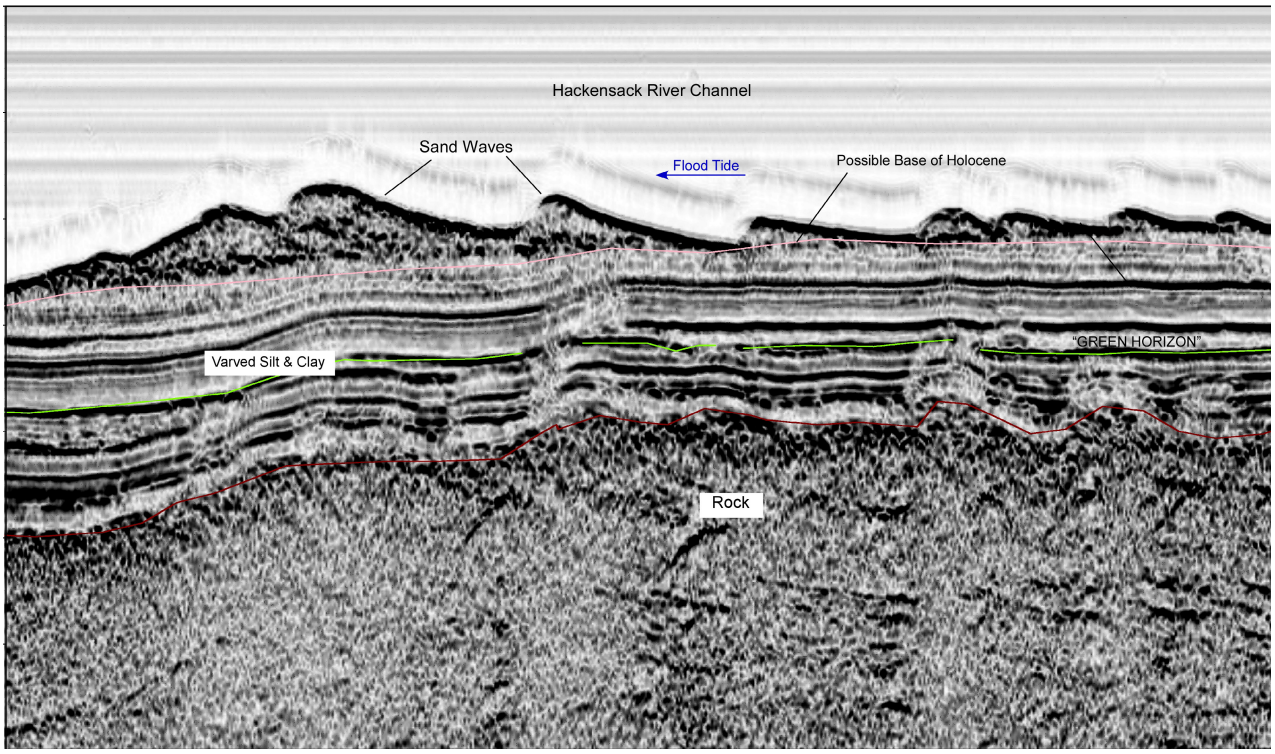
Earthworks LLC. 2008. “Geophysical Investigation as a part of the Design of the Hackensack River Enhancement Project.” USACE NY. July 15, 2008. Appendix 1-10.

Department Of The Army
New York District Corps of Engineers
Jacob K. Javits Federal Building
26 Federal Plaza
New York, NY 10278-0090

Contract #W912DS-06-D-0001
Delivery Order #0005
Geophysical Investigation as part of the Design of the Hackensack River Enhancement Project
Appendix Volume



Final Report — July 15, 2008

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Appendix I
Chain of Custody

Data Entry	Date of Entry	Data Type	Data Description	Origin of Document	Date of data	Second Level Table
1	3/14/06	Scope of work	Proposed SOW for Hackensack River Habitat Enhancement Site	Earthworks	3/10/06	
2	3/14/06	Aerial photo	1930 aerial photo of Hackensack River	NJMC Aerial Imagery	1930	
3	3/14/06	Map chart	NB, Passaic R. & Hack R. channel depths		Mar. 1966	
4	3/14/06	Aerial photo	Aerial photo of Hack R. w/ major streets highlighted	Google Maps	2006	
5	3/14/06	Aerial photo	Aerial photo of Union City, NJ	Google Maps	2006	
6	3/14/06	Road map	Road map of Hudson County, NJ	NJ GIS Transportation	2000	
7	3/14/06	Location map	US Coast & Geodetic survey map - drawing	US Coast & Geodetic	1914-15	
7	3/14/06	Location map	US Coast & Geodetic survey map - drawing	US Coast & Geodetic	1915	
8	3/14/06	Location map	US Coast & Geodetic survey map up to Overpeck Cr. - drawing	US Coast & Geodetic	1915	
9	3/14/06	Location map	US Coast & Geodetic survey, Air Compilation, Hack R. & Overpeck Cr.	US Coast & Geodetic	5/27/37	
10	3/14/06	Location map	US Coast & Geodetic survey, Air Compilation, Hack R. (Southern part)	US Coast & Geodetic	4/9/37	
11	3/14/06	Chart compilation	Shoreline manuscript (chart compilation) Newark Bay		1978	
12	3/14/06	NOAA chart	NOAA chart of Hackensack River	NOAA	1966	
13	3/17/06	Orthophotoquads	USGS '95 of Hackensack River area (19 photos)	USGS	1995	
14	3/17/06	Orthophotoquads	Digital color infrared (CIR) orthophotography of New Jersey in State Plane NAD83 (200 photos)	State of New Jersey Office of Information Technology, Office of Geographic Information Systems	2002	
15	3/17/06	Digital line graph	Graphical representation of New Jersey's State Rivers that are third order or higher	New Jersey Department of Environmental Protection	1993	
16	3/17/06	Vector digital data	Boundary lines of NJ wetlands	New Jersey Department of Environmental Protection	2002	
17	3/17/06	Orthophoto	Digital color infrared (CIR) orthophotography of New Jersey in State Plane NAD83 (200 photos)	State of New Jersey Office of Information Technology, Office of Geographic Information Systems	2002	
18	3/17/06	Vector digital data	Contour line of NJ's shore line	New Jersey Department of Environmental Protection	1993	
19	3/24/06	Proposal for SOW	10 tasks with pricing summary tables for each	Earthworks	3/17/06	
20	3/24/06	Aerial map of Hackensack Meadows	Map of Hackensack Meadows to illustrate report on drainage	Geological survey of New Jersey	1896	
21	3/24/06	History of the Meadowlands	History, ecology, and restoration of a degraded Urban wetland; Meadowlands before commission: three centuries of human use and alteration of Newark and Hackensack meadows	Stephen Marshall	Dec. 2004	
22	3/24/06	Letter from USACE NY District	SOW for geophysical exploration of Hackensack River as part of design for Hackensack River enhancement project	Arthur J. Connely, USACE NY Dist.	3/17/06	
23	3/24/06	Scope of work	SOW, Hackensack River habitat enhancement site Phase I. Geophysical Investigations, Historical analyses, and field reconnaissance	USACE-NY District	2006	
24	4/4/06	Spreadsheet	Names of reaches with approx length, width and height of each reach w/ totals	Earthworks	2/27/06	
25	4/4/06	Spreadsheet	Names of reaches with approx length, width and height of each reach w/o totals	Earthworks	2/27/06	
26	4/4/06	Word doc.	Points concerning sampling in Hackensack River	Earthworks	1/6/06	
27	4/4/06	Autocad drawing	Autocad drawing of Hackensack R. with lengths, widths and areas of reaches	Earthworks	3/10/06	
28	4/4/06	Spreadsheet	Costs per job of overall project	Earthworks	2/27/06	
29	4/4/06	Proposed SOW	Proposed SOW Hackensack River Habitat Enhancement Site Part 1. Geophysical investigations	Earthworks	2/27/06	
30	4/4/06	Proposed SOW	Proposed SOW Hackensack River Habitat Enhancement Site Part 2. Historical and archeological investigations	Earthworks	2/27/06	
31	4/4/06	Proposed SOW	Proposed SOW Hackensack River Habitat Enhancement Site Part 3. Subsurface Investigations and Benthic Ecology	Earthworks	2/27/06	
32	4/5/06	Word doc.	Outline of tasks to be done for Hackensack River Enhancement project - Bruce	Earthworks	7/6/05	

33	4/5/06	Spreadsheet	Lengths (ft), widths (ft) and areas (sqft) of reaches & lengths (ft) and areas (sqft) of tributaries of Hackensack River	Earthworks	3/10/06	
34	4/5/06	Spreadsheet	Cost Proposal - Marine archaeological sensitivity assessment reconnaisance field survey	Public Archaeology Laboratory	3/8/06	
35	4/5/06	DXF drawing	DXF drawing of reach areas of Hackensack River Project	Earthworks	3/9/06	
36	4/5/06	PDF doc.	Case history: High-resolution geophysical characterization of shallow water wetlands	Mansoor, Slater & Artigas, Geophysics	1/21/05	
37	4/5/06	PDF doc.	Final report: Sediment profile imaging survey of sediment and benthic habitat characteristics of the lower Passaic River - prepared for Aqua Survey	Germano & Associates	Aug. 2005	
38	4/5/06	SID file	Map/Chart of Passaic and Hackensack Rivers with channel depths	C. & G. S.	2/24/69	
39	4/5/06	Word doc.	A brief history of the Hackensack River with images	Earthworks	3/8/06	
40	4/5/06	Aerial photo	Aerial photo from space of Long Island, CT, New York and northern NJ including NY/NJ harbors		7/14/05	
41	4/5/06	PDF location map	Line drawing of Hackensack River enhancement project and tributaries	Earthworks	3/7/06	
42	4/5/06	Text doc. (Notepad)	Info on upper wetlands boundary for NJ	NJDEP	2002	
43	4/5/06	Text doc. (Notepad)	Info on state rivers of NJ (third order or higher)	NJDEP	1993	
44	4/5/06	Text doc. (Notepad)	High res. Ortho-photography of NJ state plane	NJ office of Information Tech, office of GIS	2002	
45	4/5/06	Text doc. (Notepad)	Info on NJ shoreline	NJDEP	1993	
46	4/5/06	Word doc.	Letter to USACE on fiber optic lines in Rutherford tidegates/culverts replacement project, survey scope of services	Earthworks	2/22/06	
47	4/5/06	PDF report	Benthic Habitats of NY/NJ Harbor: 1995 Survey of Jamacia, Upper, Newark, Bowery, and Flushing Bays	USACE-NY District (Bryce)/Terra Solutions	Oct. 2000	
48	4/5/06	Spreadsheet	Cost estimates per task	Earthworks	3/19/06	
49	4/5/06	Spreadsheet	Salaries of Earthworks employees	Earthworks	3/22/06	
50	4/5/06	html page directory	MERI Directory of people and contact info	NJ Meadowlands Commission Environmental Research Institute	3/8/06	
51	4/5/06	JPEG image	Image of MERI homepage top banner	NJ Meadowlands Commission Environmental Research Institute	3/6/06	
52	4/5/06	GIF image	Image of toolbar on MERI internet site	NJ Meadowlands Commission Environmental Research Institute	3/6/06	
53	4/5/06	Word doc.	Doc to Bryce with concerns due to project	Earthworks	3/9/06	
55	5/1/06	Letter from NJMC	Letter stating need for Data Distribution Agreement (DDA) to be signed by Earthworks and returned to NJMC	New Jersey Meadowlands Commission	5/1/06	
56	5/1/06	Data Distribution Agreement	Data Distribution Agreement b/w NJMC/MERI, GIS and Earthworks	State of NJ NJMC	5/1/06	
57	5/1/06	CD-R	USACE-Disk1 1978 Aerial photo of Hackensack area, 2002 building planimetrics, flood plain and wetland planimetrics (no date)	USACE-NY District	5/1/06	
58	5/1/06	CD-R	USACE-Disk2 1930 Aerial Photo of Newark Bay, Hackensack and Passaic River areas; thirty-three (33) planimetric files	USACE-NY District	5/1/06	
59	5/1/06	CD-R	USACE-Disk3 1969 Aerial photo	USACE-NY District	5/1/06	
60	5/1/06	CD-R	USACE-Disk4	USACE-NY District	5/1/06	
61	8/4/06	JPEG image	Hackensack River datums from Sept 1986	USACE-NY District	9/30/86	
62	8/4/06	JPEG image	Hackensack River datums from Sept 1986- Upper Hackensack	USACE-NY District	9/30/86	
63	8/4/06	JPEG image	Newark Bay datums from Sept 1986	USACE-NY District	9/30/86	
64	8/24/06	Spreadsheet	Notes on surveys that have been scanned, 8/1/06	Earthworks	8/3/06	yes
65	8/24/06	Spreadsheet	Schedule for digitizing maps of Hackensack	Earthworks	8/18/06	yes
66	8/25/06	Spreadsheet	Inventory of microfiche cards to be scanned	Earthworks	8/24/06	yes
67	8/25/06	TIF image	Image of Rogers' first day of bathymetry	Rogers Surveying	7/5/06	
68	8/25/06	TIF image	Bathymetry image with coordinates and depth bar	Rogers Surveying	7/5/06	
69	8/25/06	Digitized NOAA charts	Digitized NOAA charts from the following years: 1841, 1871, 1886, 1915, 1940, 1969, 1972, 1976, 1980, 1984, 1985, 1990, 1992, 1997	NOAA, Earthworks		
70	8/25/06	TIF	Scanned bathy TIFs from the USACE of Hackensack River from the following years: 1984 (6), 1985 (5), 1990 (18), 1992 (7)	Earthworks	8/4/06	

71	8/25/06	DWG	Dwg of Hackensack River reaches	Earthworks	7/13/06	
72	8/28/06	Word doc.	Notes and info on Hackensack River characteristics	Earthworks	7/6/06	
73	8/28/06	JPEG images	Photos taken from water of shoreline on Hackensack River	Earthworks	8/7/06	
74	8/28/06	Spreadsheet	Combined magnetic field stats in New Jersey State Plane	Earthworks	8/4/06	
75	8/28/06	PDF	PDF image of magnetometer lines on top of magnetometer data	Earthworks	8/4/06	
76	8/28/06	PDFs	Scans of areas dredged in Hackensack River for the following years: 1930, 1931, 1932, 1933, 1934, 1935, 1941, 1942, 1946, 1949, 1953, 1959, 1960, 1962, 1963, 1976, 1986	USACE-NY District		
77	8/28/06	JPEG	Waterways and sub-watershed areas of the Hackensack River	NJMC	6/13/06	
78	8/28/06	JPEG	Image of historic cin the Meadowlands District	NJMC	6/13/06	
79	8/28/06	JPEG	Green Map System charts interconnections between nature and culture in urban places	NJMC	6/13/06	
80	8/29/06	PDFs	1870 topographic maps from lower Newark Bay to top of Hackensack River		1870	
81	8/29/06	PDF report	The Meadowlands before the Commission: Three centuries of human use and alteration of the Newark and Hackensack Meadows	Stephen Marshall	11/29/04	
82	8/29/06	PDF report	Newark Bay study area remedial investigation work plan, sediment sampling and source identification program Newark Bay, New Jersey	Tierra Solutions	Sept. 2005	
83	8/29/06	PDF report	Final report on the analysis of New Jersey sediment samples for selected Polychlorodibenzodioxins	Midwest Center for Mass Spectrometry	7/12/90	
84	8/29/06	PDF report	Ambient Bio-monitoring Network: Arthur Kill. Passaic, Hackensack and Wallkill River Drainage Basins, 1993 Benthic Marcro-invertebrate Data	NJ Dept of Environmental Protection	Dec. 1994	
85	8/29/06	PDF report	Meadowlands Environmental Site Investigation Compilation (MESIC)	USACE-NY District	May. 2004	
86	8/29/06	PDF report	Meadowlands Xanadu Redevelopment Project EIS; Section 4- Environmental conditions, impacts and mitigation	The Louis Berger Group, Inc.		
87	8/29/06	PDF	Bergen County map of railroads and roadways	NJDT- Division of Information Technology	Jul. 2000	
88	8/29/06	JPEG	Map of Palisades Ridge, showing all crossing on Hackensack River as well as the direction of glacial striation on the Palisades ridge	R. Salisbury, C. Peet, J. Smock, C.C., Vermeule	1893	
89	8/29/06	PDF	Hackensack Meadowlands District Official Zoning Map	New Jersey Meadowlands Commission	2/17/04	
90	8/29/06	JPEG	Image of railroad crossings in Newark Bay and lower Hackensack River from 1869	Sundry	1869	
91	8/29/06	TIF image	Image of railroad crossings in all of New York/New Jersey Harbor from 1887	Sundry	1887	
92	8/29/06	PDF	Areas and lengths of reaches for Hackensack River Enhancement Project	Earthworks	6/22/06	
93	8/29/06	Spreadsheet	Historical data accumulated through research on Hackensack River	Earthworks	7/24/06	yes
94	8/29/06	Spreadsheet	Earthworks task schedule for Hackensack River Enhancement Project (updated)	Earthworks	8/29/06	yes
95	8/29/06	AVI	Short video clip of what Hackensack and Meadowlands would look like with a significant sea level rise	Earthworks	6/28/06	
96	2/21/07	Spreadsheet	Side-scan sonar data acquisition notes	Earthworks	1/19/07	
97	4/22/07	PDF	GPS coordinates for the NJMC sampling locations	NJMC	3/19/07	
98	4/22/07	TIF	Map of Fisheries Inventory Sampling Locations for the NJMC	NJMC	3/19/07	
99	5/7/07	SID file	Historical maps of NY/NJ are from David Rumsey Collection of years 1776, 1884, 1866, 1888, 1891, 1893	David Rumsey Collection, Rutgers University		
100	5/11/07	XTF	Side-scan sonar acquisition data	Earthworks	1/19/07	
101	5/11/07	Seg-Y	Sub-bottom acquisition data	Earthworks	10/19/06	
102	6/25/07	Scan	Scan of conditions and improvements of Newark Bay, Hackensack and Passaic Rivers as of 1986		4/5/07	
103	6/25/07	Spreadsheet	Locations of tide stations in or around Hackensack River area	Earthworks	6/19/07	
104	6/25/07	Spreadsheet	River flow station locations in Hackensack and Passaic Rivers	Earthworks	6/19/07	
105	6/25/07	PDFs	Hackensack River sediment maps	Earthworks	4/6/07	
106	6/25/07	Spreadsheet	Field planning and survey lines for sub-bottom profiling	Earthworks	4/18/07	
107	6/25/07	Spreadsheet	Magnetometer acquisition data	Earthworks	4/12/07	
108	6/25/07	JPEGs	Hackensack River shoreline photos from Earthworks work boat	Earthworks	6/21/07	

109	6/25/07	JPEGs	Aerial photos of Hackensack River from 1930, 1978, 2002		6/22/07	
110	6/25/07	Spreadsheet	Hackensack River datum points at Kearny Pt and Amtrak RR Swing bridge	Earthworks	5/29/07	
111	6/25/07	PDFs	Hackensack River project datums	NOAA	6/22/06	
112	6/25/07	JPEGs	JPG images of the vibracore logs	Earthworks	6/25/07	
113	6/25/07	Spreadsheet	List of vibracores and their location on Hackensack River	Earthworks	6/25/07	
114	6/25/07	Spreadsheet	GPS position points of Hackensack River bottom sampling	Earthworks	6/4/07	
115	6/25/07	Word doc.	Directions to Earthworks sediment coring	Earthworks	5/25/07	
116	6/26/07	PDF	Hackensack River Study Remedial Investigation Report	USACE-NYD/Peninsula Restoration Group	Jun-07	
117	6/26/07	PDF	NJMC's master plan for a cohesive set of principles and standards to guide future development while protecting the resources of the Meadowlands District	NJMC	Jan-04	
118	6/26/07	Spreadsheet	Geologic plates and borings throughout Hackensack and Newark Bay area	NJ-DOT/NJ Geological Survey/Joseph S. Ward, Inc./Earthworks	8/11/06	
119	6/26/07	PDF	Foundation Reconnaissance Investigation, Hackensack Meadows, New Jersey	USACE-NYD/Joseph S. Ward, Inc.	Dec-62	

Appendix II
Notes on Historical Bathymetry

Page 7 of 126

General Notes

Grid Information
All the final key frame grids have the same basic grid geometry.
The XY (horizontal) datum is NAD83.
The XY projection is New Jersey State Plane U.S. Feet.

Grid Size: 5251 rows x 2682 columns
Total Nodes: 14083182
Filled Nodes: 542092
Blanked Nodes: 13541090

Grid Geometry (NAD83)

X Minimum: 597,810
X Maximum: 624,620
X Spacing: 10

Y Minimum: 681,510
Y Maximum: 734,010
Y Spacing: 10

Z values in the grids are in NAVD88 feet. Below the native datums (as found in the surveys and charts) are listed.

Reference to upstream position is based on feet up the centerline starting at Droyer's Point.

1841 Model

Source(s):
H00131.tif (1841 from 10,199 to 74,085)
http://map.ngdc.noaa.gov/website/mgg/nos_hydro/viewer.htm

Datum
Horizontal:
No horizontal datum noted on survey image. Lines that appear to be latitude and longitude are marked over survey area. These lines are not labeled in any way so values for lat and long were assigned to these lines. The result was several hundred feet off (see below for values) and the data was later shifted by the below amounts to better fit the 2006 bathymetric survey and these positions are assumed to be close to the intentions of the surveyors.

Value used to shift to current datum:
X: -1282.0
Y: 675.0
This adjustment places the data in a position that fits better with the 2006 data. The adjusted position is more likely to be more accurate than the non-adjusted position.

Vertical:

From survey:
"Soundings in feet reduced to ordinary low water
Ordinary rise and fall of tide 4 feet 6 in."
Value used to shift to current datum:
None

Shorelines:
All shorelines on survey sheet are represented in the grid. The four inlets represented in the survey shorelines have no depth data.

1871 Model

Source(s):
H01282 (1871 from 18,237 to 42,484)
http://map.ngdc.noaa.gov/website/mgg/nos_hydro/viewer.htm

Areas represented in 1871 model came from 1841 model.
They include:
H00131.tif (1841 from 10,199 to 18,237ft)

Datum
Horizontal:
Lines of latitude and longitude labeled. No other notes about horizontal datums on survey.

Value used to shift to current datum (ft):
X: -1449.87
Y: 383.57
This adjustment places the data in a position that fits better with the 2006 data. The adjusted position is more likely to be more accurate than the non-adjusted position.

Vertical:
From survey:
"The soundings are expressed in feet and refer to mean low water."

Value used to shift to current datum: None

Shorelines:
Survey includes shorelines and these shorelines take precedence over shorelines in the 1841 model. Where there are no 1871 shorelines, the 1841 shorelines are used.

1888 Model

Source(s):
H01706 (1888 from 0 to 26,844ft)
http://map.ngdc.noaa.gov/website/mgg/nos_hydro/viewer.htm

Areas represented in 1888 model came from 1871 model.

They include:
H01282 (1871 from 26,844 to 42,484ft)
H00131 (1841 from 42,484 to 74,085ft)

Datum
Horizontal:
Lines on survey assumed to be lines of latitude and longitude but are not labeled in any way. One line of latitude has the words "Projection approximate" underneath it.

Value used to shift to current datum: None

Vertical:
From survey:
"The soundings are expressed in feet and show the depths at mean low water."

Value used to shift to current datum: None

Shorelines:
Survey includes shorelines and these shorelines take precedence over shorelines in the 1871 model. Where there are no 1888 shorelines, the 1871 shorelines are used.

1917 Model

Source(s):
H03725 and H03726 (1915 from 30,824 to 69,577ft)
0049_1of1_1917_Hackensack (1917 from 0 to 8,500ft)
http://map.ngdc.noaa.gov/website/mgg/nos_hydro/viewer.htm

Areas in 1917 model not represented in 1917 survey came from 1888 model.
They include:
H01706 (1888 from 8,500 to 26,844ft)
H01282 (1871 from 26,844 to 30,824ft)

This model is missing from 69,577 to 74,085. There is no data for this area in the surveys listed and the data in the 1841 survey (H0031) does fit well enough to merge it to these data sets.

Datum
Horizontal:
Lines on survey assumed to be lines of latitude and longitude but are not labeled in any way. One line of latitude has the words "Projection approximate" underneath it.

Value used to shift to current datum: None

Vertical:
From survey:
"The soundings are expressed in feet and show the depths at mean low water."

Value used to shift to current datum: None

Shorelines:
Survey includes shorelines and these shorelines take precedence over shorelines in the 1888 model. Where there are no 1917 shorelines, the 1888 shorelines are used.

1928 Model

Source(s):
0069_1of1_1928_Hackensack (from 6,657 to 14,000ft)
0070_1of1_1928_Hackensack (from 14,000 to 26,206ft)
http://map.ngdc.noaa.gov/website/mgg/nos_hydro/viewer.htm

Areas in 1928 model not represented in 1928 survey came from 1917 model.
They include:
0049_1of1_1917_Hackensack (1917 from 0 to 6,657ft)
H03725 and H03726 (1915 from 30,824 to 69,577ft)
H01706 (1888 from 26,206 to 26,844ft)
H01282 (1871 from 26,844 to 42,484ft)

This model is missing from 69,577 to 74,085ft. There is no data for this area in the surveys listed and the data in the 1841 survey (H0031) does fit well enough to merge it to these data sets.

Datum
Horizontal:
From Survey:
"TRIANGULATION:- Coordinates are parallel and perpendicular to a meridian passing through U.S.C.&G.S. Station "Bogart" on Todd Hill S.I. and its origin so chosen as to make Station "Bogart" S.20,350 ft, W.202500 ft."

This is the same for both surveys 0069 and 0070.

Value used to shift to [current datum]:

Vertical:
From survey:
"Soundings are expressed in feet and tenths and refer to the plane of Mean Low Water."

This is the same for both surveys 0069 and 0070.

Value used to shift to [current datum]:

Shorelines:

1940 Model

Source(s):
0122-3_1of1_1940_Hackensack (from 0 to 12,699ft)
287_-01-1940 (from 12,699 to 74,085ft)

http://map.ngdc.noaa.gov/website/mgg/nos_hydro/viewer.htm

Where the survey (0122-3_1of1_1940) overlaps the 1940 U.S.C.&G.S. Chart 267 the data from the survey was used.

Datum
Horizontal:
0122-3_1of1_1940_Hackensack
From Survey:
"Coordinates are based on a rectangular system having its axes parallel and perpendicular to a meridian passing through U.S.C.&G.S. Sta. "Bogart" on Todt Hill, S.I. The origin of the system is so chosen as to make Sta. "Bogart" S. 20,350 ft., W. 20,250 ft."

287_-01-1940
From Chart:
"N. A. 1927" (In Top right had corner)
Line of latitude and longitude on chart where used to calibrate the image.

Value used to shift to [current datum]:

Vertical:
0122-3_1of1_1940_Hackensack
From Survey:
"Soundings are expressed in feet and tenths and refer to the local plane of mean low water, which plane is 2.4 ft. below mean sea level at Sandy Hook, N.J."

287_-01-1940
From Chart:
"Soundings In Feet At Mean Low Water"

Value used to shift to [current datum]:

Shorelines:
All shorelines cam from the 1940 U.S.C.&G.S. Chart 267 used in this model.

1948 Model

Source(s):
0138-3_7of9_1948_Hackensack (1948 from 0 to 6,657ft)
0138-4_9of9_1950_Hackensack (1948 from 6,657 to 30,500ft)

The file 0138-3_7of9_1948_Hackensack should be called 0138-3_3of4_1948_Hackensack.

Areas in 1948 model not represented in 1928 survey came from 1917 model.
They include:
287_-01-1940 (from 12,699 to 74,085ft)

Surveys scanned from Microfiche file received from USACE.

Datum
Horizontal:
From Surveys:
"Coordinates are based on a rectangular system having its axes parallel and perpendicular to a meridian passing through U.S.C.&G.S. Sta. "Bogart" on Todt Hill, S.I. The origin of the system is so chosen as to make Sta. "Bogart" S. 20350 ft., W 20,250 ft."

Value used to shift to [current datum]:

Vertical:
From Survey:
"The panes of reference are mean low water and vary from 2.3 to 2.8 ft. below mean sea level (see tabulation of Datum Planes)."

Value used to shift to [current datum]:

Shorelines:
Shorelines from 1948 surveys where available and from 1940 model elsewhere.

1962 Model

Source(s):
0162_1of4_1962_Hackensack (1962 from 28,394 to 40,500ft)
0162_2of4_1962_Hackensack (1962 from 40,500 to 52,192ft)
0162_3of4_1962_Hackensack (1962 from 52,192 to 65,738ft)
0162_4of4_1962_Hackensack (1962 from 65,738 to 73,300ft)

Pages scanned from Microfiche file received from USACE.

Areas in 1962 model not represented in the pages listed above came from the 1948 model and includes:
0138-3_7of9_1948_Hackensack (1948 from 0 to 6,657ft)
0138-4_9of9_1950_Hackensack (1948 from 6,657 to 28,394ft)

Datum
Horizontal:
From Pages:
"Coordinates are based on a rectangular system having its axes parallel and perpendicular to a meridian passing through U.S.C.& G.S. Sta. "Bogart" on Todt Hill, S.I. The origin of the system is so chosen as to make Sta. "Bogart" S.20,350 ft., W 20,250 ft."

Value used to shift to [current datum]:

Vertical:
From Survey:
"The planes of reference are mean low water and vary from 2.3 to 2.8 ft. below mean sea level (see tabulation of Datum Planes)."

Value used to shift to [current datum]:

Shorelines:
Shorelines are from the four 0162 USACE pages listed above in the section of the model covered by those pages and are from the 1948 model elsewhere.

1984 Model

Source(s):
1984_442_1_survey
1984_441_2_survey
1984_440_3_survey
1984_439_4_survey
1984_438_5_survey
1984_437_6_survey
(together the above 1984 survey covers the area from 0 to 23,221ft)

1984_12337 (NOAA chart from 23,221 to 74,085ft)

Surveys scanned from Microfiche file received from USACE.
NOAA chart from
http://historicals.ncd.noaa.gov/historicals/histmap.asp

Datum
Horizontal:
From Survey Pages:
"Coordinates are expressed in feet and refer to the New Jersey Mercator System"
Value used to shift to [current datum]:

From Chart:
"Mercator Projection" and "North American 1927 Datum"
Value used to shift to [current datum]:

Vertical:
From Survey Pages:
"Soundings or Elevation refer to Mean Low Water As Determined from Benchmark W-38"
and
"The Plane of mean low water is 2.4 feet below N.G.V.D"
Value used to shift to [current datum]:

From Chart:
"Soundings In Feet At Mean Low Water"

Shorelines:
All shorelines come from NOAA's 1984 12337 charts listed above.

1990 Model

Source(s):
1990_415_07
1990_416_08
1990_417_09
1990_418_10
1990_419_11
1990_420_12
1990_421_13
1990_422_14
1990_423_15
1990_424_16
1990_425_17
1990_426_18
1990_427_19
1990_428_20
1990_429_21
1990_430_22
1990_431_23
(together the above 1990 survey covers the area from 23,9,06 to 74,085ft)

1992_407_1
1992_408_2
1992_409_3
1992_410_4
1992_411_5
1992_412_6
1992_413_7
(together the above 1992 survey covers the area from 0 to 23,906ft)

Surveys scanned from Microfiche file received from USACE.

Datum
Horizontal:
From Survey Pages:
"Coordinates are expressed in feet and refer to the New Jersey Mercator System"
Value used to shift to [current datum]:

Vertical:
From Survey Pages:
"Soundings or Elevation refer to Mean Low Water As Determined from Benchmark Tidal 2"
and
"The Plane of mean low water is 2.4 feet below N.G.V.D"
Value used to shift to [current datum]:

Shorelines:
All shorelines come from survey pages above.

2006 Model

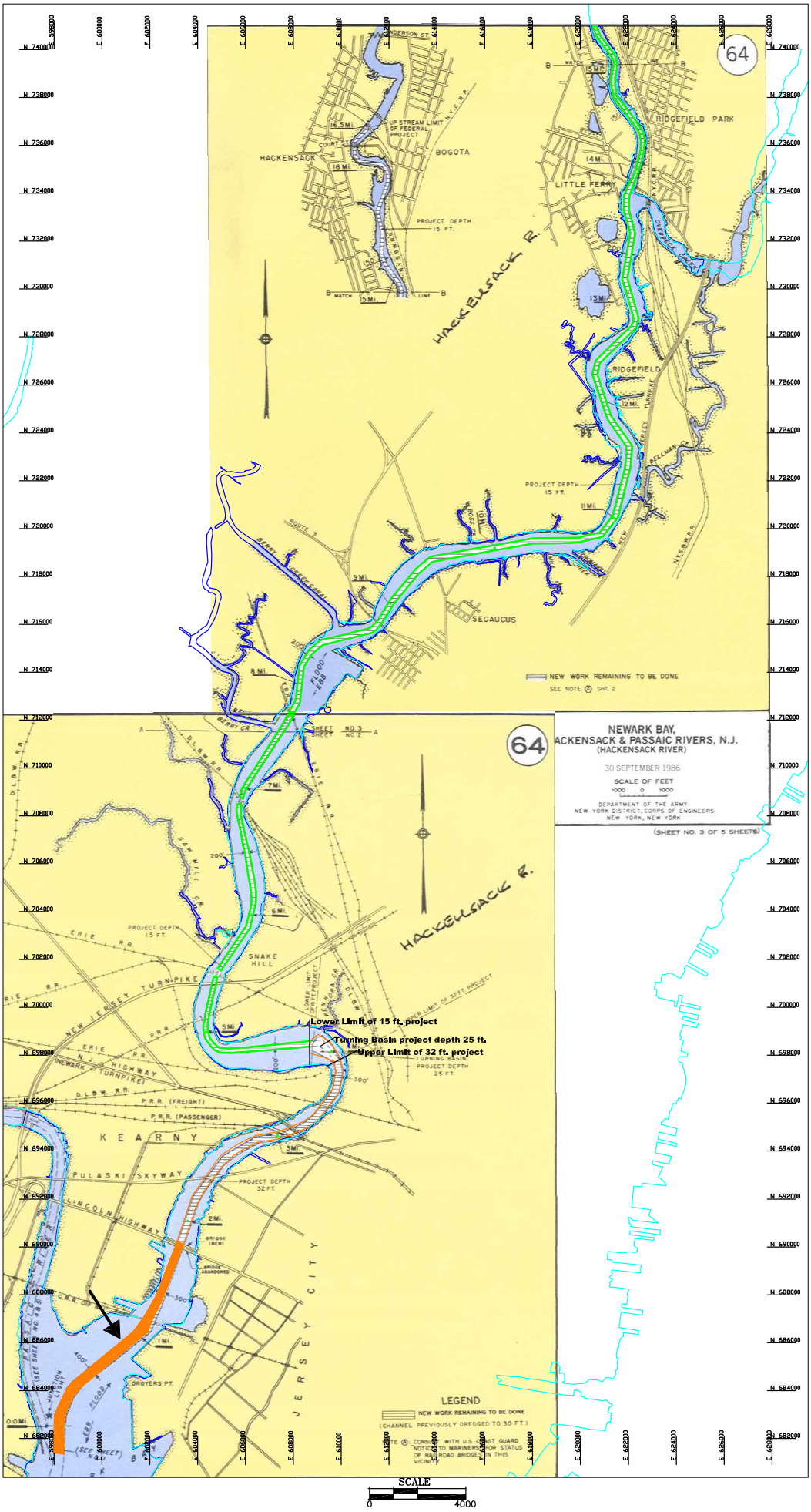
Source(s):
Rogers Surveying LLC 2006 Multibeam Survey Data

Datum
Horizontal:
New Jersey State Plane NAD 1983

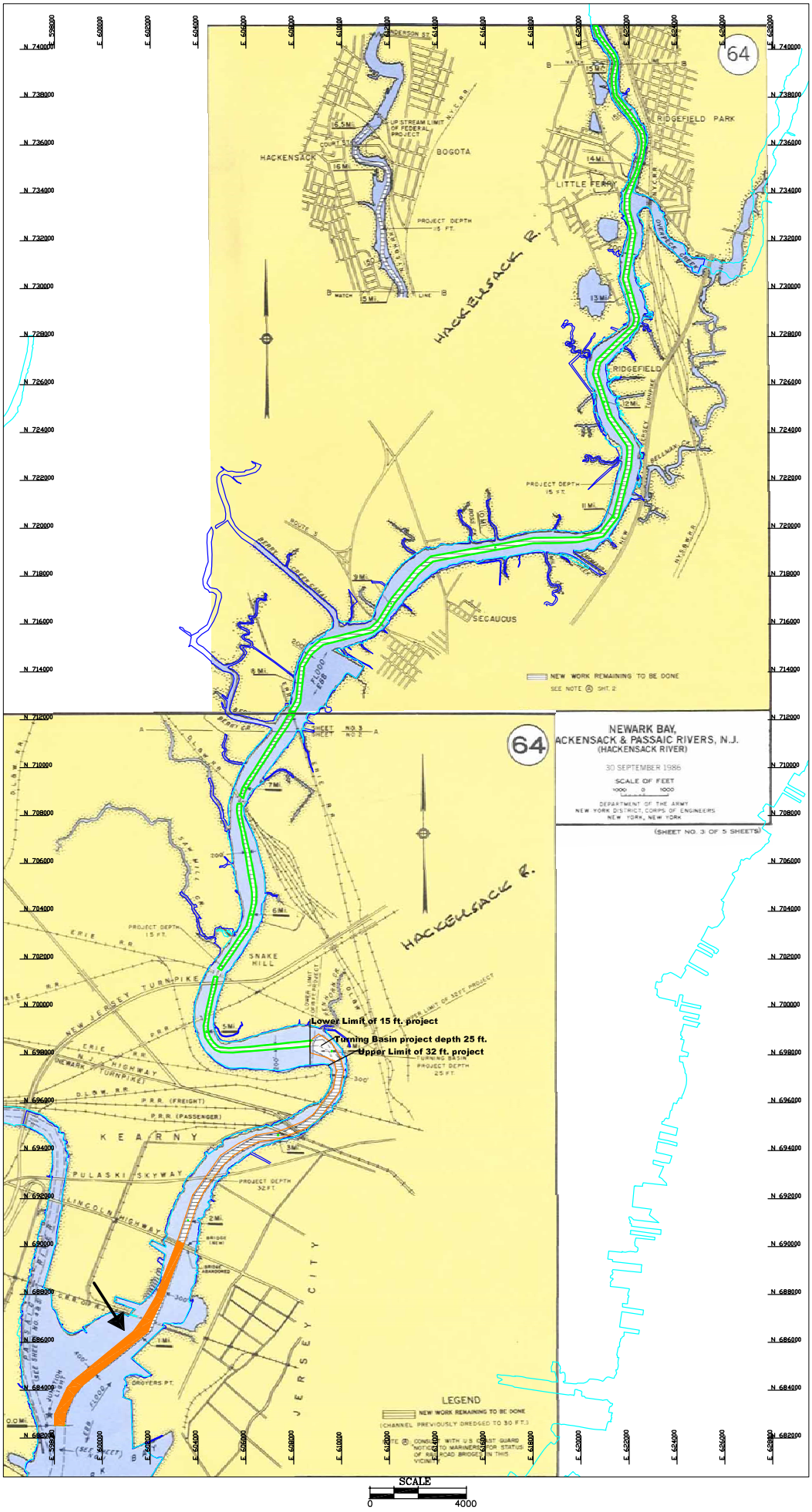
Vertical:
Mean Low Water N.A.V.D. 1988

Shorelines:
Shorelines are from New Jersey Department of Environmental Protection (NJDEP).

Appendix III
Historical Dredging Records from the USACE-NYD

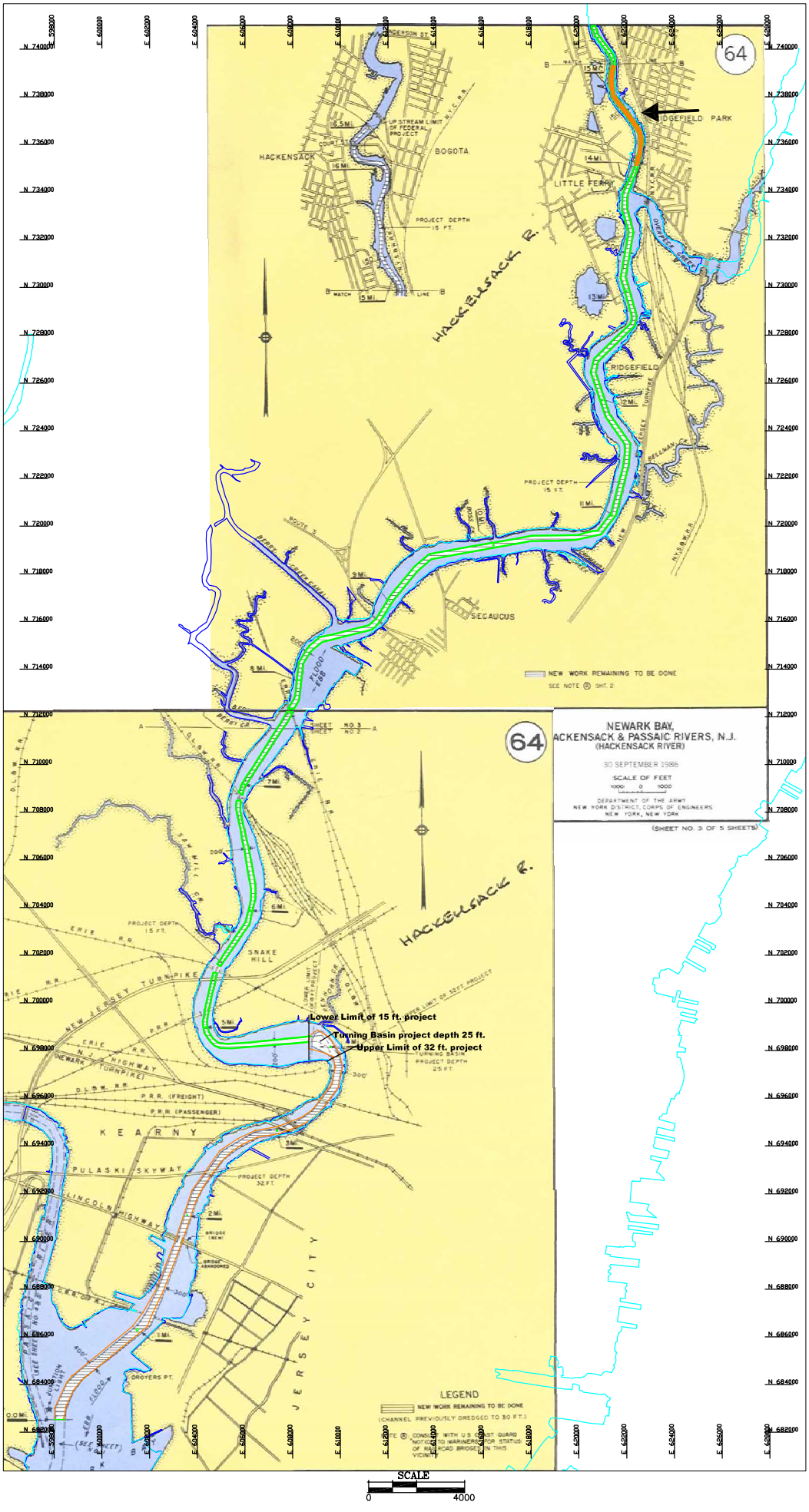


Dredged Area 1930 (Area:4,013,990.01 sq ft)



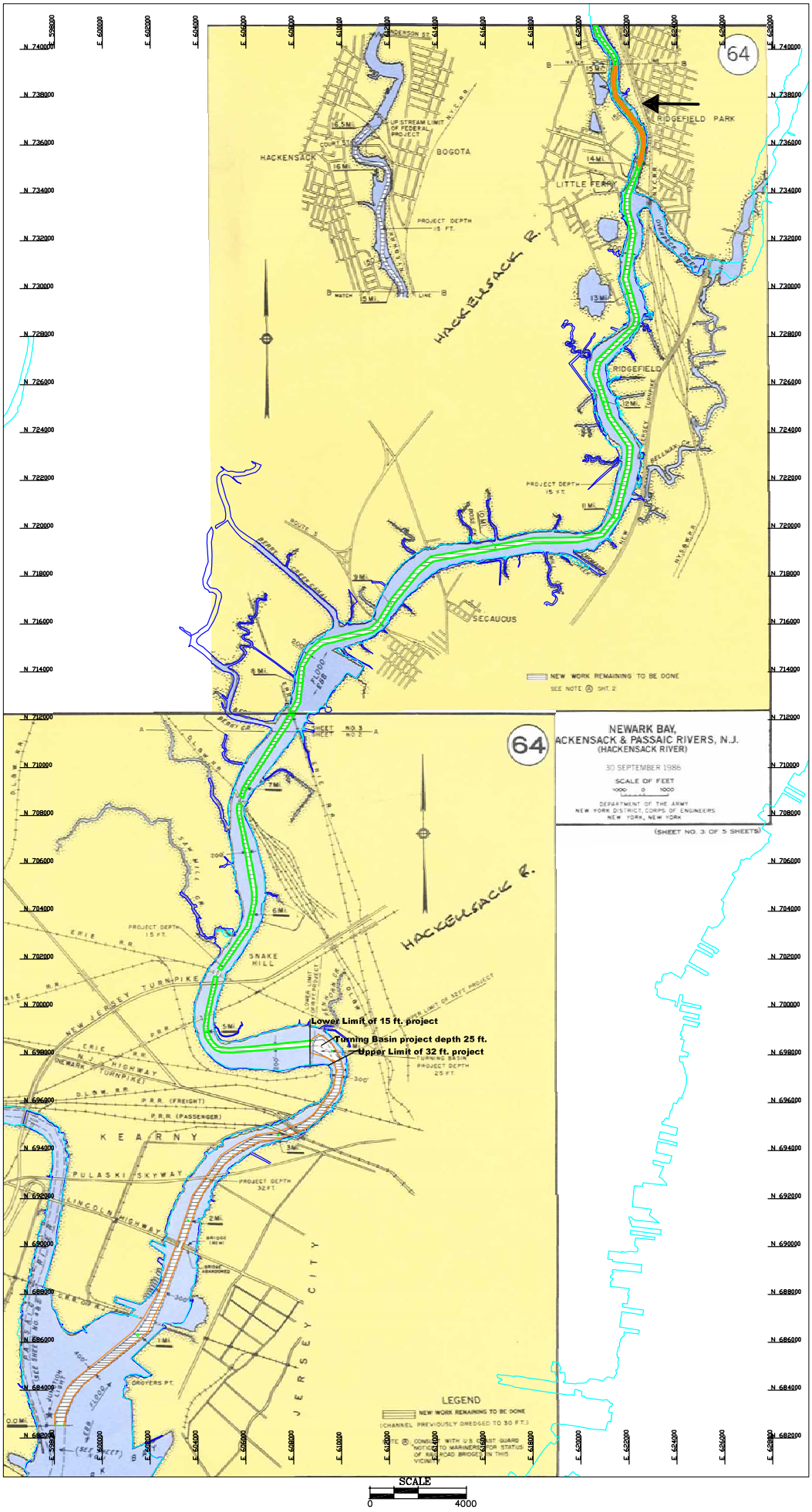
Dredged Area 1931 (Area: 3,548,211.22 sq ft)

