Hydrology and Pond Hydraulics Report. July 1983.** [2a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. This report details existing hydrologic and hydrology data for the Sawmill Creek Basin and the proposed recreation pond components.

3. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Recreation Pond Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Discusses background and existing hydrology of the site of a proposed 160-acre pond between present day Harrier Meadow and 1-E Landfill. Contains the same leachate and sediment data as its companion BSC Engineering reports.

4. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

D. Biological Studies – Fauna

5. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. July – September 2001.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Include photographs documenting environmental conditions.

6. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School. October 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School sites. Includes photographs documenting environmental conditions.

7. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. November 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Includes photographs documenting environmental conditions.

8. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow and Mill Creek. December 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow and Mill Creek sites. Includes photographs documenting environmental conditions.

9. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. May – December 2002, & January – October 2003.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Include photographs documenting environmental conditions.

10. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2001 to June 30, 2001. Report Number 5. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

11. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 2001 to December 31, 2001. Report Number 6. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the second half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

12. ***Feltes, R. M., & Jean Marie Hartman (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2002 to June 30, 2002. Report Number 7. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2002: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

13. ***Hartman, J. M. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 1999 to December 31, 1999. Report Number 2. Rutgers University. 2000.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh during the second half of 1999: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed (*Phragmites australis)* control, and monitoring reports.

14. ***Hartman, J. M. & Kelly J. Smith. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District. Report Number 1. Rutgers University. 1999.** [5] Describes work through February 1999 beginning prior to reconstruction of Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh. The goal of restoration was to obtain cover by wetland vegetation (other than common reed *(Phragmites australis*)) within two years. Five tasks are addressed: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

15. ***Hartman, J. M., Ross M. Feltes, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2000 to December 31, 2000. Report Numbers 3 & 4. Rutgers University. 2001.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh during the year 2000: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

E. Biological Studies – General Environmental

16. ***Cai, H. and Hahn, D. Assessing Microbial Indicators for Heavy Metal Contamination using Automated Image Analysis. MERI. 2002.** [1a] Sediment and saltmarsh hay *(Spartina patens)* samples were collected at a site in Harrier Meadow in April, June and August 2000. The samples were analyzed for Ni, Cu, Cd, Cr, Pb, and Zn. Control samples of *S. patens* were grown in a greenhouse in Ni-amended and fungicide-treated soils. Plant uptake of Ni, Cu, Cd, Cr and Pb were compared among the samples. Sediment samples were also collected from Kearny Freshwater Marsh and the bacterial populations were analyzed.

17. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August – September 2001.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Include photographs documenting environmental conditions.

18. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School. October 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School sites. Includes photographs documenting environmental conditions.

19. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. November 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Includes photographs documenting environmental conditions.

20. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow and Mill Creek. December 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow and Mill Creek sites. Includes photographs documenting environmental conditions.

21. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. May – December 2002, & January – October 2003.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Include photographs documenting environmental conditions.

22. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2001 to June 30, 2001. Report Number 5. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

23. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 2001 to December 31, 2001. Report Number 6. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the second half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

24. ***Feltes, R. M., & Jean Marie Hartman (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2002 to June 30, 2002. Report Number 7. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2002: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

25. ***Hartman, J. M. Harrier Meadow Wetlands Mitigation Site First Annual Monitoring Report. Rutgers University. 1999.** [5] First year of annual monitoring for Harrier Meadow required under the Consolidated Rail Corporation's USACE Permit No. 91-0322-RS. Describes vegetation monitoring in 27 permanent plots at Harrier Meadow during the first growing season, post-construction.

26. ***Hartman, J. M. Harrier Meadow Wetlands Mitigation Site Second Annual Monitoring Report. Rutgers University. 2000.** [5] Second year of annual monitoring for Harrier Meadow required under the Consolidated Rail Corporation's USACE Permit No. 91-0322-RS. Describes vegetation monitoring in 25 permanent plots at Harrier Meadow during the second growing season, post-construction.

27. ***Hartman, J. M. Harrier Meadow Wetlands Mitigation Site Third Annual Monitoring Report. Rutgers University. 2001.** [5] Third year of annual monitoring for Harrier Meadow required under the Consolidated Rail Corporation's USACE Permit No. 91-0322-RS. Describes vegetation monitoring in 28 permanent plots at Harrier Meadow during the third growing season, post-construction.

28. ***Hartman, J. M. Harrier Meadow Wetlands Mitigation Site Fourth Annual Monitoring Report. Rutgers University. 2001.** [5] Fourth year of annual monitoring for Harrier Meadow required under the Consolidated Rail Corporation's USACE Permit No. 91-0322-RS. Describes vegetation monitoring in 27 permanent plots at Harrier Meadow during the fourth growing season, post-construction. Continued management of common reed *(Phragmites australis)* and purple loosestrife *(Lythrum salicaria)* was recommended.

29. ***Hartman, J. M. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 1999 to December 31, 1999. Report Number 2. Rutgers University. 2000.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh during the second half of 1999: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed (*Phragmites australis)* control, and monitoring reports.

30. ***Hartman, J. M., and David. J. Bart. Phragmites Control: Progress on Monitoring Tidal Restoration Projects in the New Jersey Meadowlands, District – Summary Report for Task 4. Report Number 8. Rutgers University. 2003.** [5] Describes methods for controlling common reed *(Phragmites australis)* at the Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh sites. Greenhouse and field experiments were used to understand site conditions and human activities that promote invasion, so that a model might be developed to predict when a site is likely to be invaded.

31. ***Hartman, J. M. & Kelly J. Smith. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District. Report Number 1. Rutgers University. 1999.** [5] Describes work through February 1999 beginning prior to reconstruction of Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh. The goal of restoration was to obtain cover by wetland vegetation (other than common reed *(Phragmites australis*)) within two years. Five tasks are addressed: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

32. ***Hartman, J. M., Ross M. Feltes, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2000 to December 31, 2000. Report Numbers 3 & 4. Rutgers University. 2001.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh during the year 2000: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

33. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

F. Geotechnical

34. ***Ducks Unlimited, Inc. Baseline Monitoring Program: Soil and Sediment Contamination at Wetland Enhancement Sites within the Hackensack Meadowlands. March 1998.** [1a] Describes the results of soils sampling and analysis at several wetland restoration sites in the HMD, including Berry's Creek Canal site (also known as Oritani Marsh), Harrier Meadow, Mill Creek Marsh, and the Saw Mill Creek Wildlife Management Area. Preliminary surveys were conducted to screen soils at the sites for detection of the presence of potential chemical contaminants that might affect future plans for wetland restoration.

35. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2001 to June 30, 2001. Report Number 5. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

36. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 2001 to December 31, 2001. Report Number 6. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the second half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

37. ***Feltes, R. M., & Jean Marie Hartman (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2002 to June 30, 2002. Report Number 7. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2002: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

38. ***Hartman, J. M. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 1999 to December 31, 1999. Report Number 2. Rutgers University. 2000.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh during the second half of 1999: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed (*Phragmites australis)* control, and monitoring reports.

39. ***Hartman, J. M. & Kelly J. Smith. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District. Report Number 1. Rutgers University. 1999.** [5] Describes work through February 1999 beginning prior to reconstruction of Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh. The goal of restoration was to obtain cover by wetland vegetation (other than common reed *(Phragmites australis*)) within two years. Five tasks are addressed: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

40. ***Hartman, J. M., Ross M. Feltes, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2000 to December 31, 2000. Report Numbers 3 & 4. Rutgers University. 2001.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh during the year 2000: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

41. **PS&S, Sadat Associates Inc. BCUA Residual Ash Landfill Site. July 1989.** [1a] Subsurface investigation report for Harrier Meadows.

G. Hydraulics and Hydrology

42. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Basin Hydrology and Pond Hydraulics Report. July 1983.** [2a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. This report details existing hydrologic and hydrology data for the Sawmill Creek Basin and the proposed recreation pond components.

43. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Recreation Pond Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Discusses background and existing hydrology of the site of a proposed 160-acre pond between present day Harrier Meadow and 1-E Landfill. Contains the same leachate and sediment data as its companion BSC Engineering reports.

44. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

45. **The Louis Berger Group, Inc. Harrier Meadows Wetland Enhancement Site: Tidal Assessment Report. January 2002.** [2a] A tidal assessment was conducted to determine if tidal influences to Harrier Meadows had been recently altered. The assessment consisted of field investigations to observe the tides during various phases, tidal monitoring and hydraulic analyses, as well as a review of past studies conducted for the Sawmill Watershed Basin and surrounding area.

46. **Wetland and Water Resource Engineering Consultants. Harrier Marsh Wetland Response Letter. September 1997.** [2a] A letter response to a request from NJMC to determine if the proposed modifications to the Saw Mill Creek Trail would reduce the volume of water that supplies the new Harrier Marsh Project (now known as Harrier Meadow). It was determined that replacement of the existing pipes with an equal number of pipes of equal diameter, installation of the pipes at an invert elevation of 0.0 feet, and incorporation of the existing bridge into the dike will provide adequate volume of water to allow the Harrier Marsh Wetland to function as designed.

H. Water and Sediments

47. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

48. **Cai, H. and D. Hahn. Assessing Microbial Indicators for Heavy Metal Contamination using Automated Image Analysis. MERI. 2001.** [1a] Sediment and bacterial populations in samples from Harrier Meadow and artificially contaminated Ni samples were incubated under sulfate-reducing conditions and analyzed. Compared to non-amended samples, Ni-amended samples generally displayed lower cell numbers, but a larger range of cell size distributions.

49. ***Cai, H. and Hahn, D. Assessing Microbial Indicators for Heavy Metal Contamination using Automated Image Analysis. MERI. 2002.** [1a] Sediment and saltmarsh hay *(Spartina patens)* samples were collected at a site in Harrier Meadow in April, June and August 2000. The samples were analyzed for Ni, Cu, Cd, Cr, Pb, and Zn. Control samples of *S. patens* were grown in a greenhouse in Ni-amended and fungicide-treated soils. Plant uptake of Ni, Cu, Cd, Cr and Pb were compared among the samples. Sediment samples were also collected from Kearny Freshwater Marsh and the bacterial populations were analyzed.

50. ***Ducks Unlimited, Inc. Baseline Monitoring Program: Soil and Sediment Contamination at Wetland Enhancement Sites within the Hackensack Meadowlands. March 1998.** [1a] Describes the results of soils sampling and analysis at several wetland restoration sites in the HMD, including Berry's Creek Canal site (also know as Oritani Marsh), Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh. Preliminary surveys were conducted to screen soils at the sites for detection of the presence of potential chemical contaminants that might affect future plans for wetland restoration.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

51. **GEOD Surveying and Aerial Mapping. As-Built of Harrier Site. 8/24/1998.** [1a] As-built survey of enhancement activities completed in 1998 of Harrier Meadows Site. Contours are at one foot intervals.

SITE #4 – HESS MITIGATION SITE

Category: Existing Restoration, Preservation, and/or Mitigation Site

Location: Located on the eastern edge of the Hackensack River, north of Snipes Park, and south of Route 3 – Eastbound in Secaucus, Hudson County.
Latitude/Longitude: 40.79639 / -74.06891

Current Land Use: Tidal Marsh

Size: 3 acres

Current Ownership: Amerada Hess

Site Description: Amerada Hess restored this site in the 1990's as mitigation for permitted marsh fills. Prior to restoration, the site was not subject to daily tidal inundation and supported a monoculture of common reed (*Phragmites australis*). Site restoration included the removal of previously placed dredged material and planting of smooth cordgrass (*Spartina alterniflora*). Currently, the site is dominated by *S. alterniflora*, with inclusions of *Phragmites*.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***Langan Engineering Associates, Inc. NJDEP Resubmittal Stream Encroachment Permit Application No. 14747: Amerada Hess Corporation, Secaucus, NJ. 1988.** [1a] Permit application with wetland delineation, existing vegetation list, soil analysis, and mitigation plan.

B. Real Estate/Ownership

Hess Mitigation is owned by Amerada Hess.

C. Site History & Land Use

2. **Langan Engineering Associates, Inc. Alternatives Analysis: Amerada Hess Project, Secaucus, New Jersey. 1989.** [1a] Reports on alternatives for redeveloping the site of an existing fuel storage facility by constructing an office building, parking garage, marina, and a linear park at the water's edge. Also includes alternatives for widening the Meadowland Parkway.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

3. ***Langan Engineering Associates, Inc. NJDEP Resubmittal Stream Encroachment Permit Application No. 14747: Amerada Hess Corporation, Secaucus, NJ. 1988.** [1a] Permit application with wetland delineation, existing vegetation list, soil analysis, and mitigation plan.

F. Geotechnical

4. ***Langan Engineering Associates, Inc. NJDEP Resubmittal Stream Encroachment Permit Application No. 14747: Amerada Hess Corporation, Secaucus, NJ. 1988.** [1a] Permit application with wetland delineation, existing vegetation list, soil analysis, and mitigation plan.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

5. ***Langan Engineering Associates, Inc. NJDEP Resubmittal Stream Encroachment Permit Application No. 14747: Amerada Hess Corporation, Secaucus, NJ. 1988.** [1a] Permit application with wetland delineation, existing vegetation list, soil analysis, and mitigation plan.

SITE #5 – MARSH RESOURCES MEADOWLANDS MITIGATION BANK

Category: Existing Restoration, Preservation, and/or Mitigation Site

Location: The site is bordered to the northeast and southeast by the Hackensack River, to the east by the Metro Media tract, to the southwest by the Transco facilities, and to the northwest by the New Jersey Turnpike – Western Spur in Carlstadt, Bergen County.
Latitude/Longitude: 40.81411 / -74.04022

Current Land Use: Tidal Marsh

Size: 206 acres

Current Ownership: Marsh Resources Inc.

Site Description: The site was restored by Marsh Resources Inc. as a private wetland mitigation bank to offset permitted wetland fill impacts that occur within the service area. Prior to restoration, dredged material had been placed on the site. As a result, the site was not being inundated twice daily by the tides and was dominated by a monoculture of common reed (*Phragmites australis*). Restoration activities included excavation of dredged material, creation of low and high marsh areas and tidal channels, creation of upland islands from the excavated material, and planting of native vegetation within the marsh and upland areas. Currently the low marsh areas are dominated by smooth cordgrass (*Spartina alterniflora*), dwarf spike rush (*Eleocharis parvula*), and marsh fleabane (*Pluchea purpurascens*). The high marsh areas are dominated by saltmarsh hay (*Spartina patens*), spikegrass (*Distichlis spicata*), and groundsel tree (*Baccharis halimifolia*), with inclusions of a variety of other herbaceous species. The upland islands support tree, shrub, and herbaceous species. This site has also been known as the Transco Marsh Site and the Doctor's Creek Site.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***Levine – Fricke, Inc. Transcontinental Gas Pipeline Corporation: Phase I Environmental Site Assessment. March 1996.** [6] A Phase I ESA was conducted for a Transco property (now the Marsh Resources Wetland Mitigation Bank site) on Paterson Plank Road in Carlstadt, NJ. Transco was investigating the potential of constructing a wetland mitigation bank on the property, so the ESA focused on the marshland areas outside the fenced liquefied natural gas plant area. The assessment included: 1) geologic and hydrogeologic studies; 2) site history, including aerial photograph review; 3) an environmental risk assessment; and 4) a current land use assessment.

2. ***Louis Berger and Associates, Inc. Executed Banking Instrument for the Purposes of Establishing the Meadowlands Mitigation Bank. March 1999.** [2a] Establishes guidelines and responsibilities for the establishment, use, operation and maintenance of the Meadowlands Mitigation Bank. Includes a baseline conditions report, which consists of information on ownership, site history/land use, cultural resources, hydrology, soil, vegetation, wetlands, and wildlife, as well as a wetland delineation report. Contains an existing condition topographic survey (1996) and proposed mitigation design plans (1998).

3. ***Louis Berger and Associates, Inc. Marsh Resources Meadowlands Mitigation Bank: Credit Availability Documentation. September 1999.** [2a] Established that the hydrological regime and initial planting of the marsh areas within Phase 1 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and water quality, benthic, and macroinvertebrate sampling data for Phase 1.

4. ***The Louis Berger Group. Marsh Resources Meadowlands Mitigation Bank: Revised Credit Availability Report. March 2002.** [2a] Provided evidence that the hydrological regime and initial planting of the marsh areas within Phase 2 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Demonstrated that emergent wetlands, open waters, and upland islands had been created in the ratios approved by the USACE in consultation with MIMAC through "elevation means." Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and fish sampling data for Phase 2.

B. Real Estate/Ownership

Marsh Resources Meadowlands Mitigation Bank is owned by Marsh Resources Inc.

5. ***Louis Berger and Associates, Inc. Executed Banking Instrument for the Purposes of Establishing the Meadowlands Mitigation Bank. March 1999.** [2a] Establishes guidelines and responsibilities for the establishment, use, operation and maintenance of the Meadowlands Mitigation Bank. Includes a baseline conditions report, which consists of information on ownership, site history/land use, cultural resources, hydrology, soil, vegetation, wetlands, and wildlife, as well as a wetland delineation report. Contains an existing condition topographic survey (1996) and proposed mitigation design plans (1998).

C. Site History & Land Use

6. ***Levine – Fricke, Inc. Transcontinental Gas Pipeline Corporation: Phase I Environmental Site Assessment. March 1996.** [6] A Phase I ESA was conducted for a Transco property (now the Marsh Resources Wetland Mitigation Bank site) on Paterson Plank Road in Carlstadt, NJ. Transco was investigating the potential of constructing a wetland mitigation bank on the property, so the ESA focused on the marshland areas outside the fenced liquefied natural gas plant area. The assessment included: 1) geologic and hydrogeologic studies; 2) site history including aerial photographs; 3) an environmental risk assessment; and 4) a current land use assessment.

7. ***Louis Berger and Associates, Inc. Executed Banking Instrument for the Purposes of Establishing the Meadowlands Mitigation Bank. March 1999.** [2a] Establishes guidelines and responsibilities for the establishment, use, operation and maintenance of the Meadowlands Mitigation Bank. Includes a baseline conditions report, which consists of information on ownership, site history/land use, cultural resources, hydrology, soils, vegetation, wetlands, and wildlife, as well as a wetland delineation report. Contains an existing condition topographic survey (1996) and proposed mitigation design plans (1998).

D. Biological Studies – Fauna

8. ***Able, Kenneth W., Melissa J. Neuman, & Ruess Guillermo (Rutgers University). The Influence of Low Dissolved Oxygen on Predatory Fishes: Comparisons between Restored and Impacted Marsh Creeks in the Hackensack Meadowlands. 2002.**[1a] A study to determine patterns in water quality indicators and predatory fish use, and examine food habits of the dominant fish predators in two tidal marshes, Mill Creek Marsh (impacted natural creek) and Doctor's Creek (a restored/created creek that is part of Marsh Resources Wetland Mitigation Bank).

9. ***Donald J. Smith Environmental Consultants. Monthly Reports: Marsh Resources Wetlands Mitigation Bank. January – December 2001, January – December 2002, & January – October 2003.** [6] Monthly observation reports detailing wildlife and habitat monitoring at the Marsh Resources Meadowlands Mitigation Bank site. Include photographs documenting site conditions.

10. ***Louis Berger and Associates, Inc. Executed Banking Instrument for the Purposes of Establishing the Meadowlands Mitigation Bank. March 1999.** [2a] Establishes guidelines and responsibilities for the establishment, use, operation and maintenance of the Meadowlands Mitigation Bank. Includes a baseline conditions report, which consists of information on ownership, site history/land use, cultural resources, hydrology, soils, vegetation, wetlands, and wildlife, as well as a wetland delineation report. Contains an existing condition topographic survey (1996) and proposed mitigation design plans (1998).

11. ***Louis Berger and Associates, Inc. Marsh Resources Meadowlands Mitigation Bank: Credit Availability Documentation. September 1999.** [2a] Established that the hydrological regime and initial planting of the marsh areas within Phase 1 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and water quality, benthic, and macroinvertebrate sampling data for Phase 1.

12. ***Louis Berger and Associates, Inc. Wetland Delineation Report: Transcontinental Gas Pipe Line Corporation. January 1993.** [1] Details existing wetland and wildlife documentation, and lists the vegetation, soils, hydrology, and wildlife observed during the field investigation. It also includes a surveyed map of the delineated wetlands, as well as a site constraints map.

13. ***The Louis Berger Group. Marsh Resources Meadowlands Mitigation Bank: Revised Credit Availability Report. March 2002.** [2a] Provided evidence that the hydrological regime and initial planting of the marsh areas within Phase 2 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Demonstrated that emergent wetlands, open waters, and upland islands had been created in the ratios approved by the USACE in consultation with MIMAC through "elevation means." Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and fish sampling data for Phase 2.

14. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

E. Biological Studies – General Environmental

15. ***Able, Kenneth W., Melissa J. Neuman, & Ruess Guillermo, Rutgers University. The Influence of Low Dissolved Oxygen on Predatory Fishes: Comparisons between Restored and Impacted Marsh Creeks in the Hackensack Meadowlands. 2002.**[1a] Analyzed patterns in water quality indicators and predatory fish use, and examined food habits of the dominant fish predators in two tidal marshes, Mill Creek (an impacted natural creek) and Doctor's Creek (a restored/created creek). This research demonstrated that these sport fish are commonly found in tidal creeks in the Meadowlands and that their distribution could be influenced by low dissolved oxygen.

16. ***Levine – Fricke, Inc. Transcontinental Gas Pipeline Corporation: Phase I Environmental Site Assessment. March 1996.** [6] A Phase I ESA was conducted for a Transco property (now the Marsh Resources Wetland Mitigation Bank site) on Paterson Plank Road in Carlstadt, NJ. Transco was investigating the potential of constructing a wetland mitigation bank on the property, so the ESA focused on the marshland areas outside the fenced liquefied natural gas plant area. The assessment included: 1) geologic and hydrogeologic studies; 2) site history including aerial photographs; 3) an environmental risk assessment; and 4) a current land use assessment.

17. ***Louis Berger and Associates, Inc. Executed Banking Instrument for the Purposes of Establishing the Meadowlands Mitigation Bank. March 1999.** [2a] Establishes guidelines and responsibilities for the establishment, use, operation and maintenance of the Meadowlands Mitigation Bank. Includes a baseline conditions report, which consists of information on ownership, site history/land use, cultural resources, hydrology, soils, vegetation, wetlands, and wildlife, as well as a wetland delineation report. Contains an existing condition topographic survey (1996) and proposed mitigation design plans (1998).

18. ***Louis Berger and Associates, Inc. Marsh Resources Meadowlands Mitigation Bank: Credit Availability Documentation. September 1999.** [2a] Established that the hydrological regime and initial planting of the marsh areas within Phase 1 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and water quality, benthic, and macroinvertebrate sampling data for Phase 1.

19. ***Louis Berger and Associates, Inc. Wetland Delineation Report: Transcontinental Gas Pipe Line Corporation. January 1993.** [1] Details existing wetland and wildlife documentation, and lists the vegetation, soils, hydrology, and wildlife observed during the field investigation. It also includes a surveyed map of the delineated wetlands, as well as a site constraints map.

20. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

21. ***The Louis Berger Group. Marsh Resources Meadowlands Mitigation Bank: Revised Credit Availability Report. March 2002.** [2a] Provided evidence that the hydrological regime and initial planting of the marsh areas within Phase 2 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Demonstrated that emergent wetlands, open waters, and upland islands had been created in the ratios approved by the USACE in consultation with MIMAC through "elevation means." Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and fish sampling data for Phase 2.

22. **The Louis Berger Group. Marsh Resources Meadowlands Mitigation Bank Phase 1: First Year Monitoring Report. November 2000.** [2a] Analyzes the wetland mitigation bank's success relative to anticipated performance standards. Shows that emergent wetlands, open waters, and upland islands had been created in the ratios approved by the USACE. Includes a report on percent vegetation cover, a post-construction environmental investigation, and a sampling and analysis program for the Phase 1 sites of the Meadowlands Mitigation Bank.

23. **The Louis Berger Group. Marsh Resources Meadowlands Mitigation Bank Phase 1: Second Year Monitoring Report. November 2001.** [2a] Establishes that Phase 1 of the Meadowlands Mitigation Bank meets the requirements put forth in the USACE permit, which were: 1) an 85-percent survival and coverage rate by the end second growing season and 2) the natural presence of appropriate and sufficient vegetation. States that an 86-percent coverage across the site was achieved by the end of the second growing season.

24. **The Louis Berger Group. Marsh Resources Meadowlands Mitigation Bank Phase 1: Third Year Monitoring Report. October 2002.** [2a] Indicates that the performance standards had been met for Year 3 monitoring of Phase 1 of the Meadowlands Mitigation Bank. Presents the results of the monitoring, which include vegetation monitoring methodology and results, as well as wildlife and site maintenance observations.

25. **The Louis Berger Group. Marsh Resources Meadowlands Mitigation Bank Phase 2: First Year Monitoring Report. December 2001.** [2a] Analyzes the wetland mitigation bank's success relative to anticipated performance standards. Shows that emergent wetlands, open waters, and upland islands had been created in the ratios approved by the USACE. Includes a report on percent vegetation cover, a post-construction environmental investigation, and a sampling and analysis program for the Phase 2 sites of the Meadowlands Mitigation Bank.

26. **The Louis Berger Group. Marsh Resources Meadowlands Mitigation Bank Phase 2: Second Year Monitoring Report. October 2002.** [2a] Presents the results of the second year monitoring program for Phase 2 of the Meadowlands Mitigation Bank, which include vegetation monitoring methodology and results, as well as wildlife and site maintenance observations.

27. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

F. Geotechnical

28. ***Levine – Fricke, Inc. Transcontinental Gas Pipeline Corporation: Phase I Environmental Site Assessment. March 1996.** [6] A Phase I ESA was conducted for a Transco property (including the current Marsh Resources Wetland Mitigation Bank site) on Paterson Plank Road in Carlstadt, NJ. Transco was investigating the potential of constructing a wetland mitigation bank on the property, so the ESA focused on the marshland areas outside the fenced liquefied natural gas plant area. The assessment included: 1) geologic and hydrogeologic studies; 2) site history including aerial photographs; 3) an environmental risk assessment; and 4) a current land use assessment.

29. ***Louis Berger and Associates, Inc. Executed Banking Instrument for the Purposes of Establishing the Meadowlands Mitigation Bank. March 1999.** [2a] Establishes guidelines and responsibilities for the establishment, use, operation and maintenance of the Meadowlands Mitigation Bank. Includes a baseline conditions report, which consists of information on ownership, site history/land use, cultural resources, hydrology, soils, vegetation, wetlands, and wildlife, as well as a wetland delineation report. Contains an existing condition topographic survey (1996) and proposed mitigation design plans (1998).

30. ***Louis Berger and Associates, Inc. Wetland Delineation Report: Transcontinental Gas Pipe Line Corporation. January 1993.** [1] Details existing wetland and wildlife documentation, and lists the vegetation, soils, hydrology, and wildlife observed during the field investigation. It also includes a surveyed map of the delineated wetlands, as well as a site constraints map.

31. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

G. Hydraulics and Hydrology

32. ***Louis Berger and Associates, Inc. Executed Banking Instrument for the Purposes of Establishing the Meadowlands Mitigation Bank. March 1999.** [2a] Establishes guidelines and responsibilities for the establishment, use, operation and maintenance of the Meadowlands Mitigation Bank. Includes a baseline conditions report, which consists of information on ownership, site history/land use, cultural resources, hydrology, soils, vegetation, wetlands, and wildlife, as well as a wetland delineation report. Contains an existing condition topographic survey (1996) and proposed mitigation design plans (1998).

33. ***Louis Berger and Associates, Inc. Marsh Resources Meadowlands Mitigation Bank: Credit Availability Documentation. September 1999.** [2a] Established that the hydrological regime and initial planting of the marsh areas within Phase 1 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and water quality, benthic, and macroinvertebrate sampling data for Phase 1.

34. ***Louis Berger and Associates, Inc. Wetland Delineation Report: Transcontinental Gas Pipe Line Corporation. January 1993.** [1] Details existing wetland and wildlife documentation, and lists the vegetation, soils, hydrology, and wildlife observed during the field investigation. It also includes a surveyed map of the delineated wetlands, as well as a site constraints map.

35. ***The Louis Berger Group. Marsh Resources Meadowlands Mitigation Bank: Revised Credit Availability Report. March 2002.** [2a] Provided evidence that the hydrological regime and initial planting of the marsh areas within Phase 2 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Demonstrated that emergent wetlands, open waters, and upland islands had been created in the ratios approved by the USACE in consultation with MIMAC through "elevation means." Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and fish sampling data for Phase 2.

36. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

H. Water and Sediments

37. ***Able, Kenneth W., Melissa J. Neuman, & Ruess Guillermo (Rutgers University). The Influence of Low Dissolved Oxygen on Predatory Fishes: Comparisons between Restored and Impacted Marsh Creeks in the Hackensack Meadowlands. 2002.**[1a] A study to determine patterns in water quality indicators and predatory fish use, and examine food habits of the dominant fish predators in two tidal marshes, Mill Creek Marsh (impacted natural creek) and Doctor's Creek (a restored/created creek that is part of Marsh Resources Wetland Mitigation Bank).

38. ***Louis Berger and Associates, Inc. Marsh Resources Meadowlands Mitigation Bank: Credit Availability Documentation. September 1999.** [2a] Established that the hydrological regime and initial planting of the marsh areas within Phase 1 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and water quality, benthic, and macroinvertebrate sampling data for Phase 1.

39. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

I. Historical/Cultural Resources

40. ***The Louis Berger Group. Executed Banking Instrument for the Purposes of Establishing the Meadowlands Mitigation Bank. March 1999.** [2a] Establishes guidelines and responsibilities for the establishment, use, operation and maintenance of the Meadowlands Mitigation Bank. Includes a baseline conditions report, which includes information on ownership, site history/land use, cultural resources, hydrology, soil, vegetation, wetlands, and wildlife, as well as a wetland delineation report. Also contains conceptual mitigation design plans.

J. Restoration/Remediation Design Plans

41. ***Louis Berger and Associates, Inc. Executed Banking Instrument for the Purposes of Establishing the Meadowlands Mitigation Bank. March 1999.** [2a] Establishes guidelines and responsibilities for the establishment, use, operation and maintenance of the Meadowlands Mitigation Bank. Includes a baseline conditions report, which consists of information on ownership, site history/land use, cultural resources, hydrology, soils, vegetation, wetlands, and wildlife, as well as a wetland delineation report. Contains an existing condition topographic survey (1996) and proposed mitigation design plans (1998).

42. ***Louis Berger and Associates, Inc. Marsh Resources Meadowlands Mitigation Bank: Credit Availability Documentation. September 1999.** [2a] Established that the hydrological regime and initial planting of the marsh areas within Phase 1 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and water quality, benthic, and macroinvertebrate sampling data for Phase 1.

43. ***The Louis Berger Group. Marsh Resources Meadowlands Mitigation Bank: Revised Credit Availability Report. March 2002.** [2a] Provided evidence that the hydrological regime and initial planting of the marsh areas within Phase 2 of the mitigation bank, as set forth in all permits and the Banking Instrument, had been successfully completed. Demonstrated that emergent wetlands, open waters, and upland islands had been created in the ratios approved by the USACE in consultation with MIMAC through "elevation means." Includes Hydrology As-Builts, Planting As-Builts, Channel Cross-Sections, site photographs, and fish sampling data for Phase 2.

SITE #6 – MILL CREEK MARSH

Category: Existing Restoration, Preservation, and/or Mitigation Site

Location: Bordered on the east by the New Jersey Turnpike – Eastern Spur, to the south by a shopping center, to the west by Mill Creek, and to the north by Western Brackish Marsh in Secaucus, Hudson County.
Latitude/Longitude: 40.79723 / -74.04481

Current Land Use: Tidal Marsh and Pedestrian Trail

Size: 128 acres

Current Ownership: NJMC

Site Description: Mill Creek was restored by NJMC as a wetland mitigation area to offset permitted fill that occurred in marsh areas located within the HMD. Prior to restoration, the site was undeveloped, had been filled with dredged material, was not subject to daily tides, and supported a monoculture of common reed (*Phragmites australis*). Enhancement of the Mill Creek Marsh site included the excavation of dredged material, the re-establishment of tidal flow across the site with the creation of open water impoundments, and surface grading to support the development of low marsh and upland habitat areas. The enhancement resulted in low marsh habitats that are flushed daily by the tides, lowland scrub-shrub habitats along the marsh/upland ecotone, and creation of breeding, wintering, and migratory habitats. A secondary component is the nature park and approximately 1.5-mile walking trail. Approximately three miles of canoe-able channels with access from Mill Creek exists at the site.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. **American Geodetic Survey Co., Inc. Survey of Original Conditions at Mill Creek Wetland Enhancement Site. 4/25/1997.** [1a] Pre-restoration site survey. Contours are at one-foot intervals.

2. ***The Louis Berger Group, Inc. Mill Creek Wetland Mitigation Site: Channel Outlet & Bridge Walkway Repair Report. May 2001.** [2a] HMDC requested a damage assessment and the subsequent preparation of repair plans for a pedestrian bridge and overflow spillway located within Mill Creek Wetland Mitigation Site. Includes results of site survey, flow velocity measurements, sediment sampling, hydraulic analysis, and damage assessment, as well as proposed repair plans.

B. Real Estate/Ownership

NJMC acquired Mill Creek Marsh on December 20, 1996.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

3. ***Able, Kenneth W., Melissa J. Neuman, & Ruess Guillermo (Rutgers University). The Influence of Low Dissolved Oxygen on Predatory Fishes: Comparisons between Restored and Impacted Marsh Creeks in the Hackensack Meadowlands. 2002.**[1a] A study to determine patterns in water quality indicators and predatory fish use, and examine food habits of the dominant fish predators in two tidal marshes, Mill Creek Marsh (impacted natural creek) and Doctor's Creek (a restored/created creek that is part of Marsh Resources Wetland Mitigation Bank).

4. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August – September 2001.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Include photographs documenting environmental conditions.

5. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School. October 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School sites. Includes photographs documenting environmental conditions.

6. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. November 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Includes photographs documenting environmental conditions.

7. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow and Mill Creek. December 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow and Mill Creek sites. Includes photographs documenting environmental conditions.

8. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. May – December 2002, & January – October 2003.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Include photographs documenting environmental conditions.

9. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2001 to June 30, 2001. Report Number 5. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

10. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 2001 to December 31, 2001. Report Number 6. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the second half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

11. ***Feltes, R. M., & Jean Marie Hartman (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2002 to June 30, 2002. Report Number 7. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2002: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

12. ***Hartman, J. M. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 1999 to December 31, 1999. Report Number 2. Rutgers University. 2000.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh during the second half of 1999: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed (*Phragmites australis)* control, and monitoring reports.

13. ***Hartman, J. M. & Kelly J. Smith. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District. Report Number 1. Rutgers University. 1999.** [5] Describes work through February 1999 beginning prior to reconstruction of Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh. The goal of restoration was to obtain cover by wetland vegetation (other than common reed *(Phragmites australis*)) within two years. Five tasks are addressed: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

14. ***Hartman, J. M., Ross M. Feltes, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2000 to December 31, 2000. Report Numbers 3 & 4. Rutgers University. 2001.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh during the year 2000: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

15. ***Weis, J.S., L. Windham, and P. Weis. 2002. Growth, Survival, and Metal Content in Marsh Invertebrates Fed Diets of Detritus from *Spartina alterniflora* Loisel and *Phragmites australis* Cav. Trin. Ex Steud. from Metal-Polluted and Clean Sites. Wetlands Ecology and Management, v10 n1 pp71-84. 2002.** [1a] Detritus samples were collected from the marsh surface under common reed (*Phragmites australis*), natural cordgrass (*Spartina*), and restored *Spartina* in the Meadowlands and Eastern Long Island. Ground-up detritus was fed to groups of two species of fiddler crabs and to grass shrimp. The survival, limb regeneration rate, molting, and weight gain of the crabs on the different diets was monitored, as was survival and growth of the grass shrimp.

16. ***Yuhas, C.E. Benthic Communities in *Spartina alterniflora* and *Phragmities australis* Dominated Salt Marshes. Rutgers University. 2001.** [1a] Core samples were collected at the creek bank and edge of vegetation in natural & mitigated cordgrass *(Spartina)* marshes and in a common reed (*Phragmites australis)* dominated marsh. A recolonization experiment using sediment from an undisturbed & uncontaminated site was also conducted. The diversity and abundance of benthic communities in the samples were analyzed.

E. Biological Studies – General Environmental

17. **Conklin, J. Effects of Herbivores on Selected Salt Marsh Flora. Rutgers University. 2001.** [5] Analyzed different herbivory deterrent techniques on five different types of native saltmarsh grasses at the Mill Creek Marsh. Half the seedlings were fertilized and half were not. Half of each of the fertilized and non-fertilized groups were enclosed in a structure designed to provide protection from herbivores, while the remainder were out in the open

18. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August – September 2001.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Include photographs documenting environmental conditions.

19. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School. October 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School sites. Includes photographs documenting environmental conditions.

20. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. November 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Includes photographs documenting environmental conditions.

21. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow and Mill Creek. December 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow and Mill Creek sites. Includes photographs documenting environmental conditions.

22. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. May – December 2002, & January – October 2003.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Include photographs documenting environmental conditions.

23. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2001 to June 30, 2001. Report Number 5. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

24. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 2001 to December 31, 2001. Report Number 6. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the second half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

25. ***Feltes, R. M., & Jean Marie Hartman (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2002 to June 30, 2002. Report Number 7. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2002: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

26. **Hartman, J. M. Mill Creek Wetlands Mitigation Site First Annual Monitoring Report. Rutgers University. 2000.** [5] First year of annual monitoring for the Mill Creek Wetland Mitigation Site required under USACE Permit Nos. 93-03412, 94-05821-RS, 96-01160-RS, 97-09150, 97-09200, 98-00620, 98-21290-J2, & 1999-14310 and NJDEP Permit Nos. 0205-96-0001.4, 212-95-0001.8, 212-95-0001.9, 0232-90-0001.6, 0232-0001.7, 0237-90-001.4, 0249-93-0003-4, 0256-98-0004, 0714-99-0003.2, 0906-96-0001.5, 0909-91-0001.5, 0909-92-0003, 0000-90-0022.14, & 0000-90-0022.20. Describes vegetation monitoring in various permanent monitoring plots throughout the site during the first growing season, post-construction.

27. **Hartman, J. M. Mill Creek Wetlands Mitigation Site Second Annual Monitoring Report. Rutgers University. 2001.** [5] Second year of annual monitoring for the Mill Creek Wetland Mitigation Site required under USACE Permit Nos. 93-03412, 94-05821-RS, 96-01160-RS, 97-09150, 97-09200, 98-00620, 98-21290-J2, & 1999-14310 and NJDEP Permit Nos. 0205-96-0001.4, 212-95-0001.8, 212-95-0001.9, 0232-90-0001.6, 0232-0001.7, 0237-90-001.4, 0249-93-0003-4, 0256-98-0004, 0714-99-0003.2, 0906-96-0001.5, 0909-91-0001.5, 0909-92-0003, 0000-90-0022.14, &0000-90-0022.20. Describes vegetation monitoring in various permanent monitoring plots throughout the site during the second growing season, post-construction.

28. **Hartman, J. M. Mill Creek Wetlands Mitigation Site Third Annual Monitoring Report. Rutgers University. 2001.** [5] Third year of annual monitoring for the Mill Creek Wetland Mitigation Site required under USACE Permit Nos. 93-03412, 94-05821-RS, 96-01160-RS, 97-09150, 97-09200, 98-00620, 98-21290-J2, & 1999-14310 and NJDEP Permit Nos. 0205-96-0001.4, 212-95-0001.8, 212-95-0001.9, 0232-90-0001.6, 0232-0001.7, 0237-90-001.4, 0249-93-0003-4, 0256-98-0004, 0714-99-0003.2, 0906-96-0001.5, 0909-91-0001.5, 0909-92-0003, 0000-90-0022.14, & 0000-90-0022.20. Describes vegetation monitoring in various permanent monitoring plots throughout the site during the third growing season, post-construction.

29. **Hartman, J. M. Mill Creek Wetlands Mitigation Site Fourth Annual Monitoring Report. Rutgers University. 2001.** [5] Fourth year of annual monitoring for the Mill Creek Wetland Mitigation Site required under USACE Permit Nos. 93-03412, 94-05821-RS, 96-01160-RS, 97-09150, 97-09200, 98-00620, 98-21290-J2, & 1999-14310 and NJDEP Permit Nos. 0205-96-0001.4, 212-95-0001.8, 212-95-0001.9, 0232-90-0001.6, 0232-0001.7, 0237-90-001.4, 0249-93-0003-4, 0256-98-0004, 0714-99-0003.2, 0906-96-0001.5, 0909-91-0001.5, 0909-92-0003, 0000-90-0022.14, & 0000-90-0022.20. Describes vegetation monitoring in various permanent monitoring plots throughout the site during the fourth growing season, post-construction. Recommends additional cordgrass (*Spartina*) seeding, as well as Canada goose and common reed (*Phragmites australis*) management for some portions of the site.

30. ***Hartman, J. M. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 1999 to December 31, 1999. Report Number 2. Rutgers University. 2000.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh during the second half of 1999: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed (*Phragmites australis)* control, and monitoring reports.

31. ***Hartman, J. M. & David. J. Bart. Phragmites Control: Progress on Monitoring Tidal Restoration Projects in the New Jersey Meadowlands, District – Summary Report for Task 4. Report Number 8. Rutgers University. 2003.** [5] Describes methods for controlling common reed *(Phragmites australis)* at the Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh sites. Greenhouse and field experiments were used to understand site conditions and human activities that promote invasion, so that a model might be developed to predict when a site is likely to be invaded.

32. ***Hartman, J. M. & Kelly J. Smith. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District. Report Number 1. Rutgers University. 1999.** [5] Describes work through February 1999 beginning prior to reconstruction of Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh. The goal of restoration was to obtain cover by wetland vegetation (other than common reed *(Phragmites australis*)) within two years. Five tasks are addressed: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

33. ***Hartman, J. M., Ross M. Feltes, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2000 to December 31, 2000. Report Numbers 3 & 4. Rutgers University. 2001.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh during the year 2000: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

34. ***Hartz Mountain Industries, Inc. Environmental Impact Statement on a Multipurpose Development. October 1978.** [4] Addresses plan to construct a multipurpose development in the HMD. The proposed project included modern retail facilities, office complexes, a residential cluster, and light industrial uses, as well as recreational facilities and corridors of open wetland space.

35. ***Hover, V.C. Trace Metal Cycling in Contaminated Estuarine Sediments, Hackensack Meadowlands District, NJ. Geological Society of America Abstracts with Programs, v. 31. 1999.** [1a] Determined the spatial variability of contaminant metals throughout the Meadowlands with respect to marsh types – common reed (*Phragmites australis*), natural cordgrass species (*Spartina spp*.), and restored cordgrass species (*Spartina spp*.) – to obtain baseline information on trace metal contents and speciation in sediment and porewaters. The initial sampling concentrated on areas of natural and restored *Spartina* marshes in the Sawmill Creek and Mill Creek areas, respectively.

36. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

37. **The Louis Berger Group, Inc. Mill Creek Wetland Enhancement Site: Seeding & Fencing Program Monitoring Report. September 2001.** [2a] Documents weekly monitoring program, beginning in May 2001, to observe the growth of the smooth cordgrass (*Spartina alterniflora*) at the site. Includes photographs, as well as documentation of tidal and weather conditions.

38. ***Ravit, B., J.G. Ehrenfeld, & M.M. Haggblom. A Comparison of Sediment Microbial Communities Associated with *Phragmites australis* and *Spartina alterniflora* in Brackish Wetlands of New Jersey. Estuaries. 26(2B). 2003.** [1a] Sediment samples under different vegetation types were collected at Kearny Brackish Marsh and Mill Creek Wetland Mitigation Site. Microbial communities within the sediments are being examined to determine if there are any correlations or differences among microbial community, contaminant levels, and type of overlying vegetation in brackish marsh areas.

39. ***TAMS Consultants, Inc. Comprehensive Baseline Studies, IR-2 and Off-Site Mitigation Areas/Evaluation of the Harmon Meadow Western Brackish Marsh Mitigation Area. June 1990.** [2] Baseline studies were initiated in 1986 to provide Hartz Mountain Industries with planning information about three proposed mitigation sites - IR-2 onsite mitigation (now known as Western Brackish Marsh), Anderson Creek, and South Secaucus (also known as Riverbend Wetlands Preserve) – by documenting existing ecological conditions of the sites and the Hackensack River in their vicinity for a year-long period.

40. **TAMS Consultants, Inc. Functional Evaluation of the Villages at Mill Creek Development and Mitigation Sites. March 1993.** [2] Qualitatively evaluates the functional opportunity/effectiveness of wetlands at four sites – IR-2 (now the Mill Creek Wetland Mitigation Site), Anderson Creek Marsh, South Secaucus (also known as Riverbend Wetlands Preserve), and Meadowlark Marsh – based on physical, chemical, and biological attributes.

41. ***TAMS Consultants, Inc. Habitat Evaluation Procedure (HEP): IR-2 Site and Off-Site Mitigation Areas: Evaluation of the Villages at Mill Creek Mitigation Program. October 1990.** [2] The HEP was used to quantify the habitat value of the proposed IR-2 site (now the Mill Creek Wetland Mitigation Site) and mitigation area (now Western Brackish Marsh), as well as two potential offsite wetland mitigation sites – Anderson Creek Marsh and South Secaucus (also known as Riverbend Wetlands Preserve).

42. ***TAMS Consultants, Inc. Technical Report on Vegetation Mapping for IR-2, Anderson Creek Marsh, and South Secaucus Wetland Sites. December 1990.** [2] Presents vegetation mapping with supporting data for the IR-2 site (now the Mill Creek Wetland Mitigation Site), its potential onsite mitigation area (now Western Brackish Marsh), and potential offsite mitigation areas – Anderson Creek Marsh and South Secaucus (now known as Riverbend Wetlands Preserve).

43. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Brackish Wetland Mitigation Concept. May 1986.** [2] Quantifies the net impact of filling 97.41 acres of USACE-regulated wetlands and enhancing 91.98 acres for the construction of the proposed Villages at Mill Creek was quantified.

44. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Wetland Evaluation Technique (WET) Assessment (Draft). February 1990.** [2] A WET functional wetlands value assessment was undertaken in response to a condition of the USACE draft permit for this project. This WET assessment evaluated existing and future conditions at the IR-2 site (now the Mill Creek Wetland Mitigation Site), as well as the potential mitigation sites – Anderson Creek Marsh and South Secaucus (also known as Riverbend Wetlands Preserve). Social significance and functional effectiveness/opportunity of wetlands were evaluated.

45. ***USACE. Regulatory Permit # 97-09150. 1997.** [2] HMDC received authorization to discharge 2,293 cubic yards of fill to enhance 14.3 acres of wetland within the Mill Creek Wetland Mitigation Bank. The permit contains wetland enhancement plans (conceptual – no grading) for the Mill Creek Wetland Mitigation Bank.

46. ***USACE. Regulatory Permit # 97-09200. 1997.** [2] HMDC received authorization to discharge 73,880 cubic yards of fill to enhance 19.6 acres of wetland within the Mill Creek Wetland Mitigation Bank. These 19.6 acres were purchased by The Port Authority of New York and New Jersey to mitigate for impacts at Newark Airport. The permit contains wetland enhancement plans (conceptual – no grading) for the Mill Creek Wetland Mitigation Bank.

47. **USACE. Regulatory Permit # 99-14310. 1999.** [2] HMDC received authorization to discharge 59 cubic yards of fill in 0.1 acre of wetland for the construction of shoreline bulkhead and emergency egress piles. The action also included 1500 cubic yards of temporary fill (0.23 acres) for a construction access road. Mitigation included 0.277 acre of wetland at the Mill Creek Wetland Mitigation Bank.

48. ***USEPA & Gannett Fleming, Inc. Site Survey Report – Ecological Studies: Hartz Mountain Development Corporation Villages at Mill Creek. October 1992.** [2] Presents results of a 14-week field study designed to evaluate the existing conditions of bird and aquatic ecology at the Villages at Mill Creek site (now the Mill Creek Wetland Mitigation Site), as well as the proposed mitigation areas for the fill activity at the site – Anderson Creek and South Secaucus (also known as Riverbend Wetlands Preserve).

49. ***Weis, J.S., L. Windham, and P. Weis. 2002. Growth, Survival, and Metal Content in Marsh Invertebrates Fed Diets of Detritus from *Spartina alterniflora* Loisel and *Phragmites australis* Cav. Trin. Ex Steud. from Metal-Polluted and Clean Sites. Wetlands Ecology and Management, v10 n1 pp71-84. 2002.** [1a] Detritus samples were collected from the marsh surface under common reed (*Phragmites australis*), natural cordgrass (*Spartina*), and restored *Spartina* in the Meadowlands and Eastern Long Island. Ground-up detritus was fed to groups of two species of fiddler crabs and to grass shrimp. The survival, limb regeneration rate, molting, and weight gain of the crabs on the different diets was monitored, as was survival and growth of the grass shrimp.

F. Geotechnical

50. ***Ducks Unlimited, Inc. Baseline Monitoring Program: Soil and Sediment Contamination at Wetland Enhancement Sites within the Hackensack Meadowlands. March 1998.** [1a] Describes the results of soils sampling and analysis at several wetland restoration sites in the HMD, including Berry's Creek Canal site (also known as Oritani Marsh), Harrier Meadow, Mill Creek Marsh, and the Saw Mill Creek Wildlife Management Area. Preliminary surveys were conducted to screen soils at the sites for detection of the presence of potential chemical contaminants that might affect future plans for wetland restoration.

51. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2001 to June 30, 2001. Report Number 5. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

52. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 2001 to December 31, 2001. Report Number 6. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the second half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

53. ***Feltes, R. M., & Jean Marie Hartman (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2002 to June 30, 2002. Report Number 7. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2002: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

54. ***Hartman, J. M. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 1999 to December 31, 1999. Report Number 2. New Brunswick, NJ, USA, Rutgers University. 2000.** [5] Describes progress made on the following 5 post-restoration tasks at Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh during the second half of 1999: vegetation monitoring, bird monitoring, system function monitoring (including examinating physical/ chemical components, geomorphology/ hydrology/ salinity, sediment/ soils, contaminants, benthic invertebrates, fish, insects), *Phragmites* control, and monitoring reports.

55. ***Hartman, J. M. & Kelly J. Smith. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District. Report Number 1. Rutgers University. 1999.** [5] Describes work through February 1999 beginning prior to reconstruction of Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh. The goal of restoration was to obtain cover by wetland vegetation (other than common reed *(Phragmites australis*)) within two years. Five tasks are addressed: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

56. ***Hartman, J. M., Ross M. Feltes, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2000 to December 31, 2000. Report Numbers 3 & 4. Rutgers University. 2001.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh during the year 2000: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

57. ***The Louis Berger Group, Inc. Mill Creek Wetland Mitigation Site: Channel Outlet & Bridge Walkway Repair Report. May 2001.** [2a] HMDC requested a damage assessment and the subsequent preparation of repair plans for a pedestrian bridge and overflow spillway located within Mill Creek Wetland Mitigation Site. Includes results of site survey, flow velocity measurements, sediment sampling, hydraulic analysis, and damage assessment, as well as proposed repair plans.

G. Hydraulics and Hydrology

58. ***The Louis Berger Group, Inc. Mill Creek Wetland Mitigation Site: Channel Outlet & Bridge Walkway Repair Report. May 2001.** [2a] HMDC requested a damage assessment and the subsequent preparation of repair plans for a pedestrian bridge and overflow spillway located within Mill Creek Wetland Mitigation Site. Includes results of site survey, flow velocity measurements, sediment sampling, hydraulic analysis, and damage assessment, as well as proposed repair plans.

59. **The Louis Berger Group, Inc. Mill Creek Wetland Enhancement Site: Seeding & Fencing Program Monitoring Report. September 2001.** [2a] Documents weekly monitoring program, beginning in May 2001, to observe the growth of the smooth cordgrass (*Spartina alterniflora*) at the site. Includes photographs, as well as documentation of tidal and weather conditions.

H. Water and Sediments

60. ***Able, Kenneth W., Melissa J. Neuman, & Ruess Guillermo (Rutgers University). The Influence of Low Dissolved Oxygen on Predatory Fishes: Comparisons between Restored and Impacted Marsh Creeks in the Hackensack Meadowlands. 2002.**[1a] A study to determine patterns in water quality indicators and predatory fish use, and examine food habits of the dominant fish predators in two tidal marshes, Mill Creek Marsh (impacted natural creek) and Doctor's Creek (a restored/created creek that is part of Marsh Resources Wetland Mitigation Bank).

61. ***Anonymous. Nitrogen Budget Determination for a Selected Site in the Hackensack Meadowlands Estuary. 1974** [1a] Water velocity, DO, salinity, and temperature were monitored in Mill Creek. Samples were collected and analyzed for nitrate, nitrite and kjeldahl nitrogen. Samples were also collected from the Secaucus Sewage Treatment Plant. Found that about five percent of N was removed by the adjacent marsh.

62. ***Ducks Unlimited, Inc. Baseline Monitoring Program: Soil and Sediment Contamination at Wetland Enhancement Sites within the Hackensack Meadowlands. March 1998.** [1a] Describes the results of soils sampling and analysis at several wetland restoration sites in the HMD, including Berry's Creek Canal site (also known as Oritani Marsh), Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh. Preliminary surveys were conducted to screen soils at the sites for detection of the presence of potential chemical contaminants that might affect future plans for wetland restoration.

63. ***Hover, V.C. Trace Metal Cycling in Contaminated Estuarine Sediments, Hackensack Meadowlands District, NJ. Geological Society of America Abstracts with Programs, v. 31. 1999.** [1a] Determined the spatial variability of contaminant metals throughout the Meadowlands with respect to marsh types – common reed (*Phragmites australis*), natural cordgrass species (*Spartina spp*.), and restored cordgrass species (*Spartina spp*.) – to obtain baseline information on trace metal contents and speciation in sediment and porewaters. The initial sampling concentrated on areas of natural and restored *Spartina* marshes in the Sawmill Creek and Mill Creek areas, respectively.

64. ***The Louis Berger Group, Inc. Mill Creek Wetland Mitigation Site: Channel Outlet & Bridge Walkway Repair Report. May 2001.** [2a] HMDC requested a damage assessment and the subsequent preparation of repair plans for a pedestrian bridge and overflow spillway located within Mill Creek Wetland Mitigation Site. Includes results of site survey, flow velocity measurements, sediment sampling, hydraulic analysis, and damage assessment, as well as proposed repair plans.

65. ***Ravit, B., J.G. Ehrenfeld, & M.M. Haggblom. A Comparison of Sediment Microbial Communities Associated with *Phragmites australis* and *Spartina alterniflora* in Brackish Wetlands of New Jersey. Estuaries. 26(2B). 2003.** [1a] Sediment samples under different vegetation types were collected at Kearny Brackish Marsh and Mill Creek Wetland Mitigation Site. Microbial communities within the sediments are being examined to determine if there are any correlations or differences among microbial community, contaminant levels, and type of overlying vegetation in brackish marsh areas.

66. ***Weis, J.S., L. Windham, and P. Weis. 2002. Growth, Survival, and Metal Content in Marsh Invertebrates Fed Diets of Detritus from *Spartina alterniflora* Loisel and *Phragmites australis* Cav. Trin. Ex Steud. from Metal-Polluted and Clean Sites. Wetlands Ecology and Management, v10 n1 pp71-84. 2002.** [1a] Detritus samples were collected from the marsh surface under common reed (*Phragmites australis*), natural cordgrass (*Spartina*), and restored *Spartina* in the Meadowlands and Eastern Long Island. Ground-up detritus was fed to groups of two species of fiddler crabs and to grass shrimp. The survival, limb regeneration rate, molting, and weight gain of the crabs on the different diets was monitored, as was survival and growth of the grass shrimp.