Page 107 of 274



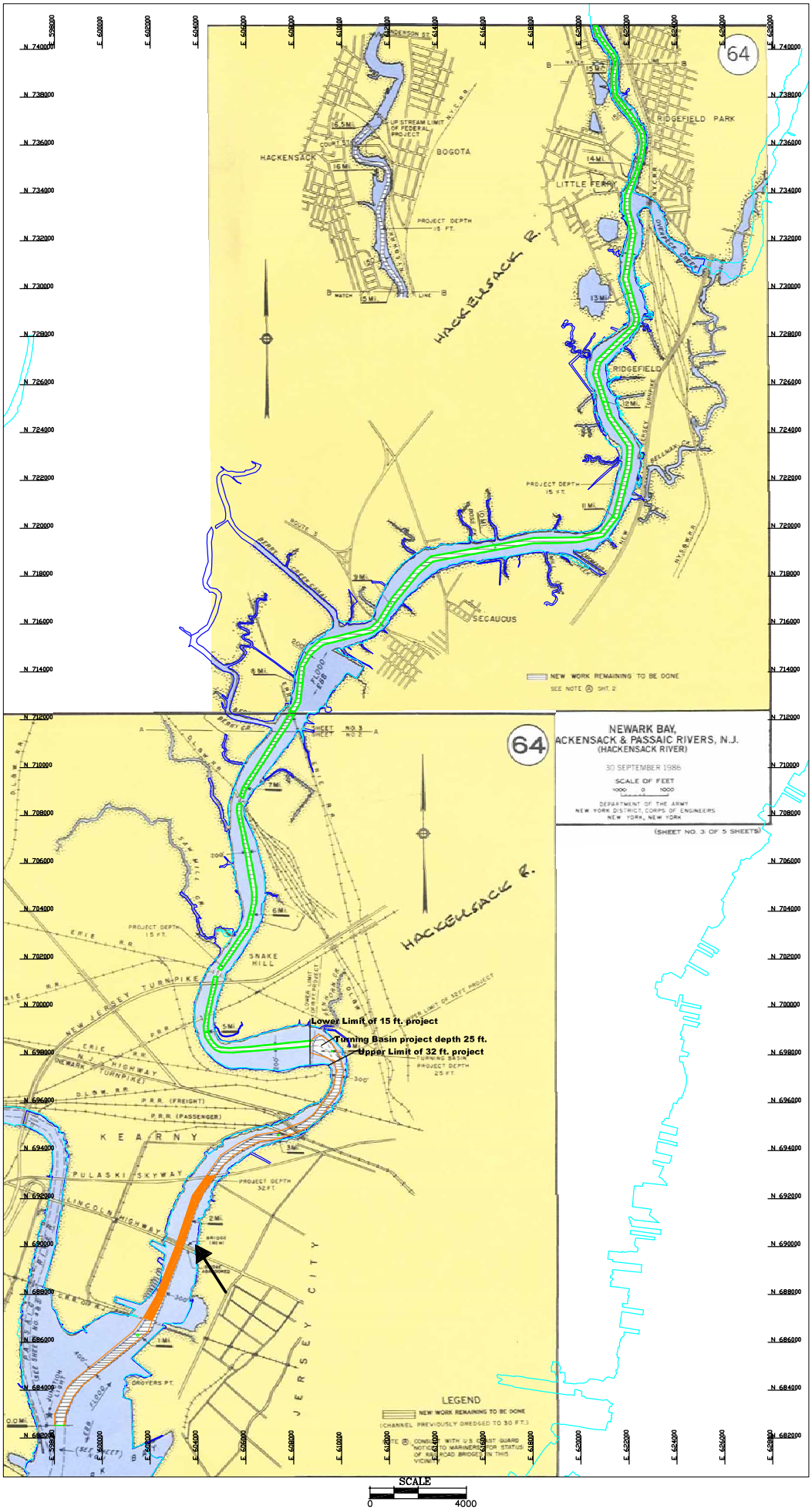
Dredged Area 1932 (Area: 677,881.27 sqft)

Page 20 of 126

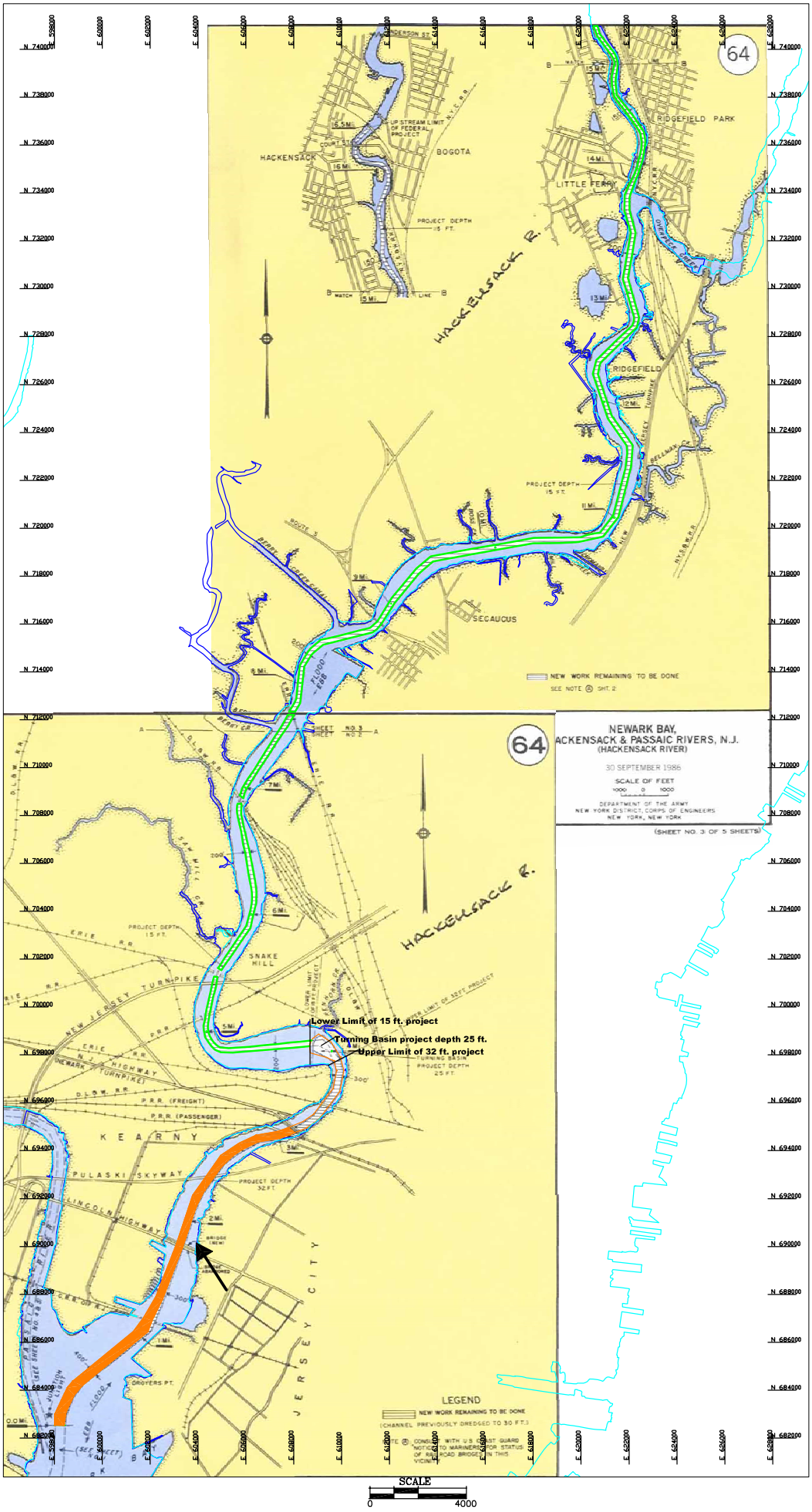


Dredged Area 1933 (Area: 677,881.27 sqft)

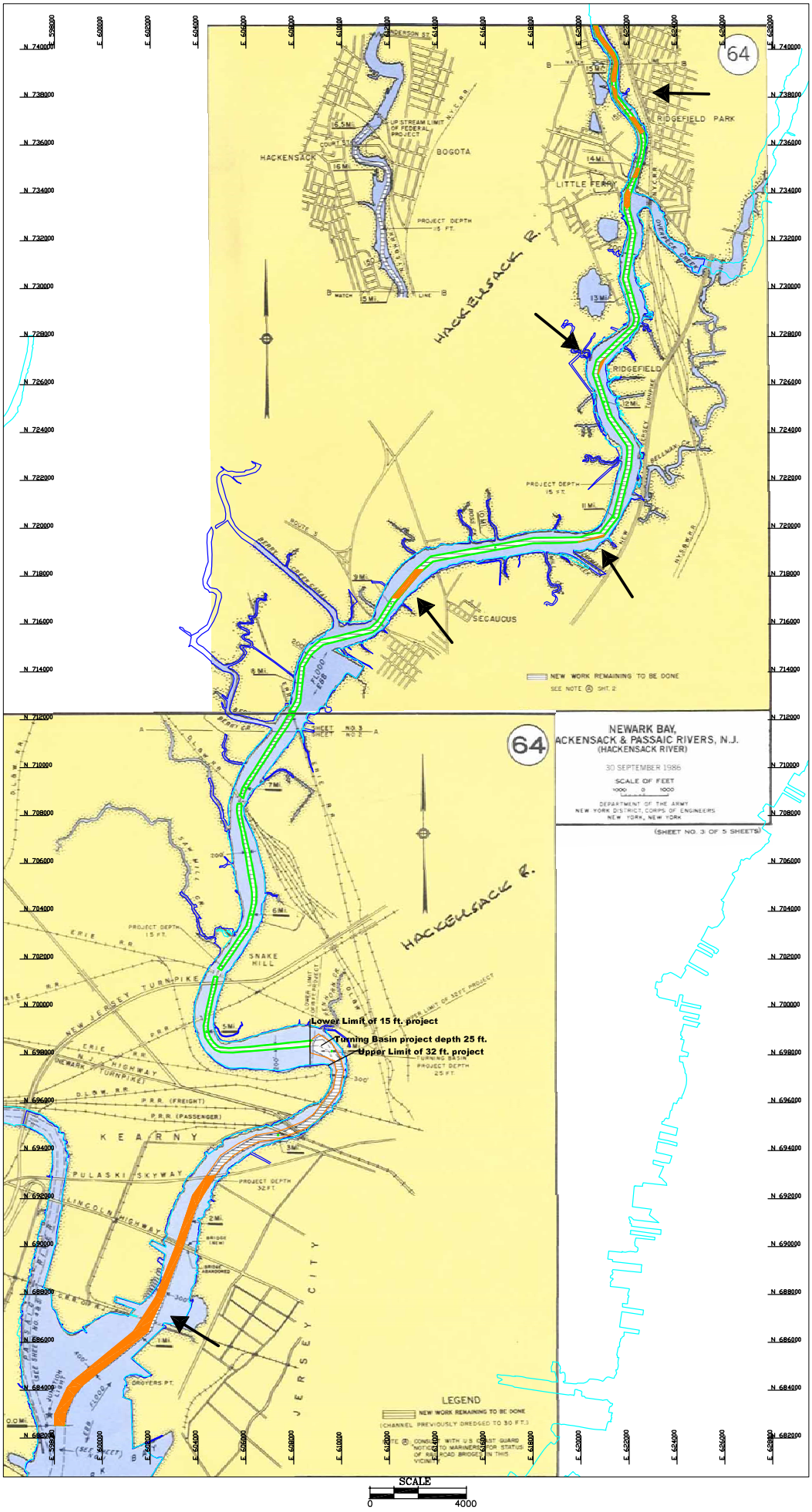
Page 21 of 126



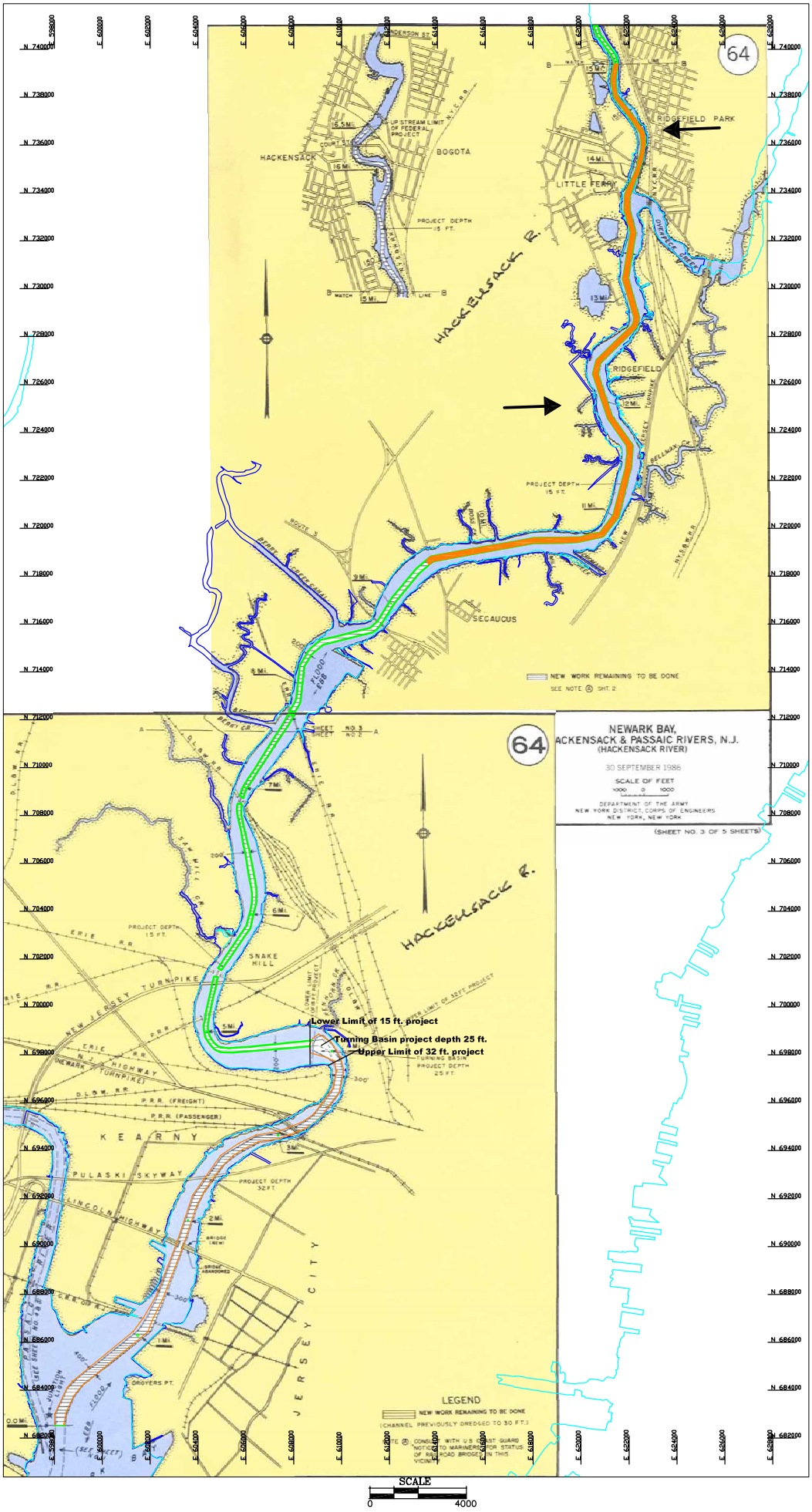
Dredged Area 1934 (Area: 2,029,818.77 sq ft)



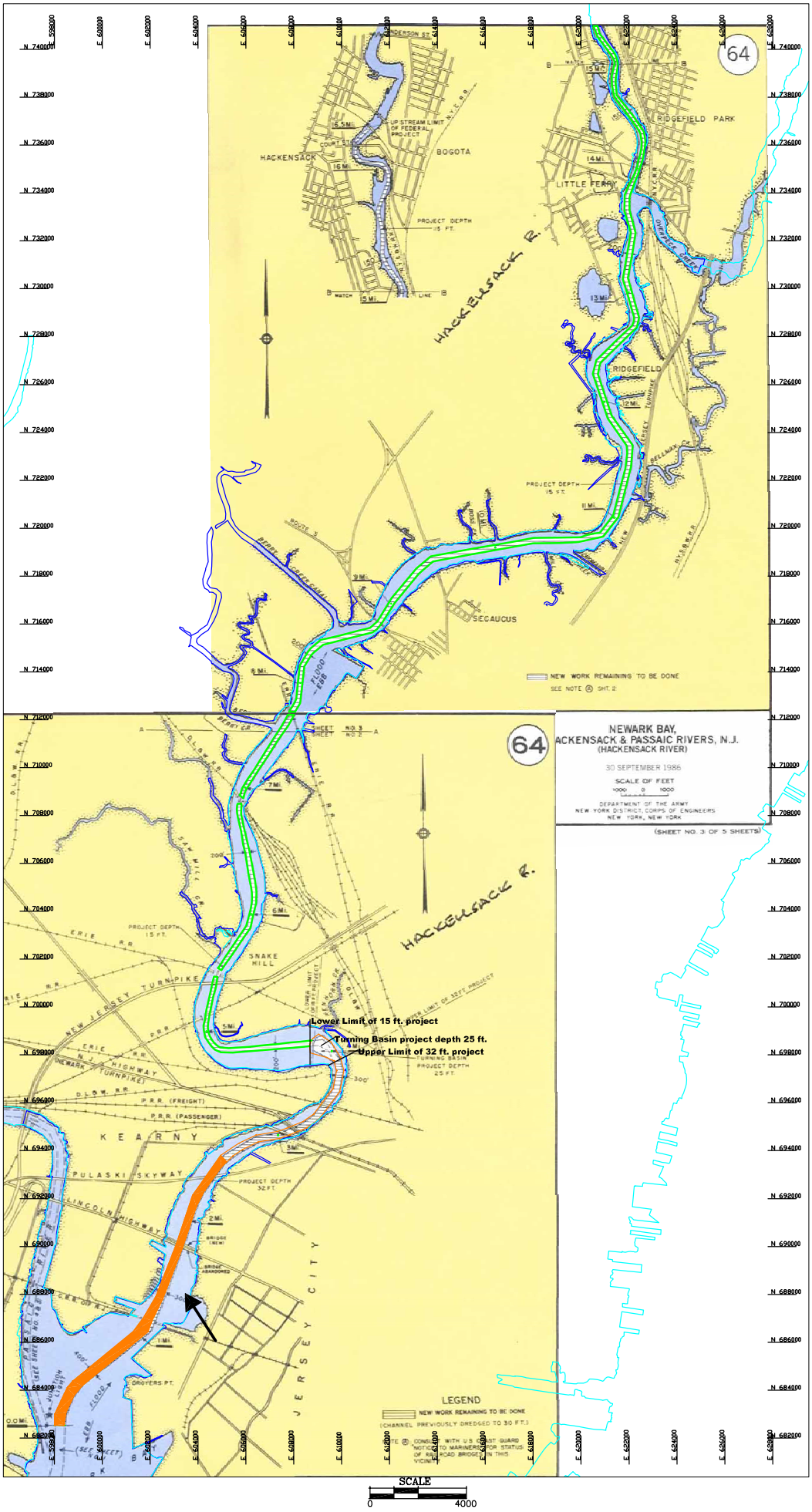
Dredged Area 1935 (Area: 5,721,669.65 sq ft)



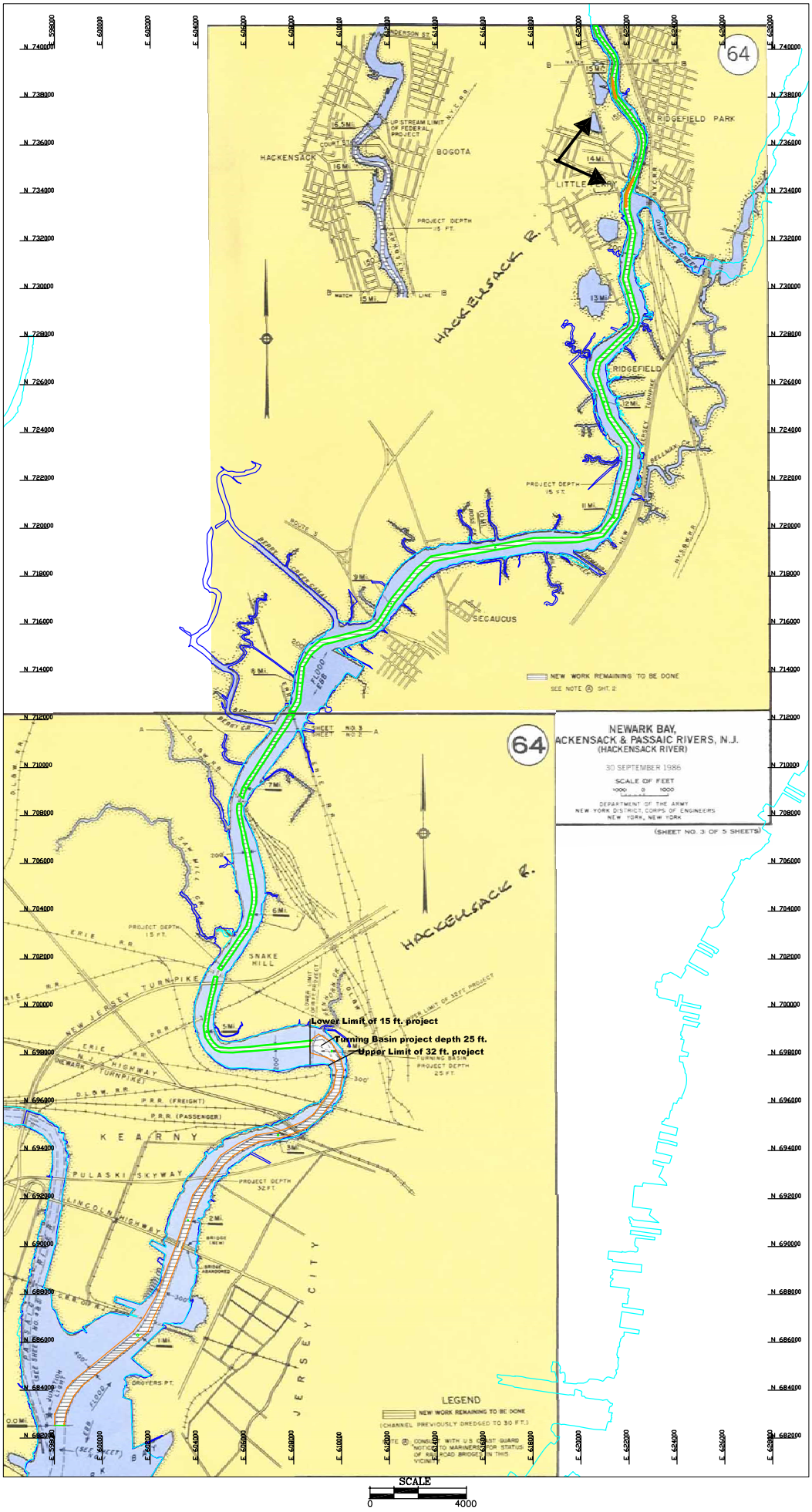
Dredged Area 1941 (Area: 5,786,181.17 sq ft)



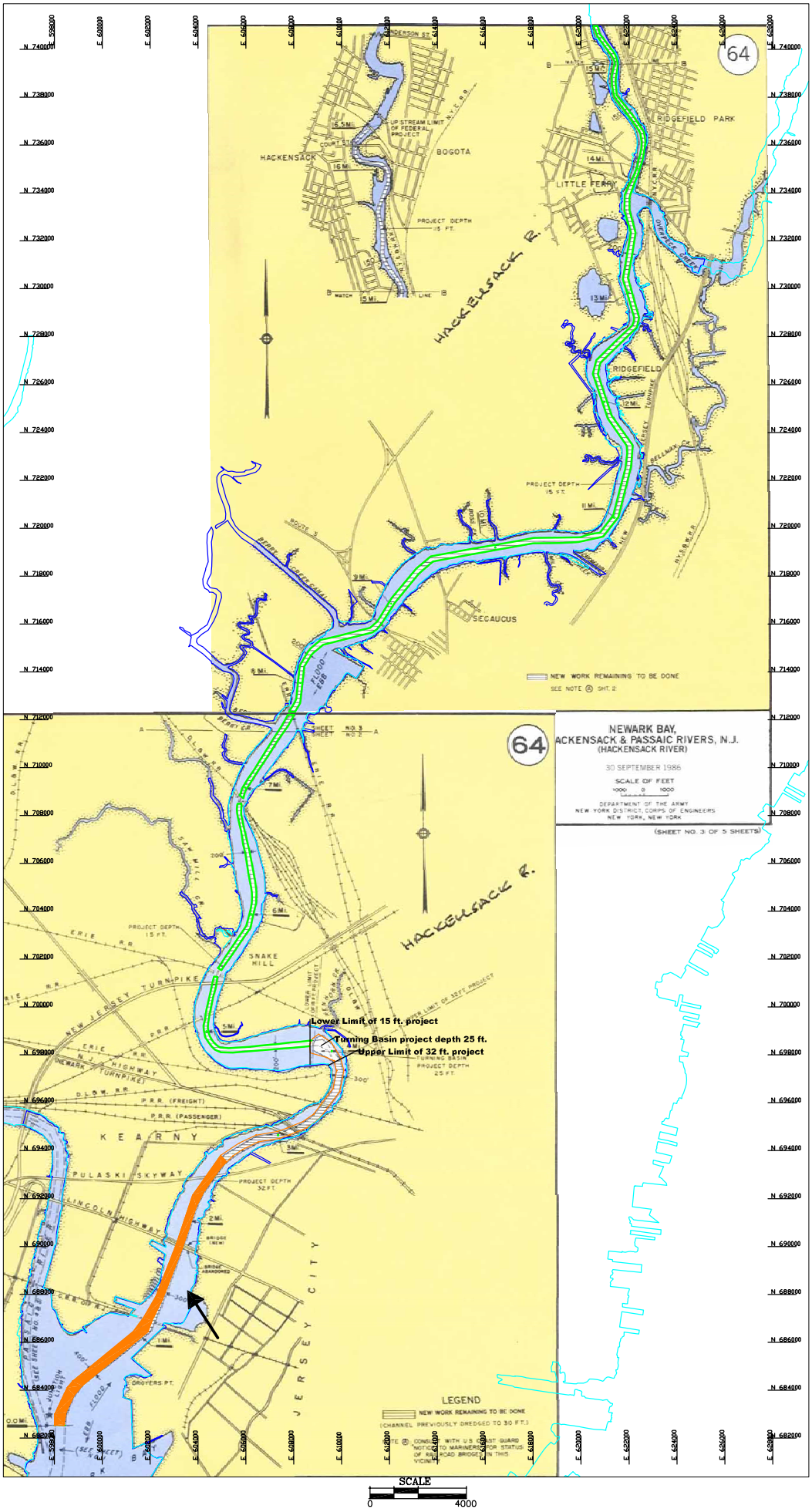
Dredged Area 1942 (Area: 5,692,257.64 sq ft)



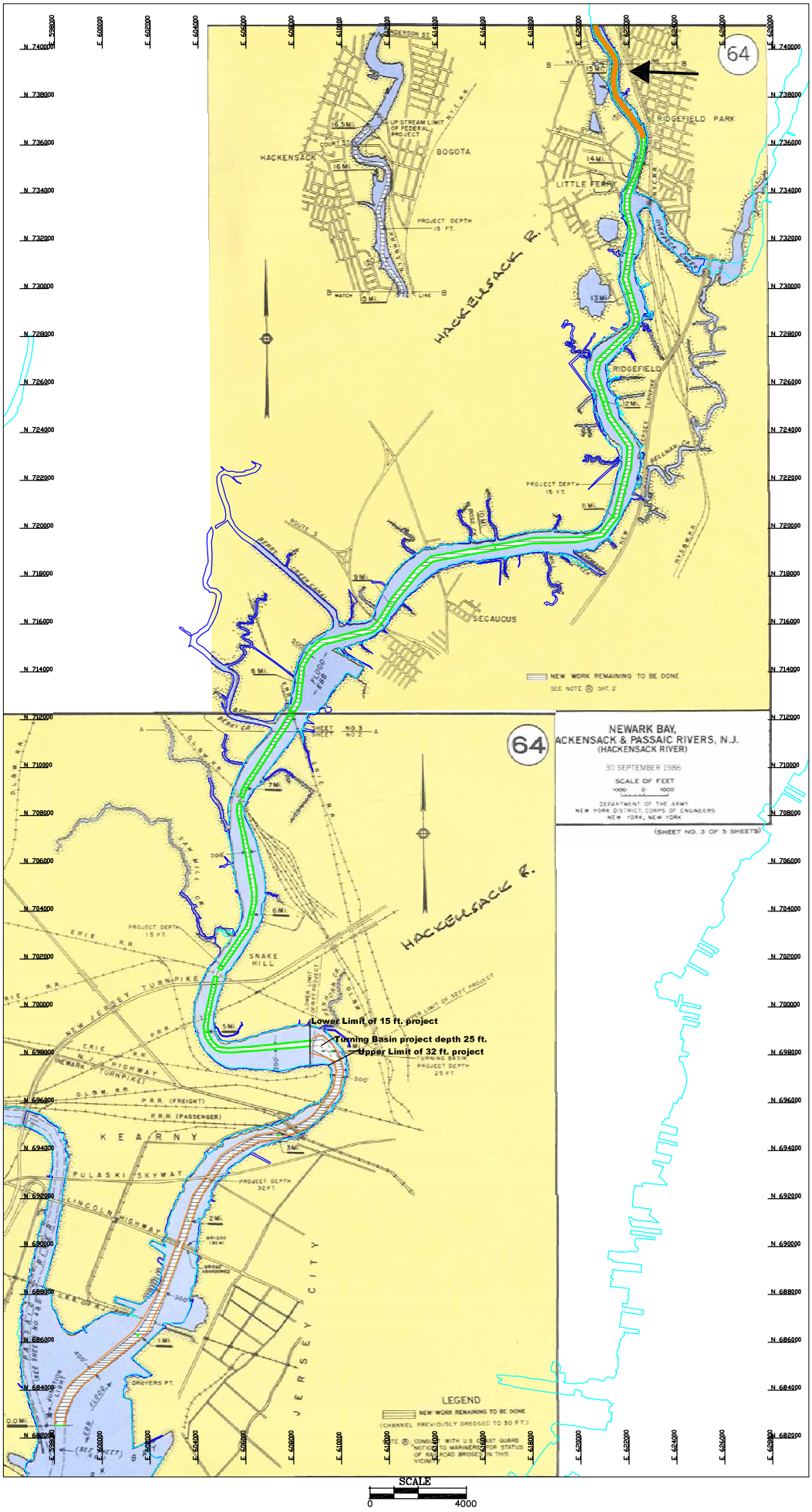
Dredged Area 1946 (Area: 4,766,276.76 sq ft)



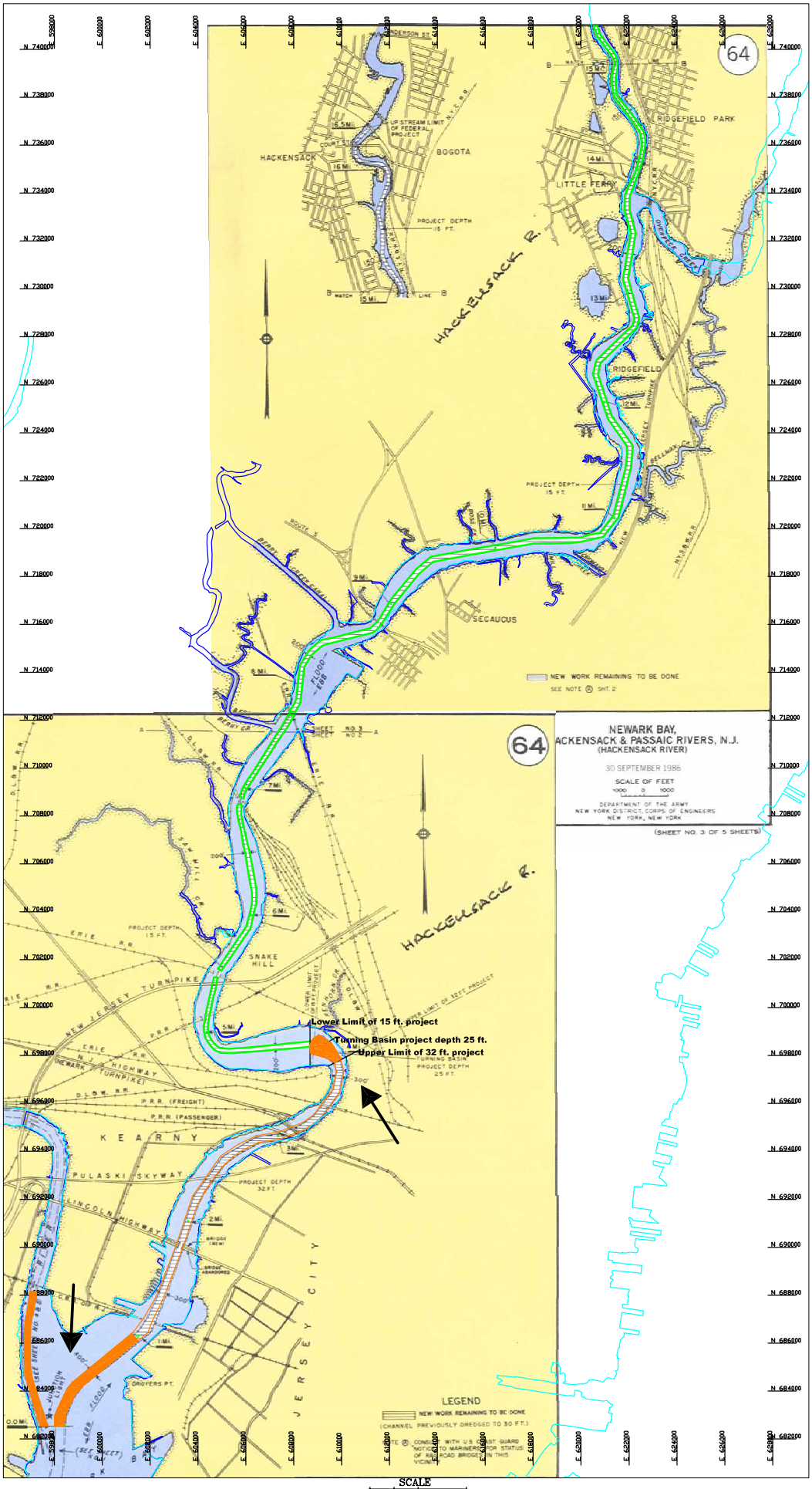
Dredged Area 1949 (Area: 188,053.37 sq ft)



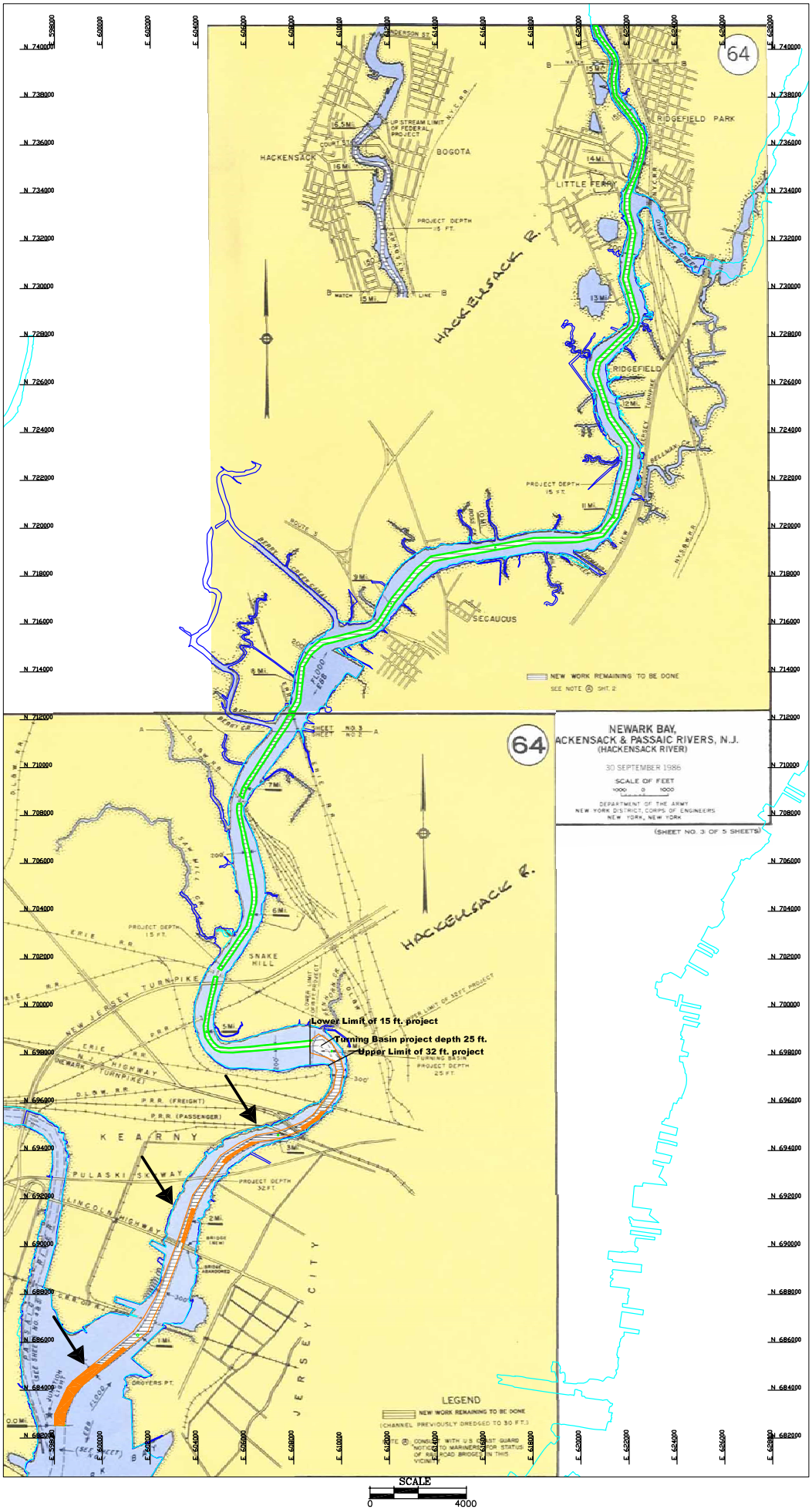
Dredged Area 1953 (Area: 4,766,276.76 sq ft)



Dredged Area 1959 (Area: 816,477.43 sq ft)

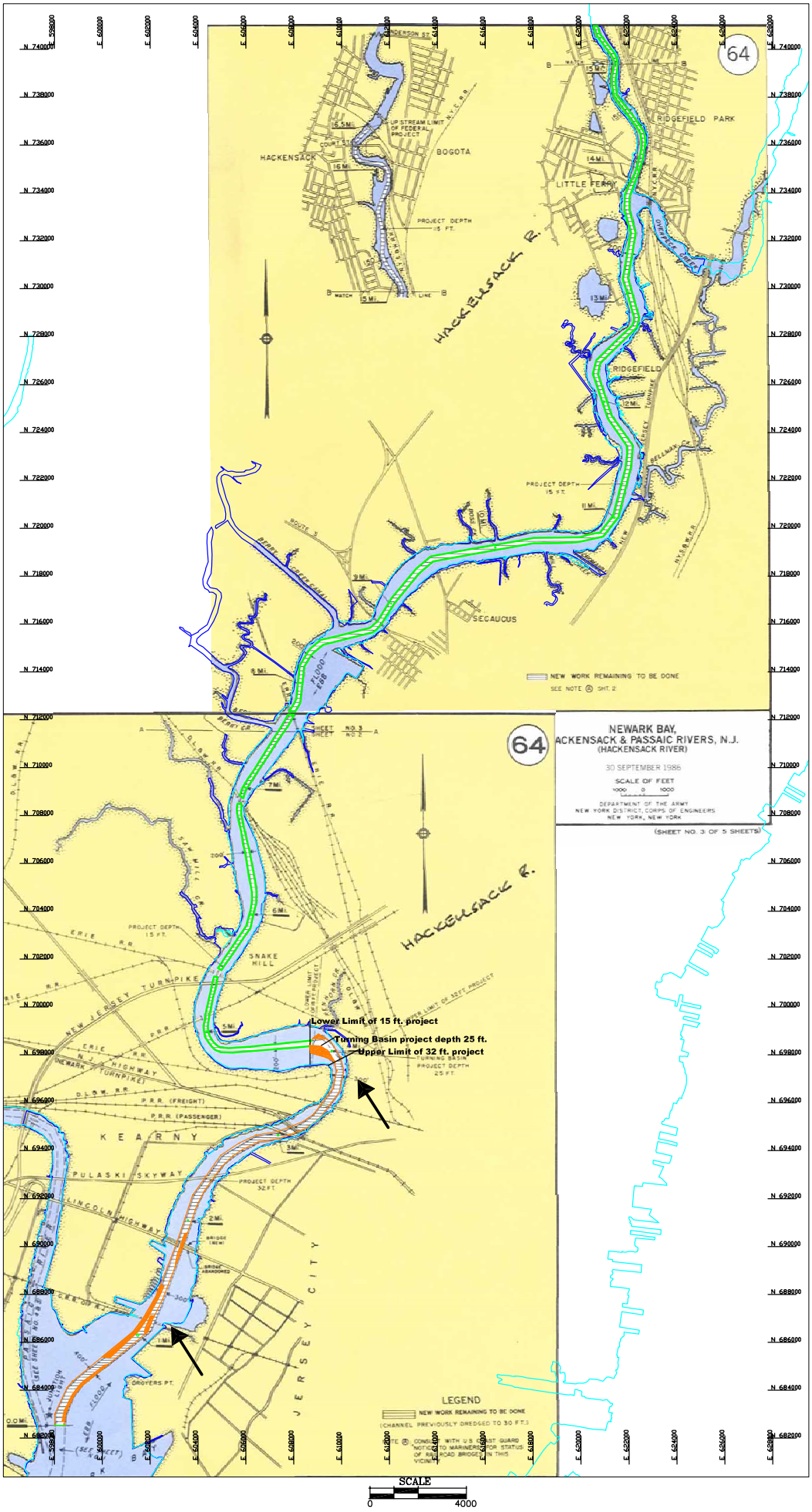


Dredged Area Hackensack 1962 (Area: 2,893,784.97 sq ft)
Dredged Area Passaic 1962 (Area: 1,581,745.74 sq ft)



Dredged Area 1976 (Area: 2,026,083.88 sq ft)

Page 31 of 126



Dredged Area 1986 (Area: 1,574,418.81 sq ft)

Appendix IV
Bridges across the lower Hackensack River

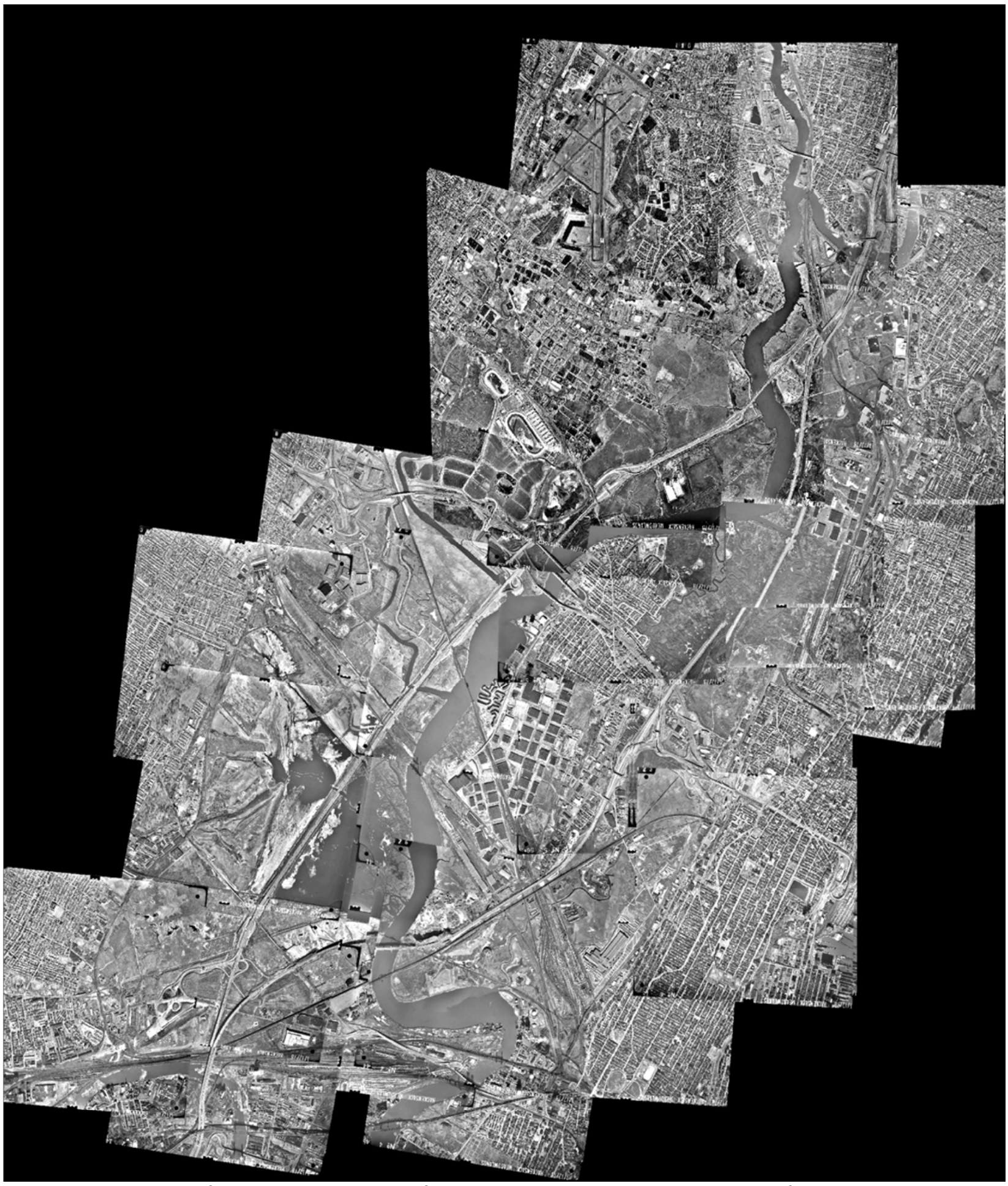
Table IV.1 Bridges across the lower Hackensack River.

Bridge	AKA	Mile marker	Northing NJSP	Northing NJSP	City	Transport type	Year built	Bridge type	Status	Railroad or Roadway	Phone number	Advanced notice
		miles	feet	feet								
Central RR	Conrail Bridge	1.3	686,930.9		Jersey City				Removed			
Lincoln Highway	Hackensack River Bridge, Route 1-9 Truck	2.0	690,368.3	690,028.0	Jersey City	Route 1-9 truck	1928	Vertical lift	Manned	Route 1-9 Truck		
Pulaski Skyway	Route 1-9	2.6	692,891.7	693,012.1	Jersey City	Route 1-9	1930-1932	Cantilever and truss		Route 1-9, NJDOT		
PATH Lift Bridge	The Triples	3.3	695,019.1	694,645.0	Jersey City	PATH mainline		Vertical lift	Manned	PATH mainline	973.690.2609	
Harsimus Branch Lift	The Triples, Hack freight	3.3	695,144.8	694,752.6	Jersey City	Conrail freight		Vertical lift	Manned	Conrail freight	973.690.2609	
Wittpenn Bridge Route 7	The Triples	3.3	695,185.2	694,787.2	Jersey City	Route 7	1930	Vertical lift	Manned	Route 7	973.690.2609	
Lower Hack Draw	Laurel Hill	3.5	696,015.7	695,871.5	Jersey City	NJT, Morristown line	1927	Vertical lift	Unmanned	New Jersey Transit, Morristown Line	201.714.2936	1hr
Portal Bridge	Penn mainline	5.4	699,449.1	699,821.5	Secaucus	Amtrak NE corridor	1907	Swing	Manned	New Jersey Transit, Amtrak, PRR NE Corridor	973.596.2423	
NJ Turnpike (Eastern spur)		5.6	700,951.4	700,964.0	Secaucus	NJTP I-95	1952	Span		NJTP, I-95		
DB Draw	Erie Swing	5.7	701,576.3	701,260.7	Secaucus			Swing	Abandoned	New Jersey Transit, former Booton Line	201.714.2936	
Upper Hack Lift	DL&W, Erie Lift, Erie Lackawana Lift	7.2	708,908.7	708,416.3	Secaucus	NJT mainline		Vertical lift	Manned	New Jersey Transit, Mainline	201.714.2936	30min
HX Draw	Erie Jackknife	8.0	712,586.4	711,567.0	Secaucus	NJT, Bergen County	1911	Bascule, Heel trunnion	Manned	New Jersey Transit, Bergen County Line	201.714.2934	
Route 3 East Bridge		9.0	716,321.0	715,917.3	Secaucus	Route 3	1934	Span		Route 3		
Route 3 West Bridge		9.2	717,212.4	716,590.2	Secaucus	Route 3	1934	Span		Route 3		
Paterson Plank Bridge		9.9	718,807,7	718,509.0	Secaucus				Removed	Paterson Plank Road		
NJ Turnpike (Western spur)		12.2	724,728.8	725,402.1	Moonachie	NJTP I-95		Span		NJTP, I-95		

Appendix V
Historical Aerial Photographs



1930 Aerial photograph of the lower Hackensack River from Oradell Dam to Kill Van Kull (obtained from NJMC).



1978 Aerial Photograph of Lower Hackensack River from Overpeck Creek to the Triples (obtained from NJMC).



2002 Aerial photograph from Overpeck Creek to Port Newark (obtained from State of New Jersey Office of Information Technology, Office of Geographic Information Systems.

Appendix VI.
Sub-bottom profiles

Table VI.1. 512i profile files and images.