67. ***Yuhas, C.E. Benthic Communities in *Spartina alterniflora* and *Phragmities australis* Dominated Salt Marshes. Rutgers University. 2001.** [1a] Core samples were collected at the creek bank and edge of vegetation in natural & mitigated cordgrass *(Spartina)* marshes and in a common reed (*Phragmites australis)* dominated marsh. A recolonization experiment using sediment from an undisturbed & uncontaminated site was also conducted. The diversity and abundance of benthic communities in the samples were analyzed.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

68. ***The Louis Berger Group, Inc. Mill Creek Wetland Mitigation Site: Channel Outlet & Bridge Walkway Repair Report. May 2001.** [2a] HMDC requested a damage assessment and the subsequent preparation of repair plans for a pedestrian bridge and overflow spillway located within Mill Creek Wetland Mitigation Site. Includes results of site survey, flow velocity measurements, sediment sampling, hydraulic analysis, and damage assessment, as well as proposed repair plans.

69. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Brackish Wetland Mitigation Concept. May 1986.** [2] Quantifies the net impact of filling 97.41 acres of USACE-regulated wetlands and enhancing 91.98 acres for the construction of the proposed Villages at Mill Creek.

70. ***USACE. Regulatory Permit # 97-09150. 1997.** [2] HMDC received authorization to discharge 2,293 cubic yards of fill to enhance 14.3 acres of wetland within the Mill Creek Wetland Mitigation Bank. The permit contains wetland enhancement plans (conceptual – no grading) for the Mill Creek Wetland Mitigation Bank.

71. ***USACE. Regulatory Permit # 97-09200. 1997.** [2] HMDC received authorization to discharge 73,880 cubic yards of fill to enhance 19.6 acres of wetland within the Mill Creek Wetland Mitigation Bank. These 19.6 acres were purchased by The Port Authority of New York and New Jersey to mitigate for impacts at Newark Airport. The permit contains wetland enhancement plans (conceptual – no grading) for the Mill Creek Wetland Mitigation Bank.

SITE #7 – SAW MILL CREEK WILDLIFE MANAGEMENT AREA

Category: Existing Restoration, Preservation, and/or Mitigation Site

Location: Divided vertically by the New Jersey Turnpike – Western Spur, bordered on the south by New Jersey Transit Boonton Line, on the East by the Hackensack River, and on the west by 1-E landfill in Kearny and Lyndhurst, Hudson and Bergen Counties respectively.
Latitude/Longitude: 40.77082 / -74.10130

Current Land Use: Wildlife management area, mudflats, tidal marsh, and open water

Size: 878 acres

Current Ownership: NJDEP (NJMC and NJDEP have an agreement for NJMC management rights.)

Site Description: Early in the 20th century, the Saw Mill Creek area adjacent to the Hackensack River was diked for mosquito control. Over ensuing decades, the topography of the area increased in height, and became cutoff from tidal flows. The overall biodiversity declined, so that by mid-century, the number of wetland species that occupied or utilized the marsh had significantly decreased. In 1950, a powerful nor'easter struck the region. Its high winds, rain, and storm tides destroyed the Saw Mill dikes, reopening the vast wetland to the Hackensack River tides. The common reed (*Phragmites australis*) that had previously colonized the area began to retreat, and smooth cordgrass (*Spartina alterniflora*) began to dominate. *S. alterniflora* now occupies hundreds of acres in the Saw Mill area.

The Saw Mill Creek Wildlife Management Area, including the large, contiguous expanse of mudflat area known as the Saw Mill mudflats, is home to myriad wildlife, including some species classified by the state as threatened or endangered. The significant species found here include striped bass, fiddler crabs, diamond-back terrapin, great blue heron, osprey, common moorhen, least bittern, and the state endangered least tern and black skimmer. Recreational use has also returned to the area, including angling, canoeing, kayaking, and NJMC boat tours. Waterfowl hunting is again permitted during the regular hunting season.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. **Wetland and Water Resource Engineering Consultants. Survey of Original Conditions at Skeetlkill Creek Marsh Wetlands Mitigation Site. January 1997.** [1a] Pre-restoration site survey. Contours are at one foot intervals.

B. Real Estate/Ownership

Saw Mill Creek Wildlife Management Area is owned by NJDEP. NJDEP and NJMC established an agreement for NJMC management rights on November 6, 1998.

C. Site History & Land Use

2. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Basin Hydrology and Pond Hydraulics Report. July 1983.** [2a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. This report details existing hydrologic and hydrology data for the Sawmill Creek Basin and the proposed recreation pond components.

3. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Recreation Pond Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Discusses background and existing hydrology of the site of a proposed 160-acre pond between present day Harrier Meadow and 1-E Landfill.

4. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

5. ***HMDC. Facts about DeKorte State Park. 1980.** [1a] The DeKorte Park Master Plan, a leachate treatment design, a sediment analysis, and a dredging feasibility study were examined. Also investigated the methane utilization, garbage composting, leaf composting, and vegetation issues related to the landfills. DeKorte State Park encompasses the Saw Mill Creek Wildlife Management Area.

6. ***Kraus, M. L. & D. J. Smith. Competition and Succession in a Perturbed Urban Estuary: The Effects of Hydrology. Proceedings of the National Wetlands Symposium: Mitigation of Impacts and Losses. 1986.** [1a] Describes the effects on vegetation of the re-introduction of tidal flow into the Sawmill Creek marsh as a result of the 1950 storm which breached the dikes and tidegates that were built in the 1800's in an attempt to drain and reclaim this large marsh area.

D. Biological Studies – Fauna

7. ***Black, I. H. Past and Present Status of the Birds of the Lower Hackensack River Marshes. New Jersey Nature News. 25(2):57-70. 1970.** [1a] Describes the highlights of the bird population of the lower Hackensack River marshes between 1961 and 1967. It compares the bird data of 1961-1967 to that of 1969, and also compares the shorebird numbers of 1961-1967 to those found prior to 1936 in the Secaucus and Newark marshes.

8. ***Dentzau, Michael L. Analysis of the Benthic Macroinvertebrate Population of the Sawmill Creek Tidal Mud Flat. HMDC. 1991.** [1a] A total of 12 benthic samples were collected using an Eckman grab sampler at low tide from the mudflat area west of and adjacent to the New Jersey Turnpike – Western Spur. The samples were maintained alive and were processed in the lab using a 1.0 millimeter mesh sieve. The densities reported were an average of all samples collected. No raw data are provided.

9. ***Mattson, Chester P., Pinto Lo, & W. Richard. Phytoplankton for Industrial Pollutants in the Hackensack Meadowlands. Proceedings of University Seminar on Pollution and Water Resources, Volume VIII. 1975.** [1a] Discusses the methods used to perform phytoplankton bioassays (using ten different phytoplankton cultures) on three different effluent types – landfill leachate, effluent from a metal finishing factory, and effluent from a metal plating factory. Samples were collected from the Hackensack Meadowlands.

10. ***McIntyre, C. Heavy Metal Concentrations in Sediment and Diamondback Terrapin (Malaclemys terrapin terrapin): Tissues from Two Sites in New Jersey. Hampshire College. 2000.** [1a] Terrapins were collected from two sites in New Jersey, one being the Saw Mill Creek Wildlife Management Area in 1999. Stomach content and liver tissues were analyzed for seven metals. Also analyzed water and sediment samples and looked at isotopic ratios of lead.

11. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

12. ***Wargo, J.G. October Avian Species Richness: A Natural Marsh vs. An Enhanced Marsh. Rutgers University. 1989.** [1a] Avian observations were made in a natural and an enhanced marsh during summer & fall 1987 and spring, summer, and fall 1988. Species richness and species diversity were compared. The results were suggested for use as baseline data for future monitoring & evaluation.

13. ***Yuhas, C.E. Benthic Communities in *Spartina alterniflora* and *Phragmities australis* Dominated Salt Marshes. Rutgers University. 2001.** [1a] Core samples were collected at the creek bank and edge of vegetation in natural & mitigated cordgrass *(Spartina)* marshes and in a common reed (*Phragmites australis)* dominated marsh. A recolonization experiment using sediment from an undisturbed & uncontaminated site was also conducted. The diversity and abundance of benthic communities in the samples were analyzed.

E. Biological Studies – General Environmental

14. ***Hover, V.C. Trace Metal Cycling in Contaminated Estuarine Sediments, Hackensack Meadowlands District, NJ. Geological Society of America Abstracts with Programs, v. 31. 1999.** [1a] Determined the spatial variability of contaminant metals throughout the Meadowlands with respect to marsh types – common reed (*Phragmites australis*), natural cordgrass species (*Spartina spp*.), and restored cordgrass species (*Spartina spp*.) – to obtain baseline information on trace metal contents and speciation in sediment and porewaters. The initial sampling concentrated on areas of natural and restored *Spartina* marshes in the Sawmill Creek and Mill Creek areas, respectively.

15. ***HMDC. The Environmental Impact Assessment for the Sawmill Creek Basin Water Quality Management Plan. March 1984.** [1] Details the environmental impacts of the Sawmill Creek Basin Water Quality Management Plan, including the following five design reports: 1) Report of Soil & Foundation Investigations; 2) Basin Hydrology & Pond Hydraulics Report; 3) Recreation Pond Design Report; 4) Leachate Collection Design Report; and 5) Wastewater Treatment Design Report. Accounts for the environmental setting and the innovative natural treatment system design concept, describes the existing conditions within the site, gives a detailed project description by element, and discusses the environmental impacts.

16. **Kraus, Mark L. Accumulation and Excretion of Five Heavy Metals by the Saltmarsh Cordgrass *Spartina alterniflora*. Bull. NJ Acad. Sci, Vol 33, No. 2 pp 39-43. 1988.** [1a] Leaves, roots rhizomes, and seeds, as well as excreted salts from smooth cordgrass were collected from the marshes of the Sawmill Creek WMA. These soils, as well as soil and sea salt samples, were analyzed for Cd, Pb, Cr, Cu, and Ni.

17. ***Kraus, M. L. Wetlands: Toxicant Sinks or Reservoirs? Proceedings of the National Symposium: Wetland Hydrology. Association of State Wetlands Mangers. 1987.** [1a] Details a study undertaken to determine the role emergent plants play in the uptake, and thus potential export, of heavy metals out of contaminated estuarine marshes in the Meadowlands. Collected soil and plant (four species) samples from four sites – Saw Mill Creek Wildlife Management Area, Western Brackish Marsh, and two unidentified sites – and analyzed the samples for Cu, Ni, Cd and Pb.

18. ***Ravit, B. and J. Ehrenfeld. Microbial Community Structure of Salt Marsh Macrophyte Rhizosphere as an Indicator of Contamination. MERI. 2002.** [1a] Compared microbial communities in the rhizosphere of smooth cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*) from Sawmill Creek Wildlife Management Area and Kearny Freshwater Marsh in the Meadowlands to those in the Mullica River. Spiked sediments with tetrabromol-bisphenol-A (a flame retardant) to analyze its degradation in the different sediments.

19. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

F. Geotechnical

20. ***Converse Consultants, Inc. Sawmill Creek Basin Water Quality Management: Report of Soils and Foundations Investigations. HMDC. 1983.** [1a] Details soils and foundation investigation that was completed for the proposed construction of leachate/wastewater treatment system and recreational paths and bridges in the Saw Mill Creek Basin.

21. ***Ducks Unlimited, Inc. Baseline Monitoring Program: Soil and Sediment Contamination at Wetland Enhancement Sites within the Hackensack Meadowlands. March 1998.** [1a] Describes the results of soils sampling and analysis at several wetland restoration sites in the HMD, including Berry's Creek Canal site (also known as Oritani Marsh), Harrier Meadow, Mill Creek Marsh, and the Saw Mill Creek Wildlife Management Area. Preliminary surveys were conducted to screen soils at the sites for detection of the presence of potential chemical contaminants that might affect future plans for wetland restoration.

22. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

G. Hydraulics and Hydrology

23. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Basin Hydrology and Pond Hydraulics Report. July 1983.** [2a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. This report details existing hydrologic and hydrology data for the Sawmill Creek Basin and the proposed recreation pond components.

24. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Recreation Pond Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Discusses background and existing hydrology of the site of a proposed 160-acre pond between present day Harrier Meadow and 1-E Landfill.

25. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

26. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

H. Water and Sediments

27. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

28. ***Hover, V.C. Trace Metal Cycling in Contaminated Estuarine Sediments, Hackensack Meadowlands District, NJ. Geological Society of America Abstracts with Programs, v. 31. 1999.** [1a] Determined the spatial variability of contaminant metals throughout the Meadowlands with respect to marsh types – common reed (*Phragmites australis*), natural cordgrass species (*Spartina spp*.), and restored cordgrass species (*Spartina spp*.) – to obtain baseline information on trace metal contents and speciation in sediment and porewaters. The initial sampling concentrated on areas of natural and restored *Spartina* marshes in the Sawmill Creek and Mill Creek areas, respectively.

29. **Konsevick, E. A Statistical Approach to Detecting the Geochemical Distribution of Heavy Metals in Tidal Flat Sediments of the Sawmill Creek Wildlife Management Area. Rutgers University. 1993.** [1a] A total of 36 shallow sediment cores were collected at the Saw Mill Creek Wildlife Management Area and analyzed for Cu, Cr, Fe Mn, Zn, grain size, and percent organic matter. In addition, a location and depth variable was assigned to each sample. Subsequent multivariate statistical analysis revealed the dominant factors controlling the residence of metals were the diagenetic processes associated with burial.

30. ***Kraus, M. L. Wetlands: Toxicant Sinks, or Reservoirs? Proceedings of the National Symposium: Wetland Hydrology. Association of State Wetlands Mangers. 1987.** [1a] Report on a study "to determine what role emergent plants play in the uptake, and thus potential export, of heavy metals out of contaminated estuarine marshes" in the Meadowlands. Collected soil and plant (four species) samples from four sites (two of which are not precisely identified). Analyzed for copper, nickel, cadmium and lead. Concentrations were higher in the soil than in plants.

31. ***McIntyre, C. Heavy Metal Concentrations in Sediment and Diamondback Terrapin (Malaclemys terrapin terrapin): Tissues from Two Sites in New Jersey. Hampshire College. 2000.** [1a] Terrapins were collected from two sites in New Jersey, one being the Saw Mill Creek Wildlife Management Area in 1999. Stomach content and liver tissues were analyzed for seven metals. Also analyzed water and sediment samples and looked at isotopic ratios of lead.

32. ***Ravit, B. and J. Ehrenfeld. Microbial Community Structure of Salt Marsh Macrophyte Rhizosphere as an Indicator of Contamination. MERI. 2002.** [1a] Compared microbial communities in the rhizosphere of smooth cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*) from Sawmill Creek Wildlife Management Area and Kearny Freshwater Marsh in the Meadowlands to those in the Mullica River. Spiked sediments with tetrabromol-bisphenol-A (a flame retardant) to analyze its degradation in the different sediments.

33. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

I. Historical/Cultural Resources

34. ***HMDC. Facts about DeKorte State Park. 1980.** [1a] The DeKorte Park Master Plan, a leachate treatment design, a sediment analysis, and a dredging feasibility study were examined. Also investigated the methane utilization, garbage composting, leaf composting, and vegetation issues related to the landfills. DeKorte State Park encompasses the Saw Mill Creek Wildlife Management Area.

J. Restoration/Remediation Design Plans

35. **Wetland Resource Engineering Consultants. Restoration Design Plan for Skeetkill Marsh. January 1997.** [1a] Design plan for restoration of the site. Contours are at one foot intervals.

36. ***Wehran Engineering and Zion and Breen Associates. Master Plan: Richard W. DeKorte State Park. 1979.** [1a] Master plan for the creation of the 2,000 acre DeKorte State Park (which encompasses the current Kingsland Impoundment) complete with key engineering, environmental, landscape architecture, and park use recommendations. Plan calls for 800 acres of active and inactive landfills to be developed, and 1,200 acres of tidal marshes (including the Saw Mill Creek Wildlife Management Area) to be preserved. An artificial marsh system was designed to treat Erie Landfill's leachate. The detailed circulation and vegetation plans are also included.

SITE #8 – SKEETKILL CREEK MARSH

Category: Existing Restoration, Preservation, and/or Mitigation Site

Location: Bordered on the west and south by Bellman's Creek, and south of Bellman's Creek Marsh and Meadowlands Field in Ridgefield, Bergen County.
Latitude/Longitude: 40.82617 / -74.01744

Current Land Use: Tidal Marsh

Size: 16 acres

Current Ownership: NJMC

Site Description: Prior to restoration by NJMC, Skeetkill Creek Marsh was undeveloped (although surrounded by industrial development), was not subject to daily tidal inundation, and supported a monoculture of common reed (*Phragmites australis)*. The restoration design included excavating previously filled areas, creating low marsh and tidal channels, and the excavation of shallow pools to provide open water habitats. Upland waterfowl habitat nesting areas were created and provided with access to open water areas. The design included the creation of a nature park and viewpoint along Pleasantview Terrace.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. **Wetland and Water Resource Engineering Consultants. Survey of Original Conditions at Skeetkill Creek Marsh Wetlands Mitigation Site. 1997.** [1a] Pre-restoration survey performed at Skeetkill Creek. All contours are at one-foot intervals.

B. Real Estate/Ownership

Skeetkill Creek Marsh is owned by NJMC.

2. **NJMC. Skeetkill Marsh Acquisition Information. September 2003.**
   (from http://www.hmdc.state.nj.us/eip/wl-skeetkill.html)
   Date of Acquisition: March 18, 1996
   Cost of Acquisition: None
   Acquired from: Russo Development Corporation

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

3. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August – September 2001.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Include photographs documenting environmental conditions.

4. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School. October 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School sites. Includes photographs documenting environmental conditions.

5. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. November 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Includes photographs documenting environmental conditions.

6. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. May – December 2002, & January – October 2003.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Include photographs documenting environmental conditions.

7. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2001 to June 30, 2001. Report Number 5. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

8. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 2001 to December 31, 2001. Report Number 6. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the second half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

9. ***Feltes, R. M., & Jean Marie Hartman (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2002 to June 30, 2002. Report Number 7. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2002: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

10. ***Hartman, J. M. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 1999 to December 31, 1999. Report Number 2. Rutgers University. 2000.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh during the second half of 1999: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed (*Phragmites australis)* control, and monitoring reports.

11. ***Hartman, J. M. & Kelly J. Smith. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District. Report Number 1. Rutgers University. 1999.** [5] Describes work through February 1999 beginning prior to reconstruction of Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh. The goal of restoration was to obtain cover by wetland vegetation (other than common reed *(Phragmites australis*)) within two years. Five tasks are addressed: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

12. ***Hartman, J. M., Ross M. Feltes, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2000 to December 31, 2000. Report Numbers 3 & 4. Rutgers University. 2001.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh during the year 2000: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

13. ***Weis, J.S., L. Windham, and P. Weis. 2002. Growth, Survival, and Metal Content in Marsh Invertebrates Fed Diets of Detritus from *Spartina alterniflora* Loisel and *Phragmites australis* Cav. Trin. Ex Steud. from Metal-Polluted and Clean Sites. Wetlands Ecology and Management, v10 n1 pp71-84. 2002.** [1a] Detritus samples were collected from the marsh surface under common reed (*Phragmites australis*), natural cordgrass (*Spartina*), and restored *Spartina* in the Meadowlands and Eastern Long Island. Ground-up detritus was fed to groups of two species of fiddler crabs and to grass shrimp. The survival, limb regeneration rate, molting, and weight gain of the crabs on the different diets was monitored, as was survival and growth of the grass shrimp.

E. Biological Studies – General Environmental

14. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August – September 2001.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Include photographs documenting environmental conditions.

15. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School. October 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School sites. Includes photographs documenting environmental conditions.

16. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. November 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Includes photographs documenting environmental conditions.

17. ***Donald J. Smith Environmental Consultants. Monthly Reports: Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh. May – December 2002, & January – October 2003.** [1a] Monthly observation reports summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, and Skeetkill Creek Marsh sites. Include photographs documenting environmental conditions.

18. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2001 to June 30, 2001. Report Number 5. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

19. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 2001 to December 31, 2001. Report Number 6. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the second half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

20. ***Feltes, R. M., & Jean Marie Hartman (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2002 to June 30, 2002. Report Number 7. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2002: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

21. ***Hartman, J. M. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 1999 to December 31, 1999. Report Number 2. Rutgers University. 2000.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh during the second half of 1999: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed (*Phragmites australis)* control, and monitoring reports.

22. ***Hartman, J. M. Skeetkill Creek Marsh Wetland Mitigation Site First Annual Monitoring Report for Russo Development Corporation. Rutgers University. 1999.** [5] First year of annual monitoring for Skeetkill Creek Marsh as required under Russo Development Corporation's NJDEP Waterfront Development Permit and Water Quality Certificate. Describes vegetation monitoring in 24 monitoring plots during the first growing season, post-construction.

23. ***Hartman, J. M. Skeetkill Creek Marsh Wetland Mitigation Site Second Annual Monitoring Report for Russo Development Corporation. Rutgers University. 2000.** [5] Second year of annual monitoring for Skeetkill Creek Marsh as required under Russo Development Corporation's NJDEP Waterfront Development Permit and Water Quality Certificate. Describes vegetation monitoring in 24 monitoring plots during the second growing season, post-construction.

24. ***Hartman, J. M. Skeetkill Creek Marsh Wetland Mitigation Site Third Annual Monitoring Report for Russo Development Corporation. Rutgers University. 2000.** [5] Third and final year of annual monitoring for Skeetkill Creek Marsh as required under Russo Development Corporation's NJDEP Waterfront Development Permit and Water Quality Certificate. Describes vegetation monitoring in 24 monitoring plots during the third growing season, post-construction. Demonstrates that the mitigation goals were met through increased habitat diversity, increased plant diversity, and dominance of wetland species.

25. ***Hartman, J. M. & David. J. Bart. Phragmites Control: Progress on Monitoring Tidal Restoration Projects in the New Jersey Meadowlands, District – Summary Report for Task 4. Report Number 8. Rutgers University. 2003.** [5] Describes methods for controlling common reed *(Phragmites australis)* at the Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh sites. Greenhouse and field experiments were used to understand site conditions and human activities that promote invasion, so that a model might be developed to predict when a site is likely to be invaded.

26. ***Hartman, J. M. & Kelly J. Smith. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District. Report Number 1. Rutgers University. 1999.** [5] Describes work through February 1999 beginning prior to reconstruction of Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh. The goal of restoration was to obtain cover by wetland vegetation (other than common reed *(Phragmites australis*)) within two years. Five tasks are addressed: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

27. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

28. ***Weis, J.S., L. Windham, and P. Weis. 2002. Growth, Survival, and Metal Content in Marsh Invertebrates Fed Diets of Detritus from *Spartina alterniflora* Loisel and *Phragmites australis* Cav. Trin. Ex Steud. from Metal-Polluted and Clean Sites. Wetlands Ecology and Management, v10 n1 pp71-84. 2002.** [1a] Detritus samples were collected from the marsh surface under common reed (*Phragmites australis*), natural cordgrass (*Spartina*), and restored *Spartina* in the Meadowlands and Eastern Long Island. Ground-up detritus was fed to groups of two species of fiddler crabs and to grass shrimp. The survival, limb regeneration rate, molting, and weight gain of the crabs on the different diets was monitored, as was survival and growth of the grass shrimp.

F. Geotechnical

29. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2001 to June 30, 2001. Report Number 5. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

30. ***Feltes, R. M., Jean Marie Hartman, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 2001 to December 31, 2001. Report Number 6. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the second half of 2001: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

31. ***Feltes, R. M., & Jean Marie Hartman (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2002 to June 30, 2002. Report Number 7. Rutgers University. 2002.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Skeetkill Creek Marsh, and Mill Creek Marsh during the first half of 2002: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

32. ***Hartman, J. M. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period July 1, 1999 to December 31, 1999. Report Number 2. Rutgers University. 2000.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh during the second half of 1999: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed (*Phragmites australis)* control, and monitoring reports.

33. ***Hartman, J. M. & Kelly J. Smith. Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District. Report Number 1. Rutgers University. 1999.** [5] Describes work through February 1999 beginning prior to reconstruction of Harrier Meadows, Mill Creek Marsh, and Skeetkill Creek Marsh. The goal of restoration was to obtain cover by wetland vegetation (other than common reed *(Phragmites australis*)) within two years. Five tasks are addressed: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

34. ***Hartman, J. M., Ross M. Feltes, & Andrew Krivenko (eds.). Progress on Monitoring Tidal Restoration Projects in the Hackensack Meadowlands District for the Period January 1, 2000 to December 31, 2000. Report Numbers 3 & 4. Rutgers University. 2001.** [5] Describes progress made on the following five post-restoration tasks at Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh during the year 2000: vegetation monitoring, bird monitoring, system function monitoring (soils, hydrology, fauna), common reed *(Phragmites australis)* control, and monitoring reports.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

35. ***Weis, J.S., L. Windham, and P. Weis. 2002. Growth, Survival, and Metal Content in Marsh Invertebrates Fed Diets of Detritus from *Spartina alterniflora* Loisel and *Phragmites australis* Cav. Trin. Ex Steud. from Metal-Polluted and Clean Sites. Wetlands Ecology and Management, v10 n1 pp71-84. 2002.** [1a] Detritus samples were collected from the marsh surface under common reed (*Phragmites australis*), natural cordgrass (*Spartina*), and restored *Spartina* in the Meadowlands and Eastern Long Island. Ground-up detritus was fed to groups of two species of fiddler crabs and to grass shrimp. The survival, limb regeneration rate, molting, and weight gain of the crabs on the different diets was monitored, as was survival and growth of the grass shrimp.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

36. **NJMC. Proposed Planting Plan for Seating Area. February 2003.** [1a] Restoration design plan for Skeetkill Marsh.

37. **Wetland and Water Resource Engineering Consultants. Restoration Design Plan for Skeetkill Marsh. 1997.** [1a] Restoration design plan for Skeetkill Marsh. Contour lines are at one-foot intervals.

SITE #9 – VINCE LOMBARDI MARSH

Category: Existing Restoration, Preservation, and/or Mitigation Site

Location: Bordered on the west and southwest by the Hackensack River, on the north by New Jersey Turnpike – Western Spur, and on the east by the Vince Lombardi Rest Area, in Ridgefield, Bergen County.
Latitude/Longitude: 40.82273 / -74.03170

Current Land Use: Tidal Marsh

Size: 10 acres

Current Ownership: New Jersey Turnpike Authority

Site Description: The Vince Lombardi Marsh is a wetland restoration site created to mitigate for permitted marsh fills associated with the development of the Vince Lombardi Rest Area. Prior to mitigation, the site had been filled with dredged material, was not subject to daily tidal inundation, and supported a monoculture of common reed (*Phragmites australis*). The site was restored in the 1980's, and included the removal of previously placed dredged material and replanting of native vegetation. Currently, the site is dominated by *Phragmites*.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Vince Lombardi Marsh is owned by the New Jersey Turnpike Authority.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

No data obtained.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #10 – WESTERN BRACKISH MARSH

Category: Existing Restoration, Preservation, and/or Mitigation Site

Location: Bordered on the east by the New Jersey Turnpike – Eastern Spur, on the west by Mill Creek, on the south by Mill Creek Marsh, and to the north by the Hackensack River in Secaucus, Hudson County.
Latitude/Longitude: 40.80331 / -74.03911

Current Land Use: Tidal Marsh

Size: 75 acres

Current Ownership: NJMC

Site Description: Hartz Mountain Industries restored this site and the Eastern Brackish Marsh in the 1980's. The 151-acre restoration effort was mitigation for permitted fill of 131 acres of brackish marsh. Prior to restoration, the site was undeveloped, had experienced little or no direct industrial activities, supported a dense monoculture of common reed (*Phragmites australis*), and was not subject to daily tidal inundation. Restoration activities included the excavation of previously placed dredged material, the creation of small upland islands from out of the excavated material, and planting of native vegetation in the tidal and upland areas. Currently, sections of the tidal marsh support smooth cordgrass (*Spartina alterniflora*), while other sections are dominated by dwarf spike rush (*Eleocharis parvula*). High marsh areas are dominated by *Phragmites*. The upland islands are dominated by grey birch (*Betula populifolia*) and *Phragmites*, and support a variety of other trees, shrubs, and herbaceous vegetation. This site has also been known as the IR-2 Mitigation Site.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

NJMC acquired Western Brackish Marsh on December 20, 1996.

C. Site History & Land Use

1. ***Berger, John. The Hackensack Meadowlands. 1991.** [2a] A "Restoration Case Study" of the mitigation site for the Hartz Mountain Project. Gives history of Hackensack Meadowlands and both Hartz Mountain mitigation sites (Eastern and Western Brackish Marshes), and describes mitigation methods. Concludes that mitigation activities enhanced habitat heterogeneity, vegetational diversity, and wildlife utilization.

D. Biological Studies – Fauna

2. ***Raichel, D. The Influence of *Phragmites* Dominance on Marsh Resident Fish in the Hackensack Meadowlands, New Jersey. Rutgers University. 2001.** [5] Investigates the response of mummichog (*Fundulus heteroclitus*) to common reed (*Phragmites australis*) vs. smooth cordgrass (*Spartina alterniflora*) and compares invertebrate assemblages in these marsh types.

3. ***Raichel, D. L., Ken Able, & Jean Marie Hartman. The Influence of *Phragmites* (Common Reed) on the Distribution, Abundance, and Potential Prey of a Resident Marsh Fish in the Hackensack Meadowlands, New Jersey." Estuaries 26: 511-521. 2003.** [5] Analyzed abundance and distribution of the various life history stages of mummichog (*Fundulus heteroclitus*) and their invertebrate prey in smooth cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*).

4. ***Wargo, J.G. October Avian Species Richness: A Natural Marsh vs. An Enhanced Marsh. Rutgers University. 1989.** [1a] Avian observations were made in a natural and an enhanced marsh during summer & fall 1987 and spring, summer, and fall 1988. Species richness and species diversity were compared. The results were suggested for use as baseline data for future monitoring & evaluation. Why

5. ***Yuhas, C.E. Benthic Communities in *Spartina alterniflora* and *Phragmities australis* Dominated Salt Marshes. Rutgers University. 2001.** [1a] Core samples were collected at the creek bank and edge of vegetation in natural & mitigated cordgrass *(Spartina)* marshes and in a common reed (*Phragmites australis)* dominated marsh. A recolonization experiment using sediment from an undisturbed & uncontaminated site was also conducted. The diversity and abundance of benthic communities in the samples were analyzed.

E. Biological Studies – General Environmental

6. ***Berger, John. The Hackensack Meadowlands. 1991.** [2a] A "Restoration Case Study" of the mitigation site for the Hartz Mountain Project. Gives history of Hackensack Meadowlands and both Hartz Mountain mitigation sites (Eastern and Western Brackish Marshes), and describes mitigation methods. Concludes that mitigation activities enhanced habitat heterogeneity, vegetational diversity, and wildlife utilization.

7. ***Celebrano, M. A Characterization of Sites in the Hackensack Meadowlands District Experiencing Unexplained Decline of *Spartina alterniflora*. HMDC. 1995.** [1a] Compares soils from the Eastern Brackish Marsh, Western Brackish Marsh, Empire Tract, and Metro Media sites to determine if differing soil characteristics effect the growth of smooth cordgrass (*Spartina alterniflora)* seedlings in the first growing season. Soil cores from were analyzed for nutrients, metals, percent organic, grain size, acid-volatile sulfides.

8. ***Enviro-Sciences, Inc. Wetlands Report. 1990.** [1a] Wetland delineation report for a five-acre parcel located along Industrial Avenue in Little Ferry, which included Block 108.3 Lot 3.01 and Block 82 Lots 17 & 20.

9. ***Hartz Mountain Industries, Inc. Environmental Impact Statement on a Multipurpose Development. October 1978.** [4] Addresses plan to construct a multipurpose development in the HMD. The proposed project included modern retail facilities, office complexes, a residential cluster, and light industrial uses, as well as recreational facilities and corridors of open wetland space.

10. ***Kraus, M. L. Wetlands: Toxicant Sinks or Reservoirs? Proceedings of the National Symposium: Wetland Hydrology. Association of State Wetlands Mangers. 1987.** [1a] Details a study undertaken to determine the role emergent plants play in the uptake, and thus potential export, of heavy metals out of contaminated estuarine marshes in the Meadowlands. Collected soil and plant (four species) samples from four sites – Saw Mill Creek Wildlife Management Area, Western Brackish Marsh, and two unidentified sites – and analyzed the samples for Cu, Ni, Cd and Pb.

11. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

12. ***McCormick, J. M. and F. R. Cantelmo. Investigation of Unexplained Decline of *Spartina alterniflora* in Northern Portions of the Hackensack Meadowlands District. HMDC. 1995.** [1a] Mainly a literature review on factors that influence survival of smooth cordgrass *(Spartina alterniflora)*. Contains specific review of history of Eastern and Western Brackish Marshes. A small study on the survivability of transplanted *S. alterniflora* was also done.

13. ***TAMS Consultants, Inc. Habitat Evaluation Procedure (HEP): IR-2 Site and Off-Site Mitigation Areas: Evaluation of the Villages at Mill Creek Mitigation Program. October 1990.** [2] The HEP was used to quantify the habitat value of the proposed IR-2 site (now the Mill Creek Wetland Mitigation Site) and mitigation area (now Western Brackish Marsh), as well as two potential offsite wetland mitigation sites – Anderson Creek Marsh and South Secaucus (also known as Riverbend Wetlands Preserve).

14. ***TAMS Consultants, Inc. Technical Report on Vegetation Mapping for IR-2, Anderson Creek Marsh, and South Secaucus Wetland Sites. December 1990.** [2] Presents vegetation mapping with supporting data for the IR-2 site (now the Mill Creek Wetland Mitigation Site), its potential onsite mitigation area (now Western Brackish Marsh), and potential offsite mitigation areas – Anderson Creek Marsh and South Secaucus (now known as Riverbend Wetlands Preserve).

15. ***TAMS Consultants, Inc. Comprehensive Baseline Studies, IR-2 and Off-Site Mitigation Areas/Evaluation of the Harmon Meadow Western Brackish Marsh Mitigation Area. June 1990.** [2] Baseline studies were initiated in 1986 to provide Hartz Mountain Industries with planning information about three proposed mitigation sites - IR-2 onsite mitigation (now known as Western Brackish Marsh), Anderson Creek Marsh, and South Secaucus (now known as Riverbend Wetlands Preserve) – by documenting existing ecological conditions of the sites and the Hackensack River in their vicinity for a year-long period.

F. Geotechnical

16. ***Celebrano, M. A Characterization of Sites in the Hackensack Meadowlands District Experiencing Unexplained Decline of *Spartina alterniflora*. HMDC. 1995.** [1a] Compares soils from the Eastern Brackish Marsh, Western Brackish Marsh, Empire Tract, and Metro Media sites to determine if differing soil characteristics effect the growth of smooth cordgrass (*Spartina alterniflora)* seedlings in the first growing season. Soil cores from were analyzed for nutrients, metals, percent organic, grain size, acid-volatile sulfides.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

17. ***Kraus, M. L. Wetlands: Toxicant Sinks or Reservoirs? Proceedings of the National Symposium: Wetland Hydrology. Association of State Wetlands Mangers. 1987.** [1a] Details a study undertaken to determine the role emergent plants play in the uptake, and thus potential export, of heavy metals out of contaminated estuarine marshes in the Meadowlands. Collected soil and plant (four species) samples from four sites – Saw Mill Creek Wildlife Management Area, Western Brackish Marsh, and two unidentified sites – and analyzed the samples for Cu, Ni, Cd and Pb.

18. ***Yuhas, C.E. Benthic Communities in *Spartina alterniflora* and *Phragmities australis* Dominated Salt Marshes. Rutgers University. 2001.** [1a] Core samples were collected at the creek bank and edge of vegetation in natural & mitigated cordgrass *(Spartina)* marshes and in a common reed (*Phragmites australis)* dominated marsh. A recolonization experiment using sediment from an undisturbed & uncontaminated site was also conducted. The diversity and abundance of benthic communities in the samples were analyzed.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

19. ***Berger, John. The Hackensack Meadowlands. 1991.** [2a] A "Restoration Case Study" of the mitigation site for the Hartz Mountain Project. Gives history of Hackensack Meadowlands and both Hartz Mountain mitigation sites (Eastern and Western Brackish Marshes), and describes mitigation methods. Concludes that mitigation activities enhanced habitat heterogeneity, vegetational diversity, and wildlife utilization.

20. ***Hix, Stephen & Christine Ross (TAMS Consultants, Inc.) Restoration of a Tidal Marsh in the Hackensack Meadowland Region. 1988.** [1] Discusses the methods and preliminary results of a 151 acre wetland restoration project (Eastern and Western Brackish Marshes) ordered by the USACE to offset the filling of 131 acres of brackish wetlands in the Hackensack Meadowlands.

21. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Brackish Wetland Mitigation Concept. May 1986.** [2] Quantifies the net impact of filling 97.41 acres of USACE-regulated wetlands and enhancing 91.98 acres for the construction of the proposed Villages at Mill Creek.

22. **TERA Corporation. Wetland Values in the Hartz Mountain Project Site, Secaucus and North Bergen, Hudson County, New Jersey. May 1982.** [4] This report summarizes further analyses of mitigation alternatives conducted after an initial conceptual plan for mitigation was prepared on the proposed project. It incorporates the suggestion offered by USFWS and USEPA personnel that freshwater habitat be considered in project development.

CANDIDATE RESTORATION SITES

SITE #11 – ANDERSON CREEK MARSH

Category: Candidate Restoration/Preservation Site

Location: Along the eastern bank of the Hackensack River, south of the New Jersey Transit Bergen Line in Secaucus, Hudson County.
Latitude/Longitude: 40.78225 / -74.08348

Current Land Use: Tidal Marsh

Size: 52 acres

Current Ownership: NJMC

Site Description: The Anderson Creek Marsh is an undeveloped area, but has been impacted by ditching for mosquito control and tide gate installation. Common reed (*Phragmites australis*) dominates approximately 95% of the site. The remaining areas are open water with mudflats. The current conceptual restoration plan entails creation of additional meandering creeks, lowering site elevations to allow for twice-daily tidal inundation, and excavation of shallow pools to provide open water habitats. Upland waterfowl habitat nesting islands are also planned with access to open water areas.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Anderson Creek Marsh is owned by NJMC.

1. **NJMC. Anderson Creek Marsh Acquisition Information. September 2003.**
   (from http://www.hmdc.state.nj.us/eip/wl-anderson.html)
   Date of Acquisition: January 1976
   Cost of Acquisition: Deeded to Commission as a condition of prior permit approval
   Acquired from: Hartz Mountain Industries

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

2. ***TAMS Consultants, Inc. & Environmental Concern, Inc. Anderson Marsh Wetlands Management Study: Hackensack Meadowlands Development Commission Island Residential - 1 Southern Tract Project. Hartz Mountain Industries, Inc. 1985.** [1a] Existing water quality, aquatic biota, bird, mammals, and reptiles/amphibians data at Anderson Creek Marsh was reviewed and new data was collected. Included a conceptual restoration/enhancement plan that suggested removing common reed (*Phragmites australis*) through the application of RODEO, re-seeding with more desirable species, and restricting grading activities to the widening and deepening of existing channels. The conceptual design plan is included.

E. Biological Studies – General Environmental

3. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

4. ***TAMS Consultants, Inc. Comprehensive Baseline Studies, IR-2 and Off-Site Mitigation Areas/Evaluation of the Harmon Meadow Western Brackish Marsh Mitigation Area. June 1990.** [2] Baseline studies were initiated in 1986 to provide Hartz Mountain Industries with planning information about three proposed mitigation sites - IR-2 onsite mitigation (now known as Western Brackish Marsh), Anderson Creek, and South Secaucus (also known as Riverbend Wetlands Preserve) – by documenting existing ecological conditions of the sites and the Hackensack River in their vicinity for a year-long period.

5. ***TAMS Consultants, Inc. Functional Evaluation of the Villages at Mill Creek Development and Mitigation Sites. March 1993.** [2] Qualitatively evaluates the functional opportunity/effectiveness of wetlands at four sites – IR-2 (now the Mill Creek Wetland Mitigation Site), Anderson Creek Marsh, South Secaucus (also known as Riverbend Wetlands Preserve), and Meadowlark Marsh – based on physical, chemical, and biological attributes.

6. ***TAMS Consultants, Inc. Habitat Evaluation Procedure (HEP): IR-2 Site and Off-Site Mitigation Areas: Evaluation of the Villages at Mill Creek Mitigation Program. October 1990.** [2] The HEP was used to quantify the habitat value of the proposed IR-2 site (now the Mill Creek Wetland Mitigation Site) and mitigation area (now Western Brackish Marsh), as well as two potential offsite wetland mitigation sites – Anderson Creek Marsh and South Secaucus (also known as Riverbend Wetlands Preserve).

7. ***TAMS Consultants, Inc. Technical Report on Vegetation Mapping for IR-2, Anderson Creek Marsh, and South Secaucus Wetland Sites. December 1990.** [2] Presents vegetation mapping with supporting data for the IR-2 site (now the Mill Creek Wetland Mitigation Site), its potential onsite mitigation area (now Western Brackish Marsh), and potential offsite mitigation areas – Anderson Creek Marsh and South Secaucus (now known as Riverbend Wetlands Preserve).

8. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Wetland Evaluation Technique (WET) Assessment (Draft). February 1990.** [2] A WET functional wetlands value assessment was undertaken in response to a condition of the USACE draft permit for this project. This WET assessment evaluated existing and future conditions at the IR-2 site (now the Mill Creek Wetland Mitigation Site), as well as the potential mitigation sites – Anderson Creek Marsh and South Secaucus (also known as Riverbend Wetlands Preserve). Social significance and functional effectiveness/opportunity of wetlands were evaluated.

9. ***TAMS Consultants, Inc. & Environmental Concern, Inc. Anderson Marsh Wetlands Management Study: Hackensack Meadowlands Development Commission Island Residential - 1 Southern Tract Project. Hartz Mountain Industries, Inc. 1985.** [1a] Existing water quality, aquatic biota, bird, mammals, and reptiles/amphibians data at Anderson Creek Marsh was reviewed and new data was collected. Included a conceptual restoration/enhancement plan that suggested removing common reed (*Phragmites australis*) through the application of RODEO, re-seeding with more desirable species, and restricting grading activities to the widening and deepening of existing channels. The conceptual design plan is included.

10. ***USEPA and Gannett Fleming, Inc. Site Survey Report: Ecological Studies: Hartz Mountain Development Corporation Villages at Mill Creek. October 1992.** [2] Presents results of a fourteen-week field study designed to evaluate the existing conditions of bird and aquatic ecology at the Villages at Mill Creek site (now the Mill Creek Wetland Mitigation Site), as well as the proposed mitigation areas for the fill activity at the site – Anderson Creek and South Secaucus (also known as Riverbend Wetlands Preserve).

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

11. ***TAMS Consultants, Inc. & Environmental Concern, Inc. Anderson Marsh Wetlands Management Study: Hackensack Meadowlands Development Commission Island Residential - 1 Southern Tract Project. Hartz Mountain Industries, Inc. 1985.** [1a] Existing water quality, aquatic biota, bird, mammals, and reptiles/amphibians data at Anderson Creek Marsh was reviewed and new data was collected. Included a conceptual restoration/enhancement plan that suggested removing common reed (*Phragmites australis*) through the application of RODEO, re-seeding with more desirable species, and restricting grading activities to the widening and deepening of existing channels. The conceptual design plan is included.

H. Water and Sediments

12. ***TAMS Consultants, Inc. & Environmental Concern, Inc. Anderson Marsh Wetlands Management Study: Hackensack Meadowlands Development Commission Island Residential - 1 Southern Tract Project. Hartz Mountain Industries, Inc. 1985.** [1a] Existing water quality, aquatic biota, bird, mammals, and reptiles/amphibians data at Anderson Creek Marsh was reviewed and new data was collected. Included a conceptual restoration/enhancement plan that suggested removing common reed (*Phragmites australis*) through the application of RODEO, re-seeding with more desirable species, and restricting grading activities to the widening and deepening of existing channels. The conceptual design plan is included.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

13. ***TAMS Consultants, Inc. & Environmental Concern, Inc. Anderson Marsh Wetlands Management Study: Hackensack Meadowlands Development Commission Island Residential - 1 Southern Tract Project. Hartz Mountain Industries, Inc. 1985.** [1a] Existing water quality, aquatic biota, bird, mammals, and reptiles/amphibians data at Anderson Creek Marsh was reviewed and new data was collected. Included a conceptual restoration/enhancement plan that suggested removing common reed (*Phragmites australis*) through the application of RODEO, re-seeding with more desirable species, and restricting grading activities to the widening and deepening of existing channels. The conceptual design plan is included.

14. ***TAMS Consultants, Inc. Functional Evaluation of the Villages at Mill Creek Development and Mitigation Sites. March 1993.** [2] Qualitatively evaluates the functional opportunity/effectiveness of wetlands at four sites – IR-2 (now the Mill Creek Wetland Mitigation Site), Anderson Creek Marsh, South Secaucus (also known as Riverbend Wetlands Preserve), and Meadowlark Marsh – based on physical, chemical, and biological attributes.

15. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Brackish Wetland Mitigation Concept. May 1986.** [2] Quantifies the net impact of filling 97.41 acres of USACE-regulated wetlands and enhancing 91.98 acres for the construction of the proposed Villages at Mill Creek.

SITE #12 – BERRY'S CREEK MARSH

Category: Candidate Restoration/Preservation Site

Location: East of the Meadowlands Corporate Center and southwest of Oritani Marsh and the New Jersey Transit – Bergen Line in Rutherford, Bergen County
Latitude/Longitude: 40.80145 / -74.08913

Current Land Use: Tidal marsh

Size: 168 acres

Current Ownership: NJMC

Site Description: Berry's Creek Marsh is an undeveloped area dominated by common reed (*Phragmites australis*). Fish Creek traverses through the site and a portion of the area is bordered by Berry's Creek. The remaining areas are open water with mudflats and isolated pockets of vegetation. The conceptual mitigation design entails grading of the marsh surface to create low marsh habitat and additional creek meanders, excavation of shallow pools to provide open water habitats, and planting of native vegetation.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

B. Real Estate/Ownership

Berry's Creek Marsh is owned by NJMC.

2. **NJMC. Berry's Creek Marsh Acquisition Information. September 2003.**
   (from http://www.hmdc.state.nj.us/eip/wl-berrys.html)
   Date of Acquisition: November 22, 1999
   Cost of Acquisition: $1,181,996.84
   Acquired from: Rutherford Land Company

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

3. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

4. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

E. Biological Studies – General Environmental

5. **Environmental Concern, Inc. A Quantitative Comparison of the Proposed Wetland Mitigation Site and Impacted Site (C & F Realty, Ltd./ Berry Creek Distribution Center). April 1992.** [4] The purpose of this report is to evaluate the wetland functions lost through impacts at the Berry Creek Distribution Center Development Site in Carlstadt, NJ and to compare them to the functions that will be gained through the proposed mitigation project located in Lyndhurst, NJ. The three approaches used were: 1) the Habitat Evaluation Procedure; 2) the Wetland Replacement Evaluation Procedure; and 3) literature validation.

6. ***ERM-Southeast, Inc., Task I: Berrys Creek Study Volume I Nature of the Problem. October 1985.**[1] This report includes site specific literature search and background investigation, site description, and describes the nature of the problem. Summarized in Volume I are all analytical data specific to the Berrys Creek area and the Wood-Ridge site. This report details, chemical contamination, of the site, surface water, mercury in the air and groundwater.

7. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

8. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

F. Geotechnical

9. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

10. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

G. Hydraulics and Hydrology

11. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

12. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

H. Water and Sediments

13. ***ERM-Southeast, Inc., Task I: Berrys Creek Study Volume I Nature of the Problem. October 1985.**[1] This report includes site specific literature search and background investigation, site description, and describes the nature of the problem. Summarized in Volume I are all analytical data specific to the Berrys Creek area and the Wood-Ridge site. This report details, chemical contamination, of the site, surface water, mercury in the air and groundwater.

14. **Galluzzi, Paul. Guidelines for Environmental Assessments of Channel and Marsh Sediment Disturbances in the Berrys Creek Drainage. April 1980.** [1] Based on data from the 1977-1978 Mercury Study which indicates the highest mercury contamination exists in these upper Berrys Creek Marshes; the mercury dump site is less than 2000 feet north of the subject inquiries. Also there is a lot of evidence that mercury is only one of several heavy metals present in high concentrations in marsh sediments.

15. ***U.S. Coast Guard & USACE. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation – New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. New Jersey Turnpike Authority. 1988.** [1a] States project purpose and need, alternatives, affected environment, and environmental consequences.

I. Historical/Cultural Resources

16. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

J. Restoration/Remediation Design Plans

17. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

SITE #13 – BELLMAN'S CREEK MARSH

Category: Candidate Restoration/Preservation Site

Location: North of Bellman's Creek and east of the Eastern Spur of the New Jersey Turnpike in the Town of Ridgefield, Bergen County, New Jersey.
Latitude/Longitude: 40.83189 / -74.01829

Current Land Use: Tidal marsh

Size: 62 acres

Current Ownership: PSEG

Site Description: Bellman's Creek marsh is dominated by common reed (*Phragmites australis*) and interspersed with pockets of wooded uplands and mudflats. Portions of the site are used for utility purposes, including a berm running through the site from the northeast to the southwest.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Bellman's Creek Marsh is owned by PSEG.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

1. ***Anonymous. Biological Water Quality and Field Sampling Survey of the Hackensack Meadowlands. HMDC. 1980.** [1a] Water samples from 11 sites were collected on a single day, measuring temperature, salinity, dissolved oxygen, and suspended solids. The biological portion of the study is negligible, as four fish sampling nets were set in Berry's Creek Canal and Sawmill Creek, but only one killifish was caught.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

2. ***Anonymous. Biological Water Quality and Field Sampling Survey of the Hackensack Meadowlands. HMDC. 1980.** [1a] Water samples from 11 sites were collected on a single day, measuring temperature, salinity, dissolved oxygen, and suspended solids. The biological portion of the study is negligible, as four fish sampling nets were set in Berry's Creek Canal and Sawmill Creek, but only one killifish was caught.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #14 – EMPIRE TRACT

Category: Candidate Restoration/Preservation Site

Location: Bordered on the east by the Hackensack River and on the south by the New Jersey Turnpike – Western Spur, in Carlstadt, Bergen County.
Latitude/Longitude: 40.82147 / -74.05017

Current Land Use: Brackish marsh

Size: 531 acres

Current Ownership: Empire Ltd. (a wholly owned subsidiary of Terminal Construction)

Site Description: The Empire Tract is a historically diked marsh that is dominated by common reed (*Phragmites australis*). Channelized tidal creeks exist at the site, but land/water interface is poor due to high elevations, tide gates, and the installation of a gas pipeline. The site has been extensively studied and a number of conceptual wetland mitigation plans have been developed for the site.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***USACE. Final Environmental Impact Statement on the Meadowlands Mills Project Proposed by Empire Ltd. 2002.** [1a] Assesses potential impacts on the Empire Tract from the proposed construction of a mall, including several different fill and mitigation alternatives. Existing wetlands were assessed using the Indicator Value Assessment method.

B. Real Estate/Ownership

Empire Tract is owned by Empire Ltd., a wholly owned subsidiary of Terminal Construction.

2. ***USACE. Final Environmental Impact Statement on the Meadowlands Mills Project Proposed by Empire Ltd. 2002.** [1a] Assesses potential impacts on the Empire Tract from the proposed construction of a mall, including several different fill and mitigation alternatives. Existing wetlands were assessed using the Indicator Value Assessment method.

C. Site History & Land Use

3. ***Paulus, Sokolowski, and Sartor, Inc. Waterfront Development Permit, Water Quality Certification, Coastal Zone Management Consistency Determination, and Stream Encroachment Permit. 1996.** [1a] Multi-permit application package for the Meadowlands Mills project prepared to fulfill the application requirements for NJDEP Waterfront Development Permit, Water Quality Certification, Coastal Zone Management Consistency Determination, and Stream Encroachment permits. Contains project description and project alternatives, summarizes existing site conditions, details project compliance with coastal zone management rules, and provides project checklist for water quality and stream encroachment requirements. Also listed other relevant required permits and application status.

4. ***TAMS Consultants, Inc. Meadowlands Mills Wetland Mitigation Conceptual Plan: Empire Tract, Hackensack Meadowlands, New Jersey. Empire, Ltd. 1998.** [1a] Presents on site mitigation plan associated with the construction of a mall at the Empire Tract. Existing wetlands were assessed and found to be of low value. Discusses site history.

5. ***USACE. Final Environmental Impact Statement on the Meadowlands Mills Project Proposed by Empire Ltd. 2002.** [1a] Assesses potential impacts on the Empire Tract from the proposed construction of a mall, including several different fill and mitigation alternatives. Existing wetlands were assessed using the Indicator Value Assessment method.

D. Biological Studies – Fauna

6. **Paulus, Sokoloski, and Sartor, Inc. Essential Fish Habitat Assessment of the Empire Tract and Meadowlands Mills Development. November 1999.** [4] Reviewed available on-site fish surveys; concluding that the non-tidal portion of the Empire Tract does not provide essential fish habitat for managed species.

7. ***Paulus, Sokolowski, and Sartor, Inc. Waterfront Development Permit, Water Quality Certification, Coastal Zone Management Consistency Determination, and Stream Encroachment Permit. 1996.** [1a] Multi-permit application package for the Meadowlands Mills project prepared to fulfill the application requirements for NJDEP Waterfront Development Permit, Water Quality Certification, Coastal Zone Management Consistency Determination, and Stream Encroachment permits. Contains project description and project alternatives, summarizes existing site conditions, details project compliance with coastal zone management rules, and provides project checklist for water quality and stream encroachment requirements. Also listed other relevant required permits and application status.

8. ***TAMS Consultants, Inc. Avian Survey Report: Existing Conditions, Environmental Consequences, and Mitigation Activities – Empire Tract. Revised October 29, 1998.** [1] A report detailing an avian survey, conducted from 1996 to 1997, to determine the overall bird usage of the Empire Tract (through which Moonachie Creek flows). The report also includes a discussion of the potential impacts to the avian community of the affected environment that would result from development and an assessment of the proposed mitigation activities for the Meadowlands Mills wetland mitigation program and its beneficial effect on avifauna.

E. Biological Studies – General Environmental

9. ***Celebrano, M. A Characterization of Sites in the Hackensack Meadowlands District Experiencing Unexplained Decline of *Spartina alterniflora*. HMDC. 1995.** [1a] Compares soils from the Eastern Brackish Marsh, Western Brackish Marsh, Empire Tract, and Metro Media sites to determine if differing soil characteristics effect the growth of smooth cordgrass (*Spartina alterniflora)* seedlings in the first growing season. Soil cores from were analyzed for nutrients, metals, percent organic, grain size, acid-volatile sulfides.

10. ***Paulus, Sokolowski, and Sartor, Inc. Waterfront Development Permit, Water Quality Certification, Coastal Zone Management Consistency Determination, and Stream Encroachment Permit. 1996.** [1a] Multi-permit application package for the Meadowlands Mills project prepared to fulfill the application requirements for NJDEP Waterfront Development Permit, Water Quality Certification, Coastal Zone Management Consistency Determination, and Stream Encroachment permits. Contains project description and project alternatives, summarizes existing site conditions, details project compliance with coastal zone management rules, and provides project checklist for water quality and stream encroachment requirements. Also listed other relevant required permits and application status.

11. ***TAMS Consultants, Inc. Meadowlands Mills Wetland Mitigation Conceptual Plan: Empire Tract, Hackensack Meadowlands, New Jersey. Empire, Ltd. 1998.** [1a] Presents on site mitigation plan associated with the construction of a mall at the Empire Tract. Existing wetlands were assessed and found to be of low value. Discusses site history

12. ***USACE. Final Environmental Impact Statement on the Meadowlands Mills Project Proposed by Empire Ltd. 2002.** [1a] Assesses potential impacts on the Empire Tract from the proposed construction of a mall, including several different fill and mitigation alternatives. Existing wetlands were assessed using the Indicator Value Assessment method.

13. **U.S. Army Corps of Engineers. Jurisdictional Determination: Empire Tract Site (App. No. 1995-07440). 11/3/1997.** [2] A jurisdictional determination was performed by the USACE in 1997 for the Empire Site.

F. Geotechnical

14. ***Celebrano, M. A Characterization of Sites in the Hackensack Meadowlands District Experiencing Unexplained Decline of *Spartina alterniflora*. HMDC. 1995.** [1a] Compares soils from the Eastern Brackish Marsh, Western Brackish Marsh, Empire Tract, and Metro Media sites to determine if differing soil characteristics effect the growth of smooth cordgrass (*Spartina alterniflora)* seedlings in the first growing season. Soil cores from were analyzed for nutrients, metals, percent organic, grain size, acid-volatile sulfides.