File Name	Acquisition date	File Size (Mb)
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0111_c5_1003_0003_H_20060706	July-06-2006	56.00
0111_c5_1004_0004_H_20060706	July-06-2006	18.00
0111_c5_1004_0005_L_20060706	July-06-2006	16.00
0111_c5_1004_0006_L_20060706	July-06-2006	13.00
0111_c5_1005_0007_L_20060706	July-06-2006	09.00
0111_c5_1005_0008_H_20060706	July-06-2006	14.00
0111_c5_1006_0010_H_20060706	July-06-2006	09.00
0111_c5_1007_0011_H_20060706	July-06-2006	08.00
0111_c5_1007_0012_H_20060706	July-06-2006	18.00
0111_c5_1008_0003_H_20060707	July-07-2006	13.00
0111_c5_1009_0004_H_20060707	July-07-2006	10.00
0111_c5_1010_0005_H_20060707	July-07-2006	10.00
0111_c5_1011_0007_H_20060707	July-07-2006	08.00
0111_c5_1012_0009_H_20060707	July-07-2006	15.00
0111_c5_1012_0010_L_20060707	July-07-2006	06.00
0111_c5_1012_0011_H_20060707	July-07-2006	14.00
0111_c5_1013_0013_H_20060707	July-07-2006	34.00
0111_c5_1014_0014_H_20060707	July-07-2006	11.00
0111_c5_1015_0016_H_20060707	July-07-2006	15.00
0111_c5_1016_0018_H_20060707	July-07-2006	21.00
0111_c5_1017_0020_H_20060707	July-07-2006	07.00
0111_c5_1017_0021_H_20060707	July-07-2006	05.00
0111_c5_1018_0022_H_20060707	July-07-2006	45.00
0111_c5_2000_0039_H_20060706	July-06-2006	10.00
0111_c5_2001_0037_H_20060706	July-06-2006	04.00
0111_c5_2002_0034_H_20060706	July-06-2006	09.00
0111_c5_2002_0035_H_20060706	July-06-2006	07.00
0111_c5_2003_0030_H_20060706	July-06-2006	09.00
0111_c5_2004_0028_H_20060706	July-06-2006	07.00
0111_c5_2005_0026_H_20060706	July-06-2006	08.00
0111_c5_2006_0024_H_20060706	July-06-2006	08.00
0111_c5_2007_0021_H_20060706	July-06-2006	07.00
0111_c5_2007_0022_L_20060706	July-06-2006	05.00
0111_c5_2008_0018_L_20060706	July-06-2006	07.00
0111_c5_2008_0019_L_20060706	July-06-2006	04.00
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0111_c5_2012_0045_H_20060707	July-07-2006	04.00
0111_c5_2013_0043_H_20060707	July-07-2006	05.00
0111_c5_2014_0041_H_20060707	July-07-2006	07.00
0111_c5_2015_0039_H_20060707	July-07-2006	07.00
0111_c5_2016_0037_H_20060707	July-07-2006	04.00
0111_c5_2017_0035_H_20060707	July-07-2006	04.00
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0111_c5_2019_0031_H_20060707	July-07-2006	05.00
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0111_c5_xxxx_0017_H_20060706	July-06-2006	12.00
0111_c5_xxxx_0017_H_20060707	July-07-2006	05.00

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0111_c5_xxxx_0033_H_20060706	July-06-2006	14.00
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0111_c5_xxxx_0038_H_20060707	July-07-2006	12.00
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0111_c5_6026_030_M_20070418_0030000	April-04-2007	07.00
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0111_c5_6029_033_M_20070418_0033000	April-04-2007	12.00
0111_c5_6030_034_M_20070418_0034000	April-04-2007	29.00
0111_c5_6xxx_035_M_20070418_0035000	April-04-2007	43.00
0111_c5_6031_036_M_20070418_0036000	April-04-2007	41.00

Table VI.2. Innomar SES330 profile files and images.

File Name	Acquisition Date	File Size (Mb)
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0111_im_7004_L_19042007111640	July-19-2007	56.00
0111_im_7005_L_19042007113814	July-19-2007	18.00
0111_im_7006_L_19042007114714	July-19-2007	06.00
0111_im_7007_L_19042007115123	July-19-2007	26.00
0111_im_7008_L_19042007120044	July-19-2007	56.00
0111_im_7009_L_19042007121858	July-19-2007	26.00
0111_im_7010_L_19042007122700	July-19-2007	05.00
0111_im_7011_L_19042007122859	July-19-2007	06.00
0111_im_7012_L_19042007123145	July-19-2007	15.00
0111_im_7013_L_19042007123637	July-19-2007	00.80
0111_im_7014_L_19042007123707	July-19-2007	45.00
0111_im_7015_L_19042007125153	July-19-2007	00.60
0111_im_7016_L_19042007125318	July-19-2007	52.00
0111_im_7017_L_19042007131433	July-19-2007	06.00
0111_im_7018_L_19042007131714	July-19-2007	47.00

Appendix VII.
Core data

Table of Contents

Shallow cores

Shallow cores – spreadsheet Table VI. 1 in this appendix
Shallow cores – photographs in DVD volume

Vibracores

Vibracore – spreadsheet Table VI.1 in this appendix
Vibracore – descriptions in this appendix
Vibracore – photographs in DVD volume

Sediment descriptions[1] of top of cores

Event	core #	Reaches	event #	Easting NJ State Plane NAD 83 (ft.)	Northing NJ State Plane NAD 83 (ft.)	Recovery[2]	Top of interval elevation NAVD88 (ft)	Top of interval depth below NAVD88 (ft)	Interval depth below mudline (ft)	Age of deposit	Facies #	Interval gross sediment type	Short name	Modifier	Long name	River bottom surface	Color modifier	Oily	Organic	Main descriptor	Layers	Odor	Organics	Shells/bivalves	Split Core Photo	In Tube Core photo
1	HR07-sed-001	Droyer's Point Reac	155	598,638.0	683,620.4	Yes	-27.9	27.93	0.0-0.5	Holocene	700	Mud	Red brown silt and clay		Red brown silt and clay		red brown			clay & silt						sed001_D70S11889.JPG
2	HR07-sed-002	Droyer's Point Reac	154	598,343.0	683,630.3	Yes	-37.8	37.80	0.0-0.5	Holocene	300	Mud	Black brown organic mu	clay-rich	Black brown clay with some to little silt		black brown		organic	clay & silt			plant matter			sed002_D70S11891.JPG
3	HR07-sed-003	Droyer's Point Reac	150	598,333.6	683,748.2	No	-32.2	32.23	0.0-0.5		0	No recovery														
4	HR07-sed-003	Droyer's Point Reac	151	598,327.8	683,712.4	No	-34.2	34.16	0.0-0.5		0	No recovery														
5	HR07-sed-003	Droyer's Point Reac	152	598,289.2	683,718.3	No	-22.8	22.85	0.0-0.5		0	No recovery														
6	HR07-sed-003	Droyer's Point Reac	153	598,295.5	683,678.7	No	-30.3	30.31	0.0-0.5		0	No recovery														
7	HR07-sed-004	Droyer's Point Reac	149	598,166.6	683,971.3	Yes	-9.1	9.12	0.0-0.5	Holocene	100	Oily Black "silt"	Black silt		Black organic clay and/or silt w/ oily sheen		gray	slight oily sheer	organic	black organic clay & silt		odor	plant matter		sed004_D70S12232.JPG	sed004_D70S11899.JPG
8	HR07-sed-005	Droyer's Point Reac	148	599,224.5	683,978.9	Yes	-13.2	13.17	0.0-0.5	Holocene	550	Mud	Gray mud		Gray clay and silt some sand	veneer of sand	gray brown	x	organic	silty clay some sand				in situ bivalves	sed005_D70S12161.JPG	sed005_D70S12027.JPG
9	HR07-sed-006	Droyer's Point Reac	156	599,447.5	684,874.9	Yes	-37.5	37.54	0.0-0.5	Holocene	400	Mud	brown organic mud	silt-rich	Brown silt		brown		organic	silt			plant matter			sed006_D70S11901.JPG
10	HR07-sed-007	Droyer's Point Reac	144	599,333.9	685,029.4	Partial	-13.0	13.01	0.0-0.5	Holocene	800	Sand	Sand		Sand		brown			sand						
11	HR07-sed-007	Droyer's Point Reac	145	599,251.6	685,018.5	Yes	-12.7	12.67	0.0-0.5	Holocene	820	Sand	Sand		Sand		brown black		organic	sand clayey				in situ bivalves	sed007_D70S12145.JPG	sed007_D70S12022.JPG
12	HR07-sed-008	Droyer's Point Reac	146	600,852.4	685,162.7	Partial	-17.5	17.47	0.0-0.5	Holocene	400	Mud	Brown organic mud	silt-rich	Brown silt		lt brown			silt						sed008_D70S11905.JPG
13	HR07-sed-009	Droyer's Point Reac	147	601,016.4	685,320.1	Yes	-20.2	20.20	0.0-0.5	Holocene	820	Sand	Sand		Sand		dark brown to black		organic	silty sand			plant matter		sed009_D70S12179.JPG	sed009_D70S11906.JPG
14	HR07-sed-010	Droyer's Point Reac	142	601,530.9	685,955.0	Partial	-16.1	16.10	0.0-0.5	Holocene	700	Mud	Red brown silt and clay		Red brown silt and clay		red brown			silt						
15	HR07-sed-010	Droyer's Point Reac	143	601,488.3	685,942.6	No	-16.5	16.52	0.0-0.5		0	No recovery														
16	HR07-sed-011	Droyer's Point Reac	157	601,313.0	686,153.1	No	-37.0	37.03	0.0-0.5		0	No														
17	HR07-sed-011	Droyer's Point Reac	158	601,362.4	686,130.7	No	-37.9	37.92	0.0-0.5		0	No														
18	HR07-sed-012	Marion Reach Soutl	141	603,523.2	689,393.4	Yes	-25.3	25.25	0.0-0.5	Holocene	920	Peat	Peat		Peat with little to some clay & silt	veneer of sand	black brown		organic	peat & clay some silt			plant matter		sed012_D70S12224.JPG	sed012_D70S11914.JPG
19	HR07-sed-013	Marion Reach Soutl	159	603,184.4	689,542.7	Yes	-35.9	35.94	0.0-0.5	Holocene	100	Oily Black "silt"	Black silt		Black organic clay and/or silt w/ oily sheen		black	oily	organic	black organic clay & silt					sed013_D70S12175.JPG	sed013_D70S11922.JPG
20	HR07-sed-014	Marion Reach Soutl	160	603,106.8	689,595.6	No	-36.9	36.89	0.0-0.5		0	No														
21	HR07-sed-014	Marion Reach Soutl	161	603,094.7	689,576.6	No	-36.9	36.94	0.0-0.5		0	No														
22	HR07-sed-015	Marion Reach Soutl	162	602,788.2	689,743.4	No	-30.1	30.06	0.0-0.5		0	No													sed015_D70S12178.JPG	sed015_D70S12030.JPG
23	HR07-sed-016	Marion Reach Soutl	140	602,664.4	689,843.1	Yes	-19.5	19.49	0.0-0.5	Holocene	300	Mud	Black brown organic mu	clay-rich	Black brown clay with some to little silt		brown & black gray		organic	clay					sed016_D70S12205.JPG	sed016_D70S11930.JPG
24	HR07-sed-017	Marion Reach North	138	604,205.6	691,742.8	Yes	-5.1	5.07	0.0-0.5	Holocene	630	Mud	Brown to red brown mud		Brown to red brown		brown to red brown			clay				shells fragments	sed017_D70S12192.JPG	sed017_D70S11935.JPG
25	HR07-sed-018A	Marion Reach North	165	603,952.4	691,778.1	Yes	-32.9	32.92	0.0-0.5	Holocene	800	Sand	Sand		Sand		brown			sand					sed018_D70S12156.JPG	
26	HR07-sed-018B	Marion Reach North	139	604,048.4	691,790.9	Yes	-27.1	27.13	0.0-0.5	Holocene	150	Oily Black "silt"	Black silt		Black organic clay and/or silt w/ oily sheen		dark gray - dark brown	oily sheen	organic	black organic clay & silt	laminated					sed018_D70S11936.JPG
27	HR07-sed-019	Marion Reach North	164	603,779.7	691,856.7	No	-39.6	39.57	0.0-0.5		0	No														
28	HR07-sed-019	Marion Reach North	166	603,746.8	691,841.0	No	-38.4	38.39	0.0-0.5		0	No														
29	HR07-sed-020	Marion Reach North	163	603,481.8	691,860.4	Yes	-26.9	26.95	0.0-0.5	Holocene	300	Mud	Black brown organic mu	clay-rich	Black brown clay with some to little silt		brown black			clay	laminated				sed020_D70S12095.JPG	sed020_D70S11947.JPG
30	HR07-sed-021	Marion Reach North	131	603,995.1	692,670.3	No	-16.6	16.60	0.0-0.5		0	No														
31	HR07-sed-021	Marion Reach North	132	604,023.1	692,651.6	No	-16.9	16.89	0.0-0.5		0	No														
32	HR07-sed-021	Marion Reach North	133	603,994.7	692,604.7	No	-16.1	16.07	0.0-0.5		0	No														
33	HR07-sed-021	Marion Reach North	134	603,950.0	692,619.1	No	-16.1	16.13	0.0-0.5		0	No														
34	HR07-sed-021	Marion Reach North	135	603,936.2	692,490.0	No	-17.5	17.48	0.0-0.5		0	No														
35	HR07-sed-021	Marion Reach North	136	603,948.2	692,473.0	No	-18.2	18.22	0.0-0.5		0	No														
36	HR07-sed-021	Marion Reach North	137	603,869.8	692,446.9	Partial	-19.7	19.65	0.0-0.5	Holocene	810	Sand	Sand		Sand		lt brown			sand some fine grave						
37	HR07-sed-022	Marion Reach North	126	604,492.7	693,795.7	No	-11.7	11.68	0.0-0.5		0	No														
38	HR07-sed-022	Marion Reach North	127	604,477.9	693,794.9	No	-11.8	11.77	0.0-0.5		0	No														
39	HR07-sed-022	Marion Reach North	128	604,458.3	693,810.5	Partial	-10.9	10.90	0.0-0.5	Holocene	700	Mud	Red brown silt and clay		Red brown silt and clay		red brown			silt						
40	HR07-sed-022	Marion Reach North	129	604,457.7	693,806.4	Partial	-10.8	10.78	0.0-0.5	Holocene	700	Mud	Red brown silt and clay		Red brown silt and clay		red brown			silt						
41	HR07-sed-023	Marion Reach North	167	607,004.9	694,388.7	Yes	-33.0	33.03	0.0-0.5	Holocene	420	Mud	Black brown organic mu	silt-rich	Black brown clay & silt		gray brown			clayey silt fine grave						sed023_D70S12035.JPG
42	HR07-sed-024	Marion Reach North	125	606,617.5	694,835.1	Yes	-25.0	24.99	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt & some sand		gray black	x	organic	silt & clay some sand	laminated		plant matter	shells fragments	sed024_D70S12103.JPG	sed024_D70S11950.JPG
43	HR07-sed-025	Marion Reach North	124	606,454.4	694,860.8	Yes	-8.0	8.04	0.0-0.5	Holocene	460	Mud	Black brown organic mu	silt-rich	Black brown clayey silt with some sand		dark brown to black	x	organic	clayey silt some sand	laminated				sed025_D70S12088.JPG	sed025_D70S11957.JPG
44	HR07-sed-026	Laurel Hill Reach	168	609,639.1	697,006.4	No	-30.5	30.51	0.0-0.5		0	No														
45	HR07-sed-026	Laurel Hill Reach	169	609,689.8	697,024.2	No	-34.2	34.16	0.0-0.5		0	No														
46	HR07-sed-026	Laurel Hill Reach	170	609,698.0	697,004.0	No	-35.7	35.68	0.0-0.5		0	No														
47	HR07-sed-027	Laurel Hill Reach	171	608,354.3	697,707.8	Yes	-11.8	11.77	0.0-0.5	Holocene	550	Mud	Gray mud		Gray clay and silt some sand		gray	x	organic	clayey silt some sand			plant matter		sed027_D70S12054.JPG	sed027_D70S11962.JPG
48	HR07-sed-028	Laurel Hill Reach	172	608,153.7	697,795.2	Yes	-12.1	12.09	0.0-0.5	Holocene	500	Mud	Gray mud		Gray clay and silt	veneer of sand	gray		organic	silt & clay			plant matter		sed028_D70S12042.JPG	sed028_D70S11968.JPG
49	HR07-sed-029	Laurel Hill Reach	173	608,096.7	698,037.4	Yes	-18.8	18.80	0.0-0.5	Holocene	500	Mud	Gray mud		Gray clay and silt	veneer of sand	gray		organic	clayey silt			plant matter		sed029_D70S12037.JPG	sed029_D70S11976.JPG
50	HR07-sed-030	Laurel Hill Reach	174	608,232.5	698,210.9	No	-17.1	17.13	0.0-0.5		0	No														
51	HR07-sed-030	Laurel Hill Reach	175	608,160.6	698,253.0	No	-17.3	17.31	0.0-0.5		0	No														
52	HR07-sed-030	Laurel Hill Reach	176	608,151.9	698,208.8	Yes	-16.8	16.83	0.0-0.5	Holocene	810	Sand	Sand		Sand		brown			sand some fine grave					sed030_D70S12110.JPG	sed030_D70S11983.JPG
53	HR07-sed-031	Laurel Hill Reach	181	607,557.4	698,376.6	Yes	-20.7	20.72	0.0-0.5	Holocene	460	Mud	Black brown organic mu	silt-rich	Black brown clayey silt with some sand	veneer of sand	black brown	x	organic	clayey silt some sand						
54	HR07-sed-031	Laurel Hill Reach	181	607,557.4	698,376.6	No	-20.7	20.72	0.0-0.5		0	No														
55	HR07-sed-031	Laurel Hill Reach	182	607,535.5	698,383.8	Yes	-21.1	21.12	0.0-0.5	Holocene	610	Mud	Gray & red brown clay		Gray & red brown clay		gray & red brown			clay	fine layers/bands				sed031_D70S12135.JPG	sed031_D70S11987.JPG
56	HR07-sed-032	Laurel Hill Reach	177	607,782.2	698,843.9	Yes	-18.1	18.05	0.0-0.5	Holocene	400	Mud	Black brown organic mu	silt-rich	Black brown clay & silt	veneer of sand	gray brown		organic	clayey silt				shells fragments	sed032_D70S12119.JPG	sed032_D70S11990.JPG
57	HR07-sed-033	Laurel Hill Reach	178	607,811.3	699,089.2	Yes	-8.5	8.51	0.0-0.5	Holocene	400	Mud	Black brown organic mu	silt-rich	Black brown clay & silt		gray & black & brown			clayey silt	laminated				sed033_D70S12129.JPG	sed033_D70S11996.JPG
58	HR07-sed-034	Laurel Hill Reach	184	607,103.0	697,869.9	Yes	-21.9	21.87	0.0-0.5	Holocene	610	Mud	Gray & red brown clay		Gray & red brown clay		gray & red brown			clay	laminated				sed034_D70S12100.JPG	sed034_D70S12002.JPG
59	HR07-sed-035	Laurel Hill Reach	180	607,008.1	698,648.5	Yes	-19.8	19.84	0.0-0.5	Holocene	500	Mud	Gray mud		Gray clay and silt	veneer of sand	gray		organic	clayey silt	laminated		plant matter		sed035_D70S12071.JPG	sed035_D70S12007.JPG
60	HR07-sed-036	Laurel Hill Reach	179	606,990.3	698,933.3	Yes	-3.2	3.22	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt		black & dark gray			clayey silt some sand					sed036_D70S12074.JPG	sed036_D70S12013.JPG
61	HR07-sed-037	Laurel Hill Reach	115	605,256.4	697,605.2	Yes	-5.0	4.99	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt		gray black		organic	clayey silt		H_2S			sed037_D70S11209.JPG	sed037_D70S11043.JPG
62	HR07-sed-038	Laurel Hill Reach	114	605,350.8	697,785.4	Partial	-19.1	19.08	0.0-0.5	Holocene	300	Mud	Black brown organic mu	clay-rich	Black brown clay with some to little silt		lt brown			clay						sed038_D70S10999.JPG
63	HR07-sed-039	Laurel Hill Reach	113	605,674.3	698,378.1	Yes	-19.0	18.99	0.0-0.5	Holocene	800	Sand	Sand		Sand		dark gray		organic	sand	laminated		plant matter		sed039_D70S11264.JPG	sed039_D70S11002.JPG
64	HR07-sed-040	Laurel Hill Reach	117	605,843.5	698,523.1	Yes	-11.9	11.92	0.0-0.5	Holocene	400	Mud	Black brown organic mu	silt-rich	Black brown clay & silt		gray brown			silty clay	laminated				sed040_D70S11199.JPG	sed040_D70S11008.JPG
65	HR07-sed-041	Laurel Hill Reach	116	605,775.1	698,578.5	Yes	-3.5	3.50	0.0-0.5	Holocene	100	Oily Black "silt"	Black silt		Black organic clay and/or silt w/ oily sheen		black	oily sheen	organic	black organic clay & silt			plant matter		sed041_D70S11161.JPG	sed041_D70S11054.JPG
66	HR07-sed-042	Laurel Hill Reach	118	604,682.2	698,582.4	No	-37.3	37.30	0.0-0.5		0	No														
67	HR07-sed-042	Laurel Hill Reach	119	604,693.0	698,560.1	No	-36.8	36.81	0.0-0.5		0	No														
68	HR07-sed-043	Laurel Hill Reach	123	606,755.4	704,691.6	Partial	-2.7	2.68	0.0-0.5	Holocene	400	Mud	Black brown organic mu	silt-rich	Black brown clay & silt		brown			silt & clay						
69	HR07-sed-043	Laurel Hill Reach	001	605,267.7	701,669.2	No	-16.4	16.35	0.0-0.5		0	No														
70	HR07-sed-043	Laurel Hill Reach	112	605,289.7	701,680.6	Partial	-14.8	14.81	0.0-0.5	Holocene	400	Mud	Black brown organic mu	silt-rich	Black brown clay & silt		brown			silt & clay						
71	HR07-sed-044	Laurel Hill Reach	120	604,933.1	701,823.1	No	-37.6	37.62	0.0-0.5		0	No														
72	HR07-sed-044	Lyndhurst Reach	121	604,851.5	701,952.9	No	-30.9	30.93	0.0-0.5		0	No														
73	HR07-sed-045A	Lyndhurst Reach	123	606755.4	704691.6	Yes	-2.7	2.68	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay		gray black		organic	clay			plant matter	in situ bivalves		
74	HR07-sed-045B	Lyndhurst Reach	123	606,755.4	704,691.6	Yes	-2.7	2.68	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt		gray & black		organic	clay some silt		odor	plant matter wood		sed045_D70S11180.JPG	sed045_D70S11021.JPG
75	HR07-sed-046	Lyndhurst Reach	109	606,537.5	704,648.5	Yes	-22.8	22.84	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		gray black		organic	clay	laminated				sed046_D70S11262.JPG	sed046_D70S11046.JPG
76	HR07-sed-047	Lyndhurst Reach	110	606,062.7	704,541.3	Yes	-21.1	21.07	0.0-0.5	Holocene	810	Sand	Sand		Sand		brown			sand some fine grave				in situ bivalves	sed047_D70S11269.JPG	sed047_D70S11013.JPG
77	HR07-sed-048	Lyndhurst Reach	122	605,839.3	704,534.8	Yes	-16.2	16.19	0.0-0.5	Holocene	920	Peat	Peat		Peat with little to some clay & silt	veneer of sand	black brown		organic	peat & clayey silt	laminated		plant matter	in situ bivalves	sed048_D70S11235.JPG	sed048_D70S11056.JPG
78	HR07-sed-049	Lyndhurst Reach	108	606,545.1	705,861.1	Yes	-5.5	5.53	0.0-0.5	Holocene	300	Mud	Black brown organic mu	clay-rich	Black brown clay with some to little silt		gray & black & brown		organic	clay some silt	laminated				sed049_D70S11221.JPG	sed049_D70S11030.JPG
79	HR07-sed-050	Lyndhurst Reach	107	606,383.9	705,755.9	Yes	-16.9	16.90	0.0-0.5	Holocene	500	Mud	Gray mud		Gray clay and silt		gray		organic	silt & clay	laminated				sed050_D70S11156.JPG	sed050_D70S11015.JPG
80	HR07-sed-051	Lyndhurst Reach	106	605,455.8	705,968.6	Yes	-21.7	21.70	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt		dark gray		organic	clayey silt			plant matter roots		sed051_D70S11188.JPG	sed051_D70S11036.JPG
81	HR07-sed-052	nderson Creek Rea	104	606,462.1	709,401.6	Yes	-3.4	3.44	0.0-0.5	Holocene	500	Mud	Gray mud		Gray clay and silt	worm tubes	dark gray		organic	silt & clay			plant matter	in situ bivalves	sed052_D70S11127.JPG	sed052_D70S11041.JPG
82	HR07-sed-053	nderson Creek Rea	099	606,237.6	709,618.5	Yes	-28.5	28.52	0.0-0.5	Holocene	500	Mud	Gray mud		gray clay and silt	veener fine gravel	dark gray		organic	silt & clay			plant matter		sed053_D70S11278.JPG	sed053_D70S10991.JPG
83	HR07-sed-054	nderson Creek Rea	100	606,103.6	709,781.7	No	-22.4	22.37	0.0-0.5		0	No														
84	HR07-sed-054	nderson Creek Rea	101	606,108.9	709,768.3	No	-22.0	22.05	0.0-0.5		0	No														
85	HR07-sed-054	nderson Creek Rea	102	606,081.7	709,775.8	No	-22.1	22.09	0.0-0.5		0	No														
86	HR07-sed-054	nderson Creek Rea	105	605,988.5	709,849.9	Yes	-22.7	22.67	0.0-0.5	Holocene	920	Peat	Peat		Peat with little to some clay & silt	veneer of sand	brown		organic	peat & silt			plant matter		sed054_D70S11193.JPG	sed054_D70S10994.JPG
87	HR07-sed-055	nderson Creek Rea	103	605,872.7	710,078.9	Yes	-4.0	3.98	0.0-0.5	Holocene	500	Mud	Gray mud		Gray clay and silt	veneer of sand	gray		organic	clay		odor	plant matter	in situ bivalves	sed055_D70S11282.JPG	sed055_D70S11034.JPG
88	HR07-sed-056A	Harmon Cove Reach	076	608,106.0	712,567.3	Yes	-24.8	24.80	0.0-0.5	Holocene	300	Mud	Black brown organic mu	clay-rich	Black brown clay with some to little silt		black brown		organic	clay			plant matter			sed056_D70S10832.JPG
89	HR07-sed-056B	Harmon Cove Reach	098	608,217.2	712,559.4	Yes	-36.2	36.24	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt		dark gray		organic	clayey silt	laminated		plant matter		sed056_D70S11291.JPG	sed056_D70S11061.JPG
90	HR07-sed-057	Harmon Cove Reach	077	608,085.8	712,842.6	Yes	-20.7	20.70	0.0-0.5	Holocene	900	Peat	Peat		Peat with little to some clay & silt		black brown		organic	peat some silt			plant matter	in situ bivalves	sed057_D70S11661.JPG	sed057_DS7010733.JPG
91	HR07-sed-058	Harmon Cove Reach	075	608,932.6	712,826.7	Yes	-7.3	7.32	0.0-0.5	Holocene	300	Mud	Black brown organic mu	clay-rich	Black brown clay with some to little silt		black brown		organic	clay			plant matter		sed058_D70S11643.JPG	sed058_D70S10922.JPG
92	HR07-sed-059	Harmon Cove Reach	078	608,595.2	713,095.8	Yes	-21.0	21.02	0.0-0.5	Holocene	300	Mud	Black brown organic mu	clay-rich	Black brown clay with some to little silt		black-dark brown		organic	clay	laminated		plant matter	shells fragments	sed059_D70S11773.JPG	sed059_D70S10929.JPG
93	HR07-sed-060	Harmon Cove Reach	074	608,069.8	713,645.1	Yes	-8.7	8.73	0.0-0.5	Holocene	500	Mud	Gray mud		Gray clay and silt	veneer of sand	gray		organic	clayey silt			plant matter		sed060_D70S11824.JPG	sed060_D70S10915.JPG

Sediment descriptions[1] of top of cores

Event	core #	Reaches	event #	Easting NJ State Plane NAD 83 (ft.)	Northing NJ State Plane NAD 83 (ft.)	Recovery[2]	Top of interval elevation NAVD88 (ft)	Top of interval depth below NAVD88 (ft)	Interval depth below mudline (ft)	Age of deposit	Facies #	Interval gross sediment type	Short name	Modifier	Long name	River bottom surface	Color modifier	Oily	Organic	Main descriptor	Layers	Odor	Organics	Shells/bivalves	Split Core Photo	In Tube Core photo
94	HR07-sed-061	Harmon Cove Reach	073	609,636.5	714,418.4	Yes	-4.8	4.81	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt		black brown		organic	clay					sed061_D70S11748.JPG	sed061_D70S10906.JPG
95	HR07-sed-062	Harmon Cove Reach	079	609,372.1	714,465.9	Yes	-12.4	12.37	0.0-0.5	Holocene	610	Mud	Gray & red brown clay		Gray & red brown clay		gray & red brown		organic	clay	laminated			shells fragments	sed062_D70S11428.JPG	sed062_D70S10954.JPG
96	HR07-sed-063	Harmon Cove Reach	080	608,956.5	714,545.5	Yes	-21.3	21.33	0.0-0.5	Holocene	460	Mud	Black brown organic mud	silt-rich	Black brown clay with some to little silt some sand		black brown	x	organic	silty clay some sand			plant matter		sed063_D70S11698.JPG	
97	HR07-sed-065	Harmon Cove Reach	081	609,145.8	714,807.8	Yes	-25.3	25.32	0.0-0.5	Holocene	100	Oily Black "silt"	Black silt		Black organic clay and/or silt w/ oily sheen		black	oily	organic	black organic clay & silt						sed065_D70S10959.JPG
98	HR07-sed-066	Harmon Cove Reach	097	609,221.5	714,950.0	Yes	-31.1	31.13	0.0-0.5	Holocene	100	Oily Black "silt"	Black silt		Black organic clay and/or silt w/ oily sheen		black	slight oily sheer	organic	black organic clay & silt						sed066_D70S11017.JPG
99	HR07-sed-067	Harmon Cove Reach	096	609,455.9	715,061.7	Yes	-33.3	33.28	0.0-0.5	Holocene	400	Mud	Brown organic mud	silt-rich	Brown silt		brown			silt					sed067_D70S11297.JPG	sed067_D70S11011.JPG
100	HR07-sed-068	Harmon Cove Reach	072	610,061.4	715,051.6	Yes	-5.5	5.46	0.0-0.5	Holocene	900	Peat	Peat		Peat with little to some clay & silt	veneer of clay	black brown		organic	peat			plant matter		sed068_D70S11722.JPG	sed068_D70S10894.JPG
101	HR07-sed-069	Harmon Cove Reach	071	610,040.4	715,102.8	Yes	-8.7	8.72	0.0-0.5	Holocene	550	Mud	Gray mud		Gray clay and silt and plants		gray		organic	silt & insitu plants			plant matter		sed069_D70S11646.JPG	sed069_D70S10908.JPG
102	HR07-sed-070	Harmon Cove Reach	082	609,938.5	715,211.7	Yes	-15.3	15.33	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay					sed070_D70S11688.JPG	sed070_D70S10771.JPG
103	HR07-sed-071	Harmon Cove Reach	095	609,766.4	715,425.3	Yes	-30.8	30.76	0.0-0.5	Holocene	460	Mud	Black brown organic mud	silt-rich	Black brown clayey silt with some sand	veneer of sand	black brown	x	organic	clayey silt some sand		odor			sed071_D70S11304.JPG	sed071_D70S10900.JPG
104	HR07-sed-072	Harmon Cove Reach	083	609,667.6	715,686.0	Yes	-23.7	23.74	0.0-0.5	Holocene	460	Mud	Black brown organic mud	silt-rich	Black brown clayey silt with some sand	veneer of sand	black brown	x	organic	clayey silt some sand	laminated				sed072_D70S11796.JPG	sed072_D70S10774.JPG
105	HR07-sed-073	Harmon Cove Reach	070	609,680.2	715,824.3	Yes	-8.7	8.74	0.0-0.5	Holocene	400	Mud	Black brown organic mud	silt-rich	Black brown clay & silt		black brown		organic	silty clay		H_2S	plant matter		sed073_D70S11729.JPG	sed073_D70S10725.JPG
106	HR07-sed-074	Harmon Cove Reach	088	610,166.8	715,847.6	Yes	-18.9	18.92	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt		black brown		organic	clay			plant matter		sed074_D70S11677.JPG	sed074_D70S10791.JPG
107	HR07-sed-076	Garrett's Reach	090	612,764.9	717,827.0	Yes	-19.8	19.80	0.0-0.5	Holocene	212	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black			clay		very strong		in situ bivalves	sed076_D70S11543.JPG	sed076_D70S10737.JPG
108	HR07-sed-077	Garrett's Reach	091	612,661.0	717,968.2	Yes	-19.1	19.06	0.0-0.5	Holocene	460	Mud	Black brown organic mud	silt-rich	Black brown clayey silt with some sand		black brown	x	organic	clayey silt some sand			plant matter		sed077_D70S11735.JPG	sed077_D70S10799.JPG
109	HR07-sed-078	Garrett's Reach	092	612,467.1	718,121.7	Yes	-14.3	14.29	0.0-0.5	Holocene	210	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay			plant matter		sed078_D70S11774.JPG	sed078_D70S10818.JPG
110	HR07-sed-080	Garrett's Reach	093	613,875.2	718,728.1	Yes	-21.3	21.28	0.0-0.5	Holocene	810	Sand	Sand		Sand		dark brown		organic	silty sand some clay			plant matter	shells fragments	sed080_D70S11715.JPG	sed080_D70S10859.JPG
111	HR07-sed-081	Garrett's Reach	094	613,828.9	718,981.7	Yes	-10.7	10.70	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt		black brown		organic	clay	laminated		plant matter		sed081_D70S11676.JPG	
112	HR07-sed-082	Garrett's Reach	033	616,418.6	718,977.5	Yes	-4.7	4.72	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay						sed082_DS7010508.JPG
113	HR07-sed-083	Garrett's Reach	067	616,394.6	719,129.1	Yes	-22.5	22.50	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay					sed083_D70S11477.JPG	sed083_DS7010765.JPG
114	HR07-sed-084	Garrett's Reach	068	616,357.4	719,356.6	Yes	-25.3	25.34	0.0-0.5	Holocene	900	Peat	Peat		Peat with little to some clay & silt		black brown		organic	peat clayey			plant matter		sed084_D70S11441.JPG	sed084_DS7010712.JPG
115	HR07-sed-085	Garrett's Reach	034	616,355.9	719,478.7	Yes	-8.0	8.00	0.0-0.5	Holocene	210	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay	worm tubes	black		organic	clay			plant matter		sed085_DS7010634.JPG	sed085_DS7010588.JPG
116	HR07-sed-086	Garrett's Reach	069	616,279.8	719,493.2	Yes	-4.5	4.51	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt		black		organic	silty clay			plant matter		sed086_D70S11425.JPG	sed086_DS7010735.JPG
117	HR07-sed-087	Garrett's Reach	036	618,316.6	719,234.8	Yes	-8.3	8.28	0.0-0.5	Holocene	210	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay & insitu plants			plant matter roots		sed087_DS7010660.JPG	sed087_DS7010628.JPG
118	HR07-sed-088	Garrett's Reach	066	618,333.2	719,352.5	Yes	-16.8	16.77	0.0-0.5	Holocene	210	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay			plant matter		sed088_D70S11357.JPG	sed088_DS7010842.JPG
119	HR07-sed-89A	Garrett's Reach	037	619,419.7	719,256.7	Yes	-8.7	8.67	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt	black veneer	gray brown		organic	clay			plant matter	shells fragments		sed089A_DS7010567.JPG
120	HR07-sed-89B	Garrett's Reach	038	619,417.5	719,258.2	Yes	-8.8	8.78	0.0-0.5	Holocene	500	Mud	Gray mud		Gray clay and silt	worm tubes	gray		organic	clay and plants			plant matter roots		sed089B_DS7010609.JPG	ed089B_DS7010583.JPG
121	HR07-sed-090	Garrett's Reach	065	619,467.1	719,595.4	Yes	-18.3	18.25	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black & dark gray		organic	clay					sed090_D70S11444.JPG	sed090_D70S10831.JPG
122	HR07-sed-091	Garrett's Reach	039	619,507.2	719,705.2	Yes	-7.5	7.47	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt		gray & black & brown		organic	silt & clay			plant matter		sed091_D70S11450.JPG	sed091_D70S10747.JPG
123	HR07-sed-092	Bellmaine Reach	042	621,913.7	721,190.5	Yes	-7.8	7.85	0.0-0.5	Holocene	100	Oily Black "silt"	Black silt		Black organic clay and/or silt w/ oily sheen		gray & black	slight oily sheer	organic	black organic clay & silt			plant matter		sed092_DS7010523.JPG	sed092_DS7010520.JPG
124	HR07-sed-093	Bellmaine Reach	041	621,861.1	721,212.0	Yes	-14.8	14.83	0.0-0.5	Holocene	550	Mud	Gray mud		gray clay and silt some sand	worm tubes	gray	x	organic	silt & clay some sand			plant matter roots		sed093_DS7010674.JPG	sed093_DS7010535.JPG
125	HR07-sed-094	Bellmaine Reach	040	621,493.5	721,329.1	Yes	-9.2	9.20	0.0-0.5	Holocene	210	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay			plant matter roots		sed094_DS7010646.JPG	sed094_DS7010624.JPG
126	HR07-sed-095	Bellmaine Reach	045	622,190.3	723,552.7	Yes	-5.5	5.55	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt	black veneer worm tubes	gray brown			clay				shells fragments	sed095_DS7010544.JPG	sed095_DS7010541.JPG
127	HR07-sed-096	Bellmaine Reach	043	622,085.1	723,521.7	Yes	-18.0	18.02	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay		weak			sed096_DS7010600.JPG	sed096_DS7010597.JPG
128	HR07-sed-097	Bellmaine Reach	064	621,955.8	723,498.7	Yes	-23.3	23.28	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt		black		organic	silt & clay			plant matter		sed097_D70S11331.JPG	sed097_DS7010720.JPG
129	HR07-sed-98B	Bellmaine Reach	044	621,807.1	723,439.9	Yes	-5.5	5.50	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt		black-dark brown		organic	clay	laminated		plant matter		sed098B_D70S11576.JPG	ed098B_D70S10870.JPG
130	HR07-sed-099	Bellmaine Reach	047	621,190.2	727,270.9	Yes	-4.8	4.84	0.0-0.5	Holocene	210	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay	veneer of sand	black		organic	clay		H_2S	plant matter		sed099_D70S11487.JPG	sed099_D70S10853.JPG
131	HR07-sed-100	Bellmaine Reach	046	621,138.2	727,421.2	Yes	-8.2	8.18	0.0-0.5	Holocene	500	Mud	Gray mud		Gray clay and silt		dark gray		organic	silt & clay				shells fragments	sed100_D70S11382.JPG	sed100_D70S10793.JPG
132	HR07-sed-101	Bellmaine Reach	048	620,955.3	727,556.3	Yes	-17.1	17.06	0.0-0.5	Holocene	810	Sand	Sand		Sand		black		organic	sand some silt	fine layers/bands				sed101_D70S11101.JPG	sed101_D70S10851.JPG
133	HR07-sed-102	Bellmaine Reach	049	620,860.3	727,610.9	Yes	-11.2	11.21	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt & sand		black-dark brown	x	organic	clay some sand					sed102_D70S11517.JPG	sed102_DS7010744.JPG
134	HR07-sed-103	Overpeck Creek Reach	050	622,349.2	728,655.8	Yes	-17.8	17.82	0.0-0.5	Holocene	630	Mud	Black & red brown clay		Black & red brown		black & red brown		organic	clay	laminated		plant matter		sed103_D70S11545.JPG	
135	HR07-sed-104	Overpeck Creek Reach	051	622,420.5	729,169.8	Yes	-8.9	8.86	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt		black & dark gray		organic	silt & clay			plant matter		sed104_D70S11422.jpg	sed104_DS7010721.JPG
136	HR07-sed-105	Overpeck Creek Reach	063	622,338.6	729,198.3	Yes	-14.8	14.79	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black & dark gray		organic	clay	laminated	H_2S			sed105_D70S11402.JPG	sed105_D70S10946.JPG
137	HR07-sed-106	Overpeck Creek Reach	052	622,115.9	729,149.5	Yes	-10.0	9.96	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt		black & dark gray		organic	clay some silt			plant matter		sed106_D70S11313.JPG	sed106_D70S10810.JPG
138	HR07-sed-108	Bellmaine Reach	053	622,084.2	731,147.4	Yes	-3.6	3.61	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay					sed108_D70S11582.JPG	sed108_D70S10867.JPG
139	HR07-sed-109	Overpeck Creek Reach	062	621,957.5	731,187.3	Yes	-17.8	17.75	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt	veener of peat	black brown		organic	clay	fine layers/bands		plant matter		sed109_D70S11589.JPG	sed109_D70S10976.JPG
140	HR07-sed-110	Overpeck Creek Reach	054	621,709.3	731,181.7	Yes	-3.7	3.68	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay					sed110_D70S11600.JPG	sed110_D70S10784.JPG
141	HR07-sed-111	Overpeck Creek Reach	055	622,270.9	732,112.0	Yes	-3.4	3.44	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt		black brown		organic	clay			plant matter		sed111_D70S11509.JPG	sed111_DS7010741.JPG
142	HR07-sed-112	Overpeck Creek Reach	061	622,074.0	732,244.3	Yes	-19.2	19.23	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt		black brown		organic	clay					sed112_D70S11555.JPG	sed112_D70S10882.JPG
143	HR07-sed-113	Overpeck Creek Reach	056	621,978.3	732,366.2	Yes	-11.5	11.48	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay		black		organic	clay		H_2S			sed113_D70S11306.jpg	sed113_DS7010726.JPG
144	HR07-sed-114	Overpeck Creek Reach	057	622,502.6	733,755.3	Yes	-5.1	5.07	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt		black brown		organic	clay					sed114_D70S11463.JPG	sed114_D70S10885.JPG
145	HR07-sed-115	Overpeck Creek Reach	058	622,110.6	733,756.2	Yes	-12.0	12.01	0.0-0.5	Holocene	250	Mud	Black gray organic mud		Black to dark gray organic clay & silt	veener plant matter	black & dark gray		organic	clayey silt	fine layers/bands		plant matter		sed115_D70S11387.JPG	sed115_DS7010751.JPG
146	HR07-sed-116	Overpeck Creek Reach	060	622,001.1	733,781.3	Yes	-15.6	15.64	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt		black brown		organic	clay	laminated				sed116_D70S11496.JPG	
147	HR07-sed-117	Overpeck Creek Reach	059	621,843.0	733,802.4	Yes	-3.9	3.91	0.0-0.5	Holocene	300	Mud	Black brown organic mud	clay-rich	Black brown clay with some to little silt		gray & black & brown		organic	clay	laminated				sed117_D70S11366.JPG	sed117_D70S10873.JPG
148	HR07-vc-01	Laurel Hill Reach		605,437.0	698,226.0	Yes	-25.7	25.7	0.0-0.5	Holocene	810	Sand	Sand		Sand	Brown fine sand with plant matter laminations									HR07-vc-01	
149	HR07-vc-02	Lyndhurst Reach		605,877.0	704,137.0	Yes	-11.5	11.5	0.0-0.5	Holocene	500	Mud	Gray mud		Gray clay with plant-matter laminatins										HR07-vc-02	
150	HR07-vc-03	Harmon Cove Reach		609,536.0	714,415.0	Yes	-9.6	9.6	0.0-0.5	Holocene	100	Oily Black "silt"	Black silt		Black organic clay and/or silt w/ oily sheen		black	slight oily sheer	organic	black organic clay & silt					HR07-vc-03	
151	HR07-vc-04	Harmon Cove Reach		609,392.0	714,568.0	Yes	-12.5	12.5	0.0-0.5	Holocene	100	Oily Black "silt"	Black silt		Black organic clay and/or silt w/ oily sheen		black	slight oily sheer	organic	black organic clay & silt					HR07-vc-04	
152	HR07-vc-05	Garrett's Reach		618,886.0	719,663.0	Yes	-15.9	15.9	0.0-0.5	Holocene	200	Mud	Black gray organic mud	clay-rich	Black to dark gray organic clay										HR07-vc-05	
153	HR07-vc-07	Harmon Cove Reach		608,605.0	713,014.0	Yes	-27.0	27	0.0-0.5	Holocene	100	Oily Black "silt"	Black silt		Black organic clay and/or silt w/ oily sheen		black	slight oily sheer	organic	black organic clay & silt					HR07-vc-07	

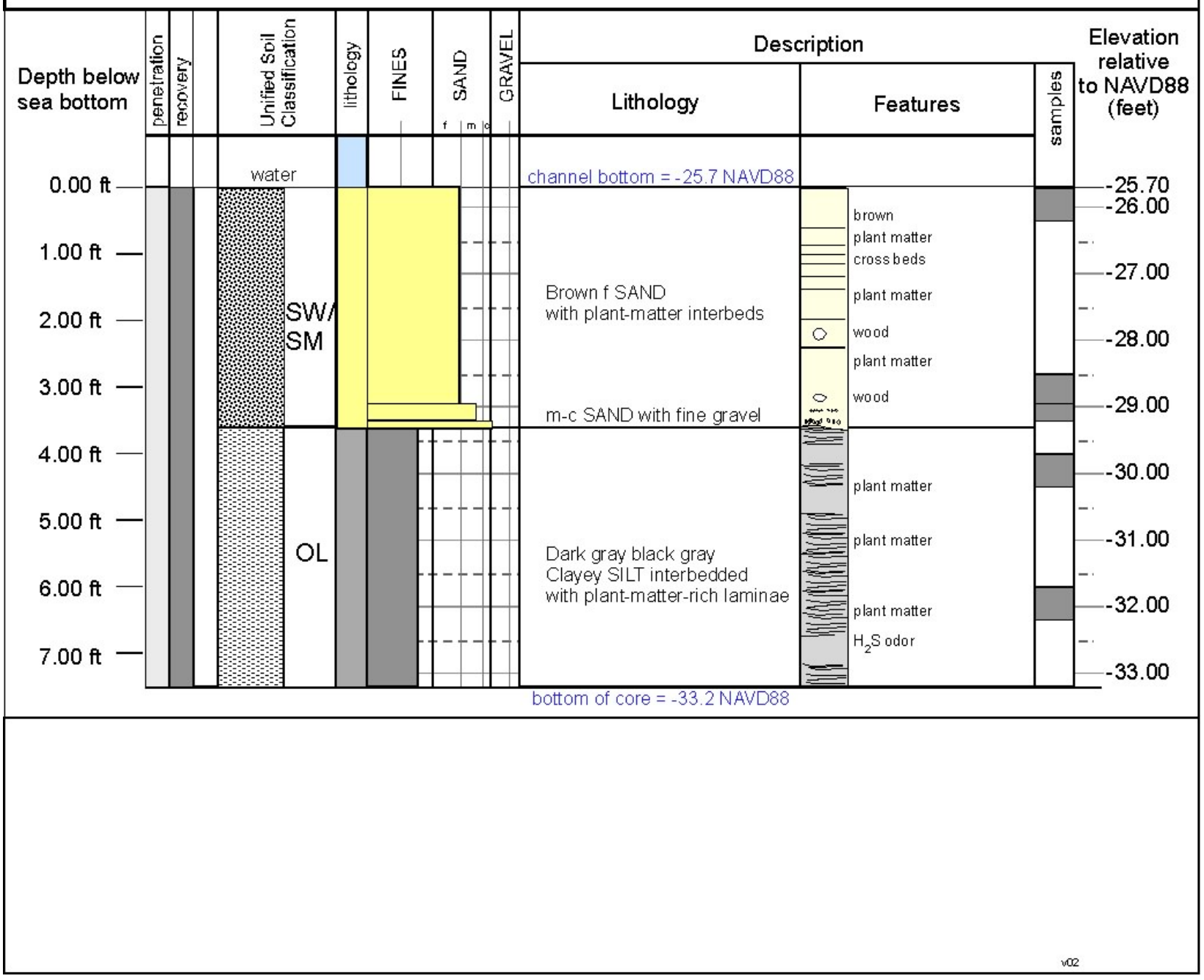
1 Descriptions are based on visual inspection with hand lens and grain-size scale
Mud includes clay and silt.
Clay-rich mud has no visual or tactile evidence of silt (there could be v. fine silts).