15. ***USACE. Final Environmental Impact Statement on the Meadowlands Mills Project Proposed by Empire Ltd. 2002.** [1a] Assesses potential impacts on the Empire Tract from the proposed construction of a mall, including several different fill and mitigation alternatives. Existing wetlands were assessed using the Indicator Value Assessment method.

G. Hydraulics and Hydrology

16. **Paulus, Sokolowski, and Sartor, Inc. Meadowlands Mills Storm Water Management Report. Empire, Ltd. 2000.** [1a] Describes existing conditions regarding stormwater, regulatory requirements associated with development, and proposed stormwater components and provisions at the Empire Tract.

17. ***Paulus, Sokolowski, and Sartor, Inc. Water Budget and Water Quality Improvement Function Analysis for the Empire Tract Located in the Borough of Carlstadt and Township of South Hackensack, Bergen County, New Jersey. 2000.** [1a] Includes a water budget for existing conditions at the Empire Tract. Water quality samples were taken during two low and two high flow events. From this data, net imports/exports of BOD, COD, P, N, TSS, and TOC were estimated.

18. ***Paulus, Sokolowski, and Sartor, Inc. Waterfront Development Permit, Water Quality Certification, Coastal Zone Management Consistency Determination, and Stream Encroachment Permit. 1996.** [1a] Multi-permit application package for the Meadowlands Mills project prepared to fulfill the application requirements for NJDEP Waterfront Development Permit, Water Quality Certification, Coastal Zone Management Consistency Determination, and Stream Encroachment permits. Contains project description and project alternatives, summarizes existing site conditions, details project compliance with coastal zone management rules, and provides project checklist for water quality and stream encroachment requirements. Also listed other relevant required permits and application status.

19. ***USACE. Final Environmental Impact Statement on the Meadowlands Mills Project Proposed by Empire Ltd. 2002.** [1a] Assesses potential impacts on the Empire Tract from the proposed construction of a mall, including several different fill and mitigation alternatives. Existing wetlands were assessed using the Indicator Value Assessment method.

H. Water and Sediments

20. ***Paulus, Sokolowski, and Sartor, Inc. Water Budget and Water Quality Improvement Function Analysis for the Empire Tract Located in the Borough of Carlstadt and Township of South Hackensack, Bergen County, New Jersey. 2000.** [1a] Includes a water budget for existing conditions at the Empire Tract. Water quality samples were taken during two low and two high flow events. From this data, net imports/exports of BOD, COD, P, N, TSS, and TOC were estimated.

21. ***Paulus, Sokolowski, and Sartor, Inc. Waterfront Development Permit, Water Quality Certification, Coastal Zone Management Consistency Determination, and Stream Encroachment Permit. 1996.** [1a] Multi-permit application package for the Meadowlands Mills project prepared to fulfill the application requirements for NJDEP Waterfront Development Permit, Water Quality Certification, Coastal Zone Management Consistency Determination, and Stream Encroachment permits. Contains project description and project alternatives, summarizes existing site conditions, details project compliance with coastal zone management rules, and provides project checklist for water quality and stream encroachment requirements. Also listed other relevant required permits and application status.

22. ***USACE. Final Environmental Impact Statement on the Meadowlands Mills Project Proposed by Empire Ltd. 2002.** [1a] Report assessing potential impacts on the Empire Tract from the proposed construction of a mall, including several different fill and mitigation alternatives. Existing wetlands were assessed using the Indicator Value Assessment method.

I. Historical/Cultural Resources

23. ***USACE. Final Environmental Impact Statement on the Meadowlands Mills Project Proposed by Empire Ltd. 2002.** [1a] Report assessing potential impacts on the Empire Tract from the proposed construction of a mall, including several different fill and mitigation alternatives. Existing wetlands were assessed using the Indicator Value Assessment method.

J. Restoration/Remediation Design Plans

24. **Paulus, Sokoloski, and Sartor, Inc. Meadowlands Mills Conceptual Wetlands Mitigation Plan. December 1999.** [4] Conceptual wetland mitigation plan for the proposed construction of a mall at the Empire Tract. Includes the enhancement of 221 acres of wetlands dominated by common reed (*Phragmites australis*) to increase wetland values, as well as the preservation of 29 acres of existing wetlands. The functionality of existing and proposed conditions was assessed using the Indicator Value Assessment methodology.

25. **Paulus, Sokoloski, and Sartor, Inc. Meadowlands Mills Wetlands Mitigation Project Monitoring and Maintenance Plan. January 2000 (Revised March 2000).** [4] Monitoring and maintenance plan for a proposed wetland mitigation project at the Empire Tract. Plan includes recording the progress of the project, monitoring and maintaining the ecological development of the enhanced wetlands, identifying corrective steps to address potential problems, and documenting the monitoring and maintenance activities in annual written reports.

26. ***TAMS Consultants, Inc. Avian Survey Report: Existing Conditions, Environmental Consequences, and Mitigation Activities – Empire Tract. Revised October 29, 1998.** [1] A report detailing an avian survey, conducted from 1996 to 1997, to determine the overall bird usage of the Empire Tract (through which Moonachie Creek flows). The report also includes a discussion of the potential impacts to the avian community of the affected environment that would result from development and an assessment of the proposed mitigation activities for the Meadowlands Mills wetland mitigation program and its beneficial effect on avifauna.

27. ***TAMS Consultants, Inc. Meadowlands Mills Wetland Mitigation Conceptual Plan: Empire Tract, Hackensack Meadowlands, New Jersey. Empire, Ltd. 1998.** [1a] Presents on site mitigation plan associated with the construction of a mall at the Empire Tract. Existing wetlands were assessed and found to be of low value. Discusses site history.

28. ***USACE. Final Environmental Impact Statement on the Meadowlands Mills Project Proposed by Empire Ltd. 2002.** [1a] Report assessing potential impacts on the Empire Tract from the proposed construction of a mall, including several different fill and mitigation alternatives. Existing wetlands were assessed using the Indicator Value Assessment method.

SITE #15 – KEARNY BRACKISH MARSH

Category: Candidate Restoration/Preservation Site

Location: The site is divided horizontally by the New Jersey Turnpike – Eastern Spur and bordered in the east by the Hackensack River in Kearny, Hudson County.
Latitude/Longitude: 40.75814 / -74.10272

Current Land Use: Tidal marsh

Size: 116 acres

Current Ownership: NJMC

Site Description: Emergent vegetation at the Kearny Brackish Marsh has been mostly eliminated over the past ten years and replaced by open water. Both tidal flows and hydrologic connections have been restricted due to surrounding development. The current conceptual restoration design includes the re-establishment of emergent vegetation by managing water levels and preventing soil erosion, potentially through the replacement of the broken water control structures at the Cayuga Dike.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Kearny Brackish Marsh is owned by NJMC.

1. **NJMC. Kearny Brackish Marsh Acquisition Information. September 2003.**
   (from http://www.hmdc.state.nj.us/eip/wl-kearnyb.html)
   Date of Acquisition: November 9, 1999
   Cost of Acquisition: $933,085
   Acquired from: Town of Kearny

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

2. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

3. ***Ravit, B., J.G. Ehrenfeld, & M.M. Haggblom. A Comparison of Sediment Microbial Communities Associated with *Phragmites australis* and *Spartina alterniflora* in Brackish Wetlands of New Jersey. Estuaries. 26(2B). 2003.** [1a] Sediment samples under different vegetation types were collected at Kearny Brackish Marsh and Mill Creek Wetland Mitigation Site. Microbial communities within the sediments are being examined to determine if there are any correlations or differences among microbial community, contaminant levels, and type of overlying vegetation in brackish marsh areas.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

4. ***Ravit, B., J.G. Ehrenfeld, & M.M. Haggblom. A Comparison of Sediment Microbial Communities Associated with *Phragmites australis* and *Spartina alterniflora* in Brackish Wetlands of New Jersey. Estuaries. 26(2B). 2003.** [1a] Sediment samples under different vegetation types were collected at Kearny Brackish Marsh and Mill Creek Wetland Mitigation Site. Microbial communities within the sediments are being examined to determine if there are any correlations or differences among microbial community, contaminant levels, and type of overlying vegetation in brackish marsh areas.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #16 – KEARNY FRESHWATER MARSH

Category: Candidate Restoration/Preservation Sites

Location: Bordered to the north by the New Jersey Transit – Boonton Line, to the south by a freight line and the west by Keegan Landfill, in Kearny, Hudson County.
Latitude/Longitude: 40.75956 / -74.12746

Current Land Use: Freshwater wetland

Size: 279 acres

Current Ownership: NJMC

Site Description: The Kearny Freshwater Marsh is a freshwater impoundment, adjacent to the Keegan Landfill at its southwestern corner. Over the years, the productivity of the marsh has declined as a result of rising water levels within the marsh itself. Additionally, leachate from the Keegan Landfill and runoff from the surrounding areas have resulted in increased contaminant levels throughout the surface sediments. The current conceptual restoration plan includes the re-establishment of emergent vegetation by managing water levels and stemming erosion, removal and disposal of contaminated surface soils, closure of the Keegan Landfill (a source of leachate), and installation of a water control structure and/or pumping station to manage water levels.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***Camp Dresser & McKee Inc. Land Use Feasibility Study Keegan Landfill, Kearny, New Jersey Final Report. July 1998.** [1] Evaluates the development potential of the Keegan Landfill based on existing, available data. Includes a description of existing conditions, compiled through literature review. Reviews geology, subsurface hydrology, soils, water quality, wetlands (adjacent Kearny Freshwater Marsh), air quality, noise, and hazardous materials. Also reviews landfill closure regulations, funding, and methods.

2. ***Urban Mass Transportation Administration. Technical Reports for the Draft EIS and Section 4 (f) Evaluation, Boonton Line-Montclair Branch Corridor Study. 1989.** [1a] The majority of this study area is located outside the HMD, except for a small section of the Kearny and Secaucus area, including the Kearny Freshwater Marsh site. Includes separate reports reviewing existing data on transportation, land use/socio-economics, air quality, noise/vibration, terrestrial/aquatic resources, community participation, and historical/cultural resources regarding the Boonton Line Montclair Branch Corridor.

B. Real Estate/Ownership

Kearny Freshwater Marsh is owned by NJMC.

3. **NJMC. Kearny Freshwater Marsh Acquisition Information. September 2003.**
(from http://www.hmdc.state.nj.us/eip/wl-kearnyf.html)
Date of Acquisition: November 9, 1999
Cost of Acquisition: $1,180,000
Acquired from: Town of Kearny

C. Site History & Land Use

4. ***Camp Dresser & McKee Inc. Land Use Feasibility Study Keegan Landfill, Kearny, New Jersey Final Report. July 1998.** [1] Evaluates the development potential of the Keegan Landfill based on existing, available data. Includes a description of existing conditions, compiled through literature review. Reviews geology, subsurface hydrology, soils, water quality, wetlands (adjacent Kearny Freshwater Marsh), air quality, noise, and hazardous materials. Also reviews landfill closure regulations, funding, and methods.

5. ***HMDC. The Kearny Marsh: The Dynamics of a Young Freshwater Marsh in the Hackensack Meadowlands, A Basin Management Plan. May, 1982.** [1] A basin management plan for Kearny Marsh that expanded on the ideas set forth in HMDC's "Ecological and Resource Management Plan," written in 1978. The plan also developed an understanding of what created and was changing Kearny Freshwater Marsh with regard to human disturbances, hydrology, vegetation, and wildlife. The plan also discusses the importance of marsh preservation, water quality, and water management.

6. ***Kane, Richard. Birds of the Kearny Marsh. Occasional Paper No. 135, New Jersey Audubon Vol. IV No. 5. Winter, 1978.** [1] A paper detailing both specific avian and general site observations made by Richard Kane, Irving Black, and Don Smith as they recorded the numbers and species of birds inhabiting the Kearny Marsh in the 1970's. The site's deep water habitat created a productive wetland resource, attracting both resident and migratory water- and land-bird species.

7. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. Hackensack Meadowlands Development Commission. 1978.** [1a] Provides a synopsis of what the then eight-year old HMDC had learned about the Hackensack Estuary. Section 1 is an "ecological primer", Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

8. ***Urban Mass Transportation Administration. Technical Reports for the Draft EIS and Section 4 (f) Evaluation, Boonton Line-Montclair Branch Corridor Study. 1989.** [1a] The majority of this study area is located outside the HMD, except for a small section of the Kearny and Secaucus area, including the Kearny Freshwater Marsh site. Includes separate reports reviewing existing data on transportation, land use/socio-economics, air quality, noise/vibration, terrestrial/aquatic resources, community participation, and historical/cultural resources regarding the Boonton Line Montclair Branch Corridor.

D. Biological Studies – Fauna

9. ***Bentivegna, C., S. Bugel, J. Alfano, & K. Czechowicz, Comparison of Sediment and Detritus Toxicity from a Heavy Metal Contaminated Freshwater Marsh. Abstracts of the Meadowlands Symposium. 2003.** [1a] Sediment and detritus samples were collected from six sites in Kearny Marsh. Study included monitoring macroinvertebrates in situ, analyzing sediment chemistry, testing sediment and detritus toxicity with chironomids, and measuring heavy metal bioaccumulation

10. ***Bugel, S. & C. Bentivegna. Evaluating Macroinvertebrate Biodiversity in a New Jersey Freshwater Marsh. Abstracts of the Meadowlands Symposium. 2003.** [1a] Six sites in Kearny Freshwater Marsh were sampled in June, August, and October of 2002 using dip net and Hester-Dendy samplers. Water quality parameters including pH, temperature, salinity, and dissolved oxygen were measured concurrently. Results indicated that collection techniques and water quality parameters used in freshwater streams were not indicative of marsh ecosystem health.

11. ***HMDC. The Kearny Marsh: The Dynamics of a Young Freshwater Marsh in the Hackensack Meadowlands, A Basin Management Plan. May, 1982.** [1] A basin management plan for Kearny Marsh that expanded on the ideas set forth in HMDC's "Ecological and Resource Management Plan," written in 1978. The plan also developed an understanding of what created and was changing Kearny Freshwater Marsh with regard to human disturbances, hydrology, vegetation, and wildlife. The plan also discusses the importance of marsh preservation, water quality, and water management.

12. ***Kane, Richard. Birds of the Kearny Marsh. Occasional Paper No. 135, New Jersey Audubon Vol. IV No. 5. Winter, 1978.** [1] A paper detailing both specific avian and general site observations made by Richard Kane, Irving Black, and Don Smith as they recorded the numbers and species of birds inhabiting the Kearny Marsh in the 1970's. The site's deep water habitat created a productive wetland resource, attracting both resident and migratory water- and land-bird species.

13. ***Kane, Richard. *Phragmites* use by birds in New Jersey. NJ Audubon Society Magazine. Vol. XXVI, No. 4, pp. 122-123. Winter 2000-2001.** [1a] Provides a list of birds that have been seen in common reed (*Phragmites australis*) – including 32 species that breed in *Phragmites* – with numerous references to the Hackensack Meadowlands, especially Kearny Marsh.

14. ***Urban Mass Transportation Administration. Technical Reports for the Draft EIS and Section 4 (f) Evaluation, Boonton Line-Montclair Branch Corridor Study. 1989.** [1a] The majority of this study area is located outside the HMD, except for a small section of the Kearny and Secaucus area, including the Kearny Freshwater Marsh site. Includes separate reports reviewing existing data on transportation, land use/socio-economics, air quality, noise/vibration, terrestrial/aquatic resources, community participation, and historical/cultural resources regarding the Boonton Line Montclair Branch Corridor.

E. Biological Studies – General Environmental

15. ***Cai, H. and Hahn, D. Assessing Microbial Indicators for Heavy Metal Contamination using Automated Image Analysis. MERI. 2002.** [1a] Sediment and saltmarsh hay *(Spartina patens)* samples were collected at a site in Harrier Meadow in April, June and August 2000. The samples were analyzed for Ni, Cu, Cd, Cr, Pb, and Zn. Control samples of *S. patens* were grown in a greenhouse in Ni-amended and fungicide-treated soils. Plant uptake of Ni, Cu, Cd, Cr and Pb were compared among the samples. Sediment samples were also collected from Kearny Freshwater Marsh and the bacterial populations were analyzed.

16. ***Camp Dresser & McKee Inc. Land Use Feasibility Study Keegan Landfill, Kearny, New Jersey Final Report. July 1998.** [1] Evaluates the development potential of the Keegan Landfill based on existing, available data. Includes a description of existing conditions, compiled through literature review. Reviews geology, subsurface hydrology, soils, water quality, wetlands (adjacent Kearny Freshwater Marsh), air quality, noise, and hazardous materials. Also reviews landfill closure regulations, funding, and methods.

17. ***HMDC. The Kearny Marsh: The Dynamics of a Young Freshwater Marsh in the Hackensack Meadowlands, A Basin Management Plan. May, 1982.** [1] A basin management plan for Kearny Marsh that expanded on the ideas set forth in HMDC's "Ecological and Resource Management Plan," written in 1978. The plan also developed an understanding of what created and was changing Kearny Freshwater Marsh with regard to human disturbances, hydrology, vegetation, and wildlife. The plan also discusses the importance of marsh preservation, water quality, and water management.

18. ***Kane, Richard. *Phragmites* use by birds in New Jersey. NJ Audubon Society Magazine. Vol. XXVI, No. 4, pp. 122-123. Winter 2000-2001.** [1a] Provides a list of birds that have been seen in common reed (*Phragmites australis*) – including 32 species that breed in *Phragmites* – with numerous references to the Hackensack Meadowlands, especially Kearny Marsh.

19. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. Hackensack Meadowlands Development Corporation. 1978.** [1a] Provides a synopsis of what the then eight-year old HMDC had learned about the Hackensack Estuary. Section 1 is an "ecological primer", Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

20. ***Ravit, B. and J. Ehrenfeld. Microbial Community Structure of Salt Marsh Macrophyte Rhizosphere as an Indicator of Contamination. MERI. 2002.** [1a] Compared microbial communities in the rhizosphere of smooth cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*) from Sawmill Creek Wildlife Management Area and Kearny Freshwater Marsh in the Meadowlands to those in the Mullica River. Spiked sediments with tetrabromol-bisphenol-A (a flame retardant) to analyze its degradation in the different sediments.

21. **Tutak, J. A Comparative Analysis of Seed Bank Composition in the Kearny Freshwater Marsh. Rutgers, The State University of New Jersey. 2003.** [5] The Kearny Freshwater Marsh is dominated by two invasive species, common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*), while a few islands within the marsh support other species. The seed banks of these islands were analyzed to determine what species were present and able to colonize bare islands. Examined species richness, relative density, and frequency.

22. ***Urban Mass Transportation Administration. Technical Reports for the Draft EIS and Section 4 (f) Evaluation, Boonton Line-Montclair Branch Corridor Study. 1989.** [1a] The majority of this study area is located outside the HMD, except for a small section of the Kearny and Secaucus area, including the Kearny Freshwater Marsh site. Includes separate reports reviewing existing data on transportation, land use/socio-economics, air quality, noise/vibration, terrestrial/aquatic resources, community participation, and historical/cultural resources regarding the Boonton Line Montclair Branch Corridor.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

23. ***Bugel, S. & C. Bentivegna. Evaluating Macroinvertebrate Biodiversity in a New Jersey Freshwater Marsh. Abstracts of the Meadowlands Symposium. 2003.** [1a] Six sites in Kearny Freshwater Marsh were sampled in June, August, and October of 2002 using dip net and Hester-Dendy samplers. Water quality parameters including pH, temperature, salinity, and dissolved oxygen were measured concurrently. Results indicated that collection techniques and water quality parameters used in freshwater streams were not indicative of marsh ecosystem health.

24. ***Bentivegna, C., S. Bugel, J. Alfano, & K. Czechowicz, Comparison of Sediment and Detritus Toxicity from a Heavy Metal Contaminated Freshwater Marsh. Abstracts of the Meadowlands Symposium. 2003.** [1a] Sediment and detritus samples were collected from six sites in Kearny Marsh. Study included monitoring macroinvertebrates in situ, analyzing sediment chemistry, testing sediment and detritus toxicity with chironomids, and measuring heavy metal bioaccumulation

25. ***Cai, H. and Hahn, D. Assessing Microbial Indicators for Heavy Metal Contamination using Automated Image Analysis. MERI. 2002.** [1a] Sediment and saltmarsh hay *(Spartina patens)* samples were collected at a site in Harrier Meadow in April, June and August 2000. The samples were analyzed for Ni, Cu, Cd, Cr, Pb, and Zn. Control samples of *S. patens* were grown in a greenhouse in Ni-amended and fungicide-treated soils. Plant uptake of Ni, Cu, Cd, Cr and Pb were compared among the samples. Sediment samples were also collected from Kearny Freshwater Marsh and the bacterial populations were analyzed.

26. **Langan Engineering and Environmental Services, Inc. Sediment and Water Sampling Report: Kearny Marsh. June 22, 1999.** [1a] Report submitted as part of permit application #93-00080 Volume VIII, 23 March 1999, detailing methodologies and results of sediment sampling at the Kearny Freshwater Marsh. Surface water samples at 22 locations were collected on April 7 and 8, 1999, core sediment samples at 11 of the 22 locations were completed on April 29, 1999, and surface sediment samples were collected at the same 22 locations on May 26, 1999.

27. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. Hackensack Meadowlands Development Corporation. 1978.** [1a] Provides a synopsis of what the then eight-year old HMDC had learned about the Hackensack Estuary. Section 1 is an "ecological primer", Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

28. ***Ravit, B. and J. Ehrenfeld. Microbial Community Structure of Salt Marsh Macrophyte Rhizosphere as an Indicator of Contamination. MERI. 2002.** [1a] Compared microbial communities in the rhizosphere of smooth cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*) from Sawmill Creek Wildlife Management Area and Kearny Freshwater Marsh in the Meadowlands to those in the Mullica River. Spiked sediments with tetrabromol-bisphenol-A (a flame retardant) to analyze its degradation in the different sediments.

I. Historical/Cultural Resources

29. ***Urban Mass Transportation Administration. Technical Reports for the Draft EIS and Section 4 (f) Evaluation, Boonton Line-Montclair Branch Corridor Study. 1989.** [1a] The majority of this study area is located outside the HMD, except for a small section of the Kearny and Secaucus area, including the Kearny Freshwater Marsh site. Includes separate reports reviewing existing data on transportation, land use/socio-economics, air quality, noise/vibration, terrestrial/aquatic resources, community participation, and historical/cultural resources regarding the Boonton Line Montclair Branch Corridor.

J. Restoration/Remediation Design Plans

30. ***HMDC. Draft Proposed Wetland Mitigation for FDP Enterprises Inc. September 1998.** [2] This document was submitted to the USACE as part of permit application #93-00080 Vol. VI, 29 April 1998 to 24 September 1998. It discusses the mitigation plan for Kearny Freshwater Marsh associated with the FD&P project.

SITE #17 – LAUREL HILL PARK WETLAND

Category: Candidate Restoration/Preservation Site

Location: Adjacent to Laurel Hill Park, east of the Hackensack River, north of the Penn-Central Northeast Corridor (AMTRAK), and south of the New Jersey Turnpike – Eastern Spur in Secaucus, Hudson County.
Latitude/Longitude: 40.75603 / -74.08950

Current Land Use: Tidal marsh and public park

Size: 20 acres

Current Ownership: Hudson County

Site Description: Laurel Hill Park Wetland is surrounded by rail lines and highways. The site is dominated by common reed (*Phragmites australis*) interspersed with pockets of saltmarsh hay (*Spartina patens*). Tidal waters enter the site directly from the Hackensack River.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***Edwards and Kelcey, Inc. Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station: Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Environmental assessment consisting of: 1) description of proposed project and need; 2) alternative analysis; and 3) environmental impacts of the project. The environmental impacts investigated include land acquisitions, land use/zoning, air quality, soil contamination, water quality, groundwater, storm water/flooding, wetlands, ecologically sensitive areas, wildlife/vegetation, endangered species, and geology. Discusses two potential sites for conceptual wetland mitigation. Includes requisite state and federal permits, as well as a Federal Transit Administration Finding of No Significant Impact was also included. (Appendices D through J are missing.)

B. Real Estate/Ownership

Laurel Hill Park Wetland is owned by Hudson County.

C. Site History & Land Use

2. ***Edwards and Kelcey, Inc. Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station: Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Environmental assessment consisting of: 1) description of proposed project and need; 2) alternative analysis; and 3) environmental impacts of the project. The environmental impacts investigated include land acquisitions, land use/zoning, air quality, soil contamination, water quality, groundwater, storm water/flooding, wetlands, ecologically sensitive areas, wildlife/vegetation, endangered species, and geology. Discusses two potential sites for conceptual wetland mitigation. Includes requisite state and federal permits, as well as a Federal Transit Administration Finding of No Significant Impact was also included. (Appendices D through J are missing.)

3. ***Facciolla, Nicholas W. Minerals of Laurel Hill. 1981.** [1a] A compilation of information regarding the area currently known as Laurel Hill in Secaucus. Specifically, there is a chapter on the history, geology, and mineralogy of Snake Hill.

D. Biological Studies – Fauna

4. ***Edwards and Kelcey, Inc. Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station: Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Environmental assessment consisting of: 1) description of proposed project and need; 2) alternative analysis; and 3) environmental impacts of the project. The environmental impacts investigated include land acquisitions, land use/zoning, air quality, soil contamination, water quality, groundwater, storm water/flooding, wetlands, ecologically sensitive areas, wildlife/vegetation, endangered species, and geology. Discusses two potential sites for conceptual wetland mitigation. Includes requisite state and federal permits, as well as a Federal Transit Administration Finding of No Significant Impact was also included. (Appendices D through J are missing.)

E. Biological Studies – General Environmental

5. ***Edwards and Kelcey, Inc. Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station: Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Environmental assessment consisting of: 1) description of proposed project and need; 2) alternative analysis; and 3) environmental impacts of the project. The environmental impacts investigated include land acquisitions, land use/zoning, air quality, soil contamination, water quality, groundwater, storm water/flooding, wetlands, ecologically sensitive areas, wildlife/vegetation, endangered species, and geology. Discusses two potential sites for conceptual wetland mitigation. Includes requisite state and federal permits, as well as a Federal Transit Administration Finding of No Significant Impact was also included. (Appendices D through J are missing.)

6. **USACE. Jurisdictional Determination: Laurel Hill Park (Application. No. 1995-03220). 8/15/1995.** [2] A jurisdictional determination was performed by the USACE in 1995 for Laurel Hill Park.

F. Geotechnical

7. ***Edwards and Kelcey, Inc. Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station: Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Environmental assessment consisting of: 1) description of proposed project and need; 2) alternative analysis; and 3) environmental impacts of the project. The environmental impacts investigated include land acquisitions, land use/zoning, air quality, soil contamination, water quality, groundwater, storm water/flooding, wetlands, ecologically sensitive areas, wildlife/vegetation, endangered species, and geology. Discusses two potential sites for conceptual wetland mitigation. Includes requisite state and federal permits, as well as a Federal Transit Administration Finding of No Significant Impact was also included. (Appendices D through J are missing.)

8. ***Facciolla, Nicholas W. Minerals of Laurel Hill. 1981.** [1a] A compilation of information regarding the area currently known as Laurel Hill in Secaucus. Specifically, there is a chapter on the history, geology, and mineralogy of Snake Hill.

G. Hydraulics and Hydrology

9. ***Edwards and Kelcey, Inc. Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station: Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Environmental assessment consisting of: 1) description of proposed project and need; 2) alternative analysis; and 3) environmental impacts of the project. The environmental impacts investigated include land acquisitions, land use/zoning, air quality, soil contamination, water quality, groundwater, storm water/flooding, wetlands, ecologically sensitive areas, wildlife/vegetation, endangered species, and geology. Discusses two potential sites for conceptual wetland mitigation. Includes requisite state and federal permits, as well as a Federal Transit Administration Finding of No Significant Impact was also included. (Appendices D through J are missing.)

H. Water and Sediments

10. ***Edwards and Kelcey, Inc. Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station: Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Environmental assessment consisting of: 1) description of proposed project and need; 2) alternative analysis; and 3) environmental impacts of the project. The environmental impacts investigated include land acquisitions, land use/zoning, air quality, soil contamination, water quality, groundwater, storm water/flooding, wetlands, ecologically sensitive areas, wildlife/vegetation, endangered species, and geology. Discusses two potential sites for conceptual wetland mitigation. Includes requisite state and federal permits, as well as a Federal Transit Administration Finding of No Significant Impact was also included. (Appendices D through J are missing.)

I. Historical/Cultural Resources

11. ***Edwards and Kelcey, Inc. Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station: Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Environmental assessment consisting of: 1) description of proposed project and need; 2) alternative analysis; and 3) environmental impacts of the project. The environmental impacts investigated include land acquisitions, land use/zoning, air quality, soil contamination, water quality, groundwater, storm water/flooding, wetlands, ecologically sensitive areas, wildlife/vegetation, endangered species, and geology. Discusses two potential sites for conceptual wetland mitigation. Includes requisite state and federal permits, as well as a Federal Transit Administration Finding of No Significant Impact was also included. (Appendices D through J are missing.)

J. Restoration/Remediation Design Plans

12. ***Edwards and Kelcey, Inc. Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station: Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Environmental assessment consisting of: 1) description of proposed project and need; 2) alternative analysis; and 3) environmental impacts of the project. The environmental impacts investigated include land acquisitions, land use/zoning, air quality, soil contamination, water quality, groundwater, storm water/flooding, wetlands, ecologically sensitive areas, wildlife/vegetation, endangered species, and geology. Discusses two potential sites for conceptual wetland mitigation. Includes requisite state and federal permits, as well as a Federal Transit Administration Finding of No Significant Impact was also included. (Appendices D through J are missing.)

SITE #18 – LOSEN SLOTE CREEK PARK

Category: Candidate Restoration/Preservation Site

Location: Northwest of the Mehrhof Pond site and bordered to the west by Losen Slote Creek in Little Ferry, Bergen County.
Latitude/Longitude: 40.83756 / -74.03893

Current Land Use: Freshwater wetland and public park

Size: 26 acres

Current Ownership: Borough of Little Ferry (NJMC has a 99-year lease agreement for public access.)

Site Description: The Losen Slote Creek Park site was part of the extensive plantation of Captain John Berry, an early Meadowlands landowner. During Captain Berry's time, the area was a semi-wilderness of cedar swamps, cattails, and wet woodlands. In the 18th century, the site was harvested for salt hay from the tidal portions of the site. In the 19th century, the site was diked and drained, and as a result, much of the formerly tidal areas are now upland. The park was protected in 1990 per an agreement between the Town of Little Ferry and the NJMC.

The recreational section of the park contains a two-acre children's playground, a regulation-size roller hockey rink, and an educational and recreational resource area with outdoor classrooms. The undeveloped portion consists of an inner coastal plain lowland forest. A plant inventory was completed in 1991. Some existing wetlands on the property were enhanced in 1992; however, some areas onsite could still be enhanced. The park is located adjacent to the Bergen County Utilities Authority Nature Preserve. The site is one of the few remaining remnants of lowland forest in Bergen County.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***Talge, H. Survey of the Losen Slote Creek Park and Adjacent Lands. August 1987.** [4] Discusses the natural history of Losen Slote Creek Park, including maps.

B. Real Estate/Ownership

Losen Slote Creek Park is owned by the Borough of Little Ferry, from whom NJMC has a 99-year lease agreement for public access.

C. Site History & Land Use

2. ***Talge, H. Survey of the Losen Slote Creek Park and Adjacent Lands. August 1987.** [4] Discusses the natural history of Losen Slote Creek Park, including maps.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

3. **Paulus, Sokolowski, and Sartor, Inc. Zoning Certificate Application: Proposed Sludge Dewatering Facilities. Bergen County Utilities Authority. 1991.** [1a] BCUA proposed to construct a sludge de-watering building in an existing, cleared area to implement the long-term sludge management plan. The application package included a completed application form, statement of compliance with environmental performance standards, and a wetland delineation survey. Included a review of the NWI maps and the HMDC Wetland Bio-zones Inventory, as well as an onsite soils/hydrology/vegetation investigation. The approximate limits of the wetland are shown on Plate 1, which is missing.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

4. **HMDC. Losen Slote Creek Park Woods; Contract EI- 103. May 1992.** [1a] Set of drawings of enhancement plans for Losen Slote Creek Park.

SITE #19 – LYNDHURST RIVERSIDE MARSH

Category: Candidate Restoration/Preservation Site

Location: Located southeast of where Berry's Creek flows into the Hackensack River, to the east of the Bellemeade Mitigation site, and south of Rutherford Landfill in Lyndhurst, Hudson County.
Latitude/Longitude: 40.78422 / -74.08880

Current Land Use: Tidal marsh

Size: 31 acres

Current Ownership: NJMC

Site Description: Lyndhurst Riverside Marsh is undeveloped and adjacent to the Bellemeade Mitigation site. The site is dominated by common reed (*Phragmites australis*). The current conceptual mitigation design includes grading of the marsh surface, creating of tidal channels, and reestablishing high saltmarsh.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. **Van Cleef Engineering Associates. Boundary and Topographic Survey for Lyndhurst Preserve Wetland Mitigation Site. 1999.** [1a] A boundary and topographic survey was completed for the Lyndhurst Preserve Wetlands Mitigation Site. The horizontal survey datum is NAD27 (feet); vertical datum is NAVD88 (feet). Cross-sections were surveyed at 50-foot intervals along creeks/ditches. Contour lines were generated at 0.5-foot intervals.

B. Real Estate/Ownership

Lyndhurst Riverside Marsh is owned by NJMC.

2. **NJMC. Riverside Marsh Acquisition Information. September 2003.**
   (from http://www.hmdc.state.nj.us/eip/wl-riverside.html)
   Date of Acquisition: April 28, 1999
   Cost of Acquisition: $306.470.20
   Acquired from: Town of Lyndhurst

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

3. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #20 – MEADOWLARK MARSH

Category: Candidate Restoration/Preservation Site

Location: Located north of Bellman's Creek and east of the New Jersey Turnpike – Eastern Spur in Ridgefield, Bergen County.
Latitude/Longitude: 40.82120 / -74.02449

Current Land Use: Tidal marsh

Size: 90 acres

Current Ownership: Hartz Mountain Development Corporation, but NJMC is in the process of acquiring the site.

Site Description: The Meadowlark Marsh site is currently undeveloped and dominated by common reed (*Phragmites australis*), but dotted with staghorn sumac (*Rhus hirta*) and black cherry (*Prunus serotina*) trees. Site elevations range from approximately 15 feet in the upland forest to 1-foot along Bellman's Creek. It appears that runoff from development along Westside Avenue is a possible source of freshwater for several ponds contained on site. The land is visited frequently by feeding ducks including green-winged teal (*Anas crecca*), and is a popular nesting area for red-winged black birds (*Agelaius phoeniceus*). This site has also been known as the Meadowlark Tract and the Bellman's Creek Site.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Meadowlark Marsh is owned by Hartz Mountain Development Corporation; however, it is in the process of being acquired by NJMC.

C. Site History & Land Use

1. ***Louis Berger & Associates, Inc. Bellman's Creek Site: Assessment of 90-acre Site in the Hackensack Meadowlands District. August, 1997.** [4] Assessment of site (called Bellman's Creek Site, but now known as the Meadowlark Marsh site) included the review of existing wildlife, land use (including wetlands), soils, hydrologic, sediment, and cultural resources information, as well as the collection of new data during a field investigation. Wetland functional value scores were also developed. The site was determined to be a potential wetland mitigation bank site, but would require a Phase II study of a spoil pile, a subsurface investigation program, and a culvert linking the northern and central sections to restore tidal flow to the central section.

2. ***PMK Group, Preliminary Assessment Report Meadowlark Site. December 2003.** [1a] This preliminary Phase 1 assessment evaluated the potential for hazardous material to exist on the property at levels likely to warrant mitigation, through site reconnaissance, and reviews of maps, historical information, and government agency listings.

D. Biological Studies – Fauna

3. ***Louis Berger & Associates, Inc. Bellman's Creek Site: Assessment of 90-acre Site in the Hackensack Meadowlands District. August, 1997.** [2a] Assessment of site (called Bellman's Creek Site, but now known as the Meadowlark Marsh site) included the review of existing wildlife, wetland/upland areas, soils, hydrologic, sediment, and cultural resources information, as well as the collection of new data during a field investigation. Wetland functional value scores were also developed. The site was determined to be a potential wetland mitigation bank site, but would require a Phase II study of a spoil pile, a subsurface investigation program, and a culvert linking the northern and central sections to restore tidal flow to the central section.

E. Biological Studies – General Environmental

4. ***Louis Berger & Associates, Inc. Bellman's Creek Site: Assessment of 90-acre Site in the Hackensack Meadowlands District. August, 1997.** [2a] Assessment of site (called Bellman's Creek Site, but now known as the Meadowlark Marsh site) included the review of existing wildlife, wetland/upland areas, soils, hydrologic, sediment, and cultural resources information, as well as the collection of new data during a field investigation. Wetland functional value scores were also developed. The site was determined to be a potential wetland mitigation bank site, but would require a Phase II study of a spoil pile, a subsurface investigation program, and a culvert linking the northern and central sections to restore tidal flow to the central section.

5. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

6. ***PMK Group, Preliminary Assessment Report Meadowlark Site. December 2003.** [1a] This preliminary Phase 1 assessment evaluated the potential for hazardous material to exist on the property at levels likely to warrant mitigation, through site reconnaissance, and reviews of maps, historical information, and government agency listings.

7. **TAMS Consultants, Inc. Functional Evaluation of the Villages at Mill Creek Development and Mitigation Sites. March 1993.** [2] Qualitatively evaluates the functional opportunity/effectiveness of wetlands at four sites – IR-2 (now the Mill Creek Wetland Mitigation Site), Anderson Creek Marsh, South Secaucus (also known as Riverbend Wetlands Preserve), and Meadowlark Marsh – based on physical, chemical, and biological attributes.

F. Geotechnical

8. ***Louis Berger & Associates, Inc. Bellman's Creek Site: Assessment of 90-acre Site in the Hackensack Meadowlands District. August, 1997.** [2a] Assessment of site (called Bellman's Creek Site, but now known as the Meadowlark Marsh site) included the review of existing wildlife, wetland/upland areas, soils, hydrologic, sediment, and cultural resources information, as well as the collection of new data during a field investigation. Wetland functional value scores were also developed. The site was determined to be a potential wetland mitigation bank site, but would require a Phase II study of a spoil pile, a subsurface investigation program, and a culvert linking the northern and central sections to restore tidal flow to the central section.

G. Hydraulics and Hydrology

9. ***Louis Berger & Associates, Inc. Bellman's Creek Site: Assessment of 90-acre Site in the Hackensack Meadowlands District. August, 1997.** [2a] Assessment of site (called Bellman's Creek Site, but now known as the Meadowlark Marsh site) included the review of existing wildlife, wetland/upland areas, soils, hydrologic, sediment, and cultural resources information, as well as the collection of new data during a field investigation. Wetland functional value scores were also developed. The site was determined to be a potential wetland mitigation bank site, but would require a Phase II study of a spoil pile, a subsurface investigation program, and a culvert linking the northern and central sections to restore tidal flow to the central section.

H. Water and Sediments

10. ***Louis Berger & Associates, Inc. Bellman's Creek Site: Assessment of 90-acre Site in the Hackensack Meadowlands District. August, 1997.** [2a] Assessment of site (called Bellman's Creek Site, but now known as the Meadowlark Marsh site) included the review of existing wildlife, wetland/upland areas, soils, hydrologic, sediment, and cultural resources information, as well as the collection of new data during a field investigation. Wetland functional value scores were also developed. The site was determined to be a potential wetland mitigation bank site, but would require a Phase II study of a spoil pile, a subsurface investigation program, and a culvert linking the northern and central sections to restore tidal flow to the central section.

I. Historical/Cultural Resources

11. ***Louis Berger & Associates, Inc. Bellman's Creek Site: Assessment of 90-acre Site in the Hackensack Meadowlands District. August, 1997.** [2a] Assessment of site (called Bellman's Creek Site, but now known as the Meadowlark Marsh site) included the review of existing wildlife, wetland/upland areas, soils, hydrologic, sediment, and cultural resources information, as well as the collection of new data during a field investigation. Wetland functional value scores were also developed. The site was determined to be a potential wetland mitigation bank site, but would require a Phase II study of a spoil pile, a subsurface investigation program, and a culvert linking the northern and central sections to restore tidal flow to the central section.

J. Restoration/Remediation Design Plans

12. ***Louis Berger & Associates, Inc. Bellman's Creek Site: Assessment of 90-acre Site in the Hackensack Meadowlands District. August, 1997.** [2a] Assessment of site (called Bellman's Creek Site, but now known as the Meadowlark Marsh site) included the review of existing wildlife, wetland/upland areas, soils, hydrologic, sediment, and cultural resources information, as well as the collection of new data during a field investigation. Wetland functional value scores were also developed. The site was determined to be a potential wetland mitigation bank site, but would require a Phase II study of a spoil pile, a subsurface investigation program, and a culvert linking the northern and central sections to restore tidal flow to the central section.

13. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Brackish Wetland Mitigation Concept. May 1986.** [2] Quantifies the net impact of filling 97.41 acres of USACE-regulated wetlands and enhancing 91.98 acres for the construction of the proposed Villages at Mill Creek.

SITE #21 – MEHRHOF POND

Category: Candidate Restoration/Preservation Site

Location: South of Losen Slote Creek, east of Losen Slote Creek Park, and west of the Hackensack River in Little Ferry, Bergen County.
Latitude/Longitude: 40.83600 / -74.03752

Current Land Use: Open water, upland, and freshwater wetland

Size: 77 acres

Current Ownership: BCUA (NJMC has lease access agreement for public access.)

Site Description: The Mehrhof Pond site consists of an open freshwater pond (Mehrhof Pond), native grassland and wet meadow areas, and the BCUA Nature Preserve and trail. The site is adjacent to a BCUA water treatment facility, and is bisected by a service road. The approximately six acre BCUA Nature Preserve and trail were dedicated in June of 1996 by BCUA. The nature preserve itself is considered a remnant lowland forest with coastal indications, while the self-guided trail is approximately 1½ miles long and features observation sites that include an observation deck and an outdoor classroom. The trail encircles Mehrhof Pond, which was formerly a clay pit for a brick manufacturing company that occupied the property until the 1940's. All the plant life that embellishes the nature preserve is indigenous to the area. At the present time, the BCUA Nature Preserve is not open to the general public, but is open by appointment only to organized groups and organizations.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Mehrhof Pond is owned by BCUA, from whom NJMC has a lease access agreement for public access.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

1. **Princeton Hydro, LLC. An Environmental Assessment of Mehrhof Pond as part of the Revitilization Project for the Bergen County Utilities Authority Nature Preserve & Trail, Bergen County. October 1998.** [1a] Fisheries study completed for Mehrhof Pond.

E. Biological Studies – General Environmental

No data obtained.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #22 – METRO MEDIA TRACT

Category: Candidate Restoration/Preservation Site

Location: Bordered on the east and south by the Hackensack River and on the north by Marsh Resources Meadowlands Mitigation Bank in Carlstadt, Bergen County.
Latitude/Longitude: 40.81180 / -74.03711

Current Land Use: Tidal marsh

Size: 74 acres

Current Ownership: NJMC

Site Description: This Metro Media Tract surrounds the Metro Media Broadcast site and towers. The site is undeveloped and dominated by common reed (*Phragmites australis*). Tidal flows are restricted due to high elevations. The current conceptual restoration plan includes restoring tidal hydrology, restoring high and low saltmarsh habitat, creating a tidal channel network, and creating an upland buffer zone.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Metro Media Tract was acquired on July 28, 2003 by NJMC for one-million dollars.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

1. ***Celebrano, M. A Characterization of Sites in the Hackensack Meadowlands District Experiencing Unexplained Decline of *Spartina alterniflora*. HMDC. 1995.** [1a] Compares soils from the Eastern Brackish Marsh, Western Brackish Marsh, Empire Tract, and Metro Media sites to determine if differing soil characteristics effect the growth of smooth cordgrass (*Spartina alterniflora)* seedlings in the first growing season. Soil cores from were analyzed for nutrients, metals, percent organic, grain size, acid-volatile sulfides.

F. Geotechnical

2. ***Celebrano, M. A Characterization of Sites in the Hackensack Meadowlands District Experiencing Unexplained Decline of *Spartina alterniflora*. HMDC. 1995.** [1a] Compares soils from the Eastern Brackish Marsh, Western Brackish Marsh, Empire Tract, and Metro Media sites to determine if differing soil characteristics effect the growth of smooth cordgrass (*Spartina alterniflora)* seedlings in the first growing season. Soil cores from were analyzed for nutrients, metals, percent organic, grain size, acid-volatile sulfides.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #23 – MORI TRACT

Category: Candidate Restoration/Preservation Site

Location: Located along Cromakill Creek, south of Eastern Brackish Marsh, and bordered to the west by West Side Avenue in Secaucus, Hudson County.
Latitude/Longitude: 40.79141 / -74.03806

Current Land Use: Tidal marsh

Size: 77 acres

Current Ownership: Eugene E. Mori

Site Description: This site is a restricted tidal marsh dominated by common reed (*Phragmites australis*). The current conceptual restoration plan includes increasing tidal flow and exchange, restoring intertidal wetlands, and reintroducing native wetland species. The adjacent upland area to the south of the site is owned by the same property owner.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Mori Tract is owned by Eugene E. Mori.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

1. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

2. **USACE. Jurisdictional Determination: Mori Tract Site (Application. No. 2001-00328). 7/6/2001.** [2] A jurisdictional determination was performed by the USACE in 2001 for the Mori Tract, Block 227, Lot 9 (Part) and Block 443, Lot 2.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plan

No data obtained.

SITE #24 – ORITANI MARSH

Category: Candidate Restoration/Preservation Site

Location: Bordered to the northeast by Berry's Creek Canal, to the southeast by the New Jersey Turnpike – Western Spur, and to the west by New Jersey Transit Bergen Line in East Rutherford, Bergen County. Latitude/Longitude: 40.80229 / -74.08405

Current Land Use: Tidal marsh

Size: 224 acres

Current Ownership: NJMC

Site Description: Oritani Marsh is an undeveloped tract that includes upland areas and high and low marsh areas, with small tidal channels in certain areas of the site. Present elevations at the Oritani Marsh site are substantially higher than that of the average daily tide, resulting in minimal hydrologic connections to the adjacent Berry's Creek Canal and the Hackensack River. The upland areas are dominated by a dense monoculture of common reed (*Phragmites australis*). The high marsh areas are dominated by saltmarsh hay (*Spartina patens*), while the low marsh areas are dominated by smooth cordgrass (*Spartina alterniflora*), marsh fleabane (*Pluchea pupurascens*), and dwarf spikerush (*Eleocharis pavula*).

The northern portions of the tract along the Berry's Creek Canal received spoils from the original dredging of the canal between 1902 and 1908. The northeastern half of the site received hydraulically broadcast spoils removed from the New Jersey Turnpike construction during the mid-1950s. Together, these activities eliminated a large portion of the low saltmarsh, burying it beneath several feet of fill material.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***The Louis Berger Group, Inc. Oritani Marsh Mitigation Site: Baseline Studies. February 2001.** [2a] Following the feasibility analysis conducted in 1999, multiple biological, chemical, and geomorphological studies were conducted to characterize existing site conditions and potential contamination. A topographic survey was conducted by GEOD Corporation in conjunction with the baseline studies. A discussion the implications of the studies' results on the restoration plan for Oritani Marsh was also included.

B. Real Estate/Ownership

Oritani Marsh is owned by NJMC.

2. **NJMC. Oritani Marsh Acquisition Information. September 2003.**
(from http://www.hmdc.state.nj.us/eip/wl-oritani.html)
Date of Acquisition: March 25, 1998
Cost of Acquisition: $2,200,000
Acquired from: Sisselman Israel Associates

C. Site History & Land Use

3. ***The Louis Berger Group, Inc. Oritani Marsh Mitigation Site: Baseline Studies. February 2001.** [2a] Following the feasibility analysis conducted in 1999, multiple biological, chemical, and geomorphological studies were conducted to characterize existing site conditions and potential contamination. A topographic survey was conducted by GEOD Corporation in conjunction with the baseline studies. A discussion the implications of the studies' results on the restoration plan for Oritani Marsh was also included.

D. Biological Studies – Fauna

4. ***Barrett, K. R., M. A. McBrien, & F. J. Artigas. Chemical and Biotic Assessment of Oritani Marsh, a Degraded Brackish Marsh in the Hackensack Meadowlands, Northeastern NJ. Abstract of the Meadowlands Symposium. 2003.** [1a] Oritani Marsh was assessed for vegetation, soil/sediment chemistry, abundance/diversity of benthic invertebrates, and bird and mammal usage.

5. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

6. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. September 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

7. ***The Louis Berger Group, Inc. Oritani Marsh Mitigation Site: Baseline Studies. February 2001.** [2a] Following the feasibility analysis conducted in 1999, multiple biological, chemical, and geomorphological studies were conducted to characterize existing site conditions and potential contamination. A topographic survey was conducted by GEOD Corporation in conjunction with the baseline studies. A discussion the implications of the studies' results on the restoration plan for Oritani Marsh was also included.

E. Biological Studies – General Environmental

8. ***Barrett, K. R., M. A. McBrien, & F. J. Artigas. Chemical and Biotic Assessment of Oritani Marsh, a Degraded Brackish Marsh in the Hackensack Meadowlands, Northeastern NJ. Abstract of the Meadowlands Symposium. 2003** [1a] Oritani Marsh was assessed for vegetation, soil/sediment chemistry, abundance/diversity of benthic invertebrates, and bird and mammal usage.

9. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

10. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. September 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

11. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

12. ***The Louis Berger Group, Inc. Oritani Marsh. December 1999.** [2a] A feasibility report reviewing existing information and the HMDC's conceptual wetland mitigation plan for Oritani Marsh. The report provided a written summary of existing data and suggestions for additional data required to further develop a wetland mitigation plan for the site. Hydrology, ecology, geotechnical parameters, and the nature and extent of contamination were assessed.

13. ***The Louis Berger Group, Inc. Oritani Marsh Mitigation Site: Baseline Studies. February 2001.** [2a] Following the feasibility analysis conducted in 1999, multiple biological, chemical, and geomorphological studies were conducted to characterize existing site conditions and potential contamination. A topographic survey was conducted by GEOD Corporation in conjunction with the baseline studies. A discussion the implications of the studies' results on the restoration plan for Oritani Marsh was also included.

14. **USACE. Jurisdictional Determination: Oritani Marsh (Application No. 1999-14600). 1/21/2000.** [2] A jurisdictional determination was performed by the USACE in 2000 for Oritani Marsh.

F. Geotechnical

15. ***Barrett, K. R., M. A. McBrien, & F. J. Artigas. Chemical and Biotic Assessment of Oritani Marsh, a Degraded Brackish Marsh in the Hackensack Meadowlands, Northeastern NJ. Abstract of the Meadowlands Symposium. 2003**[1a] Oritani Marsh was assessed for vegetation, soil/sediment chemistry, abundance/diversity of benthic invertebrates, and bird and mammal usage.

16. ***Ducks Unlimited, Inc. Baseline Monitoring Program: Soil and Sediment Contamination at Wetland Enhancement Sites within the Hackensack Meadowlands. March 1998.** [1a] Describes the results of soils sampling and analysis at several wetland restoration sites in the HMD, including Berry's Creek Canal site (also known as Oritani Marsh), Harrier Meadow, Mill Creek Marsh, and the Saw Mill Creek Wildlife Management Area. Preliminary surveys were conducted to screen soils at the sites for detection of the presence of potential chemical contaminants that might affect future plans for wetland restoration.

17. ***The Louis Berger Group, Inc. Oritani Marsh. December 1999.** [2a] A feasibility report reviewing existing information and the HMDC's conceptual wetland mitigation plan for Oritani Marsh. The report provided a written summary of existing data and suggestions for additional data required to further develop a wetland mitigation plan for the site. Hydrology, ecology, geotechnical parameters, and the nature and extent of contamination were assessed.

18. ***The Louis Berger Group, Inc. Oritani Marsh Mitigation Site: Baseline Studies. February 2001.** [2a] Following the feasibility analysis conducted in 1999, multiple biological, chemical, and geomorphological studies were conducted to characterize existing site conditions and potential contamination. A topographic survey was conducted by GEOD Corporation in conjunction with the baseline studies. A discussion the implications of the studies' results on the restoration plan for Oritani Marsh was also included.

G. Hydraulics and Hydrology

19. ***The Louis Berger Group, Inc. Oritani Marsh. December 1999.** [2a] A feasibility report reviewing existing information and the HMDC's conceptual wetland mitigation plan for Oritani Marsh. The report provided a written summary of existing data and suggestions for additional data required to further develop a wetland mitigation plan for the site. Hydrology, ecology, geotechnical parameters, and the nature and extent of contamination were assessed.

H. Water and Sediments

20. ***Barrett, K. R., M. A. McBrien, & F. J. Artigas. Chemical and Biotic Assessment of Oritani Marsh, a Degraded Brackish Marsh in the Hackensack Meadowlands, Northeastern NJ. Abstract of the Meadowlands Symposium. 2003.** [1a] Oritani Marsh was assessed for vegetation, soil/sediment chemistry, abundance/diversity of benthic invertebrates, and bird and mammal usage.

21. ***Ducks Unlimited, Inc. Baseline Monitoring Program: Soil and Sediment Contamination at Wetland Enhancement Sites within the Hackensack Meadowlands. March 1998.** [1a] Describes the results of soils sampling and analysis at several wetland restoration sites in the HMD, including Berry's Creek Canal site (also known as Oritani Marsh), Harrier Meadow, Skeetkill Creek Marsh, and Mill Creek Marsh. Preliminary surveys were conducted to screen soils at the sites for detection of the presence of potential chemical contaminants that might affect future plans for wetland restoration.

22. ***The Louis Berger Group, Inc. Oritani Marsh. December 1999.** [2a] A feasibility report reviewing existing information and the HMDC's conceptual wetland mitigation plan for Oritani Marsh. The report provided a written summary of existing data and suggestions for additional data required to further develop a wetland mitigation plan for the site. Hydrology, ecology, geotechnical parameters, and the nature and extent of contamination were assessed.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

23. ***The Louis Berger Group, Inc. Oritani Marsh. December 1999.** [2a] A feasibility report reviewing existing information and the HMDC's conceptual wetland mitigation plan for Oritani Marsh. The report provided a written summary of existing data and suggestions for additional data required to further develop a wetland mitigation plan for the site. Hydrology, ecology, geotechnical parameters, and the nature and extent of contamination were assessed.

24. ***The Louis Berger Group, Inc. Oritani Marsh Mitigation Site: Baseline Studies. February 2001.** [2a] Following the feasibility analysis conducted in 1999, multiple biological, chemical, and geomorphological studies were conducted to characterize existing site conditions and potential contamination. A topographic survey was conducted by GEOD Corporation in conjunction with the baseline studies. A discussion the implications of the studies' results on the restoration plan for Oritani Marsh was also included.

SITE #25 – PETRILLO TRACT

Category: Candidate Restoration/Preservation Site

Location: Located adjacent to the Secaucus High School, Secaucus Tract, and Mill Creek Marsh sites in Secaucus, Hudson County.
Latitude/Longitude: 40.80004 / -74.04621

Current Land Use: Tidal marsh

Size: 8 acres

Current Ownership: Louise G. Petrillo

Site Description: The Petrillo Tract includes a lowland marsh area and upland areas. It appears that runoff from residential streets flows into the property. A drainage ditch on the western border prevents runoff from an adjacent parking lot from reaching the upland areas; however, the topography suggests that this runoff reaches the low-lying marsh area. The current conceptual restoration plans includes increasing tidal flow and exchange, restoring intertidal wetlands, reintroducing native wetland species, and restoring upland grassland habitat.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Petrillo Tract is owned by Louise G. Petrillo.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

1. ***TAMS Consultants, Inc. Comprehensive Baseline Studies, IR-2 and Off-Site Mitigation Areas/Evaluation of the Harmon Meadow Western Brackish Marsh Mitigation Area. June 1990.** [2] Baseline studies were initiated in 1986 to provide Hartz Mountain Industries with planning information about three proposed mitigation sites - IR-2 onsite mitigation (now known as Western Brackish Marsh), Anderson Creek, and South Secaucus (also known as Riverbend Wetlands Preserve) – by documenting existing ecological conditions of the sites and the Hackensack River in their vicinity for a year-long period.