2 No recovery due to hard bottom or sand, does not include failed attempts and non recovery due to current or mechanical problems

vibracore: HR07-vc-01
Hackensack River, NJ

Location: Easting 605,437 ft
Northing 698,226 ft
Datum: NAD 83, NJ State Plane ft

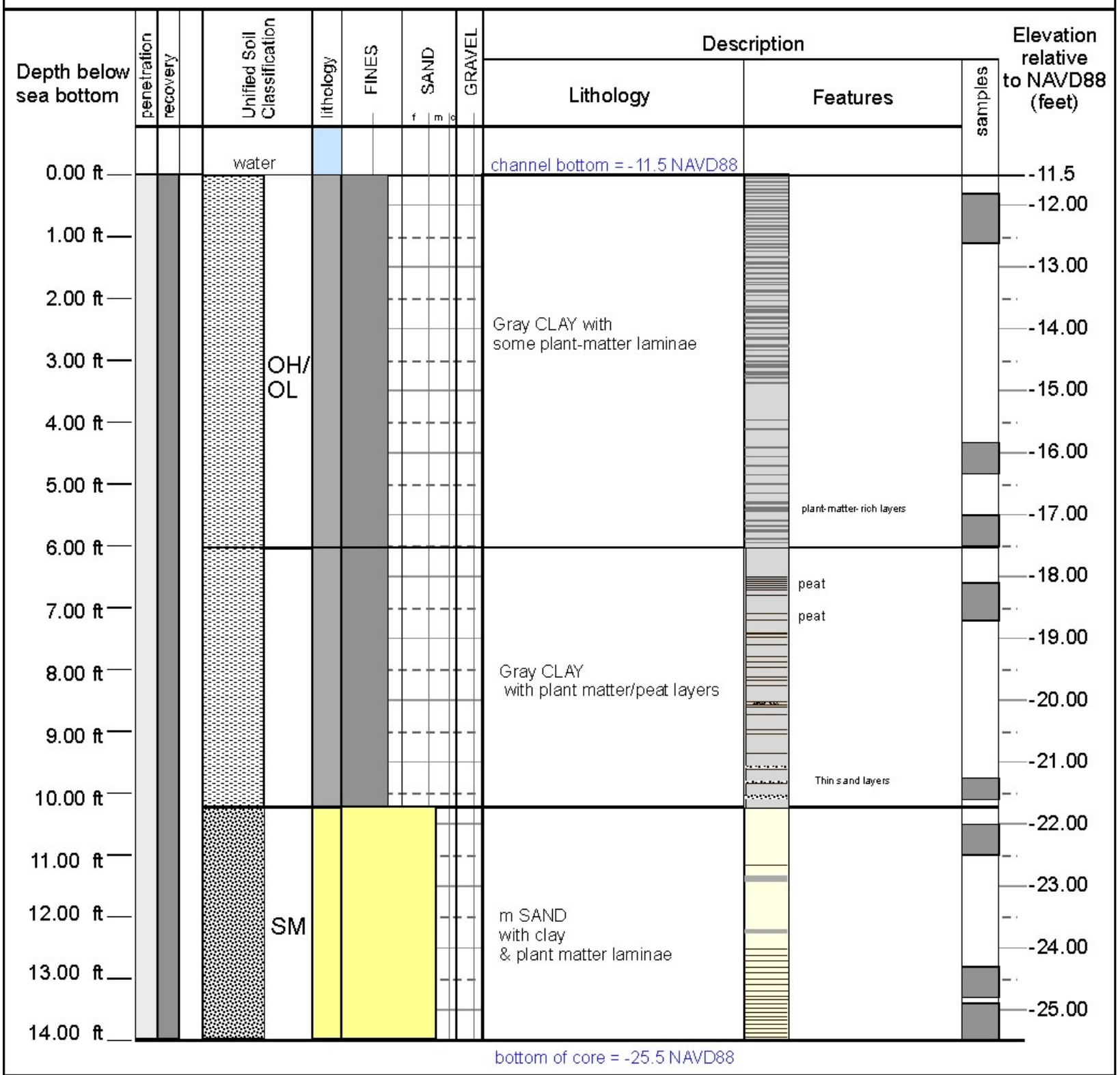
Date Cored: June 15, 2007



vibracore: HR07-vc-02
Hackensack River, NJ

Location: Easting 605,877 ft
Northing 704,237 ft
Datum: NAD 83, NJ State Plane ft

Date Cored: June 15, 2007



v02

vibracore: HR07-vc-03
Hackensack River, NJ

Location: Easting 609,536 ft
Northing 714,415 ft
Datum: NAD 83, NJ State Plane ft.

Date Cored: June 15, 2007

Depth below sea bottom	Unified Soil Classification	Description: Lithology	Description: Features	Elevation relative to NAVD88 (feet)
0.00 ft	water	channel bottom = -9.6 NAVD88		-9.6
1.00 ft	OH	Black to dark gray CLAY oily sheen petroleum odor		-10.00
2.00 ft				-11.00
3.00 ft				-12.00
4.00 ft				-13.00
5.00 ft				-14.00
6.00 ft	OH /OL	Gray Clayey SILT with plant matter		-15.00
7.00 ft				-16.00
8.00 ft			red siltstone clasts	-17.00
9.00 ft				-18.00
10.00 ft		Gray Clayey SILT w/ dark bands with plant matter		-19.00
11.00 ft				-20.00
12.00 ft	OH /OL		peat in clay	-21.00
13.00 ft				-22.00
14.00 ft		Brown-gray clay & silt		-23.00
15.00 ft		w/ dark bands with plant matter with some red clay layers		-24.00
16.00 ft				-25.00

bottom of core = -25.6 NAVD88

penetration
recovery
FINES
SAND (f m c)
GRAVEL
samples

v02

vibracore: HR07-vc-04
Hackensack River, NJ

Location: Easting 609,392 ft
Northing 714,568 ft
Datum: NAD 83, NJ State Plane ft

Date Cored: June 15, 2007

Depth below sea bottom	penetration	recovery	Unified Soil Classification	lithology	FINES	SAND (f m c)	GRAVEL	Description: Lithology	Description: Features	samples	Elevation relative to NAVD88 (feet)
0.00 ft			water					channel bottom = -12.5 NAVD88			-12.50
1.00 ft								Black to dark gray CLAY oily sheen petroleum odor			-13.00
2.00 ft											-14.00
3.00 ft											-15.00
4.00 ft											-16.00
5.00 ft											-17.00
6.00 ft			OH/ OL								-18.00
7.00 ft											-19.00
8.00 ft									Sampled in 2ft intervals for testing (segmented and preserved for future testing)		-20.00
9.00 ft											-21.00
10.00 ft											-22.00
11.00 ft											-23.00
12.00 ft											-24.00
13.00 ft								Dark-gray clay & silt w/ dark bands with plant matter with some oily black layer red clay layers			-25.00
14.00 ft											-26.00
15.00 ft											-27.00
16.00 ft											-28.00
17.00 ft											-29.00
18.00 ft											-30.00
19.00 ft											-31.00
20.00 ft								bottom of core = -31.0 NAVD88			

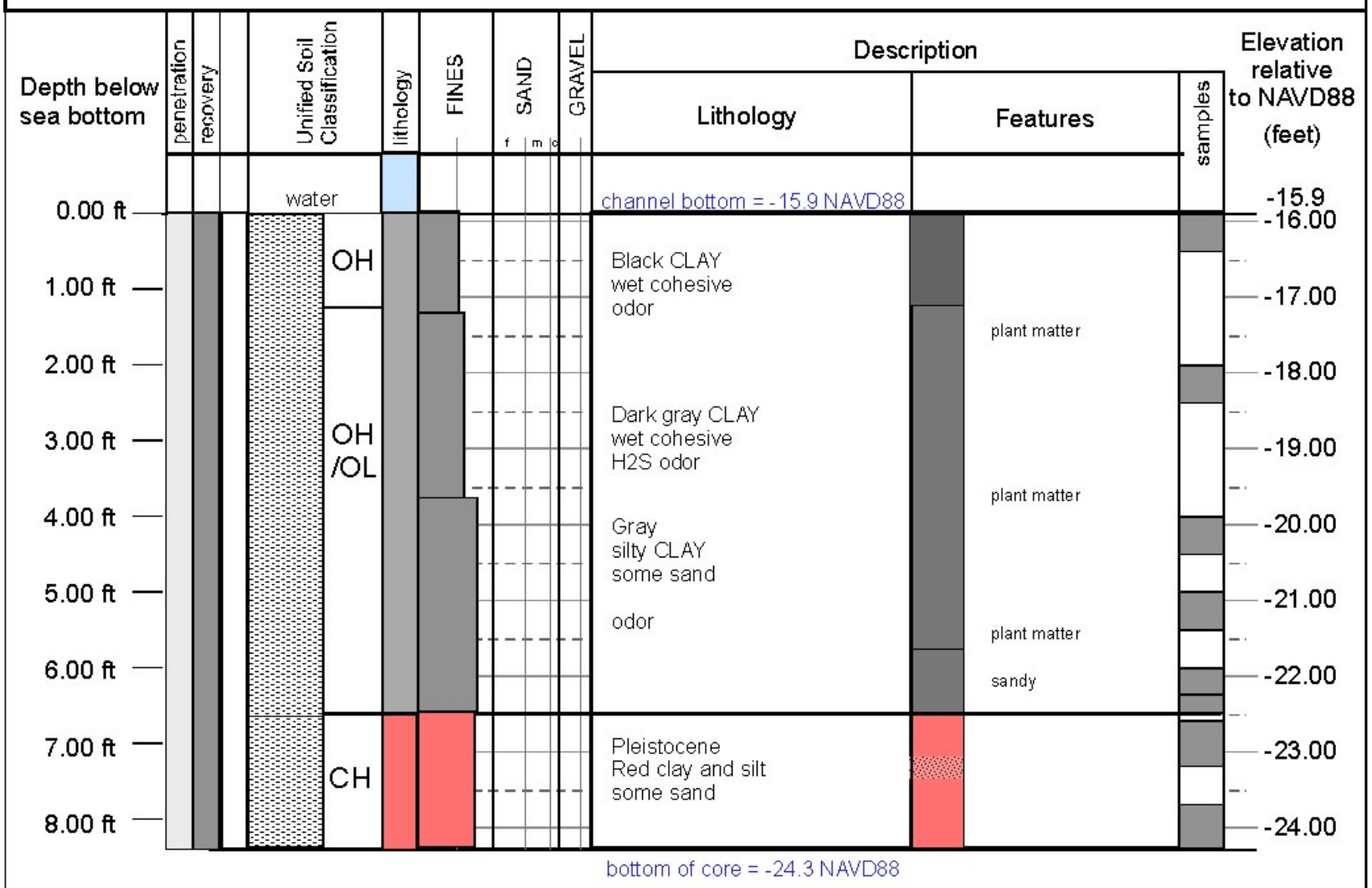
v02

Earthworks, LLC

vibracore: HR07-vc-05
Hackensack River, NJ

Location: Easting 618,886 ft
Northing 719,663 ft
Datum: NAD 83, NJ State Plane ft.

Date Cored: June 15, 2007



v02

vibracore: HR07-vc-07
Hackensack River, NJ

Location: Easting 618,886 ft
Northing 719,663 ft
Datum: NAD 83, NJ State Plane ft.

Date Cored: June 15, 2007

Depth below sea bottom	Unified Soil Classification	Description: Lithology	Description: Features	Elevation relative to NAVD88 (feet)
0.00 ft	water	channel bottom = -27.0 NAVD88		-27.00
1.00 ft	OH	oily black CLAY		-28.00
2.00 ft				-29.00
3.00 ft	OH/ OL	Black to gray gray CLAY little to some silt plant-matter		-30.00
4.00 ft				-31.00
5.00 ft				-32.00
6.00 ft	OL	Dark gray to black laminae CLAY and plant matter		-33.00
7.00 ft				-34.00
8.00 ft				-35.00
9.00 ft				-36.00
10.00 ft				-37.00
11.00 ft				-38.00
12.00 ft				-39.00
13.00 ft				-40.00
14.00 ft	OL	Brown to red brown clayey SILT and plant matter		-41.00
15.00 ft				-42.00
		bottom of core = -42.3 NAVD88		
16.00 ft				
17.00 ft				
18.00 ft				
19.00 ft				
20.00 ft				

penetration
recovery
lithology
FINES
SAND (f m c)
GRAVEL
samples

v02

Appendix VIII.
Historical subsurface data

Table VIII.1 List of historical borings used for subsurface horizons.

Number	Well Name	Easting	Northing	Source
0001	NJGS-OFM13-001	597,825.1	742,301.1	004-003-00
0002	NJGS-OFM13-002	599,818.6	742,021.8	004-003-00
0003	NJGS-OFM13-003	600,052.6	742,214.9	004-003-00
0004	NJGS-OFM13-004	602,123.1	742,832.4	004-003-00
0005	NJGS-OFM13-005	603,038.6	742,761.9	004-003-00
0006	NJGS-OFM13-006	603,970.2	742,702.1	004-003-00
0007	NJGS-OFM13-007	601,824.5	740,814.6	004-003-00
0008	NJGS-OFM13-008	603,316.5	738,777.5	004-003-00
0009	NJGS-OFM13-009	597,432.2	743,248.9	004-003-00
0010	NJGS-OFM13-010	601,909.0	738,007.0	004-003-00
0011	NJGS-OFM13-011	600,683.8	736,762.5	004-003-00
0012	NJGS-OFM13-012	599,832.3	737,124.9	004-003-00
0013	NJGS-OFM13-013	597,230.9	737,562.9	004-003-00
0014	NJGS-OFM13-014	597,239.5	737,387.4	004-003-00
0015	NJGS-OFM13-015	596,973.7	735,393.6	004-003-00
0016	NJGS-OFM13-016	597,485.5	734,724.7	004-003-00
0017	NJGS-OFM13-017	597,757.9	733,563.0	004-003-00
0018	NJGS-OFM13-018	599,829.4	734,137.6	004-003-00
0019	NJGS-OFM13-019	599,677.3	733,710.1	004-003-00
0020	NJGS-OFM13-020	598,839.7	732,596.9	004-003-00
0021	NJGS-OFM13-021	599,208.0	731,745.0	004-003-00
0022	NJGS-OFM13-022	602,535.0	734,203.1	004-003-00
0024	NJGS-OFM13-024	602,281.4	731,172.0	004-003-00
0025	NJGS-OFM13-025	603,428.5	731,457.5	004-003-00
0026	NJGS-OFM13-026	600,662.9	727,418.2	004-003-00
0027	NJGS-OFM13-027	599,980.7	725,613.8	004-003-00
0030	NJGS-OFM13-030	597,153.8	723,382.3	004-003-00
0031	NJGS-OFM13-031	599,058.9	723,305.3	004-003-00
0032	NJGS-OFM13-032	597,473.5	722,551.5	004-003-00
0033	NJGS-OFM13-033	602,695.0	723,972.4	004-003-00
0034	NJGS-OFM13-034	596,541.5	720,648.5	004-003-00
0037	NJGS-OFM13-037	596,562.8	719,453.6	004-003-00
0038	NJGS-OFM13-038	596,166.4	719,270.6	004-003-00
0039	NJGS-OFM13-039	596,361.4	717,276.3	004-003-00
0041	NJGS-OFM13-041	598,362.2	715,524.0	004-003-00
0042	NJGS-OFM13-042	598,913.1	715,144.4	004-003-00
0043	NJGS-OFM13-043	600,048.7	719,155.5	004-003-00
0044	NJGS-OFM13-044	601,595.9	719,678.5	004-003-00
0046	NJGS-OFM13-046	616,492.5	742,058.7	004-003-00
0047	NJGS-OFM13-047	616,622.7	742,045.0	004-003-00
0048	NJGS-OFM13-048	612,315.2	739,736.0	004-003-00
0050	NJGS-OFM13-050	626,984.0	743,925.3	004-003-00
0051	NJGS-OFM13-051	626,247.7	742,274.4	004-003-00
0052	NJGS-OFM13-052	626,454.5	742,215.1	004-003-00
0053	NJGS-OFM13-053	625,859.9	739,824.7	004-003-00
0054	NJGS-OFM13-054	623,514.9	737,807.1	004-003-00
0055	NJGS-OFM13-055	625,550.7	735,562.5	004-003-00
0056	NJGS-OFM13-056	622,477.4	734,971.1	004-003-00
0057	NJGS-OFM13-057	624,325.4	730,492.3	004-003-00
0060	NJGS-OFM13-060	627,976.9	737,617.3	004-003-00
0061	NJGS-OFM13-061	628,373.3	738,534.5	004-003-00
0062	NJGS-OFM13-062	628,760.6	739,151.3	004-003-00
0063	NJGS-OFM13-063	629,498.5	741,085.4	004-003-00
0064	NJGS-OFM13-064	629,498.5	741,085.4	004-003-00
0065	NJGS-OFM13-065	629,750.3	740,700.8	004-003-00
0067	NJGS-OFM13-067	628,338.9	743,630.7	004-003-00
0069	NJGS-OFM13-069	628,095.3	733,914.7	004-003-00
0070	NJGS-OFM13-070	628,615.7	733,177.3	004-003-00
0073	NJGS-OFM13-073	630,159.4	730,058.6	004-003-00
0074	NJGS-OFM13-074	625,963.0	729,461.0	004-003-00
0075	NJGS-OFM13-075	625,840.2	728,825.8	004-003-00
0077	NJGS-OFM13-077	626,959.8	740,042.3	004-003-00
0078	NJGS-OFM13-078	627,002.4	740,631.8	004-003-00
0079	NJGS-OFM13-079	627,137.2	741,131.1	004-003-00

0080	NJGS-OFM13-080	628,057.0	740,728.3	004-003-00
0081	NJGS-OFM13-081	628,048.9	740,123.9	004-003-00
0082	NJGS-OFM13-082	627,833.0	739,775.2	004-003-00
0084	NJGS-OFM13-084	628,844.1	741,488.2	004-003-00
0085	NJGS-OFM13-085	628,934.1	741,806.0	004-003-00
0086	NJGS-OFM13-086	629,334.1	742,050.0	004-003-00
0087	NJGS-OFM13-087	629,802.8	742,324.6	004-003-00
0088	NJGS-OFM13-088	630,271.4	742,614.3	004-003-00
0089	NJGS-OFM13-089	625,592.5	733,531.2	004-003-00
0090	NJGS-OFM13-090	622,794.7	730,484.0	004-003-00
0091	NJGS-OFM13-091	620,367.7	729,541.9	004-003-00
0092	NJGS-OFM13-092	621,002.8	728,530.3	004-003-00
0093	NJGS-OFM13-093	620,819.8	728,229.1	004-003-00
0094	NJGS-OFM13-094	620,837.6	737,149.5	004-003-00
0095	NJGS-OFM13-095	620,614.4	736,247.7	004-003-00
0096	NJGS-OFM13-096	619,820.9	736,457.9	004-003-00
0097	NJGS-OFM13-097	616,686.2	742,359.9	004-003-00
0098	NJGS-OFM13-098	619,340.9	741,058.5	004-003-00
0099	NJGS-OFM13-099	619,644.9	741,031.5	004-003-00
0100	NJGS-OFM13-100	620,843.5	742,152.9	004-003-00
0101	NJGS-OFM13-101	616,152.1	738,583.2	004-003-00
0102	NJGS-OFM13-102	613,266.4	740,512.7	004-003-00
0103	NJGS-OFM13-103	612,470.4	738,518.0	004-003-00
0104	NJGS-OFM13-104	612,601.9	738,134.5	004-003-00
0105	NJGS-OFM13-105	608,980.4	731,555.4	004-003-00
0106	NJGS-OFM13-106	609,936.4	730,411.2	004-003-00
0107	NJGS-OFM13-107	611,397.8	730,959.1	004-003-00
0108	NJGS-OFM13-108	614,853.8	729,198.8	004-003-00
0111	NJGS-OFM13-111	609,490.7	725,931.0	004-003-00
0112	NJGS-OFM13-112	610,836.5	724,775.9	004-003-00
0113	NJGS-OFM13-113	611,618.8	720,654.0	004-003-00
0114	NJGS-OFM13-114	613,450.2	719,148.1	004-003-00
0115	NJGS-OFM13-115	616,667.2	720,716.7	004-003-00
0116	NJGS-OFM13-116	614,039.3	718,052.2	004-003-00
0117	NJGS-OFM13-117	620,328.7	718,420.0	004-003-00
0118	NJGS-OFM13-118	620,821.3	717,707.8	004-003-00
0119	NJGS-OFM13-119	623,811.2	727,215.9	004-003-00
0120	NJGS-OFM13-120	623,499.5	726,642.4	004-003-00
0121	NJGS-OFM13-121	624,477.7	726,461.9	004-003-00
0122	NJGS-OFM13-122	629,178.2	728,089.1	004-003-00
0124	NJGS-OFM13-124	623,412.9	722,567.8	004-003-00
0125	NJGS-OFM13-125	623,230.8	722,095.1	004-003-00
0126	NJGS-OFM13-126	622,812.4	721,149.3	004-003-00
0127	NJGS-OFM13-127	622,685.7	720,462.5	004-003-00
0128	NJGS-OFM13-128	622,883.2	720,091.8	004-003-00
0130	NJGS-OFM13-130	624,759.5	722,589.4	004-003-00
0131	NJGS-OFM13-131	624,900.1	722,704.5	004-003-00
0134	NJGS-OFM13-134	624,763.3	719,901.9	004-003-00
0135	NJGS-OFM13-135	623,362.3	717,878.7	004-003-00
0136	NJGS-OFM13-136	623,072.3	717,262.4	004-003-00
0137	NJGS-OFM13-137	624,078.3	718,039.8	004-003-00
0139	NJGS-OFM13-139	622,393.8	716,172.3	004-003-00
0140	NJGS-OFM13-140	620,498.0	713,103.1	004-003-00
0142	NJGS-OFM13-142	617,607.0	713,302.4	004-003-00
0143	NJGS-OFM13-143	616,864.6	711,883.3	004-003-00
0144	NJGS-OFM13-144	616,412.2	711,109.1	004-003-00
0145	NJGS-OFM13-145	617,230.3	710,498.6	004-003-00
0146	NJGS-OFM13-146	619,662.7	710,797.1	004-003-00
0147	NJGS-OFM13-147	621,561.4	711,321.8	004-003-00
0148	NJGS-OFM13-148	622,092.2	711,624.8	004-003-00
0149	NJGS-OFM13-149	618,987.0	709,106.8	004-003-00
0150	NJGS-OFM13-150	614,541.0	705,380.1	004-003-00
0151	NJGS-OFM13-151	614,702.8	705,455.6	004-003-00
0152	NJGS-OFM13-152	616,436.6	706,348.9	004-003-00
0153	NJGS-OFM13-153	617,033.9	706,437.8	004-003-00
0154	NJGS-OFM13-154	617,587.7	706,512.1	004-003-00

0155	NJGS-OFM13-155	617,990.0	706,485.6	004-003-00
0156	NJGS-OFM13-156	611,271.4	703,870.2	004-003-00
0157	NJGS-OFM13-157	611,240.9	703,486.0	004-003-00
0158	NJGS-OFM13-158	610,819.2	703,451.9	004-003-00
0159	NJGS-OFM13-159	610,035.6	702,797.3	004-003-00
0160	NJGS-OFM13-160	609,460.9	702,538.5	004-003-00
0161	NJGS-OFM13-161	608,757.8	701,969.7	004-003-00
0162	NJGS-OFM13-162	606,128.4	700,463.6	004-003-00
0163	NJGS-OFM13-163	605,505.0	700,183.3	004-003-00
0164	NJGS-OFM13-164	604,832.8	699,924.1	004-003-00
0165	NJGS-OFM13-165	604,885.4	700,841.8	004-003-00
0167	NJGS-OFM13-167	601,755.6	700,454.1	004-003-00
0168	NJGS-OFM13-168	601,164.8	700,142.1	004-003-00
0169	NJGS-OFM13-169	600,428.9	699,616.0	004-003-00
0171	NJGS-OFM13-171	597,841.9	703,104.0	004-003-00
0172	NJGS-OFM13-172	606,982.4	712,011.2	004-003-00
0173	NJGS-OFM13-173	610,396.7	716,924.6	004-003-00
0174	NJGS-OFM13-174	604,285.6	720,032.2	004-003-00
0175	NJGS-OFM13-175	604,088.2	699,536.6	004-003-00
0176	NJGS-OFM13-176	603,699.7	699,342.8	004-003-00
0178	NJGS-OFM13-178	603,415.2	699,458.8	004-003-00
0190	NJGS-OFM13-190	623,889.2	700,827.4	004-003-00
0192	NJGS-OFM13-192	605,169.2	726,981.7	004-003-00
0194	NJGS-OFM13-194	598,336.4	714,297.6	004-003-00
0195	NJGS-OFM13-195	631,125.1	729,731.8	004-003-00
0196	NJGS-OFM13-196	631,055.4	731,424.8	004-003-00
0199	NJGS-OFM13-199	638,284.5	733,702.1	004-003-00
0200	NJGS-OFM13-200	635,147.0	734,604.9	004-003-00
0201	NJGS-OFM13-201	635,020.0	734,740.2	004-003-00
0202	NJGS-OFM13-202	634,945.1	735,767.1	004-003-00
0203	NJGS-OFM13-203	634,689.4	736,339.7	004-003-00
0205	NJGS-OFM13-205	636,304.4	738,691.0	004-003-00
0206	NJGS-OFM13-206	637,755.4	741,555.2	004-003-00
0210	NJGS-OFM13-210	607,202.4	729,289.1	004-003-00
0212	NJGS-OFM13-212	598,283.0	713,539.9	004-003-00
0214	NJGS-OFM13-214	597,955.0	708,780.2	004-003-00
0215	NJGS-OFM13-215	596,358.1	704,815.2	004-003-00
0216	NJGS-OFM13-216	596,933.8	706,759.4	004-003-00
0217	NJGS-OFM13-217	600,180.6	706,197.5	004-003-00
0219	NJGS-OFM13-219	601,728.5	738,037.2	004-003-00
0220	NJGS-OFM13-220	610,729.7	741,646.1	004-003-00
0221	NJGS-OFM13-221	611,172.3	742,235.0	004-003-00
0222	NJGS-OFM13-222	611,910.4	742,003.9	004-003-00
0223	NJGS-OFM13-223	614,489.4	743,320.7	004-003-00
0224	NJGS-OFM13-224	614,152.5	743,404.8	004-003-00
0225	NJGS-OFM13-225	614,536.6	742,563.3	004-003-00
0226	NJGS-OFM13-226	614,494.0	742,405.9	004-003-00
0227	NJGS-OFM13-227	616,014.8	742,099.1	004-003-00
0228	NJGS-OFM13-228	617,010.6	721,519.0	004-003-00
0229	NJGS-OFM13-229	629,085.3	735,340.4	004-003-00
0230	NJGS-OFM13-230	613,548.3	740,557.0	004-003-00
0231	NJGS-OFM13-231	614,448.5	740,675.9	004-003-00
0232	NJGS-OFM13-232	612,654.5	738,659.2	004-003-00
0233	NJGS-OFM13-233	617,778.9	736,733.1	004-003-00
0234	NJGS-OFM13-234	617,475.2	734,587.3	004-003-00
0235	NJGS-OFM13-235	617,777.0	732,916.3	004-003-00
0236	NJGS-OFM13-236	617,529.4	732,500.5	004-003-00
0237	NJGS-OFM13-237	620,337.5	733,201.3	004-003-00
0238	NJGS-OFM13-238	618,755.1	730,619.8	004-003-00
0239	NJGS-OFM13-239	602,097.6	730,986.8	004-003-00
0240	NJGS-OFM13-240	602,673.6	726,756.2	004-003-00
0241	NJGS-OFM13-241	604,173.5	726,753.1	004-003-00
0242	NJGS-OFM13-242	604,456.3	726,935.8	004-003-00
0244	NJGS-OFM13-244	606,251.3	724,132.8	004-003-00
0245	NJGS-OFM13-245	605,854.2	725,611.5	004-003-00
0246	NJGS-OFM13-246	603,075.5	721,203.2	004-003-00

0247	NJGS-OFM13-247	596,592.1	705,115.0	004-003-00
0248	NJGS-OFM13-248	597,866.5	704,907.1	004-003-00
0249	NJGS-OFM13-249	598,067.1	702,224.2	004-003-00
0250	NJGS-OFM13-250	599,703.4	699,681.2	004-003-00
0252	NJGS-OFM13-252	611,152.6	701,629.2	004-003-00
0253	NJGS-OFM13-253	612,563.7	700,099.9	004-003-00
0254	NJGS-OFM13-254	612,883.0	699,504.0	004-003-00
0255	NJGS-OFM13-255	612,395.3	716,070.2	004-003-00
0256	NJGS-OFM13-256	617,478.1	717,087.4	004-003-00
0257	NJGS-OFM13-257	618,576.0	709,085.8	004-003-00
0261	NJGS-OFM13-261	624,102.8	727,517.7	004-003-00
0262	NJGS-OFM13-262	624,798.9	725,320.0	004-003-00
0263	NJGS-OFM13-263	623,563.1	716,893.4	004-003-00
0265	NJGS-OFM13-265	622,424.5	700,319.2	004-003-00
0266	HR07-vc-01	605,437.0	698,226.0	001-000-00
0267	HR07-vc-02	605,877.0	704,137.0	001-000-00
0268	HR07-vc-03	609,536.0	714,415.0	001-000-00
0269	HR07-vc-04	609,392.0	714,568.0	001-000-00
0270	HR07-vc-05	618,886.0	719,663.0	001-000-00
0271	HR07-vc-07	608,605.0	713,014.0	001-000-00
0272	EW_database-4B-31	593,850.6	675,698.9	002-000-00
0273	EW_database-4C-10	590,910.6	678,759.1	002-000-00
0274	EW_database-4C-11	590,661.4	678,622.6	002-000-00
0275	EW_database-4C-15	588,337.5	679,641.9	002-000-00
0276	EW_database-4C-7	591,138.6	678,748.7	002-000-00
0277	EW_database-4C-8	591,356.2	678,567.3	002-000-00
0278	EW_database-4C-9	591,139.8	678,335.7	002-000-00
0279	EW_database-DH-54	591,094.2	678,539.8	002-000-00
0280	EW_database-DH-55	588,507.6	679,687.6	002-000-00
0281	EW_database-E-00-7-4	586,990.6	675,243.8	002-000-00
0282	EW_database-E-98-18	587,001.0	675,578.0	002-000-00
0283	EW_database-E-98-19	587,202.0	675,579.0	002-000-00
0284	EW_database-KVK-37741	593,888.0	675,906.8	002-000-00
0285	EW_database-KVK-37754	591,316.7	678,289.4	002-000-00
0286	EW_database-KVK-37755	590,932.1	678,459.1	002-000-00
0287	EW_database-KVK-37756	590,715.0	678,934.5	002-000-00
0288	EW_database-KVK-37757	590,431.7	678,768.0	002-000-00
0289	EW_database-KVK-37758	588,979.9	679,333.7	002-000-00
0290	EW_database-KVK-37759	588,939.6	679,716.8	002-000-00
0291	EW_database-KVK-37742	593,720.4	676,115.1	002-000-00
0292	EW_database-KVK-37760	588,366.0	679,909.8	002-000-00
0293	EW_database-KVK-37761	588,200.7	679,728.2	002-000-00
0294	EW_database-KVK-95-55	587,170.1	675,145.5	002-000-00
0295	EW_database-KVK-95-63	593,750.0	675,908.0	002-000-00
0296	EW_database-KVK-95-66	590,441.0	678,929.0	002-000-00
0297	EW_database-KVK-95-67	589,211.5	679,653.3	002-000-00
0298	EW_database-KVK-95-68	588,637.8	679,784.3	002-000-00
0299	EW_database-KVK-95-70	588,758.5	679,637.1	002-000-00
0300	EW_database-PA-3-022	594,714.1	675,466.3	003-000-00
0301	EW_database-PA-3-023	594,726.9	676,937.1	003-000-00
0302	EW_database-PA-3-025	596,095.9	678,624.4	003-000-00
0303	EW_database-PA-3-044	597,004.6	675,296.0	003-000-00
0304	EW_database-PA-3-047	597,658.4	676,823.6	003-000-00
0305	EW_database-PA-3-089	594,710.9	675,897.2	003-000-00
0306	EW_database-PA-3-095	594,365.8	675,858.9	003-000-00
0307	EW_database-PA-3-098	594,710.9	675,897.2	003-000-00
0308	EW_database-PA-3-099	595,087.8	675,884.5	003-000-00
0309	EW_database-PA-3-100	594,486.9	676,413.6	003-000-00
0310	EW_database-PA-3-103	595,111.7	676,361.4	003-000-00
0311	EW_database-PA-3-104	596,059.1	678,165.5	003-000-00
0312	EW_database-PA-3-106	597,009.8	676,461.8	003-000-00
0313	EW_database-PA-3-110	594,849.2	676,574.9	003-000-00
0314	EW_database-PA-3-111	595,330.7	676,377.0	003-000-00
0315	EW_database-PA-3-112	594,795.8	676,909.0	003-000-00
0316	EW_database-PA-3-113	595,797.3	678,306.0	003-000-00
0317	EW_database-PA-3-134	595,924.9	677,527.8	003-000-00

0318	EW_database-PA-3-135	595,950.5	677,872.7	003-000-00
0319	EW_database-PA-3-136	595,447.4	677,792.7	003-000-00
0320	EW_database-PA-3-137	595,741.7	677,975.1	003-000-00
0321	EW_database-PA-3-138	595,701.1	678,173.2	003-000-00
0322	EW_database-PA-3-139	596,228.8	678,054.2	003-000-00
0323	EW_database-PA-3-145A	594,826.7	676,875.9	003-000-00
0324	EW_database-PN-98-3	593,895.0	675,553.0	002-000-00
0325	EW_database-PN-98-4	593,508.0	675,365.0	002-000-00
0326	EW_database-PN-98-5	593,433.0	676,185.0	002-000-00
0327	EW_database-PNP-98-16	592,798.0	675,457.0	002-000-00
0328	NJ-OFM20-003	599,635.0	697,535.0	004-002-00
0329	NJ-OFM20-004	596,339.4	696,185.6	004-002-00
0330	NJ-OFM20-006	607,076.0	697,193.8	004-002-00
0331	NJ-OFM20-009	600,803.0	692,318.0	004-002-00
0332	NJ-OFM20-010	602,981.3	689,813.4	004-002-00
0333	NJ-OFM20-011	601,822.6	689,418.8	004-002-00
0334	NJ-OFM20-012	601,835.9	678,734.0	004-002-00
0335	NJ-OFM20-013	612,943.9	695,776.2	004-002-00
0336	NJ-OFM20-014	622,134.3	692,445.4	004-002-00
0337	NJ-OFM20-015	622,026.5	691,576.5	004-002-00
0338	NJ-OFM20-016	622,536.7	691,233.7	004-002-00
0339	NJ-OFM20-017	597,983.2	678,462.4	004-002-00
0340	NJ-OFM20-018	621,966.2	690,484.0	004-002-00
0341	NJ-OFM20-019	622,691.0	690,367.1	004-002-00
0342	NJ-OFM20-020	623,021.8	690,337.2	004-002-00
0343	NJ-OFM20-021	622,277.3	689,874.6	004-002-00
0344	NJ-OFM20-022	621,825.8	689,898.5	004-002-00
0345	NJ-OFM20-023	620,996.5	689,769.0	004-002-00
0346	NJ-OFM20-024	620,908.1	689,450.0	004-002-00
0347	NJ-OFM20-025	621,763.5	689,558.9	004-002-00
0348	NJ-OFM20-026	621,160.7	689,174.7	004-002-00
0349	NJ-OFM20-027	621,728.0	688,989.9	004-002-00
0350	NJ-OFM20-029	623,451.7	690,626.1	004-002-00
0351	NJ-OFM20-030	624,727.4	690,329.0	004-002-00
0352	NJ-OFM20-031	626,462.2	689,986.3	004-002-00
0353	NJ-OFM20-033	622,493.9	689,155.6	004-002-00
0354	NJ-OFM20-034	621,024.0	689,267.9	004-002-00
0355	NJ-OFM20-035	619,361.4	690,465.2	004-002-00
0356	NJ-OFM20-037	621,086.4	685,056.7	004-002-00
0357	NJ-OFM20-039	620,784.0	684,359.0	004-002-00
0358	NJ-OFM20-040	619,669.1	683,648.2	004-002-00
0359	NJ-OFM20-041	616,264.1	683,636.1	004-002-00
0360	NJ-OFM20-043	620,107.8	682,442.0	004-002-00
0361	NJ-OFM20-044	619,621.2	682,123.4	004-002-00
0362	NJ-OFM20-045	619,071.9	681,715.3	004-002-00
0363	NJ-OFM20-046	618,015.7	680,747.5	004-002-00
0364	NJ-OFM20-046	616,542.2	678,696.5	004-002-00
0365	NJ-OFM20-047	617,258.7	679,619.7	004-002-00
0366	NJ-OFM20-049	616,113.3	677,885.3	004-002-00
0367	NJ-OFM20-050	615,469.4	676,816.2	004-002-00
0368	NJ-OFM20-063	611,073.8	684,029.2	004-002-00
0369	NJ-OFM20-064	605,051.1	686,106.0	004-002-00
0370	NJ-OFM20-065	604,684.7	686,347.3	004-002-00
0371	NJ-OFM20-067	623,503.6	695,580.4	004-002-00
0372	NJ-OFM20-073	599,122.8	694,139.6	004-002-00
0373	NJ-OFM20-076	600,276.4	695,696.8	004-002-00
0374	NJ-OFM20-077	597,434.1	692,218.2	004-002-00
0375	NJ-OFM20-078	605,142.2	692,917.1	004-002-00
0376	NJ-OFM20-079	604,272.0	693,065.9	004-002-00
0377	NJ-OFM20-080	603,280.5	692,978.0	004-002-00
0378	NJ-OFM20-081	601,625.1	692,832.3	004-002-00
0379	NJ-OFM20-082	600,771.3	692,583.9	004-002-00
0380	NJ-OFM20-084	599,685.7	692,957.5	004-002-00
0381	NJ-OFM20-085	599,114.2	692,748.8	004-002-00
0382	NJ-OFM20-086	598,364.8	693,033.2	004-002-00
0383	NJ-OFM20-087	596,709.6	692,925.1	004-002-00

0384	NJ-OFM20-088	612,425.6	697,193.5	004-002-00
0385	NJ-OFM20-089	604,571.1	685,882.5	004-002-00
0386	NJ-OFM20-091	602,743.2	686,564.0	004-002-00
0387	NJ-OFM20-092	601,673.7	687,116.8	004-002-00
0388	NJ-OFM20-093	602,185.4	686,910.6	004-002-00
0389	NJ-OFM20-094	600,498.0	687,436.9	004-002-00
0390	NJ-OFM20-095	599,054.9	687,865.8	004-002-00
0391	NJ-OFM20-096	597,375.2	688,399.7	004-002-00
0392	NJ-OFM20-098	601,601.2	682,260.9	004-002-00
0393	NJ-OFM20-101	604,824.1	692,429.6	004-002-00
0394	NJ-OFM20-106	619,468.4	691,558.3	004-002-00
0395	NJ-OFM20-110	613,038.4	681,363.3	004-002-00
0396	NJ-OFM20-111	614,450.0	691,471.5	004-002-00
0397	NJ-OFM20-115	610,422.1	697,343.8	004-002-00
0398	NJ-OFM20-116	610,343.9	697,949.9	004-002-00
0399	NJ-OFM20-117	610,678.6	698,146.7	004-002-00
0400	NJ-OFM20-123	621,384.8	685,231.5	004-002-00
0401	NJ-OFM20-124	605,232.9	681,380.8	004-002-00
0402	NJ-OFM20-125	605,294.1	681,194.7	004-002-00
0403	NJ-OFM20-127	613,007.1	680,028.1	004-002-00
0404	NJ-OFM20-128	613,925.1	693,017.7	004-002-00
0405	NJ-OFM20-129	602,660.1	691,773.4	004-002-00
0406	NJ-OFM20-131	603,848.3	693,976.8	004-002-00
0407	NJ-OFM20-132	604,732.7	694,101.4	004-002-00
0408	NJ-OFM20-134	608,696.7	675,502.0	004-002-00
0409	NJ-OFM20-135	607,820.0	675,518.8	004-002-00
0410	NJ-OFM20-136	611,461.8	680,606.0	004-002-00
0411	NJ-OFM20-140	606,963.8	696,662.9	004-002-00
0412	NJ-OFM20-141	600,271.3	677,550.3	004-002-00
0413	NJ-OFM20-143	616,823.6	686,036.9	004-002-00
0414	NJ-OFM20-144	616,183.2	684,357.8	004-002-00
0415	NJ-OFM20-145	615,957.2	684,450.3	004-002-00
0416	NJ-OFM20-122-(?)	596,789.5	696,210.1	004-002-00
0417	NJ-OFM20-2-(?)	601,662.2	698,327.2	004-002-00
0418	NJ-OFM20-5-(?)	603,042.5	696,829.3	004-002-00
0419	NJ-OFM20-85-(?)	600,304.4	692,870.0	004-002-00
0420	NJ-OFM20-89-(?)	604,571.1	685,878.7	004-002-00
0421	NJ-OFM20-97-(?)	596,947.6	688,541.8	004-002-00
0422	NJ-OF-M20-1000S-001	598,048.3	697,855.2	004-002-00
0423	NJ-OF-M20-1000S-002	597,410.8	696,498.3	004-002-01
0424	NJ-OF-M20-1000S-003	597,063.7	696,292.7	004-002-01
0425	NJ-OF-M20-1000S-004	596,892.9	695,795.8	004-002-01
0426	NJ-OF-M20-1000S-005	596,937.9	694,890.2	004-002-01
0427	NJ-OF-M20-1000S-006	596,602.5	694,100.9	004-002-01
0428	NJ-OF-M20-1000S-007	596,492.3	692,572.0	004-002-01
0429	NJ-OF-M20-1000S-008	597,414.5	693,049.8	004-002-01
0430	NJ-OF-M20-1000S-009	597,605.2	692,854.0	004-002-01
0431	NJ-OF-M20-1000S-010	597,849.1	693,091.6	004-002-01
0432	NJ-OF-M20-1000S-012	599,280.7	693,037.0	004-002-01
0433	NJ-OF-M20-1000S-013	599,473.8	692,329.3	004-002-01
0434	NJ-OF-M20-1000S-014	600,087.8	692,947.4	004-002-01
0435	NJ-OF-M20-1000S-015	600,137.4	692,475.1	004-002-01
0436	NJ-OF-M20-1000S-016	601,306.1	692,868.1	004-002-01
0437	NJ-OF-M20-1000S-017	601,165.8	692,410.3	004-002-01
0438	NJ-OF-M20-1000S-018	601,954.6	692,848.2	004-002-01
0439	NJ-OF-M20-1000S-019	602,571.1	692,922.5	004-002-01
0440	NJ-OF-M20-1000S-020	602,934.8	692,932.2	004-002-01
0441	NJ-OF-M20-1000S-021	603,503.3	693,076.8	004-002-01
0442	NJ-OF-M20-1000S-022	603,796.0	693,038.7	004-002-01
0443	NJ-OF-M20-1000S-023	604,673.1	693,097.2	004-002-01
0444	NJ-OF-M20-1000S-024	605,375.9	693,178.3	004-002-01
0445	NJ-OF-M20-1000S-025	605,771.6	693,030.0	004-002-01
0446	NJ-OF-M20-1000S-026	605,912.4	693,345.2	004-002-01
0447	NJ-OF-M20-1000S-027	606,197.7	693,110.0	004-002-01
0448	NJ-OF-M20-1000S-028	606,338.5	693,425.0	004-002-01
0449	NJ-OF-M20-1000S-029	606,568.5	693,197.5	004-002-01

0450	NJ-OF-M20-1000S-030	606,748.8	693,496.8	004-002-01
0451	NJ-OF-M20-1000S-031	606,962.7	693,340.1	004-002-01
0452	NJ-OF-M20-1000S-032	607,127.4	693,599.9	004-002-01
0453	NJ-OF-M20-1000S-033	607,475.4	693,451.4	004-002-01
0454	NJ-OF-M20-1000S-034	607,711.0	693,742.7	004-002-01
0455	NJ-OF-M20-1000S-035	608,011.7	693,562.8	004-002-01
0456	NJ-OF-M20-1000S-036	608,168.4	693,853.7	004-002-01
0457	NJ-OF-M20-1000S-037	608,398.1	693,634.4	004-002-01
0458	NJ-OF-M20-1000S-038	608,578.4	693,948.9	004-002-01
0459	NJ-OF-M20-1000S-039	608,863.1	693,792.7	004-002-01
0460	NJ-OF-M20-1000S-040	609,232.6	694,146.8	004-002-01
0461	NJ-OF-M20-1000S-041	609,714.6	693,928.5	004-002-01
0462	NJ-OF-M20-1000S-042	597,586.5	691,845.5	004-002-01
0463	NJ-OF-M20-1000S-043	598,243.2	691,723.3	004-002-01
0464	NJ-OF-M20-1000S-044	601,540.3	691,774.3	004-002-01
0465	NJ-OF-M20-1000S-045	600,470.3	690,499.5	004-002-01
0466	NJ-OF-M20-1000S-046	601,813.6	690,743.7	004-002-01
0467	NJ-OF-M20-1000S-047	602,114.6	690,611.5	004-002-01
0468	NJ-OF-M20-1000S-048	602,415.5	690,510.8	004-002-01
0469	NJ-OF-M20-1000S-049	602,700.6	690,417.8	004-002-01
0470	NJ-OF-M20-1000S-050	602,985.6	690,348.5	004-002-01
0471	NJ-OF-M20-1000S-051	603,207.4	690,263.1	004-002-01
0472	NJ-OF-M20-1000S-052	603,405.4	690,185.4	004-002-01
0473	NJ-OF-M20-1000S-053	603,627.0	690,131.5	004-002-01
0474	NJ-OF-M20-1000S-054	603,904.8	689,888.9	004-002-01
0475	NJ-OF-M20-1000S-055	604,166.2	689,787.9	004-002-01
0476	NJ-OF-M20-1000S-056	604,396.2	689,623.9	004-002-01
0477	NJ-OF-M20-1000S-057	604,681.6	689,460.1	004-002-01
0478	NJ-OF-M20-1000S-058	604,974.6	689,367.3	004-002-01
0479	NJ-OF-M20-1000S-059	596,455.2	688,710.4	004-002-01
0480	NJ-OF-M20-1000S-060	596,763.7	688,609.8	004-002-01
0481	NJ-OF-M20-1000S-061	597,183.0	688,470.4	004-002-01
0482	NJ-OF-M20-1000S-062	597,665.5	688,307.7	004-002-01
0483	NJ-OF-M20-1000S-063	601,177.8	687,272.4	004-002-01
0484	NJ-OF-M20-1000S-064	601,470.5	687,179.6	004-002-01
0485	NJ-OF-M20-1000S-065	601,937.4	686,985.3	004-002-01
0486	NJ-OF-M20-1000S-066	602,348.6	686,877.4	004-002-01
0487	NJ-OF-M20-1000S-067	596,262.0	685,682.4	004-002-01
0488	NJ-OF-M20-1000S-068	596,445.7	685,115.9	004-002-01
0489	NJ-OF-M20-1000S-069	596,448.1	684,445.9	004-002-01
0490	NJ-OF-M20-1000S-070	596,606.7	684,241.8	004-002-01
0491	NJ-OF-M20-1000S-071	597,271.9	683,591.4	004-002-01
0492	NJ-OF-M20-1000S-073	602,704.4	682,992.2	004-002-01
0493	NJ-OF-M20-1000S-074	599,788.6	680,964.4	004-002-01
0494	NJ-OF-M20-1000S-075	596,403.2	679,101.0	004-002-01
0495	NJ-OF-M20-1000S-076	598,289.2	678,480.8	004-002-01
0496	NJ-OF-M20-1000S-077	598,549.7	678,340.3	004-002-01
0497	NJ-OF-M20-1000S-078	599,978.2	677,504.6	004-002-01
0498	NJ-OF-M20-1000S-082	608,980.8	696,091.8	004-002-01
0499	NJ-OF-M20-1000S-083	609,360.4	695,919.5	004-002-01
0500	NJ-OF-M20-1000S-084	609,952.6	695,818.3	004-002-01
0501	NJ-OF-M20-1000S-086	607,570.8	695,219.4	004-002-01
0502	NJ-OF-M20-1000S-087	607,927.4	694,905.6	004-002-01
0503	NJ-OF-M20-1000S-088	604,768.3	686,174.5	004-002-01
0504	NJ-OF-M20-1000S-089	605,345.5	685,744.3	004-002-01
0505	NJ-OF-M20-1000S-090	611,137.2	698,288.1	004-002-01
0506	NJ-OF-M20-1000S-092	612,733.8	697,620.2	004-002-01
0507	NJ-OF-M20-1000S-094	611,514.7	695,673.6	004-002-01
0508	NJ-OF-M20-2000S-001	599,908.8	697,713.7	004-002-02
0509	NJ-OF-M20-2000S-002	599,363.9	697,472.8	004-002-02
0510	NJ-OF-M20-2000S-003	599,672.9	697,357.7	004-002-02
0511	NJ-OF-M20-2000S-004	599,040.5	697,218.8	004-002-02
0512	NJ-OF-M20-2000S-005	600,314.3	697,214.3	004-002-02
0513	NJ-OF-M20-2000S-006	600,669.9	697,296.2	004-002-02
0514	NJ-OF-M20-2000S-007	598,684.6	697,075.1	004-002-02
0515	NJ-OF-M20-2000S-008	599,365.9	696,970.2	004-002-02