2. ***TAMS Consultants, Inc. Habitat Evaluation Procedure (HEP): IR-2 Site and Off-Site Mitigation Areas: Evaluation of the Villages at Mill Creek Mitigation Program. October 1990.** [2] The HEP was used to quantify the habitat value of the proposed IR-2 site (now the Mill Creek Wetland Mitigation Site) and mitigation area (now Western Brackish Marsh), as well as two potential offsite wetland mitigation sites – Anderson Creek Marsh and South Secaucus (also known as Riverbend Wetlands Preserve).

3. ***TAMS Consultants, Inc. Technical Report on Vegetation Mapping for IR-2, Anderson Creek Marsh, and South Secaucus Wetland Sites. December 1990.** [2] Presents vegetation mapping with supporting data for the IR-2 site (now the Mill Creek Wetland Mitigation Site), its potential onsite mitigation area (now Western Brackish Marsh), and potential offsite mitigation areas – Anderson Creek Marsh and South Secaucus (now known as Riverbend Wetlands Preserve).

4. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Brackish Wetland Mitigation Concept. May 1986.** [2] Quantifies the net impact of filling 97.41 acres of USACE-regulated wetlands and enhancing 91.98 acres for the construction of the proposed Villages at Mill Creek was quantified.

5. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Wetland Evaluation Technique (WET) Assessment (Draft). February 1990.** [2] A WET functional wetlands value assessment was undertaken in response to a condition of the USACE draft permit for this project. This WET assessment evaluated existing and future conditions at the IR-2 site (now the Mill Creek Wetland Mitigation Site), as well as the potential mitigation sites – Anderson Creek Marsh and South Secaucus (also known as Riverbend Wetlands Preserve). Social significance and functional effectiveness/opportunity of wetlands were evaluated.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

6. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Brackish Wetland Mitigation Concept. May 1986.** [2] Quantifies the net impact of filling 97.41 acres of USACE-regulated wetlands and enhancing 91.98 acres for the construction of the proposed Villages at Mill Creek.

SITE #26 - RIVERBEND WETLANDS PRESERVE

Category: Candidate Restoration/Preservation Site

Location: Directly adjacent to the Malanka landfill to the east, to the Hackensack River to the west and south, and south of the Laurel Hill Park Wetland site in Secaucus, Hudson County.
Latitude/Longitude: 40.75312 / -74.08973

Current Land Use: Tidal marsh

Size: 57 acres

Current Ownership: NJMC

Site Description: Riverbend Wetlands Preserve is undeveloped but is directly adjacent to the Malanka Landfill. Mosquito ditches were dug at the site in the 1920's and 1930's. Portions of the site currently support a mixture of native high saltmarsh vegetation, dominated by saltmarsh hay (*Spartina patens*). Other areas consist of open water and dense monocultures of common reed (*Phragmites australis*). Rutgers University uses the site as a reference study site due to the presence of native high marsh vegetation.

The site was purchased by NJMC in December 1996. NJMC has since prepared a preliminary wetland enhancement design and developed a scope of the work for baseline studies at the site. Preliminary evaluation of the open marsh water technique has been completed and presented to the jurisdictional agencies. A restoration design is being developed based on open marsh water management, and the baseline studies scope of work is being modified to ensure consistency with the OMWM requirements. The site has also been known as the South Secaucus Site.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Riverbend Wetlands Preserve is owned by NJMC.

1. **NJMC. Riverbend Wetlands Preserve Acquisition Information. September 2003.**
   (from http://www.hmdc.state.nj.us/eip/wl-riverbend.html)
   Date of Acquisition: December 20, 1996
   Cost of Acquisition: $475,000
   Acquired from: Hartz Mountain Industries

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

2. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

3. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. September 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

E. Biological Studies – General Environmental

4. ***Bart, D. Environmental Determinants of *Phragmites australis* Invasion in a New Jersey Salt Marsh: Interactions Among Human Activities, Disturbance, and Edaphic Conditions. Rutgers University. 2003.** [5] Tested ability of common reed (*Phragmites australis*) to establish itself in poorly drained saline environments through burial of large rhizomes, periods of low salinity, and localized drainage.

5. ***Bart, D. & J.M. Hartman. Environmental Constraints on Early Establishment of *Phragmites australis* in Salt Marshes. Wetlands. Volume 22 No. 2 pp. 201-213. 2002.** [5] Effects of rhizome burial, salinity, anoxia, and sulfides on emergence, survival, growth, biomass production, and spread of common reed (*Phragmites australis*) were examined in greenhouse and field experiments.

6. ***Bart, D. and J.M. Hartman. Environmental Determinants of *Phragmites australis* Expansion in a New Jersey Salt Marsh: An Experimental Approach. Oikos. 89:59-69. 2000.** [1a] Examined the effects of drainage and sulfides on common reed (*Phragmites australis*). Three experimental treatments were performed on *Phragmites* plants: 1) the previous year's dead stems were clipped to limit aeration; 2) rhizomes were severed to prevent translocation; and 3) both previous year's dead stems were clipped and rhizomes were severed. A control set was left undisturbed.

7. ***Bart, D. & J.M. Hartman. The Role of Large Rhizome Dispersal and Low Salinity Windows in the Establishment of Common Reed, *Phragmites australis*, in Salt Marshes: New Links to Human Activities. Estuaries. Volume 26 No. 2B pp. 436-443. 2003.** [5] Tested ability of common reed (*Phragmites australis*) to establish itself in poorly drained saline environments through burial of large rhizomes, periods of low salinity, and localized drainage.

8. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

9. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. September 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

10. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

11. ***TAMS Consultants, Inc. Comprehensive Baseline Studies, IR-2 and Off-Site Mitigation Areas/Evaluation of the Harmon Meadow Western Brackish Marsh Mitigation Area. June 1990.** [2] Baseline studies were initiated in 1986 to provide Hartz Mountain Industries with planning information about three proposed mitigation sites – IR-2 onsite mitigation (now known as Western Brackish Marsh), Anderson Creek Marsh, and South Secaucus (also known as Riverbend Wetlands Preserve) – by documenting existing ecological conditions of the sites and the Hackensack River in their vicinity for a year-long period.

12. ***TAMS Consultants, Inc. Functional Evaluation of the Villages at Mill Creek Development and Mitigation Sites. March 1993.** [2] Qualitatively evaluates the functional opportunity/effectiveness of wetlands at four sites – IR-2 (now the Mill Creek Wetland Mitigation Site), Anderson Creek Marsh, South Secaucus (also known as Riverbend Wetlands Preserve), and Meadowlark Marsh – based on physical, chemical, and biological attributes.

13. ***TAMS Consultants, Inc. Habitat Evaluation Procedure (HEP): IR-2 Site and Off-Site Mitigation Areas: Evaluation of the Villages at Mill Creek Mitigation Program. October 1990.** [2] The HEP was used to quantify the habitat value of the proposed IR-2 site (now the Mill Creek Wetland Mitigation Site) and mitigation area (now Western Brackish Marsh), as well as two potential offsite wetland mitigation sites – Anderson Creek Marsh and South Secaucus (also known as Riverbend Wetlands Preserve).

14. ***TAMS Consultants, Inc. Technical Report on Vegetation Mapping for IR-2, Anderson Creek Marsh, and South Secaucus Wetland Sites. December 1990.** [2] Presents vegetation mapping with supporting data for the IR-2 site (now the Mill Creek Wetland Mitigation Site), its potential onsite mitigation area (now Western Brackish Marsh), and potential offsite mitigation areas – Anderson Creek Marsh and South Secaucus (now known as Riverbend Wetlands Preserve).

15. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Wetland Evaluation Technique (WET) Assessment (Draft). February 1990.** [2] A WET functional wetlands value assessment was undertaken in response to a condition of the USACE draft permit for this project. This WET assessment evaluated existing and future conditions at the IR-2 site (now the Mill Creek Wetland Mitigation Site), as well as the potential mitigation sites – Anderson Creek Marsh and South Secaucus (also known as Riverbend Wetlands Preserve). Social significance and functional effectiveness/opportunity of wetlands were evaluated.

16. ***USEPA and Gannett Fleming, Inc. Site Survey Report: Ecological Studies: Hartz Mountain Development Corporation Villages at Mill Creek. October 1992.** [2] Presents results of a fourteen-week field study designed to evaluate the existing conditions of bird and aquatic ecology at the Villages at Mill Creek site (now the Mill Creek Wetland Mitigation Site), as well as the proposed mitigation areas for the fill activity at the site – Anderson Creek and South Secaucus (also known as Riverbend Wetlands Preserve).

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

17. **TAMS Consultants, Inc. Riverbend Wetlands Preserve: Sampling and Analyses of Sediment. June 11, 2001.** [2a] Sediment sampling and analysis was conducted at the Riverbend Wetlands Preserve. Samples were collected from 15 locations – ten within on-site creeks and five within the marsh plain – on April 26, 27, and 28, 2001. As composite and duplicates were included, a total of 28 samples were analyzed.

18. **Torlucci, Joseph Jr. Distribution of Heavy Metal Concentrations in Sediment Surrounding a Sanitary Landfill in the Hackensack Meadowlands, NJ. Rutgers University, Newark. 1982.** [1a] Collected sediment cores surrounding the "Mall" Landfill (aka Malanka Landfill) in Secaucus and analyzed for metals. Compared concentrations to other landfills and analyzed vertical gradient.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

19. ***TAMS Consultants, Inc. The Villages at Mill Creek (IR-2) Brackish Wetland Mitigation Concept. May 1986.** [2] Quantifies the net impact of filling 97.41 acres of USACE-regulated wetlands and enhancing 91.98 acres for the construction of the proposed Villages at Mill Creek.

SITE #27 – SECAUCUS HIGH SCHOOL

Category: Candidate Restoration/Preservation Site

Location: Bordered on the north by the Hackensack River and the southeast by Secaucus Tract in Secaucus, Hudson County.
Latitude/Longitude: 40.80420 / -74.04718

Current Land Use: Tidal marsh

Size: 43 acres

Current Ownership: Town of Secaucus (NJMC has a 99-year lease agreement.)

Site Description: The Secaucus High School site is currently dominated by common reed (*Phragmites australis*), and contains narrow sinuous channels, several mosquito ditches, and tide gates. A pump station, located on the southwest corner of the site, is fed by stormwater from the parking lot of the adjacent high school, as well as a small portion of the neighboring residential area to the southwest, and discharges stormwater directly onto the property. Additionally, three culverts collect stormwater from a 1000-foot section of Mill Ridge Road and feed directly onto the site from the south side. These culverts contain flap gates which theoretically keep onsite tidal waters from backing up onto the road. The flap gates are in poor condition, and currently are not working. Consequently, during heavy rains or excessively high tides, Mill Ridge Road experiences flooding.

The current restoration concept plan includes the use of the site as an emergency flood control detention basin. Design criteria are based on a 100-year storm. Existing storm sewer catch basins feeding directly to the site through the flap gates would be re-routed through new underground storm lines, and directed into the existing pump station, where flow would be discharged to the site from a single, regulated location that would not be subjected to tidal backflow. The installation of automatic Self-Regulating Tidegates would isolate the site from tidal influences during excessively high-tide conditions. This in turn would allow stormwater to be discharged onto the site to be detained until the storm or tides subside. A number of meandering channels and small ponded areas will also be developed.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Secaucus High School is owned by the Town of Secaucus, from whom NJMC has a 99-year lease agreement.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

1. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

2. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. September 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

3. ***Donald J. Smith Environmental Consultants. Monthly Report. Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School. October 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School sites. Includes photographs documenting environmental conditions.

E. Biological Studies – General Environmental

4. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. August 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

5. ***Donald J. Smith Environmental Consultants. Monthly Report: Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve and Secaucus High School. September 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, Oritani Marsh, Riverbend Wetlands Preserve, and Secaucus High School sites. Includes photographs documenting environmental conditions.

6. ***Donald J. Smith Environmental Consultants. Monthly Report. Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School. October 2001.** [1a] Monthly observation report summarizing site conditions, management recommendations, and wildlife monitoring data at the Harrier Meadow, Mill Creek, Skeetkill Creek Marsh, and Secaucus High School sites. Includes photographs documenting environmental conditions.

7. ***TAMS Consultants, Inc. Secaucus High School Wetland Mitigation Site: Baseline Studies. March 8, 2001.** [2a] Baseline studies were conducted for the Secaucus High School Wetland Mitigation Site, including vegetation cover type mapping; hydrologic features mapping; soil, sediment, and water sampling and analysis; and ecological sampling and analysis. The report details the methods, results, and conclusions for all of the studies conducted.

F. Geotechnical

8. ***TAMS Consultants, Inc. Secaucus High School Wetland Mitigation Site: Baseline Studies. March 8, 2001.** [2a] Baseline studies were conducted for the Secaucus High School Wetland Mitigation Site, including vegetation cover type mapping; hydrologic features mapping; soil, sediment, and water sampling and analysis; and ecological sampling and analysis. The report details the methods, results, and conclusions for all of the studies conducted.

G. Hydraulics and Hydrology

9. ***TAMS Consultants, Inc. Secaucus High School Wetland Mitigation Site: Baseline Studies. March 8, 2001.** [2a] Baseline studies were conducted for the Secaucus High School Wetland Mitigation Site, including vegetation cover type mapping; hydrologic features mapping; soil, sediment, and water sampling and analysis; and ecological sampling and analysis. The report details the methods, results, and conclusions for all of the studies conducted.

H. Water and Sediments

10. ***TAMS Consultants, Inc. Secaucus High School Wetland Mitigation Site: Baseline Studies. March 8, 2001.** [2a] Baseline studies were conducted for the Secaucus High School Wetland Mitigation Site, including vegetation cover type mapping; hydrologic features mapping; soil, sediment, and water sampling and analysis; and ecological sampling and analysis. The report details the methods, results, and conclusions for all of the studies conducted.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #28 – SECAUCUS TRACT

Category: Candidate Restoration/Preservation Site

Location: Bordered on the west by the Secaucus High School site and to the east by Mill Creek Marsh in Secaucus, Hudson County.
Latitude/Longitude: 40.80313 / -74.04427

Current Land Use: Tidal marsh

Size: 42 acres

Current Ownership: Town of Secaucus (NJMC has a 99-year lease agreement.)

Site Description: The site is currently dominated by common reed (*Phragmites australis*). Restoration of this site would provide connectivity between the Mill Creek Marsh and Secaucus High School sites to form a large, expanse of contiguous habitat.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Secaucus Tract is owned by the Town of Secaucus, from whom NJMC has a 99-year lease agreement commencing in September of 1999.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

No data obtained.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #29 – STEINER'S MARSH

Category: Candidate Restoration/Preservation Site

Location: Located south of the New Jersey Turnpike – Western Spur, west of Paterson Plank Road, and north of Hackensack River in East Rutherford, Bergen County.
Latitude/Longitude: 40.80745 / -74.06321

Current Land Use: Tidal marsh and upland

Size: 8 acres

Current Ownership: Tomu Construction Company, Inc.

Site Description: Steiner's Marsh is predominately an upland area with a low marsh fringe dominated by smooth cordgrass (*Spartina alterniflora*) along the southeastern edge of the site. Development on the property includes a Transco service road along the northern property edge and a golf driving range at the eastern corner. Site elevations range from one foot along the Hackensack River to approximately eight feet on the Transco road. The site may receive some runoff from nearby parking lots and roads.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Steiner's Marsh is owned by Tomu Construction Company, Inc.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

No data obtained.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #30 – TETERBORO WOODS

Category: Candidate Restoration/Preservation Site

Location: The site is bordered by Moonachie Avenue to the south and New Jersey Transit Pascack Valley Line in Moonachie, Teterboro, and Little Ferry, Bergen County
Latitude/Longitude: 40.84622 / -74.05548

Current Land Use: Freshwater wetland

Size: 258 acres

Current Ownership: Port Authority of New York and New Jersey

Site Description: The Teterboro Woods site consists of two separate areas southeast and southwest of the Teterboro Airport. The dominant wetland type is palustrine, successional broad-leaved deciduous forested/scrub-shrub with pockets of emergent wetlands. Upland inclusions and some disturbed areas are scattered among the wetland areas. Disturbance is mostly due to excavation and subsequent filling, as well as ditch dredging and spoil disposal. The Teterboro Woods site is slated for preservation.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***The Louis Berger Group, Inc. Teterboro Airport: Final Wetland Delineation Report. December 1999.** [6] A wetland delineation was performed to determine the extent of federal and/or state jurisdictional boundaries, as well as identify and characterize types, of all wetlands and open water bodies within the project area. Several different wetland classes were identified and a total of 68 wetland areas were delineated. The delineated wetland boundaries were overlaid on a 1-foot contour topographic map provided by the Port Authority of New York and New Jersey (the property owner).

B. Real Estate/Ownership

Teterboro Woods is owned by the Port Authority of New York and New Jersey.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

2. **Louis Berger & Associates, Inc. Report on Environmental Conditions at Teterboro Airport. May 1989.** [1a] Details the wetlands and stream encroachment in the vicinity of the East and West Riser Ditches at Teterboro Airport.
3. **Louis Berger and Associates, Inc. Wetland Delineation Report for Teterboro Airport. May 1987.** [6] A field survey of the Teterboro Airport was conducted during the winter and spring months of 1986 and 1987. This report includes detailed wetland and upland descriptions, a soil log, and recommendations for fill operations at the airport site.

4. **Louis Berger & Associates, Inc. Wetland Mitigation for Teterboro Airport. 1987** [1a] Details a wetland delineation and unauthorized wetland fill determination for the South Development and East Areas. Includes applications for USACE Section 404 and NYSDEC Stream Encroachment permits Includes concepts to mitigation for unauthorized fill.

5. ***The Louis Berger Group, Inc. Teterboro Airport: Final Wetland Delineation Report. December 1999.** [6] A wetland delineation was performed to determine the extent of federal and/or state jurisdictional boundaries, as well as identify and characterize types, of all wetlands and open water bodies within the project area. Several different wetland classes were identified and a total of 68 wetland areas were delineated. The delineated wetland boundaries were overlaid on a 1-foot contour topographic map provided by the Port Authority of New York and New Jersey (the property owner).

6. **USACE. Jurisdictional Determination: Teterboro Woods/Airport Site (App. No. 2000-01158). 10/3/2001.** [2] A jurisdictional determination was performed by the USACE in 2001 for the Teterboro Woods/Airport Site.

F. Geotechnical

7. **Louis Berger and Associates, Inc. Wetland Delineation Report for Teterboro Airport. May 1987.** [6] A field survey of the Teterboro Airport was conducted (following the 1987 Corps of Engineers Wetland Delineation Manual) during the winter and spring months of 1986 and 1987. This report includes detailed wetland and upland descriptions, a soil log, and recommendations for fill operations at the airport site.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

8. **Louis Berger & Associates, Inc. Wetland Mitigation for Teterboro Airport. 1987** [1a] Details a wetland delineation and unauthorized wetland fill determination for the South Development and East Areas. Includes applications for USACE Section 404 and NYSDEC Stream Encroachment permits Includes concepts to mitigate for unauthorized fill.

WATERBODIES AND OTHER WETLANDS

SITE #31 – BELLMAN'S CREEK

Category: Waterbodies & Other Wetlands

Location: Located in the northeast corner of the HMD, running along/through Bellman's Creek Marsh, Skeetkill Creek Marsh, and Meadowlark Marsh. The creek begins in Ridgefield and then runs along the border of Ridgefield and North Bergen out to the Hackensack River, in Bergen and Hudson Counties.

Current Land Use: Open Water

Site Description: Bellman's Creek is tidally influenced. Its banks are primarily mudflats and common reed (*Phragmites australis*) dominated marsh. The creek flows under the New Jersey Turnpike – Eastern Spur, and through culverts under Westside Avenue. Some flooding of the areas around Bellman's Creek is common during storm events.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Not applicable.

C. Site History & Land Use

1. ***Louis Berger & Associates, Inc. Wetland Delineation Report. 1993.** [1a] Wetland delineation report performed for Lots 1 through 46, Block 137 in Carlstadt, owned by Transcontinental Gas Pipe Line Corporations. Existing wetland documentation/reports evaluated included: 1) 1976 NWI Map; 2) 1989 USEPA Wetland HMDC Assessment Map; 3) 1986 New Jersey Turnpike Technical Study Volume II: Biological Resources; 4) 1989 NRCS Bergen County Soil Survey; 5) 1985 HMDC Aerial Photograph; and 6) 1990 Vicinity Map (topographic map).

D. Biological Studies - Fauna

No data obtained.

E. Biological Studies – General Environmental

No data obtained.

F. Geotechnical

2. ***PSE&G Company. Application for the Zoning Certificate for the 12" Natural Gas Distribution Main. 1993.** [1a] Includes the application form and checklist for compliance with environmental performance standards. PSEG (formerly PSE&G) proposed the installation of a 12-inch gas main between the existing PSEG M&R station and the Lowe Paper cogeneration facility in Ridgefield. The use of a horizontal drilling method near the waterway and wetland areas was proposed to reduce environmental impacts. A wetland delineation map is provided.

3. ***Schulderein, J. Geoarchaeological Overview of Bellman's Creek, Hackensack Meadowlands, New Jersey. H-BLRT 1B Appendix (Pages 198 - 219). 1995.** [1a] An appendix in a report entitled *Jersey City to the Vince Lombardi Park-Ride, Archeological Testing for the Hudson-Bergen Light Rail System* prepared by Joan H. Geismar. Undertaken to identify depositional contexts and buried archeological site potential in the vicinity of borehole NA-04 near the confluence of the Hackensack River and the southeast bank of Bellman's Creek. Discusses other paleoecological research performed in other parts of the Meadowlands.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

4. ***Mattson, C., G. Potera, & M.E. Saks. Water Quality in a Disordered Ecosystem: A Report on the Water Quality Monitoring Study Performed in the Hackensack Meadowlands between June and September 1971. 1971.** [1a] Part of a natural resource inventory on which to base future land use decisions and against which to make future comparisons. Chemistry and water quality were measured at 11 sites, including Berry's Creek, Penhorn Creek, Losen Slote Creek, Bellman's Creek, Moonachie Creek, Mill Creek, and the Hackensack River.

I. Historical/Cultural Resources

5. ***Schulderein, J. Geoarchaeological Overview of Bellman's Creek, Hackensack Meadowlands, New Jersey. H-BLRT 1B Appendix (Pages 198 - 219). 1995.** [1a] An appendix in a report entitled *Jersey City to the Vince Lombardi Park-Ride, Archeological Testing for the Hudson-Bergen Light Rail System* prepared by Joan H. Geismar. Undertaken to identify depositional contexts and buried archeological site potential in the vicinity of borehole NA-04 near the confluence of the Hackensack River and the southeast bank of Bellman's Creek. Discusses other paleoecological research performed in other parts of the Meadowlands.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #32 – BERRY'S CREEK/BERRY'S CREEK CANAL

Category: Waterbodies & Other Wetlands

Location: Berry's Creek is located on the western side of the Hackensack River, running along NJSEA Sports Complex Walden Marsh, Berry's Creek Marsh, Lyndhurst Landfill, Rutherford Landfill, Bellemeade Mitigation, and Lyndhurst Riverside Marsh. The creek flows through East Rutherford into Rutherford, then along the boundary of Rutherford and Lyndhurst out to the Hackensack River in Bergen County.

Berry's Creek Canal is located to the east of the Hackensack River along the northern boundary of Oritani Marsh in East Rutherford, Bergen County.

Current Land Use: Open Water

Site Description: Berry's Creek and Berry's Creek Canal converge just south of the Route 3 Bridge. The canal flows unimpeded, while the creek flows through two degraded culverts located under the Rutherford Landfill haul road and New Jersey Transit Bergen Line. Both are considered to be highly contaminated, with high levels of mercury and other heavy metals found in the sediments. From as early as 1943, F.W. Berk and Co., and then later the Wood-Ridge Chemical Corporation (Velsicol Corporation), were releasing effluent containing substantial levels of mercury into the canal. Studies have estimated that as much as one to two kilograms of mercury per day were being released from the chemical plant, until it ceased operation in 1974. Although the chemical plants are no longer releasing mercury into the canal, studies have shown that the site is still a source of contamination.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***BCUA. Bergen County Utilities Authority Resource Recovery Facility: Lyndhurst Site Rezoning Application. 1983.** [1a] Rezoning application for Block 231, Lot 11 in Lyndhurst for a resource recovery facility. This application included: 1) a resource recovery technology site feasibility analysis; 2) an environmental analysis; and 3) a planning report. The environmental analysis investigated a water quality report for Berry's Creek, as well as safety and public health issues. The planning report consisted of topographic map and wetlands inventory.

2. ***ERDC, HMDC, & USACE – NYD. Flood Control Survey. 2000.** [2a] Survey performed for the HMD that consisted of: 1) cross-sections along the Hackensack River and its major tributaries, including Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke; 2) identifying 30 flood control structures along the Hackensack River; and 3) locating all bridges and piers within the study area. In addition, digital aerials were flown and geo-referenced. The vertical datum for the survey was NGVD29. At 13 of the 30 flood control structures, tide gages and single beam acoustic Doppler current meters were installed and monitored to measure velocity, head difference, and discharge at these locations.

3. ***Exponent Environmental Group. Agency Review Draft Phase I Remedial Investigation Report: Ventron/Velsicol Site, Wood-Ridge/Carlstadt, New Jersey. Volumes 1-3. December 1998.** [1] Investigation to develop sufficient site characterization information to support informed risk management decisions. Report includes information on surface and subsurface soil, hydrology, leachate/seep sampling, surface water and sediment, wetlands, air, hazardous substances, topography, and cultural resources. Volumes 1, 2, and 3 contain the main body of the report, the appendices, and the final version of the background investigation technical memorandum, respectively.

4. ***Exponent Environmental Group. Operable Unit 1 Remedial Investigation Report: Ventron/Velsicol Site, Wood-Ridge/Carlstadt, New Jersey. Volumes 1-3 September 2000.** [1] Phase I and I-A site characterizations were completed to identify any additional data needed to support the remedial investigation objectives. Specific objectives of the Phase I and IA investigations included: 1) the identification SoPCs that have been released; 2) the characterization of the transport and fate of SoPCs at the site; 3) the completion of the off site delineation of mercury in surface soils; and 4) the characterization of sediment and surface water quality in the West Ditch.

5. ***Jack McCormick & Associates, Inc. Draft Assessment of the Potential Environmental Impact of the Construction and Operation of a New Jersey Sports and Exposition Complex at a Site in Rutherford, Bergen County, New Jersey. 1972.** [1a] Draft EIS that evaluated both the onsite and offsite environmental impacts of the construction and operation of the NJSEA's Sports Complex (Walden Marsh was part of the site). Examined land form/geology, vegetation, wildlife, and water quality at the proposed site. Assessed probable noise, traffic, and air quality impacts. Also includes environmental inventory for the HMD (physiography/geology and vegetation) and the project site (vegetation, wildlife, geology, and water quality).

6. ***Paulus, Sokolowski, & Sartor, Inc. Wetland Assessment and Mitigation Plan for Eighty Associates, East Rutherford, NJ Sites. 1988.** [1a] Report detailing proposed onsite (two sites) and offsite (third site) freshwater mitigation for fills due to development by Eighty Associates at the first two sites in Rutherford. Used WET to evaluate the existing wetlands and HEP to determine the required mitigation acreages. Proposed mitigation plan included the use of a weir/pump combination to create freshwater marsh.

7. ***Rogers Surveying, Inc. Hackensack River Survey: Upper Portion. March 1999.** [4] Survey performed for the Operations Division of the USACE-NYD, generated at one-foot contour intervals from the top of the bank to the approximate location of the mean low water line. The survey covered an area along the northwest corner of the junction of the Hackensack River and Berry's Creek. Vertical datum for the survey was NGVD29.

8. ***TAMS Consultants, Inc. Delineation of Waters of U.S. 1992.** [1a] Wetland delineation for Block 231, Lot 8 in Lyndhurst for Wilson Associates. USACE 1987 delineation manual was used. No freshwater wetlands were found onsite, but a delineation of the spring high tide mark (3.8-feet) determined the extent of tidal wetlands. Detailed vegetation, soil, and hydrology investigation results were included in the report.

B. Real Estate/Ownership

Not applicable.

C. Site History & Land Use

9. ***NJSEA. Flood Management Plan Hackensack Meadowlands District – Volume 2: Summary of Permit to Construct an Embankment and Other Facilities on Berry's Creek, Bergen County, New Jersey. 1980.** [1a] Draft EIS examining the impacts of the proposed embankment and other facilities related to the NJSEA Sports Complex construction along Berry's Creek, which includes a football stadium, a horse racing facility, and an environment center. Discusses adverse environmental impacts due to the elimination of the Walden Marsh.

D. Biological Studies – Fauna

10. ***The Academy of Natural Sciences Benedict Estuaries Research Laboratory & HMDC Environmental Operations Research Laboratory. Interim Report: Accumulation of Chromium in Blue Crabs *(Callinectes sapidus*) from the Hackensack River, Hudson County, New Jersey. November 1991.** [1] Interim report of study (March 1992 study cited with Konsevick as author) designed to characterize the levels of chromium in the claw, body muscle, and hepatopancreas of blue crabs. The samples were collected during three seasonal events at three Hackensack River sites chosen to depict conditions throughout the estuary – Diamond Shamrock, Sawmill Creek, and Berry's Creek.

11. ***Anonymous (HMDC). Biological Water Quality and Field Sampling Survey of the Hackensack Meadowlands. 1980.** [1a] During a one-day sampling event, water quality was measured at 11 sites for temperature, salinity, DO, and TSS. Also set fish sampling nets in Berry's Creek Canal and Sawmill Creek.

12. ***Black, I. H. Past and Present Status of the Birds of the Lower Hackensack River Marshes. New Jersey Nature News. 25(2):57-70. 1970.** [1a] Describes the highlights of the bird population of the lower Hackensack River marshes between 1961 and 1967. It compares the bird data of 1961-1967 to that of 1969, and also compares the shorebird numbers of 1961-1967 to those found prior to 1936 in the Secaucus and Newark marshes.

13. ***Bragin, A. Brett, W. Frame, M. Kraus, D. Smith, A. Goeller, J. Graviec, & E. Konsevick. Inventory of Fisheries Resources of the Hackensack River within the Jurisdictional Boundary of the Hackensack Meadowlands Development Commission from Kearny, Hudson County, to Ridgefield, Bergen County, New Jersey. May 18, 1989.** [1] A two-year survey (2/1987 to 12/1988) initiated by HMDC of the lower Hackensack River to ascertain the fisheries values of the river and help guide intelligent decisions on development applications.

14. ***EA Science and Technology & PSE&G. Kearny Generating Station Supplemental 316(b) Report. NJDEP. 1988.** [1a] Evaluates the effects of the cooling water intake of the Kearny Generating Station on the ecology of the Hackensack River and adjacent waters, based on entrainment and impingement data collected from June 1987 to April 1988, and on biological data collected from the vicinity of the Kearny station since August 1986. Studies of macrozooplankton, ichthyoplankton, and juvenile and adult fish were conducted in vicinity of the station and the full length of the estuary. Includes background information on the Hackensack Estuary.

15. ***ERM – Southeast, Inc. Task I: Site Specific Literature Search – Non-Hazardous Matrix Characteristics Part I: Soils and Sediment Characteristics Water Quality and Biological Resources Rare and Endangered Species. April 1985.** [1] An update concerning further Task I research conducted by ERM – Southeast, Inc. Incorporates all the Task I site specific literature for determining non-hazardous matrix characteristics for: 1) soil and sediment; 2) water quality; and 3) biota for the Berry's Creek environmental study.

16. **Galluzzi, P. Mercury Concentrations in Muskrats, *Ondata zibethicus*, from the Hackensack Meadowlands, New Jersey. Fairleigh Dickinson University. 1976.** [1a] Muskrats were collected from four locations in the tributaries of the Hackensack River, including Berry's Creek, and from a control area. Mercury concentrations in the muskrats from each of the sampling sites were compared. Concludes that mercury is not accumulating faster in muskrats in areas of known contamination than those found in natural, uncontaminated areas.

17. **HMDC Environmental Operations Laboratory. Berry's Creek Site Mercury in Biota Monitoring. May 1988.** [1] Addresses the quality assurance requirements set forth by NJDEP for work performed in conjunction with a NPL site. The project was an experimental design to determine if intestinal tract contents effect whole fish concentrations of mercury.

18. ***Jack McCormick & Associates, Inc. Collections of Aquatic Organisms from the Hackensack Meadowlands, Bergen and Hudson Counties, NJ. 1977.** [1a] Study undertaken to obtain a large number of biological samples from the waters and wetlands at eight stations in the central meadowlands. Samples were collected during three days in October 1976. Specimens were identified, labeled, packaged, and frozen. The concentrations of mercury in the samples collected were to be determined at a later date under a separate contract.

19. ***Jack McCormick & Associates, Inc. Draft Assessment of the Potential Environmental Impact of the Construction and Operation of a New Jersey Sports and Exposition Complex at a Site in Rutherford, Bergen County, New Jersey. 1972.** [1a] Draft EIS that evaluated both the onsite and offsite environmental impacts of the construction and operation of the NJSEA's Sports Complex (Walden Marsh was part of the site). Examined land form/geology, vegetation, wildlife, and water quality at the proposed site. Assessed probable noise, traffic, and air quality impacts. Also includes environmental inventory for the HMD (physiography/geology and vegetation) and the project site (vegetation, wildlife, geology, and water quality).

20. ***Konsevick, Edward. Accumulation of Chromium in Blue Crabs from the Hackensack River, Hudson County, New Jersey. March 1992.** [1] Designed to characterize the levels of chromium in the claw, body muscle, and hepatopancreas of blue crabs. The samples were collected during three seasonal events at three Hackensack River sites chosen to depict conditions throughout the estuary – Diamond Shamrock, Sawmill Creek, and Berry's Creek.

21. ***McFarland, Victor A., Charles R. Lee, & Joan U. Clarke (USACE WES). Bioavailability Studies – Phase 1: Mercury Uptake by Killifish and Clams. 1988** [1a] Fish and clams were exposed to different concentrations of suspended sediment in a series of experiments and mercury uptake was measured.

22. **Santoro, E. & S. Koepp. Mercury Levels in Organisms in Proximity to an Old Chemical Site (Berry's Creek, Hackensack Meadowlands, New Jersey). Marine Pollution Bulletin, vol. 17, # 5 pp. 219-224. 1986.** [1a] Finfish and crustacea were collected seasonally at 11 sites in and around Berry's Creek during 1979 and 1980 and analyzed for total mercury. Mummichogs appeared to be a reliable indicator of local mercury contamination. Only infrequent mercury concentrations in excess of US FDA action guidelines were obtained in potentially edible species. No immediate health hazard was indicated.

23. ***Weis, Peddick, Judith S. Weis, & John Bogden. Effects of Environmental Factors on Release of Mercury from Berry's Creek Sediments and Its Uptake by Killifish: *Fundulus heteroclitus*. Environmental Pollution (Series A) v40. 1986** [1a] Sediments from Berry's Creek were place in lab aquaria and subject to different treatments in the presence of killifish. Aeration, stirring, salinity, and pH were varied. Fish tissues were analyzed for mercury. Also includes results of field collection/analyzation of fish.

E. Biological Studies – General Environmental

24. ***BCUA. Bergen County Utilities Authority Resource Recovery Facility: Lyndhurst Site Rezoning Application. 1983.** [1a] Rezoning application for Block 231, Lot 11 in Lyndhurst for a resource recovery facility. This application included: 1) a resource recovery technology site feasibility analysis; 2) an environmental analysis; and 3) a planning report. The environmental analysis investigated a water quality report for Berry's Creek, as well as safety and public health issues. The planning report consisted of topographic map and wetlands inventory.

25. **Burke, D.J., J.S. Weis, & P. Weis. Release of Metals by the Leaves of the Salt Marsh Grasses *Spartina alterniflora* and *Phragmites australis*. May 2000.** [1] The differential release of metals by smooth cordgrass *(Spartina alterniflora)* and the invasive perennial grass common reed (*Phragmites australis)* were examined in a tributary of Berry's Creek. It was determined that *S. alterniflora* can release larger quantities of metals into the marsh environment than *Phargmites*, through excretion and leaf deposition.

26. ***Exponent Environmental Group. Agency Review Draft Phase I Remedial Investigation Report: Ventron/Velsicol Site, Wood-Ridge/Carlstadt, New Jersey. Volumes 1-3. December 1998.** [1] Investigation to develop sufficient site characterization information to support informed risk management decisions. Report includes information on surface and subsurface soil, hydrology, leachate/seep sampling, surface water and sediment, wetlands, air, hazardous substances, topography, and cultural resources. Volumes 1, 2, and 3 contain the main body of the report, the appendices, and the final version of the background investigation technical memorandum, respectively.

27. ***Exponent Environmental Group. Operable Unit 1 Ecological Risk Assessment Ventorn/Velsicol Site Wood-Ridge/Carlstadt, New Jersey. April 2001.** [1] Presents the results of the ERA for the site, which is an eight step interactive process among involved parties. As a result of this study, environmentally sensitive areas were identified, described, and mapped according to the N.J.A.C. 7:1E-4.10 guidance.

28. ***Jack McCormick & Associates, Inc. Draft Assessment of the Potential Environmental Impact of the Construction and Operation of a New Jersey Sports and Exposition Complex at a Site in Rutherford, Bergen County, New Jersey. 1972.** [1a] Draft EIS that evaluated both the onsite and offsite environmental impacts of the construction and operation of the NJSEA's Sports Complex (Walden Marsh was part of the site). Examined land form/geology, vegetation, wildlife, and water quality at the proposed site. Assessed probable noise, traffic, and air quality impacts. Also includes environmental inventory for the HMD (physiography/geology and vegetation) and the project site (vegetation, wildlife, geology, and water quality).

29. ***NJSEA. Flood Management Plan Hackensack Meadowlands District – Volume 2: Summary of Permit to Construct an Embankment and Other Facilities on Berry's Creek, Bergen County, New Jersey. 1980.** [1a] Draft EIS examining the impacts of the proposed embankment and other facilities related to the NJSEA Sports Complex construction along Berry's Creek, which includes a football stadium, a horse racing facility, and an environment center. Discusses adverse environmental impacts due to the elimination of the Walden Marsh.

30. ***Paulus, Sokolowski & Sartor, Inc. Wetland Assessment and Mitigation Plan for Eighty Associates, East Rutherford, NJ Sites. 1988.** [1a] Report detailing proposed onsite (two sites) and offsite (third site) freshwater mitigation for fills due to development by Eighty Associates at the first two sites in Rutherford. Used WET to evaluate the existing wetlands and HEP to determine the required mitigation acreages. Proposed mitigation plan included the use of a weir/pump combination to create freshwater marsh.

31. ***TAMS Consultants, Inc. Delineation of Waters of U.S. 1992.** [1a] Wetland delineation for Block 231, Lot 8 in Lyndhurst for Wilson Associates. USACE 1987 delineation manual was used. No freshwater wetlands were found onsite, but a delineation of the spring high tide mark (3.8-feet) determined the extent of tidal wetlands. Detailed vegetation, soils, and hydrology investigation results were included in the report.

32. ***Turner, Joe. Chromium Concentrations in the Blue Crab (*Callinectes sapidus*): An Independent Study Project Conducted at the Hackensack Meadowlands Environmental Research Laboratory. May 1990.** [1] Blue crabs were analyzed for total chromium concentrations to determine extent of contamination. The NJDEP and the HMDC supplied samples collected over a two year period from the Hackensack River near the Laurel Hill, from Sawmill Creek, and from Berry's Creek Canal.

33. **Windham, Lisamarie, Judith S. Weis, and Peddrick Weis. Patterns and Processes of Mercury Release from Leaves of Two Dominant Salt Marsh Macrophytes, *Phragmites australis* and *Spartina alterniflora*. December 2001.** [1] A sampling event conducted off of a tributary of Berry's Creek between late May and late July, it was determined that leaves of smooth cordgrass *(S. alterniflora)* consistently releases two to three times more Hg than leaves of common reed (*Phragmites australis)*. This study also revealed many other facts pertaining to the release of Hg from these plants during the time period of the testing.

F. Geotechnical

34. ***BCUA. Bergen County Utilities Authority Resource Recovery Facility: Lyndhurst Site Rezoning Application. 1983.** [1a] Rezoning application for Block 231, Lot 11 in Lyndhurst for a resource recovery facility. This application included: 1) a resource recovery technology site feasibility analysis; 2) an environmental analysis; and 3) a planning report. The environmental analysis investigated a water quality report for Berry's Creek, as well as safety and public health issues. The planning report consisted of topographic map and wetlands inventory.

35. ***Dames & Moore. Final Project Operations Plan, Remedial Investigation, Scientific Chemical Processing Site, Carlstadt Township, Bergen County, New Jersey. 1987.** [1a] A seven page section gives a brief description of this superfund site, including site history and environmental characteristics. The remainder of the document is a work plan for a remedial investigation.

36. ***ERM – Southeast, Inc. Task I: Site Specific Literature Search – Non-Hazardous Matrix Characteristics Part I: Soils and Sediment Characteristics Water Quality and Biological Resources Rare and Endangered Species. April 1985.** [1] An update concerning further Task I research conducted by ERM – Southeast, Inc. Incorporates all the Task I site specific literature for determining non-hazardous matrix characteristics for: 1) soil and sediment; 2) water quality; and 3) biota for the Berry's Creek environmental study.

37. ***Exponent Environmental Group. Agency Review Draft Phase I Remedial Investigation Report: Ventron/Velsicol Site, Wood-Ridge/Carlstadt, New Jersey. Volumes 1-3. December 1998.** [1] Investigation to develop sufficient site characterization information to support informed risk management decisions. Report includes information on surface and subsurface soil, hydrology, leachate/seep sampling, surface water and sediment, wetlands, air, hazardous substances, topography, and cultural resources. Volumes 1, 2, and 3 contain the main body of the report, the appendices, and the final version of the background investigation technical memorandum, respectively.

38. ***Exponent Environmental Group. Operable Unit 1 Remedial Investigation Report: Ventron/Velsicol Site, Wood-Ridge/Carlstadt, New Jersey. Volumes 1-3 September 2000.** [1] Phase I and I-A site characterizations were completed to identify any additional data needed to support the remedial investigation objectives. Specific objectives of the Phase I and IA investigations included: 1) the identification SoPCs that have been released; 2) the characterization of the transport and fate of SoPCs at the site; 3) the completion of the off site delineation of mercury in surface soils; and 4) the characterization of sediment and surface water quality in the West Ditch.

39. ***Jack McCormick & Associates, Inc. Draft Assessment of the Potential Environmental Impact of the Construction and Operation of a New Jersey Sports and Exposition Complex at a Site in Rutherford, Bergen County, New Jersey. 1972.** [1a] Draft EIS that evaluated both the onsite and offsite environmental impacts of the construction and operation of the NJSEA's Sports Complex (Walden Marsh was part of the site). Examined land form/geology, vegetation, wildlife, and water quality at the proposed site. Assessed probable noise, traffic, and air quality impacts. Also includes environmental inventory for the HMD (physiography/geology and vegetation) and the project site (vegetation, wildlife, geology, and water quality).

40. ***TAMS Consultants, Inc. Delineation of Waters of U.S. 1992.** [1a] Wetland delineation for Block 231, Lot 8 in Lyndhurst for Wilson Associates. USACE 1987 delineation manual was used. No freshwater wetlands were found onsite, but a delineation of the spring high tide mark (3.8-feet) determined the extent of tidal wetlands. Detailed vegetation, soils, and hydrology investigation results were included in the report.

G. Hydraulics and Hydrology

41. ***Bertolotti, Benjamin J. Chemical Oxygen Demand Interference in the Stormwater Collection System of the Meadowlands Sport Complex. 1990.** [1] Analyzed Berry's Creek for exceedence of permit levels of organic and inorganic pollutants at the discharge point of the stormwater collection system for the Meadowlands Sports Complex. The system consists of four retention basins that trap runoff from the facility's parking lots. Pumping action moves the water through the system, eventually discharging into Berry's Creek.

42. ***Dames & Moore. Final Project Operations Plan, Remedial Investigation, Scientific Chemical Processing Site, Carlstadt Township, Bergen County, New Jersey. 1987.** [1a] A seven page section gives a brief description of this superfund site, including site history and environmental characteristics. The remainder of the document is a work plan for a remedial investigation.

43. ***ERDC, HMDC, & USACE – NYD. Flood Control Survey. 2000.** [2a] Survey performed for the HMD that consisted of: 1) cross-sections along the Hackensack River and its major tributaries, including Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke; 2) identifying 30 flood control structures along the Hackensack River; and 3) locating all bridges and piers within the study area. In addition, digital aerials were flown and geo-referenced. The vertical datum for the survey was NGVD29. At 13 of the 30 flood control structures, tide gages and single beam acoustic Doppler current meters were installed and monitored to measure velocity, head difference, and discharge at these locations.

44. ***ERDC & USACE – NYD. The Hackensack Meadowlands Flood Control Study. 1998 – 2004 (On-going).** [2a] Undertaken to develop a numerical hydraulic model of the Hackensack River and its associated tidal marshes and channels. A parent model (one-dimensional hydrologic) is being developed for the Hackensack River Basin, while child models (two-dimensional hydrologic) are being developed for Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke. The study also includes the evaluation of the performance of proposed flood control structures and restored wetland areas with respect to flood elevations, as well as the effects of optimum maintenance on existing flood control structures.

45. ***Exponent Environmental Group. Agency Review Draft Phase I Remedial Investigation Report: Ventron/Velsicol Site, Wood-Ridge/Carlstadt, New Jersey. Volumes 1-3. December 1998.** [1] Investigation to develop sufficient site characterization information to support informed risk management decisions. Report includes information on surface and subsurface soil, hydrology, leachate/seep sampling, surface water and sediment, wetlands, air, hazardous substances, topography, and cultural resources. Volumes 1, 2, and 3 contain the main body of the report, the appendices, and the final version of the background investigation technical memorandum, respectively.

46. ***Exponent Environmental Group. Operable Unit 1 Remedial Investigation Report: Ventron/Velsicol Site, Wood-Ridge/Carlstadt, New Jersey. Volumes 1-3 September 2000.** [1] Phase I and I-A site characterizations were completed to identify any additional data needed to support the remedial investigation objectives. Specific objectives of the Phase I and IA investigations included: 1) the identification SoPCs that have been released; 2) the characterization of the transport and fate of SoPCs at the site; 3) the completion of the off site delineation of mercury in surface soils; and 4) the characterization of sediment and surface water quality in the West Ditch.

47. ***Galluzzi, Paul F. (HMDC). An Investigation of the Net Downstream Movement of Mercury on Suspended Sediment in Berry's Creek, East Rutherford, Bergen County, New Jersey. 1982** [1a] Collected samples in Berry's Creek over eight tidal cycles measuring temperature, DO, salinity, velocity, suspended sediment, and mercury in water and on sediment.

48. **HMDC Environmental Operations Laboratory. Mercury Concentrations in Surface Waters of Berry's Creek. 1988.** [1] Presents data collected from November 1987 to January 1988 in Berry's Creek. Physical parameters observed include: tide level, temperature, pH, salinity, and dissolved oxygen. Concentrations of Hg were also analyzed.

49. ***Konsevick, Edward. Sediment Geochemistry of the Hackensack Meadowlands: A Survey of Research Conducted in the Hackensack River Estuary. 1991.** [1] Survey undertaken to show how this mixed estuary, where there is little riverwater input and tidal influence dominates circulation, functions in terms of particle associated pollutants in sediment. The papers reviewed cover the entire reach of the Lower Hackensack River and one of its major tributaries, Berry's Creek.

50. ***Mattson, C., G. Potera, & M.E. Saks. Water Quality in a Disordered Ecosystem: A Report on the Water Quality Monitoring Study Performed in the Hackensack Meadowlands between June and September 1971. 1971.** [1a] Part of a natural resource inventory on which to base future land use decisions and against which to make future comparisons. Chemistry and water quality were measured at 11 sites, including Berry's Creek, Penhorn Creek, Losen Slote Creek, Bellman's Creek, Moonachie Creek, Mill Creek, and the Hackensack River.

51. ***NJSEA. Flood Management Plan Hackensack Meadowlands District – Volume 2: Summary of Permit to Construct an Embankment and Other Facilities on Berry's Creek, Bergen County, New Jersey. 1980.** [1a] Draft EIS examining the impacts of the proposed embankment and other facilities related to the NJSEA Sports Complex construction along Berry's Creek, which includes a football stadium, a horse racing facility, and an environment center. Discusses adverse environmental impacts due to the elimination of the Walden Marsh.

52. ***PTI Environmental Services. Agency Review Draft: Background Investigation Technical Memorandum for the Wood-Ridge Site RI/FS, Wood-Ridge/Carlstadt, New Jersey. July 1997.** [1] BITM summarizing currently available information about the Wood-Ridge NPL site and establishing the starting point for further work to be conducted in RI/FS. Gives specific information with regard to the surface water hydrology of Berry's Creek and primarily focuses on possible contaminations to Berry's Creek from the Wood-Ridge site or off-site and the role of Berry's Creek in the transport of these contaminations.

53. ***TAMS Consultants, Inc. Delineation of Waters of U.S. 1992.** [1a] Wetland delineation for Block 231, Lot 8 in Lyndhurst for Wilson Associates. USACE 1987 delineation manual was used. No freshwater wetlands were found onsite, but a delineation of the spring high tide mark (3.8-feet) determined the extent of tidal wetlands. Detailed vegetation, soils, and hydrology investigation results were included in the report.

H. Water and Sediments

54. ***Anonymous (HMDC). Biological Water Quality and Field Sampling Survey of the Hackensack Meadowlands. 1980.** [1a] During a one-day sampling event, water quality was measured at 11 sites for temperature, salinity, DO, and TSS. Also set fish sampling nets in Berry's Creek Canal and Sawmill Creek.

55. **Battelle. Effect of Acid Rain on the Leaching and Bioavailability of Heavy Metals in Contaminated Coastal Wetlands. 1981** [1a] Grant proposal submitted to the USEPA containing data tables of sediment chemistry, taken from other sources. One table has Hg, Cu, Cr, and Cd concentrations in sediment from upper Berry's Creek.

56. ***BCUA. Bergen County Utilities Authority Resource Recovery Facility: Lyndhurst Site Rezoning Application. 1983.** [1a] Rezoning application for Block 231, Lot 11 in Lyndhurst for a resource recovery facility. This application included: 1) a resource recovery technology site feasibility analysis; 2) an environmental analysis; and 3) a planning report. The environmental analysis investigated a water quality report for Berry's Creek, as well as safety and public health issues. The planning report consisted of topographic map and wetlands inventory.

57. ***Bertolotti, Benjamin J. Chemical Oxygen Demand Interference in the Stormwater Collection System of the Meadowlands Sport Complex. 1990.** [1] Analyzed Berry's Creek for exceedence of permit levels of organic and inorganic pollutants at the discharge point of the stormwater collection system for the Meadowlands Sports Complex. The system consists of four retention basins that trap runoff from the facility's parking lots. Pumping action moves the water through the system, eventually discharging into Berry's Creek.

58. **Dames & Moore. Data Summaries, SCP Site. 1988.** [1a] Data summaries of soil, water and sediments related to the Remedial Investigation, Scientific Chemical Processing Site.

59. ***ERM – Southeast, Inc. Task I: Site Specific Literature Search – Non-Hazardous Matrix Characteristics Part I: Soils and Sediment Characteristics Water Quality and Biological Resources Rare and Endangered Species. April 1985.** [1] An update concerning further Task I research conducted by ERM – Southeast, Inc. Incorporates all the Task I site specific literature for determining non-hazardous matrix characteristics for: 1) soil and sediment; 2) water quality; and 3) biota for the Berry's Creek environmental study.

60. **ERT. Draft Stream Channel Sediment Sampling Plan: Revision 2 – UOP Site, East Rutherford, NJ. April 1987.** [1] Describes the sampling requirements for: 1) onsite, offsite, and Berry's Creek sediments; 2) the samples to be collected from the marshlands adjacent to Ackerman's Creek; and 3) the analytical laboratory requirements for the samples.

61. ***Exponent Environmental Group. Agency Review Draft Phase I Remedial Investigation Report: Ventron/Velsicol Site, Wood-Ridge/Carlstadt, New Jersey. Volumes 1-3. December 1998.** [1] Investigation to develop sufficient site characterization information to support informed risk management decisions. Report includes information on surface and subsurface soil, hydrology, leachate/seep sampling, surface water and sediment, wetlands, air, hazardous substances, topography, and cultural resources. Volumes 1, 2, and 3 contain the main body of the report, the appendices, and the final version of the background investigation technical memorandum, respectively.

62. ***Exponent Environmental Group. Operable Unit 1 Ecological Risk Assessment Ventorn/Velsicol Site Wood-Ridge/Carlstadt, New Jersey. April 2001.** [1] Presents the results of the ERA for the site, which is an eight step interactive process among involved parties. As a result of this study, environmentally sensitive areas were identified, described, and mapped according to the N.J.A.C. 7:1E-4.10 guidance.

63. ***Exponent Environmental Group. Operable Unit 1 Remedial Investigation Report: Ventron/Velsicol Site, Wood-Ridge/Carlstadt, New Jersey. Volumes 1-3 September 2000.** [1] Phase I and I-A site characterizations were completed to identify any additional data needed to support the remedial investigation objectives. Specific objectives of the Phase I and IA investigations included: 1) the identification SoPCs that have been released; 2) the characterization of the transport and fate of SoPCs at the site; 3) the completion of the off site delineation of mercury in surface soils; and 4) the characterization of sediment and surface water quality in the West Ditch.

64. ***Galluzzi, Paul F. (HMDC). An Investigation of the Net Downstream Movement of Mercury on Suspended Sediment in Berry's Creek, East Rutherford, Bergen County, New Jersey. 1982** [1a] Collected samples in Berry's Creek over eight tidal cycles measuring temperature, DO, salinity, velocity, suspended sediment, and mercury in water and on sediment.

65. **Gambrell, R.P, H. Ghane, J. Weispape, R.D. Delaune, & W.H. Patrick, Jr. Factors Affecting Mercury Transformations and Migration in Berry's Creek. 1989.** [1] Examined how changes in selected physicochemical parameters of the Berry's Creek sediment-water system may affect chemical transformations controlling release of excess metals that are present.

66. **Goeller, Arthur. Heavy Metals and Radionuclides in Sediments of The Hackensack River, NJ. Rutgers University. 1989.** [1a] Vertical distribution of Cr, Zn, Pb, Cd, Cu, and Ni was determined for 12 sediment cores taken along the main channel of the Hackensack River, as well as in creeks, including Berry's Creek. Each core was dated via Be7 and Cs137.

67. ***Gunawardana, Vajira K., Po-Shu Huang, Tavit O. Najarian, & Rhomaios V. Ram. Impact Analysis of Sewage Treatment Plant Discharges of the Water Quality of the Lower Hackensack River. June 1992.** [1] Analyzed the impacts of discharge from BCUA treatment plant on the dissolved oxygen regime of the lower Hackensack River. The three tributaries that were selected for this study were Sawmill Creek, Berry's Creek, and Mill Creek.

68. **HMDC Environmental Operations Laboratory. Mercury Concentrations in Surface Waters of Berry's Creek. 1988.** [1] Presents data collected from November 1987 to January 1988 in Berry's Creek. Physical parameters observed include: tide level, temperature, pH, salinity, and dissolved oxygen. Concentrations of Hg were also analyzed.

69. ***Jack McCormick & Associates, Inc. Draft Assessment of the Potential Environmental Impact of the Construction and Operation of a New Jersey Sports and Exposition Complex at a Site in Rutherford, Bergen County, New Jersey. 1972.** [1a] Draft EIS that evaluated both the onsite and offsite environmental impacts of the construction and operation of the NJSEA's Sports Complex (Walden Marsh was part of the site). Examined land form/geology, vegetation, wildlife, and water quality at the proposed site. Assessed probable noise, traffic, and air quality impacts. Also includes environmental inventory for the HMD (physiography/geology and vegetation) and the project site (vegetation, wildlife, geology, and water quality).