0516	NJ-OF-M20-2000S-009	600,157.3	696,922.0	004-002-02
0517	NJ-OF-M20-2000S-010	601,445.9	697,067.6	004-002-02
0518	NJ-OF-M20-2000S-011	600,561.9	696,626.8	004-002-02
0519	NJ-OF-M20-2000S-012	601,099.5	696,686.7	004-002-02
0520	NJ-OF-M20-2000S-013	601,645.0	696,739.0	004-002-02
0521	NJ-OF-M20-2000S-014	598,279.5	695,541.8	004-002-02
0522	NJ-OF-M20-2000S-015	597,829.6	695,295.8	004-002-02
0523	NJ-OF-M20-2000S-016	598,668.2	695,363.0	004-002-02
0524	NJ-OF-M20-2000S-017	598,298.0	695,007.1	004-002-02
0525	NJ-OF-M20-2000S-018	598,654.1	695,009.0	004-002-02
0526	NJ-OF-M20-2000S-020	600,734.6	695,093.7	004-002-02
0527	NJ-OF-M20-2000S-021	601,763.2	695,006.5	004-002-02
0528	NJ-OF-M20-2000S-022	599,756.1	694,551.6	004-002-02
0529	NJ-OF-M20-2000S-023	600,571.1	694,509.9	004-002-02
0530	NJ-OF-M20-2000S-024	601,583.9	694,406.3	004-002-02
0531	NJ-OF-M20-2000S-025	598,228.9	691,400.2	004-002-02
0532	NJ-OF-M20-2000S-026	599,306.0	690,981.1	004-002-02
0533	NJ-OF-M20-2000S-027	602,229.4	691,518.2	004-002-02
0534	NJ-OF-M20-2000S-032	609,975.9	698,328.9	004-002-02
0535	NJ-OF-M20-2000S-033	610,103.2	698,077.2	004-002-02
0536	NJ-OF-M20-2000S-034	606,142.0	695,037.1	004-002-02
0537	NJ-OF-M20-2000S-035	604,869.4	687,121.1	004-002-02
0538	NJ-OF-M20-2000S-060	617,616.0	692,930.8	004-002-02
0539	NJ-OF-M20-2000S-061	618,024.9	691,400.0	004-002-02
0540	NJ-OF-M20-2000S-062	617,700.8	691,460.8	004-002-02
0541	NJ-OF-M20-2000S-063	617,400.6	691,490.3	004-002-02
0542	NJ-OF-M20-2000S-064	616,966.0	691,534.6	004-002-02
0543	NJ-OF-M20-2000S-065	616,713.2	691,564.3	004-002-02
0544	NJ-OF-M20-2000S-066	616,265.1	691,066.0	004-002-02
0545	NJ-OF-M20-2000S-067	615,999.6	690,349.0	004-002-02
0546	NJ-OF-M20-2000S-068	615,898.3	690,010.3	004-002-02
0547	NJ-OF-M20-2000S-069	615,946.9	689,664.9	004-002-02
0548	NJ-OF-M20-2000S-070	615,680.8	689,057.9	004-002-02
0549	NJ-OF-M20-2000S-071	615,548.5	688,546.1	004-002-02
0550	NJ-OF-M20-2000S-072	615,470.9	688,160.4	004-002-02
0551	NJ-OF-M20-2000S-073	615,292.4	687,270.9	004-002-02
0552	NJ-OF-M20-2000S-074	615,152.0	686,766.6	004-002-02
0553	NJ-OF-M20-2000S-075	615,602.4	686,557.6	004-002-02
0554	NJ-OF-M20-2000S-076	615,232.7	686,169.6	004-002-02
0555	NJ-OF-M20-2000S-077	614,957.1	685,986.7	004-002-02
0556	NJ-OF-M20-2000S-078	615,336.0	685,942.3	004-002-02
0557	NJ-OF-M20-2000S-079	615,447.2	685,722.9	004-002-02
0558	NJ-OF-M20-2000S-080	612,710.2	685,270.4	004-002-02
0559	NJ-OF-M20-2000S-081	615,559.0	685,291.1	004-002-02
0560	NJ-OF-M20-2000S-082	615,686.1	685,008.8	004-002-02
0561	NJ-OF-M20-2000S-083	615,695.1	684,654.9	004-002-02
0562	NJ-OF-M20-2000S-084	615,515.3	684,063.3	004-002-02
0563	NJ-OF-M20-2000S-085	615,649.9	683,922.7	004-002-02
0564	NJ-OF-M20-2000S-086	615,106.4	683,580.0	004-002-02
0565	NJ-OF-M20-2000S-087	613,740.5	683,695.7	004-002-02
0566	NJ-OF-M20-2000S-088	614,460.2	683,197.2	004-002-02
0567	NJ-OF-M20-2000S-089	614,247.7	682,959.4	004-002-02
0568	NJ-OF-M20-2000S-090	611,816.1	682,941.3	004-002-02
0569	NJ-OF-M20-2000S-091	612,537.5	681,678.3	004-002-02
0570	NJ-OF-M20-2000S-092	612,411.6	681,472.5	004-002-02
0571	NJ-OF-M20-2000S-093	612,167.4	681,155.4	004-002-02
0572	NJ-OF-M20-2000S-094	609,545.3	681,010.1	004-002-02
0573	NJ-OF-M20-2000S-095	609,853.4	680,965.0	004-002-02
0574	NJ-OF-M20-2000S-096	610,058.9	680,903.5	004-002-02
0575	NJ-OF-M20-2000S-097	610,169.2	681,038.3	004-002-02
0576	NJ-OF-M20-2000S-098	610,398.4	681,000.5	004-002-02
0577	NJ-OF-M20-2000S-099	610,666.9	681,002.5	004-002-02
0578	NJ-OF-M20-2000S-100	611,164.9	680,809.1	004-002-02
0579	NJ-OF-M20-2000S-101	611,592.4	680,268.4	004-002-02
0580	NJ-OF-M20-2000S-102	613,486.9	680,960.6	004-002-02
0581	NJ-OF-M20-2000S-103	614,206.5	680,627.3	004-002-02

0582	NJ-OF-M20-2000S-104	613,093.2	680,429.5	004-002-02
0583	NJ-OF-M20-2000S-105	612,706.8	680,032.5	004-002-02
0584	NJ-OF-M20-2000S-106	610,053.1	679,476.5	004-002-02
0585	NJ-OF-M20-2000S-107	610,282.1	679,572.8	004-002-02
0586	NJ-OF-M20-2000S-108	612,669.5	678,865.4	004-002-02
0587	NJ-OF-M20-2000S-109	615,045.7	679,932.5	004-002-02
0588	NJ-OF-M20-2000S-110	614,644.0	679,416.9	004-002-02
0589	NJ-OF-M20-2000S-111	615,860.9	679,379.2	004-002-02
0590	NJ-OF-M20-2000S-112	614,376.6	678,839.3	004-002-02
0591	NJ-OF-M20-2000S-113	615,593.5	678,912.0	004-002-02
0592	NJ-OF-M20-2000S-114	615,160.4	678,261.9	004-002-02
0593	NJ-OF-M20-2000S-115	610,086.8	677,883.9	004-002-02
0594	NJ-OF-M20-2000S-116	612,125.6	677,899.1	004-002-02
0595	NJ-OF-M20-2000S-117	612,742.2	677,809.2	004-002-02
0596	NJ-OF-M20-2000S-118	613,484.8	678,098.8	004-002-02
0597	NJ-OF-M20-2000S-119	613,999.3	677,629.6	004-002-02
0598	NJ-OF-M20-2000S-120	610,498.8	676,885.3	004-002-02
0599	NJ-OF-M20-2000S-121	611,960.5	677,077.5	004-002-02
0600	NJ-OF-M20-2000S-122	612,980.0	677,219.4	004-002-02
0601	NJ-OF-M20-2000S-123	612,956.5	676,974.6	004-002-02
0602	NJ-OF-M20-2000S-124	612,933.3	676,359.0	004-002-02
0603	NJ-OF-M20-2000S-126	612,001.3	675,365.8	004-002-02
0604	NJ-OF-M20-2000S-127	618,013.4	680,121.0	004-002-02
0605	NJ-OF-M20-2000S-128	617,566.8	679,289.9	004-002-02
0606	NJ-OF-M20-2000S-129	617,827.7	679,142.0	004-002-02
0607	NJ-OF-M20-2000S-130	616,731.5	678,842.1	004-002-02
0608	NJ-OF-M20-2000S-131	617,008.9	678,528.8	004-002-02
0609	NJ-OF-M20-2000S-132	616,535.0	678,525.2	004-002-02
0610	NJ-OF-M20-2000S-133	616,322.2	678,334.2	004-002-02
0611	NJ-OF-M20-2000S-134	616,077.7	678,135.2	004-002-02
0612	NJ-OF-M20-2000S-135	616,631.4	677,966.0	004-002-02
0613	NJ-OF-M20-2000S-136	615,991.9	677,621.8	004-002-02
0614	NJ-OF-M20-2000S-137	615,731.2	677,469.8	004-002-02
0615	NJ-OF-M20-2000S-138	616,237.4	677,442.3	004-002-02
0616	NJ-OF-M20-2000S-139	616,601.2	677,413.6	004-002-02
0617	NJ-OF-M20-2000S-140	615,336.3	677,135.2	004-002-02
0618	NJ-OF-M20-2000S-141	615,573.7	677,010.8	004-002-02
0619	NJ-OF-M20-2000S-142	614,648.8	676,482.6	004-002-02
0620	NJ-OF-M20-2000S-143	614,443.4	676,023.2	004-002-02
0621	NJ-OF-M20-2000S-144	614,206.3	675,816.1	004-002-02
0622	NJ-OF-M20-2000S-145	615,558.4	675,865.9	004-002-02
0623	NJ-OF-M20-2000S-146	616,389.1	676,291.0	004-002-02
0624	NJ-OF-M20-2000S-147	617,235.6	676,542.7	004-002-02
0625	NJ-OF-M20-2000S-148	617,172.4	676,336.8	004-002-02
0626	NJ-OF-M20-2000S-149	616,602.5	675,834.5	004-002-02
0627	NJ-OF-M20-2000S-150	618,105.0	675,758.7	004-002-02
0628	NJ-OF-M20-2000S-151	614,633.1	675,108.7	004-002-02
0629	NJ-OF-M20-2000S-153	616,261.9	675,341.9	004-002-02
0630	NJ-OF-M20-2000S-193	620,114.3	697,854.1	004-002-02
0631	NJ-OF-M20-2000S-194	620,523.6	698,061.3	004-002-02
0632	NJ-OF-M20-2000S-195	620,517.5	697,785.8	004-002-02
0633	NJ-OF-M20-2000S-196	620,800.2	698,008.1	004-002-02
0634	NJ-OF-M20-2000S-197	621,037.4	697,915.2	004-002-02
0635	NJ-OF-M20-2000S-198	621,313.7	697,862.0	004-002-02
0636	NJ-OF-M20-2000S-199	622,079.3	697,686.3	004-002-02
0637	NJ-OF-M20-2000S-200	619,701.5	697,009.2	004-002-02
0638	NJ-OF-M20-2000S-201	618,802.8	695,022.8	004-002-02
0639	NJ-OF-M20-2000S-202	618,764.0	694,755.1	004-002-02
0640	NJ-OF-M20-2000S-203	618,280.3	692,872.0	004-002-02
0641	NJ-OF-M20-2000S-204	619,308.1	692,783.6	004-002-02
0642	NJ-OF-M20-2000S-205	619,758.9	692,676.0	004-002-02
0643	NJ-OF-M20-2000S-206	619,988.0	692,692.9	004-002-02
0644	NJ-OF-M20-2000S-207	620,148.1	691,970.4	004-002-02
0645	NJ-OF-M20-2000S-208	619,107.3	691,351.5	004-002-02
0646	NJ-OF-M20-2000S-209	620,063.6	691,144.6	004-002-02
0647	NJ-OF-M20-2000S-210	620,845.5	691,085.9	004-002-02

0648	NJ-OF-M20-2000S-211	619,591.6	690,529.1	004-002-02
0649	NJ-OF-M20-2000S-212	619,513.6	690,190.9	004-002-02
0650	NJ-OF-M20-2000S-213	621,444.9	691,332.4	004-002-02
0651	NJ-OF-M20-2000S-214	620,423.8	689,340.1	004-002-02
0652	NJ-OF-M20-2000S-215	620,435.1	687,974.5	004-002-02
0653	NJ-OF-M20-2000S-216	620,427.7	687,762.6	004-002-02
0654	NJ-OF-M20-2000S-217	618,906.0	687,383.2	004-002-02
0655	NJ-OF-M20-2000S-218	621,499.3	688,365.4	004-002-02
0656	NJ-OF-M20-2000S-219	599,761.3	695,157.6	004-002-02
0657	NJ-OF-M20-2000S-219	621,705.9	691,168.6	004-002-02
0658	NJ-OF-M20-2000S-220	621,777.9	690,799.7	004-002-02
0659	NJ-OF-M20-2000S-221	622,812.2	690,686.4	004-002-02
0660	NJ-OF-M20-2000S-222	622,006.9	690,753.6	004-002-02
0661	NJ-OF-M20-2000S-223	621,921.3	690,235.0	004-002-02
0662	NJ-OF-M20-2000S-224	622,442.4	690,158.9	004-002-02
0663	NJ-OF-M20-2000S-225	622,860.7	690,184.3	004-002-02
0664	NJ-OF-M20-2000S-226	624,241.1	690,464.5	004-002-02
0665	NJ-OF-M20-2000S-227	625,242.6	690,266.2	004-002-02
0666	NJ-OF-M20-2000S-228	625,833.6	690,074.3	004-002-02
0667	NJ-OF-M20-2000S-229	626,258.9	690,038.3	004-002-02
0668	NJ-OF-M20-2000S-230	623,925.0	697,305.9	004-002-02
0669	NJ-OF-M20-2000S-231	623,611.2	696,973.0	004-002-02
0670	NJ-OF-M20-2000S-232	624,092.5	696,795.4	004-002-02
0671	NJ-OF-M20-2000S-233	624,518.3	696,704.1	004-002-02
0672	NJ-OF-M20-2000S-234	624,865.4	696,580.8	004-002-02
0673	NJ-OF-M20-2000S-235	623,534.7	696,405.5	004-002-02
0674	NJ-OF-M20-2000S-236	623,850.4	696,266.1	004-002-02
0675	NJ-OF-M20-2000S-237	624,283.2	696,387.4	004-002-02
0676	NJ-OF-M20-2000S-238	623,332.0	695,845.0	004-002-02
0677	NJ-OF-M20-2000S-239	623,057.0	695,630.5	004-002-02
0678	NJ-OF-M20-2000S-240	622,624.3	695,383.5	004-002-02
0679	NJ-OF-M20-2000S-241	622,853.4	695,243.3	004-002-02
0680	NJ-OF-M20-2000S-242	619,002.9	686,622.1	004-002-02
0681	NJ-OF-M20-2000S-243	617,555.1	685,330.0	004-002-02
0682	NJ-OF-M20-2000S-244	618,619.5	685,527.0	004-002-02
0683	NJ-OF-M20-2000S-245	618,668.1	685,071.5	004-002-02
0684	NJ-OF-M20-2000S-246	619,313.6	685,524.6	004-002-02
0685	NJ-OF-M20-2000S-247	620,235.1	685,971.7	004-002-02
0686	NJ-OF-M20-2000S-248	620,196.3	685,704.5	004-002-02
0687	NJ-OF-M20-2000S-249	620,189.1	685,445.2	004-002-02
0688	NJ-OF-M20-2000S-250	620,158.3	685,170.1	004-002-02
0689	NJ-OF-M20-2000S-251	621,118.5	685,876.5	004-002-02
0690	NJ-OF-M20-2000S-252	621,631.0	685,825.5	004-002-02
0691	NJ-OF-M20-2000S-253	620,600.1	685,071.6	004-002-02
0692	NJ-OF-M20-2000S-254	621,127.1	685,554.8	004-002-02
0693	NJ-OF-M20-2000S-255	621,970.1	685,757.5	004-002-02
0694	NJ-OF-M20-2000S-256	621,560.7	685,558.3	004-002-02
0695	NJ-OF-M20-2000S-257	621,750.0	685,504.8	004-002-02
0696	NJ-OF-M20-2000S-258	621,939.3	685,459.3	004-002-02
0697	NJ-OF-M20-2000S-259	621,656.5	685,041.2	004-002-02
0698	NJ-OF-M20-2000S-260	621,980.0	684,894.8	004-002-02
0699	NJ-OF-M20-2000S-261	621,649.3	684,735.0	004-002-02
0700	NJ-OF-M20-2000S-262	621,925.4	684,658.9	004-002-02
0701	NJ-OF-M20-2000S-263	621,594.9	684,443.9	004-002-02
0702	NJ-OF-M20-2000S-264	621,800.0	684,359.4	004-002-02
0703	NJ-OF-M20-2000S-265	620,325.1	684,700.0	004-002-02
0704	NJ-OF-M20-2000S-266	620,570.1	684,466.3	004-002-02
0705	NJ-OF-M20-2000S-267	621,450.4	682,403.6	004-002-02
0706	NJ-OF-M20-2000S-268	619,536.8	681,953.9	004-002-02
0707	NJ-OF-M20-2000S-269	618,087.2	681,619.2	004-002-02
0708	NJ-OF-M20-2000S-270	618,860.4	681,483.4	004-002-02
0709	NJ-OF-M20-2000S-271	618,656.4	681,174.4	004-002-02
0710	NJ-OF-M20-2000S-272	619,719.6	681,474.5	004-002-02
0711	NJ-OF-M20-2000S-273	619,044.2	680,704.3	004-002-02
0712	NJ-OF-M20-2000S-274	619,016.1	682,099.4	004-002-02
0713	NJ-OF-M20-2000S-275	605,621.3	686,608.6	004-002-02

0714	NJ-OF-M20-2000S-277	606,705.8	676,346.0	004-002-02
0715	NJ-OF-M20-3000S-004	597,989.2	688,214.8	004-002-03
0716	NJ-OF-M20-3000S-005	598,780.3	685,938.6	004-002-03
0717	NJ-OF-M20-3000S-006	598,577.5	685,302.9	004-002-03
0718	NJ-OF-M20-3000S-007	598,364.1	684,709.1	004-002-03
0719	NJ-OF-M20-3000S-008	600,705.7	680,584.4	004-002-03
0720	NJ-OF-M20-3000S-009	601,042.7	679,962.0	004-002-03
0721	NJ-OF-M20-3000S-010	601,295.2	679,554.3	004-002-03
0722	NJ-OF-M20-3000S-011	599,802.0	676,830.3	004-002-03
0723	NJ-OF-M20-3000S-020	602,237.1	691,018.0	004-002-03
0724	NJ-OF-M20-3000S-021	603,019.7	690,026.7	004-002-03
0725	NJ-OF-M20-3000S-022	603,320.3	689,855.5	004-002-03
0726	NJ-OF-M20-3000S-023	603,273.6	689,687.6	004-002-03
0727	NJ-OF-M20-3000S-034	613,083.0	695,119.6	004-002-03
0728	NJ-OF-M20-3000S-041	614,942.3	683,275.0	004-002-03
0729	NJ-OF-M20-3000S-042	614,838.5	682,829.0	004-002-03
0730	NJ-OF-M20-3000S-043	615,482.7	683,394.4	004-002-03
0731	NJ-OF-M20-3000S-044	615,426.8	682,765.5	004-002-03
0732	NJ-OF-M20-3000S-045	615,898.6	682,983.9	004-002-03
0733	NJ-OF-M20-3000S-046	615,910.3	682,617.4	004-002-03
0734	NJ-OF-M20-3000S-047	615,566.3	681,776.5	004-002-03
0735	NJ-OF-M20-3000S-048	616,530.6	684,015.1	004-002-03
0736	NJ-OF-M20-3000S-049	616,846.4	683,719.2	004-002-03
0737	NJ-OF-M20-3000S-050	617,150.1	683,946.7	004-002-03
0738	NJ-OF-M20-3000S-051	617,534.3	683,578.1	004-002-03
0739	NJ-OF-M20-3000S-052	617,984.3	683,979.6	004-002-03
0740	NJ-OF-M20-3000S-053	617,954.2	683,529.2	004-002-03
0741	NJ-OF-M20-3000S-054	618,656.4	683,781.0	004-002-03
0742	NJ-OF-M20-3000S-055	617,467.7	676,809.8	004-002-03
0743	NJ-OF-M20-3000S-056	618,063.1	676,142.0	004-002-03
0744	NJ-OF-M20-3000S-057	616,567.1	675,105.0	004-002-03
0745	NJ-OF-M20-3000S-066	618,911.5	694,746.4	004-002-03
0746	NJ-OF-M20-3000S-067	620,539.3	693,750.6	004-002-03
0747	NJ-OF-M20-3000S-068	619,027.4	689,768.1	004-002-03
0748	NJ-OF-M20-3000S-070	619,217.8	683,749.1	004-002-03
0749	NJ-OF-M20-3000S-071	620,330.0	683,565.0	004-002-03
0750	NJ-OF-M20-3000S-072	601,631.8	679,063.0	004-002-03
0751	NJ-OF-M20-3000S-073	604,097.9	675,343.6	004-002-03
0752	NJ-OF-M42-001	566,826.6	697,127.5	004-001-00
0753	NJ-OF-M42-003	570,496.1	696,570.9	004-001-00
0754	NJ-OF-M42-004	572,086.1	695,349.9	004-001-00
0755	NJ-OF-M42-005	576,505.0	695,126.8	004-001-00
0756	NJ-OF-M42-006	577,114.9	697,317.7	004-001-00
0757	NJ-OF-M42-007	579,352.2	696,748.9	004-001-00
0758	NJ-OF-M42-008	579,472.3	697,437.6	004-001-00
0759	NJ-OF-M42-008	583,734.4	693,998.7	004-001-00
0760	NJ-OF-M42-009	581,931.3	697,192.6	004-001-00
0761	NJ-OF-M42-012	584,006.9	695,755.2	004-001-00
0762	NJ-OF-M42-013	583,983.8	695,570.3	004-001-00
0763	NJ-OF-M42-014	583,664.9	695,445.4	004-001-00
0764	NJ-OF-M42-015	583,008.5	695,431.5	004-001-00
0765	NJ-OF-M42-016	584,330.6	694,895.5	004-001-00
0766	NJ-OF-M42-020	584,400.1	693,171.3	004-001-00
0767	NJ-OF-M42-022	583,235.3	693,388.5	004-001-00
0768	NJ-OF-M42-023	582,874.8	693,194.3	004-001-00
0769	NJ-OF-M42-024	582,153.6	693,698.1	004-001-00
0770	NJ-OF-M42-025	581,941.0	693,841.4	004-001-00
0771	NJ-OF-M42-026	581,524.9	694,830.5	004-001-00
0772	NJ-OF-M42-027	581,409.3	695,144.9	004-001-00
0773	NJ-OF-M42-028	580,812.9	696,217.2	004-001-00
0774	NJ-OF-M42-029	581,044.2	694,631.8	004-001-00
0775	NJ-OF-M42-030	579,726.8	694,701.1	004-001-00
0776	NJ-OF-M42-031	578,169.1	694,178.9	004-001-00
0777	NJ-OF-M42-032	578,714.6	693,892.3	004-001-00
0778	NJ-OF-M42-033	580,064.3	693,832.1	004-001-00
0779	NJ-OF-M42-034	579,791.7	692,990.8	004-001-00

0780	NJ-OF-M42-035	576,052.3	692,159.3	004-001-00
0781	NJ-OF-M42-037	577,328.2	691,031.2	004-001-00
0782	NJ-OF-M42-038	575,877.0	689,080.7	004-001-00
0783	NJ-OF-M42-039	575,072.6	689,543.1	004-001-00
0784	NJ-OF-M42-040	575,821.7	687,638.5	004-001-00
0785	NJ-OF-M42-041	576,154.5	687,795.6	004-001-00
0786	NJ-OF-M42-042	581,354.1	692,856.8	004-001-00
0787	NJ-OF-M42-043	580,989.1	690,989.3	004-001-00
0788	NJ-OF-M42-045	585,726.7	693,051.4	004-001-00
0789	NJ-OF-M42-046	581,544.0	688,779.9	004-001-00
0790	NJ-OF-M42-047	577,754.1	684,975.7	004-001-00
0791	NJ-OF-M42-049	575,757.2	685,928.2	004-001-00
0792	NJ-OF-M42-050	586,110.4	693,190.1	004-001-00
0793	NJ-OF-M42-052	587,252.0	693,241.3	004-001-00
0794	NJ-OF-M42-054	589,151.2	695,645.4	004-001-00
0795	NJ-OF-M42-055	588,947.4	697,272.4	004-001-00
0796	NJ-OF-M42-056	589,585.3	697,009.1	004-001-00
0797	NJ-OF-M42-057	591,091.9	696,940.4	004-001-00
0798	NJ-OF-M42-058	593,965.7	698,245.3	004-001-00
0799	NJ-OF-M42-059	594,187.8	697,394.9	004-001-00
0800	NJ-OF-M42-061	590,325.0	695,784.5	004-001-00
0801	NJ-OF-M42-064	587,977.8	692,090.6	004-001-00
0802	NJ-OF-M42-068	592,109.3	693,973.4	004-001-00
0803	NJ-OF-M42-074	595,075.6	695,047.4	004-001-00
0804	NJ-OF-M42-078	594,715.5	693,318.5	004-001-00
0805	NJ-OF-M42-079	595,856.8	693,083.6	004-001-00
0806	NJ-OF-M42-080	594,974.4	692,930.4	004-001-00
0807	NJ-OF-M42-081	593,029.1	692,351.5	004-001-00
0808	NJ-OF-M42-082	593,736.2	691,501.5	004-001-00
0809	NJ-OF-M42-083	595,981.6	692,690.8	004-001-00
0810	NJ-OF-M42-084	595,575.1	692,468.6	004-001-00
0811	NJ-OF-M42-090	593,047.7	690,988.0	004-001-00
0812	NJ-OF-M42-092	594,697.5	689,352.8	004-001-00
0813	NJ-OF-M42-093	594,947.0	689,094.2	004-001-00
0814	NJ-OF-M42-094	595,261.2	688,918.7	004-001-00
0815	NJ-OF-M42-095	595,788.0	688,798.9	004-001-00
0816	NJ-OF-M42-097	591,342.5	689,230.8	004-001-00
0817	NJ-OF-M42-098	590,644.7	688,717.4	004-001-00
0818	NJ-OF-M42-099	590,441.4	688,416.9	004-001-00
0819	NJ-OF-M42-100	590,016.2	688,287.3	004-001-00
0820	NJ-OF-M42-102	589,697.3	687,935.9	004-001-00
0821	NJ-OF-M42-103	589,678.8	687,714.0	004-001-00
0822	NJ-OF-M42-105	588,689.8	686,128.2	004-001-00
0823	NJ-OF-M42-106	586,244.8	686,848.5	004-001-00
0824	NJ-OF-M42-107	587,377.2	686,668.6	004-001-00
0825	NJ-OF-M42-108	581,414.4	690,125.0	004-001-00
0826	NJ-OF-M42-109	589,526.3	686,678.6	004-001-00
0827	NJ-OF-M42-110	590,704.8	686,864.0	004-001-00
0828	NJ-OF-M42-111	590,889.7	686,572.9	004-001-00
0829	NJ-OF-M42-112	590,538.5	686,489.5	004-001-00
0830	NJ-OF-M42-113	591,934.1	686,444.0	004-001-00
0831	NJ-OF-M42-114	591,458.1	687,908.9	004-001-00
0832	NJ-OF-M42-116	591,619.9	684,793.8	004-001-00
0833	NJ-OF-M42-117	594,309.4	687,434.5	004-001-00
0834	NJ-OF-M42-119	592,377.8	683,592.5	004-001-00
0835	NJ-OF-M42-120	592,719.7	683,435.5	004-001-00
0836	NJ-OF-M42-121	594,600.5	688,086.3	004-001-00
0837	NJ-OF-M42-123	581,738.2	687,564.2	004-001-00
0838	NJ-OF-M42-124	581,465.5	687,032.6	004-001-00
0839	NJ-OF-M42-125	582,866.1	686,445.7	004-001-00
0840	NJ-OF-M42-131	580,365.6	684,892.4	004-001-00
0841	NJ-OF-M42-133	577,615.5	684,430.2	004-001-00
0842	NJ-OF-M42-136	581,202.2	684,735.3	004-001-00
0843	NJ-OF-M42-138	587,765.4	685,018.6	004-001-00
0844	NJ-OF-M42-139	587,044.4	683,428.3	004-001-00
0845	NJ-OF-M42-140	586,859.6	683,003.0	004-001-00

0846	NJ-OF-M42-141	587,049.1	684,375.9	004-001-00
0847	NJ-OF-M42-142	589,304.5	685,125.5	004-001-00
0848	NJ-OF-M42-143	588,990.2	685,203.9	004-001-00
0849	NJ-OF-M42-144	588,246.1	683,960.3	004-001-00
0850	NJ-OF-M42-145	563,028.1	692,128.1	004-001-00
0851	NJ-OF-M42-146	591,333.3	681,724.6	004-001-00
0852	NJ-OF-M42-147	592,423.9	680,902.5	004-001-00
0853	NJ-OF-M42-149	562,954.3	691,323.7	004-001-00
0854	NJ-OF-M42-150	567,363.1	689,795.6	004-001-00
0855	NJ-OF-M42-151	569,110.0	690,331.0	004-001-00
0856	NJ-OF-M42-152	568,712.5	690,247.9	004-001-00
0857	NJ-OF-M42-153	567,977.8	689,485.5	004-001-00
0858	NJ-OF-M42-154	570,265.8	688,490.6	004-001-00
0859	NJ-OF-M42-155	569,064.2	687,927.2	004-001-00
0860	NJ-OF-M42-157	565,034.7	685,664.1	004-001-00
0861	NJ-OF-M42-159	562,280.8	683,798.1	004-001-00
0862	NJ-OF-M42-160	564,739.5	682,645.5	004-001-00
0863	NJ-OF-M42-161	566,486.0	684,516.8	004-001-00
0864	NJ-OF-M42-163	568,011.0	685,163.3	004-001-00
0865	NJ-OF-M42-164	568,935.1	686,226.1	004-001-00
0866	NJ-OF-M42-166	565,950.4	682,399.8	004-001-00
0867	NJ-OF-M42-167	564,605.8	681,434.4	004-001-00
0868	NJ-OF-M42-168	564,360.9	681,328.2	004-001-00
0869	NJ-OF-M42-169	563,760.1	681,698.4	004-001-00
0870	NJ-OF-M42-170	564,666.1	680,338.8	004-001-00
0871	NJ-OF-M42-173	565,802.8	681,179.5	004-001-00
0872	NJ-OF-M42-175	566,172.8	679,921.9	004-001-00
0873	NJ-OF-M42-176	564,684.8	679,793.2	004-001-00
0874	NJ-OF-M42-177	562,319.5	675,911.5	004-001-00
0875	NJ-OF-M42-178	563,927.8	675,975.2	004-001-00
0876	NJ-OF-M42-179	567,231.3	679,403.6	004-001-00
0877	NJ-OF-M42-181	568,770.3	679,181.1	004-001-00
0878	NJ-OF-M42-182	568,276.0	678,321.4	004-001-00
0879	NJ-OF-M42-183	568,216.2	677,036.3	004-001-00
0880	NJ-OF-M42-184	567,878.8	677,216.8	004-001-00
0881	NJ-OF-M42-185	567,703.2	677,105.9	004-001-00
0882	NJ-OF-M42-186	566,238.7	675,234.3	004-001-00
0883	NJ-OF-M42-198	576,280.8	676,789.4	004-001-00
0884	NJ-OF-M42-200	575,781.3	678,985.1	004-001-00
0885	NJ-OF-M42-203	577,897.9	680,482.7	004-001-00
0886	NJ-OF-M42-208	578,433.8	682,743.0	004-001-00
0887	NJ-OF-M42-212	582,196.1	682,609.1	004-001-00
0888	NJ-OF-M42-213	579,511.0	679,174.5	004-001-00
0889	NJ-OF-M42-215	580,491.0	677,191.6	004-001-00
0890	NJ-OF-M42-216	578,355.8	677,884.9	004-001-00
0891	NJ-OF-M42-217	577,801.4	675,490.4	004-001-00
0892	NJ-OF-M42-220	580,398.7	675,878.8	004-001-00
0893	NJ-OF-M42-221	581,840.5	676,757.3	004-001-00
0894	NJ-OF-M42-223	583,901.7	676,378.6	004-001-00
0895	NJ-OF-M42-335	588,828.3	677,193.8	004-001-00
0896	NJ-OF-M42-340	593,421.6	694,390.1	004-001-00
0897	NJ-OF-M42-344	585,962.9	683,169.2	004-001-00
0898	NJ-OF-M42-349	590,057.6	678,655.0	004-001-00
0899	NJ-OF-M42-350	590,834.0	678,313.3	004-001-00
0900	NJ-OF-M42-354	590,750.8	676,556.9	004-001-00
0901	NJ-OF-M42-357	592,571.6	676,853.7	004-001-00
0902	NJ-OF-M42-358	588,588.1	682,467.5	004-001-00
0903	NJ-OF-M42-359	589,475.4	682,172.1	004-001-00
0904	NJ-OF-M42-360	590,048.5	681,779.4	004-001-00
0905	NJ-OF-M42-361	590,649.3	681,442.3	004-001-00
0906	NJ-OF-M42-362	591,619.8	680,934.4	004-001-00
0907	NJ-OF-M42-363	592,414.6	680,602.1	004-001-00
0908	NJ-OF-M42-364	593,214.1	680,297.5	004-001-00
0909	NJ-OF-M42-365	593,851.9	680,011.3	004-001-00
0910	NJ-OF-M42-366	594,591.3	679,702.1	004-001-00
0911	NJ-OF-M42-367	595,155.0	679,485.3	004-001-00

0912	NJ-OF-M42-368	595,695.7	679,286.9	004-001-00
0913	NJ-OF-M42-369	596,134.7	678,612.4	004-001-00
0914	NJ-OF-M42-370	595,483.1	677,826.3	004-001-00
0915	NJ-OF-M42-371	594,739.1	676,979.9	004-001-00
0916	NJ-OF-M42-372	595,349.1	676,379.5	004-001-00
0917	NJ-OF-M42-373	594,669.7	675,879.9	004-001-00
0918	NJ-OF-M42-380	586,577.6	676,060.5	004-001-00
0919	NJ-OF-M42-381	586,877.9	675,016.0	004-001-00
0920	NJ-OF-M42-447	587,247.1	694,988.5	004-001-00
0921	NJ-OF-M42-448	582,773.0	693,887.6	004-001-00
0922	NJ-OF-M42-449	582,149.0	694,127.9	004-001-00
0923	NJ-OF-M42-452	582,759.4	691,188.2	004-001-00
0924	NJ-OF-M42-453	584,649.0	697,613.4	004-001-00
0925	NJ-OF-M42-454	585,009.6	697,530.3	004-001-00
0926	NJ-OF-M42-xxx	592,137.4	689,841.3	004-001-00
0969	NJ-OFM42-2	567,390.4	696,942.2	004-001-00
0970	NJ-OFM42-10	583,470.4	697,724.2	004-001-00
0971	NJ-OFM42-11	583,900.5	696,272.9	004-001-00
0972	NJ-OFM42-19	584,229.1	693,494.9	004-001-00
0973	NJ-OFM42-36	572,613.3	692,021.5	004-001-00
0974	NJ-OFM42-44	584,381.7	692,459.5	004-001-00
0975	NJ-OFM42-48	576,996.1	684,818.6	004-001-00
0976	NJ-OFM42-51	587,085.6	692,991.6	004-001-00
0977	NJ-OFM42-53	585,425.9	695,847.8	004-001-00
0978	NJ-OFM42-60	592,848.1	696,229.4	004-001-00
0979	NJ-OFM42-62	587,339.9	692,062.6	004-001-00
0980	NJ-OFM42-63	587,705.1	692,085.9	004-001-00
0981	NJ-OFM42-67	591,688.7	694,005.6	004-001-00
0982	NJ-OFM42-69	592,076.9	693,709.9	004-001-00
0983	NJ-OFM42-73	576,557.6	680,330.2	004-001-00
0984	NJ-OFM42-77	595,196.0	693,679.4	004-001-00
0985	NJ-OFM42-85	588,911.5	691,226.5	004-001-00
0986	NJ-OFM42-86	591,051.4	689,572.7	004-001-00
0987	NJ-OFM42-87	589,346.0	690,357.7	004-001-00
0988	NJ-OFM42-88	589,022.4	690,838.3	004-001-00
0989	NJ-OFM42-89	585,805.6	690,430.6	004-001-00
0990	NJ-OFM42-91	593,874.8	691,358.3	004-001-00
0991	NJ-OFM42-96	592,142.0	689,836.7	004-001-00
0992	NJ-OFM42-101	590,385.9	689,156.4	004-001-00
0993	NJ-OFM42-104	589,027.2	686,659.9	004-001-00
0994	NJ-OFM42-115	591,837.1	688,269.6	004-001-00
0995	NJ-OFM42-118	595,321.4	686,658.6	004-001-00
0996	NJ-OFM42-122	583,577.8	687,864.8	004-001-00
0997	NJ-OFM42-126	583,152.7	686,626.0	004-001-00
0998	NJ-OFM42-127	580,263.8	686,510.2	004-001-00
0999	NJ-OFM42-128	579,935.7	686,020.3	004-001-00
1000	NJ-OFM42-129	579,635.3	685,414.7	004-001-00
1001	NJ-OFM42-130	579,931.1	684,984.9	004-001-00
1002	NJ-OFM42-132	579,663.1	684,531.9	004-001-00
1003	NJ-OFM42-134	578,655.5	684,601.2	004-001-00
1004	NJ-OFM42-135	580,901.7	686,001.8	004-001-00
1005	NJ-OFM42-137	583,291.4	684,897.3	004-001-00
1006	NJ-OFM42-145	589,618.7	684,284.4	004-001-00
1007	NJ-OFM42-156	566,716.5	687,456.8	004-001-00
1008	NJ-OFM42-162	566,384.5	683,620.0	004-001-00
1009	NJ-OFM42-165	567,886.3	684,701.0	004-001-00
1010	NJ-OFM42-171	565,927.5	681,484.5	004-001-00
1011	NJ-OFM42-172	566,676.0	682,103.6	004-001-00
1012	NJ-OFM42-174	571,764.1	683,987.6	004-001-00
1013	NJ-OFM42-180	567,661.1	679,218.5	004-001-00
1014	NJ-OFM42-199	576,590.4	677,015.9	004-001-00
1015	NJ-OFM42-201	576,377.4	680,076.0	004-001-00
1016	NJ-OFM42-202	578,078.1	681,074.3	004-001-00
1017	NJ-OFM42-204	576,682.1	682,479.7	004-001-00
1018	NJ-OFM42-205	572,023.6	680,751.7	004-001-00
1019	NJ-OFM42-207	579,529.3	681,610.5	004-001-00

1020	NJ-OFM42-209	580,430.4	683,561.2	004-001-00
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1023	NJ-OFM42-214	577,764.3	676,590.6	004-001-00
1030	NJ-OFM42-336	581,146.9	682,992.7	004-001-00
1031	NJ-OFM42-337	580,370.5	681,541.2	004-001-00
1032	NJ-OFM42-338	579,279.8	680,741.5	004-001-00
1033	NJ-OFM42-339	575,235.5	682,003.7	004-001-00
1034	NJ-OFM42-341	578,383.2	680,713.8	004-001-00
1035	NJ-OFM42-342	579,095.0	680,288.5	004-001-00
1036	NJ-OFM42-343	577,269.9	675,772.4	004-001-00
1037	NJ-OFM42-345	582,972.6	682,207.1	004-001-00
1038	NJ-OFM42-346	584,798.3	681,352.4	004-001-00
1039	NJ-OFM42-347	586,762.5	680,451.6	004-001-00
1040	NJ-OFM42-348	588,643.5	679,620.3	004-001-00
1041	NJ-OFM42-356	592,405.3	677,107.8	004-001-00
1048	NJ-OFM42-450	579,019.2	697,997.0	004-001-00
1049	NJ-OFM42-451	584,612.9	691,683.0	004-001-00
1050	NJ-OFM20-119	610,887.8	681,807.5	004-002-00
1051	NJ-OFM20-71-X	602,663.7	696,179.3	004-002-00
1052	NJ-OFM20-130	602,683.9	679,054.6	004-002-00
1053	NJ-OFM20-120	610,748.3	683,000.5	004-002-00
1054	NJ-OFM20-28	622,488.9	689,025.1	004-002-00
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1056	NJ-OFM20-70-X	602,136.7	696,259.2	004-002-00
1057	NJ-OFM20-68-X	600,770.4	696,240.0	004-002-00
1058	NJ-OFM20-112	617,617.9	683,709.7	004-002-00
1059	NJ-OFM20-126	614,425.7	682,780.5	004-002-00
1060	NJ-OFM20-54	615,444.1	682,362.7	004-002-00
1061	NJ-OFM20-100	602,850.9	684,384.2	004-002-00
1062	NJ-OFM20-99	621,121.9	698,302.4	004-002-00
1063	NJ-OFM20-66	623,306.2	695,086.5	004-002-00
1064	NJ-OFM20-57	616,379.5	683,657.9	004-002-00
1065	NJ-OFM20-53	615,996.7	681,811.3	004-002-00
1066	NJ-OFM20-105	610,567.8	694,508.9	004-002-00
1067	NJ-OFM20-102	605,099.2	692,301.5	004-002-00
1068	NJ-OFM20-36	616,370.9	688,093.7	004-002-00
1069	NJ-OFM20-108	601,592.9	682,618.6	004-002-00
1070	NJ-OFM20-52	617,969.2	682,110.0	004-002-00
1071	NJ-OFM20-51	616,923.1	681,053.5	004-002-00
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1076	NJ-OFM20-109	604,136.0	686,123.4	004-002-00
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1078	NJ-OFM20-75	606,580.9	695,206.1	004-002-00
1079	NJ-OFM20-104	614,819.6	687,370.4	004-002-00
1080	NJ-OFM20-32	622,259.6	690,767.4	004-002-00
1081	NJ-OFM20-142	616,283.0	686,032.8	004-002-00
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1084	NJ-OFM20-1	600,716.8	698,061.1	004-002-00
1085	NJ-OFM20-42	618,536.5	676,313.8	004-002-00
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1088	NJ-OFM20-113	609,429.9	695,497.0	004-002-00
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1093	NJOFM20-1085-85	610,253.2	695,575.9	004-002-00
1094	NJOFM20-1072-72	598,554.5	682,234.8	004-002-00
1095	NJOFM20-1080-80	610,170.4	696,853.0	004-002-00
1096	NJOFM20-1079-79	610,209.0	697,135.2	004-002-00
1097	NJOFM20-1081-81	610,053.0	696,508.0	004-002-00
1098	NJOFM20-1093-93	612,191.1	696,184.6	004-002-00
1099	NJOFM20-1095-95	611,964.1	695,574.2	004-002-00
1100	NJOFM20-1011-11	597,938.2	692,674.7	004-002-00
1101	NJOFM20-1091-91	611,312.3	697,840.3	004-002-00

1102	NJOFM20-3036-36	615,861.9	689,527.7	004-002-00
1103	NJOFM20-3039-39	617,657.6	689,524.2	004-002-00
1104	NJOFM20-3040-40	618,098.8	689,480.1	004-002-00
1105	NJOFM20-3069-69	619,480.4	689,285.1	004-002-00
1106	NJOFM20-3003-3	596,830.2	688,915.7	004-002-00
1107	NJOFM20-3038-38	617,190.1	689,562.9	004-002-00
1114	NJOFM20-3002-2	598,034.3	690,002.7	004-002-00
1115	NJOFM20-3035-35	616,706.9	689,606.7	004-002-00
1116	NJOFM20-3001-1	597,378.0	690,984.3	004-002-00
1117	NJOFM20-3037-37	616,281.7	689,588.1	004-002-00
1118	NJOFM20-3019-19	599,003.8	696,370.6	004-002-00

Appendix IX.
Comments and Responses

Comments to Draft Geophysical & Benthic Investigation of the Hackensack River Report by Earthworks (geophysical report dated June 2007) and Responses (July, 2008)

Comment Number	Commenter	Report Reference	Comment	Response
1	NJMC	DVD animations	The labels for towns represented on figures in some of the movie files on the "Time Lapse Representation" DVD are incorrect. On the "3-south-north.mov" and "5-south-hackensack.mov" the lower left of image appears to be upper Newark Bay with the Passaic River looping around what is labeled Kearny. I think that area is the City of Newark and the area labeled North Arlington looks like Harrison to me. On the "6-north-hackensack.mov" image it appears to me the Moonachie label spans the Metromedia, MRI, and the Kane sites, which are in Carlstadt, and if that is the case, North Bergen is across the river.	Done. All time lapse representation have been corrected and re-rendered.
2	NJMC	pg. 5 & 28 of Geo Rpt.	"Bellmaine" should be "Bellman's" as in Bellman's Creek. Check all figures and text for this error.	Done. All references to "Bellmaine" have been changed to "Bellman's"
3	NJMC	Pg. 15, fig 2.	The "black silt" in the title is redundant.	Done. Second "black silt" removed from caption
4	NJMC & NYD	Pg 18, para 5 and other locations in report (e.g., pg. 132, para. 6)	Funding constraints did not allow for chemical analysis of extra core taken from Harmon Cove. Reference to this core and chemical analysis of the core should be removed from report.	Done. All references to chemical analysis were removed from report.
5	NJMC	Pg. 22, fig. 3	The "on Hackensack River" in the title is redundant.	Done. Second "on the Hackensack" removed from caption
6	NJMC	Pg. 40	Item numbers such as 108, 109 and 110 lists "Chief of Engineers". This should clarify if this means authorization for construction was provided on these dates or if this relates to Corps navigation channel dredging being performed in these years.	Item #'s (now) 110, 111, 112 have "USACE, navigation improvements" added to them
7	NJMC	Pg. 41	#116 – 1984 – EPA declares Berry's Creek Canal a Superfund site. This is incorrect. It should be "Ventron/Velsicol" as the Superfund site.	Done. "Ventron/Veliscol" replaced Berry's Creek Canal as the Superfund site.
8	NJMC	Fig. 9-12	They describe "key to the upper left" in the title (incorrectly). They	Done. Caption has been changed

			should be “lower right” instead.	to read “key to the color map in lower right”
9	NJMC	Pg. 46, fig. 16	“Tidal elevations at Battery Park, NY with respect to NAD88” in the title is confusing. Please verify.	“Battery Park, NY” removed from caption
10	NJMC	unspecified	Please provide greater explanation of the groundtruthing performed. Especially the grain size analysis data done on the samples collected.	Grain size was described by an expert Geologist, as is now explained in methodology 3.8 Shallow Core Borings, no grain size analyses were performed
11	NJMC	Fig. 88	It would be useful to depict the existing and historical bridge locations on this figure. Particularly given the hypothesis of “damming of sediment by bridges”.	Now fig. 89 All bridges on plate 38 are now marked on figure 89 and plate 39. Note bridges may also shunt sediments as mentioned in text
12	NJMC	Pg. 11	As seen in several of the comments listed below, statements are made without any references or sources for these statements. Adding the references/sources will improve the report.	Done. Several sources added to report as footnotes
13	NJMC	Pg. 11, para 5.	Regarding Oradell Dam, construction began in 1921, but the dam was not completed until 1923 (as correctly shown in Table 6, line 52).	Sentence changed to read “…Oradell Dam constructed from 1921-1923…”
14	NJMC	Pg. 11, para. 6	The first sentence makes it sound as if the river was not tidal prior to 1921. The river was tidal, but the salt front was much lower than it is today. The second sentence should be clarified. According to NOAA, the highest spring tide range in the Hackensack is 7.6 feet (2.3 m.) at the City of Hackensack. A storm surge of 2.5 feet would bring the range to ~10 feet.	We understand the confusion and note that the river was tidal before 1921. We intend to say only that tidal elevations have been measured in the lower Hackensack River since 1921. Specification of tidal data has been improved.
15	NJMC	Pg. 13, para. 1	Correct the spelling of Lockatong sandstone (the “k” has been replaced by an “h” throughout the report).	Done. Spelling of Lockatong has been changed
16	NJMC	Pg. 13, para. 2	What is the source for the statement that the river was home to striped bass, tomcod and “fresh water flounders”? What species of “fresh water flounders” are referred to here?	Specification of fish have been removed
17	NJMC	Pg. 13, para. 3	What are the sources for the following statements; that Berry’s Creek Canal was a primary source of pollution for several years, and that by 1960, the fish population was reduced to only one species (the mummichog)?	Word “primary” was removed. “reduced to a single species” changed “to a few species.” Sources sighted.
18	NJMC	Pg. 13, para. 5	The NJMC does not enforce the regulations of the federal Clean Water Act, or the NJDEP regulations related to discharges of contaminants. The	Sentence including “NJMC has enforced the regulations” has