70. ***Konsevick, Edward. Sediment Geochemistry of the Hackensack Meadowlands: A Survey of Research Conducted in the Hackensack River Estuary. 1991.** [1] Survey undertaken to show how this mixed estuary, where there is little riverwater input and tidal influence dominates circulation, functions in terms of particle associated pollutants in sediment. The papers reviewed cover the entire reach of the Lower Hackensack River and one of its major tributaries, Berry's Creek.

71. ***Konsevick, Edward, Christine Cheng Hobble, & Paul Lupini. Monitoring Effects of Urban Land Use of Esturine Water Quality, Hackensack Meadowlands District, New Jersey. November 1994.** [1] In 1993, the USGS, in cooperation with the HMDC, established a network of 14 ambient water monitoring sites, including the Hackensack River, Berry's Creek, Penhorn Creek, Sawmill Creek, Mill Creek, and Cromakill Creek, to characterize the current status of water quality in the HMD. Salinity, DO, fecal coliform, pH, TSS, turbidity, total phosphorous, ammonia, sulfate, BOD, COD, heavy metal concentrations were measured at each of the monitoring sites.

72. **McFarland. Sediment Characterization: Berry's Creek, Original Material. August, 1987.** [1] Original sediment material for Berry's Creek received from USACE-WES for chemical transformation studies was characterized for a number of properties. Additional sediment material was received from USACE-WES, which provided a second sampling similar to the original samples to be used in bioassay studies.

73. ***McFarland, Victor A., Charles R. Lee, & Joan U. Clarke (USACE WES). Bioavailability Studies – Phase 1: Mercury Uptake by Killifish and Clams. 1988** [1a] Fish and clams were exposed to different concentrations of suspended sediment in a series of experiments and mercury uptake was measured.

74. ***NJSEA. Flood Management Plan Hackensack Meadowlands District – Volume 2: Summary of Permit to Construct an Embankment and Other Facilities on Berry's Creek, Bergen County, New Jersey. 1980.** [1a] Draft EIS examining the impacts of the proposed embankment and other facilities related to the NJSEA Sports Complex construction along Berry's Creek, which includes a football stadium, a horse racing facility, and an environment center. Discusses adverse environmental impacts due to the elimination of the Walden Marsh.

75. ***PTI Environmental Services. Agency Review Draft: Background Investigation Technical Memorandum for the Wood-Ridge Site RI/FS, Wood-Ridge/Carlstadt, New Jersey. July 1997.** [1] BITM summarizing currently available information about the Wood-Ridge NPL site and establishing the starting point for further work to be conducted in RI/FS. Gives specific information with regard to the surface water hydrology of Berry's Creek and primarily focuses on possible contaminations to Berry's Creek from the Wood-Ridge site or off-site and the role of Berry's Creek in the transport of these contaminations.

76. **Sabounjian, E. & P. Galluzi. The Distribution of Mercury Contamination in Marsh Sediments, Channel Sediments, and Surface Waters of the Hackensack Meadowlands, New Jersey. 1980.** [1a] Sediment cores to a depth of 18 inches and surface water were sampled at 42 sites throughout the HMD, including Eight Day Swamp and Berry's Creek. Mercury contamination was compared among marsh sediments, channel sediments, and surface waters, as well as along different points downstream of a former mercury processing facility. Contamination between marshes removed from tidal influence and those close to watercourses was also compared.

77. **Schaefer, J., T. Cardona-Merek, K. Ellickson, J. Yagi, T. Barkay, & J. Reinfelder. Mercury Contamination in Berry's Creek and Downstream Ecosystem. Abstracts of the Meadowlands Symposium. 2003.** [1a] Gradients in total Hg and MM concentrations were observed at Berry's Creek, Berry's Creek Canal, and the Hackensack River. These measurements were compared to measurements taken at three sites within Berry's Creek Canal to determine if there was a difference in Hg and MM levels along the length of Berry's Creek and Berry's Creek Canal.

78. ***Weis, Peddick, Judith S. Weis, & John Bogden. Effects of Environmental Factors on Release of Mercury from Berry's Creek Sediments and Its Uptake by Killifish: *Fundulus heteroclitus*. Environmental Pollution (Series A) v40. 1986** [1a] Sediments from Berry's Creek were place in lab aquaria and subject to different treatments in the presence of killifish. Aeration, stirring, salinity, and pH were varied. Fish tissues were analyzed for mercury. Also includes results of field collection/analyzation of fish.

I. Historical/Cultural Resources

79. ***Exponent Environmental Group. Agency Review Draft; Phase I Remedial Investigation Report: Ventron/Velsicol Site, Wood-Ridge/Carlstadt, New Jersey, Volumes 1-3 December 1998.** [1] Investigation to develop sufficient site characterization information to support informed risk management decisions for the site. This includes information on surface and subsurface soil, hydrology, leachate/seep sampling, surface water and sediment, wetlands, air, hazardous substances, topography, and cultural resources. Volumes 1, 2, and 3 contain the main body of the report, the appendices, and the final version of the background investigation technical memorandum, respectively.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #33 – CROMAKILL CREEK

Category: Waterbodies & Other Wetlands

Location: Located to the east of the Hackensack River, flowing through the Mori Tract and Eastern Brackish Marsh, under the New Jersey Turnpike – Eastern Spur, and along the northern boundary of Western Brackish Marsh. The creek begins in Secaucus and flows along the border between Secaucus and North Bergen out to the Hackensack River in Hudson County.

Current Land Use: Open Water

Site Description: Cromakill Creek is tidally influenced. An active sewage treatment plant discharges effluent into its upper reaches, causing poor water quality throughout the year. Heavy sedimentation, presumably from the effluent, and common reed (*Phragmites australis*) invasion are choking off the creek channel.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Not applicable.

C. Site History & Land Use

1. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

2. ***EA Science and Technology & PSE&G. Kearny Generating Station Supplemental 316(b) Report. NJDEP. 1988.** [1a] Evaluates the effects of the cooling water intake of the Kearny Generating Station on the ecology of the Hackensack River and adjacent waters, based on entrainment and impingement data collected from June 1987 to April 1988, and on biological data collected from the vicinity of the Kearny station since August 1986. Studies of macrozooplankton, ichthyoplankton, and juvenile and adult fish were conducted in vicinity of the station and the full length of the estuary. Includes background information on the Hackensack Estuary.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

3. ***Anonymous (HMDC). Biological Water Quality and Field Sampling Survey of the Hackensack Meadowlands. 1980.** [1a] During a one-day sampling event, water quality was measured at 11 sites for temperature, salinity, DO, and TSS. Also set fish sampling nets in Berry's Creek Canal and Sawmill Creek.

4. **Engineering & Environmental Services, Inc. Surface Water & Sediment Quality Investigation Block 227, Lot 1, Town of Secaucus, Hudson County, New Jersey. January 2001.** [2] Submitted as part of an existing Jurisdictional Determination. It contains excerpts from the January 2001 Report relative to sampling location and existing water and sediment quality within Cromakill Creek.

5. ***Konsevick, Edward, Christine Cheng Hobble, & Paul Lupini. Monitoring Effects of Urban Land Use of Esturine Water Quality, Hackensack Meadowlands District, New Jersey. November 1994.** [1] In 1993, the USGS, in cooperation with the HMDC, established a network of 14 ambient water monitoring sites, including the Hackensack River, Berry's Creek, Penhorn Creek, Sawmill Creek, Mill Creek, and Cromakill Creek, to characterize the current status of water quality in the HMD. Salinity, DO, fecal coliform, pH, TSS, turbidity, total phosphorous, ammonia, sulfate, BOD, COD, heavy metal concentrations were measured at each of the monitoring sites.

6. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #34 – EIGHT DAY SWAMP

Category: Waterbodies & Other Wetlands

Location: North of NJSEA Sports Complex Walden Marsh in Carlstadt, Bergen County.

Current Land Use: Preserved tidal marsh

Current Ownership: Various private owners and the State of New Jersey

Site Description: The Eight Day Swamp is a highly contaminated wetland area that lies on the western banks of Berry's Creek. High levels of mercury and other heavy metals are found throughout the site. An estimated 50 tons of mercury are found in a stratified layer within the marsh soils. The Eight Day Swamp is dominated by a monoculture of common reed (*Phragmites australis*) and receives very little tidal flushing.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Separate portions of the site are owned by various private owners and the State of New Jersey.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

1. ***Weis, P. and J. W. Weis. Eight Day Swamp: Assessment of Heavy Metal Contamination and Benthic Diversity. 2002.** [1a] Collected sediment cores and analyzed individual slices for eight metals and identified and counted benthos. Compared sediment concentrations and benthos diversity to determine if there is a correlation between the two.

2. ***Weis, Judith S. & Peddrick Weis. Benthic Communities and Metal Contamination in Eight-Day Swamp, a Brackish Marsh in the Hackensack Meadowlands. Abstracts of the Meadowlands Symposium. 2003.** [1a] Cores taken from 16 stations within Eight Day Swamp were analyzed for metal concentrations and for benthic community. The metal levels were compared with the benchmark ERM values, and expressed in terms of toxic units. The benthic community was analyzed in samples (three replicates from each station) after staining with Rose Bengal.

E. Biological Studies – General Environmental

No data obtained.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

3. **Sabounjian, E. & P. Galluzi. The Distribution of Mercury Contamination in Marsh Sediments, Channel Sediments, and Surface Waters of the Hackensack Meadowlands, New Jersey. 1980.** [1a] Sediment cores to a depth of 18 inches and surface water were sampled at 42 sites throughout the HMD, including Eight Day Swamp and Berry's Creek. Mercury contamination was compared among marsh sediments, channel sediments, and surface waters, as well as along different points downstream of a former mercury processing facility. Contamination between marshes removed from tidal influence and those close to watercourses was also compared.

4. ***Weis, P. and J. W. Weis. Eight Day Swamp: Assessment of Heavy Metal Contamination and Benthic Diversity. 2002.** [1a] Collected sediment cores and analyzed individual slices for eight metals and identified and counted benthos. Compared sediment concentrations and benthos diversity to determine if there is a correlation between the two.

5. ***Weis, Judith S. & Peddrick Weis. Benthic Communities and Metal Contamination in Eight-Day Swamp, a Brackish Marsh in the Hackensack Meadowlands. Abstracts of the Meadowlands Symposium. 2003.** [1a] Cores taken from 16 stations within Eight Day Swamp were analyzed for metal concentrations and for benthic community. The metal levels were compared with the benchmark ERM values, and expressed in terms of toxic units. The benthic community was analyzed in samples (three replicates from each station) after staining with Rose Bengal.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #35 – HACKENSACK RIVER

Category: Waterbodies & Other Wetlands

Location: Begins in Rockland County, New York, flowing down through the middle of the HMD, and eventually outlets into the Newark Bay at Kearny Point.

Current Land Use: Open Water

Site Description: The key waterbody in the HMD is the Hackensack River, which drains the Hackensack River watershed, approximately 197 square miles in size, two-thirds of which is located in Bergen and Hudson counties. The Oradell Dam was constructed to supply potable water to northern New Jersey and has essentially separated the Hackensack River into two distinct components: the upper river (above the dam) and the lower river (below the dam). The upper river is a controlled freshwater section in which the flow is inhibited, while the lower river, its tributaries, and the adjoining wetlands comprise a brackish estuary influenced by the semi-diurnal tides. The 50-mile southward course of the river parallels that of the nearby Hudson River to the east, with the majority of the river's lower reaches located in the HMD.

Within the HMD, the major inputs of freshwater to the Hackensack River come from industrial and municipal discharges, stormwater runoff, and water spilling over the Oradell Dam. In the lower reaches, tidal fluctuations and seasonal water events permit flooding of adjacent wetland areas along the river and its tributaries. The river provides hydrologic support to the adjoining wetland areas, preserving wetlands and their diverse flora and fauna. Additionally, opportunities exist for observation, education, and scientific activities relative to the environment and the quality of the river. The river also provides for commercial and recreational uses.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***ERDC, HMDC, & USACE – NYD. Flood Control Survey. 2000.** [2a] Survey performed for the HMD that consisted of: 1) cross-sections along the Hackensack River and its major tributaries, including Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke; 2) identifying 30 flood control structures along the Hackensack River; and 3) locating all bridges and piers within the study area. In addition, digital aerials were flown and geo-referenced. The vertical datum for the survey was NGVD29. At 13 of the 30 flood control structures, tide gages and single beam acoustic Doppler current meters were installed and monitored to measure velocity, head difference, and discharge at these locations.

2. ***HMDC. A Historical Consideration of Tidal Flow in the Hackensack Meadowlands. July, 1973.** [2a] Compilation of historical evidence relating to tidal flow to assist in determining ownership of the Meadowlands along the Hackensack River. The report including maps and historical data.

3. ***Rogers Surveying, Inc. Hackensack River Survey: Lower Portion. March 1999.** [4] Survey performed for the USACE-NYD as part of an annual condition survey for various maintenance purposes (i.e. potential dredge planning, navigation, etc.). The survey covered the Hackensack River from the junction of the Hackensack and Passaic Rivers up to a point north of the turning basin in the river. Vertical datum for the survey was NGVD29.

4. ***Rogers Surveying, Inc. Hackensack River Survey: Upper Portion. March 1999.** [4] Survey performed for the Operations Division of the USACE-NYD, generated at one-foot contour intervals from the top of the bank to the approximate location of the mean low water line. The survey covered an area along the northwest corner of the junction of the Hackensack River and Berry's Creek. Vertical datum for the survey was NGVD29.

5. **Vermeule C.C. Annual Report of the New Jersey Geological Survey for 1896: Map of Hackensack Meadows to Illustrate Report on Drainage. 1896.** [2a] A map contained in an annual report published by Macrellish & Quigley, Trenton, New Jersey for the New Jersey Geological Survey for 1986. The map was a figure for a section of the annual report entitled "Drainage of the Hackensack and Newark Tide Marshes."

6. ***Woodward-Clyde Consultants. Triaxial Thermal Plume Monitoring Program for Hudson and Kearny Generating Stations: Final Report. 1976.** [1a] Presented results of a triaxial temperature program conducted to satisfy the monitoring requirements of the USEPA NPDES permits for PSEG (formerly PSE&G). Included methodology used, hydrology of the Hackensack River, and triaxial survey results. Surface distributions and cross-section views are presented for each of the four stages of the tide. A bathymetric survey was conducted to obtain river bottom profiles along each transect.

B. Real Estate/Ownership

7. ***HMDC. A Historical Consideration of Tidal Flow in the Hackensack Meadowlands. July, 1973.** [2a] Compilation of historical evidence relating to tidal flow to assist in determining ownership of the Meadowlands along the Hackensack River. The report including maps and historical data.

C. Site History & Land Use

8. ***HMDC. A Historical Consideration of Tidal Flow in the Hackensack Meadowlands. July, 1973.** [2a] Compilation of historical evidence relating to tidal flow to assist in determining ownership of the Meadowlands along the Hackensack River. The report including maps and historical data.

9. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

D. Biological Studies – Fauna

10. ***Anselmini, Ludwig D. An Ecological Study of the Hackensack River in the Vicinity of the Hudson Generating Station, Jersey City, New Jersey. July 1974.** [1] Presents the results of in-depth studies conducted in the Hackensack River, including two fisheries studies completed between 1971 and 1973, an Ichthyoplankton study completed between 1972 and 1973, a Phytoplankton study done in 1973, a Zooplankton study done in 1972, and a Benthos study completed between 1972 and 1973.

11. **Belton, Thomas, Bruce Ruppel, & Rovert Hazen (NJDEP). A Study of Dioxin Contamination in Select Finfish, Crustaceans, and Sediment of New Jersey Waterways. 1985.** [1a] Samples were collected in the Passaic River, especially around the Diamond Alkai plant, as well as in the Hackensack River. Analyzed blue crabs for dioxin contamination, among other species.

12. **Bragin, A. Brett. (HMDC). An Inventory of Fishery Resources of the Hackensack River.** [4] Basic water quality and fishery data were collected at 21 sites.

13. ***Bragin, A. Brett, W. Frame, M. Kraus, D. Smith, A. Goeller, J. Graviec, & E. Konsevick. Inventory of Fisheries Resources of the Hackensack River within the Jurisdictional Boundary of the Hackensack Meadowlands Development Commission from Kearny, Hudson County, to Ridgefield, Bergen County, New Jersey. May 18, 1989.** [1] A two-year survey (2/1987 to 12/1988) initiated by HMDC of the lower Hackensack River to ascertain the fisheries values of the river and help guide intelligent decisions on development applications.

14. ***EA Science and Technology & PSE&G. Kearny Generating Station Supplemental 316(b) Report. NJDEP. 1988.** [1a] Evaluates the effects of the cooling water intake of the Kearny Generating Station on the ecology of the Hackensack River and adjacent waters, based on entrainment and impingement data collected from June 1987 to April 1988, and on biological data collected from the vicinity of the Kearny station since August 1986. Studies of macrozooplankton, ichthyoplankton, and juvenile and adult fish were conducted in vicinity of the station and the full length of the estuary. Includes background information on the Hackensack Estuary.

15. **ERM-Southeast, Inc. 1.2.D Existing and Proposed Regional Plans: Task 1. 1985.** [1a] A general literature search done by ERM-Southwest, Inc. This volume is a comprehensive review of all existing regional plans that encompass the project area (Berry's Creek area). Zoning, water quality and flood management, air quality, quasi-govenrmental agency plans, and major development proposals were reviewed.

16. **Homa, J. Jr., P. G. Broskus, & T. W. Woithe (Ichthyological Associates, Inc.). A Survey of the Hackensack River, with Special Reference to Anadromus Fishes, in April and May 1976. December 1976.** [4] Fishes were sampled by gill net and beach seine, and selected physicochemical parameters – air and water temperature, dissolved oxygen concentration, salinity, pH, and transparency – were measured in six regions of the Hackensack River and Newark Bay.

17. **Ichthyological Associates, Inc. An Ecological Study of the Hackensack River in the Vicinity of the Bergen Generating Station Public Service Electric & Gas Company. 1974.** [1a] Provides results (data tables) of fishes collected by trawl and seine during 1971, 1972, and 1973 in the Hackensack River in the vicinity of the Bergen Generating Station. Also includes the results of impingement samples collected from the traveling screens in 1972 and 1973, as well as the collecteion of ichthyoplankton samples in 1972 and 1973, phytoplankton samples in 1973, zooplankton samples in 1972, and benthic invertebrates in 1972 and 1973.

18. ***Ichthyological Associates, Inc. Predictive Biological Information to Demonstrate the Passage and Maintenance of Representative Important Species: Demonstration Type III-Section 316 (a) of Federal Water Pollution Control Act Amendments of 1972, PL 92-500 for Hudson and Kearny Generating Stations. 1978.** [1a] Provides the results of laboratory studies on the temperature preference, temperature avoidance, and susceptibility to heat shock and cold shock of representative important species for the PSEG (formerly PSE7G) Hudson and Kearny generating stations. For each representative important species, life history, distribution in relation to water temperature, results and analysis of thermal effects experiments, and the predicted response to the Hudson and Kearny generating stations thermal plumes are discussed. Appendix B contains mathematical projections of the thermal plumes from the Hudson and Kearny generating stations.

19. **Ichthyological Associates, Inc. Effect of Reduced Levels of Dissolved Oxygen on the Avoidance Temperatures of the White Perch, Morone Americana, Blueback Herring, Alosa Aestivalis, and Atlantic Silverside, Menidia Menidia: Final Report. 1980.** [1a] Provides the results of a laboratory study completed for PSEG to determine if the behavioral avoidance temperatures exhibited by selected estuarine fishes at near air-saturated levels of DO were significantly different at reduced levels of DO.

20. ***Jack McCormick & Associates, Inc. Collections of Aquatic Organisms from the Hackensack Meadowlands, Bergen and Hudson Counties, NJ. 1977.** [1a] Study undertaken to obtain a large number of biological samples from the waters and wetlands at eight stations in the central meadowlands. Samples were collected during three days in October 1976. Specimens were identified, labeled, packaged, and frozen. The concentrations of mercury in the samples collected were to be determined at a later date under a separate contract.

21. ***Kraus, Mark L. Bioaccumulation of Heavy Metals in Pre-fledging Tree Swallows, Tachycineta bicolor Bull. Environ. Contam. Toxicol. 1989.** [1a] A total of ten sediment, nine adult midge, twelve swallow eggs, and six pre-fledgling swallows samples were analyzed for Cd, Cr, Cu, Pb, and Ni. The study demonstrated that heavy metals can move from contaminated estuarine sediments through midges and bioaccumulate in pre-fledgling tree swallows. The accumulation of metals in bird tissues is dependant on the tissue and metal type.

22. **Kraus, M. and A. B. Bragin. Utilization of the Hackensack River by the Atlantic Tomcod (*Microgadus tomcod*). Bulletin of the New Jersey Academy of Science 35(1): 25-27. 1990.** [4] Discusses the use of the Hackensack River by the threatened Atlantic Tomcod across its life stages, which has inhabited the Hackensack Estuary since at least 1972.

23. **Lo Pinto, Richard W. Primary Production Potential in the Central Hackensack River. 1979.** [1a] A four season investigation of K, N, nicotinic acid, thiamine, cyanocobolamine, and biotin on biological productivity to determine which of these chemicals are limiting nutrients and which are not.

24. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

25. ***NJMC & MERI. Fisheries Inventory of the Hackensack River within the Hackensack Meadowlands District. (8/2001 – 9/2003).** A two-year survey of fisheries resources within the Hackensack River and selected tributaries within the HMD was completed in September of 2003. Data was collected on a monthly and seasonal basis. A Fisheries Inventory Report is currently being drafted and is expected to be completed by December 2004.

26. ***PSE&G Company. Demonstration of Absence of Prior Appreciable Harm Respecting Application for Imposition of Alternative Thermal Effluent Limitations Bergen Steam Electric Generating Station Units No. 1 and No. 2. 1974.** [1a] Presented data to the USEPA to demonstrate that the final thermal effluent limitations specified in the draft NPDES Discharge Permit for the Bergen Generating Station are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife in and on the Hackensack River. In addition to providing information on the absence of prior harm, presented engineering and hydrologic data, water quality data, and a proposed thermal plume mapping study.

27. ***PSE&G Company. Demonstration of Absence of Prior Appreciable Harm Respecting Application for Imposition of Alternative Thermal Effluent Limitations Kearny Steam Electric Generating Station Units No. 7 and No. 8. 1974.** [1a] Presented data to the USEPA to demonstrate that the final thermal effluent limitations specified in the draft NPDES Discharge Permit for the Kearny Generating Station are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife in and on the Hackensack River. In addition to providing information on the absence of prior harm, presented engineering and hydrologic data, water quality data, and a proposed thermal plume mapping study.

28. ***PSE&G Company & Ichthyological Associates, Inc. Effect of the Cooling Water Intake Structure – Entrainment and Impingement of Fishes: Hudson Generating Station NPDES Permit No. NJ0000647, Demonstration for Section 316(b) of the Federal Water Pollution Control Act Amendments of 1972, PL 92-500. 1979.** [1a] Assessment of the environmental impact of the cooling water intake structure for Units 1 & 2 of the Hudson Generating Station. The specific environmental effects addressed were: 1) the passage of fish larvae through the cooling water system (entrainment) and 2) the retention of fish and blue crabs on the protective screens preceding the circulating-water pumps (impingement). The entrainment of fish eggs and larvae was examined in the spring when larvae were expected to be present in the source water body.

29. ***Turner, Joe. Chromium Concentrations in the Blue Crab (*Callinectes sapidus*): An Independent Study Project Conducted at the Hackensack Meadowlands Environmental Research Laboratory. May 1990.** [1] Blue crabs were analyzed for total chromium concentrations to determine extent of contamination. The NJDEP and the HMDC supplied samples collected over a two year period from the Hackensack River near the Laurel Hill, from Sawmill Creek, and from Berry's Creek Canal.

E. Biological Studies – General Environmental

30. ***Coastal Environmental Services, Inc. AGFA Division of Miles Inc. 1993.** [1a] Maps were prepared for all surrounding areas that could be affected by a discharge from an AGFA facility in Teterboro, covering areas both inside and outside of the HMD, but the maps are missing from the report. An environmentally sensitive areas protection plan and an environmental assessment to sample biota, water quality, soil/sediment and groundwater were designed, but no data was collected.

31. ***Edwards and Kelcey, Inc. Supplement to Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Supplemental environment assessment report including: 1) permit approvals; 2) water quality sampling results; and 3) a proposed offsite wetland mitigation conceptual design consisting of tidal mudflats and an impoundment.

32. **Foote, M. The Vascular Plants of the Hackensack River Area. Phytologia 50(1): 15-45. December 1981.** [4] Details the 362 vascular plants taxa found along the Hackensack River from the Hackensack Meadowlands to the Oradell Dam.

33. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

34. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

35. **Netherlands Engineering Consultants, Inc. Report on the Feasibility of Reclaiming the Hackensack Meadows by Means of Closing the Hackensack River. 1958** [1a] Investigates the overall feasibility of reclamation of the Hackensack Meadows by means of closing the river. An assessment of the physical and economic problems arising out of or associated with the reclamation was completed. Consideration was given to alternative methods of protection.

36. ***USEPA, Office of Water Planning and Standards. A Water Quality Success Story. 1978.** [1a] Provided an overview of the water quality improvements observed from 1971-1978. Included general information on the sewage treatment plants and wetland preservation efforts that all contributed to the improvement of the water quality. No field data was collected.

37. **Utzinger, Margaret. Hackensack River. 1988.** [1a] Paper discussing "abuses" of the Hackensack River, including development in the upper watershed, the New Jersey Turnpike's proposed expansion project, and the use of the river for cooling water at the PSEG Bergen Generating Station.

38. **William F. Cosulich Associates. Hudson County Resource Recovery Project: Preliminary Environmental and Health Impact Statement in Fulfillment of NJSA 13: 1E-26 Requirements. 1985.** [1a] Preliminary Environmental and Health Impact Statement submitted to NJDEP for the proposed Hudson County resource recovery facility on the 150 acres Koppers Coke site in Kearny. Included water quality, hydrology, topography/geology, and biological resource studies. The solid waste quantities, characteristics, and control, as well as an air quality impact assessment were also included.

F. Geotechnical

39. ***Carswell, L.D., Appraisal of Water Resources in the Hackensack River Basin, New Jersey. June 1976.** [1a] Details the geology and hydrology existing in the Hackensack River Basin, including descriptions of the bedrock, existing aquifers, and chemical quality of water.

40. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

41. **William F. Cosulich Associates. Hudson County Resource Recovery Project: Preliminary Environmental and Health Impact Statement in Fulfillment of NJSA 13: 1E-26 Requirements. 1985.** [1a] Preliminary Environmental and Health Impact Statement submitted to NJDEP for the proposed Hudson County resource recovery facility on the 150 acres Koppers Coke site in Kearny. Included water quality, hydrology, topography/geology, and biological resource studies. The solid waste quantities, characteristics, and control, as well as an air quality impact assessment were also included.

G. Hydraulics and Hydrology

42. ***Carswell, L.D., Appraisal of Water Resources in the Hackensack River Basin, New Jersey. June 1976.** [1a] Details the geology and hydrology existing in the Hackensack River Basin, including descriptions of the bedrock, existing aquifers, and chemical quality of water.

43. ***DiLorenzo, Joseph L. Ph.D., et al. Tidal and Water Quality Variability in an Urbanized Estuary. Abstracts of the Meadowlands Symposium. 2003.** [1a] During 1988, tide and water quality data were collected intensively in the Hackensack Estuary. Tidal elevations were monitored continually at four estuarine stations and over a six-month period; current velocities were measured concurrently at one station near the mouth of the Hackensack River. Discrete water quality samples were collected at six main-stem estuarine stations and at two- to three-hour intervals. Harmonic analyses of tidal elevation data indicate that Hackensack Estuary tides are predominantly semi-diurnal, though modulated by diurnal and fortnightly components.

44. ***ERDC, HMDC, & USACE – NYD. Flood Control Survey. 2000.** [2a] Survey performed for the HMD that consisted of: 1) cross-sections along the Hackensack River and its major tributaries, including Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke; 2) identifying 30 flood control structures along the Hackensack River; and 3) locating all bridges and piers within the study area. In addition, digital aerials were flown and geo-referenced. The vertical datum for the survey was NGVD29. At 13 of the 30 flood control structures, tide gages and single beam acoustic Doppler current meters were installed and monitored to measure velocity, head difference, and discharge at these locations.

45. ***ERDC & USACE – NYD. The Hackensack Meadowlands Flood Control Study. 1998 – 2004 (On-going).** [2a] Undertaken to develop a numerical hydraulic model of the Hackensack River and its associated tidal marshes and channels. A parent model (one-dimensional hydrologic) is being developed for the Hackensack River Basin, while child models (two-dimensional hydrologic) are being developed for Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke. The study also includes the evaluation of the performance of proposed flood control structures and restored wetland areas with respect to flood elevations, as well as the effects of optimum maintenance on existing flood control structures.

46. **ERM-Southeast, Inc. 1.2.D Existing and Proposed Regional Plans: Task 1. 1985.** [1a] A general literature search done by ERM-Southwest, Inc. This volume is a comprehensive review of all existing regional plans that encompass the project area (Berry's Creek area). Zoning, water quality and flood management, air quality, quasi-govenrmental agency plans, and major development proposals were reviewed.

47. ***Konsevick, Edward. Sediment Geochemistry of the Hackensack Meadowlands: A Survey of Research Conducted in the Hackensack River Estuary. 1991.** [1] Survey undertaken to show how this mixed estuary, where there is little riverwater input and tidal influence dominates circulation, functions in terms of particle associated pollutants in sediment. The papers reviewed cover the entire reach of the Lower Hackensack River and one of its major tributaries, Berry's Creek.

48. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

49. **Miskewitz, Robert & Richard I. Hires. The Influence of the Hackensack Meadowlands on the Tidal Hydraulics of the Hackensack River. Abstracts of the Meadowlands Symposium. 2003.** [1a] Observations of the tide and tidal currents in the Hackensack River were made using bottom mounted Acoustic Doppler Current Profilers equipped with high-resolution pressure sensors. Ten-minute average water elevations and currents at 0.5-meter depth intervals over the entire water column were obtained at stations along the Hackensack River for periods ranging from 14 to 24 days.

50. ***Pandullo Quirk Associates. Mathematical Projection of Thermal Plumes: Hudson and Kearny Generating Station. PSE&G. 1978.** [1a] Investigated temperature profiles in the Hackensack River as a result of operation of the plants under various meteorological, hydrodynamic, and Hudson and Kearny Generating Station plant operational characteristics. Included description/calibration of the model, hydrological/thermal characteristics of the Hackensack River, and projection of Hackensack River temperature distribution under various conditions.

51. ***PSE&G Company. Demonstration of Absence of Prior Appreciable Harm Respecting Application for Imposition of Alternative Thermal Effluent Limitations Bergen Steam Electric Generating Station Units No. 1 and No. 2. 1974.** [1a] Presented data to the USEPA to demonstrate that the final thermal effluent limitations specified in the draft NPDES Discharge Permit for the Bergen Generating Station are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife in and on the Hackensack River. In addition to providing information on the absence of prior harm, presented engineering and hydrologic data, water quality data, and a proposed thermal plume mapping study.

52. ***PSE&G Company. Demonstration of Absence of Prior Appreciable Harm Respecting Application for Imposition of Alternative Thermal Effluent Limitations Kearny Steam Electric Generating Station Units No. 7 and No. 8. 1974.** [1a] Presented data to the USEPA to demonstrate that the final thermal effluent limitations specified in the draft NPDES Discharge Permit for the Kearny Generating Station are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife in and on the Hackensack River. In addition to providing information on the absence of prior harm, presented engineering and hydrologic data, water quality data, and a proposed thermal plume mapping study.

53. ***Versar, Inc. Review and Evaluation of Thermal Effects Studies and Cooling Water Intake Structure Demonstrations of Impact for the Bergen, Hudson, Kearny, Linden, and Sewaren Generating Stations. First Progress Summary. 1989.** [1a] Includes evaluation of site characteristics of the Hackensack River such as: 1) drainage/basin morphology; 2) anthropogenic influences; 3) freshwater inflow; 4) tidal flow; and 5) general water quality information, as they related to facility biota interactions, evaluation criteria, and evaluation methodology. Detailed information on water withdrawal, discharges, and traveling screens for the three Hackensack facilities was also included.

54. **William F. Cosulich Associates. Hudson County Resource Recovery Project: Preliminary Environmental and Health Impact Statement in Fulfillment of NJSA 13: 1E-26 Requirements. 1985.** [1a] Preliminary Environmental and Health Impact Statement submitted to NJDEP for the proposed Hudson County resource recovery facility on the 150 acres Koppers Coke site in Kearny. Included water quality, hydrology, topography/geology, and biological resource studies. The solid waste quantities, characteristics, and control, as well as an air quality impact assessment were also included.

55. ***Woodward-Clyde Consultants. Triaxial Thermal Plume Monitoring Program for Hudson and Kearny Generating Stations: Final Report. 1976.** [1a] Presented results of a triaxial temperature program conducted to satisfy the monitoring requirements of the USEPA NPDES permits for PSEG (formerly PSE&G). Included methodology used, hydrology of the Hackensack River, and triaxial survey results. Surface distributions and cross-section views are presented for each of the four stages of the tide. A bathymetric survey was conducted to obtain river bottom profiles along each transect.

H. Water and Sediments

56. ***Anonymous (HMDC). Biological Water Quality and Field Sampling Survey of the Hackensack Meadowlands. 1980.** [1a] During a one-day sampling event, water quality was measured at 11 sites for temperature, salinity, DO, and TSS. Also set fish sampling nets in Berry's Creek Canal and Sawmill Creek.

57. **Belton, Thomas, Bruce Ruppel, & Rovert Hazen (NJDEP). A Study of Dioxin Contamination in Select Finfish, Crustaceans, and Sediment of New Jersey Waterways. 1985.** [1a] Samples were collected in the Passaic River, especially around the Diamond Alkai plant, as well as in the Hackensack River. Analyzed blue crabs for dioxin contamination, among other species.

58. ***Bonnevie, N.L., S.L. Huntley, B.W. Found, & R.J. Wenning. Trace Metal Contamination in Surficial Sediments from Newark Bay, New Jersey. Science of the Total Environment 144 (1-3):1-6. 1994.** [2] Pb (275 ± 138 mg/kg) and Cu (116 ± 63 mg/kg) concentrations in sand sediments from Hackensack Area I were similar to those found in the Passaic River and the Arthur Kill. These results suggest that metal concentrations, particularly Cd, Hg, and Pb, in surficial sediments in the Passaic River, Hackensack River, and the Arthur Kill and portions of the Hackensack Meadowlands may pose a significant threat to aquatic biota.

59. **Cheng, C. & E. Konsevick. Trends in the Water Quality of an Urban Estuary: Hackensack Meadowlands, New Jersey. Coastal Water Resources. Proceedings of a Symposium Held in Wilmington, North Carolina. American Water Resources Association. 1988.** [1a] NJMC has been conducting a summer water quality program since 1971. Of the 13 parameters evaluated, this study reports on just four: temperature, salinity, BOD, and DO. Parametric and non-parametric statistical analysis completed. Also analyzed changes in overall water quality of the Hackensack River.

60. **Clinton Bogert Associates. Summary Report: Impact Analysis of Sewage Treatment Plant Discharges on the Water Quality of the Lower Hackensack River (Volume 1). September 1990.** [4] Evaluates whether additional treatment of the BCUA treatment plant effluents as stipulated in the Northeast Water Quality Management Plan and the NJDEP permit is needed. Surface runoff and river models were developed and verified by local data.

61. ***DiLorenzo, Joseph L. Ph.D., et al. Tidal and Water Quality Variability in an Urbanized Estuary. Abstracts of the Meadowlands Symposium. 2003.** [1a] During 1988, tide and water quality data were collected intensively in the Hackensack Estuary. Tidal elevations were monitored continually at four estuarine stations and over a six-month period; current velocities were measured concurrently at one station near the mouth of the Hackensack River. Discrete water quality samples were collected at six main-stem estuarine stations and at two- to three-hour intervals. Harmonic analyses of tidal elevation data indicate that Hackensack Estuary tides are predominantly semi-diurnal, though modulated by diurnal and fortnightly components.

62. ***Edwards and Kelcey, Inc. Supplement to Environmental Assessment Report for NJ Transit's Proposed Secaucus Transfer Station Northeast Corridor Track Modifications and Main Line Improvements. 1994.** [1a] Supplemental environment assessment report including: 1) permit approvals; 2) water quality sampling results; and 3) a proposed offsite wetland mitigation conceptual design consisting of tidal mudflats and an impoundment.

63. **ERM-Southeast, Inc. 1.2.D Existing and Proposed Regional Plans: Task 1. 1985.** [1a] A general literature search done by ERM-Southwest, Inc. This volume is a comprehensive review of all existing regional plans that encompass the project area (Berry's Creek area). Zoning, water quality and flood management, air quality, quasi-govenrmental agency plans, and major development proposals were reviewed.

64. **Goeller, Arthur F. III. Heavy Metals and Radionuclides in Sediment of the Hackensack River, New Jersey. Rutgers University. October 1989.** [1] The vertical and areal distribution of Cr, Zn, Pb, Cd, Cu, and Ni were determined for 12 sediment cores taken in creeks along the main channel of the Hackensack River.

65. ***Gunawardana, Vajira K., Po-Shu Huang, Tavit O. Najarian, & Rhomaios V. Ram. Impact Analysis of Sewage Treatment Plant Discharges of the Water Quality of the Lower Hackensack River. June 1992.** [1] Analyzed the impacts of discharge from BCUA treatment plant on the dissolved oxygen regime of the lower Hackensack River. The three tributaries that were selected for this study were Sawmill Creek, Berry's Creek, and Mill Creek.

66. ***Ichthyological Associates, Inc. Predictive Biological Information to Demonstrate the Passage and Maintenance of Representative Important Species: Demonstration Type III-Section 316 (a) of Federal Water Pollution Control Act Amendments of 1972, PL 92-500 for Hudson and Kearny Generating Stations. 1978.** [1a] Provides the results of laboratory studies on the temperature preference, temperature avoidance, and susceptibility to heat shock and cold shock of representative important species for the PSEG (formerly PSE7G) Hudson and Kearny generating stations. For each representative important species, life history, distribution in relation to water temperature, results and analysis of thermal effects experiments, and the predicted response to the Hudson and Kearny generating stations thermal plumes are discussed. Appendix B contains mathematical projections of the thermal plumes from the Hudson and Kearny generating stations.

67. **Konsevick, Edward. Hackensack River Water Quality: 1993-1996. March 1997.** [1] Summary of data collected between 1993-1996 defines the then current status of the Hackensack River, and depicts apparent trends. The data summarized includes precipitation, dissolved oxygen, fecal coliform, and heavy metal concentrations

68. ***Konsevick, Edward. Sediment Geochemistry of the Hackensack Meadowlands: A Survey of Research Conducted in the Hackensack River Estuary. 1991.** [1] Survey undertaken to show how this mixed estuary, where there is little riverwater input and tidal influence dominates circulation, functions in terms of particle associated pollutants in sediment. The papers reviewed cover the entire reach of the Lower Hackensack River and one of its major tributaries, Berry's Creek.

69. ***Konsevick, Edward, Christine Cheng Hobble, & Paul Lupini. Monitoring Effects of Urban Land Use of Esturine Water Quality, Hackensack Meadowlands District, New Jersey. November 1994.** [1] In 1993, the USGS, in cooperation with the HMDC, established a network of 14 ambient water monitoring sites, including the Hackensack River, Berry's Creek, Penhorn Creek, Sawmill Creek, Mill Creek, and Cromakill Creek, to characterize the current status of water quality in the HMD. Salinity, DO, fecal coliform, pH, TSS, turbidity, total phosphorous, ammonia, sulfate, BOD, COD, heavy metal concentrations were measured at each of the monitoring sites.

70. **Konsevick, E., K. R. Barrett, & C. C. Hobble. Effects of Drought on Water Quality in the Lower Hackensack River. Proceedings, Annual Conference of the American Water Resources Association. 2002.** [1a] The waters of the lower Hackensack River and tributaries have been monitored seasonally from 13 sites since 1993. Parameters monitored include: conventional field parameters (dissolved oxygen, pH, temperature, salinity); heavy metals (cadmium, chromium, copper, iron, lead, nickel, zinc); nutrients; solids; and bacteria. Correlated metals concentrations to rainfall amounts.

71. **Lo Pinto Associates, Inc. Determination of Tertiary Sewage Treatment Requirements for Waste Water Discharge into the Hackensack River at the Proposed Harmon Cove Discharge Site. 1978.** [1a] Water samples were collected from the Hackensack River, then N or P was added to some samples, followed by the addition of phytoplankton, to determine the limiting nutrient.

72. ***Lo Pinto, Richard W. Waste Water Treatment: A Determination of Limiting Factors Through Biological Assay. Fairleigh Dickinson University. 1975.** [1a] Identified chemicals released by sewage treatment plants to the Hackensack River that increase algae growth (limiting factors) to: 1) determine if it was desirable to add tertiary treatment and 2) direct the treatment at the proper chemical target.

73. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

74. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

75. ***Mattson, C., G. Potera, & M.E. Saks. Water Quality in a Disordered Ecosystem: A Report on the Water Quality Monitoring Study Performed in the Hackensack Meadowlands between June and September 1971. 1971.** [1a] Part of a natural resource inventory on which to base future land use decisions and against which to make future comparisons. Chemistry and water quality were measured at 11 sites, including Berry's Creek, Penhorn Creek, Losen Slote Creek, Bellman's Creek, Moonachie Creek, Mill Creek, and the Hackensack River.

76. **Mattson, Chester P., Richard W. Lo Pinto, Joanne D. Lo Pinto. Hackensack River Determination of Tertiary Sewage Treatment Requirements for Waste Water Discharge. Proceedings of University Seminar on Pollution and Water Resources, Volume VI. Columbia University. 1975.** [1a] Determined necessity for constructing a tertiary sewage treatment plant by the Hackensack River near Secaucus by analyzing the effect of N and K, which have been shown to be responsible for eutrophication, and can be removed from domestic waste water by tertiary treatment. Water samples collected from the Hackensack River near the Erie Lackawanna Railroad Bridge were used as a basis and N and K were added.

77. ***Pandullo Quirk Associates. Mathematical Projection of Thermal Plumes: Hudson and Kearny Generating Station. PSE&G. 1978.** [1a] Investigated temperature profiles in the Hackensack River as a result of operation of the plants under various meteorological, hydrodynamic, and Hudson and Kearny Generating Station plant operational characteristics. Included description/calibration of the model, hydrological/thermal characteristics of the Hackensack River, and projection of Hackensack River temperature distribution under various conditions.

78. **Pecchioli, Joel A., et al. Mercury in the Hackensack River: Initial Findings of the NJ Toxics Reduction Workplan for NY-NJ Harbor. Abstracts of the Meadowlands Symposium. 2003.** [1a] Presents the initial findings of the Phase 1 Studies for the New Jersey Toxics Reduction Workplan for NY-NJ Harbor that included the collection of water samples at three tidal locations and the head-of-tide in the Hackensack River.

79. ***PSE&G Company. Demonstration of Absence of Prior Appreciable Harm Respecting Application for Imposition of Alternative Thermal Effluent Limitations Bergen Steam Electric Generating Station Units No. 1 and No. 2. 1974.** [1a] Presented data to the USEPA to demonstrate that the final thermal effluent limitations specified in the draft NPDES Discharge Permit for the Bergen Generating Station are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife in and on the Hackensack River. In addition to providing information on the absence of prior harm, presented engineering and hydrologic data, water quality data, and a proposed thermal plume mapping study.

80. ***PSE&G Company. Demonstration of Absence of Prior Appreciable Harm Respecting Application for Imposition of Alternative Thermal Effluent Limitations Kearny Steam Electric Generating Station Units No. 7 and No. 8. 1974.** [1a] Presented data to the USEPA to demonstrate that the final thermal effluent limitations specified in the draft NPDES Discharge Permit for the Kearny Generating Station are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife in and on the Hackensack River. In addition to providing information on the absence of prior harm, presented engineering and hydrologic data, water quality data, and a proposed thermal plume mapping study.

81. **Tong, Huayl, James H. Simpson, Fredrika C. Moser, Stephen J. Monson, Michael L. Gross, Bruce L. Deck, & Richard F. Bopp. A Major Incident of Dioxin Contamination: Sediments of New Jersey Estuaries Environmental Science and Technology. 1991.** [1a] Dioxin was measured in sediments and suspended matter samples collected near the Diamond Shamrock site in on the Passaic River in Newark. Be7 and Cs137 were also measured for dating. One sample was collected in the Hackensack River.

82. ***USEPA, Office of Water Planning and Standards. A Water Quality Success Story. 1978.** [1a] Provided an overview of the water quality improvements observed from 1971-1978. Included general information on the sewage treatment plants and wetland preservation efforts that all contributed to the improvement of the water quality. No field data was collected.

83. ***Versar, Inc. Review and Evaluation of Thermal Effects Studies and Cooling Water Intake Structure Demonstrations of Impact for the Bergen, Hudson, Kearny, Linden, and Sewaren Generating Stations. First Progress Summary. 1989.** [1a] Includes evaluation of site characteristics of the Hackensack River such as: 1) drainage/basin morphology; 2) anthropogenic influences; 3) freshwater inflow; 4) tidal flow; and 5) general water quality information, as they related to facility biota interactions, evaluation criteria, and evaluation methodology. Detailed information on water withdrawal, discharges, and traveling screens for the three Hackensack facilities was also included.

84. **William F. Cosulich Associates. Hudson County Resource Recovery Project: Preliminary Environmental and Health Impact Statement in Fulfillment of NJSA 13: 1E-26 Requirements. 1985.** [1a] Preliminary Environmental and Health Impact Statement submitted to NJDEP for the proposed Hudson County resource recovery facility on the 150 acres Koppers Coke site in Kearny. Included water quality, hydrology, topography/geology, and biological resource studies. The solid waste quantities, characteristics, and control, as well as an air quality impact assessment were also included.

85. **Wilson, Timothy P. & Jennifer L. Bonin. Sediment, Carbon, and Trace Contaminant Contributions to the New Jersey Meadowlands Area from the Hackensack River Basin. Abstracts of the Meadowlands Symposium. 2003.** [1a] As part of the Toxics Reduction Workplan for the New York – New Jersey Harbor, conducted study to estimate the loads of suspended sediment, organic carbon, particulate nitrogen, and select trace elements at the head-of-tide of the Hackensack River. Trace organic compounds were measured in the suspended sediment and water, and include polychlorinated biphenyls, dioxins, furans, polycyclic aromatic hydrocarbons, pesticides, and metals.

86. ***Woodward-Clyde Consultants. Triaxial Thermal Plume Monitoring Program for Hudson and Kearny Generating Stations: Final Report. 1976.** [1a] Presented results of a triaxial temperature program conducted to satisfy the monitoring requirements of the USEPA NPDES permits for PSEG (formerly PSE&G). Included methodology used, hydrology of the Hackensack River, and triaxial survey results. Surface distributions and cross-section views are presented for each of the four stages of the tide. A bathymetric survey was conducted to obtain river bottom profiles along each transect.

I. Historical/Cultural Resources

87. **Kardas, Susan & Edward McLarrabee. Cultural Resource Reconnaissance of the Hackensack River Tidal Barrier Hudson County, New Jersey. January 1982.** [1a] A cultural resource reconnaissance was conducted for the immediate area of a proposed tidal barrier structure to be placed on the Hackensack River due south of Laurel Hill. Findings are that the study area has been marsh land for the last 2000 to 4000 years, with late 19th century industrial landfill on the south shore, and mid 20th century power generation and sanitary landfill on the north.

88. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

J. Restoration/Remediation Design Plans

89. **County Planning Board, County of Bergen, N.J. The Hackensack River and Adjacent Areas. 1964.** [2a] Plan for clearing the Hackensack River and adjacent tide lands of pollution, making them suitable for public use and development, primarily for conservation and recreation purposes. Included pollution clearing and prevention, river level control, flood prevention, and the creation of a freshwater lake for both an emergency supply and conservation and recreation use.

SITE #36 – KINGSLAND IMPOUNDMENT

Category: Waterbodies & Other Wetlands

Location: Located north of Saw Mill Creek Wildlife Management Area, to the south of Avon Landfill, and to the east of Kinglands Landfill in Lyndhurst, Bergen County.

Current Land Use: Impounded open water areas and pedestrian trail

Current Ownership: NJMC

Site Description: The Kingsland Impoundment receives tidal waters from both the Sawmill Creek mudflats and Kingsland Creek; inputs are controlled by a sluice gate. Common reed (*Phragmites australis*) stands are interspersed with open water areas. Water levels in the impoundment are managed throughout the year for shorebirds and waterfowl habitat, educational programs, and scenic beauty. Water levels vary from mudflats to approximately 24 inches, depending on which management scheme is in place. The 0.5 mile Marsh Discovery Trail, which bisects the Kingsland Impoundment, has four bird blinds and seating areas for nature enthusiasts.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Kingsland Impoundment is owned by NJMC.

C. Site History & Land Use

1. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Basin Hydrology and Pond Hydraulics Report. July 1983.** [2a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. This report details existing hydrologic and hydrology data for the Sawmill Creek Basin and the proposed recreation pond components.

2. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Recreation Pond Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Discusses background and existing hydrology of the site of a proposed 160-acre pond between present day Harrier Meadow and 1-E Landfill.

3. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

4. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

5. ***Wehran Engineering and Zion and Breen Associates. Master Plan: Richard W. DeKorte State Park. 1979.** [1a] Master plan for the creation of the 2,000 acre DeKorte State Park (which encompasses the current Kingsland Impoundment) complete with key engineering, environmental, landscape architecture, and park use recommendations. Plan calls for 800 acres of active and inactive landfills to be developed, and 1,200 acres of tidal marshes (including the Saw Mill Creek Wildlife Management Area) to be preserved. An artificial marsh system was designed to treat Erie Landfill's leachate. The detailed circulation and vegetation plans are also included.

6. **Wright, Kevin W. The Hackensack Meadowlands: Prehistory and History. December 1988.** [1] Explores the prehistory and history of the Meadowlands in general. However, it uses the Kingsland Marsh as a control by which the a sample of the events affecting the Meadowlands can be seen in detail.

D. Biological Studies – Fauna

7. ***Black, I. H. Past and Present Status of the Birds of the Lower Hackensack River Marshes. New Jersey Nature News. 25(2):57-70. 1970.** [1a] Describes the highlights of the bird population of the lower Hackensack River marshes between 1961 and 1967. It compares the bird data of 1961-1967 to that of 1969, and also compares the shorebird numbers of 1961-1967 to those found prior to 1936 in the Secaucus and Newark marshes.

8. ***Kraus, Mark L. (HMDC). Heavy Metal Accumulation in Pre-fledging Tree Swallows (Tridoproche bicolor). 1988.** [1a] A work plan for a proposed food chain/biomagnification study of Pre-fledging Tree Swallows.

E. Biological Studies – General Environmental

9. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

10. ***Wehran Engineering and Zion and Breen Associates. Master Plan: Richard W. DeKorte State Park. 1979.** [1a] Master plan for the creation of the 2,000 acre DeKorte State Park (which encompasses the current Kingsland Impoundment) complete with key engineering, environmental, landscape architecture, and park use recommendations. Plan calls for 800 acres of active and inactive landfills to be developed, and 1,200 acres of tidal marshes (including the Saw Mill Creek Wildlife Management Area) to be preserved. An artificial marsh system was designed to treat Erie Landfill's leachate. The detailed circulation and vegetation plans are also included.

F. Geotechnical

11. ***Converse Consultants, Inc. Sawmill Creek Basin Water Quality Management: Report of Soils and Foundations Investigations. HMDC. 1983.** [1a] Details soils and foundation investigation that was completed for the proposed construction of leachate/wastewater treatment system and recreational paths and bridges in the Saw Mill Creek Basin.

G. Hydraulics and Hydrology

12. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Basin Hydrology and Pond Hydraulics Report. July 1983.** [2a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. This report details existing hydrologic and hydrology data for the Sawmill Creek Basin and the proposed recreation pond components.

13. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Recreation Pond Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Discusses background and existing hydrology of the site of a proposed 160-acre pond between present day Harrier Meadow and 1-E Landfill.

14. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

15. ***TAMS & USACE-NYD. Reconnaissance Report for Flood Control Measures, Hackensack River Basin, Hudson and Bergen Counties. 1981.** [1a] Used a mathematical model, LATIS, to predict water surface levels and flows for 31 different hydraulic conditions. A flood damage survey and the resulting stage-damage curves were also used to determine the mean annual damage throughout the Meadowlands. Mapping used for this report was obtained from flood insurance studies by FEMA and TAMS.

H. Water and Sediments

16. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

17. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

18. ***Mattson, Chester P. & Richard Lo Pinto. Phytoplankton for Industrial Pollutants in the Hackensack Meadowlands. Proceedings of University Seminar on Pollution and Water Resources, Volume VIII. 1975.** [1a] Discusses the methods used to perform phytoplankton bioassays (using ten different phytoplankton cultures) on three different effluent types – landfill leachate, effluent from a metal finishing factory, and effluent from a metal plating factory. Samples were collected from the Hackensack Meadowlands.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

19. ***Wehran Engineering and Zion and Breen Associates. Master Plan: Richard W. DeKorte State Park. 1979.** [1a] Master plan for the creation of the 2,000 acre DeKorte State Park (which encompasses the current Kingsland Impoundment) complete with key engineering, environmental, landscape architecture, and park use recommendations. Plan calls for 800 acres of active and inactive landfills to be developed, and 1,200 acres of tidal marshes (including the Saw Mill Creek Wildlife Management Area) to be preserved. An artificial marsh system was designed to treat Erie Landfill's leachate. The detailed circulation and vegetation plans are also included.

SITE #37 – LOSEN SLOTE CREEK

Category: Waterbodies & Other Wetlands

Location: Located in the northeastern portion of the HMD, running along Losen Slote Creek Park, Mehrhof Pond, and the northern tip of the Empire Tract. The creek begins outside of the HMD in Little Ferry, and runs along the border of Little Ferry and Moonachie, then along the border of Little Ferry and South Hackensack, before it outlets into the Hackensack River in Bergen County.

Current Land Use: Open Water

Site Description: Losen Slote Creek (also know as Eckles Creek) is not influenced by tidal waters due to a tide gate located near its outlet into the Hackensack River. The tide gate was installed by the Bergen County Mosquito Commission, sometime around 1921. The creek receives freshwater inputs from surrounding areas. There are freshwater meadows and forested wetlands located along the banks.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Not applicable.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

No data obtained.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

1. ***Mattson, C., G. Potera, & M.E. Saks. Water Quality in a Disordered Ecosystem: A Report on the Water Quality Monitoring Study Performed in the Hackensack Meadowlands between June and September 1971. 1971.** [1a] Part of a natural resource inventory on which to base future land use decisions and against which to make future comparisons. Chemistry and water quality were measured at 11 sites, including Berry's Creek, Penhorn Creek, Losen Slote Creek, Bellman's Creek, Moonachie Creek, Mill Creek, and the Hackensack River.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #38 – MILL CREEK

Category: Waterbodies & Other Wetlands

Location: Located east of the Hackensack River, in Secaucus, Hudson County. It runs along Mill Creek Wetland Mitigation Site, Petrillo Tract, Secaucus Tract, and Western Brackish Marsh before it outlets into the Hackensack River.

Current Land Use: Open Water

Site Description: Mill Creek is a meandering tidal creek with several oxbows. It is the main waterbody that flows into the Mill Creek Marsh owned by NJMC. The Secaucus Sewage Treatment Plant releases large quantities of tertiary-level treated freshwater into the creek, lowering salinity levels. Un-enhanced portions of the bank are dominated by common reed (*Phragmites australis*), while a variety of aquatic species have established along the enhanced marsh areas.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Not applicable.

C. Site History & Land Use

1. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

D. Biological Studies – Fauna

2. ***Able, Kenneth W., Melissa J. Neuman, & Ruess Guillermo (Rutgers University). The Influence of Low Dissolved Oxygen on Predatory Fishes: Comparisons between Restored and Impacted Marsh Creeks in the Hackensack Meadowlands. 2002.**[1a] A study to determine patterns in water quality indicators and predatory fish use, and examine food habits of the dominant fish predators in two tidal marshes, Mill Creek Marsh (impacted natural creek) and Doctor's Creek (a restored/created creek that is part of Marsh Resources Wetland Mitigation Bank).

3. ***EA Science and Technology & PSE&G. Kearny Generating Station Supplemental 316(b) Report. NJDEP. 1988.** [1a] Evaluates the effects of the cooling water intake of the Kearny Generating Station on the ecology of the Hackensack River and adjacent waters, based on entrainment and impingement data collected from June 1987 to April 1988, and on biological data collected from the vicinity of the Kearny station since August 1986. Studies of macrozooplankton, ichthyoplankton, and juvenile and adult fish were conducted in vicinity of the station and the full length of the estuary. Includes background information on the Hackensack Estuary.

E. Biological Studies – General Environmental

4. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

5. ***Trattner, R., A. Hernadez, V. Lasher, D. Voight, C.P. Mattson, D. Smith, F. Platt, & M. Saks. Nitrogen Budget Determination for a Selected Site in the Hackensack Meadowlands Estuary. November 1974.** [4] Quantified a nitrogen budget for the Mill Creek drainage basin in the Secaucus area in order to determine whether wetlands in the Meadowlands can utilize the nitrogen load that passes over and through them.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

6. ***Able, Kenneth W., Melissa J. Neuman, & Ruess Guillermo (Rutgers University). The Influence of Low Dissolved Oxygen on Predatory Fishes: Comparisons between Restored and Impacted Marsh Creeks in the Hackensack Meadowlands. 2002.**[1a] A study to determine patterns in water quality indicators and predatory fish use, and examine food habits of the dominant fish predators in two tidal marshes, Mill Creek Marsh (impacted natural creek) and Doctor's Creek (a restored/created creek that is part of Marsh Resources Wetland Mitigation Bank).

7. ***Anonymous (HMDC). Biological Water Quality and Field Sampling Survey of the Hackensack Meadowlands. 1980.** [1a] During a one-day sampling event, water quality was measured at 11 sites for temperature, salinity, DO, and TSS. Also set fish sampling nets in Berry's Creek Canal and Sawmill Creek.

8. ***Anonymous. Nitrogen Budget Determination for a Selected Site in the Hackensack Meadowlands Estuary. 1974** [1a] Water velocity, DO, salinity, and temperature were monitored in Mill Creek. Samples were collected and analyzed for nitrate, nitrite, and kjeldahl nitrogen. Samples were also collected from the Secaucus Sewage Treatment Plant and compared to Mill Creek samples.

9. ***Bopp, R. F. Radionuclide Analysis of Mill Creek and Saw Mill Creek Sediment Samples. 2001.** **[1a]** Pb 210 and Cs 137 dating of four sediment cores from Mill Creek and one from Sawmill Creek, ranging from 18 to 26 centimeters deep, were collected in 1999. All data from Mill Creek supported the trace-metal-based hypothesis that the more consolidate clay mud is old (pre-industrial) sediment, and organic-rich upper layers represent recent deposition that occurred since site manipulation. In the Sawmill Creek core, no Pb or Cs isotopes were found.

10. ***Gunawardana, Vajira K., Po-Shu Huang, Tavit O. Najarian, & Rhomaios V. Ram. Impact Analysis of Sewage Treatment Plant Discharges of the Water Quality of the Lower Hackensack River. June 1992.** **[1]** Analyzed the impacts of discharge from BCUA treatment plant on the dissolved oxygen regime of the lower Hackensack River. The three tributaries that were selected for this study were Sawmill Creek, Berry's Creek, and Mill Creek.
11. ***Konsevick, Edward, Christine Cheng Hobble, & Paul Lupini. Monitoring Effects of Urban Land Use of Esturine Water Quality, Hackensack Meadowlands District, New Jersey. November 1994.** **[1]** In 1993, the USGS, in cooperation with the HMDC, established a network of 14 ambient water monitoring sites, including the Hackensack River, Berry's Creek, Penhorn Creek, Sawmill Creek, Mill Creek, and Cromakill Creek, to characterize the current status of water quality in the HMD. Salinity, DO, fecal coliform, pH, TSS, turbidity, total phosphorous, ammonia, sulfate, BOD, COD, heavy metal concentrations were measured at each of the monitoring sites.

12. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** **[1a]** A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

13. ***Mattson, C., G. Potera, & M.E. Saks. Water Quality in a Disordered Ecosystem: A Report on the Water Quality Monitoring Study Performed in the Hackensack Meadowlands between June and September 1971. 1971.** **[1a]** Part of a natural resource inventory on which to base future land use decisions and against which to make future comparisons. Chemistry and water quality were measured at 11 sites, including Berry's Creek, Penhorn Creek, Losen Slote Creek, Bellman's Creek, Moonachie Creek, Mill Creek, and the Hackensack River.

14. ***Trattner, R., A. Hernadez, V. Lasher, D. Voight, C.P. Mattson, D. Smith, F. Platt, & M. Saks. Nitrogen Budget Determination for a Selected Site in the Hackensack Meadowlands Estuary. November 1974.** **[4]** Quantified a nitrogen budget for the Mill Creek drainage basin in the Secaucus area in order to determine whether wetlands in the Meadowlands can utilize the nitrogen load that passes over and through them.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #39 – MOONACHIE CREEK

Category: Waterbodies & Other Wetlands

Location: Located in the northeastern portion of the HMD in Carlstadt, Bergen County. Runs from the Empire Tract underneath the New Jersey Turnpike – Western Spur to the southwest of Marsh Resources Meadowlands Mitigation Bank, down to the Hackensack River.

Current Land Use: Open Water

Site Description: Moonachie Creek is cut off from tidal influence by a tide gate, as well as berms along the Hackensack, built and maintained by the Bergen County Mosquito Commission. The creek drains a large portion of the Empire Tract. Its banks are dominated by common reed (*Phragmites australis*), with some mixed wooded species at higher elevations.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Not applicable.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

1. ***TAMS Consultants, Inc. Avian Survey Report: Existing Conditions, Environmental Consequences, and Mitigation Activities – Empire Tract. Revised October 29, 1998.** [1] A report detailing an avian survey, conducted from 1996 to 1997, to determine the overall bird usage of the Empire Tract (through which Moonachie Creek flows). The report also includes a discussion of the potential impacts to the avian community of the affected environment that would result from development and an assessment of the proposed mitigation activities for the Meadowlands Mills wetland mitigation program and its beneficial effect on avifauna.

E. Biological Studies – General Environmental

2. ***TAMS Consultants, Inc. Avian Survey Report: Existing Conditions, Environmental Consequences, and Mitigation Activities – Empire Tract. Revised October 29, 1998.** [1] A report detailing an avian survey, conducted from 1996 to 1997, to determine the overall bird usage of the Empire Tract (through which Moonachie Creek flows). The report also includes a discussion of the potential impacts to the avian community of the affected environment that would result from development and an assessment of the proposed mitigation activities for the Meadowlands Mills wetland mitigation program and its beneficial effect on avifauna.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

3. ***Mattson, C., G. Potera, & M.E. Saks. Water Quality in a Disordered Ecosystem: A Report on the Water Quality Monitoring Study Performed in the Hackensack Meadowlands between June and September 1971. 1971.** [1a] Part of a natural resource inventory on which to base future land use decisions and against which to make future comparisons. Chemistry and water quality were measured at 11 sites, including Berry's Creek, Penhorn Creek, Losen Slote Creek, Bellman's Creek, Moonachie Creek, Mill Creek, and the Hackensack River.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #40 – NJSEA SPORTS COMPLEX-WALDEN MARSH

Category: Waterbodies & Other Wetlands

Location: Adjacent to the NJSEA Sports Complex, north of Oritani Marsh along Berry's Creek in East Rutherford, Bergen County.

Current Land Use: Preserved tidal marsh

Current Ownership: NJSEA

Site Description: The approximately 120 acre Walden Marsh is highly channelized due to mosquito ditches, and receives tidal influence from Berry's Creek. The site is predominately a common reed (*Phragmites australis*) monoculture, with highly contaminated soils. It has been estimated that 20 tons of mercury exist in a stratified layer in the Walden Marsh soils.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

NJSEA Sports Complex-Walden Marsh is owned by NJSEA.

C. Site History & Land Use

1. ***Jack McCormick & Associates, Inc. Draft Assessment of the Potential Environmental Impact of the Construction and Operation of a New Jersey Sports and Exposition Complex at a Site in Rutherford, Bergen County, New Jersey. 1972.** [1a] Draft EIS that evaluated both the onsite and offsite environmental impacts of the construction and operation of the NJSEA's Sports Complex (Walden Marsh was part of the site). Examined land form/geology, vegetation, wildlife, and water quality at the proposed site. Assessed probable noise, traffic, and air quality impacts. Also includes environmental inventory for the HMD (physiography/geology and vegetation) and the project site (vegetation, wildlife, geology, and water quality).

2. ***Jack McCormick & Associates, Inc. Full Environmental Impact Statement for the Proposed Meadowlands Arena at the New Jersey Sports Complex, Borough of East Rutherford, County of Bergen. 1978.** [1a] Details the potential environmental effects of the proposed Hackensack Meadowlands Arena and New Jersey Sports Complex. Includes traffic, test boring, wildlife, vehicular emissions, air quality, and water quality data for the surrounding area.

3. ***NJSEA. Flood Management Plan Hackensack Meadowlands District – Volume 2: Summary of Permit to Construct an Embankment and Other Facilities on Berry's Creek, Bergen County, New Jersey. 1980.** [1a] Draft EIS examining the impacts of the proposed embankment and other facilities related to the NJSEA Sports Complex construction along Berry's Creek, which includes a football stadium, a horse racing facility, and an environment center. Discusses adverse environmental impacts due to the elimination of the Walden Marsh.

D. Biological Studies – Fauna

4. ***Jack McCormick & Associates, Inc. Collections of Aquatic Organisms from the Hackensack Meadowlands, Bergen and Hudson Counties, NJ. 1977.** [1a] Study undertaken to obtain a large number of biological samples from the waters and wetlands at eight stations in the central meadowlands. Samples were collected during three days in October 1976. Specimens were identified, labeled, packaged, and frozen. The concentrations of mercury in the samples collected were to be determined at a later date under a separate contract.

5. ***Jack McCormick & Associates, Inc. Draft Assessment of the Potential Environmental Impact of the Construction and Operation of a New Jersey Sports and Exposition Complex at a Site in Rutherford, Bergen County, New Jersey. 1972.** [1a] Draft EIS that evaluated both the onsite and offsite environmental impacts of the construction and operation of the NJSEA's Sports Complex (Walden Marsh was part of the site). Examined land form/geology, vegetation, wildlife, and water quality at the proposed site. Assessed probable noise, traffic, and air quality impacts. Also includes environmental inventory for the HMD (physiography/geology and vegetation) and the project site (vegetation, wildlife, geology, and water quality).

6. ***Jack McCormick & Associates, Inc. Full Environmental Impact Statement for the Proposed Meadowlands Arena at the New Jersey Sports Complex, Borough of East Rutherford, County of Bergen. 1978.** [1a] Details the potential environmental effects of the proposed Hackensack Meadowlands Arena and New Jersey Sports Complex. Includes traffic, test boring, wildlife, vehicular emissions, air quality, and water quality data for the surrounding area.

E. Biological Studies – General Environmental

7. ***Jack McCormick & Associates, Inc. Draft Assessment of the Potential Environmental Impact of the Construction and Operation of a New Jersey Sports and Exposition Complex at a Site in Rutherford, Bergen County, New Jersey. 1972.** [1a] Draft EIS that evaluated both the onsite and offsite environmental impacts of the construction and operation of the NJSEA's Sports Complex (Walden Marsh was part of the site). Examined land form/geology, vegetation, wildlife, and water quality at the proposed site. Assessed probable noise, traffic, and air quality impacts. Also includes environmental inventory for the HMD (physiography/geology and vegetation) and the project site (vegetation, wildlife, geology, and water quality).

8. ***Jack McCormick & Associates, Inc. Full Environmental Impact Statement for the Proposed Meadowlands Arena at the New Jersey Sports Complex, Borough of East Rutherford, County of Bergen. 1978.** [1a] Details the potential environmental effects of the proposed Hackensack Meadowlands Arena and New Jersey Sports Complex. Includes traffic, test boring, wildlife, vehicular emissions, air quality, and water quality data for the surrounding area.

9. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

10. ***NJSEA. Flood Management Plan Hackensack Meadowlands District – Volume 2: Summary of Permit to Construct an Embankment and Other Facilities on Berry's Creek, Bergen County, New Jersey. 1980.** [1a] Draft EIS examining the impacts of the proposed embankment and other facilities related to the NJSEA Sports Complex construction along Berry's Creek, which includes a football stadium, a horse racing facility, and an environment center. Discusses adverse environmental impacts due to the elimination of the Walden Marsh.

11. ***NJSEA. Technical Support Document for a Permit Application: Brendan Byrne Arena Parking Facility Expansion. 1985.** [1a] Examined the potential impacts of the proposed project, which consisted of the expansion of parking facilities at the Meadowlands Arena by filling in 11.5 acres of wetland. It included a mitigation plan for the proposed project and outlined all the required permits.

F. Geotechnical

12. **Converse Ward Davis Dixon, Inc. Report of Soils And Foundation Investigation, Proposed Meadowlands Arena, East Rutherford, New Jersey. 1978.** [1a] Determined and evaluated subsurface conditions, and provided recommendations for the design and construction of foundations, floors, and pavements as influenced by the subsurface conditions. Available geologic data was reviewed, an exploration program prepared and executed, and conclusions and recommendations were included.

13. ***Jack McCormick & Associates, Inc. Full Environmental Impact Statement for the Proposed Meadowlands Arena at the New Jersey Sports Complex, Borough of East Rutherford, County of Bergen. 1978.** [1a] Details the potential environmental effects of the proposed Hackensack Meadowlands Arena and New Jersey Sports Complex. Includes traffic, test boring, wildlife, vehicular emissions, air quality, and water quality data for the surrounding area.

G. Hydraulics and Hydrology

14. ***Bertolotti, Benjamin J. Chemical Oxygen Demand Interference in the Stormwater Collection System of the Meadowlands Sport Complex. 1990.** [1] Analyzed Berry's Creek for exceedence of permit levels of organic and inorganic pollutants at the discharge point of the stormwater collection system for the Meadowlands Sports Complex. The system consists of four retention basins that trap runoff from the facility's parking lots. Pumping action moves the water through the system, eventually discharging into Berry's Creek.

15. ***NJSEA. Flood Management Plan Hackensack Meadowlands District – Volume 2: Summary of Permit to Construct an Embankment and Other Facilities on Berry's Creek, Bergen County, New Jersey. 1980.** [1a] Draft EIS examining the impacts of the proposed embankment and other facilities related to the NJSEA Sports Complex construction along Berry's Creek, which includes a football stadium, a horse racing facility, and an environment center. Discusses adverse environmental impacts due to the elimination of the Walden Marsh.

16. ***NJSEA. Technical Support Document for a Permit Application: Brendan Byrne Arena Parking Facility Expansion. 1985.** [1a] Examined the potential impacts of the proposed project, which consisted of the expansion of parking facilities at the Meadowlands Arena by filling in 11.5 acres of wetland. It included a mitigation plan for the proposed project and outlined all the required permits.

H. Water and Sediments

17. ***Bertolotti, Benjamin J. Chemical Oxygen Demand Interference in the Stormwater Collection System of the Meadowlands Sport Complex. 1990.** [1] Analyzed Berry's Creek for exceedence of permit levels of organic and inorganic pollutants at the discharge point of the stormwater collection system for the Meadowlands Sports Complex. The system consists of four retention basins that trap runoff from the facility's parking lots. Pumping action moves the water through the system, eventually discharging into Berry's Creek.

18. ***Jack McCormick & Associates, Inc. Full Environmental Impact Statement for the Proposed Meadowlands Arena at the New Jersey Sports Complex, Borough of East Rutherford, County of Bergen. 1978.** [1a] Details the potential environmental effects of the proposed Hackensack Meadowlands Arena and New Jersey Sports Complex. Includes traffic, test boring, wildlife, vehicular emissions, air quality, and water quality data for the surrounding area.

19. ***NJSEA. Flood Management Plan Hackensack Meadowlands District – Volume 2: Summary of Permit to Construct an Embankment and Other Facilities on Berry's Creek, Bergen County, New Jersey. 1980.** [1a] Draft EIS examining the impacts of the proposed embankment and other facilities related to the NJSEA Sports Complex construction along Berry's Creek, which includes a football stadium, a horse racing facility, and an environment center. Discusses adverse environmental impacts due to the elimination of the Walden Marsh.

20. ***NJSEA. Technical Support Document for a Permit Application: Brendan Byrne Arena Parking Facility Expansion. 1985.** [1a] Examined the potential impacts of the proposed project, which consisted of the expansion of parking facilities at the Meadowlands Arena by filling in 11.5 acres of wetland. It included a mitigation plan for the proposed project and outlined all the required permits.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

21. **Jack McCormick & Associates, Inc. A Mercury Budget for Berrys Creek Tidal Marsh, Proposed Plan and Budget. 1975.** [1a] Describes a plan to create a mercury budget in a tidal marsh owned by the NJSEA.

22. ***NJSEA. Technical Support Document for a Permit Application: Brendan Byrne Arena Parking Facility Expansion. 1985.** [1a] Examined the potential impacts of the proposed project, which consisted of the expansion of parking facilities at the Meadowlands Arena by filling in 11.5 acres of wetland. It included a mitigation plan for the proposed project and outlined all the required permits.

SITE #41 – PENHORN CREEK

Category: Waterbodies & Other Wetlands

Location: Located in the southeastern portion of the HMD, flows along the border of Secaucus and Jersey City in Hudson County, underneath the various New Jersey Transit rail lines that converge at the Secaucus Transfer Station. The creek outlets to the Hackensack River, just east of Malanka Landfill.

Current Land Use: Open Water

Site Description: Penhorn Creek is blocked from tidal inundation at two points by tide gates. The first is located just above the Hackensack River by the railroad crossing, while the second is located above Secaucus Road. Both tide gates have associated pump stations. The creek runs through the Croxton rail yards and other industrial areas, resulting in very poor water quality. The surrounding areas consist mainly of industrial grounds and monotypic common reed (*Phragmites australis*) stands.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***ERDC, HMDC, & USACE – NYD. Flood Control Survey. 2000.** [2a] Survey performed for the HMD that consisted of: 1) cross-sections along the Hackensack River and its major tributaries, including Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke; 2) identifying 30 flood control structures along the Hackensack River; and 3) locating all bridges and piers within the study area. In addition, digital aerials were flown and geo-referenced. The vertical datum for the survey was NGVD29. At 13 of the 30 flood control structures, tide gages and single beam acoustic Doppler current meters were installed and monitored to measure velocity, head difference, and discharge at these locations.

B. Real Estate/Ownership

Not applicable.

C. Site History & Land Use

2. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

D. Biological Studies – Fauna

3. ***Aguilar Associates & Consultants, Inc. Report on Surface Water Quality and Benthos Biological Studies for the Design Modification to the NEC for the Secaucus Transfer Station Project. June 1990.** [1] As part of the comprehensive environmental analysis of the Design Modifications to the Northeast Corridor for the Secaucus Transfer Station Project, surface water quality was analyzed and quantitative benthic studies were performed. Tests were conducted in four locations, including Penhorn Creek and three ponds near the NEC project area.

E. Biological Studies – General Environmental

4. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

F. Geotechnical

No data obtained.

G. Hydraulics and Hydrology

5. ***ERDC, HMDC, & USACE – NYD. Flood Control Survey. 2000.** [2a] Survey performed for the HMD that consisted of: 1) cross-sections along the Hackensack River and its major tributaries, including Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke; 2) identifying 30 flood control structures along the Hackensack River; and 3) locating all bridges and piers within the study area. In addition, digital aerials were flown and geo-referenced. The vertical datum for the survey was NGVD29. At 13 of the 30 flood control structures, tide gages and single beam acoustic Doppler current meters were installed and monitored to measure velocity, head difference, and discharge at these locations.

6. ***ERDC & USACE – NYD. The Hackensack Meadowlands Flood Control Study. 1998 – 2004 (On-going).** [2a] Undertaken to develop a numerical hydraulic model of the Hackensack River and its associated tidal marshes and channels. A parent model (one-dimensional hydrologic) is being developed for the Hackensack River Basin, while child models (two-dimensional hydrologic) are being developed for Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke. The study also includes the evaluation of the performance of proposed flood control structures and restored wetland areas with respect to flood elevations, as well as the effects of optimum maintenance on existing flood control structures.

H. Water and Sediments

7. ***Aguilar Associates & Consultants, Inc. Report on Surface Water Quality and Benthos Biological Studies for the Design Modification to the NEC for the Secaucus Transfer Station Project. June 1990.** [1] As part of the comprehensive environmental analysis of the Design Modifications to the Northeast Corridor for the Secaucus Transfer Station Project, surface water quality was analyzed and quantitative benthic studies were performed. Tests were conducted in four locations, including Penhorn Creek and three ponds near the NEC project area.

8. ***Konsevick, Edward, Christine Cheng Hobble, & Paul Lupini. Monitoring Effects of Urban Land Use of Esturine Water Quality, Hackensack Meadowlands District, New Jersey. November 1994.** [1] In 1993, the USGS, in cooperation with the HMDC, established a network of 14 ambient water monitoring sites, including the Hackensack River, Berry's Creek, Penhorn Creek, Sawmill Creek, Mill Creek, and Cromakill Creek, to characterize the current status of water quality in the HMD. Salinity, DO, fecal coliform, pH, TSS, turbidity, total phosphorous, ammonia, sulfate, BOD, COD, heavy metal concentrations were measured at each of the monitoring sites.

9. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

10. ***Mattson, C., G. Potera, & M.E. Saks. Water Quality in a Disordered Ecosystem: A Report on the Water Quality Monitoring Study Performed in the Hackensack Meadowlands between June and September 1971. 1971.** [1a] Part of a natural resource inventory on which to base future land use decisions and against which to make future comparisons. Chemistry and water quality were measured at 11 sites, including Berry's Creek, Penhorn Creek, Losen Slote Creek, Bellman's Creek, Moonachie Creek, Mill Creek, and the Hackensack River.

I. Historical/Cultural Resources

11. **Geismar, Joan H. Stage 1A Cultural Resources Survey of the Impact Area of New Jersey Turnpike Secaucus Interchange Project Hudson County, New Jersey. July 1992.** [1a] The study area of this project includes Potters Field and Penhorn Creek. The study indicates that the banks of Penhorn Creek may harbor evidence of prehistoric or early historical use of the area by Native Americans. Parts of the proposed interchange in the vicinity of Potter's Field and Penhorn Creek will require an archaeological evaluation that should include soil boring data and possible soil testing.

J. Restoration/Remediation Design Plans

No data obtained.

SITE #42 – SAW MILL CREEK

Category: Waterbodies & Other Wetlands

Location: Located in the southwestern portion of the HMD, flowing along and through the Saw Mill Creek Wildlife Management Area and under the New Jersey Turnpike – Western Spur before it outlets into the Hackensack River. The creek runs along the border of Kearny and Lyndhurst in Hudson and Bergen Counties respectfully.

Current Land Use: Open Water

Site Description: Saw Mill Creek is strongly influenced by the tides, and has several mosquito ditches that stem off the main creek channel. The creek opens up to large mudflat areas that are frequented by many waterfowl, wading birds, and shorebirds. Two tide gates, constructed in the 1920's, were destroyed by storm events in the 1950's, re-opening the site to the tides Since then, the established common reed (*Phragmites australis*) monoculture in the surrounding areas has been steadily replaced by smooth cordgrass (*Spartina alterniflora*).

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

B. Real Estate/Ownership

Not applicable.

C. Site History & Land Use

1. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Basin Hydrology and Pond Hydraulics Report. July 1983.** [2a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. This report details existing hydrologic and hydrology data for the Sawmill Creek Basin and the proposed recreation pond components.

2. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Recreation Pond Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Discusses background and existing hydrology of the site of a proposed 160-acre pond between present day Harrier Meadow and 1-E Landfill.

3. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

4. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

D. Biological Studies – Fauna

5. ***The Academy of Natural Sciences Benedict Estuaries Research Laboratory & HMDC Environmental Operations Research Laboratory. Interim Report: Accumulation of Chromium in Blue Crabs *(Callinectes sapidus*) from the Hackensack River, Hudson County, New Jersey. November 1991.** [1] Interim report of study (March 1992 study cited with Konsevick as author) designed to characterize the levels of chromium in the claw, body muscle, and hepatopancreas of blue crabs. The samples were collected during three seasonal events at three Hackensack River sites chosen to depict conditions throughout the estuary – Diamond Shamrock, Sawmill Creek, and Berry's Creek.

6. ***Anonymous (HMDC). Biological Water Quality and Field Sampling Survey of the Hackensack Meadowlands. 1980.** [1a] During a one-day sampling event, water quality was measured at 11 sites for temperature, salinity, DO, and TSS. Also set fish sampling nets in Berry's Creek Canal and Sawmill Creek.

7. ***Bragin, A. Brett, W. Frame, M. Kraus, D. Smith, A. Goeller, J. Graviec, & E. Konsevick. Inventory of Fisheries Resources of the Hackensack River within the Jurisdictional Boundary of the Hackensack Meadowlands Development Commission from Kearny, Hudson County, to Ridgefield, Bergen County, New Jersey. May 18, 1989.** [1] A two-year survey (2/1987 to 12/1988) initiated by HMDC of the lower Hackensack River to ascertain the fisheries values of the river and help guide intelligent decisions on development applications.

8. ***EA Science and Technology & PSE&G. Kearny Generating Station Supplemental 316(b) Report. NJDEP. 1988.** [1a] Evaluates the effects of the cooling water intake of the Kearny Generating Station on the ecology of the Hackensack River and adjacent waters, based on entrainment and impingement data collected from June 1987 to April 1988, and on biological data collected from the vicinity of the Kearny station since August 1986. Studies of macrozooplankton, ichthyoplankton, and juvenile and adult fish were conducted in vicinity of the station and the full length of the estuary. Includes background information on the Hackensack Estuary.

9. ***Jack McCormick & Associates, Inc. Collections of Aquatic Organisms from the Hackensack Meadowlands, Bergen and Hudson Counties, NJ. 1977.** [1a] Study undertaken to obtain a large number of biological samples from the waters and wetlands at eight stations in the central meadowlands. Samples were collected during three days in October 1976. Specimens were identified, labeled, packaged, and frozen. The concentrations of mercury in the samples collected were to be determined at a later date under a separate contract.

10. ***Konsevick, Edward. Accumulation of Chromium in Blue Crabs from the Hackensack River, Hudson County, New Jersey. March 1992.** [1] Designed to characterize the levels of chromium in the claw, body muscle, and hepatopancreas of blue crabs. The samples were collected during three seasonal events at three Hackensack River sites chosen to depict conditions throughout the estuary – Diamond Shamrock, Sawmill Creek, and Berry's Creek.

11. ***Kraus, Mark L. Bioaccumulation of Heavy Metals in Pre-fledging Tree Swallows, Tachycineta bicolor Bull. Environ. Contam. Toxicol. 1989.** [1a] A total of ten sediment, nine adult midge, twelve swallow eggs, and six pre-fledgling swallows samples were analyzed for Cd, Cr, Cu, Pb, and Ni. The study demonstrated that heavy metals can move from contaminated estuarine sediments through midges and bioaccumulate in pre-fledgling tree swallows. The accumulation of metals in bird tissues is dependant on the tissue and metal type.

12. ***Lo Pinto, R. A. (HMDC). Biological Assay Procedure for Determining the Effects of Industrial Effluents on Some Key Aspects of the Hackensack Meadowlands Estuary. 1973.** [1a] Procedure to the HMDC in establishing guidelines to regulate the admission of certain pollutants into the ecosystem. Examined the program of introducing bivalves and other consumer population into the system.

13. ***Turner, Joe. Chromium Concentrations in the Blue Crab (*Callinectes sapidus*): An Independent Study Project Conducted at the Hackensack Meadowlands Environmental Research Laboratory. May 1990.** [1] Blue crabs were analyzed for total chromium concentrations to determine extent of contamination. The NJDEP and the HMDC supplied samples collected over a two year period from the Hackensack River near the Laurel Hill, from Sawmill Creek, and from Berry's Creek Canal.

14. **Weis, J.S., L. Windham, and P. Weis. Patterns of Metal Accumulation in Leaves of the Tidal Marsh Plants *Spartina alterniflora* Loisel and *Phragmites australis* Cav. Trin ex Steud. Over the Growing Season. 2000.** [6] Previous studies found that upper leaves of *P. australis* and *S. alterniflora* have lower levels of metals than lower leaves. Two hypotheses were tested: (1) leaves produced earlier in the season contain more metals and/or (2) individual leaves continue to accumulate metals during their lifespan. Results supported only hypothesis 2; individual leaves are not representative of a plant as a whole so several leaves should be collected and pooled.

E. Biological Studies – General Environmental

15. ***HMDC. The Environmental Impact Assessment for the Sawmill Creek Basin Water Quality Management Plan. March 1984.** [1] Details the environmental impacts of the Sawmill Creek Basin Water Quality Management Plan, including the following five design reports: 1) Report of Soil & Foundation Investigations; 2) Basin Hydrology & Pond Hydraulics Report; 3) Recreation Pond Design Report; 4) Leachate Collection Design Report; and 5) Wastewater Treatment Design Report. Accounts for the environmental setting and the innovative natural treatment system design concept, describes the existing conditions within the site, gives a detailed project description by element, and discusses the environmental impacts.

16. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

F. Geotechnical

17. ***HMDC. The Environmental Impact Assessment for the Sawmill Creek Basin Water Quality Management Plan. March 1984.** [1] Details the environmental impacts of the Sawmill Creek Basin Water Quality Management Plan, including the following five design reports: 1) Report of Soil & Foundation Investigations; 2) Basin Hydrology & Pond Hydraulics Report; 3) Recreation Pond Design Report; 4) Leachate Collection Design Report; and 5) Wastewater Treatment Design Report. Accounts for the environmental setting and the innovative natural treatment system design concept, describes the existing conditions within the site, gives a detailed project description by element, and discusses the environmental impacts.

G. Hydraulics and Hydrology

18. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Basin Hydrology and Pond Hydraulics Report. July 1983.** [2a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. This report details existing hydrologic and hydrology data for the Sawmill Creek Basin and the proposed recreation pond components.

19. ***HMDC. The Environmental Impact Assessment for the Sawmill Creek Basin Water Quality Management Plan. March 1984.** [1] Details the environmental impacts of the Sawmill Creek Basin Water Quality Management Plan, including the following five design reports: 1) Report of Soil & Foundation Investigations; 2) Basin Hydrology & Pond Hydraulics Report; 3) Recreation Pond Design Report; 4) Leachate Collection Design Report; and 5) Wastewater Treatment Design Report. Accounts for the environmental setting and the innovative natural treatment system design concept, describes the existing conditions within the site, gives a detailed project description by element, and discusses the environmental impacts.

H. Water and Sediments

20. ***Anonymous (HMDC). Biological Water Quality and Field Sampling Survey of the Hackensack Meadowlands. 1980.** [1a] During a one-day sampling event, water quality was measured at 11 sites for temperature, salinity, DO, and TSS. Also set fish sampling nets in Berry's Creek Canal and Sawmill Creek.

21. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

22. ***Bopp, R. F. Radionuclide Analysis of Mill Creek and Saw Mill Creek Sediment Samples. 2001.** [1a] Pb 210 and Cs 137 dating of four sediment cores from Mill Creek and one from Sawmill Creek, ranging from 18 to 26 centimeters deep, were collected in 1999. All data from Mill Creek supported the trace-metal-based hypothesis that the more consolidate clay mud is old (pre-industrial) sediment, and organic-rich upper layers represent recent deposition that occurred since site manipulation. In the Sawmill Creek core, no Pb or Cs isotopes were found.

23. ***Gunawardana, Vajira K., Po-Shu Huang, Tavit O. Najarian, & Rhomaios V. Ram. Impact Analysis of Sewage Treatment Plant Discharges of the Water Quality of the Lower Hackensack River. June 1992.** [1] Analyzed the impacts of discharge from BCUA treatment plant on the dissolved oxygen regime of the lower Hackensack River. The three tributaries that were selected for this study were Sawmill Creek, Berry's Creek, and Mill Creek.

24. ***HMDC. The Environmental Impact Assessment for the Sawmill Creek Basin Water Quality Management Plan. March 1984.** [1] Details the environmental impacts of the Sawmill Creek Basin Water Quality Management Plan, including the following five design reports: 1) Report of Soil & Foundation Investigations; 2) Basin Hydrology & Pond Hydraulics Report; 3) Recreation Pond Design Report; 4) Leachate Collection Design Report; and 5) Wastewater Treatment Design Report. Accounts for the environmental setting and the innovative natural treatment system design concept, describes the existing conditions within the site, gives a detailed project description by element, and discusses the environmental impacts.

25. ***Konsevick, Edward, Christine Cheng Hobble, & Paul Lupini. Monitoring Effects of Urban Land Use of Esturine Water Quality, Hackensack Meadowlands District, New Jersey. November 1994.** [1] In 1993, the USGS, in cooperation with the HMDC, established a network of 14 ambient water monitoring sites, including the Hackensack River, Berry's Creek, Penhorn Creek, Sawmill Creek, Mill Creek, and Cromakill Creek, to characterize the current status of water quality in the HMD. Salinity, DO, fecal coliform, pH, TSS, turbidity, total phosphorous, ammonia, sulfate, BOD, COD, heavy metal concentrations were measured at each of the monitoring sites.

26. ***Lo Pinto, R. A. (HMDC). Biological Assay Procedure for Determining the Effects of Industrial Effluents on Some Key Aspects of the Hackensack Meadowlands Estuary. 1973.** [1a] Procedure to the HMDC in establishing guidelines to regulate the admission of certain pollutants into the ecosystem. Examined the program of introducing bivalves and other consumer population into the system.

27. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

No data obtained.

EXISTING/POTENTIAL REMEDIATION SITES

SITE #43 – 1-E LANDFILL

Category: Existing/Potential Remediation Site

Location: Along the western border of the New Jersey Meadowlands in Kearny and North Arlington, Hudson and Bergen Counties respectively.
Latitude/Longitude: 40.77278 / -74.11839

Current Land Use: Combination of a leaf composting facility and passive open space.

Size: 409 acres

Current Ownership: NJMC

Site Description: The 1-E Landfill is currently accepting dredged material as part of the cap from Newark Bay. The site also contains a leaf compost facility and a transfer station.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. **NJMC. Kucera Aerial Photography for the 1-E Landfill. 2003.** Aerial photograph of the 1-E Landfill.

B. Real Estate/Ownership

1-E Landfill is owned by NJMC.

C. Site History & Land Use

2. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Basin Hydrology and Pond Hydraulics Report. July 1983.** [2a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. This report details existing hydrologic and hydrology data for the Sawmill Creek Basin and the proposed recreation pond components.

3. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Recreation Pond Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Discusses background and existing hydrology of the site of a proposed 160-acre pond between present day Harrier Meadow and 1-E Landfill.

4. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

D. Biological Studies – Fauna

5. **Krivenko, Andrew J. Use of Landfill Ponds by Avifauna, Landfill Habitat Survey. HMDC. August 1993.** [1] Study analyzing species and number of birds are utilizing ponds atop the 1-E and 1-A Landfills. While a census was taken in the summer of 1992, this study is more in depth, taking into account 12 ponds on two different landfills. A total of 38 species of birds were observed using the ponds; of these, eight were observed with young and are therefore confirmed breeders.

6. ***Scarlatelli, Ken. 1992 Landfill Wildlife Habitat Study: Preliminary Results. 1992.** [1] Documented usage by avifauna and water quality of eight existing unlined ponds located on the 1-E Landfill, as well as the lined pond on top of the 1-A Landfill. An inventory of terrestrial habitat on the top and side slope of 1-E was also conducted. Plant and bird inventories were also conducted.

E. Biological Studies – General Environmental

7. ***Scarlatelli, Ken. 1992 Landfill Wildlife Habitat Study: Preliminary Results. 1992.** [1] Documented usage by avifauna and water quality of eight existing unlined ponds located on the 1-E Landfill, as well as the lined pond on top of the 1-A Landfill. An inventory of terrestrial habitat on the top and side slope of 1-E was also conducted. Plant and bird inventories were also conducted.

8. **STS Consultants, Ltd. Environmental Impact Statement: DeKorte Park Landfill. February 1985.** [1a] This EIS was performed to assess the impact of a proposal by HMDC to operate and close a balefill and sanitary landfill on a site located in Kearny and North Arlington, NJ. The proposed project involved site improvements and environmental upgrading of two existing solid waste disposal facilities.

9. **The RBA Group, Inc. Environmental Impact Statement for the One Year Operation of the I-C Landfill. August 1984.** [1a] Describes the interim landfill project at the 1-C landfill (now part of the 1-E landfill), the existing environmental setting, environmental impacts and methods of mitigation, and alternatives to the proposed project.

F. Geotechnical

10. ***The RBA Group, Inc. A Preliminary Engineering Design for the One Year Operation of the I-C Landfill. August 1984.** [1a] The HMDC proposed to operate an Interim Essex County Landfill in a designated area within the boundaries of the DeKorte State Park (i.e. at the 1-C landfill, now part of the 1-E landfill). This report contains a hydrogeological investigation, a traffic analysis, a conceptual site plan, a leachate generation estimate, a schedule of construction, and a preliminary operations cost estimate.

11. **STS Consultants, Ltd. Field Exploration Program: DeKorte Park Landfill. 1985** [1a] The proposed geotechnical exploration program for the DeKorte Park Landfill expansion (now part of the 1-E landfill) is detailed in this report. Two key features of the expansion project were addressed – engineering modifications to be constructed around the landfill and an assessment of the slope stability of the landfill.

12. **STS Consultants Ltd. Geotechnical Data Report for the DeKorte Park Landfill (Volume 1). August 1985.** [1a] Summarizes field exploration and testing procedures, details laboratory test results, and describes the existing subsurface soil conditions at the DeKorte Park Landfill (now part of the 1-E Landfill).

13. ***STS Consultants, Ltd. Geotechnical Slope Stability Analysis for Perimeter Slopes: DeKorte Park Landfill. May 1985 (revised June 1985).** [1a] Summarizes the results of slope stability analyses performed for the DeKorte Park Landfill (now part of the 1-E Landfill), considering geometry, groundwater and leachate level, and geotechnical data, which was only partially available during the preparation of the Phase 1 preliminary engineering design report.

G. Hydraulics and Hydrology

14. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Basin Hydrology and Pond Hydraulics Report. July 1983.** [2a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. This report details existing hydrologic and hydrology data for the Sawmill Creek Basin and the proposed recreation pond components.

15. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Recreation Pond Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Discusses background and existing hydrology of the site of a proposed 160-acre pond between present day Harrier Meadow and 1-E Landfill.

16. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

17. ***The RBA Group, Inc. A Preliminary Engineering Design for the One Year Operation of the I-C Landfill. August 1984.** [1a] The HMDC proposed to operate an Interim Essex County Landfill in a designated area within the boundaries of the DeKorte State Park (i.e. at the 1-C landfill, now part of the 1-E landfill). This report contains a hydrogeological investigation, a traffic analysis, a conceptual site plan, a leachate generation estimate, a schedule of construction, and a preliminary operations cost estimate.

H. Water and Sediments

18. ***BSC Engineering. Sawmill Creek Basin Water Quality Management: Wastewater Treatment Design Report. HMDC. 1983.** [1a] One of five reports prepared for the HMDC as part of an overall Water Quality Management effort that was part of the DeKorte Park planning process. Proposed a wetland-based leachate/wastewater treatment system, which was never built. Covers purpose, goals, problems, background, and current conditions. Contains a map of sampling sites. Analyzed surface water, landfill leachate, and sediment. Focused on area west of turnpike (i.e. in and around present day Kingsland Impoundment, Harrier Meadow, and the 1-E landfill).

19. ***Scarlatelli, Ken. 1992 Landfill Wildlife Habitat Study: Preliminary Results. 1992.** [1] Documented usage by avifauna and water quality of eight existing unlined ponds located on the 1-E Landfill, as well as the lined pond on top of the 1-A Landfill. An inventory of terrestrial habitat on the top and side slope of 1-E was also conducted. Plant and bird inventories were also conducted.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

20. **HMDC. Leachate Pumping Stations: Landfill Sites 1-A and 1-E. December 1997.** Construction plan set including drawings and details for a leachate pumping system and force main for the 1-E and 1-A Landfills.

21. ***STS Consultants, Ltd. Geotechnical Slope Stability Analysis for Perimeter Slopes: DeKorte Park Landfill. May 1985 (revised June 1985).** [1a] Summarizes the results of slope stability analyses performed for the DeKorte Park Landfill (now part of the 1-E Landfill), considering geometry, groundwater and leachate level, and geotechnical data, which was only partially available during the preparation of the Phase 1 preliminary engineering design report.

22. **STS Consultants, Ltd. Perimeter Closure Improvements 1-E Landfill. 2000.** Construction plan set including drawings and details for a perimeter stormwater system necessary for the closure of the 1-E Landfill.

23. **STS Consultants, Ltd. Perimeter Construction 1-E Landfill. April 1992.** Construction plan set including drawings and details for a leachate collection system and slurry trench wall for the 1-E Landfill.

24. **STS Consultants, Ltd. Perimeter Regrading 1-E Landfill: Hackensack Meadowlands Development Corporation. 1988.** Plan set including drawings and details for perimeter regrading and the access road construction plan for the 1-E Landfill.

25. **STS Consultants, Ltd. Phase 1 Preliminary Engineering Design Report: DeKorte Park Landfill. February 1985.** [1a] Presents preliminary concepts to vertically expand the combined landfill and closure concepts to control landfill gas, leachate, and surface drainage. Post-closure concepts address the continued long term maintenance requirements such as monitoring, erosion control, and revegetation to develop the site as part of Richard W. DeKorte State Park.

SITE #44 – AVON LANDFILL

Category: Existing/Potential Remediation Site

Location: Bordered by New Jersey Transit Main line, New Jersey Turnpike – Western Spur, and the Lyndhurst Landfill in Lyndhurst Township, Bergen County.
Latitude/Longitude: 40.79256 / -74.10304

Current Land Use: Passive open space; non-active, unremediated landfill

Size: 91 acres

Current Ownership: EnCap Golf Holdings, LLC.

Site Description: Closed to operations in 1980.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. **GEOD Surveying & Aerial Mapping, Preliminary ALTA/ASCM Land Title Survey Block 233– Lot 12, Block 231 Lots 12 & 14. March 2001.** [1a] Survey map of a portion of the Avon Landfill at a scale of 1 inch = 50 feet.

2. **GEOD Surveying & Aerial Mapping, ALTA/ASCM Land Title Survey Block 233 – Lot 14. April 2001.** [1a] Survey map of a portion of the Avon Landfill at a scale of 1 inch = 200 feet.

3. ***NJMC. Kucera Panochromatic Imagery for the Meadowlands. February 2002.** Most recent aerial photographs of the Hackensack Meadowlands District.

B. Real Estate/Ownership

Avon Landfill is owned by EnCap Golf Holdings, LLC.

4. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

5. ***Louis Berger & Associates, Inc. N.J. Turnpike Widening: Landfills Section of EIS. August 1988.** [1] A brief overview of all the landfills that would be affected by the widening of the New Jersey Turnpike, which includes the Rutherford and Avon Landfills. Details affected environments and environmental consequences, in addition to site usage, ownership, and estimate of disruption for each specific landfill.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

6. ***Dru Associates. Wetland Delineation Report for the Lyndhurst and Rutherford Redevelopment Area: Lyndhurst, Avon, and Rutherford Landfills. March 2002.** [3] A wetland delineation was performed for the Lyndhurst and Rutherford Redevelopment Area, which includes the Lyndhurst, Avon, and Rutherford Landfills. The report includes a topographic map showing the delineation boundaries and transect locations.

7. ***L. Robert Kimball & Associates, Inc. Remedial Investigation Report for the Avon Landfill. May 2000.** [1] Evaluates prior investigative findings and documents current conditions as needed to support the development design and construction for the Avon landfill. Research and investigations included subsurface characteristics of the landfill, physical/chemical characteristics of migration pathways, characterization and concentration of contaminants in landfilled waste, and impacted environment.

8. ***Louis Berger & Associates, Inc. N.J. Turnpike Widening: Landfills Section of EIS. August 1988.** [1] A brief overview of all the landfills that would be affected by the widening of the New Jersey Turnpike, which includes the Rutherford and Avon Landfills. Details affected environments and environmental consequences, in addition to site usage, ownership, and estimate of disruption for each specific landfill.

9. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

10. ***USACE. Jurisdictional Determination: EnCap Site/Northern Golf Course Resort Site (Application No. 2000-00381). 7/3/2000.** [2] A jurisdictional determination was performed by the USACE in 2000 for the Lyndhurst, Rutherford, and Avon Landfills.

F. Geotechnical

11. ***IT Corporation. Remedial Action Workplan/Closure Plan for the Avon Landfill. August/September 2000.** [1] The remedial investigation for the Avon Landfill included an examination of site topography, geology, hydrology, and hydrogeology. The report presents the remedial investigation results, remedial approach/design basis, closure plan design, closure construction activities, post closure operation, maintenance and monitoring.

12. ***L. Robert Kimball & Associates, Inc. Remedial Investigation Report for the Avon Landfill. May 2000.** [1] Evaluates prior investigative findings and documents current conditions as needed to support the development design and construction for the Avon landfill. Research and investigations included subsurface characteristics of the landfill, physical/chemical characteristics of migration pathways, characterization and concentration of contaminants in landfilled waste, and impacted environment.

13. ***L. Robert Kimball & Associates, Inc. Preliminary Assessment Report: Lyndhurst and Rutherford Redevelopment Area (Lyndhurst, Avon, and Rutherford Landfills). March 2000.** [1] Background research and site investigations were conducted at the Lyndhurst, Avon, and Rutherford Landfills to identify the presence and extent of areas of concern associated with former landfill operations, as well as types and levels of contamination. Includes recommendations to fill existing data gaps necessary to implement a remediation plan, and ultimately develop these properties.

14. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Action Workplan/Closure Plan Addendum for Meadowlands Golf Redevelopment Project Avon Landfill. EnCap Golf Holdings, LLC & HMDC. May 2001.** [1] Summarizes a prior remedial investigation, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

G. Hydraulics and Hydrology

15. ***IT Corporation. Remedial Action Workplan/Closure Plan for the Avon Landfill. August/September 2000.** [1] The remedial investigation for the Avon Landfill included an examination of site topography, geology, hydrology, and hydrogeology. The report presents the remedial investigation results, remedial approach/design basis, closure plan design, closure construction activities, post closure operation, maintenance and monitoring.

16. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Action Workplan/Closure Plan Addendum for Meadowlands Golf Redevelopment Project Avon Landfill. EnCap Golf Holdings, LLC & HMDC. May 2001.** [1] Summarizes a prior remedial investigation, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

H. Water and Sediments

17. ***IT Corporation. Remedial Action Workplan/Closure Plan for the Avon Landfill. August/September 2000.** [1] The remedial investigation for the Avon Landfill included an examination of site topography, geology, hydrology, and hydrogeology. The report presents the remedial investigation results, remedial approach/design basis, closure plan design, closure construction activities, post closure operation, maintenance and monitoring.

18. ***L. Robert Kimball & Associates, Inc. Remedial Investigation Report for the Avon Landfill. May 2000.** [1] Evaluates prior investigative findings and documents current conditions as needed to support the development design and construction for the Avon landfill. Research and investigations included subsurface characteristics of the landfill, physical/chemical characteristics of migration pathways, characterization and concentration of contaminants in landfilled waste, and impacted environment.

19. ***L. Robert Kimball & Associates, Inc. Preliminary Assessment Report: Lyndhurst and Rutherford Redevelopment Area (Lyndhurst, Avon, and Rutherford Landfills). March 2000.** [1] Background research and site investigations were conducted at the Lyndhurst, Avon, and Rutherford Landfills to identify the presence and extent of areas of concern associated with former landfill operations, as well as types and levels of contamination. Includes recommendations to fill existing data gaps necessary to implement a remediation plan, and ultimately develop these properties.

20. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Action Workplan/Closure Plan Addendum for Meadowlands Golf Redevelopment Project Avon Landfill. EnCap Golf Holdings, LLC & HMDC. May 2001.** [1] Summarizes a prior remedial investigation, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

21. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

22. ***IT Corporation. Remedial Action Workplan/Closure Plan for the Avon Landfill. August/September 2000.** [1] The remedial investigation for the Avon Landfill included an examination of site topography, geology, hydrology, and hydrogeology. The report presents the remedial investigation results, remedial approach/design basis, closure plan design, closure construction activities, post closure operation, maintenance and monitoring.

23. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

24. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Action Workplan/Closure Plan Addendum for Meadowlands Golf Redevelopment Project Avon Landfill. EnCap Golf Holdings, LLC & HMDC. May 2001.** [1] Summarizes a prior remedial investigation, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

SITE #45 – ERIE LANDFILL

Category: Existing/Potential Remediation Site

Location: South of Kingsland Landfill and north of Harrier Meadow in North Arlington, Bergen County
Latitude/Longitude: 40.78912 / -74.11594

Current Land Use: Active landfill, but contained (i.e. remediation system is in place)

Size: 38 acres

Current Ownership: NJMC

Site Description: The Erie Landfill was closed to operations prior to 1970. A remediation system was put in place in 2002, and the landfill was reopened.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. **NJMC. Kucera Aerial Photography for the Erie Landfill. 2003.** Aerial photograph of the Erie Landfill.

2. **Neglia Engineering Associates. Preliminary Subdivision – Flintstone Crushing Aggregate: Block 191 Lot 1.01 and Block 192 Lots 1 & 3.02. June 15, 2000 (revised May 5, 2003).** [1a] Subdivision map at a scale of 1 inch = 1000 feet.

B. Real Estate/Ownership

Erie Landfill is owned by NJMC.

3. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

No data obtained.

F. Geotechnical

4. **Converse Consultants. Report of Geotechnical and Laboratory Data Erie Landfill North Arlington, New Jersey. January 3, 2001.** [1a] Summarizes geotechnical field and laboratory data obtained by Converse Consultants from a report prepared by Paulus, Sokolowski, and Sartor for the BCUA Residual Ash Landfill.

5. **Converse Consultants. Report of Stability Analysis Erie Landfill North Arlington New Jersey. March 21, 2002** [1a] Slope stability analysis for the Erie Landfill; submitted as part of an NJDEP permit application.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

No data obtained.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

6. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

7. **NJMC. Erie Landfill Site Improvements: Contract SW 01-01. July 31, 2001.** [1a] Construction documents, including plans and specifications, for installation of a slurry wall, leachate collection system, and leachate pumping station for the Erie Landfill.

8. **STS Consultants, Ltd. Erie Landfill Site Improvements: Contract SW 01-01 CM. November 1, 2002.** [1a] As-built report for the construction of a slurry wall, leachate collection system, and leachate pumping station for the Erie Landfill. Contains information regarding the testing that was conducted to insure the improvements were in compliance with the plans and specifications.

9. ***Wehran Engineering and Zion and Breen Associates. Master Plan: Richard W. DeKorte State Park. 1979.** [1a] Master plan for the creation of the 2,000 acre DeKorte State Park (which encompasses the current Kingsland Impoundment) complete with key engineering, environmental, landscape architecture, and park use recommendations. Plan calls for 800 acres of active and inactive landfills to be developed, and 1,200 acres of tidal marshes (including the Saw Mill Creek Wildlife Management Area) to be preserved. An artificial marsh system was designed to treat Erie Landfill's leachate. The detailed circulation and vegetation plans are also included.

SITE #46 – KEEGAN LANDFILL

Category: Existing/Potential Remediation Site

Location: Off Bergen Avenue in Kearny, Hudson County
Latitude/Longitude: 40.75657 / -74.13501

Current Land Use: Passive open space, non-active landfill, unremediated

Size: 110 acres

Current Ownership: Town of Kearny and private ownership

Site Description: The Keegan Landfill is bordered on the southeast and east by wetland areas and open-water wetland (i.e. Kearny Freshwater marsh). The western boundary is a mix of residential and industrial facilities. Frank Creek originates on the site and discharges to the Passaic River.

NJMC documents indicate that the Keegan landfill began landfill operations in the 1940's, with the majority of landfilling operations taking place in the 1960's. The site was known as the Municipal Sanitary Landfill Authority (MSLA) 1-B Landfill and operated by MSLA under a lease agreement with the town of Kearny. The Keegan Landfill was closed in 1972. Today the majority of the site is owned by the Town of Kearny, with a portion under private ownership.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***NJMC. Kucera Panochromatic Imagery for the Meadowlands. February 2002.** Most recent aerial photographs of the Hackensack Meadowlands District.

B. Real Estate/Ownership

Keegan Landfill is owned by both the Town of Kearny and private owners.

2. ***Camp Dresser & McKee Inc. Land Use Feasibility Study Keegan Landfill, Kearny, New Jersey Final Report. July 1998.** [1] Evaluates the development potential of the Keegan Landfill based on existing, available data. Includes a description of existing conditions, compiled through literature review. Reviews geology, subsurface hydrology, soils, water quality, wetlands (adjacent Kearny Freshwater Marsh), air quality, noise, and hazardous materials. Also reviews landfill closure regulations, funding, and methods.

3. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

C. Site History & Land Use

4. ***Camp Dresser & McKee Inc. Land Use Feasibility Study Keegan Landfill, Kearny, New Jersey Final Report. July 1998.** [1] Evaluates the development potential of the Keegan Landfill based on existing, available data. Includes a description of existing conditions, compiled through literature review. Reviews geology, subsurface hydrology, soils, water quality, wetlands (adjacent Kearny Freshwater Marsh), air quality, noise, and hazardous materials. Also reviews landfill closure regulations, funding, and methods.

5. ***Region II Superfund Technical Assessment and Response Team. Site Inspection Prioritization Report Keegan Landfill. December 1997.** [1] Contains very detailed information regarding site history, more recent sampling data for groundwater and leachate, and general environmental data.

6. ***USEPA, Federal Programs Division & Roy F. Weston, Inc. Site Inspection Prioritization Report: Keegan Landfill. December 1997.** [2] Water, soil, and sediment samples were conducted as part of Site Inspection Prioritization activities. Also contains site description.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

7. ***Camp Dresser & McKee Inc. Land Use Feasibility Study Keegan Landfill, Kearny, New Jersey Final Report. July 1998.** [1] Evaluates the development potential of the Keegan Landfill based on existing, available data. Includes a description of existing conditions, compiled through literature review. Reviews geology, subsurface hydrology, soils, water quality, wetlands (adjacent Kearny Freshwater Marsh), air quality, noise, and hazardous materials. Also reviews landfill closure regulations, funding, and methods.

8. ***Camp Dresser and McKee Inc. Preliminary Environmental and Health Impact Statement for the Materials Handling Complex at the Former Keegan Landfill. May 1995.** [1] Based on the results of an environmental data collection program at the Keegan Landfill, this assessment characterized the significant beneficial and adverse impacts to the following environments: physical/chemical, biological/ecological, cultural, and socioeconomic. Identified both positive and negative potential groundwater, surface water quality, wetlands, traffic, visual, and recreational impacts.

9. ***Region II Superfund Technical Assessment and Response Team. Site Inspection Prioritization Report Keegan Landfill. December 1997.** [1] Contains very detailed information regarding site history, more recent sampling data for groundwater and leachate, and general environmental data.

F. Geotechnical

10. ***Camp Dresser & McKee Inc. Land Use Feasibility Study Keegan Landfill, Kearny, New Jersey Final Report. July 1998.** [1] Evaluates the development potential of the Keegan Landfill based on existing, available data. Includes a description of existing conditions, compiled through literature review. Reviews geology, subsurface hydrology, soils, water quality, wetlands (adjacent Kearny Freshwater Marsh), air quality, noise, and hazardous materials. Also reviews landfill closure regulations, funding, and methods.