			NJMC enforces its own zoning and planning regulations. What is the source for the statement that biologists have lately identified cod in the Hackensack River?	been removed. Also removed, biologists identifying species in the river.
19	NJMC	Pg. 14, para. 1 and other locations in report/figures	The text mentions a 14.0 mile stretch of river was investigated. Are these measurements in nautical or statute miles?	"statute" added to specify measurement
20	NJMC	Pg. 25, para. 1	What is the source for the statement that marine waters flooded Newark Bay about 7,000 years ago?	Years corrected to 3,000-5,600. Source sighted, calculation consistent with various sea level curves
21	NJMC	Pg 31, para. 1 and table 3	State that the total area of river investigated was 86,807,481.2 square feet. This does not match the figures given on pages 16 and 17, which state that the total area of river investigated (including tributary mouths) was 86,454,152 square feet. Please check and correct.	Different numbers due to before and after project estimates removed. Total area figures are now consistent throughout. Correct figure is 86,807,481.2
22	NJMC	Pg. 31 para. 2	The tidal delay from The Battery is given in feet. Shouldn't the tidal delay between The Battery and any point on the Hackensack River be reported as a time, and the difference in height reported in feet (or meters)?	Difference in tide ranges given in time and resulting height. Source is sighted
23	NJMC	Pg. 31, para. 4	What is the source for the average salinity of the Hackensack River being 24 ppt? That figure seems high. It should also specify where in the river this is the average.	Salinity of water changed to 16ppt. Source is sighted
24	NJMC	Pg. 39, table 6, line 15	The Morris Canal was completed to Newark in 1831. This entry should be changed to reflect that 1836 was when the Morris Canal was <u>extended</u> through Kearny Point and across Bergen Hill, to its' terminus on the Hudson River at Jersey City. After line 79, add the November 1950 storm that breached the dikes and destroyed the tide gates along Sawmill Creek, thereby restoring tidal flow to an area that had been excluded from the flow of the tides for over 100 years. Also, the Nor'easter of December 11-12, 1992, which produced the most severe flooding along the NJ coast since the 1962 hurricane, should be added to this Table. What is the source for the dates of the beginning and completion of the Berry's Creek Canal?	Dates and events added to table.
25	NJMC	Figs 44 thru 48	What do the various colored lines on these figures denote? Add a legend to these figures.	Annotation and captions improved. Descriptions of various color lines added to the captions
26	NJMC	Fig 54	The Meadowlands Sports Complex was not constructed in the area between Berry's Creek and Berry's Creek Canal. Remove this label.	All animations redone. Label removed and relocated in correct area

27	NJMC	Figs 56 thru 66	The labels for "Kearny" have been placed over Newark, and the labels for "North Arlington" have been placed over Kearny. These need to be corrected.	All animations redone. "Kearny" label has been removed and "Newark" and "Harrison" added
28	NJMC	Pg. 124, para. 7	Rising sea levels have been drowning the lower Hackensack River valley since much, much earlier than 1922.	Misunderstanding statement has been clarified
29	NJMC	Pg. 126, last sentence	Should this read "less than" 10 feet?	"<" has been added to correct statement
30	NJMC	Pg. 137, last para.	Should the 3rd sentence read – "The deeper the water column, the more suspended sediment is available….". It appears that the reference to Figure 93 should actually read Figure 94. Should the reference to Figure 94 be changed to Figure 95?	Sentence corrected. References to figures changed and are now consistent.
31	NJMC	Pg. 139, para. 2	Should read Lower Hack Bridge.	Changed to "Lower Hack Bridge"
32	NJMC	Throughout report	"Aqua Surveys" should be changed to "Aqua Survey, Inc." or ASI.	Changed to "Aqua Survey, Inc."
33	NJMC	Geophysical and Benthic Reports	It appears that there are discrepancies between the two subject reports in terms of how the sediment surface is described (typically, geophysical report describes an area as sandy whereas the benthic report describes the same area as silty/muddy. Please reconcile the two reports or provide the reasons for the apparent discrepancy.	Section "5.2 Sediment distribution" added. At issue is the combination of sparse & strong spacial variation over the short length scale of both grain size vertically and horizontally
34	NJMC	Geophysical report	As the scope describes surveying approximately 10 tributaries to approximately 1000' upstream from the Hackensack, Earthworks should either perform all of this data collection or provide the rationale for why it was not feasible in accordance with the scope.	Section added to Scope of Work. Area covered was limited by depth in channels, boat draft, instrument behavior. For full explanation see paragraphs 4 & 5 in SOW section of report.
35	NYD	Section 2	The scope of work section should more closely follow the scope used in the task order issued (possibly included in an appendix. To the extent that the scope is summarized here, it should say more accurately in the second paragraph that "The Corps of Engineers with the non-federal sponsor, the NJMC, is evaluating as part of the HRE Hackensack Restoration study the possible design and construction of numerous restoration actions within the Hackensack Meadowlands District. Earthworks has been tasked to collect this synoptic information in the Hackensack River in support of this study."	Done. Recommended paragraph was added as second paragraph in the Scope of Work section of report
36	NYD	Plate 1	Wetlands may be better illustrated by using hatching instead of line outlines.	Objective of geophysical investigation were the channels in the Hackensack River. Hatching

				wetlands would obscure the channels and over-emphasis the wetlands with respect to the channels. After considering various options we decided to leave as is.
37	NYD	Plate 2	It may be useful to align the segment boundaries to coincide with the reach boundaries (where the two are close to each other).	Boundaries for the segments and the reaches were chosen for scaling and display purposes. While we understand the stylistic concern, to align boundaries between the segments and reaches would preclude the goal of scaling and comprehensive and continuous display. Effort would not enhance the display
38	NYD	Plates 5-7	These plates would benefit by adding callouts identifying notable features (e.g., bridge scour, utility crossings, sand waves, tributaries, etc.)	Callouts identified in the location map (fig. 1 plate 1). Callouts placed in location map so as not to obscure data in data plates.
39	NYD	Plate 40	This figure would benefit by also showing areas of net erosion (in a different color, of course).	The estimation of the areas eroded and the calculation of the volumes deposited and eroded is interpretation and is beyond the scope of work. The intent of the geophysical investigation was to acquire the data pertinent to the understanding and enhancement of the Hackensack River channels. Advanced interpretation is recommended for future projects
40	NYD	Plates 12-17	These plates would benefit by adding callouts identifying notable features (e.g., bridge scour, utility crossings, sand waves, tributaries, etc.)	Callouts were added to location map. Callouts were not added to the data displays. Call outs would be added to interpretation plots but they are beyond the scope of work
41	NYD	Plates 25 & 26	The top of rock appears to be inconsistent with the sub bottom profile data. Please review.	Much of the confusion arises when the seismic signal is

				attenuated and multiples become the dominant features in the image. We have denoted multiples and improved horizons and captions identifying the horizons, especially the difference between pleistocene varves and pleistocene till.
42	NYD	Plate 31	This anomaly list would be better on plates 32-34.	Done. Anomaly list has been placed on plates 31-34
43	NYD	Time lapse videos	The 1922 time period should note by callout or other visual device the damming of the upstream river with the construction of the Oradell reservoir.	Done. Years ‘21, ‘22, ‘23 are denoted by the slowing of frames and denoting the years in orange
44	NYD	Pg. 25, para. 5	The reference here (and elsewhere in the report) to data being available upon request seemed open ended and does not identify who the request should be made to. This should be clarified.	Done. Reference clarified. Now reads “…upon request, to Bryce Wisemiller.”
45	NYD	Pg. 27	This section needs to be updated. Also, the reference to chemical analysis should be removed.	Done. Section 3.11 QA/QC has been updated. This table has been added as appendix IX. All references to chemical analyses have been removed
46	NYD	Pg. 31, table 3	Area should also be listed in acres and square miles.	Done. Table has been updated with both acre and square mile columns added
47	NYD	Pg 32, table 4	Minor typos in table (Amtrack Rr Wwingbridge, Jersey City Pa-rr, etc.). Please review table and make corrections.	Done. Typos in table have been corrected
48	NYD	Pg. 34, para. 6	This sentence should be revised to say “…the USACE performed localized maintenance dredging in these channels in …”	Done. Sentence has been changed to revised recommendation
49	NYD	Pg. 39-41, table 6	Numerous typos in table, some unclear references. Suggest that table be provided to Corps for direct editing	Done. Table cleaned up and typos corrected
50	NYD	Pg. 41, para 1; pg. 89, para 4.; pg. 110, figure 75	The dredged area at Harmon Cove may have been a borrow site rather than a turning basin. Use of the term “turning basin” should not be used to describe this area unless there is direct evidence of it being constructed for such use.	Term “turning basin” has been removed from report
51	NYD	Pg. 45 & 46, figures 15 & 16	Event # 131 appears to be erroneous (it looks like it should be # 133 from the table). Please double check all the events to the tables to make sure they are consistent.	Figures 15 & 16 corrected to be consistent with updated table 6
52	NYD	Pg. 50, figure	Shouldn’t the Kearny Point bridge be shown on this figure also?	No. Kearny Point Bridge is not

		19		apparent in hydrographic data
53	NYD	Pg. 48 – 58, figures 17-27	Some features (Berry's Creek, Berry's Creek Canal, Kearny Point Bridge, etc.) appear on one figure and are not apparent on the following figures. Please make the ancillary features more consistent between years as well as consistent with the timeframe chronology tables. When this is not possible, a caveat should be noted on the figure.	These are data plots. Figure caption was changed to better describe that the figures show only the data extracted from the hydrographic surveys and charts. No changes are made to produce consistency beyond a consistent algorithm for working with the hydrographic data. An interpretation step would be required to upgrade the mathematical model that is beyond the scope of work.
54	NYD	Pg. 121, para. 3	All references to providing additional data upon request should be made with care – request to who? For how long will the data be made available? Etc. Minimally, the NJMC and NYD should have copies of all this data for long-term archiving. Also, page number is missing on page.	References to providing additional data has been clarified, and will be made with care to Bryce Wisemiller, USACE-NYD. Page number added
55	NYD	Pg. 124, para. 1	Insert "and the construction of the Oradell Reservoir," after "Since 1922".	Line added to sentence
56	NYD	Pg. 124, para. 5	To the extent the historical data allows, the volume of sediment accumulated in depositional areas such as Harmon Cove and segment 3 should be calculated and presented in tabular format. Also, figures showing net deposition should also illustrate net erosion, should there be such areas. Similarly, the volume of sediment eroded should also be calculated and shown in table form.	The estimation of the areas eroded and the calculation of the volumes deposited and eroded is interpretation and is beyond the scope of work. The intent of the geophysical investigation was to acquire the data pertinent to the understanding and enhancement of the Hackensack River channels. Advanced interpretation is recommended for future projects
57	NYD	Pg. 125, table 14	"tidal laminated NB CDF" is unclear. Please spell out acronym or provide greater explanation	Acronym changed to read NB Confined Disposal Facility
58	NYD	Pg. 137, para 3	Typo "wer" should be "were"	Typo corrected
59	NYD	Pg. 139, para 2 & page 144, list #	Replace "gas pipeline" with "a pipeline suspected to be one of the Jersey City Municipal Water Supply pipelines" as subsequent discussions indicate that the pipeline is very likely this and not a gas pipeline.	All references to "gas pipeline" changed to "pipeline"

		15.		
60	NYD	Pg. 142	Change section title to “Further Possible Interpretation, Modeling and Monitoring”. Change text to “The next **potential** steps to be taken include:”. Delete 2. in list.	Done. Title changed to recommended title. #2 in list was removed

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DEPARTMENT OF THE ARMY

OTE.—It is to be understood that this instrument does not give any property rights either in real estate or material any exclusive privileges; and that it does not authorize any injury to private property or invasion of private , or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining assent to the work authorized. ~~IT IS NOT VALID UNTIL THE GOVERNMENT SO FAR AS CONCERNS~~ (See *Cummings* v. *Chicago*, 188 U. S., 410.)

16—13168-2

OP-E

PERMIT

Department of the Army, New York District, Corps of Engineers.
111 East 16th Street, New York, N.Y. 10003
7 August, 19 67.

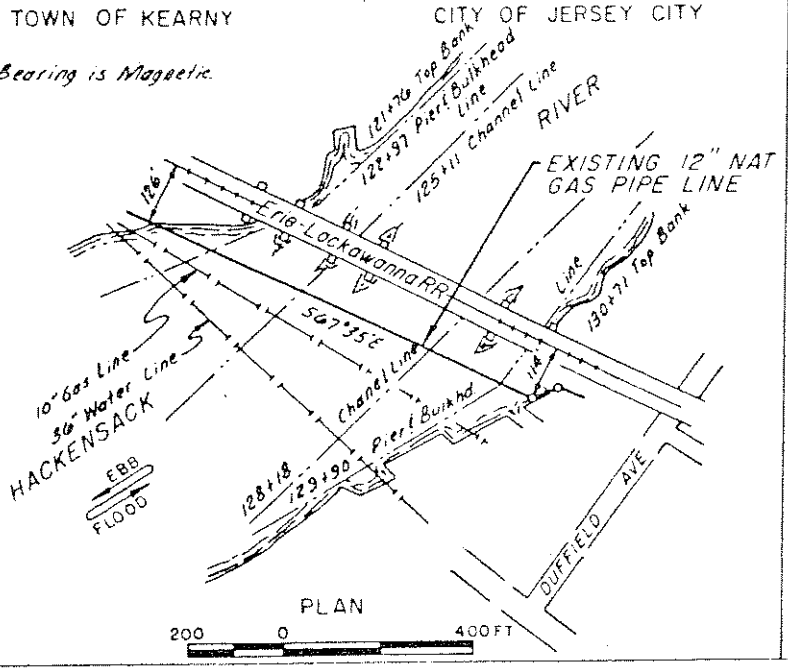
anscontinental Gas Pipe Line Corporation
4 Broad Street
ewark, N. J. 07102

entlemen:

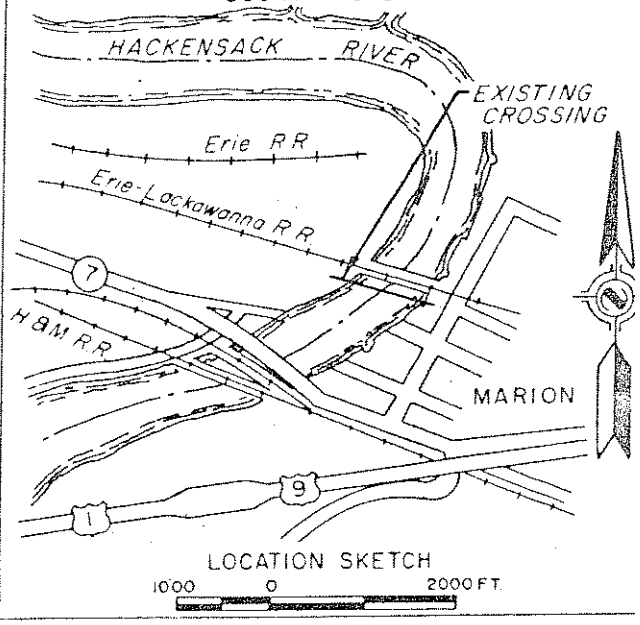
Referring to written request dated 27 April 1967, signed by Mr. Fletcher W. Hartley, Supervising Engineer, - - -

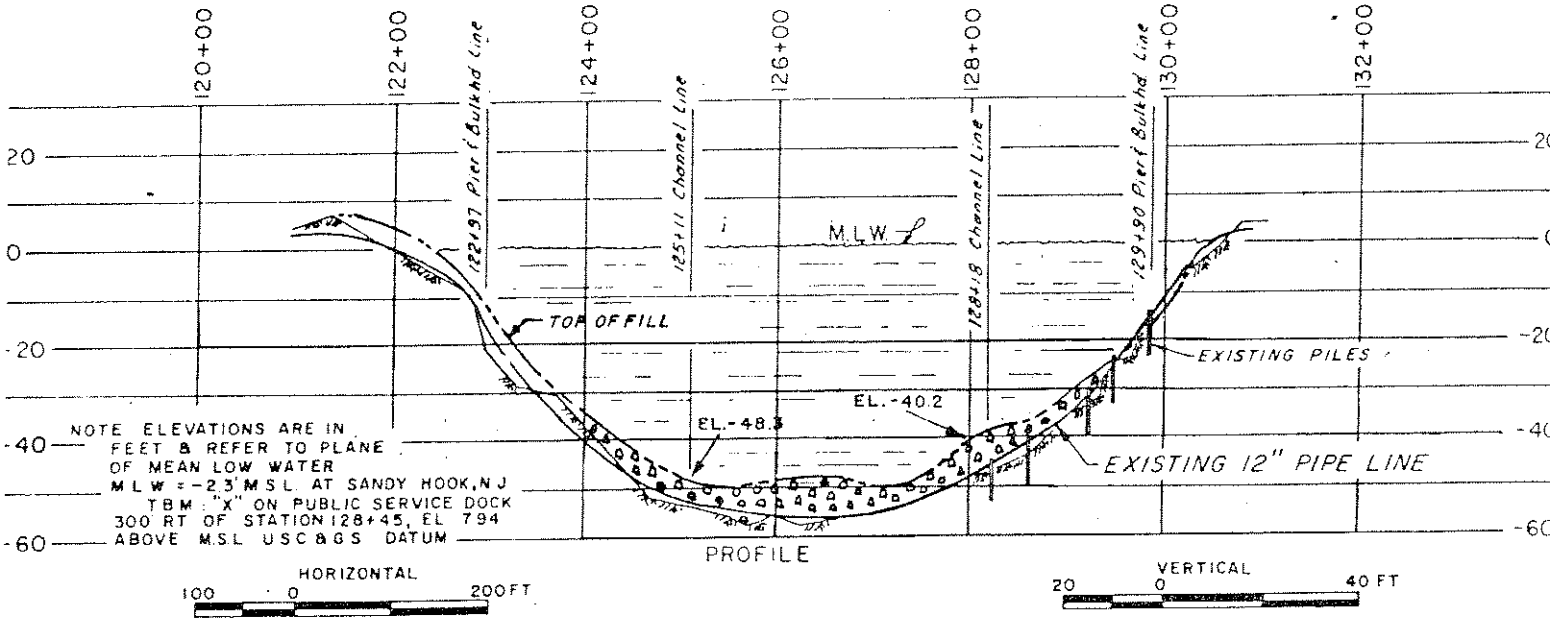
HUDSON COUNTY, NEW JERSEY
TOWN OF KEARNY CITY OF JERSEY CITY

Note: Bearing is Magnetic.



HUDSON COUNTY, NEW JERSEY
TRACED FROM HUDSON COUNTY ROAD MAP





Field Note Book
REFERENCE DRAWINGS

10-11-84 Page 24
DWG. NO.

Application by,
TRANSCONTINENTAL GAS PIPE LINE CORP.

4-2-63
DATE

R. J. Judah
ENGINEER

TRANSCONTINENTAL GAS PIPE LINE CORP.

ENGINEERING DEPARTMENT HOUSTON, TEXAS

EXISTING BACKFILL OVER 12" PIPE LINE
CROSSING UNDER THE
HACKENSACK RIVER
HUDSON COUNTY, NEW JERSEY

DESIGNED BY	DATE	CORRECT BY	DATE
DRAWN BY C.J.B	DATE 4-2-63	APPROVED BY	DATE
CHECKED BY R.R.S	DATE 4-2-63	APPROVED BY R. J. Judah ENGINEER	
TRACED BY	DATE		
W. O. NO.	SCALE Noted	PROJECT NO. 126	
	SHEET		

REVISION | BY | DATE | NO.

(*a*) That the work shall be subject to the supervision and approval of the District Engineer, Corps of Engineers, in charge of the locality, who may temporarily suspend the work at any time, if in his judgment the interests of navigation so require.

(*b*) That any material dredged in the prosecution of the work herein authorized shall be removed evenly and no large refuse piles, ridges across the bed of the waterway, or deep holes that may have a tendency to cause injury to navigable channels or to the banks of the waterway shall be left. If any pipe, wire, or cable hereby authorized is laid in a trench, the formation of permanent ridges across the bed of the waterway shall be avoided and the back filling shall be so done as not to increase the cost of future dredging for navigation. Any material to be deposited or dumped under this authorization, either in the waterway or on shore above high-water mark, shall be deposited or dumped at the locality shown on the drawing hereto attached, and, if so prescribed thereon, within or behind a good and substantial bulkhead or bulkheads, such as will prevent escape of the material in the waterway. If the material is to be deposited in the harbor of New York, or in its adjacent or tributary waters, or in Long Island Sound, a permit therefor must be previously obtained from the Supervisor of New York Harbor, New York City.

(*c*) That there shall be no unreasonable interference with navigation by the work herein authorized.

(*d*) That if inspections or any other operations by the United States are necessary in the interest of navigation, all expenses connected therewith shall be borne by the permittee.

(*e*) That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of all navigable waters at or adjacent to the work or structure.

(*f*) That if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army, it shall cause unreasonable obstruction to the free navigation of said water, the owner will be required upon due notice from the Secretary of the Army, to remove or alter the structural work or obstructions caused thereby without expense to the United States, so as to render navigation reasonably free, easy, and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the United States, and to such extent and in such time and manner as the Secretary of the Army may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration.

(*g*) That the United States shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the Government for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

(*h*) That if the display of lights and signals on any work hereby authorized is not otherwise provided for by law, such lights and signals as may be prescribed by the U. S. Coast Guard, shall be installed and maintained by and at the expense of the owner.

(*i*) That the permittee shall notify the said district engineer at what time the work will be commenced, and as far in advance of the time of commencement as the said district engineer may specify, and shall also notify him promptly, in writing, of the commencement of work, suspension of work, if for a period of more than one week, resumption of work, and its completion.

(*j*) That if the structure or work herein authorized is not completed on or before ..... the 31st ..... day of ..... December ....., 19 70, this permit, if not previously revoked or specifically extended, shall cease and be null and void.

Copies furnished:
Commander
Third Coast Guard District
Governors Island
New York, N.Y. 10004

Departmenet of Conserv & Economic Dev
Bureau of Navigation
State of New Jersey
P.O. Box 1889
Trenton, N.J. 08625

(each w/drawing)

By authority of the Secretary of the Army:

For and in behalf of
R. T. BATSON
Colonel, Corps of Engineers
District Engineer

PINATA/OP-E
WUESTEFELD/OP

ENG FORM 1 SEP 48 1721 (Civil) This form supersedes ED Form 96, dated 1 Apr 48, which may be used until exhausted.

EM 1145-2-303

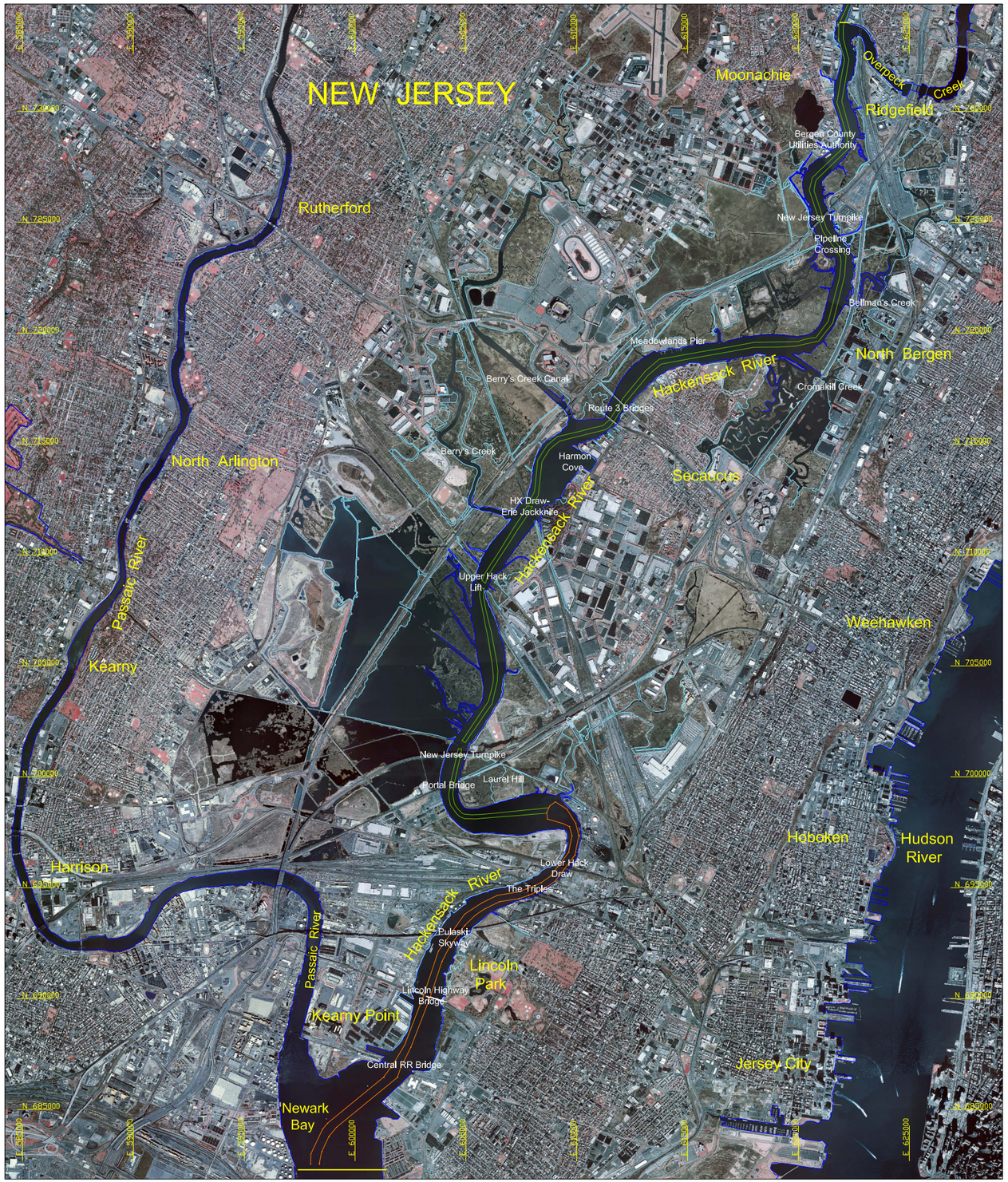
U. S. GOVERNMENT PRINTING OFFICE 16—13168-5

Appendix X.
11” x 17” version of plates

Plate 1: Location map of the Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance





- Hackensack River study boundary
- Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
  New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
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- Federal Channel coordinates obtained from USACE November 2006
- Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J, (Hackensack River)," 1975 and 1986 N0. 64, covering sporadical spot maintenance dredging.

New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

N

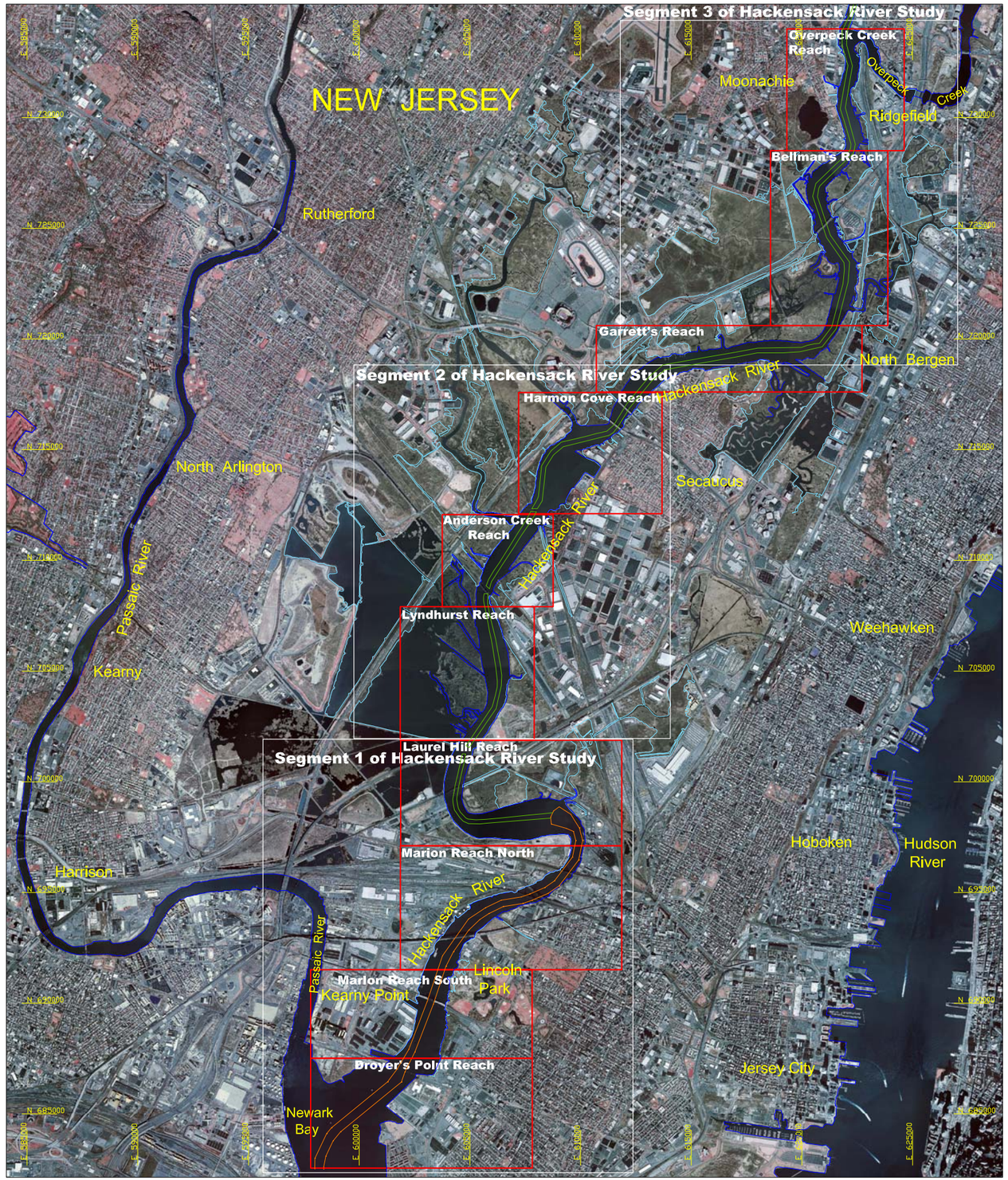
Drawn By:
Approved By:
Date: June 7, 2007

Earthworks

Plate 2: Reaches and segments of the Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance





- Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
  New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
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Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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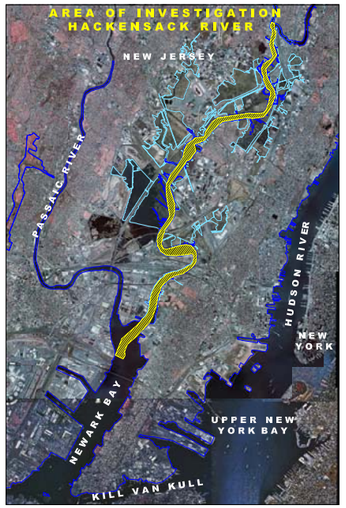
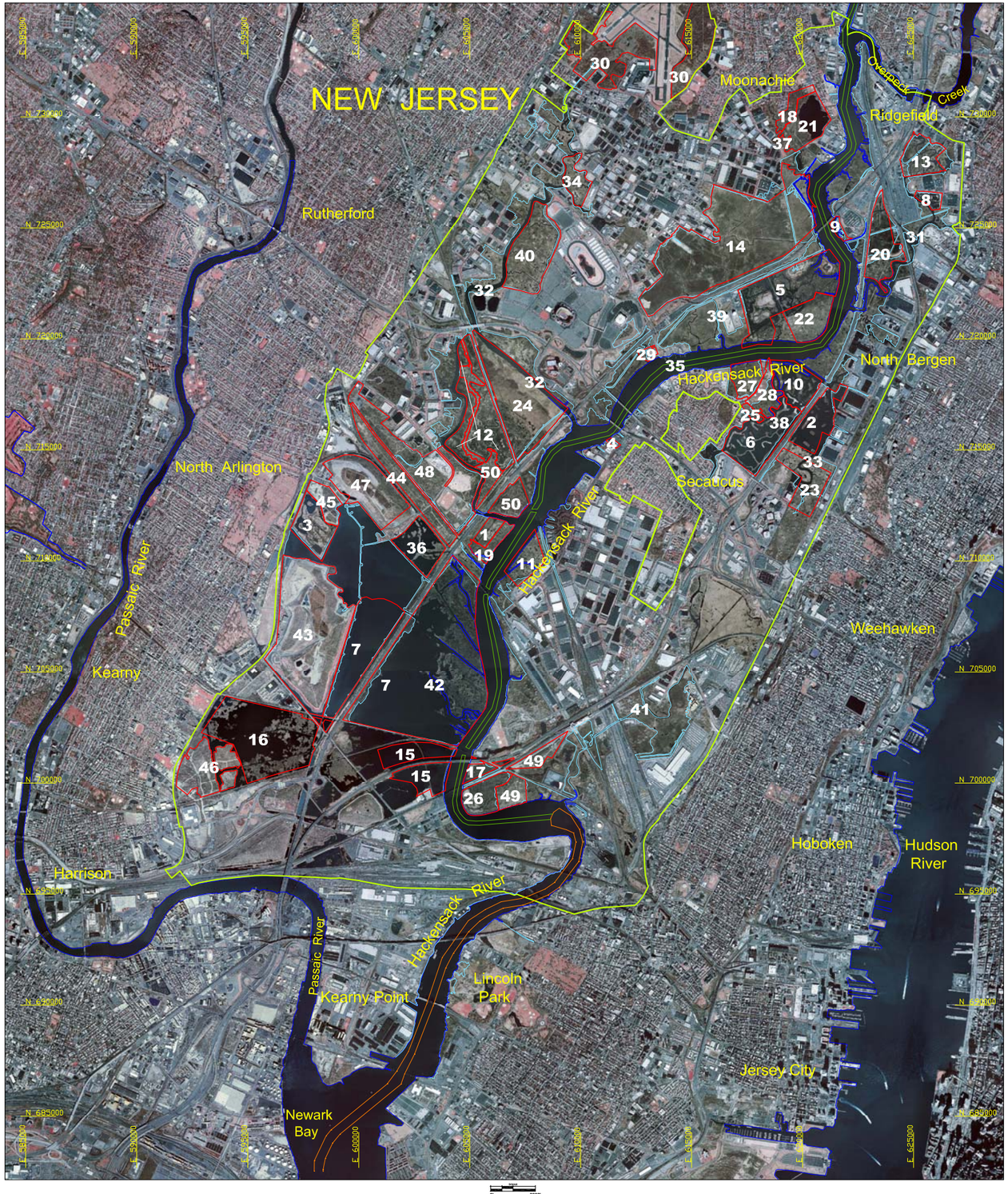
Drawn By:
Approved By:
Date: June 7, 2007

Earthworks

Plate 3: Environmental sites on the Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance





- Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
  New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
- Wetlands Boundaries from "NJDEP Upper Wetlands Boundary/Upper Wetlands Limit for New Jersey," 2002.
  New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
- Federal Channel coordinates obtained from USACE November 2006
- Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 N0. 64, covering sporadical spot maintenance dredging.
- Boundary of the Meadowlands as specified in "Meadowlands Environmental Site Investigation Compilation (MESIC), Hudson-Raritan Esturay, Hackensack Meadowlands, New Jersey:" USACE, May 2004
- Boundaries of the fifty MESIC sites as specified in "Meadowlands Environmental Site Investigation Compilation (MESIC), Hudson-Raritan Esturay, Hackensack Meadowlands, New Jersey:" USACE, May 2004

New Jersey State Plane Feet Coordinate System
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Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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Meadowlands Environmental Site Information Compilation U.S. Army Corps of Engineers

Table 1-1: MESIC Sites

Existing Restoration, Preservation, and/or Mitigation Sites		Waterbodies and Other Wetlands	
1	Bellemeade Mitigation	31	Bellman's Creek
2	Eastern Brackish Marsh	32	Berry's Creek/Berry's Creek Canal
3	Harrier Meadow	33	Cromakill Creek
4	Hess Mitigation Site	34	Eight Day Swamp
5	Marsh Resources Meadowlands Mitigation Bank	35	Hackensack River
6	Mill Creek Marsh	36	Kingsland Impoundment
7	Saw Mill Creek Wildlife Management Area	37	Losen Slote Creek
8	Skeetkill Creek Marsh	38	Mill Creek
9	Vince Lombardi Marsh	39	Moonachie Creek
10	Western Brackish Marsh	40	NJSEA Sports Complex-Walden Marsh
		41	Penhorn Creek
		42	Saw Mill Creek
Candidate Restoration Sites		**Existing/Potential Remediation Sites**	
11	Anderson Creek March	43	1-E Landfill
12	Berry's Creek Marsh	44	Avon Landfill
13	Bellman's Creek Marsh	45	Erie Landfill
14	Empire Tract	46	Keegan Landfill
15	Kearny Brackish Marsh	47	Kingsland Landfill
16	Kearny Freshwater Marsh	48	Lyndhurst Landfill
17	Laurel Hill Park Wetland	49	Malanka Landfill
18	Losen Slote Creek Park	50	Rutherford Landfill
19	Lyndhurst Riverside Marsh		
20	Meadowlark Marsh		
21	Mehrhof Pond		
22	Metro Media Tract		
23	Mori Tract		
24	Oritani Marsh		
25	Petrillo Tract		
26	Riverbend Wetlands Preserve		
27	Secausus High School		
28	Secausus Tract		
29	Steiner's Marsh		
30	Teterboro Woods		

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Approved By:
Date: June 7, 2007

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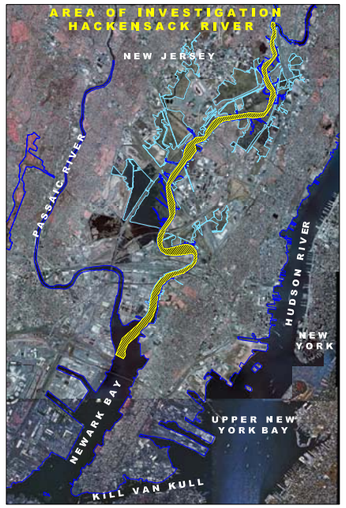
Plate 4: Multibeam bathymetry of the Hackensack River for 2006

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses,
and Field Reconnaissance



Multibeam Bathymetry data acquired by Rogers Surveying June-October, 2006

Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
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New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

Federal Channel coordinates obtained from USACE November 2006

Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 N0. 64, covering sporadical spot maintenance dredging.

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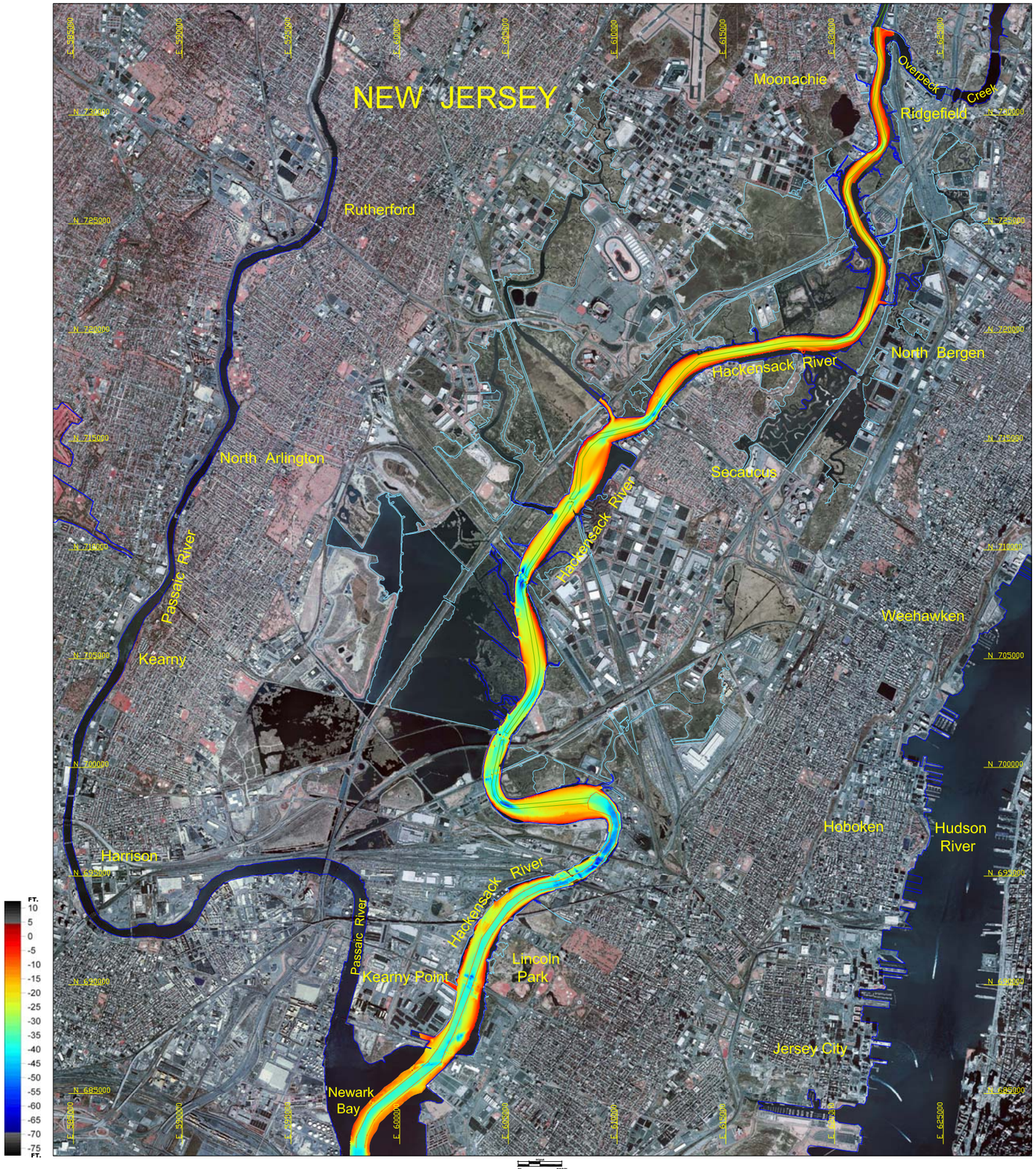
Orthophotograph: USGS, 1995

N



Drawn By:
Approved By:
Date: June 7, 2007

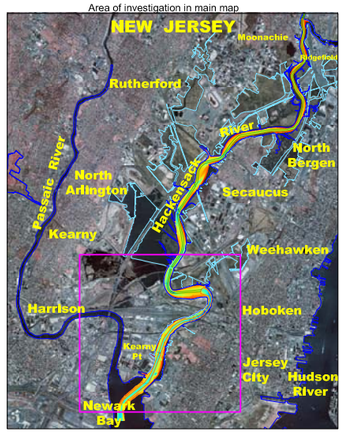
Page 86 of 126

Plate 5: Multibeam bathymetry of the Hackensack River segment 1 for 2006

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map



Multibeam Bathymetry data acquired by Rogers Surveying June-October, 2006

Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
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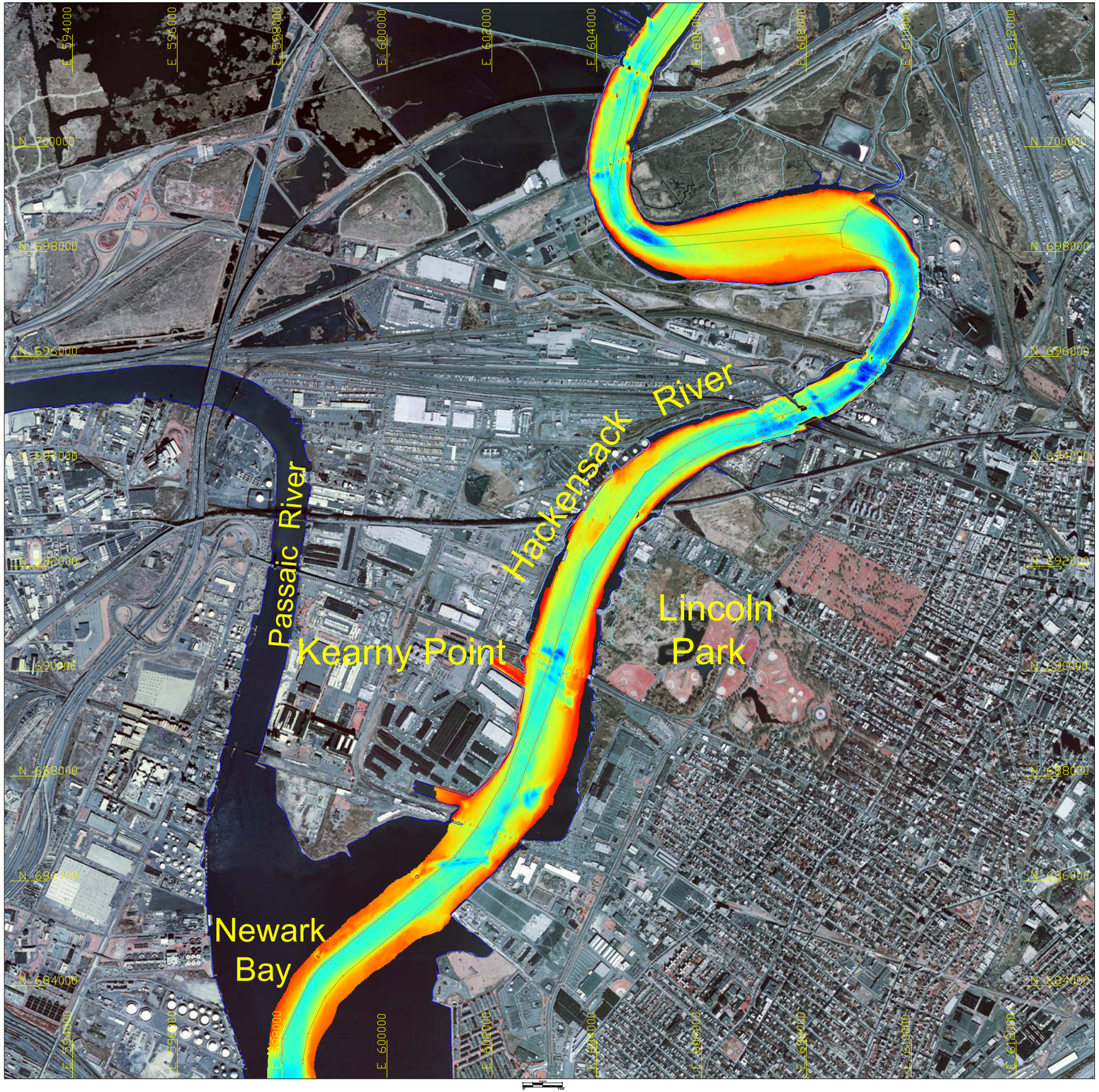
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

Drawn By:
Approved By:
Date: June 7, 2007



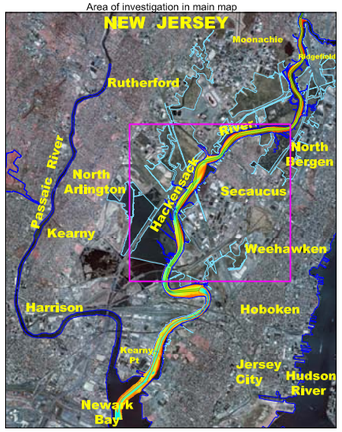
Earthworks

Plate 6: Multibeam bathymetry of the Hackensack River segment 2 for 2006

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map



Multibeam Bathymetry data acquired by Rogers Surveying June-October, 2006

Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
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Federal Channel coordinates obtained from USACE November 2006

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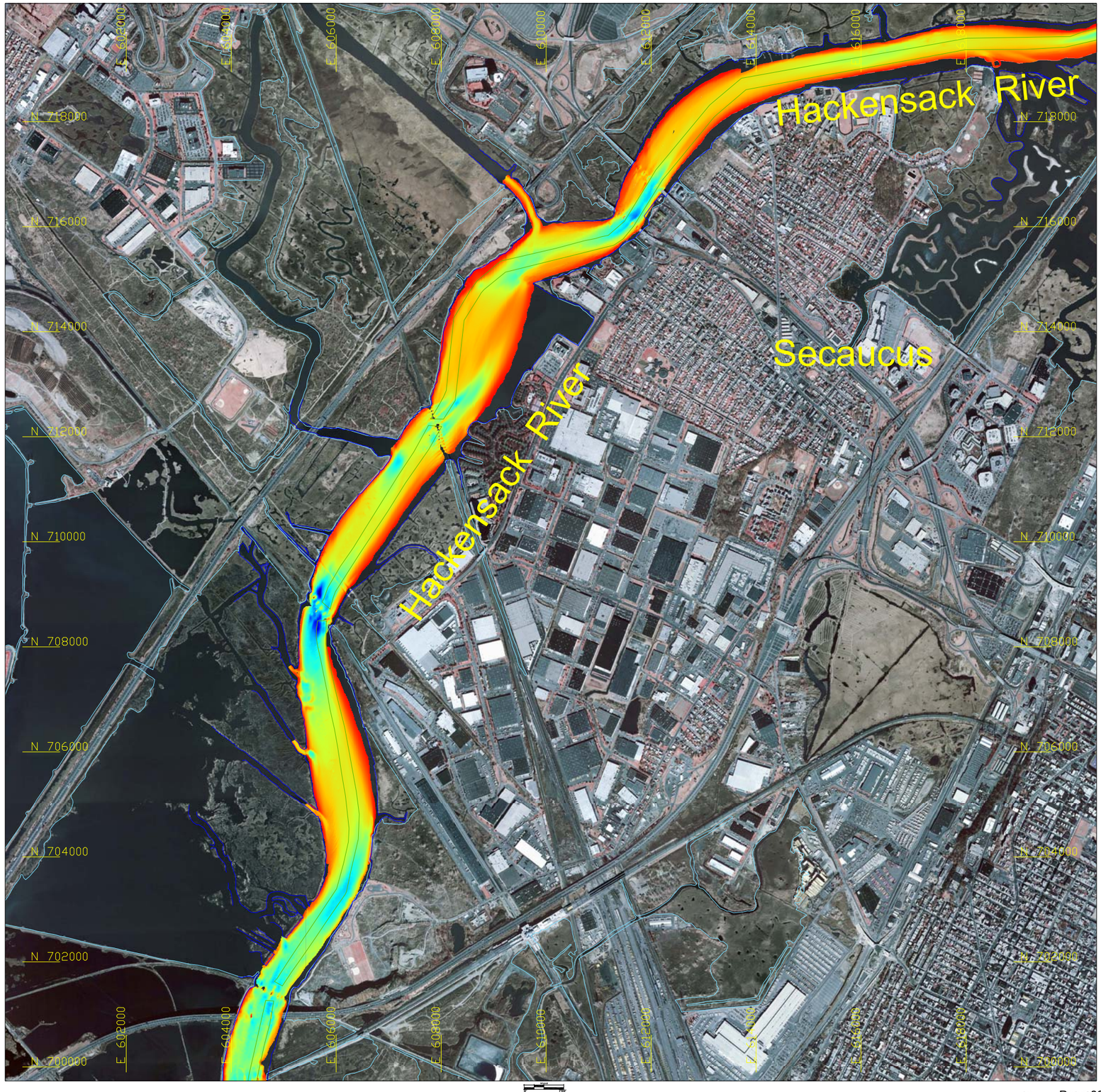
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

Drawn By:
Approved By:
Date: June 7, 2007



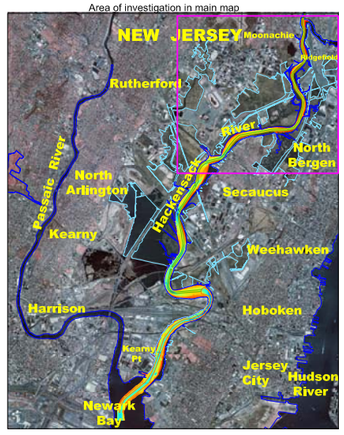
Earthworks

Plate 7: Multibeam bathymetry of the Hackensack River segment 3 for 2006

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map



Multibeam Bathymetry data acquired by Rogers Surveying June-October, 2006

Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

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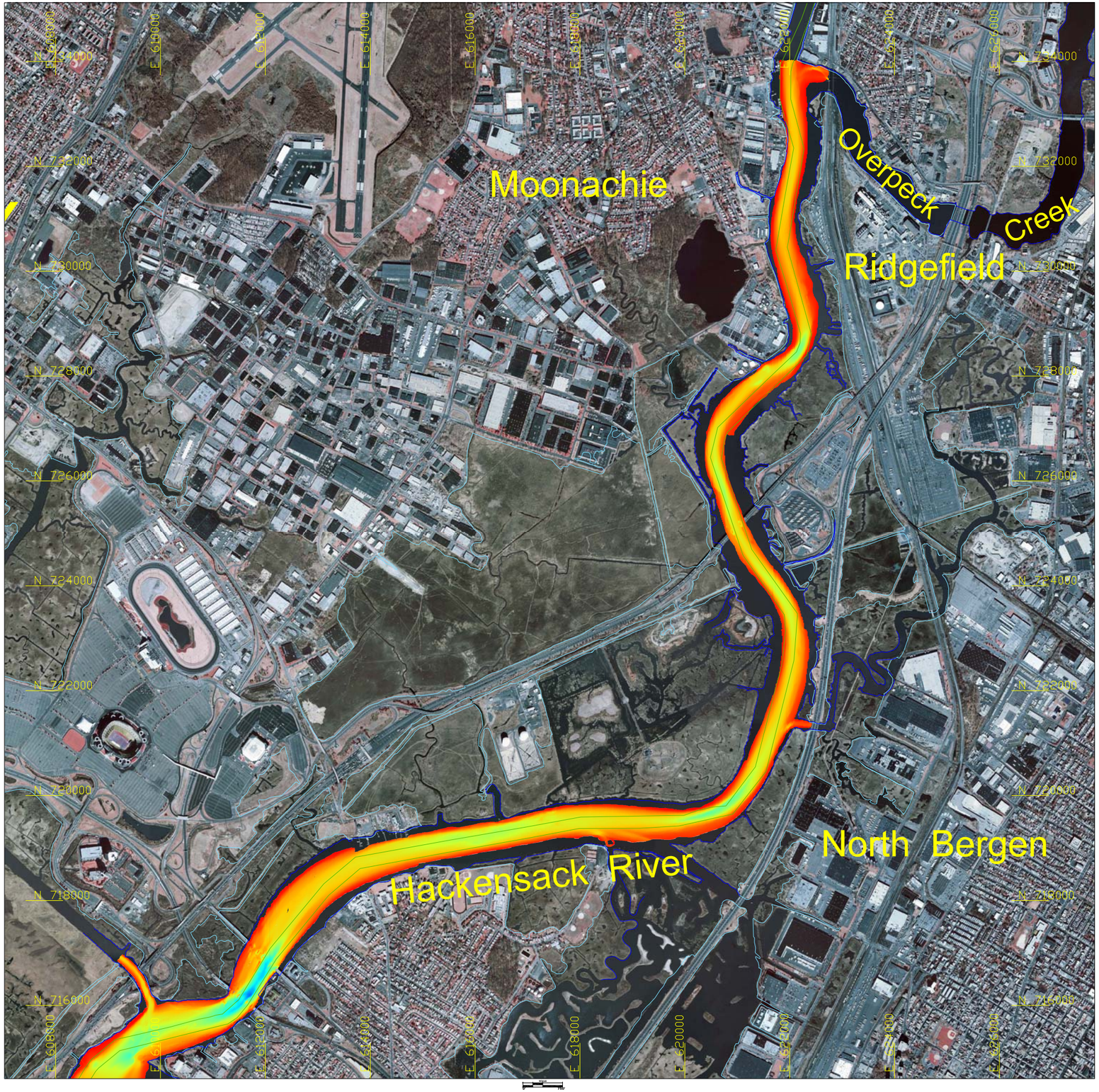
Orthophotograph: USGS, 1995

Drawn By:
Approved By:
Date: June 7, 2007



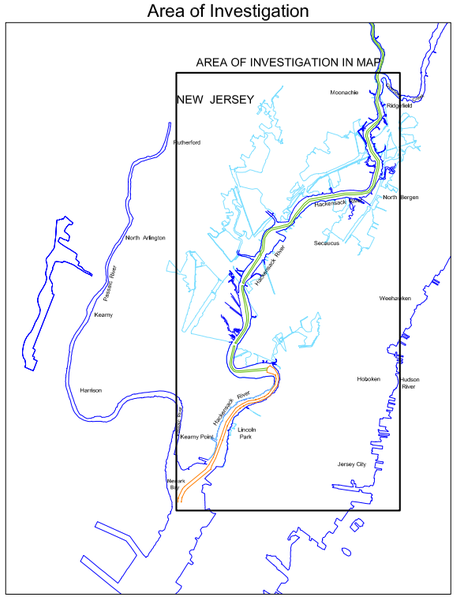
Earthworks

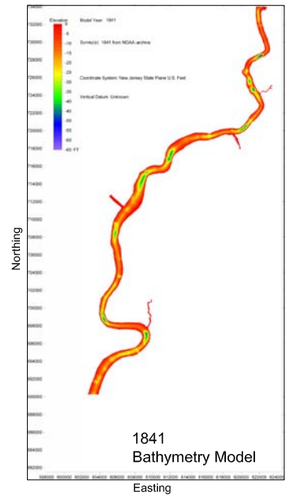
Plate 8: Geomorphological Evolution
of the Hackensack River

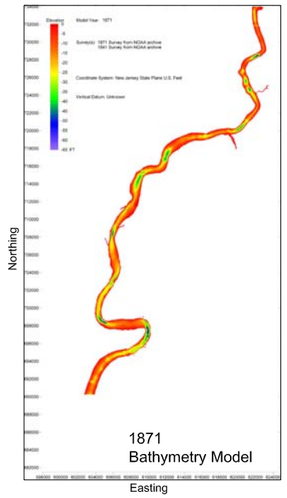
Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses,
and Field Reconnaissance

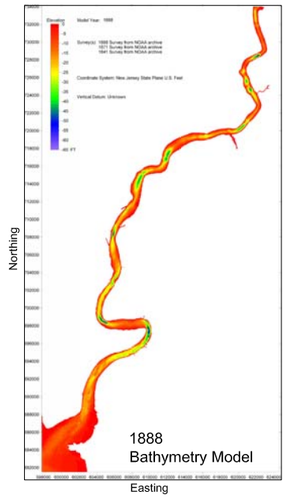


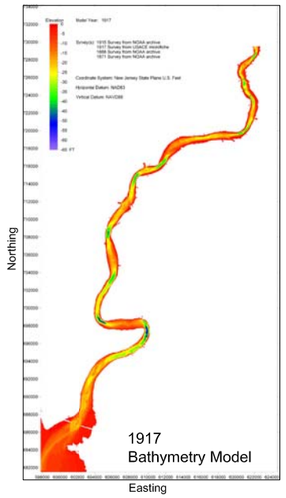
Area of Investigation

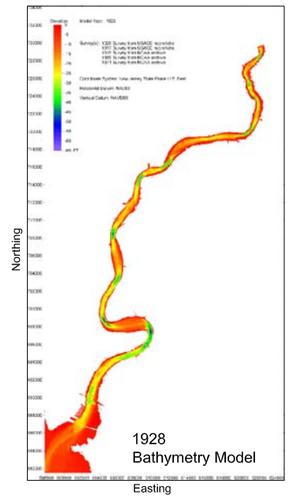


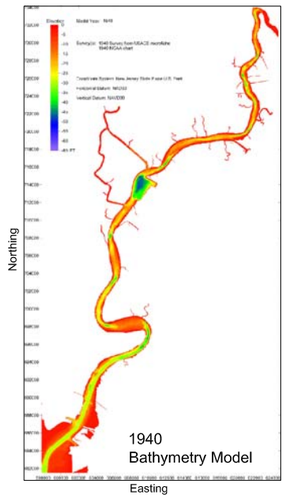


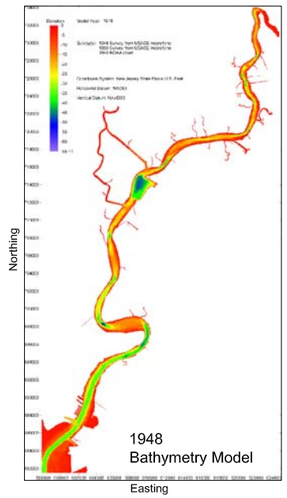


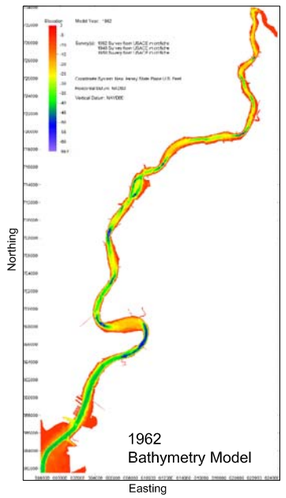


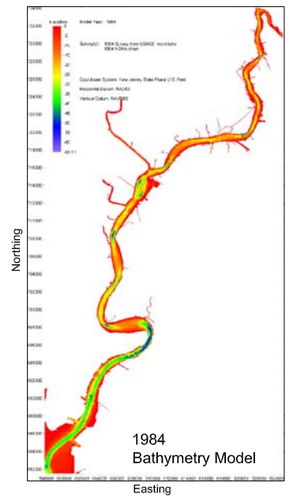


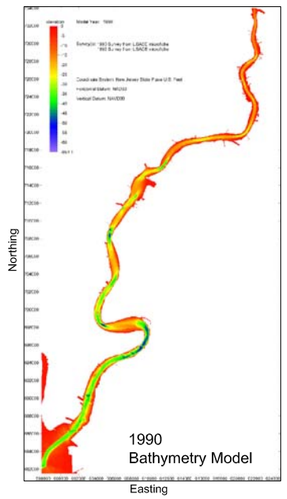


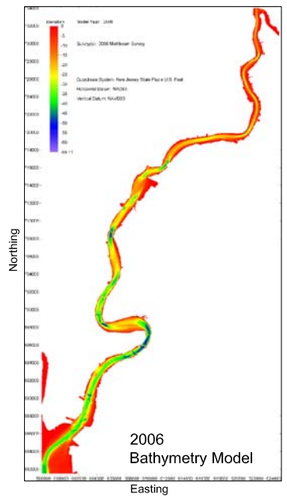








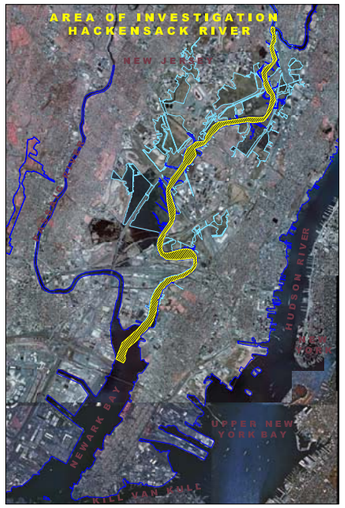




Drawn By:
Approved By:
Date: June 28, 2007

Plate 9: USACE historical maintenance dredging records for the Hackensack River: areas dredged over time

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Listing of USACE historical data used in this report for Hackensack River from 1928 to 1992

Year	USACE data			
	Type	Figure	Type	Figure
1928	survey	21		
1930			maintenance	28
1931			maintenance	
1932			maintenance	
1933			maintenance	
1934			maintenance	
1935			maintenance	29
1940	survey	22		
1941			maintenance	
1942			maintenance	30
1946			maintenance	31
1948	survey	23		
1949			maintenance	
1953			maintenance	32
1959			maintenance	
1962	survey	24	maintenance	33
1976			maintenance	34
1984	survey	25		
1986			maintenance	35
1992	survey	26		

Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

Wetlands Boundaries from "NJDEP Upper Wetlands Boundary/Upper Wetlands Limit for New Jersey," 2002.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

Federal Channel coordinates obtained from USACE November 2006

Maintenance Channel boundary and historical maintenance dredging: Digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 N0. 64, covering sporadical spot maintenance dredging.

New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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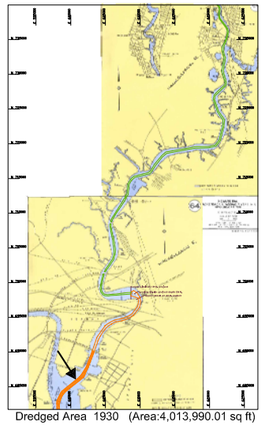
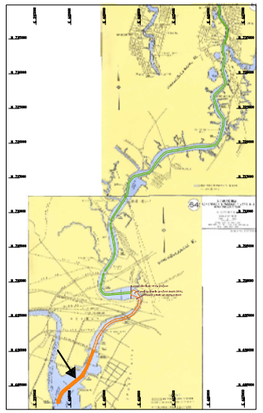
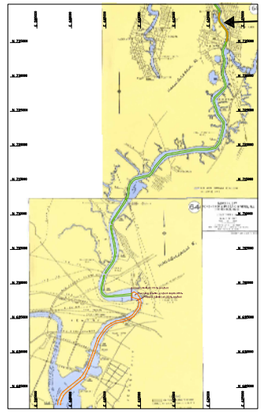
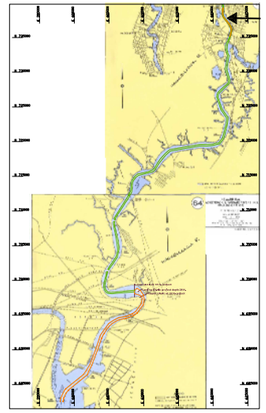
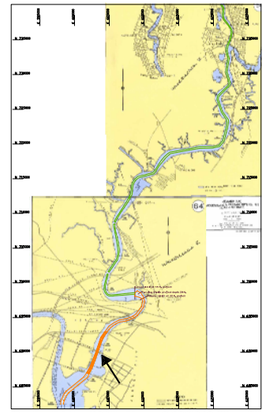
Drawn By:
Approved By:
Date: June 7, 2007

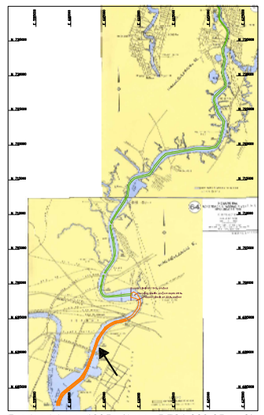

Dredged Area 1930 (Area:4,013,990.01 sq ft)

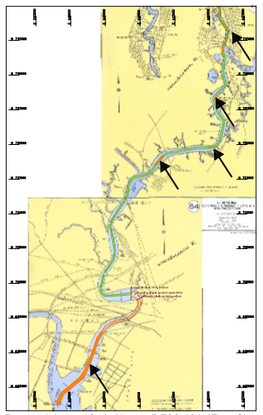

Dredged Area 1931 (Area: 3,548,211.22 sq ft)

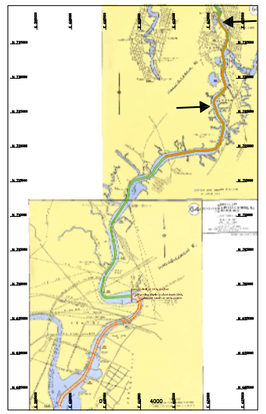

Dredged Area 1932 (Area: 677,881.27 sqft)

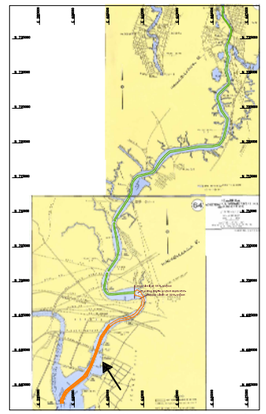

Dredged Area 1933 (Area: 677,881.27 sqft)

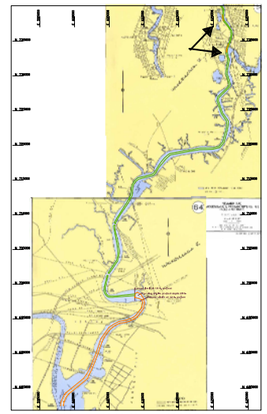

Dredged Area 1934 (Area: 2,029,818.77 sq ft)

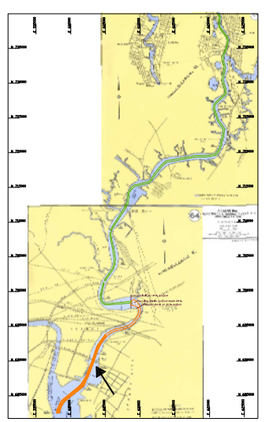

Dredged Area 1935 (Area: 5,721,669.65 sq ft)

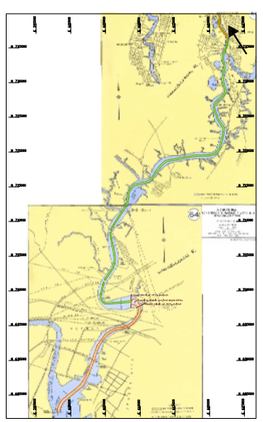

Dredged Area 1941 (Area: 5,786,181.17 sq ft)


Dredged Area 1942 (Area: 5,692,257.64 sq ft)

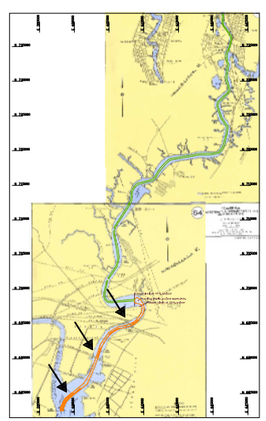

Dredged Area 1946 (Area: 4,766,276.76 sq ft)


Dredged Area 1949 (Area: 188,053.37 sq ft)


Dredged Area 1953 (Area: 4,766,276.76 sq ft)


Dredged Area 1959 (Area: 816,477.43 sq ft)


Dredged Area Hackensack 1962 (Area: 2,893,784.97 sq ft)
Dredged Area Passaic 1962 (Area: 1,581,745.74 sq ft)


Dredged Area 1976 (Area: 2,026,083.88 sq ft)

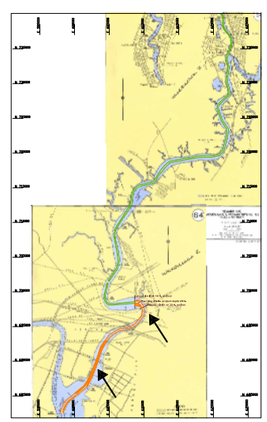
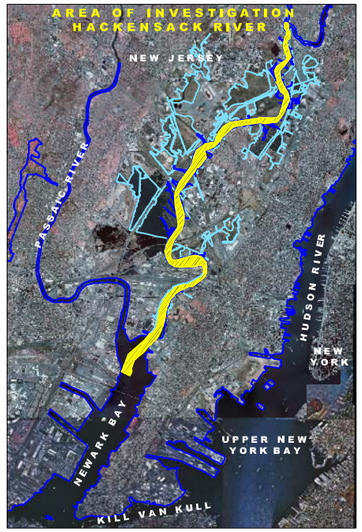
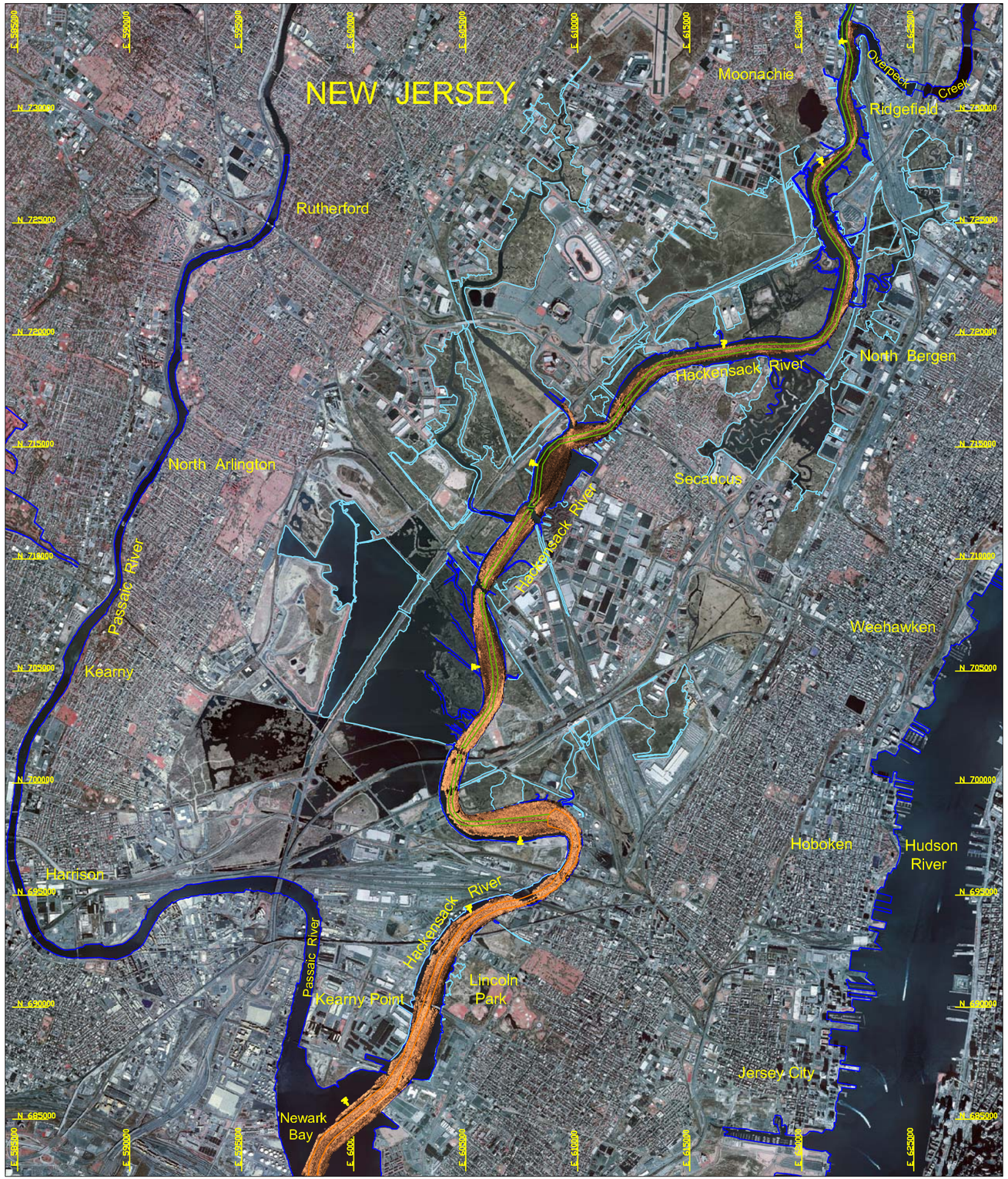

Dredged Area 1986 (Area: 1,574,418.81 sq ft)

Plate 10: Orthosonograph of the Hackensack River illuminated from the west

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance





Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)

Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

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New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

Federal Channel coordinates obtained from USACE November 2006

Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 N0. 64, covering sporadical spot maintenance dredging.

New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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Approved By:
Date: June 7, 2007

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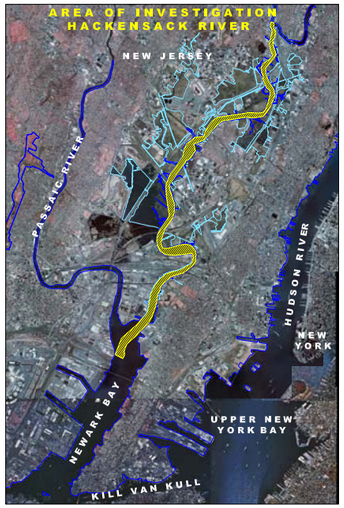
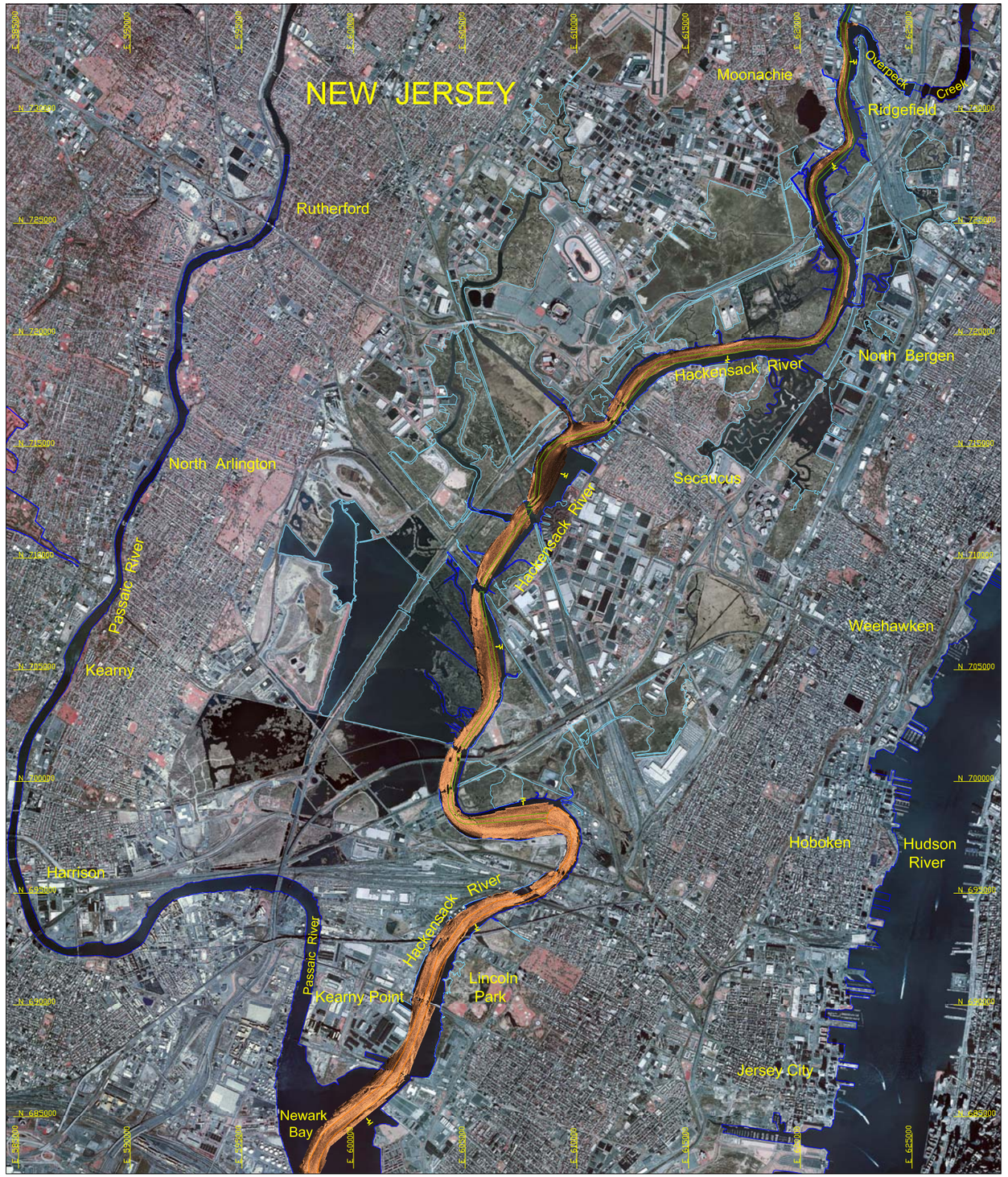
Plate 11: Orthosonograph of the Hackensack River illuminated from the east

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance





Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)

Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

Wetlands Boundaries from "NJDEP Upper Wetlands Boundary/Upper Wetlands Limit for New Jersey," 2002.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

Federal Channel coordinates obtained from USACE November 2006

Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 N0. 64, covering sporadical spot maintenance dredging.

New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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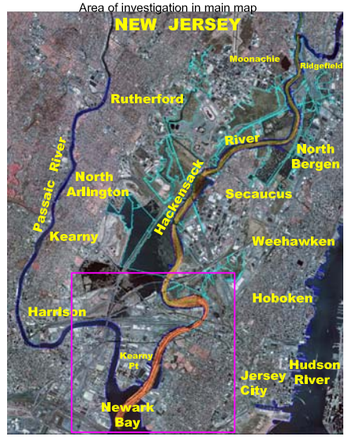
Page 93 of 126

Plate 12: Orthosonograph of the Hackensack River segment 1 illuminated from the west

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map



Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)
Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
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New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
Federal Channel coordinates obtained from USACE November 2006
Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 NO. 64, covering sporadical spot maintenance dredging.
New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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Approved By:
Date: June 7, 2007



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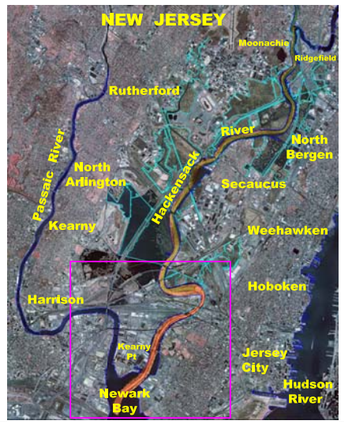
Plate 13: Orthosonograph of the Hackensack River segment 1 illuminated from the east

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map



Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)
Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
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New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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Date: June 7, 2007



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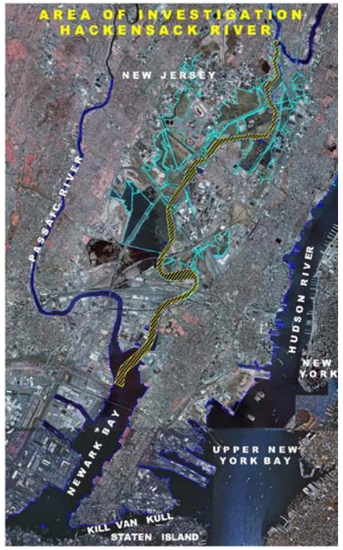
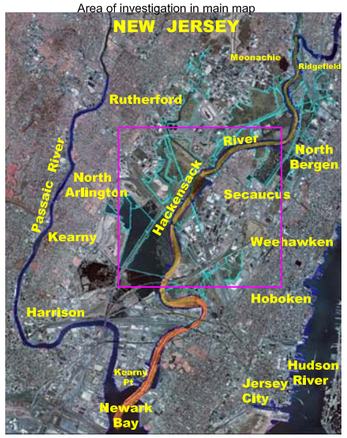
Plate 14: Orthosonograph of the Hackensack River segment 2 illuminated from the west

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map



Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)
Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
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New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
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New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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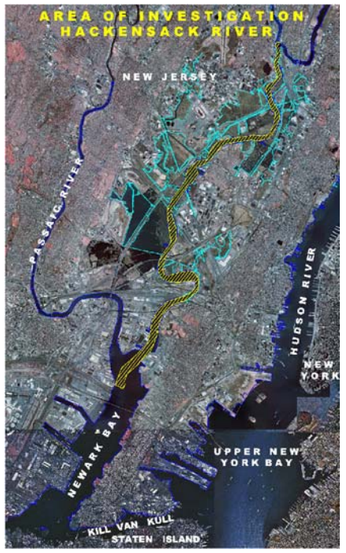
Approved By:
Date: June 7, 2007

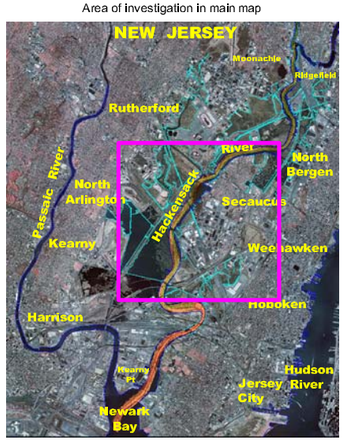


Plate 15: Orthosonograph of the Hackensack River segment 2 illuminated from the east

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map



Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)
Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
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New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
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New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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Approved By:
Date: June 7, 2007



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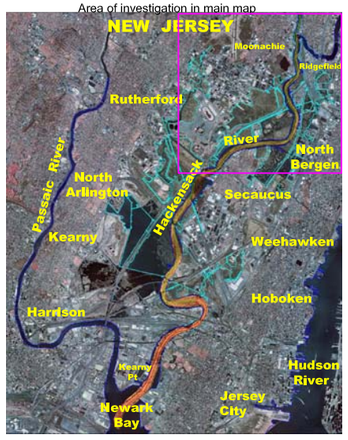
Plate 16: Orthosonograph of the Hackensack River segment 3 illuminated from the west

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map



Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)
Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
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Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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Approved By:
Date: June 7, 2007

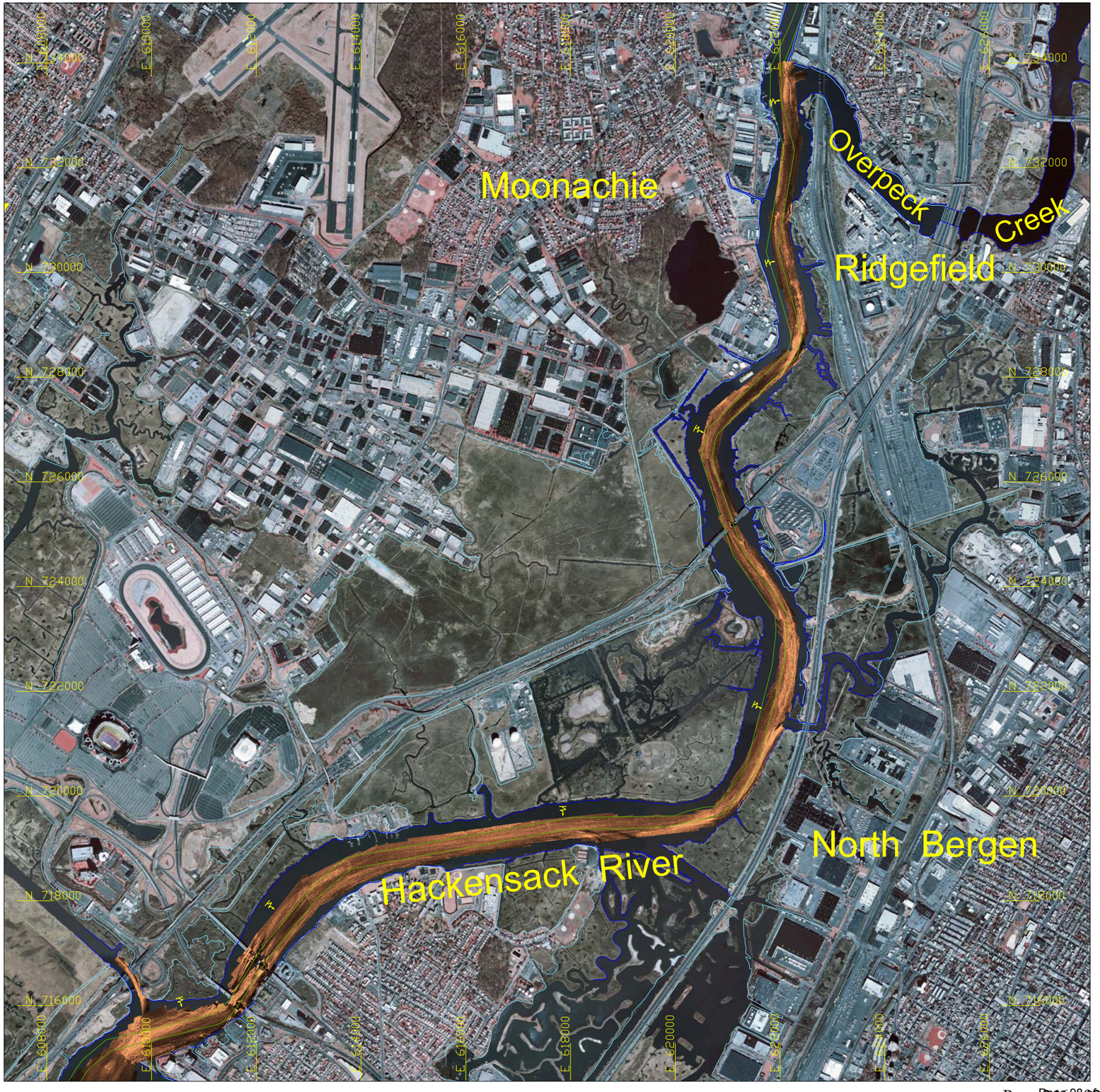

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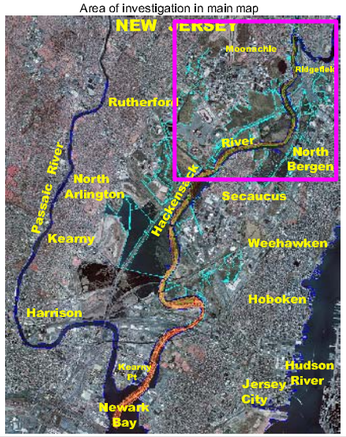
Plate 17: Orthosonograph of the Hackensack River segment 3 illuminated from the east

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map



Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)
Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993,
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
Wetlands Boundaries from "NJDEP Upper Wetlands Boundary/Upper Wetlands Limit for New Jersey," 2002,
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North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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Approved By:
Date: June 7, 2007



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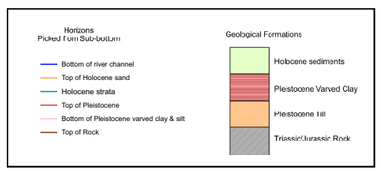
Plate 18: Sub-bottom cross section through Pleistocene to bedrock

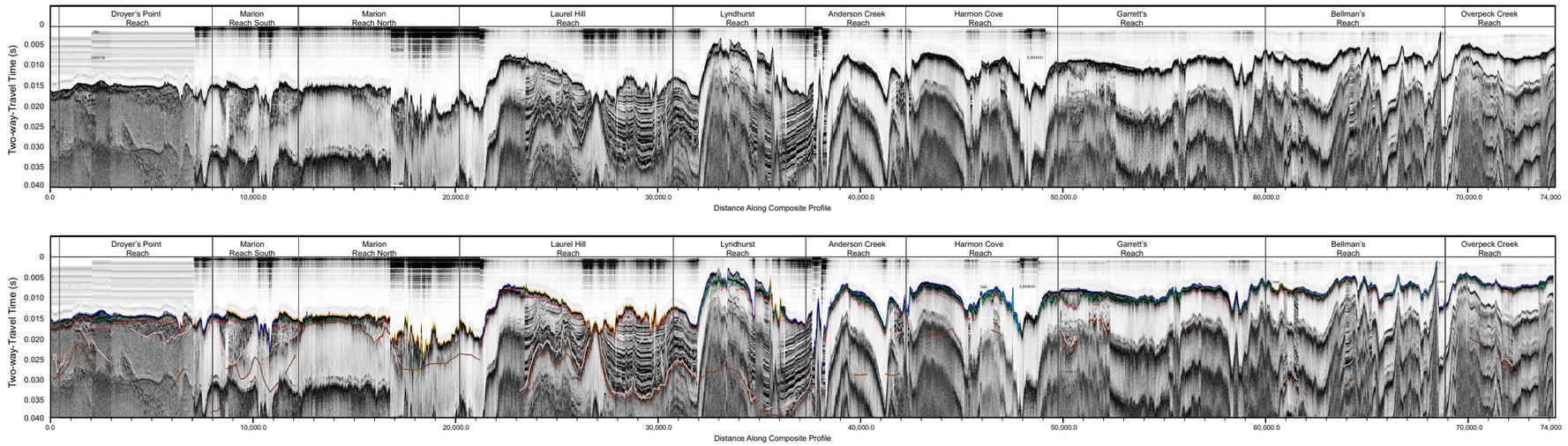
Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance



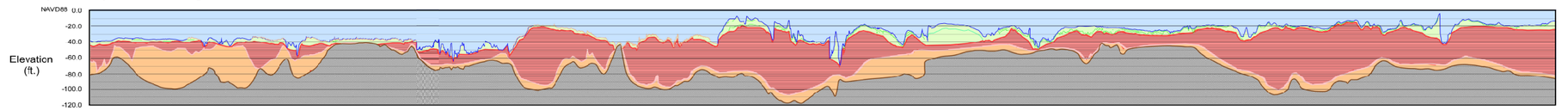


Composite sub-bottom profile along Hackensack River

South North



Interpreted depth section along Hackensack River

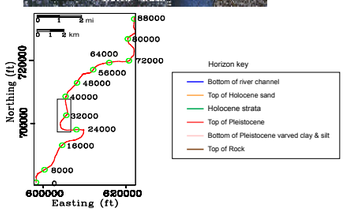


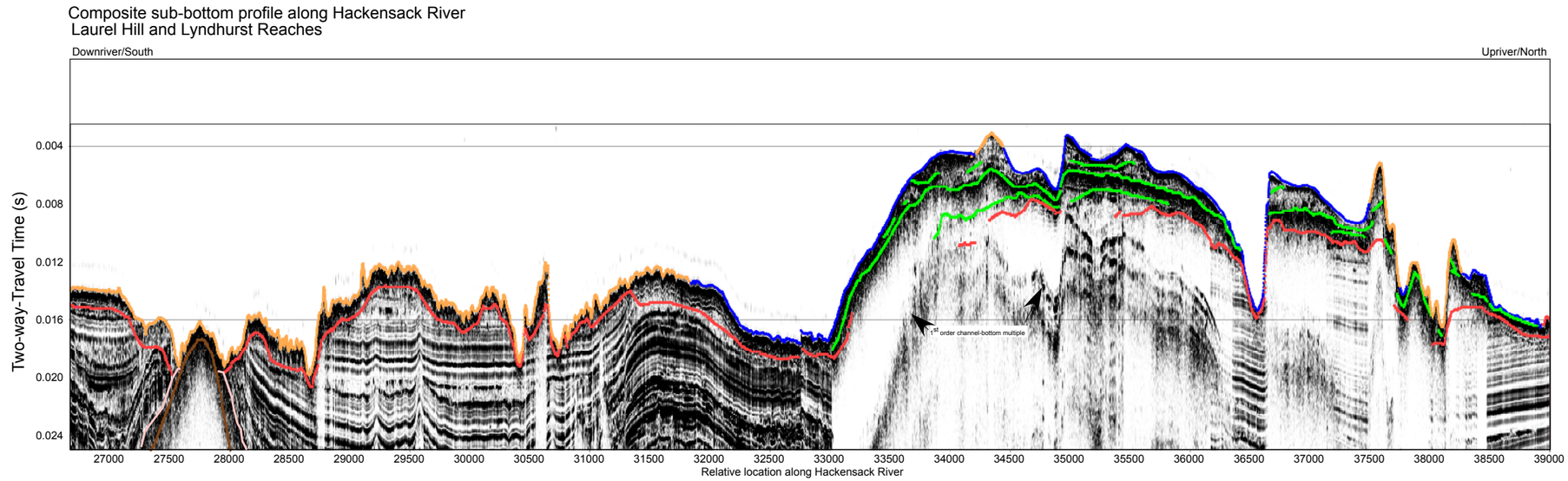
Earthworks

Plate 19: Sub-bottom cross section through Pleistocene in Laurel Hill and Lyndhurst Reaches

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance



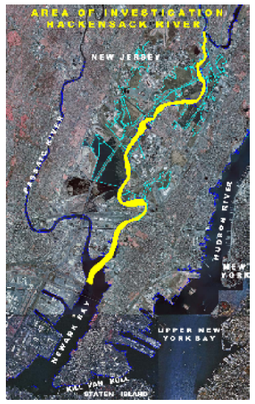


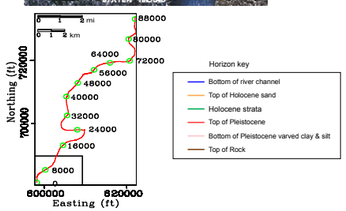


Earthworks

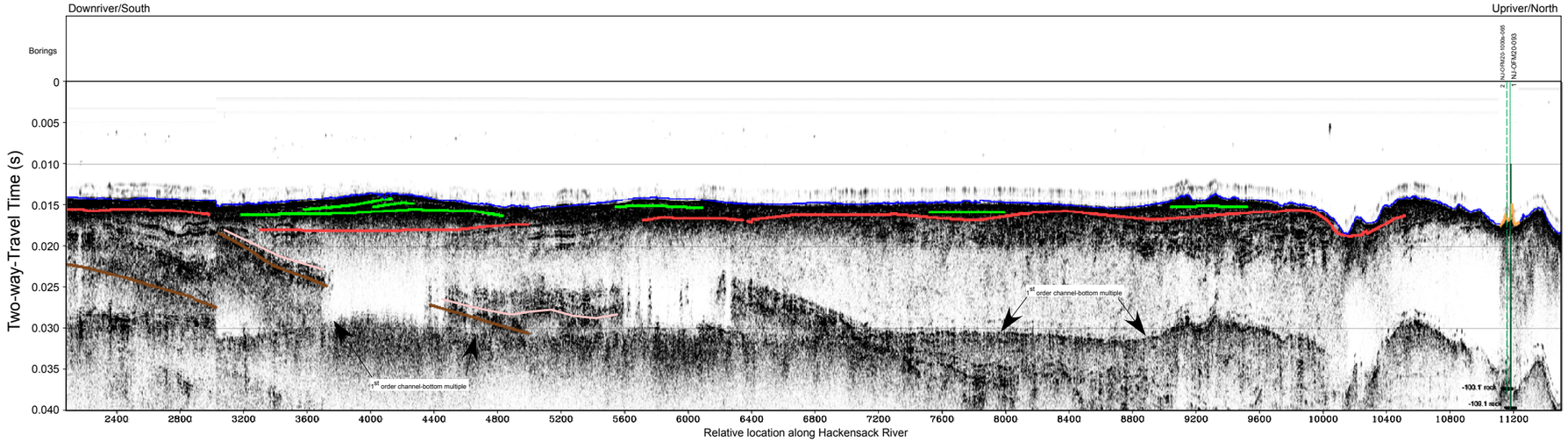
Plate 20: Sub-bottom cross section in Reach 1