11. ***Camp Dresser and McKee Inc. Preliminary Environmental and Health Impact Statement for the Materials Handling Complex at the Former Keegan Landfill. May 1995.** [1] Based on the results of an environmental data collection program at the Keegan Landfill, this assessment characterized the significant beneficial and adverse impacts to the following environments: physical/chemical, biological/ecological, cultural, and socioeconomic. Identified both positive and negative potential groundwater, surface water quality, wetlands, traffic, visual, and recreational impacts.

12. ***Region II Superfund Technical Assessment and Response Team. Site Inspection Prioritization Report Keegan Landfill Kearny, Hudson County, New Jersey. December 1997.** [1] This report gives very detailed information regarding site history, as well as more recent sampling data of groundwater and leachate, and environmental data in general.

13. ***USEPA, Federal Programs Division & Roy F. Weston, Inc. Site Inspection Prioritization Report: Keegan Landfill. December 1997.** [2] Water, soil, and sediment samples were conducted as part of Site Inspection Prioritization activities. Also contains site description.

G. Hydraulics and Hydrology

14. ***Camp Dresser & McKee Inc. Land Use Feasibility Study Keegan Landfill, Kearny, New Jersey Final Report. July 1998.** [1] Evaluates the development potential of the Keegan Landfill based on existing, available data. Includes a description of existing conditions, compiled through literature review. Reviews geology, subsurface hydrology, soils, water quality, wetlands (adjacent Kearny Freshwater Marsh), air quality, noise, and hazardous materials. Also reviews landfill closure regulations, funding, and methods.

15. ***Camp Dresser and McKee Inc. Preliminary Environmental and Health Impact Statement for the Materials Handling Complex at the Former Keegan Landfill. May 1995.** [1] Based on the results of an environmental data collection program at the Keegan Landfill, this assessment characterized the significant beneficial and adverse impacts to the following environments: physical/chemical, biological/ecological, cultural, and socioeconomic. Identified both positive and negative potential groundwater, surface water quality, wetlands, traffic, visual, and recreational impacts.

H. Water and Sediments

16. ***Camp Dresser & McKee Inc. Land Use Feasibility Study Keegan Landfill, Kearny, New Jersey Final Report. July 1998.** [1] Evaluates the development potential of the Keegan Landfill based on existing, available data. Includes a description of existing conditions, compiled through literature review. Reviews geology, subsurface hydrology, soils, water quality, wetlands (adjacent Kearny Freshwater Marsh), air quality, noise, and hazardous materials. Also reviews landfill closure regulations, funding, and methods.

17. ***Camp Dresser and McKee Inc. Preliminary Environmental and Health Impact Statement for the Materials Handling Complex at the Former Keegan Landfill. May 1995.** [1] Based on the results of an environmental data collection program at the Keegan Landfill, this assessment characterized the significant beneficial and adverse impacts to the following environments: physical/chemical, biological/ecological, cultural, and socioeconomic. Identified both positive and negative potential groundwater, surface water quality, wetlands, traffic, visual, and recreational impacts.

18. **NUS Corporation. Final Draft Site Inspection Report: Keegan Landfill. September 1989.** [1a] Seven surface water samples and six sediment samples were collected at the Keegan Landfill site to determine the presence or absence of Target Compound List substances and the potential for these substances to migrate off site. Results of this sampling indicate the presence of mercury, lead, chromium, PCBs, and semivolatile compounds in various sediment samples.

19. ***Region II Superfund Technical Assessment and Response Team. Site Inspection Prioritization Report Keegan Landfill. December 1997.** [1] Contains very detailed information regarding site history, more recent sampling data for groundwater and leachate, and general environmental data.

20. ***USEPA, Federal Programs Division & Roy F. Weston, Inc. Site Inspection Prioritization Report: Keegan Landfill. December 1997.** [2] Water, soil, and sediment samples were conducted as part of Site Inspection Prioritization activities. Also contains site description.

I. Historical/Cultural Resources

21. ***Camp Dresser and McKee Inc. Preliminary Environmental and Health Impact Statement for the Materials Handling Complex at the Former Keegan Landfill. May 1995.** [1] Based on the results of an environmental data collection program at the Keegan Landfill, this assessment characterized the significant beneficial and adverse impacts to the following environments: physical/chemical, biological/ecological, cultural, and socioeconomic. Identified both positive and negative potential groundwater, surface water quality, wetlands, traffic, visual, and recreational impacts.

J. Restoration/Remediation Design Plans

22. ***Camp Dresser & McKee Inc. Land Use Feasibility Study Keegan Landfill, Kearny, New Jersey Final Report. July 1998.** [1] Evaluates the development potential of the Keegan Landfill based on existing, available data. Includes a description of existing conditions, compiled through literature review. Reviews geology, subsurface hydrology, soils, water quality, wetlands (adjacent Kearny Freshwater Marsh), air quality, noise, and hazardous materials. Also reviews landfill closure regulations, funding, and methods.

23. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

SITE #47 – KINGSLAND LANDFILL

Category: Existing/Potential Remediation Site

Location: Bordered to the west by New Jersey Transit Kingsland Line and the north by New Jersey Transit Main Line, in North Arlington and Lyndhurst, Bergen County.
Latitude/Longitude: 40.79042 / -74.10911

Current Land Use: Passive open space; remediated landfill.

Size: 150 acres

Current Ownership: EnCap Golf Holdings, LLC.

Site Description: Landfill closed in 1988. Remediated in the 1990's.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. **GEOD Surveying & Aerial Mapping, Preliminary ALTA/ASCM Land Title Survey Block 192 Lot 4, Block 194 Lot 1, Block 195 Lot 1, Block 197 Lot 1. July 2001.** [1a] Survey map at a scale of 1 inch = 200 feet.

2. **GEOD Surveying & Aerial Mapping, ALTA/ASCM Land Title Survey Block 198 – Lots 1– 3. August 2001.** [1a] Survey map at a scale of 1 inch = 50 feet.

3. **GEOD Surveying & Aerial Mapping, ALTA/ASCM Land Title Survey Block 236 – Lot 1.01. August 2001.** [1a] Survey map at a scale of 1 inch = 200 feet.

4. ***NJMC. Kucera Panochromatic Imagery for the Meadowlands. February 2002.** Most recent aerial photographs of the Hackensack Meadowlands District.

B. Real Estate/Ownership

Kingsland Landfill is owned by EnCap Golf Holdings, LLC.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

5. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located within the Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site, including soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contained an IVA assessment for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan for the mitigation site.

E. Biological Studies – General Environmental

6. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located within the Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site, including soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contained an IVA assessment for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan for the mitigation site.

7. **USACE. Jurisdictional Determination: Kingsland Landfill (Application No. 2000-00381-1). 3/20/2001** [2] A jurisdictional determination was performed by the USACE in 1997 for the Kingsland Landfill; it was modified and issued in 2001.

F. Geotechnical

8. ***Clinton-Bogert Associates. BCUA Expansion of the Kingsland Park Sanitary Landfill. August 1984 (revised November 1984).** [1a] Engineering design report for the expansion of the Kingsland Landfill.

9. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located within the Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site, including soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contained an IVA assessment for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan for the mitigation site.

G. Hydraulics and Hydrology

10. ***Clinton-Bogert Associates. BCUA Expansion of the Kingsland Park Sanitary Landfill. August 1984 (revised November 1984).** [1a] Engineering design report for the expansion of the Kingsland Landfill.

11. ***Clinton-Bogert Associates. BCUA Kingsland Park Sanitary Landfill Final Cap and Stormwater Management System Contract 108B. June 1989** [1a] Contract drawings of the final cap and stormwater management systems for the Kingsland Landfill.

12. **Clinton-Bogert Associates. BCUA Ditch Stormwater Outlet Kingsland Park Sanitary Landfill Contract 105A. February 1985.** [1a] Contract drawings of ditch stormwater outlet for the Kingsland Landfill.

13. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located within the Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site, including soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contained an IVA assessment for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan for the mitigation site.

H. Water and Sediments

14. ***Clinton-Bogert Associates. BCUA Expansion of the Kingsland Park Sanitary Landfill. August 1984 (revised November 1984).** [1a] Engineering design report for the expansion of the Kingsland Landfill.

15. ***Clinton-Bogert Associates. BCUA Kingsland Park Sanitary Landfill Compliance Cutoff Wall/Leachate Collection System. April 1992** [1a] Record drawings of Kingsland Landfill compliance cutoff wall and leachate collection system.

16. ***Clinton-Bogert Associates. BCUA Kingsland Park Sanitary Landfill Expansion Improvements Contract 106. June 1989** [1a] Record drawings of cutoff wall leachate collection system and pump station.

I. Historical/Cultural Resources

17. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located within the Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site, including soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contained an IVA assessment for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan for the mitigation site.

J. Restoration/Remediation Design Plans

18. **BCUA. Pilot Study Extension Report for the Use of Chemically-Stabilized Sludge Product at the Kingsland Park Sanitary Landfill. 1994.** [1a] Pilot study/risk assessment that examined the physical, chemical, and health risk issues related to the use of BCUA's dewatered, chemically stabilized, and cured sewage sludge at the Kingsland Landfill as a landfill cover material. Compared two chemical stabilization processes considered for the BCUA's implementation.

19. **Camp Dresser McKee. BCUA Kingsland Park Sanitary Landfill Closure Contract 98-05. February 1999.** [1a] Closure plans for the Kingsland Landfill.

20. **Clinton-Bogert Associates. BCUA Expansion of Kingsland Park Sanitary Landfill Volume IV. August 1984** [1a] Contract drawings for Kingsland Landfill expansion.

21. ***Clinton-Bogert Associates. BCUA Kingsland Park Sanitary Landfill Compliance Cutoff Wall/Leachate Collection System. April 1992** [1a] Record drawings of Kingsland Landfill compliance cutoff wall and leachate collection system.

22. **Clinton-Bogert Associates. BCUA Kingsland Park Sanitary Landfill Expansion Improvements Contract 106. September 1986** [1a] Contract drawings of the Kingsland Landfill expansion improvements.

23. ***Clinton-Bogert Associates. BCUA Kingsland Park Sanitary Landfill Expansion Improvements Contract 106. June 1989** [1a] Record drawings of cutoff wall leachate collection system and pump station.

24. ***Clinton-Bogert Associates. BCUA Kingsland Park Sanitary Landfill Final Cap and Stormwater Management System Contract 108B. June 1989** [1a] Contract drawings of final cap and stormwater management systems for the Kingsland Landfill.

25. **Clinton-Bogert Associates. BCUA Kingsland Park Sanitary Landfill Improvements Contract 106. November 1986.** [1a] Contract documents for improvements to the Kingsland Landfill.

26. **HMDC. Capping Hackensack Meadowlands Development Commission Portion of Kingsland Park Landfill Contract SW89-001. October 1989.** [1a] Contract drawings of capping HMDC portion of the Kingsland Landfill.

27. **Paulus, Sokolowski, and Sartor, LLC. Amendment to Landfill Closure/Post-Closure Care and Financial Plan and Application for Sanitary Landfill Disruption Approval: Kingsland Park Sanitary Landfill. July 2002.** [3] This plan amendment addresses the required landfill work that had not been completed by BCUA, as well as the post-closure care plan provisions and sanitary landfill disruption provisions as listed in the NJDEP Solid Waste Regulations, N.J.A.C. 7:26.

SITE #48 – LYNDHURST LANDFILL

Category: Existing/Potential Remediation Site

Location: South of the Meadowlands Corporate Center in Lyndhurst, Bergen County.
Latitude/Longitude: 40.79462 / -74.10118

Current Land Use: Passive open space; recreational park with ball fields and two sets of radio towers; unremediated landfill.

Size: 232 acres

Current Ownership: EnCap Golf Holdings, LLC.

Site Description: Operations at the Lyndhurst Landfill ceased in the early 1970's.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***NJMC. Kucera Panochromatic Imagery for the Meadowlands. February 2002.** Most recent aerial photographs of the Hackensack Meadowlands District.

B. Real Estate/Ownership

Lyndhurst Landfill is owned by EnCap Golf Holdings, LLC.

2. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

C. Site History & Land Use

3. ***L. Robert Kimball & Associates, Inc. Final Remedial Investigation Report: Lyndhurst and Rutherford Landfills September 2001.** [2a] Background and site investigations were conducted to determine the following: past/present land uses, physical/chemical characteristics of fill used to construct current lands, contaminant presence and migration pathways, contaminant impacts to local environment, and preliminary information needed for remediation, design, and permitting.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

4. ***Dru Associates. Wetland Delineation Report for the Lyndhurst and Rutherford Redevelopment Area: Lyndhurst, Avon, and Rutherford Landfills. March 2002.** [3] A wetland delineation was performed for the Lyndhurst and Rutherford Redevelopment Area, which includes the Lyndhurst, Avon, and Rutherford Landfills. The report includes a topographic map showing the delineation boundaries and transect locations.

5. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

6. ***USACE. Jurisdictional Determination: EnCap Site/Northern Golf Course Resort Site (Application No. 2000-00381). 7/3/2000.** [2] A jurisdictional determination was performed by the USACE in 2000 for the Lyndhurst, Rutherford, and Avon Landfills.

F. Geotechnical

7. ***L. Robert Kimball & Associates, Inc. Final Remedial Investigation Report: Lyndhurst and Rutherford Landfills September 2001.** [1] Background and site investigations were conducted to determine the following: past/present land uses, physical/chemical characteristics of fill used to construct current lands, contaminant presence and migration pathways, contaminant impacts to local environment, and preliminary information needed for remediation, design, and permitting.

8. ***L. Robert Kimball & Associates, Inc. Preliminary Assessment Report: Lyndhurst and Rutherford Redevelopment Area (Lyndhurst, Avon, and Rutherford Landfills). March 2000.** [1] Background research and site investigations were conducted at the Lyndhurst, Avon, and Rutherford Landfills to identify the presence and extent of areas of concern associated with former landfill operations, as well as types and levels of contamination. Includes recommendations to fill existing data gaps necessary to implement a remediation plan, and ultimately develop these properties.

9. ***Paulus, Sokolowski, and Sartor, LLC. Draft Geotechnical Engineering Feasibility Study: Vertical Development at the Lyndhurst and Rutherford Landfills. July 2002.** [1] A feasibility study to identify site-specific geotechnical considerations and evaluate foundation concepts for the proposed vertical development at the Lyndhurst and Rutherford Landfills. Test boring, laboratory test data, and previous geotechnical investigations were reviewed. Contains construction plans for vertical development.

10. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Investigation Report, Remedial Action Selection Report, Remedial Action Work Plan, and Major Landfill Disruption Application. October 2003.** [1] Summarizes prior remedial studies, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

G. Hydraulics and Hydrology

11. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Investigation Report, Remedial Action Selection Report, Remedial Action Work Plan, and Major Landfill Disruption Application. October 2003.** [1] Summarizes prior remedial studies, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

H. Water and Sediments

12. ***L. Robert Kimball & Associates, Inc. Final Remedial Investigation Report: Lyndhurst and Rutherford Landfills September 2001.** [1] Background and site investigations were conducted to determine the following: past/present land uses, physical/chemical characteristics of fill used to construct current lands, contaminant presence and migration pathways, contaminant impacts to local environment, and preliminary information needed for remediation, design, and permitting.

13. ***L. Robert Kimball & Associates, Inc. Preliminary Assessment Report: Lyndhurst and Rutherford Redevelopment Area (Lyndhurst, Avon, and Rutherford Landfills). March 2000.** [1] Background research and site investigations were conducted at the Lyndhurst, Avon, and Rutherford Landfills to identify the presence and extent of areas of concern associated with former landfill operations, as well as types and levels of contamination. Includes recommendations to fill existing data gaps necessary to implement a remediation plan, and ultimately develop these properties.

14. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Investigation Report, Remedial Action Selection Report, Remedial Action Work Plan, and Major Landfill Disruption Application. October 2003.** [1] Summarizes prior remedial studies, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

15. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

16. ***Paulus, Sokolowski, and Sartor, LLC. Draft Geotechnical Engineering Feasibility Study: Vertical Development at the Lyndhurst and Rutherford Landfills. July 2002.** [1] A feasibility study to identify site-specific geotechnical considerations and evaluate foundation concepts for the proposed vertical development at the Lyndhurst and Rutherford Landfills. Test boring, laboratory test data, and previous geotechnical investigations were reviewed. Contains construction plans for vertical development.

17. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

18. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Investigation Report, Remedial Action Selection Report, Remedial Action Work Plan, and Major Landfill Disruption Application. October 2003.** [1] Summarizes prior remedial studies, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

19. **Paulus, Sokolowski, and Sartor, LLC. Revised Remedial Action Workplan/Closure Plan and Major Landfill Disruption Application: Lyndhurst and Rutherford Landfills. April 2002.** [1] Comprehensive description of the remediation plan for the Lyndhurst and Rutherford Landfills. Addresses the following: NJDEP permit conditions (dating from December 2001), property adjustments to the Lyndhurst project site, evaluation of the use of a processed dredge material cover system, use of a vertical hydraulic barrier, and proposed improvements to Viola Ditch.

SITE #49 – MALANKA LANDFILL

Category: Existing/Potential Remediation Site

Location: South of the Penn-Central Northeast Corridor (Amtrak) in southern Secaucus, Hudson County. Latitude/Longitude: 40.75329 / -74.08582

Current Land Use: Passive open space; non-active, unremediated landfill

Size: 66 acres

Current Ownership: Private ownership

Site Description: Closed to operations in 1983.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. ***NJMC. Kucera Panochromatic Imagery for the Meadowlands. February 2002.** Most recent aerial photographs of the Hackensack Meadowlands District.

B. Real Estate/Ownership

Malanka Landfill is privately owned.

2. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

C. Site History & Land Use

No data obtained.

D. Biological Studies – Fauna

3. ***Aguilar Associates & Consultants, Inc. Report on Surface Water Quality and Benthos Biological Studies for the Design Modification to the NEC for the Secaucus Transfer Station Project. 1990.** [1a] Four ponds created by the construction of berms and Penhorn Creek were sampled.

E. Biological Studies – General Environmental

No data obtained.

F. Geotechnical

4. **AccuTech Environmental Services, Inc., NEC Secaucus Transfer Landfill/Solid Waste Evaluation. July 1990.**[1] Soil and geotechnical boring samples were performed in the NEC Secaucus Transfer Site. While most of the samples locations were positioned adjacent to existing railroad track embankments, some were conducted at the Malanka Landfill as a preface to possible embankment construction and disturbance at the landfill.

G. Hydraulics and Hydrology

No data obtained.

H. Water and Sediments

5. ***Aguilar Associates & Consultants, Inc. Report on Surface Water Quality and Benthos Biological Studies for the Design Modification to the NEC for the Secaucus Transfer Station Project. 1990.** [1a] Four ponds created by the construction of berms and Penhorn Creek were sampled.

6. **Torlucci, Joseph Jr. Distribution of Heavy Metal Concentrations in Sediment Surrounding a Sanitary Landfill in the Hackensack Meadowlands, NJ. Rutgers University, Newark. 1982.** [1a] Collected sediment cores surrounding the "Mall" Landfill (aka Malanka Landfill) in Secaucus and analyzed for metals. Compared concentrations to other landfills and analyzed vertical gradient.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

7. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

SITE #50 – RUTHERFORD LANDFILL

Category: Existing/Potential Remediation Site

Location: East and west of New Jersey Turnpike Western Spur in Rutherford, Bergen County. Latitude/Longitude: 40.79880 / -74.09220

Current Land Use: Passive open space; non-active, unremediated landfill

Size: 98 acres

Current Ownership: EnCap Golf Holdings, LLC.

Site Description: Closed to operations in the early 1970's.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

Relevant survey, mapping, and GIS data for the Meadowlands can be found in the Meadowlands-wide site report under data category A.

1. **GEOD Surveying & Aerial Mapping, ALTA/ASCM Land Title Survey Block 220 – Lots 1-4. May 2001.** [1a] Survey map at a scale of 1 inch = 100 feet.

2. **GEOD Surveying & Aerial Mapping, ALTA/ASCM Land Title Survey Block 220 – Lots 5. August 2000.** [1a] Survey map at a scale of 1 inch = 100 feet.

3. **GEOD Surveying & Aerial Mapping, ALTA/ASCM Land Title Survey Block 220 – Lots 6 & 8. May 2001.** [1a] Survey map at a scale of 1 inch = 100 feet.

4. **GEOD Surveying & Aerial Mapping, ALTA/ASCM Land Title Survey Block 220 – Lot 7, 9-12 & 15.01. May 2001.** [1a] Survey map at a scale of 1 inch = 200 feet.

5. **GEOD Surveying & Aerial Mapping, ALTA/ASCM Land Title Survey Block 220 – Lots 14 & 15.03. May 2001.** [1a] Survey map at a scale of 1 inch = 100 feet.

6. **GEOD Surveying & Aerial Mapping, ALTA/ASCM Land Title Survey Block 220 – Lot 15.02. May 2001.** [1a] Survey map at a scale of 1 inch = 100 feet.

7. ***NJMC. Kucera Panochromatic Imagery for the Meadowlands. February 2002.** Most recent aerial photographs of the Hackensack Meadowlands District.

B. Real Estate/Ownership

Rutherford Landfill is owned by EnCap Golf Holdings, LLC.

8. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

9. ***Louis Berger & Associates, Inc. N.J. Turnpike Widening: Landfills Section of EIS. August 1988.** [1] A brief overview of all the landfills that would be affected by the widening of the New Jersey Turnpike, which includes the Rutherford and Avon Landfills. Details affected environments and environmental consequences, in addition to site usage, ownership, and estimate of disruption for each specific landfill.

C. Site History & Land Use

10. ***L. Robert Kimball & Associates, Inc. Final Remedial Investigation Report: Lyndhurst and Rutherford Landfills September 2001.** [2a] Background and site investigations were conducted to determine the following: past/present land uses, physical/chemical characteristics of fill used to construct current lands, contaminant presence and migration pathways, contaminant impacts to local environment, and preliminary information needed for remediation, design, and permitting.

D. Biological Studies – Fauna

No data obtained.

E. Biological Studies – General Environmental

11. ***Dru Associates. Wetland Delineation Report for the Lyndhurst and Rutherford Redevelopment Area: Lyndhurst, Avon, and Rutherford Landfills. March 2002.** [3] A wetland delineation was performed for the Lyndhurst and Rutherford Redevelopment Area, which includes the Lyndhurst, Avon, and Rutherford Landfills. The report includes a topographic map showing the delineation boundaries and transect locations.

12. ***Louis Berger & Associates, Inc. N.J. Turnpike Widening: Landfills Section of EIS. August 1988.** [1] A brief overview of all the landfills that would be affected by the widening of the New Jersey Turnpike, which includes the Rutherford and Avon Landfills. Details affected environments and environmental consequences, in addition to site usage, ownership, and estimate of disruption for each specific landfill.

13. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

14. ***USACE. Jurisdictional Determination: EnCap Site/Northern Golf Course Resort Site (Application No. 2000-00381). 7/3/2000.** [2] A jurisdictional determination was performed by the USACE in 2000 for the Lyndhurst, Rutherford, and Avon Landfills.

F. Geotechnical

15. ***L. Robert Kimball & Associates, Inc. Final Remedial Investigation Report: Lyndhurst and Rutherford Landfills September 2001.** [1] Background and site investigations were conducted to determine the following: past/present land uses, physical/chemical characteristics of fill used to construct current lands, contaminant presence and migration pathways, contaminant impacts to local environment, and preliminary information needed for remediation, design, and permitting.

16. ***L. Robert Kimball & Associates, Inc. Preliminary Assessment Report: Lyndhurst and Rutherford Redevelopment Area (Lyndhurst, Avon, and Rutherford Landfills). March 2000.** [1] Background research and site investigations were conducted at the Lyndhurst, Avon, and Rutherford Landfills to identify the presence and extent of areas of concern associated with former landfill operations, as well as types and levels of contamination. Includes recommendations to fill existing data gaps necessary to implement a remediation plan, and ultimately develop these properties.

17. ***Paulus, Sokolowski, and Sartor, LLC. Draft Geotechnical Engineering Feasibility Study: Vertical Development at the Lyndhurst and Rutherford Landfills. July 2002.** [1] A feasibility study to identify site-specific geotechnical considerations and evaluate foundation concepts for the proposed vertical development at the Lyndhurst and Rutherford Landfills. Test boring, laboratory test data, and previous geotechnical investigations were reviewed. Contains construction plans for vertical development.

18. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Investigation Report, Remedial Action Selection Report, Remedial Action Work Plan, and Major Landfill Disruption Application. October 2003.** [1] Summarizes prior remedial studies, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

G. Hydraulics and Hydrology

19. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Investigation Report, Remedial Action Selection Report, Remedial Action Work Plan, and Major Landfill Disruption Application. October 2003.** [1] Summarizes prior remedial studies, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

H. Water and Sediments

20. ***L. Robert Kimball & Associates, Inc. Final Remedial Investigation Report: Lyndhurst and Rutherford Landfills September 2001.** [1] Background and site investigations were conducted to determine the following: past/present land uses, physical/chemical characteristics of fill used to construct current lands, contaminant presence and migration pathways, contaminant impacts to local environment, and preliminary information needed for remediation, design, and permitting.

21. ***L. Robert Kimball & Associates, Inc. Preliminary Assessment Report: Lyndhurst and Rutherford Redevelopment Area (Lyndhurst, Avon, and Rutherford Landfills). March 2000.** [1] Background research and site investigations were conducted at the Lyndhurst, Avon, and Rutherford Landfills to identify the presence and extent of areas of concern associated with former landfill operations, as well as types and levels of contamination. Includes recommendations to fill existing data gaps necessary to implement a remediation plan, and ultimately develop these properties.

22. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Investigation Report, Remedial Action Selection Report, Remedial Action Work Plan, and Major Landfill Disruption Application. October 2003.** [1] Summarizes prior remedial studies, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

I. Historical/Cultural Resources

No data obtained.

J. Restoration/Remediation Design Plans

23. ***HMDC. The HMDC Official Orphan Landfill Tour. January 1999.** [2] Submitted to the USACE as part of permit application No. 93-00080 Volume VIII of XXV March 99. It includes specific site descriptions and proposed closure tasks and concerns for Malanka, Avon, Lyndhurst, Rutherford, Erie, and Keegan Landfills.

24. ***Paulus, Sokolowski, and Sartor, LLC. Final Wetlands Mitigation Plan for EnCap Golf Holdings, LLC and the New Jersey Meadowlands Commission: Brownfield Redevelopment Project. June 2001 (Revised May 2002).** [1] Outlines the final wetland mitigation plan for Lyndhurst, Avon, and Rutherford Landfills. The mitigation area is located in Berry's Creek Marsh. The report provides a description of wetlands to be impacted at the three landfills, as well as a description of existing conditions of the mitigation site, including topography, soils and surficial geology, hydrology, vegetation, fish and wildlife, and historic resources. The report also contains IVA assessments for both the existing wetlands and the proposed mitigation wetlands, a detailed wetlands mitigation plan, and maintenance and monitoring plan.

25. ***Paulus, Sokolowski, and Sartor, LLC. Draft Geotechnical Engineering Feasibility Study: Vertical Development at the Lyndhurst and Rutherford Landfills. July 2002.** [1] A feasibility study to identify site-specific geotechnical considerations and evaluate foundation concepts for the proposed vertical development at the Lyndhurst and Rutherford Landfills. Test boring, laboratory test data, and previous geotechnical investigations were reviewed. Contains construction plans for vertical development.

26. ***Paulus, Sokolowski, and Sartor, LLC. Remedial Investigation Report, Remedial Action Selection Report, Remedial Action Work Plan, and Major Landfill Disruption Application. October 2003.** [1] Summarizes prior remedial studies, including soil, groundwater, surface water, sediment, and air quality investigations. The report details a remedial action plan, and discusses a remedial action package for the site.

27. **Paulus, Sokolowski, and Sartor, LLC. Revised Remedial Action Workplan/Closure Plan and Major Landfill Disruption Application: Lyndhurst and Rutherford Landfills. April 2002.** [1] Comprehensive description of the remediation plan for the Lyndhurst and Rutherford Landfills. Addresses the following: NJDEP permit conditions (dating from December 2001), property adjustments to the Lyndhurst project site, evaluation of the use of a processed dredge material cover system, use of a vertical hydraulic barrier, and proposed improvements to Viola Ditch.

MEADOWLANDS-WIDE

SITE – MEADOWLANDS -WIDE INFORMATION

Category: Meadowlands-Wide Information

Location: In Bergen County: Carlstadt, East Rutherford, Little Ferry, Lyndhurst, Moonachie, North Arlington, Ridgefield, Rutherford, South Hackensack, and Teterboro. In Hudson County: Jersey City, Kearny, North Bergen, and Secaucus.

Current Land Use: Various, including residential, commercial, industrial, transportation, recreational, landfills, wetlands, and open space.

Size: 19,730 acres or 32 square miles

Current Ownership: Various, including state, county, city, and private owners.

Site Description: The Hackensack Meadowlands, located in Bergen & Hudson Counties, New Jersey is an integral part of the New York – New Jersey Harbor Estuary. The approximately 8,400 acres of wetlands and waterways that remain are especially significant for concentrations of federal trust species and state-listed species of concern including waterfowl, wading birds, shorebirds, raptors, anadromous fish, estuarine fish, and terrapins. Much of the wetlands area in the Meadowlands is degraded due to physical disturbances, such as filling and alterations to natural hydrologic connections. Leachate contamination from extensive landfills in the area is common. Numerous point sources, stormwater runoff from developed areas and highways, and other non-point sources have severely degraded water and sediment quality in areas of the habitat complex.

EXISTING SITE SPECIFIC DATA INVENTORY

* – Report repeated under multiple data categories and/or sites.

A. Survey, Maps, and GIS

1. **Aerial Data Reduction Associates. Aerial Photographs of the Hackensack Meadowlands District. 1985.** [1a] Aerial photos of the entire HMD. Scaled at 1 inch = 1000 feet.

2. **Aerial Data Reduction Associates. Topographic Map of the Hackensack Meadowlands District. 1985.** [1a] Topographic map of HMD based on Aerial Data Reduction Associates aerial photographs from 1985. Scaled at 1 inch = 200 feet.

3. **Aerial Data Reduction Associates. Aerial Photographs of the Hackensack Meadowlands District. 1992.** [1a] Aerial photos of the entire HMD. Scaled at 1 inch = 1000 feet.

4. **Aerial Data Reduction Associates. Topographic Map of the Hackensack Meadowlands District. 1992.** [1a] Topographic map of HMD based on Aerial Data Reduction Associates aerial photographs from 1992. Scaled at 1 inch = 200 feet.

5. **Aerial Surveys Inc. Aerial Photographs of the Hackensack Meadowlands District. April 5, 1972.** [1a] Aerial photos of the entire HMD. Scaled at 1 inch = 1000 feet.

6. **Aero Service. Aerial Photographs of the Hackensack Meadowlands District. April 7, 1969.** [1a] Aerial photos of the entire HMD. Scaled at 1 inch = 1000 feet.

7. **Artigas, F. J. Updating GIS Land Use Attributes from Surface Texture Information Using SIR-C Images. U.S. EPA Environmental Problem Solving with Geographical Information Systems: A National Conference. September 1999.** [1a] Used remotely-sensed radar reflectance to locate and map debris fields in the Meadowlands.

8. ***Elefante, Dom (ed.), NJMC. 1994 Land Use Designations of the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset containing land use information for the portions of the 14 municipalities that are within the NJMC's jurisdiction as of 1994.

9. **Elefante, Dom (ed.), NJMC. 2' Contours and Spot Elevations of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing the 2' contours and spot elevations for the entire HMD.

10. **Elefante, Dom (ed.), NJMC. Building Footprints of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing all building footprints for the entire HMD.

11. ***Elefante, Dom (ed.), NJMC. Channels of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing information depicting all minor bodies of water including small streams and drainage ditches. The data was digitized at a scale of 1:2400 from 2002 Topographic maps of the HMD.

12. **Elefante, Dom (ed.), NJMC. Transportation Features the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing transportation features, such as parking lots, roadways, and rail lines, within the HMD.

13. ***Elefante, Dom (ed.). NJMC. Waterways of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing information depicting all major bodies of water within the HMD, including the Hackensack River and its larger tributaries. The data was digitized at a scale of 1:2400 from 2002 Topographic Maps of the District. This coverage also includes the addition of Sach's Creek, which had previously been omitted.

14. ***Elefante, Dom & Adrian Molato (ed.), NJMC. 2002 Parcel Line Information of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing parcel line information for the portions of the 14 municipalities that are within the NJMC's jurisdiction.

15. ***Elefante, Dom & Bill Nierstedt (ed.), NJMC. 1967 Open Space Areas in the Hackensack Meadowlands District. 1997.** [2a] A dataset containing open space polygons for the HMD as of 1967; revised as of 1997.

16. ***ERDC, HMDC, & USACE – NYD. Flood Control Survey. 2000.** [2a] Survey performed for the HMD that consisted of: 1) cross-sections along the Hackensack River and its major tributaries, including Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke; 2) identifying 30 flood control structures along the Hackensack River; and 3) locating all bridges and piers within the study area. In addition, digital aerials were flown and geo-referenced. The vertical datum for the survey was NGVD29. At 13 of the 30 flood control structures, tide gages and single beam acoustic Doppler current meters were installed and monitored to measure velocity, head difference, and discharge at these locations.

17. **GEOD and USACE. GEOD 1' Resolution Ortho-Photograph (aerials). September 2001.** [2a] Aerial Photographs of the HMD from September 2001 at 1-foot resolution.

18. **G.M. Hopkins, Co. Atlas Vol. 2 Hudson County: Parts of Secaucus and North Bergen Counties. 1923.** [2a] Historical map of the HMD.

19. ***Gordon, Gabrielle (ed.), NJMC. 1986 New Jersey Department of Environmental Protection Tidal and Non-tidal Wetlands in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset created using the 1986 Freshwater Wetlands coverage from NJDEP.

20. **Gordon, Gabrielle (ed.), NJMC. 1996 PSEG Sampling Sites for the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset illustrating the PSEG sampling site locations within the HMD.

21. **Gordon, Gabrielle (ed.), NJMC. 2001 Funded and Orphan Landfill Coverage, Hackensack Meadowlands District, New Jersey. 2001.** [2a] A dataset showing funded and orphan landfills in the HMD.

22. ***Gordon, Gabrielle (ed.), NJMC. 2001 Water Control Structure Locations for the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing wetland information derived from a field inspection by the U.S. Army Corps of Engineers and the NJMC wetland scientists, covering the entire HMD.

23. ***Gordon, Gabrielle (ed.), NJMC. 2002 Current and Potential Mitigation Projects in the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing current and potential mitigations sites for the portions of the 14 municipalities that are within the NJMC's jurisdiction.

24. ***Gordon, Gabrielle (ed.), NJMC. 2002 Open Space Designations in the Hackensack Meadowlands District. 2002.** [2a] A dataset containing information on the wetlands, parks, management, and water areas for the HMD as of 2002.

25. ***Gordon, Gabrielle (ed.), NJMC. 2002 Zoning Designations of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing the zoning designations for the portions of the 14 municipalities that are within the NJMC's jurisdiction.

26. ***Gordon, Gabrielle (ed.), NJMC. Federal Emergency Management Agency Flood Designations for the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing the Federal Emergency Management Agency flood information for the portions of the 14 municipalities that are within the NJMC's jurisdiction. The Q3 Flood Data are derived from the Flood Insurance Rate Maps published by the Federal Emergency Management Agency.

27. ***Gordon, Gabrielle (ed.), NJMC. Federal Emergency Management Agency Flood Designations with Open Space Areas for the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing open space, zoning, golf course, and specially designated areas pertaining to the Federal Emergency Management Agency 100-year flood zone within in the HMD.

28. ***Gordon, Gabrielle (ed.), NJMC. Fishery Study Locations and Gear Types Used Within the Hackensack Meadowlands District. 2001.** [2a] A dataset containing the sampling locations and gear types used for a fisheries study within the HMD (excluding the trawls, which are maintained in a separate coverage). The point data was created using the NJDEP quarter quads as a base layer to obtain the approximate locations of the study areas.

29. **Gordon, Gabrielle (ed.), NJMC. Hackensack Meadowlands District Boundary, New Jersey. 2001.** [2a] A dataset showing the boundary of the HMD, which contains portions of 14 municipalities within the Meadowlands region.

30. ***Gordon, Gabrielle (ed.), NJMC. National Oceanic and Atmospheric Association Tide Gauges within the Hackensack Meadowlands Region. 1999.** [2a] A dataset containing the locations of tide gages within the Hackensack Meadowlands that are managed and maintained by the National Oceanic and Atmospheric Association.

31. **Gordon, Gabrielle (ed.), NJMC. Public Facilities Found Within the Municipalities that Comprise the Hackensack Meadowlands District. 2002.** [2a] A dataset created using the 1986 Land Use/Land Cover coverage from NJDEP.

32. ***Gordon, Gabrielle (ed.), NJMC. Tide Gauge Stations within the Hackensack Meadowlands District. 2001.** [2a] A dataset containing the tide gauge stations found within the HMD. The point data was created using coordinates provided by NJMC staff.

33. ***Gordon, Gabrielle (ed.), NJMC. Trawl Locations for Fisheries Study within the Hackensack Meadowlands District. 2001.** [2a] A dataset containing the trawling sampling locations for a fisheries study within the HMD. The line data was created using the NJDEP quarter quads as a base layer to obtain the approximate location of the study areas.

34. ***Gordon, Gabrielle (ed.), NJMC. Water Quality Monitoring Stations within the Hackensack Meadowlands Region. 2001.** [2a] A dataset containing the locations of the water quality monitoring stations found within the HMD. The point data was created using coordinates provided by NJMC staff.

35. ***Gordon, Gabrielle & Dom Elefante (ed.), NJMC. Priority Preservation Areas for the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset showing the priority preservation areas for the HMD.

36. ***Gordon, Gabrielle, Dom Elefante, Adrian Molato, Timucin Bakirtas, Kamal Saleh, Linda Wills, & Debra Dworkis (ed.), NJMC. 2002 Land Use Designations of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing land use information for the portions of the 14 municipalities that are within the NJMC's jurisdiction as of 2002.

37. ***Gordon, Gabrielle & Marc Kurbansade (ed.), NJMC. Waterfowl Sensitivity Locations in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset showing the sensitivity locations of selected waterfowl within the HMD.

38. ***Gordon, Gabrielle & Marc Kurbansade (ed.), NJMC. Waterfowl Wintering Areas in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset showing the winter habitat areas of selected water fowl within the HMD.

39. ***Gordon, Gabrielle & Marc Kurbansade (ed.), NJMC. Feeding and Roosting Areas for Heron in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset showing the feeding and roosting areas for heron within the HMD.

40. ***Gordon, Gabrielle & Monica Mianecki (ed.), NJMC. Floodprone Areas in the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing the water control structure locations found within the HMD. The point data was created using coordinates provided by NJMC staff.

41. ***Hartman, J., Tamara Shapiro, & Mark Wong. Evidence of Landcover and Landuse Change in the New Jersey Meadowlands. Rutgers University. 2003.** [5] Compiled information from a variety of sources to develop maps illustrating landcover since European settlement. Historically there were freshwater wetlands that included significant patches of white cedar swamp, as well as non-tidal and tidal marshes. Deforestation and erosion from extensive agricultural ditching, logging, and road/railroad building lowered wetland elevations as rising sea levels increased brackish tidal water.

42. ***Kurbansade, Marc (ed.), NJMC. Cultural Resources for the Hackensack Meadowlands District, New Jersey. 2001.** [2a] A dataset showing the NJDEP State Historic Preservation Office properties within the HMD. As this dataset was created by digitizing polygons by hand from a State Historic Preservation Office paper base map, areas should be considered approximate.

43. ***Kurbansade, Marc (ed.), NJMC. Waterfowl Brooding Areas in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset showing the brooding habitat of selected waterfowl within the HMD.

44. ***Kurbansade, Marc (ed.), NJMC. Waterfowl Moulting Areas in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset showing the moulting areas of selected water fowl within the HMD.

45. **Michael Baker Jr. Inc. Aerial Photographs of the Hackensack Meadowlands District. 1978.** [1a] Aerial photos of the entire HMD. Scaled at 1 inch = 1200 feet.

46. ***NJDEP & Gabrielle Gordon (ed.), NJMC. 1986 New Jersey Department of Environmental Protection Land Use/Land Cover in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset created using the 1986 Land Use/Land Cover coverage from NJDEP.

47. **NJDEP. Maps Created by NJDEP to Show the Riparian Boundaries for the Hackensack Meadowlands District.** [1a] The Riparian Maps for the HMD were done by the NJDEP Bureau of Tidelands Management.

48. **NJDEP. New Jersey Department of Environmental Protection Known Contaminated Site Locations in the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset showing the known contaminated sites and properties within the State of New Jersey as of 2001 where contamination of soil or groundwater has been identified or where a discharge of contamination has occurred or is suspected. This list may include sites where remediation is currently under way, required, but not yet initiated or has been completed.

49. ***NJMC. Kucera Panochromatic Imagery for the Meadowlands. February 2002.** [2a] Most recent aerial photographs of the HMD. Scaled at 1 inch = 1000 feet.

50. **NJMC. Topography of the Meadowlands (based on Kucera Panochromatic Imagery - February 2002). March 2002.** [2a] Topographic map of HMD based on Kucera aerial photographs from February 2002.

51. **Unknown. Aerial Photographs of the Hackensack Meadowlands District. May 5, 1976.** [1a] Aerial photos of the entire HMD. Scaled at 1 inch = 1000 feet.

52. **USACE. Fairchild Aerial Photographs of the Hackensack Meadows, New Jersey, 1:3000. April, 1963.** [2a] Blueline aerial photographs depicting spot elevations and some contours.

53. **USEPA. AVID Maps. 1989 (revised 1992).** [1a] A dataset containing wetland information determined from a field inspection by the NJMC and USEPA coverage for the entire HMD.

54. ***USEPA-Region II & USACE-NYD. Draft Environmental Impact Statement on the Special Area Management Plan for the Hackensack Meadowlands District, NJ. June 1995.** [2a] EIS developed based on the SAMP for the HMD. The document presents the purpose and need for the SAMP, an alternatives analysis, an analysis of the environmental impacts on the preferred alternative, and the implementation strategy. The EIS included an IVA for specific assessment areas to assess wetland functional values. This document contains maps and figures of the HMD.

55. **USGS. Geologic Atlas of the United States: Passaic Folio No. 157, New Jersey – New York. 1908.** [2a] Folio No. 157 in the Passaic series covers an area of about 905 square miles, of which the Meadowlands is a small part. The atlas also contains descriptive text of areal and surficial geology, geography, and physiography for the State of New Jersey.

56. ***Wong, M. Land Use Change in the Meadowlands. Rutgers University. 2002.** [1a] A series of color coded maps were produced depicting change in land cover from 1890 to 2000 in the Meadowlands. It was determined that the Meadowlands was not entirely a cedar forest when Europeans arrived; cedars covered only portion of the area. The Oradell Dam, constructed in the 1920s, was not responsible for conversion from cedar forest to marshlands; the conversion had already taken place by that time. Furthermore, rise of sea level rise and decline of ground level since the 1600's has greatly affected the trajectory of vegetation change.

57. ***ZURN Environmental Engineers. Analysis of Alternative Solid Wastes Management Systems for the Hackensack Meadowlands District. 1970.** [1a] Included three major components: 1) evaluation of the extent/characteristics of past/existing solid waste disposal operations; 2) estimation of the magnitude of potential solid waste disposal operations; and 3) development of guidelines for regulation of solid waste disposal operations. Section III details characteristics of the Meadowlands, including geology, topography, groundwater, and surface water flows.

B. Real Estate/Ownership

58. ***Elefante, Dom & Adrian Molato (ed.), NJMC. 2002 Parcel Line Information of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing parcel line information for the portions of the 14 municipalities that are within the NJMC's jurisdiction.

59. ***Helmstetter, Donald. Analysis of Various Wetland Parcels Located in the Hackensack Meadowlands Development Common District: Parts One and Two. August 1997.** An analysis of various parcels within the HMD in two parts. Part One included general information about the properties and the valuation procedure used; Part Two included a list of 39 properties with a parcel description, zoning, other attributes, and comparison of sales and concluded value. Part two also included wetland issues and wetland sales history for the 39 properties.

60. ***Various Authors. Hackensack Meadowlands: Today and Tomorrow. Conference at Fairleigh Dickinson University. June 15, 1977.** [2a] Compilation of the presentations at a conference focusing on two major challenges of the Hackensack Meadowlands in the 1960's and 1970's: 1) the issue of ownership of the Hackensack Meadowlands and 2) the coordination of development and preservation. The conference was planned as an analysis of the progress made on resolving these challenges and discussion of the future planning of the area.

C. Site History & Land Use

61. ***Artigas, F. J. Updating GIS land use attributes from surface texture information using SIR-C images. U.S. EPA Environmental Problem Solving with Geographical Information Systems: A National Conference. Cincinnati, Ohio. September 22-24, 1999.** [1a] Used remotely-sensed radar reflectance to locate and map debris fields in the Meadowlands.

62. **Berger, John. Hackensack River Meadowlands. 1991.** [1a] Provides a brief review of the geological history of the Meadowlands, and a brief review of the regulatory role of the HMDC. It reviews the background and goals of the Hartz Mountain western brackish marsh mitigation project and discusses the methods used to restore the site, and the results of the mitigation.

63. **DiJulio, Carey. The Hackensack Meadowlands. May 2000.** [1a] Reviews the history of human impact on the Meadowlands and current attempts at management and restoration. Focuses on the history of the Meadowlands, the creation of the HMDC, its management of the Meadowlands through the 1980's, the ecological issues at the heart of wetland mitigation, and possibilities for the future.

64. ***EA Science and Technology & PSE&G. Kearny Generating Station Supplemental 316(b) Report. NJDEP. 1988.** [1a] Evaluates the effects of the cooling water intake of the Kearny Generating Station on the ecology of the Hackensack River and adjacent waters, based on entrainment and impingement data collected from June 1987 to April 1988, and on biological data collected from the vicinity of the Kearny station since August 1986. Studies of macrozooplankton, ichthyoplankton, and juvenile and adult fish were conducted in vicinity of the station and the full length of the estuary. Includes background information on the Hackensack Estuary.

65. ***Elefante, Dom (ed.), NJMC. 1994 Land Use Designations of the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset containing land use information for the portions of the 14 municipalities that are within the NJMC's jurisdiction as of 1994.

66. **Gates, Cassandra, J. Kocis, & D. Smith, HMDC. Meadows Path and Waterfront Parks: A Master Plan. 1982.** [2a] A plan for coastal urban trail and waterfront parks in the Hackensack Meadowlands. The plan consisted of 11 miles of continuous trail connecting two major regional parks and serving as the Meadowlands' main pedestrian artery. Served as the implementation plan for tying together pieces of a public use network already largely in place. Both project time table and cost estimates were included.

67. ***Gordon, Gabrielle (ed.), NJMC. 2002 Open Space Designations in the Hackensack Meadowlands District. 2002.** [2a] A dataset containing information on the wetlands, parks, management, and water areas for the HMD as of 2002.

68. ***Gordon, Gabrielle (ed.), NJMC. 2002 Zoning Designations of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing the zoning designations for the portions of the 14 municipalities that are within the NJMC's jurisdiction.

69. ***Gordon, Gabrielle, Dom Elefante, Adrian Molato, Timucin Bakirtas, Kamal Saleh, Linda Wills, & Debra Dworkis (ed.), NJMC. 2002 Land Use Designations of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing land use information for the portions of the 14 municipalities that are within the NJMC's jurisdiction as of 2002.

70. **The Foundation of the NJ Alliance for Action. Intermodal Coordination Study: A Survey and Consultant Recommendations on Containerized Transportation in Northern New Jersey. August 1994.** [4] The objectives of this study were to: 1) identify the infrastructure, systems, and institutional deficiencies adversely affecting intermodal freight operations in Northern New Jersey; 2) analyze and evaluate those deficiencies; and 3) prepare a recommended action program designed, to the extent possible, to remedy such deficiencies.

71. ***Hartman, J., Tamara Shapiro, & Mark Wong. Evidence of Landcover and Landuse Change in the New Jersey Meadowlands. Rutgers University. 2003.** [5] Compiled information from a variety of sources to develop maps illustrating landcover since European settlement. Historically there were freshwater wetlands that included significant patches of white cedar swamp, as well as non-tidal and tidal marshes. Deforestation and erosion from extensive agricultural ditching, logging, and road/railroad building lowered wetland elevations as rising sea levels increased brackish tidal water.

72. ***Helmstetter, Donald. Analysis of Various Wetland Parcels Located in the Hackensack Meadowlands Development Common District: Parts One and Two. August, 1997.** An analysis of various parcels within the HMDC District in two parts. Part One included general information about the properties and the valuation procedure used; Part Two included a list of 39 properties with a parcel description, zoning, other attributes, and comparison of sales and concluded value. Part two also included wetland issues and wetland sales history for the 39 properties.

73. ***HMDC. Hackensack Meadowlands Coastal Zone Management: Enhancement of the Coastal Ecosystem. 1982.** [1a] Compiled resources aid the HMDC in addressing a number of public policy issues for the HMD, which included: 1) waterfront parks; 2) revegetation of landfills; 3) river basin management plans; and 4) plans for specially planned areas.

74. **HMDC. Role of the Hackensack Meadowlands Development Commission in Improving Transportation in the Hackensack Meadowlands District: An Action Program. 1980.** [1a] Summarized several transportation planning studies from the past, and identified the HMD's transportation priorities as: 1) Harrison-Kingsland Branch; 2) Route 17 South Extension; 3) Meadows East; and 4) Meadowlands Parkway Southeast Extension. Estimated costs to begin work on each of the four projects within the following year.

75. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

76. **Marshall, Stephen. The Meadowlands Before the Commission: Three Centuries of Human Use and Modifications of the Hackensack Meadowlands, 1670-1969. Abstracts of the Meadowlands Symposium. 2003.** [1a] The creation of the HMDC in 1969 occurred after 300 years of recorded human use and modification of the Meadowlands. These three centuries can be divided into three over-lapping periods characterized by distinctive features: 1) extraction of natural resources; 2) degradation by inputs of sewerage and solid waste; and 3) development via conversion to upland.

77. **New Jersey Commission to Study Meadowland Development. Final Report of New Jersey Commission to Study Meadowland Development State of New Jersey. 1965.** [1a] Discusses finding a solution to the present dispute over Meadowlands titles, and finding a governmental vehicle with sufficient powers and breadth of interest to assure that a reclaimed Meadowlands would realize its full potential. Explored the legal issues surrounding these concerns, and evaluated all current efforts to reclaim and develop the Meadowlands.

78. ***NJDEP & Gabrielle Gordon (ed.), NJMC. 1986 New Jersey Department of Environmental Protection Land Use/Land Cover in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset created using the 1986 Land Use/Land Cover coverage from NJDEP.

79. ***NJMC. NJMC Master Plan. 2004.** [1a] (http://www.hmdc.state.nj.us/masterplan/05-Environ.pdf.) The Master Plan creates an overall vision of a regreened Meadowlands and a revitalized urban landscape through the delineation of cohesive goals, principles, standards, and strategies. The plan inventoried environmental, economic, and social information for the HMD. The plan also contains cultural resources information for the HMD.

80. ***New Jersey Turnpike Authority. Final Environmental Impact Statement: Interchange 11 to U.S. Route 46. September 1987.** [2a] Describes the environmental implications associated with the proposed widening and improvements of the NJ Turnpike from Interchange 11 in Woodbridge to U.S. Route 46. Details some site history, the proposed action, project purpose and need, alternatives, and effects of the plan on biological resources, socioeconomics, cultural resources, air quality, noise, traffic, soils and geology, hydrology, and water quality.

81. ***Passaic Valley Citizens Planning Association. Hackensack Meadows Master Plan Series. Report Number 1: Survey Phase. February 1958.** [1a] A report on the area of the HMD under the jurisdiction of the Meadowlands Regional Planning Board regarding Meadowlands reclamation and development.

82. **Pond, Henry O. (Hackensack River Study Commission). Hackensack River and Adjacent Areas Bergen County, County Planning Board. 1964.** [1a] A planning document that recommends: 1) the mid-section of the Hackensack River, from the head of commercial navigation north to Oradell Dam, be cleared of pollution and be made fit and suitable for public use and development; 2) the river, its banks, and flood lands be brought under public control; and 3) a dam be constructed at the head of commercial navigation to prevent further contamination of the river and to create a freshwater lake suitable for public use, development, recreation, conservation, and as an emergency water supply, as well as to prevent flooding.

83. ***Sipple, William S. Past and Present Flora and Vegetation of the Hackensack Meadowlands Bartonia, No. 41, pp. 4-56. 1971-1972.** [1a] Describes the past and present (circa 1970) vegetation of the Hackensack Meadowlands. Includes a review of previous studies done by Torrey (1819), Britton (1889), Harshberger & Burns (1919), and Heusser (1949) to reconstruct the past vegetation of the Meadowlands. Also contains a vegetation map showing the then current vegetation in the Meadowlands. Discusses factors causing vegetation change.

84. ***Various Authors. Hackensack Meadowlands: Today and Tomorrow. Conference at Fairleigh Dickinson University. June 15, 1977.** [2a] Compilation of the presentations at a conference focusing on two major challenges of the Hackensack Meadowlands in the 1960's and 1970's: 1) the issue of ownership of the Hackensack Meadowlands and 2) the coordination of development and preservation. The conference was planned as an analysis of the progress made on resolving these challenges and discussion of the future planning of the area.

85. ***Wong, M. Land Use Change in the Meadowlands. Rutgers University. 2002.** [1a] A series of color coded maps were produced depicting change in land cover from 1890 to 2000 in the Meadowlands. It was determined that the Meadowlands was not entirely a cedar forest when Europeans arrived; cedars covered only portion of the area. The Oradell Dam, constructed in the 1920s, was not responsible for conversion from cedar forest to marshlands; the conversion had already taken place by that time. Furthermore, rise of sea level rise and decline of ground level since the 1600's has greatly affected the trajectory of vegetation change.

86. ***Wright, Kevin W. The Hackensack Meadowlands: Prehistory and History. December 1988.** [1] Explores the prehistory and history of the Meadowlands in general. However, it uses the Kingsland Marsh as a control by which the a sample of the events affecting the Meadowlands can be seen in detail.

D. Biological Studies – Fauna

87. **Benjamin, P. (USFWS) Planning Aid Report: Preliminary Natural Resources Inventory and Impact Assessment for the Hackensack River Basin Flood Control Study. April 1993.** [4] Provided in response to a USACE study of two localized flooding areas, identifies impacts, mitigation measures, habitat enhancement opportunities, data gaps, and cost estimates for these efforts to protect fish and wildlife resources in the Hackensack River Basin.

88. ***Black, I. H. Past and Present Status of the Birds of the Lower Hackensack River Marshes. New Jersey Nature News. 25(2):57-70. 1970.** [1a] Describes the highlights of the bird population of the lower Hackensack River marshes between 1961 and 1967. It compares the bird data of 1961-1967 to that of 1969, and also compares the shorebird numbers of 1961-1967 to those found prior to 1936 in the Secaucus and Newark marshes.

89. ***Bragin, A. Brett, W. Frame, M. Kraus, D. Smith, A. Goeller, J. Graviec, & E. Konsevick. Inventory of Fisheries Resources of the Hackensack River within the Jurisdictional Boundary of the Hackensack Meadowlands Development Commission from Kearny, Hudson County, to Ridgefield, Bergen County, New Jersey. May 18, 1989.** [1] A two-year survey (2/1987 to 12/1988) initiated by HMDC of the lower Hackensack River to ascertain the fisheries values of the river and help guide intelligent decisions on development applications.

90. **Burr, Robert & William Lang. Planning Aid Report: Fish and Wildlife Resources Inventory and Evaluation for the Interim Survey Level Flood Control Study (Stage II) in the Hackensack River Basin, Hudson and Bergen Counties, New Jersey. September 1983.** [1a] The fundamental objective of the Hackensack River Basin Study is to reduce tidal flooding in the Hackensack River Basin. Presents information primarily related to the preservation and protection of indigenous fish and wildlife resources and endangered or threatened species, and recommends measures for reducing adverse project impacts in accordance with the Fish and Wildlife Coordination Act.

91. ***Department of Landscape Architecture and Regional Planning, New Jersey University of Pennsylvania. A Survey of Existing Physical Conditions of the Hackensack Meadows. 1969.** [1a] Gives a very general overview of the climate, geology, soils, hydrology, fauna, and flora of the Hackensack Meadowlands.

92. **Galluzzi, P. Mercury Concentrations in Muskrats, *Ondata zibethicus*, from the Hackensack Meadowlands, New Jersey. Fairleigh Dickinson University. 1976.** [1a] Muskrats were collected from four locations in the tributaries of the Hackensack River, including Berry's Creek, and from a control area. Mercury concentrations in the muskrats from each of the sampling sites were compared. Concludes that mercury is not accumulating faster in muskrats in areas of known contamination than those found in natural, uncontaminated areas.

93. ***Gordon, Gabrielle (ed.), NJMC. Fishery Study Locations and Gear Types Used Within the Hackensack Meadowlands District. 2001.** [2a] A dataset containing the sampling locations and gear types used for a fisheries study within the HMD (excluding the trawls, which are maintained in a separate coverage). The point data was created using the NJDEP quarter quads as a base layer to obtain the approximate locations of the study areas.

94. ***Gordon, Gabrielle (ed.), NJMC. Trawl Locations for Fisheries Study within the Hackensack Meadowlands District. 2001.** [2a] A dataset containing the trawling sampling locations for a fisheries study within the HMD. The line data was created using the NJDEP quarter quads as a base layer to obtain the approximate location of the study areas.

95. ***Gordon, Gabrielle & Marc Kurbansade (ed.), NJMC. Waterfowl Sensitivity Locations in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset showing the sensitivity locations of selected waterfowl within the HMD.

96. ***Gordon, Gabrielle & Marc Kurbansade (ed.), NJMC. Waterfowl Wintering Areas in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset showing the winter habitat areas of selected water fowl within the HMD.

97. ***Gordon, Gabrielle & Marc Kurbansade (ed.), NJMC. Feeding and Roosting Areas for Heron in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset showing the feeding and roosting areas for heron within the HMD.

98. ***Hart Crowser, Inc. Project Plan: Baseline Characterization – Sediment Quality, Water Quality, and Benthic Infauna. December 1997.** [4] Prepared to guide preliminary studies of sediment and water quality necessary to support an USACE permit application. The purpose of the study was to generate the recommended technical information which will form a basis for the resolution of habitat-related issues for benthos.

99. ***Jack McCormick & Associates, Inc. Collections of Aquatic Organisms from the Hackensack Meadowlands, Bergen and Hudson Counties, NJ. 1977.** [1a] Study undertaken to obtain a large number of biological samples from the waters and wetlands at eight stations in the central meadowlands. Samples were collected during three days in October 1976. Specimens were identified, labeled, packaged, and frozen. The concentrations of mercury in the samples collected were to be determined at a later date under a separate contract.

100. **J.S. Weis and P. Weis. Behavioral Responses and Interactions of Estuarine Animals with an Invasive Marsh Plant: A Laboratory Analysis. Biological Invasions. Vol 2 p 305-314. 2000.** [1a] This study investigated behavioral responses in the laboratory of two species fiddler crabs, grass shrimp, and mummichogs (*Fundulus heteroclitus*) to common reed (*Phragmites australis*) and cordgrass (*Spartina*).

101. ***Kane, Richard P. 1975 Fall Shorebird Migration in the Hackensack Meadowlands. New Jersey Audubon Magazine. 1976.** [1a] Provides an account of the 1975 fall shorebird migration, based on 26 field visits to the area now known as DeKorte Park, from July 4 to October 27, 1975. Provides a description of the area, species accounts of shorebirds observed, and a section on the future of shorebirds in the Meadowlands.

102. **Kane, R. Fall Shorebird Migration in the Hackensack Meadows, 1971-1980. Records of New Jersey Birds 9(2): 24-32.** [4] Reports on the systematic counts of sandpipers and plovers made over a period of ten years in North Arlington and Lyndhurst, NJ. The raw data is presented for conservation purposes, as it documents the importance of the lower Hackensack estuary as a stopover for some of the common shorebird species.

103. ***Kane, Richard. *Phragmites* use by birds in New Jersey. NJ Audubon Society Magazine. Vol. XXVI, No. 4, pp. 122-123. Winter 2000-2001.** [1a] Provides a list of birds that have been seen in common reed (*Phragmites australis*) – including 32 species that breed in *Phragmites* – with numerous references to the Hackensack Meadowlands, especially Kearny Marsh.

104. **Kane, R. & D. Githens. Hackensack River Migratory Bird Report with Recommendations for Conservation. New Jersey Audubon Society. April 1997.** [4] A three-year study was conducted in the Hackensack River area to inventory wildlife use, define critical migratory bird habitat, and recommend conservation measures in the region. This report investigates 21 selected sites particularly important to migratory birds.

105. **Konsevick, E. & G. Riedel. Accumulation of Chromium in Blue Crabs (*Callinectes sapidus*) from the Hackensack River, Hudson County, New Jersey. 1993.** [1a] A total of 20 male crabs were collected during three seasons at three stations in the HMD and at a control site outside the HMD. A total of three tissue types, claw muscle, body muscle, and hepatopancreas were analyzed separately. Crabs inhabiting the Meadowlands had chromium concentrations significantly higher than those from the control site.

106. ***Kraus, Mark L. Bioaccumulation of Heavy Metals in Pre-fledging Tree Swallows, Tachycineta bicolor Bull. Environ. Contam. Toxicol. 1989.** [1a] A total of ten sediment, nine adult midge, twelve swallow eggs, and six pre-fledgling swallows samples were analyzed for Cd, Cr, Cu, Pb, and Ni. The study demonstrated that heavy metals can move from contaminated estuarine sediments through midges and bioaccumulate in pre-fledgling tree swallows. The accumulation of metals in bird tissues is dependant on the tissue and metal type.

107. **Kraus, M. L., A. Benda, P. Lupini, & A. Smith (HMDC). Species Lists of Organisms Found in the Hackensack Meadowlands: Vascular Plants – Mammals. 1987.** [1a] Compilation of data collected from 33 references (dated 1972 through 1986) on the Hackensack Meadowlands. These lists should not be considered complete, as many areas within the Meadowlands have not been studied, and many of the areas that have been studied were not systematically surveyed.

108. ***Kurbansade, Marc (ed.), NJMC. Waterfowl Brooding Areas in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset showing the brooding habitat of selected waterfowl within the HMD.

109. ***Kurbansade, Marc (ed.), NJMC. Waterfowl Moulting Areas in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset showing the moulting areas of selected water fowl within the HMD.

110. ***The Louis Berger Group, Inc. Benthic Infauna Study. September 1998.** [4] Conducted as part of a field sampling program in support of a USACE permit application. Addresses recommendations made by the USEPA, USACE, and National Marine Fisheries Service for an evaluation of the relative quality of the sediment habitats within the project area.

111. ***Maguire Group, Inc. Final Draft: Function Assessment of Wetlands in New Jersey's Hackensack Meadowlands. January, 1989.** [4] Prepared for the USEPA – Region II, evaluating wetland functions within the Hackensack Meadowlands. Evaluated 33 wetland functions, including groundwater recharge and discharge, floodflow alteration, sediment stabilization, sediment/toxicant retention, nutrient removal/transformation, production export, aquatic diversity and abundance, and a number of functions related to wetland suitability for fish and wildlife.

112. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

113. ***NJMC & MERI. Fisheries Inventory of the Hackensack River within the Hackensack Meadowlands District. (8/2001 – 9/2003).** A two-year survey of fisheries resources within the Hackensack River and selected tributaries within the HMD was completed in September of 2003. Data was collected on a monthly and seasonal basis. A Fisheries Inventory Report is currently being drafted and is expected to be completed by December 2004.

114. ***PSE&G Company & Ichthyological Associates, Inc. Effect of the Cooling Water Intake Structure – Impingement of Fishes: Kearny Generating Station NPDES Permit No. NJ0000655 Demonstration for Section 316(b) of the Federal Water Pollution Control Act Amendments of 1972, PL 92-500. 1979.** [1a] Assessment of the environmental impact of the cooling water intake structure of the Kearny generating station. Assessed the ecological significance of the loss of fish and blue crabs at the intake structure. The impingement losses were evaluated in terms of the characteristics of the source water body and the life histories of the more frequently impinged species.

115. ***Raichel, D. The Influence of *Phragmites* Dominance on Marsh Resident Fish in the Hackensack Meadowlands, New Jersey. Rutgers University. 2001.** [5] Investigates the response of mummichogs (*Fundulus heteroclitus*) to common reed (*Phragmites australis*) vs. smooth cordgrass (*Spartina alterniflora*) and compares invertebrate assemblages in these marsh types.

116. ***Raichel, D. L., Ken Able, & Jean Marie Hartman. The Influence of *Phragmites* (Common Reed) on the Distribution, Abundance, and Potential Prey of a Resident Marsh Fish in the Hackensack Meadowlands, New Jersey." Estuaries 26: 511-521. 2003.** [5] Analyzed abundance and distribution of the various life history stages of mummichogs (*Fundulus heteroclitus*) and their invertebrate prey in smooth cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*).

117. **Sabounjian, E. and P, Galluzi. Mercury Concentrations in Fish and Aquatic Invertebrates from the Hackensack Meadowlands, New Jersey. 1980.** [1a] Various fish and aquatic invertebrates were sampled throughout the HMD and mercury concentrations were compared. The data suggested that older and/or larger killifish had greater concentrations of mercury, and that fiddler crabs might be a good environmental indicator of local contamination.

118. **Santoro, E. D. & S. J. Koepp. Mercury Levels in Organisms in Proximity to an Old Chemical Site. Marine Pollution Bulletin 17(5):219-224. 1986.** [4] Designed to measure the extent of mercury contamination among aquatic macrofauna in conjunction with a documented point-source discharge of mercury into the marsh environment. Mummichogs (*Fundulus heteroclitus*) appear to be a more reliable indicator of local mercury contamination than other fish in the study; no immediate health hazard was detected.

119. **Stocks, K. I. Factors Affecting Macroinfaunal Community Structure in Salt Marshes. Marine Sciences Graduate Program. Rutgers University. 2000.** [5] Examined benthic invertebrate species present in impounded and natural salt marshes in Delaware. Species lists from the two types of marshes were similar (with habitat-specific differences), but dominance patterns differed. Created salt marsh pond mesocosms at the Lyndhurst Nature Reserve to demonstrate food limitation during recolonization. The role of behavior in post-settlement movement of polychaetes was also examined.

120. ***USFWS. Significant Habitats and Habitat Complexes of the New York Bight Watershed. 1996.** Identifies and describes the essential habitats of key marine, coastal, and terrestrial species inhabiting the New York Bight watershed study area, which includes the Hackensack Meadowlands. This data will help guide informed and ecologically sound land use decisions and land protection efforts.

121. ***USFWS, USACE-NYD, USEPA-Region II, National Marine Fisheries Service, & HMDC. Wildlife Management Plan for the Hackensack Meadowlands. September 22, 2000.** [4] A wildlife management plan developed for the New Jersey Meadowlands. Plan is not site-specific, but comprises sets of objectives and strategies at the landscape, cover-type, and species-group scales for the overall Meadowlands wetland complex. The plan identifies a need to determine which native species are of greatest concern from a management standpoint, defines ecosystems, identifies important ecological processes, and identifies compatible and non-compatible human use factors.

E. Biological Studies – General Environmental

122. ***Agron, S. Environmental Geology of the Hackensack Meadowlands. Field Studies of New Jersey Geology and Guide to Field Trips. Rutgers University. 1981.** [1a] Describes the geological and ecological constraints and impacts to several of the major projects that have been erected in the HMD.

123. **Artigas, Francisco. Determination of Vigor Gradients of *Phragmites Australis* and Unvegetated Patches within Salt Marshes of the New Jersey Meadowlands Using Hyperspectral Imagery. Abstracts of the Meadowlands Symposium. 2003.** [1a] Conducted to determine if measurements of light reflectance spectra can be used to characterize plant vigor in common reed (*Phragmites australis*) stands in the Meadowlands. The spectra from greening-up phases of *Phragmites* were used as a surrogate to determine vigor gradients of *Phragmites* stands from a 2.5 meter resolution hyperspectral image. Reflectance spectra were measured from a pure, healthy, 10 by 10 meter quadrant of *Phragmites* every 15-20 days between April and September 2003.

124. ***Bart, D. Environmental Determinants of *Phragmites australis* Invasion in a New Jersey Salt Marsh: Interactions Among Human Activities, Disturbance, and Edaphic Conditions. Rutgers University. 2003.** [5] Tested ability of common reed (*Phragmites australis*) to establish itself in poorly drained saline environments through burial of large rhizomes, periods of low salinity, and localized drainage.

125. ***Bart, D. & J.M. Hartman. Environmental Constraints on Early Establishment of *Phragmites australis* in Salt Marshes. Wetlands. Volume 22 No. 2 pp. 201-213. 2002.** [5] Effects of rhizome burial, salinity, anoxia, and sulfides on emergence, survival, growth, biomass production, and spread of common reed (*Phragmites australis*) were examined in greenhouse and field experiments.

126. ***Bart, D. and J.M. Hartman. Environmental Determinants of *Phragmites australis* Expansion in a New Jersey Salt Marsh: An Experimental Approach. Oikos. 89:59-69. 2000.** [1a] Examined the effects of drainage and sulfides on common reed (*Phragmites australis*). Three experimental treatments were performed on *Phragmites* plants: 1) the previous year's dead stems were clipped to limit aeration; 2) rhizomes were severed to prevent translocation; and 3) both previous year's dead stems were clipped and rhizomes were severed. A control set was left undisturbed.

127. ***Bart, D. & J.M. Hartman. The Role of Large Rhizome Dispersal and Low Salinity Windows in the Establishment of Common Reed, *Phragmites australis*, in Salt Marshes: New Links to Human Activities. Estuaries. Volume 26 No. 2B pp. 436-443. 2003.** [5] Tested ability of common reed (*Phragmites australis*) to establish itself in poorly drained saline environments through burial of large rhizomes, periods of low salinity, and localized drainage.

128. **Burke, D. J., J. S. Weis, & P. Weis. Release of Metals by the Leaves of the Salt Marsh Grasses *Spartina alterniflora* and *Phragmites australis*. Estuarine, Coastal, and Shelf Science 51:153-159. 2000.** [4] Compared the release and accumulation of metal (Cu, Cr, Pb, and Zn) in smooth cordgrass (*Spartina alterniflora*) leaf tissue to that of common reed (*Phragmites australis*).

129. ***Camp, Dresser, and McKee. Agency Review Draft: Draft Environmental Impact Statement on the Special Area Management Plan for the Hackensack Meadowlands District, NJ. February 1995.** [1] An EIS identifying alternatives, assess the potential environmental, social, and economic consequences of each alternative, and identify the preferred alternative for the Special Area Management Plan for the Hackensack Meadowlands.

130. **Camp, Dresser, and McKee, USACE, & NJMC (ed.). Wetlands in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset containing wetland information derived from a field inspection by the U.S. Army Corps of Engineers and the NJMC wetland scientists, covering the entire HMD.

131. ***Department of Landscape Architecture and Regional Planning, New Jersey University of Pennsylvania. A Survey of Existing Physical Conditions of the Hackensack Meadows. 1969.** [1a] Gives a very general overview of the climate, geology, soils, hydrology, fauna, and flora of the Hackensack Meadowlands.

132. **Edwards and Kelcey, Inc. Pennsylvania Modified Habitat Evaluation Procedure (PAM HEP) Study. July 1993.** [4] The USACE asked that a HEP Analysis be performed to evaluate the natural resources of the NEC project area, which runs across the HMD. Proposed modifications involve the expansion of the existing track alignment from two to four tracks.

133. ***Gordon, Gabrielle (ed.), NJMC. 1986 New Jersey Department of Environmental Protection Tidal and Non-tidal Wetlands in the Hackensack Meadowlands District, New Jersey. 1999.** [2a] A dataset created using the 1986 Freshwater Wetlands coverage from NJDEP.

134. **Hartman, Jean Marie, Marian Norris, Michele Bakacs, Niki Learn, & Mark Wong. (Rutgers University). Status Report for the Hydrogeomorphic Model Development for the Urbanized Intertidal Wetlands of the Hackensack Meadowlands District. December 2001.** Discusses the Hydrogeomorphic Functional Assessment Model being developed by the USACE and other environmental agencies to provide a procedure for assessing the functional value of wetlands within the HMD. The model will provide data to improve regulatory decisions and allocation of preservation/restoration resources The project identified reference wetlands and their functional characteristics within the HMD.

135. **HMDC. Mercury in plants. 1978.** During autumn 1977 and 1988, specimens of plants representing 18 species were collected at 40 stations throughout the Hackensack Meadowlands. An additional 82 specimens representing 13 species were collected at the same stations during spring 1978. Analyses of rhizome, leaf, stem, and fruiting structure tissues were completed.

136. **HMDC. Wetland Bio-Zones of the Hackensack Meadowlands: An Inventory. 1975.** [1a] This report organized information gathered over a period of years by staff and consultants of the HMDC, for use as baseline data on which further field investigations will build. Five bio-zones are described, based on salinity and vegetation. The report lists the type of biota that are found in each bio-zone.

137. **HMDC. Wetland Bio-Zones of the Hackensack Meadowlands: An Inventory (2nd ed). 1980.** [1a] Updates the information gathered since the 1975 Bio-Zone report. Includes a cataloging of existing wetlands using aerial photographs and field inventory. A sixth bio-zone is added in this report. Acreages for each bio-zone are included.

138. **HMDC. Wetland Bio-Zones of the Hackensack Meadowlands: An Inventory (3rd ed). 1984.** [1a] Provides updated wetland acreages through June 1984 for the 1980 Bio-Zone report.

139. ***Jaworski, A. Z. and J. C. F. Tedrow. Pedologic Properties of New Jersey Tidal Marshes. Soil Science 139(1). January 1985.** [4] Describes the pedologic properties of two varieties of tidal marsh soils (protected coastal and estuarine), including sand grain morphology and plants associated with low (common reed [*Phragmites australis*], switchgrass [*Panicum virgatum*]), moderate/high (smooth cordgrass [*Spartina alterniflora*], saltmarsh hay [*Spartin patens*]), and high (Virginia glasswort [*Salicornia europaea*]) salinity levels.

140. **Kiviat, Erik & Kristi MacDonald. Hackensack Meadowlands, New Jersey, Biodiversity: A Review and Synthesis. August 8, 2002.** A document prepared for the Hackensack Meadowlands Partnership. Provided some of the scientific information needed to make sound planning, management, and restoration decisions for the HMD. Focused on acquiring a representative sample of recent biodiversity information that was most relevant to the authors' questions, as well as some older references. Maps and some "oral" natural history were also documented**.**

141. ***Lo Pinto, Richard W. Waste Water Treatment: A Determination of Limiting Factors Thru Biological Assay. Fairleigh Dickinson University. 1975.** [1a] Identified the chemicals released by a sewage treatment plant (i.e. limiting factors) in the Meadowlands, analyzed potential need to add tertiary treatment to the sewage treatment plant to decrease algae growth due to the limiting factors, and determined methods to direct tertiary treatment at the proper chemical target.

142. **Louis Berger & Associates, Inc. Technical Memorandum Phase I Analysis: Analysis and Review of Environmental Controls and Wetlands Protection in the Hackensack Meadowlands Development District, Bergen/Hudson County, New Jersey. September, 1988.** Establishes a framework of study to analyze: 1) the extent that environmental resources, particularly wetlands, were considered in the formulation of HMDC land use policy; 2) the extent and location of wetlands in the Towns of Secaucus and North Bergen within the Hackensack Meadowlands; 3) the identification of available development opportunities; and 4) the extent to which development within the Hackensack Meadowlands has been shared by authoritative powers other than the HMDC.

143. ***The Louis Berger Group, Inc. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. 2003.** [1a] (http://merilibrary.meadowlands.state.nj.us/dbtw-wpd/FullText/HGM_guidebook_RVSD.pdf) A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands was completed. The HGM model can be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation. Map-based and on-site field data (including amount of aquatic edge, channel density, vegetative cover, habitat, soil texture, and tidal inundation) were collected from the reference wetlands and used to refine data collection forms, calibrate model variables, and improve the conceptual HGM functional models. Reference sites included Skeetkill Creek Marsh, Meadowlark Marsh, Lyndhurst Riverside Marsh, MRI, Western Brackish Marsh, Mill Creek Marsh, Eastern Brackish Marsh, Mori Tract, Walden Marsh, Oritani Marsh, Harrier Meadow, Anderson Creek Marsh, Kearny Brackish Marsh, and Riverbend Wetlands Preserve.

144. ***Maguire Group, Inc. Final Draft: Function Assessment of Wetlands in New Jersey's Hackensack Meadowlands. January, 1989.** [4] Prepared for the USEPA – Region II, evaluating wetland functions within the Hackensack Meadowlands. Evaluated 33 wetland functions, including groundwater recharge and discharge, floodflow alteration, sediment stabilization, sediment/toxicant retention, nutrient removal/transformation, production export, aquatic diversity and abundance, and a number of functions related to wetland suitability for fish and wildlife.

145. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

146. ***Malcolm Pirnie, Inc. Mitigation Plan: United States Army Corps of Engineers Section 404 Permit Application (Bergen County Resource Recovery Facility) for the Bergen County Utilities Authority and American REF-FUEL. October 1985.** [4] Describes the mitigation plan for proposed impacts for the construction of the Bergen County resource recovery facility, and compares environmental values with and without construction of the proposed project.

147. ***Mattson, C. P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

148. ***Mattson, Chester & Nicholas Vallario (HMDC). Water Quality in a Recovering Ecosystem: A Report on Water Quality Research and Monitoring in the Hackensack Meadowlands 1971-1975. January, 1976.** Expanded the studies completed for a 1970 water quality study in the Hackensack Estuary to include the ecosystem's hydrology, chemistry, and biology.

149. **McBrien, Peg. Hydrogeomorphic (HGM) Functional Assessment Model and Guidebook for Tidal Fringe Wetlands in the New Jersey Meadowlands. Abstracts of the Meadowlands Symposium. 2003.** [1a] A hydrogeomorphic functional assessment model and guidebook for tidal fringe wetlands in the Hackensack Meadowlands is being completed. The HGM model will be used as a tool to help determine wetland functions and values and to approximate compensatory wetland mitigation.

150. **McHugh, J. M. Effects of Mycorrhizal Inoculation, Phosphorous Availability, Salinity, and Period of Inundation on Seedling Growth, in the Nursery, of Two Salt Marsh Grasses, *Spartina alterniflora* and *Spartina cynosuroides*. Rutgers University. 2001.** [5] Analyzed effects of inoculation with commercial mycorrhizae on growth and nutrient uptake of smooth cordgrass (*Spartina alterniflora*) and big cordgrass (*Spartina cynosuroides*) under conditions where phorsphorus was limited.

151. **NJMC. New Jersey Meadowlands Data Book. 2002.** [2a] A compilation of various socio-economic, municipal, and environmental statistics for the HMD by the NJMC, which is responsible for protecting the delicate balance of nature, providing for orderly development, and providing for facilities for the disposal of solid waste. Data shows economic development and ecological recovery can take place together. The 2002 version is an update of the 1996 version.

152. ***New Jersey Turnpike Authority. Final Environmental Impact Statement: Interchange 11 to U.S. Route 46. September 1987.** Describes the environmental implications associated with the proposed widening and improvements of the NJ Turnpike from Interchange 11 in Woodbridge to U.S. Route 46. Details some site history, the proposed action, project purpose and need, alternatives, and effects of the plan on biological resources, socioeconomics, cultural resources, air quality, noise, traffic, soils and geology, hydrology, and water quality.

153. ***New Jersey Turnpike Authority. Technical Study Volumes I and II: Natural Resources and Biological Resources: Interchange 8A to Interchange 9 and Interchange 11 to U.S. Route 46. February 1986.** [2a] Contains a summary of findings, data sources, methodologies, description of the affected environment, environmental impacts and mitigation, and environmental impacts mitigation for New Jersey Turnpike widening.

154. ***Peteet, D. M., et al. Estuarine Shifts in Organic Matter and Plant Communities in the Meadowlands and Lower Hudson River Marshes – European Impact. Abstracts of the Meadowlands Symposium. 2003.** [1a] Sediment cores spanning the last millennium from Hackensack Meadowlands and the lower Hudson estuary marshes were compared. The Meadowlands pollen signature prior to European impact is unique in that the marsh is dominated by sedge pollen, while grasses and trees, primarily oak (15-20%) and pine (10%) play a minor role. In contrast, the Hudson marshes are dominated in Piermont by tree pollen of oak (30%) and pine(30%), and Staten Island and Jamaica Bay by oak (40%) and pine (20%).

155. ***Sipple, William S. Past and Present Flora and Vegetation of the Hackensack Meadowlands Bartonia, No. 41, pp. 4-56. 1971-1972.** [1a] Describes the past and present (circa 1970) vegetation of the Hackensack Meadowlands. Includes a review of previous studies done by Torrey (1819), Britton (1889), Harshberger & Burns (1919), and Heusser (1949) to reconstruct the past vegetation of the Meadowlands. Also contains a vegetation map showing the then current vegetation in the Meadowlands. Discusses factors causing vegetation change.

156. **Totten, L. A., et al. Atmospheric Deposition of Organic and Inorganic Contaminants to the New Jersey Meadowlands. Abstracts of the Meadowlands Symposium. 2003.** [1a] Results from the New Jersey Atmospheric Deposition Network include the first estimates of atmospheric deposition fluxes of a suite of organic and inorganic contaminants to the Hudson River Estuary and the New Jersey Meadowlands. The New Jersey Atmospheric Deposition Network consisted of nine monitoring sites across the state representing a variety of land-use regimes

157. ***USACE-NYD. Flood Control Study Reconnaissance Report, Hackensack River Basin, New Jersey. June 1993.** [1] Determined the extent of federal interest in a plan to alleviate the flooding problems within the Hackensack River Basin and whether the planning should proceed further based on a preliminary appraisal of the federal interest. The study scope consisted of review of existing data, field investigations, interviews with local interests, and coordination with the NJDEP to determine environmental and cultural impacts.

158. ***USACE-NYD & U.S. Coast Guard – First Coast Guard District. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. November 1988.** [1] Discusses the project purpose and need, alternatives, affected environment, environmental consequences, and public involvement. In the environmental sections, the report goes in to detail about the geology and soils, groundwater, surface water hydrology, biological resources, and air quality.

159. ***USEPA-Region II & USACE-NYD. Draft Environmental Impact Statement on the Special Area Management Plan for the Hackensack Meadowlands District, NJ. June 1995.** [2a] EIS developed based on the SAMP for the HMD. The document presents the purpose and need for the SAMP, an alternatives analysis, an analysis of the environmental impacts on the preferred alternative, and the implementation strategy. The EIS included an IVA for specific assessment areas to assess wetland functional values. This document contains maps and figures of the HMD, as well as cultural resources information.

160. **USFWS. Hackensack Meadowlands National Wildlife Refuge: A Proposal for a New Refuge Establishment. June 10, 1999.** Proposal to establish a Meadowlands National Wildlife Refuge, which would offer an opportunity to conserve and restore a valuable estuarine system, sustain and safeguard wild living trust resources, and provide an outdoor education opportunity for America's largest urban center. The proposal contains descriptions of the refuge's resources, objectives, threats, funding, costs, establishment plan, and benefits.

161. ***USFWS. Significant Habitats and Habitat Complexes of the New York Bight Watershed. 1996.** Identifies and describes the essential habitats of key marine, coastal, and terrestrial species inhabiting the New York Bight watershed study area, which includes the Hackensack Meadowlands. This data will help guide informed and ecologically sound land use decisions and land protection efforts.

162. ***USFWS, USACE-NYD, USEPA-Region II, National Marine Fisheries Service, & HMDC. Wildlife Management Plan for the Hackensack Meadowlands. September 22, 2000.** [4] A wildlife management plan developed for the New Jersey Meadowlands. Plan is not site-specific, but comprises sets of objectives and strategies at the landscape, cover-type, and species-group scales for the overall Meadowlands wetland complex. The plan identifies a need to determine which native species are of greatest concern from a management standpoint, defines ecosystems, identifies important ecological processes, and identifies compatible and non-compatible human use factors.

163. **Waddell, D. C. & M. L. Kraus. Effects of $CuCl_2$ on the Germination Response of Two Populations of the Saltmarsh Cordgrass, *Spartina alterniflora*. Bulletin of Environmental Contamination and Toxicology.** [4] Examined population differences in the germination response of smooth cordgrass (*Spartina alterniflora*) to various concentrations of Cu. *S. alterniflora* has been demonstrated to germinate in Cu and Cd solution concentrations as high as 100 mg/L.

164. **Windham, L, J.S. Weis, & P. Weis. Patterns and Processes of Mercury Release from Leaves of Two Dominant Salt Marsh Macrophytes, *Phragmites australis* and *Spartina alterniflora*. Estuaries. Vol 24, n 6A, pp. 787-795. 2001.** [1a] Concentration and release of Hg from leaf tissue between smooth cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*) was compared.

F. Geotechnical

165. ***Agron, S. Environmental Geology of the Hackensack Meadowlands. Field Studies of New Jersey Geology and Guide to Field Trips. Rutgers University. 1981.** [1a] Describes the geological and ecological constraints and impacts to several of the major projects that have been erected in the HMD.

166. ***Carswell, L.D., Appraisal of Water Resources in the Hackensack River Basin, New Jersey. June 1976.** [1a] Details the geology and hydrology existing in the Hackensack River Basin, including descriptions of the bedrock, existing aquifers, and chemical quality of water.

167. ***Department of Landscape Architecture and Regional Planning, New Jersey University of Pennsylvania. A Survey of Existing Physical Conditions of the Hackensack Meadows. 1969.** [1a] Gives a very general overview of the climate, geology, soils, hydrology, fauna, and flora of the Hackensack Meadowlands.

168. ***Jaworski, A. Z. and J. C. F. Tedrow. Pedologic Properties of New Jersey Tidal Marshes. Soil Science 139(1). January 1985.** [4] Describes the pedologic properties of two varieties of tidal marsh soils (protected coastal and estuarine), including sand grain morphology and plants associated with low (common reed [*Phragmites australis*], switchgrass [*Panicum virgatum*]), moderate/high (smooth cordgrass [*Spartina alterniflora*], saltmarsh hay [*Spartin patens*]), and high (Virginia glasswort [*Salicornia europaea*]) salinity levels.

169. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

170. ***New Jersey Turnpike Authority. Final Environmental Impact Statement: Interchange 11 to U.S. Route 46. September 1987.** Describes the environmental implications associated with the proposed widening and improvements of the NJ Turnpike from Interchange 11 in Woodbridge to U.S. Route 46. Details some site history, the proposed action, project purpose and need, alternatives, and effects of the plan on biological resources, socioeconomics, cultural resources, air quality, noise, traffic, soils and geology, hydrology, and water quality.

171. ***Passaic Valley Citizens Planning Association. Hackensack Meadows Master Plan Series. Report Number 1: Survey Phase. February 1958.** [1a] A report on the area of the HMD under the jurisdiction of the Meadowlands Regional Planning Board regarding Meadowlands reclamation and development.

172. **Saxena, S. K., J. Hedberg, & C. C. Ladd. Research Report R75-2: Results of Special Laboratory Testing Program on Hackensack Valley Varved Clay. Massachusetts Institute of Technology. June 1974.** [1a] Describes equipment and test procedures for a laboratory program conducted on varved clay samples from glacial Lake Hackensack in Secaucus, NJ. Includes testing results and comparison of the data to that obtained for other varved clays.

173. ***Schulderein, J. Geoarchaeological Overview of Bellman's Creek, Hackensack Meadowlands, New Jersey. H-BLRT 1B Appendix (Pages 198 - 219). 1995.** [1a] An appendix in a report entitled *Jersey City to the Vince Lombardi Park-Ride, Archeological Testing for the Hudson-Bergen Light Rail System* prepared by Joan H. Geismar. Undertaken to identify depositional contexts and buried archeological site potential in the vicinity of borehole NA-04 near the confluence of the Hackensack River and the southeast bank of Bellman's Creek. Discusses other paleoecological research performed in other parts of the Meadowlands.

174. ***USACE-NYD & U.S. Coast Guard – First Coast Guard District. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. November 1988.** [1] Discusses the project purpose and need, alternatives, affected environment, environmental consequences, and public involvement. In the environmental sections, the report goes in to detail about the geology and soils, groundwater, surface water hydrology, biological resources, and air quality.

175. ***ZURN Environmental Engineers. Analysis of Alternative Solid Wastes Management Systems for the Hackensack Meadowlands District. 1970.** [1a] Included three major components: 1) evaluation of the extent/characteristics of past/existing solid waste disposal operations; 2) estimation of the magnitude of potential solid waste disposal operations; and 3) development of guidelines for regulation of solid waste disposal operations. Section III details characteristics of the Meadowlands, including geology, topography, groundwater, and surface water flows.

G. Hydraulics and Hydrology

176. ***Camp, Dresser, and McKee. Agency Review Draft: Draft Environmental Impact Statement on the Special Area Management Plan for the Hackensack Meadowlands District, NJ. February 1995.** [1] An EIS identifying alternatives, assess the potential environmental, social, and economic consequences of each alternative, and identify the preferred alternative for the Special Area Management Plan for the Hackensack Meadowlands.

177. ***Carswell, L.D., Appraisal of Water Resources in the Hackensack River Basin, New Jersey. June 1976.** [1a] Details the geology and hydrology existing in the Hackensack River Basin, including descriptions of the bedrock, existing aquifers, and chemical quality of water.

178. ***Department of Landscape Architecture and Regional Planning, New Jersey University of Pennsylvania. A Survey of Existing Physical Conditions of the Hackensack Meadows. 1969.** [1a] Gives a very general overview of the climate, geology, soils, hydrology, fauna, and flora of the Hackensack Meadowlands.

179. ***DiLorenzo, Joseph L. Ph.D., et al. Tidal and Water Quality Variability in an Urbanized Estuary. Abstracts of the Meadowlands Symposium. 2003.** [1a] During 1988, tide and water quality data were collected intensively in the Hackensack Estuary. Tidal elevations were monitored continually at four estuarine stations and over a six-month period; current velocities were measured concurrently at one station near the mouth of the Hackensack River. Discrete water quality samples were collected at six main-stem estuarine stations and at two- to three-hour intervals. Harmonic analyses of tidal elevation data indicate that Hackensack Estuary tides are predominantly semi-diurnal, though modulated by diurnal and fortnightly components.

180. ***Elefante, Dom (ed.), NJMC. Channels of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing information depicting all minor bodies of water including small streams and drainage ditches. The data was digitized at a scale of 1:2400 from 2002 Topographic maps of the HMD.

181. ***Elefante, Dom (ed.). NJMC. Waterways of the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing information depicting all major bodies of water within the HMD, including the Hackensack River and its larger tributaries. The data was digitized at a scale of 1:2400 from 2002 Topographic Maps of the District. This coverage also includes the addition of Sach's Creek, which had previously been omitted.

182. ***ERDC, HMDC, & USACE – NYD. Flood Control Survey. 2000.** [2a] Survey performed for the HMD that consisted of: 1) cross-sections along the Hackensack River and its major tributaries, including Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke; 2) identifying 30 flood control structures along the Hackensack River; and 3) locating all bridges and piers within the study area. In addition, digital aerials were flown and geo-referenced. The vertical datum for the survey was NGVD29. At 13 of the 30 flood control structures, tide gages and single beam acoustic Doppler current meters were installed and monitored to measure velocity, head difference, and discharge at these locations.

183. ***ERDC & USACE – NYD. The Hackensack Meadowlands Flood Control Study. 1998 – 2004 (On-going).** [2a] Undertaken to develop a numerical hydraulic model of the Hackensack River and its associated tidal marshes and channels. A parent model (one-dimensional hydrologic) is being developed for the Hackensack River Basin, while child models (two-dimensional hydrologic) are being developed for Berry's Creek, Penhorn Creek, Sack Creek, and the Cayuga Dyke. The study also includes the evaluation of the performance of proposed flood control structures and restored wetland areas with respect to flood elevations, as well as the effects of optimum maintenance on existing flood control structures.

184. ***Gordon, Gabrielle (ed.), NJMC. 2001 Water Control Structure Locations for the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing wetland information derived from a field inspection by the U.S. Army Corps of Engineers and the NJMC wetland scientists, covering the entire HMD.

185. ***Gordon, Gabrielle (ed.), NJMC. Federal Emergency Management Agency Flood Designations for the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing the Federal Emergency Management Agency flood information for the portions of the 14 municipalities that are within the NJMC's jurisdiction. The Q3 Flood Data are derived from the Flood Insurance Rate Maps published by the Federal Emergency Management Agency.

186. ***Gordon, Gabrielle (ed.), NJMC. Federal Emergency Management Agency Flood Designations with Open Space Areas for the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing open space, zoning, golf course, and specially designated areas pertaining to the Federal Emergency Management Agency 100-year flood zone within in the HMD.

187. ***Gordon, Gabrielle (ed.), NJMC. National Oceanic and Atmospheric Association Tide Gauges within the Hackensack Meadowlands Region. 1999.** [2a] A dataset containing the locations of tide gages within the Hackensack Meadowlands that are managed and maintained by the National Oceanic and Atmospheric Association.

188. ***Gordon, Gabrielle (ed.), NJMC. Tide Gauge Stations within the Hackensack Meadowlands District. 2001.** [2a] A dataset containing the tide gauge stations found within the HMD. The point data was created using coordinates provided by NJMC staff.

189. ***Gordon, Gabrielle & Monica Mianecki (ed.), NJMC. Floodprone Areas in the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing the water control structure locations found within the HMD. The point data was created using coordinates provided by NJMC staff.

190. ***HMDC. Hackensack Meadowlands Coastal Zone Management: Enhancement of the Coastal Ecosystem. 1982.** [1a] Compiled resources aid the HMDC in addressing a number of public policy issues for the HMD, which included: 1) waterfront parks; 2) revegetation of landfills; 3) river basin management plans; and 4) plans for specially planned areas.

191. ***Maguire Group, Inc. Final Draft: Function Assessment of Wetlands in New Jersey's Hackensack Meadowlands. January, 1989.** [4] Prepared for the USEPA – Region II, evaluating wetland functions within the Hackensack Meadowlands. Evaluated 33 wetland functions, including groundwater recharge and discharge, floodflow alteration, sediment stabilization, sediment/toxicant retention, nutrient removal/transformation, production export, aquatic diversity and abundance, and a number of functions related to wetland suitability for fish and wildlife.

192. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

193. ***Mattson, Chester & Nicholas Vallario (HMDC). Water Quality in a Recovering Ecosystem: A Report on Water Quality Research and Monitoring in the Hackensack Meadowlands 1971-1975. January, 1976.** Expanded the studies completed for a 1970 water quality study in the Hackensack Estuary to include the ecosystem's hydrology, chemistry, and biology.

194. ***New Jersey Turnpike Authority. Final Environmental Impact Statement: Interchange 11 to U.S. Route 46. September 1987.** Describes the environmental implications associated with the proposed widening and improvements of the NJ Turnpike from Interchange 11 in Woodbridge to U.S. Route 46. Details some site history, the proposed action, project purpose and need, alternatives, and effects of the plan on biological resources, socioeconomics, cultural resources, air quality, noise, traffic, soils and geology, hydrology, and water quality.

195. ***Public Health Service, Region II. Environmental Engineering Study Hackensack River Basin: Phase II Preliminary Stage 2 Draft Characterization of Existing Conditions (Working Draft Preliminary Subject Revision – Volume 1). 1966** [1a] Comprehensive report by the predecessor of the USEPA. Includes information on water supply, wastewater disposal, water pollution, solid waste, housing, vector control, and radiological health.

196. **TAMS. Hackensack Meadowlands Mathematical Study. June 1975.** Details a mathematical model of the Hackensack Meadowlands that was formulated to perform hydraulic routing of floods and tides through the complex network of channels and marshes in the system.

197. ***USACE-NYD. Flood Control Study Reconnaissance Report, Hackensack River Basin, New Jersey. June 1993.** [1] Determined the extent of federal interest in a plan to alleviate the flooding problems within the Hackensack River Basin and whether the planning should proceed further based on a preliminary appraisal of the federal interest. The study scope consisted of review of existing data, field investigations, interviews with local interests, and coordination with the NJDEP to determine environmental and cultural impacts.

198. **USACE-NYD & TAMS Consultants, Inc. Reconnaissance Report for Flood Control Measures, Hackensack River Basin, Hudson and Bergen Counties, New Jersey. January 1981.** [4] Investigation to determine if there was a federal interest that warranted further and more detailed engineering studies of flood control measures in the Hackensack Meadowlands. The investigation involved re-evaluating the feasibility of a tidal barrier and associated levees and walls using a mathematical model, LATIS.

199. ***USACE-NYD & U.S. Coast Guard – First Coast Guard District. Draft Environmental Impact Statement and Section 404 (b)(1) Evaluation New Jersey Turnpike Widening Project: Interchange 11 to U.S. Route 46. November 1988.** [1] Discusses the project purpose and need, alternatives, affected environment, environmental consequences, and public involvement. In the environmental sections, the report goes in to detail about the geology and soils, groundwater, surface water hydrology, biological resources, and air quality.

200. ***ZURN Environmental Engineers. Analysis of Alternative Solid Wastes Management Systems for the Hackensack Meadowlands District. 1970.** [1a] Included three major components: 1) evaluation of the extent/characteristics of past/existing solid waste disposal operations; 2) estimation of the magnitude of potential solid waste disposal operations; and 3) development of guidelines for regulation of solid waste disposal operations. Section III details characteristics of the Meadowlands, including geology, topography, groundwater, and surface water flows.

H. Water and Sediments

201. ***Bonnevie, N.L., S.L. Huntley, B.W. Found, & R.J. Wenning. Trace Metal Contamination in Surficial Sediments from Newark Bay, New Jersey. Science of the Total Environment 144 (1-3):1-6. 1994.** [2] Pb (275 ± 138 mg/kg) and Cu (116 ± 63 mg/kg) concentrations in sand sediments from Hackensack Area I were similar to those found in the Passaic River and the Arthur Kill. These results suggest that metal concentrations, particularly Cd, Hg, and Pb, in surficial sediments in the Passaic River, Hackensack River, and the Arthur Kill and portions of the Hackensack Meadowlands may pose a significant threat to aquatic biota.

202. ***Camp, Dresser, and McKee. Agency Review Draft: Draft Environmental Impact Statement on the Special Area Management Plan for the Hackensack Meadowlands District, NJ. February 1995.** [1] An EIS identifying alternatives, assess the potential environmental, social, and economic consequences of each alternative, and identify the preferred alternative for the Special Area Management Plan for the Hackensack Meadowlands.

203. ***Cheng, C. & E. Konsevick. Trends in the Water Quality of an Urban Estuary: Hackensack Meadowlands, New Jersey. Coastal Water Resources. Proceedings of a Symposium Held in Wilmington, North Carolina. American Water Resources Association. 1988.** [1a] NJMC has been conducting a summer water quality program since 1971. Of the 13 parameters evaluated, this study reports on just four: temperature, salinity, BOD, and DO. Parametric and non-parametric statistical analysis completed. Also analyzed changes in overall water quality of the Hackensack River.

204. ***DiLorenzo, Joseph L. Ph.D., et al. Tidal and Water Quality Variability in an Urbanized Estuary. Abstracts of the Meadowlands Symposium. 2003.** [1a] During 1988, tide and water quality data were collected intensively in the Hackensack Estuary. Tidal elevations were monitored continually at four estuarine stations and over a six-month period; current velocities were measured concurrently at one station near the mouth of the Hackensack River. Discrete water quality samples were collected at six main-stem estuarine stations and at two- to three-hour intervals. Harmonic analyses of tidal elevation data indicate that Hackensack Estuary tides are predominantly semi-diurnal, though modulated by diurnal and fortnightly components.

205. ***Gordon, Gabrielle (ed.), NJMC. Water Quality Monitoring Stations within the Hackensack Meadowlands Region. 2001.** [2a] A dataset containing the locations of the water quality monitoring stations found within the HMD. The point data was created using coordinates provided by NJMC staff.

206. ***Hart Crowser, Inc. Project Plan: Baseline Characterization – Sediment Quality, Water Quality, and Benthic Infauna. December 1997.** [4] Prepared to guide preliminary studies of sediment and water quality necessary to support an USACE permit application. The purpose of the study was to generate the recommended technical information which will form a basis for the resolution of habitat-related issues for benthos.

207. **Kellman, Roger J. Factors Effecting Sludge Utilization on the Landfills of the Hackensack Meadowlands. 1979.** [1a] Studied factors that effect a sludge utilization program for the landfills of HMD. Presented a discussion of land disposal of sewage sludge and the various land utilization methods. Included some general leachate information, and discussed the pathogens, nutrients, organics, and heavy metals. The effects of heavy metals on the plants included the discussion of availability and toxicity.

208. **Konsevick, Edward, Christine Hobble, & Paul Lupini. Hackensack Meadowlands District-Wide Water Quality Monitoring Project Summary Covering the Period January, 1993 to June, 1993. July 1994.** [1] Reviewed the project design, methods, and presentation of results of selected water quality parameters. References five papers, all of which pertain to water quality in the Meadowlands.

209. ***Konsevick, E., C. Cheng-Hobble, and P. Lupini. Monitoring Effects of Urban Land Use on Estuarine Water Quality. Hackensack Meadowlands Development Commission, Lyndhurst, NJ. 1994.** [4] The USGS, along with the HMDC, established a network of 14 ambient water quality monitoring sites to characterize the status of water quality in the HMD. The program will ensure the uninterrupted flow of information needed by decision makers to manage development within the estuary.

210. ***The Louis Berger Group, Inc. Benthic Infauna Study. September 1998.** [4] Conducted as part of a field sampling program in support of a USACE permit application. Addresses recommendations made by the USEPA, USACE, and National Marine Fisheries Service for an evaluation of the relative quality of the sediment habitats within the project area.

211. ***Maguire Group, Inc. Final Draft: Function Assessment of Wetlands in New Jersey's Hackensack Meadowlands. January, 1989.** [4] Prepared for the USEPA – Region II, evaluating wetland functions within the Hackensack Meadowlands. Evaluated 33 wetland functions, including groundwater recharge and discharge, floodflow alteration, sediment stabilization, sediment/toxicant retention, nutrient removal/transformation, production export, aquatic diversity and abundance, and a number of functions related to wetland suitability for fish and wildlife.

212. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

213. ***Mattson, C.P. Ecological and Resource Management Plan for the Hackensack Meadowlands. 1978.** [1a] A synopsis of what the then eight-year-old HMDC had learned about the Hackensack Estuary. Section 1 is an ecological primer, Section 2 provides information on the state of the estuary, and Section 3 presents natural resource management strategies for wetlands, water quality, open space, and land use planning.

214. ***Mattson, Chester & Nicholas Vallario (HMDC). Water Quality in a Recovering Ecosystem: A Report on Water Quality Research and Monitoring in the Hackensack Meadowlands 1971-1975. January, 1976.** Expanded the studies completed for a 1970 water quality study in the Hackensack Estuary to include the ecosystem's hydrology, chemistry, and biology.

215. ***Mattson, C., G. Potera, & M.E. Saks. Water Quality in a Disordered Ecosystem: A Report on the Water Quality Monitoring Study Performed in the Hackensack Meadowlands between June and September 1971. 1971.** [1a] Part of a natural resource inventory on which to base future land use decisions and against which to make future comparisons. Chemistry and water quality were measured at 11 sites, including Berry's Creek, Penhorn Creek, Losen Slote Creek, Bellman's Creek, Moonachie Creek, Mill Creek, and the Hackensack River.

216. ***Mattson, Chester P. & Richard Lo Pinto. Phytoplankton for Industrial Pollutants in the Hackensack Meadowlands. Proceedings of University Seminar on Pollution and Water Resources, Volume VIII. 1975.** [1a] Discusses the methods used to perform phytoplankton bioassays (using ten different phytoplankton cultures) on three different effluent types – landfill leachate, effluent from a metal finishing factory, and effluent from a metal plating factory. Samples were collected from the Hackensack Meadowlands.

217. ***New Jersey Turnpike Authority. Final Environmental Impact Statement: Interchange 11 to U.S. Route 46. September 1987.** Describes the environmental implications associated with the proposed widening and improvements of the NJ Turnpike from Interchange 11 in Woodbridge to U.S. Route 46. Details some site history, the proposed action, project purpose and need, alternatives, and effects of the plan on biological resources, socioeconomics, cultural resources, air quality, noise, traffic, soils and geology, hydrology, and water quality.

218. ***Peteet, D. M., et al. Estuarine Shifts in Organic Matter and Plant Communities in the Meadowlands and Lower Hudson River Marshes – European Impact. Abstracts of the Meadowlands Symposium. 2003.** [1a] Sediment cores spanning the last millennium from Hackensack Meadowlands and the lower Hudson estuary marshes were compared. The Meadowlands pollen signature prior to European impact is unique in that the marsh is dominated by sedge pollen, while grasses and trees, primarily oak (15-20%) and pine (10%) play a minor role. In contrast, the Hudson marshes are dominated in Piermont by tree pollen of oak (30%) and pine(30%), and Staten Island and Jamaica Bay by oak (40%) and pine (20%).

219. ***Public Health Service, Region II. Environmental Engineering Study Hackensack River Basin: Phase II Preliminary Stage 2 Draft Characterization of Existing Conditions (Working Draft Preliminary Subject Revision – Volume 1). 1966.** [1a] Comprehensive report by the predecessor of the USEPA. Includes information on water supply, wastewater disposal, water pollution, solid waste, housing, vector control, and radiological health.

220. **Sabounjian, E. & P. Galluzi. The Distribution of Mercury Contamination in Marsh Sediments, Channel Sediments, and Surface Waters of the Hackensack Meadowlands, New Jersey. 1980.** [1a] Sediment cores to a depth of 18 inches and surface water were sampled at 42 sites throughout the HMD, including Eight Day Swamp and Berry's Creek. Mercury contamination was compared among marsh sediments, channel sediments, and surface waters, as well as along different points downstream of a former mercury processing facility. Contamination between marshes removed from tidal influence and those close to watercourses was also compared.

221. ***Santoro, E. D. & S. J. Koepp. Mercury Levels in Organisms in Proximity to an Old Chemical Site. Marine Pollution Bulletin 17(5):219-224. 1986.** [4] Measured the extent of mercury contamination among aquatic macrofauna in conjunction with a documented point-source discharge of mercury into the marsh environment.

I. Historical/Cultural Resources

222. ***Camp, Dresser, and McKee. Agency Review Draft: Draft Environmental Impact Statement on the Special Area Management Plan for the Hackensack Meadowlands District, NJ. February 1995.** [1] An EIS identifying alternatives, assess the potential environmental, social, and economic consequences of each alternative, and identify the preferred alternative for the Special Area Management Plan for the Hackensack Meadowlands.

223. ***Kurbansade, Marc (ed.), NJMC. Cultural Resources for the Hackensack Meadowlands District, New Jersey. 2001.** [2a] A dataset showing the NJDEP State Historic Preservation Office properties within the HMD. As this dataset was created by digitizing polygons by hand from a State Historic Preservation Office paper base map, areas should be considered approximate.

224. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

225. ***New Jersey Turnpike Authority. Final Environmental Impact Statement: Interchange 11 to U.S. Route 46. September 1987.** Describes the environmental implications associated with the proposed widening and improvements of the NJ Turnpike from Interchange 11 in Woodbridge to U.S. Route 46. Details some site history, the proposed action, project purpose and need, alternatives, and effects of the plan on biological resources, socioeconomics, cultural resources, air quality, noise, traffic, soils and geology, hydrology, and water quality.

226. ***NJMC. NJMC Master Plan. 2004.** [1a] (http://www.hmdc.state.nj.us/masterplan/05-Environ.pdf.) The Master Plan creates an overall vision of a regreened Meadowlands and a revitalized urban landscape through the delineation of cohesive goals, principles, standards, and strategies. The plan inventoried environmental, economic, and social information for the HMD. The plan also contains cultural resources information for the HMD.

227. **Research and Archaeological Management, Inc. Cultural Resource Reconnaissance: Hackensack Meadowlands District Hudson and Bergen Counties, New Jersey. January 1989.** Identified known historical, architectural, and archeological resources within NJMC jurisdiction, evaluated the potential for discovery of previously undocumented cultural resources, and recommended methods for identifying undocumented resources.

228. **Rutsch, S. & S. Edward. A Cultural Resource Survey of Proposed Northeast Corridor Track Modifications at the Proposed Secaucus Transfer Station. June 1990.** [1a] Evaluated the Amtrak Northeast Corridor Study Area for the presence of potentially significant cultural resources. Included documentary research and infield investigation.

229. ***Schulderein, J. Geoarchaeological Overview of Bellman's Creek, Hackensack Meadowlands, New Jersey. H-BLRT 1B Appendix (Pages 198 - 219). 1995.** [1a] An appendix in a report entitled *Jersey City to the Vince Lombardi Park-Ride, Archeological Testing for the Hudson-Bergen Light Rail System* prepared by Joan H. Geismar Undertaken to identify depositional contexts and buried archeological site potential in the vicinity of borehole NA-04 near the confluence of the Hackensack River and the southeast bank of Bellman's Creek. Discusses other paleoecological research performed in other parts of the Meadowlands.

230. ***USACE-NYD. Flood Control Study Reconnaissance Report, Hackensack River Basin, New Jersey. June 1993.** [1] Determined the extent of federal interest in a plan to alleviate the flooding problems within the Hackensack River Basin and whether the planning should proceed further based on a preliminary appraisal of the federal interest. The study scope consisted of review of existing data, field investigations, interviews with local interests, and coordination with the NJDEP to determine environmental and cultural impacts.

231. ***USEPA-Region II & USACE-NYD. Draft Environmental Impact Statement on the Special Area Management Plan for the Hackensack Meadowlands District, NJ. June 1995.** [2a] EIS developed based on the SAMP for the HMD. The document presents the purpose and need for the SAMP, an alternatives analysis, an analysis of the environmental impacts on the preferred alternative, and the implementation strategy. The EIS included an IVA for specific assessment areas to assess wetland functional values. This document contains maps and figures of the HMD, as well as cultural resources information.

J. Restoration/Remediation Design Plans

232. ***Gordon, Gabrielle (ed.), NJMC. 2002 Current and Potential Mitigation Projects in the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset containing current and potential mitigations sites for the portions of the 14 municipalities that are within the NJMC's jurisdiction.

233. ***Gordon, Gabrielle & Dom Elefante (ed.), NJMC. Priority Preservation Areas for the Hackensack Meadowlands District, New Jersey. 2002.** [2a] A dataset showing the priority preservation areas for the HMD.

234. ***Malcolm Pirnie, Inc. Bergen County Resource Recovery Facility: Draft Environment and Health Impact Statement. BCUA. 1985.** [1a] Draft Environmental and Health Impact Statement submitted to NJDEP Division of Solid Waste, which included: 1) a flood insurance study; 2) historical and cultural reconnaissance; 3) biological resources inventories; 4) soils data; 5) water quality data; 6) recycling coordination/correspondence, 7) groundwater monitoring results (metals and nutrients); 8) coastal resources policies report; 8) supporting air quality impact documentation; 10) incineration bottom ash residue research study, and 11) habitat evaluation/mitigation plan. Although the proposed project is in Ridgefield, extensive biological resources inventories included the entire HMD.

235. ***Malcolm Pirnie, Inc. Mitigation Plan: United States Army Corps of Engineers Section 404 Permit Application (Bergen County Resource Recovery Facility) for the Bergen County Utilities Authority and American REF-FUEL. October 1985.** [4] Describes the mitigation plan for proposed impacts for the construction of the Bergen County resource recovery facility, and compares environmental values with and without construction of the proposed project.

236. ***New Jersey Turnpike Authority. Technical Study Volumes I and II: Natural Resources and Biological Resources: Interchange 8A to Interchange 9 and Interchange 11 to U.S. Route 46. February 1986.** [2a] Contains a summary of findings, data sources, methodologies, description of the affected environment, environmental impacts and mitigation, and environmental impacts mitigation for New Jersey Turnpike widening.

237. **TAMS Consultants, Inc. Hackensack Meadowlands Brackish Wetland Mitigation Plan. January 1985.** [4] Mitigation plan endeavoring to maximize the environmental values in a brackish tidal ecosystem in the lower Mill Creek basin.