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance





Composite sub-bottom profile along Hackensack River
Droyer's Point Reach



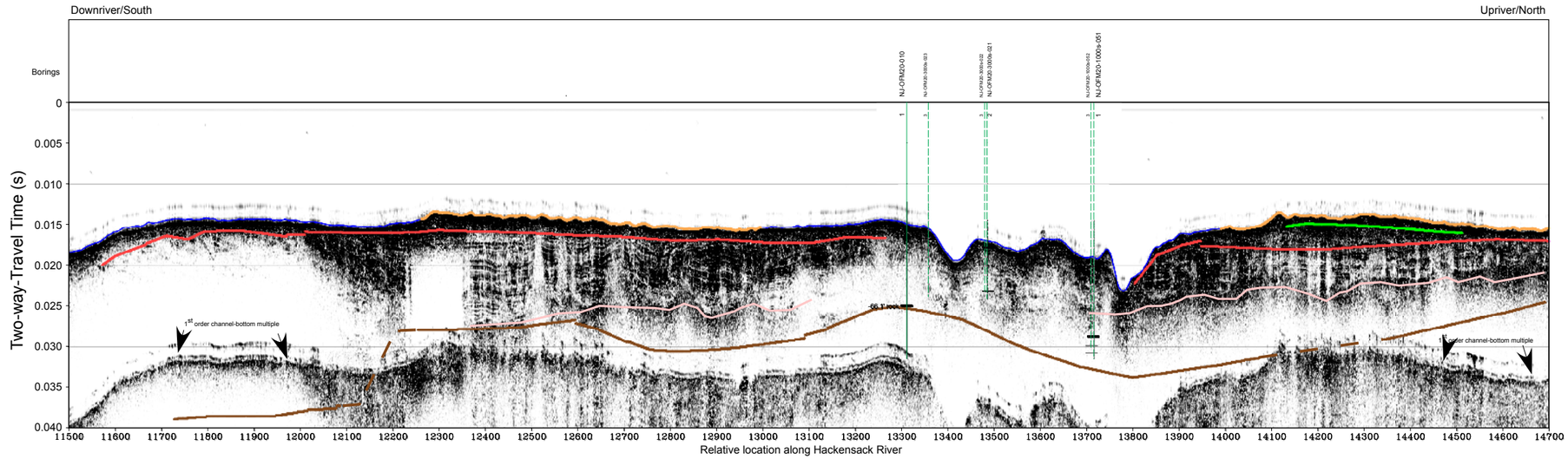
Earthworks

Plate 21: Sub-bottom cross section in Reach 2

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance



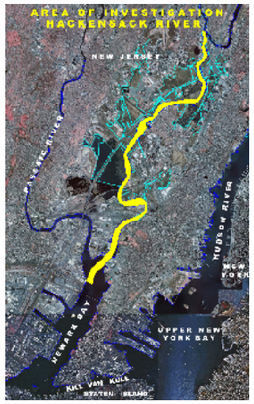
Composite sub-bottom profile along Hackensack River
Marion Reach South

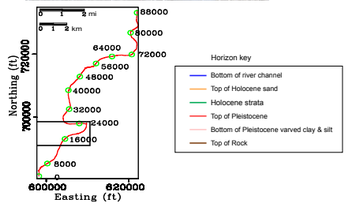


Earthworks

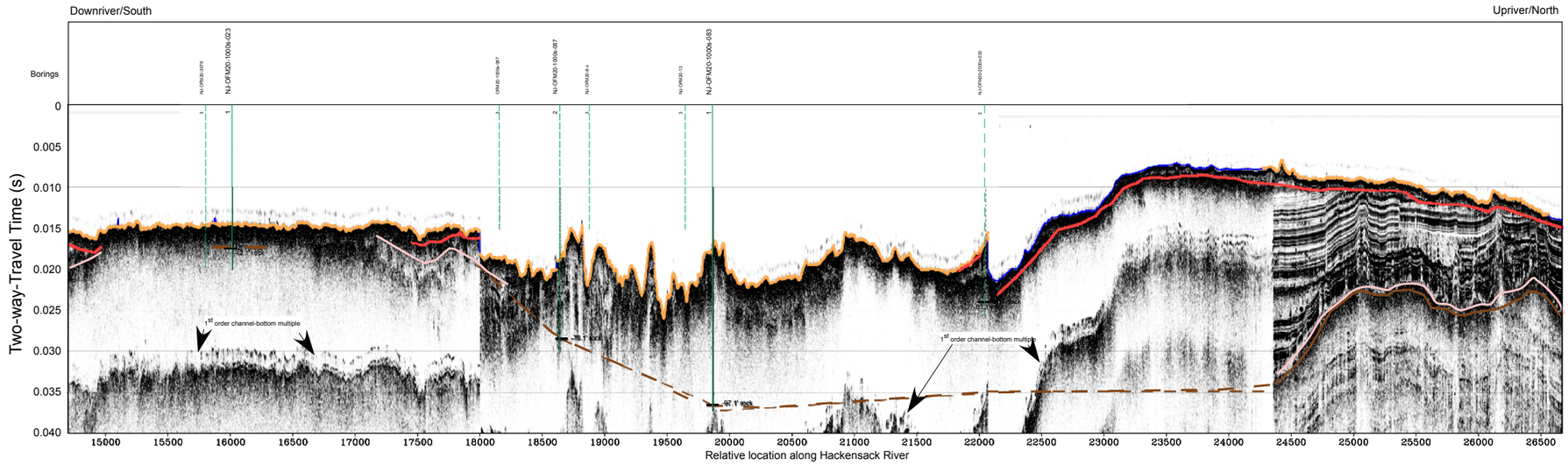
Plate 22: Sub-bottom cross section in Reach 3

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance





Composite sub-bottom profile along Hackensack River
Marion Reach North

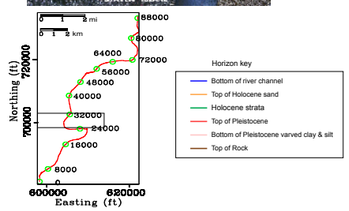


Earthworks

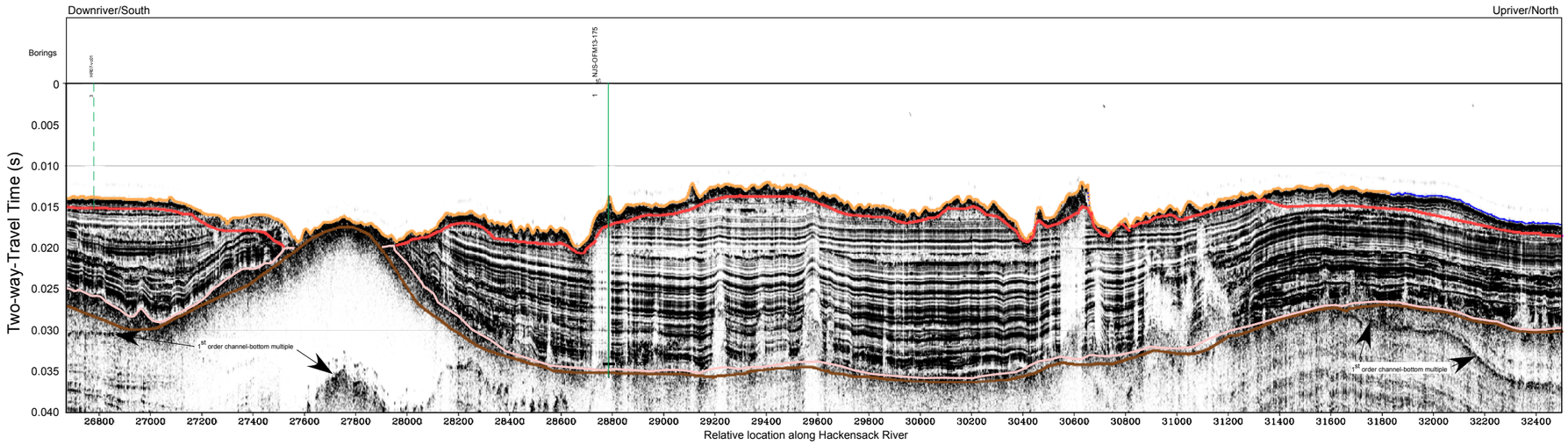
Plate 23: Sub-bottom cross section in Reach 4

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance





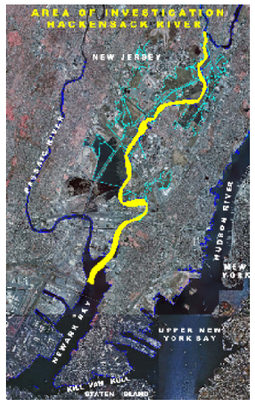
Composite sub-bottom profile along Hackensack River
Laurel Hill Reach

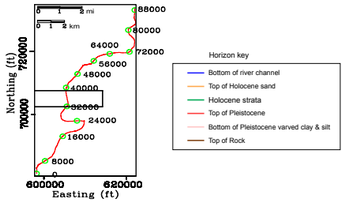


Earthworks

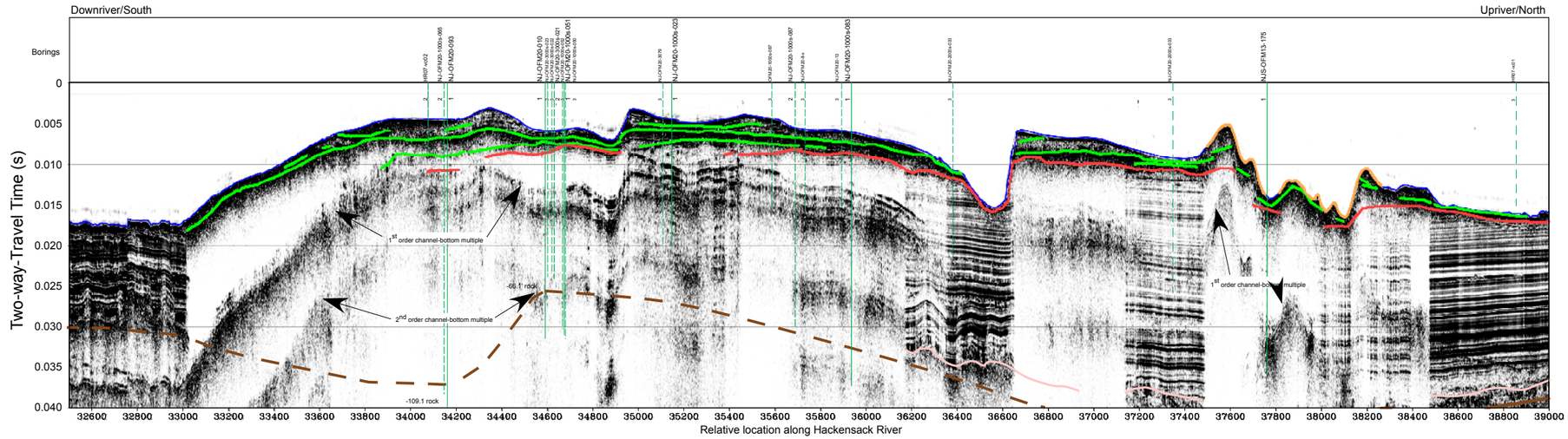
Plate 24: Sub-bottom cross section in Reach 5

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance





Composite sub-bottom profile along Hackensack River
Lyndhurst Reach



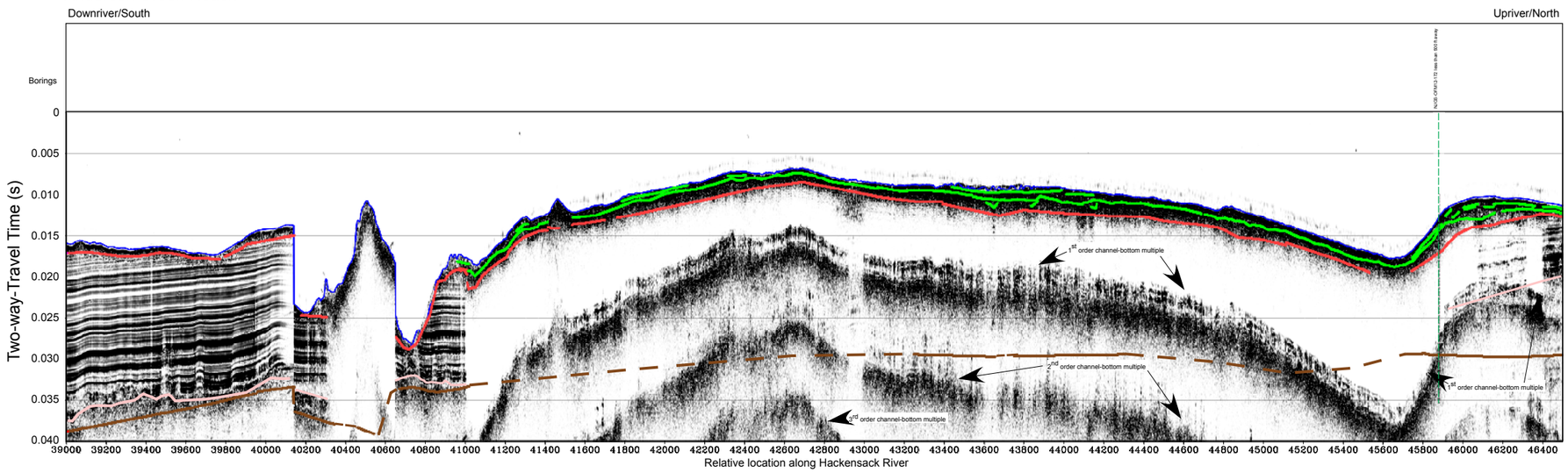
Earthworks

Plate 25: Sub-bottom cross section in Reach 6

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance



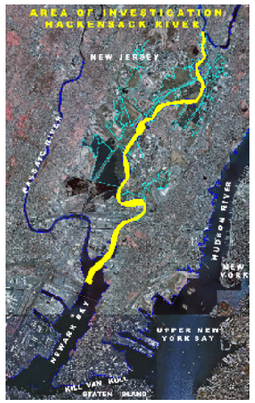
Composite sub-bottom profile along Hackensack River
Anderson Creek Reach

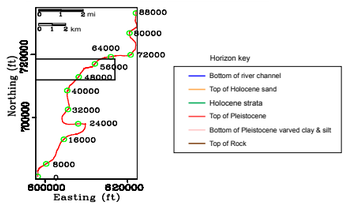


Earthworks

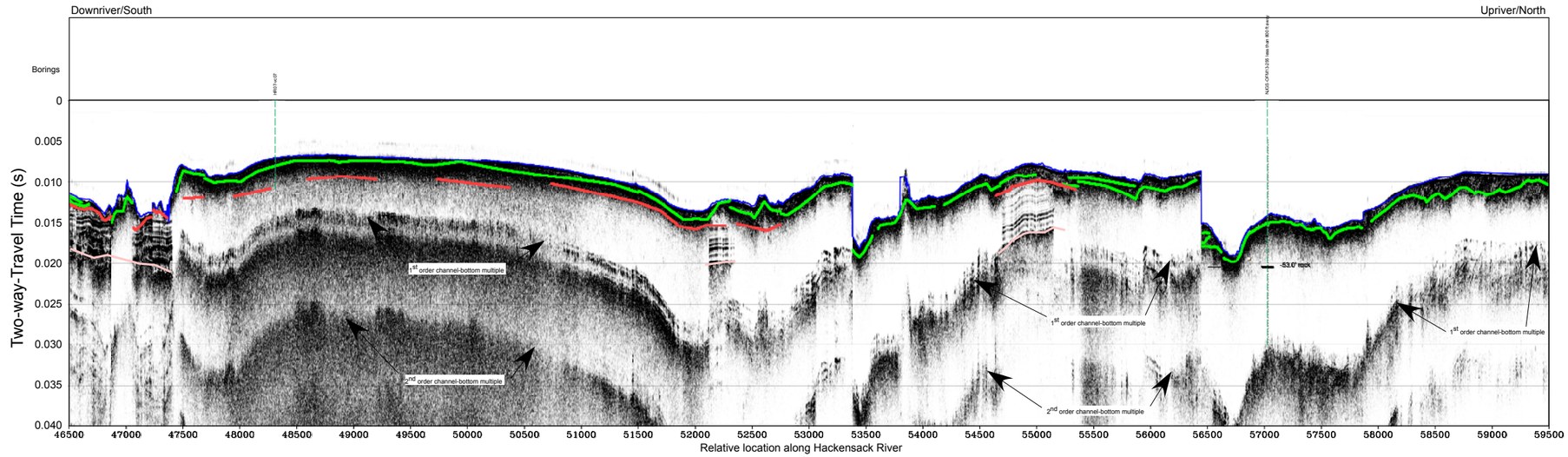
Plate 26: Sub-bottom cross section in Reach 7

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance





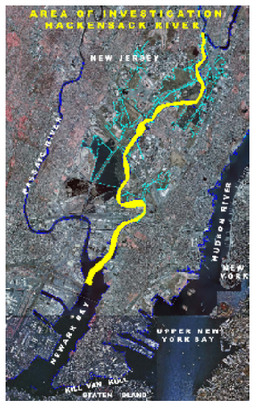
Composite sub-bottom profile along Hackensack River
Harmon Cove Reach



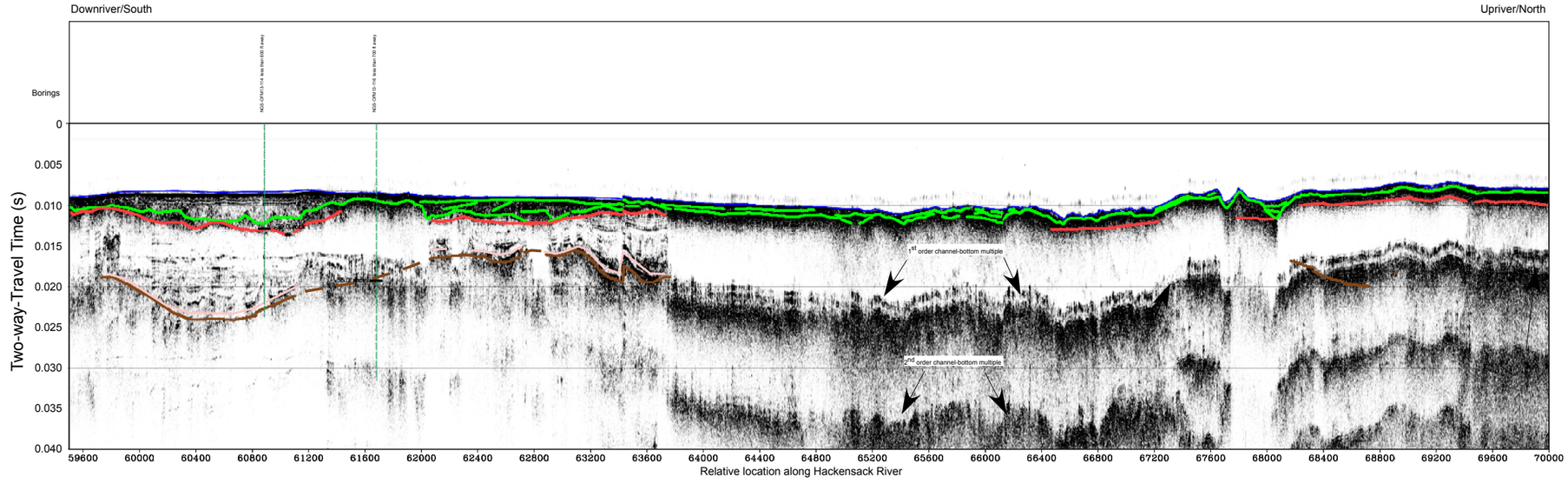
Earthworks

Plate 27: Sub-bottom cross section in Reach 8

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance



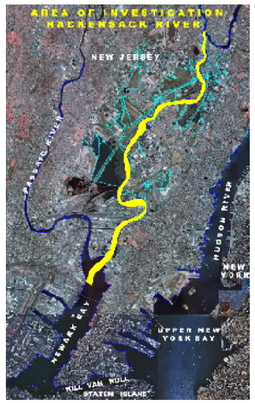
Composite sub-bottom profile along Hackensack River
Garrett's Reach

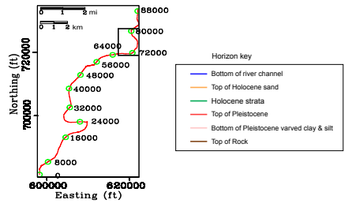


Earthworks

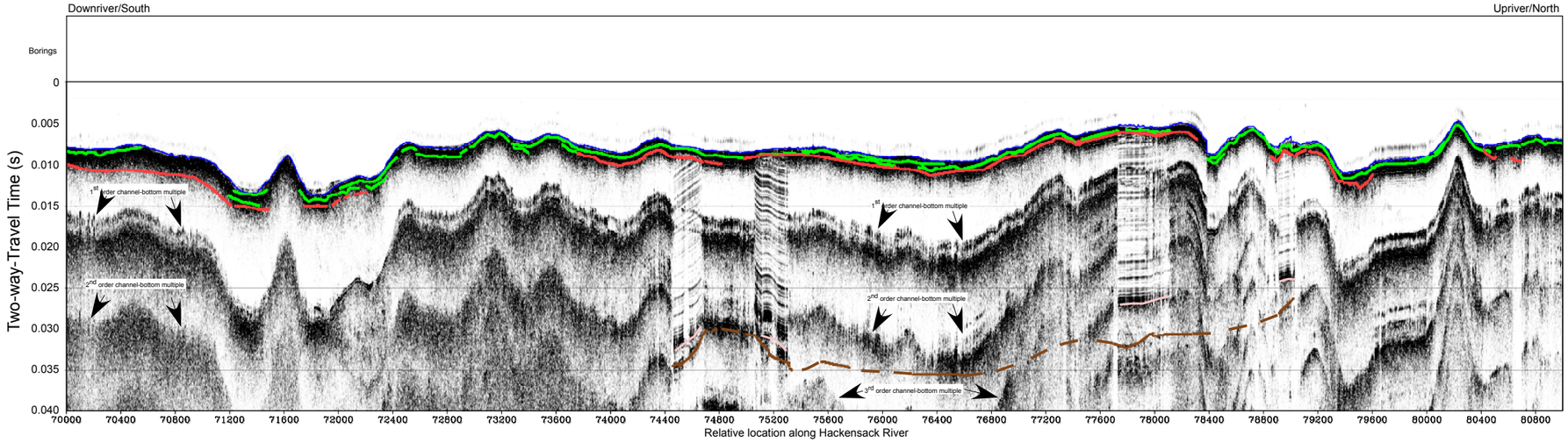
Plate 28: Sub-bottom cross section in Reach 9

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance





Composite sub-bottom profile along Hackensack River
Bellman's Reach

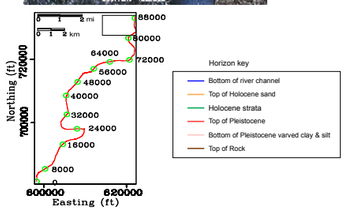


Earthworks

Plate 29: Sub-bottom cross section in Reach 10

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance





Composite sub-bottom profile along Hackensack River
Overpeck Creek Reach

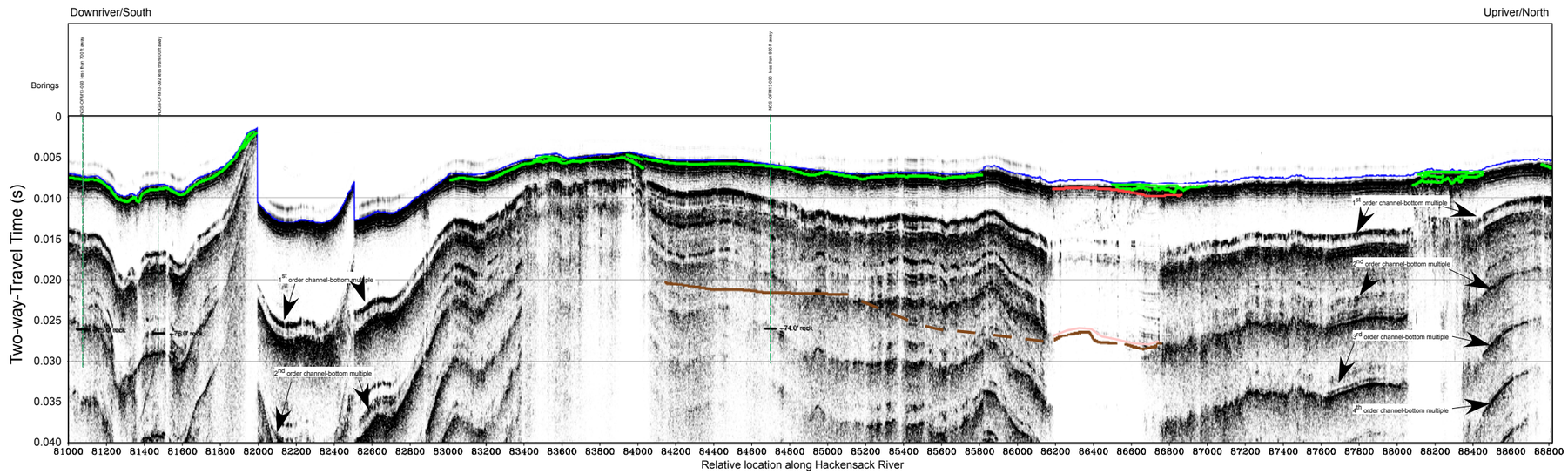


Plate 30: Magnetic field density map for the Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses,
and Field Reconnaissance



Magnetic field density data acquired by Earthworks June 2006 - April 2007
1nanoTesla (nT)=1gamma

- Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
  New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
- Wetlands Boundaries from "NJDEP Upper Wetlands Boundary/Upper Wetlands Limit for New Jersey," 2002.
  New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)
- Federal Channel coordinates obtained from USACE November 2006
- Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 N0. 64, covering sporadical spot maintenance dredging.

New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

N

Drawn By:
Approved By:
Date: June 7, 2007

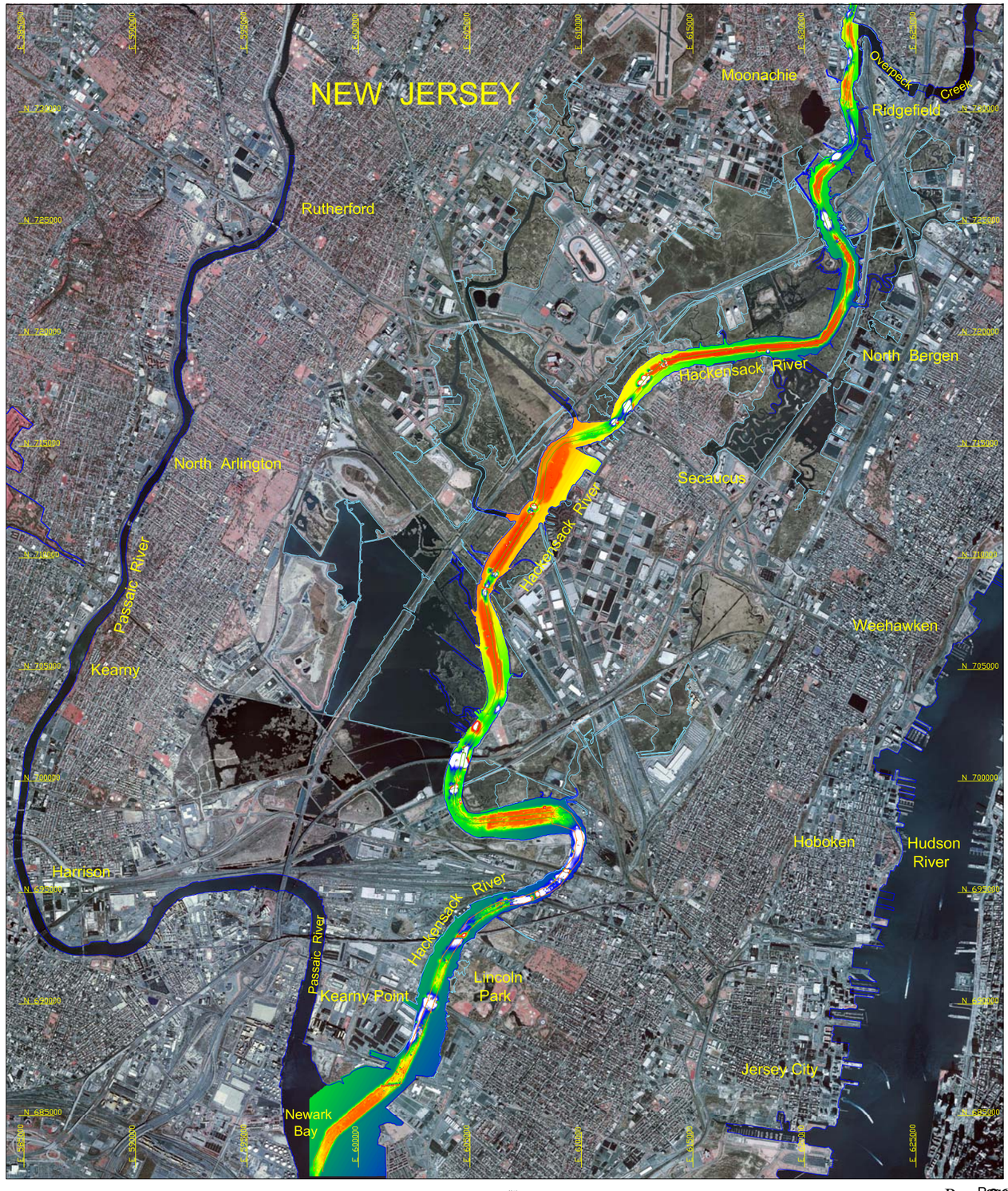
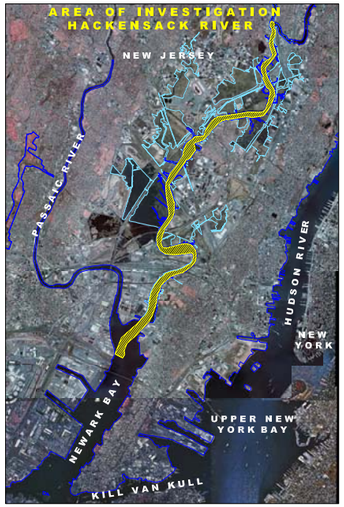
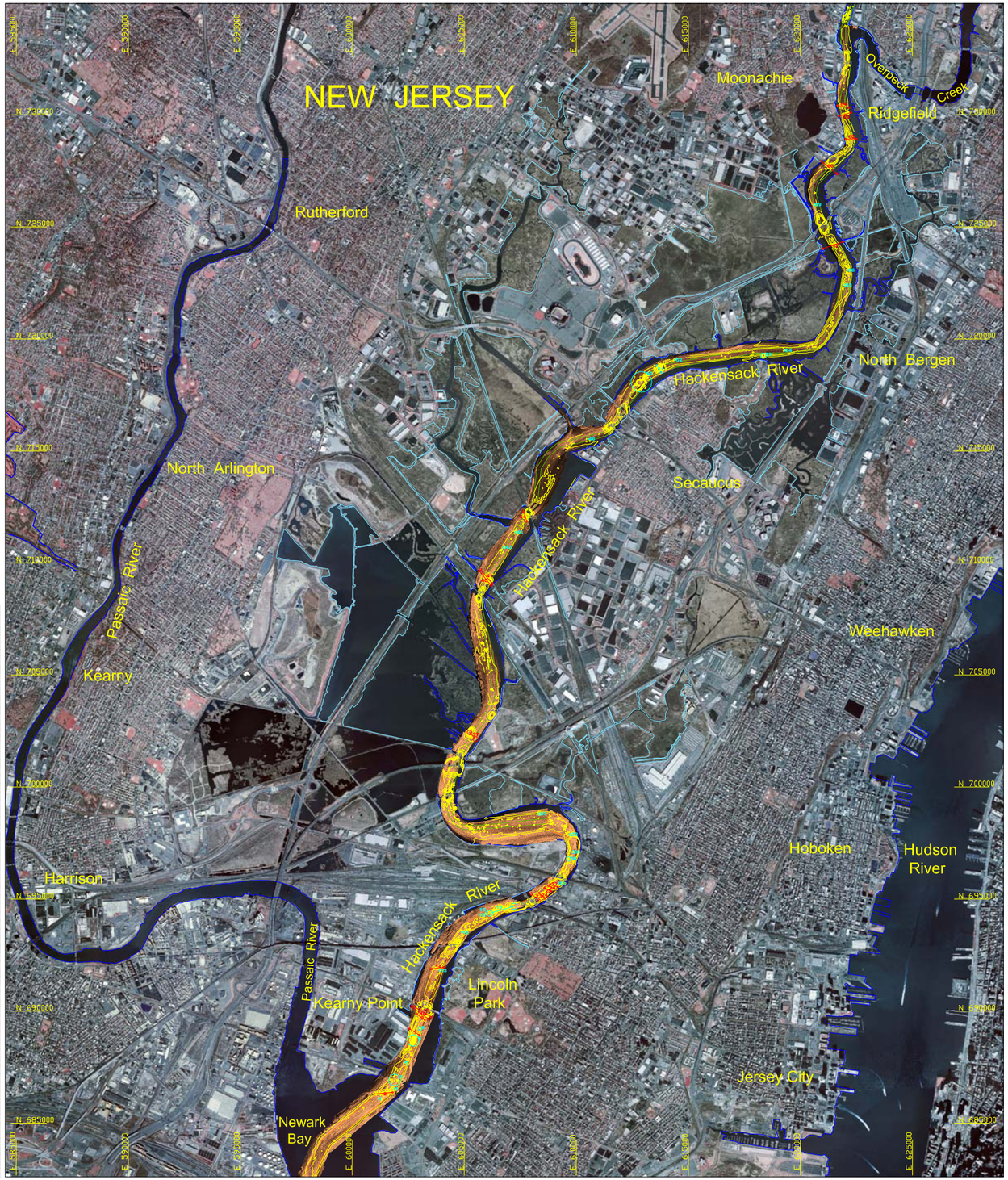


Plate 31: Magnetic field density 100nT contours with targets, overlaying the orthosonograph of the Hackensack River illuminated from the east

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance





List of crossings (red), debris (cyan), and other major targets (gray) (≥200nT) observed in the magnetic density field and side-scan sonar.

Target	Amplitude	Western or center point Easting	Western or center point Northing	Eastern point Easting	Eastern point Northing	Diameter	Description
	nT	NJSP (ft)	NJSP (ft)	NJSP (ft)	NJSP (ft)	ft	Interpretation / hypothesis
	400	601,159.28	686,102.20			60	Debris
	800	600,982.20	686,308.80	601,800.90	686,378.80		Pipeline crossing
	700	601,881.30	686,543.40			65	Debris
4	100	601,867.60	686,930.90			520	Old bridge crossing
	500	602,358.90	687,718.80			54	Debris
	>1000	602,721.10	688,894.30			505	Unknown
	400	602,549.60	689,214.30	602,868.80	688,840.70		Pipeline crossing
	200	603,019.50	689,252.40			171	Pipe debris
	700	602,877.80	689,871.60	603,241.70	689,800.50		Pipeline crossing
	500	602,860.70	690,187.40	603,369.50	689,852.30		Pipeline crossing
	500	602,880.70	690,262.10	603,550.70	689,737.50		Pipeline crossing
12	500	602,840.90	690,568.30	603,544.30	690,028.80		Lincoln Highway Bridge (U.S. Route 1-9 Truck)
13	600	603,323.90	691,818.80			91	Debris
	200	603,522.30	691,886.90	604,099.90	691,953.10		Pipeline crossing
15	500	603,960.60	692,891.70	604,886.30	693,012.10		Pulaski Skyway Bridge
16	400	604,900.70	693,324.50			75	Debris
17	400	605,894.50	694,268.70			70	Debris
18	100	605,989.30	694,406.60			90	Pipe debris
19	500	606,146.00	694,375.20	707,226.60	694,683.70		Along-river debris field
20	500	607,054.50	695,019.10	608,052.10	694,845.60		PATH bridge
21	500	607,708.60	695,144.80	608,204.90	694,752.80		Harsimus Branch lift bridge
22	500	607,740.40	695,155.20	608,245.30	694,787.20		Wittpenn Bridge
	400	607,890.00	695,233.50	608,326.40	694,935.90		Concrete mats
	700	608,332.10	695,271.60	608,574.50	695,052.50		Pipeline crossing
	700	608,594.70	695,505.20	608,897.70	695,246.80		Pipeline crossing
	700	608,756.30	695,594.60	609,018.80	695,453.30		Pipeline crossing
	700	608,835.40	695,664.40	609,174.30	695,541.70		Pipeline crossing
28	800	609,192.00	695,719.00			80	Debris
29	500	608,979.90	696,018.70	609,486.40	695,871.50		Lower Hack Draw bridge
30	800	609,846.60	696,792.70			200	Debris
31	>1000	609,866.60	697,104.30			135	Debris
32	600	609,744.70	697,880.60			120	Debris
33	600	608,363.40	698,797.70			125	Debris
34	600	603,805.70	699,449.10	604,734.20	699,821.50		Portal bridge
35	>1000	604,071.00	700,951.40	604,803.70	700,964.00		New Jersey Turnpike Bridge (Eastern Spur)
36	>1000	604,361.50	701,579.30	605,106.80	701,260.70		DB draw bridge
	600	605,236.10	702,443.40	605605.5	702143.4		Pipeline crossing
38	500	606,251.70	703,188.10			460	Laurel Hill marina
39	500	605,429.50	708,908.70	605,845.90	708,416.30		Upper Hack lift bridge
	600	605,679.90	709,643.80	606,353.10	709,991.50		Pipeline crossing, Anderson Creek
	800	605,714.20	709,704.70	606,253.60	709,866.50		Pipeline crossing, Anderson Creek
42	700	606,784.60	710,697.10			123	Debris, Anderson Creek
43	500	607,304.40	711,178.60			65	Debris, Anderson Creek
	800	607,848.60	712,299.10	607,790.30	711,862.90		Pipeline crossing, South of HX Jacknife Drawbridge
45	500	607,793.20	712,566.40	608,155.60	711,567.60		HX Jacknife Drawbridge
46	300	610,529.40	715,538.20			34	Debris, Harmon Cove reach
47	600	611,291.40	716,321.00	611,817.80	715,917.30		Rt. 3 Bridge (East)
48	400	612,051.40	716,515.80			96	Marina south of Rt. 3 Bridge (West)
49	600	611,649.00	717,212.40	612,300.80	716,580.20		Rt. 3 Bridge (West)
50	600	612,908.00	718,082.50			916	Debris field, Garrett's Reach
51	600	613,569.60	718,807.70	613,782.10	718,509.00		Paterson Plan Road Bridge Abutments
52	300	614,421.50	719,378.40			82	Debris, Garretts Reach
53	400	618,349.80	719,250.20			239	Debris, Garretts Reach
54	300	619,315.80	719,488.00			86	Debris, Garretts Reach
55	300	621,991.00	722,399.40			99	Debris, Bellmarie Reach
56	400	622,120.80	723,067.90			73	Debris, Bellmarie Reach
57	500	620,995.80	724,526.60	621,901.50	724,340.00		Pipeline crossing, Bellmarie Reach
58	1,000	620,652.80	724,728.80	621,274.00	725,402.10		Rt. 95 Western Spur
59	300	620,630.50	725,956.30			89	Debris, Bellmarie Reach
60	500	620,936.00	727,926.70	621,630.00	727,368.60		Pipeline crossing, Bellmarie Reach
61	500	621,331.30	728,070.00			132	Oil Barge at Hess Station, Bellmarie Reach
	500	622,041.40	728,911.10	622,492.60	728,802.40		Pipeline crossing, Overpeck Reach
	500	621,721.00	729,951.50	622,253.20	730,095.70		Pipeline crossing, Overpeck Reach
	400	621,656.70	730,416.50	622,170.00	730,323.30		Pipeline crossing, Overpeck Reach
65	500	621,958.70	732,304.80			163	Ruth reads, Overpeck Reach

Orthosonograph data acquired by Earthworks November 2006 - January 2007

Magnetic field density data acquired by Earthworks June 2006 - April 2007
1nanoTesla (nT)=1gamma

Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

Wetlands Boundaries from "NJDEP Upper Wetlands Boundary/Upper Wetlands Limit for New Jersey," 2002.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

Federal Channel coordinates obtained from USACE November 2006

Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 N0. 64, covering sporadical spot maintenance dredging.

New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

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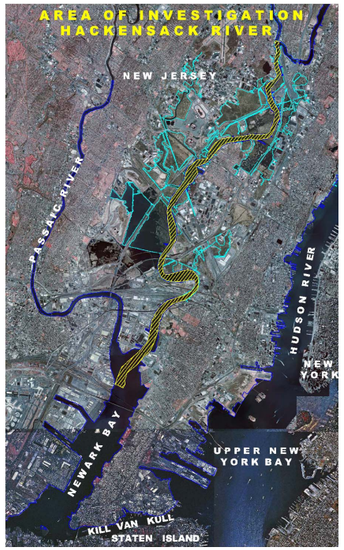
Drawn By:
Approved By:
Date: June 7, 2007

Plate 32: Magnetic field density map with targets for the Hackensack River, segment 1

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



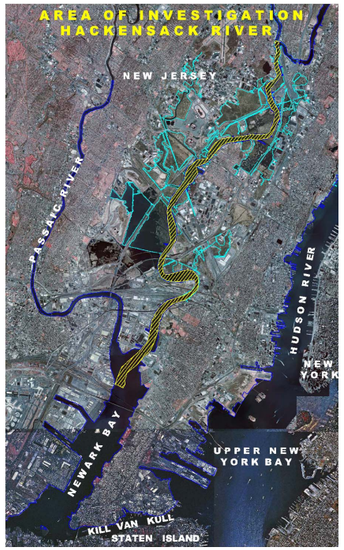
List of crossings (red), debris (cyan), and other major targets (gray) (≥200nT) observed in the magnetic density field and side-scan sonar.

Target	Amplitude	Position in state plane coordinates (ft) Existing	Northing	Existing	Northing	Inverted to	Description (interpretation / classification)
1	4,437.7	611,387.3	701,587.3			ft	Debris
2	260	607,967.0	699,183.8	607,967.0	699,183.8	ft	Pipeline crossing
3	763	617,884.3	698,233.4			ft	Debris
4	565	621,887.8	698,200.8			ft	Debris
5	660	611,299.0	697,713.8			ft	Debris
6	1,403	624,727.1	698,644.8			ft	Debris
7	260	624,727.1	698,644.8	624,727.1	698,644.8	ft	Pipeline crossing
8	763	613,814.5	698,257.4			ft	Pipeline
9	763	613,877.1	698,257.1	613,877.1	698,257.1	ft	Pipeline crossing
10	763	613,940.1	698,256.8	613,940.1	698,256.8	ft	Pipeline crossing
11	660	613,940.1	698,256.8	613,940.1	698,256.8	ft	Pipeline crossing
12	660	613,647.0	698,363.9	613,647.0	698,363.9	ft	Lincoln Highway Bridge (NB Phase 1 & Phase 2 & SB)
13	565	613,353.0	698,471.0			ft	Debris
14	763	613,353.0	698,471.0	613,353.0	698,471.0	ft	Pipeline crossing
15	660	613,060.0	698,578.0	613,060.0	698,578.0	ft	Pipeline crossing
16	565	612,766.9	698,685.1			ft	Debris
17	565	612,473.9	698,792.1			ft	Debris
18	565	612,180.9	698,899.2			ft	Debris
19	565	611,887.8	699,006.2			ft	Debris
20	565	611,594.8	699,113.3			ft	Debris
21	565	611,301.8	699,220.3			ft	Debris
22	565	611,008.7	699,327.4			ft	Debris
23	565	610,715.7	699,434.4			ft	Debris
24	565	610,422.7	699,541.5			ft	Debris
25	565	610,129.6	699,648.5			ft	Debris
26	565	609,836.6	699,755.6			ft	Debris
27	565	609,543.6	699,862.6			ft	Debris
28	565	609,250.5	699,969.7			ft	Debris
29	565	608,957.5	700,076.7			ft	Debris
30	565	608,664.5	700,183.8			ft	Debris
31	565	608,371.4	700,290.8			ft	Debris
32	565	608,078.4	700,397.9			ft	Debris
33	565	607,785.4	700,504.9			ft	Debris
34	565	607,492.3	700,612.0			ft	Debris
35	565	607,199.3	700,719.0			ft	Debris
36	565	606,906.3	700,826.1			ft	Debris
37	565	606,613.2	700,933.1			ft	Debris
38	565	606,320.2	701,040.2			ft	Debris
39	565	606,027.2	701,147.2			ft	Debris
40	565	605,734.1	701,254.3			ft	Debris
41	565	605,441.1	701,361.3			ft	Debris
42	565	605,148.1	701,468.4			ft	Debris
43	565	604,855.0	701,575.4			ft	Debris
44	565	604,562.0	701,682.5			ft	Debris
45	565	604,269.0	701,789.5			ft	Debris
46	565	603,975.9	701,896.6			ft	Debris
47	565	603,682.9	702,003.6			ft	Debris
48	565	603,389.9	702,110.7			ft	Debris
49	565	603,096.8	702,217.7			ft	Debris
50	565	602,803.8	702,324.8			ft	Debris
51	565	602,510.8	702,431.8			ft	Debris
52	565	602,217.7	702,538.9			ft	Debris
53	565	601,924.7	702,645.9			ft	Debris
54	565	601,631.7	702,753.0			ft	Debris
55	565	601,338.6	702,860.0			ft	Debris
56	565	601,045.6	702,967.1			ft	Debris
57	565	600,752.6	703,074.1			ft	Debris
58	565	600,459.5	703,181.2			ft	Debris
59	565	600,166.5	703,288.2			ft	Debris
60	565	599,873.5	703,395.3			ft	Debris
61	565	599,580.4	703,502.3			ft	Debris
62	565	599,287.4	703,609.4			ft	Debris
63	565	598,994.4	703,716.4			ft	Debris
64	565	598,701.3	703,823.5			ft	Debris
65	565	598,408.3	703,930.5			ft	Debris
66	565	598,115.3	704,037.6			ft	Debris
67	565	597,822.2	704,144.6			ft	Debris
68	565	597,529.2	704,251.7			ft	Debris
69	565	597,236.2	704,358.7			ft	Debris
70	565	596,943.1	704,465.8			ft	Debris
71	565	596,650.1	704,572.8			ft	Debris
72	565	596,357.1	704,679.9			ft	Debris
73	565	596,064.0	704,786.9			ft	Debris
74	565	595,771.0	704,894.0			ft	Debris
75	565	595,478.0	705,001.0			ft	Debris
76	565	595,184.9	705,108.1			ft	Debris
77	565	594,891.9	705,215.1			ft	Debris
78	565	594,598.9	705,322.2			ft	Debris
79	565	594,305.8	705,429.2			ft	Debris
80	565	594,012.8	705,536.3			ft	Debris
81	565	593,719.8	705,643.3			ft	Debris
82	565	593,426.7	705,750.4			ft	Debris
83	565	593,133.7	705,857.4			ft	Debris
84	565	592,840.7	705,964.5			ft	Debris
85	565	592,547.6	706,071.5			ft	Debris
86	565	592,254.6	706,178.6			ft	Debris
87	565	591,961.6	706,285.6			ft	Debris
88	565	591,668.5	706,392.7			ft	Debris
89	565	591,375.5	706,499.7			ft	Debris
90	565	591,082.5	706,606.8			ft	Debris
91	565	590,789.4	706,713.8			ft	Debris
92	565	590,496.4	706,820.9			ft	Debris
93	565	590,203.4	706,927.9			ft	Debris
94	565	589,910.3	707,035.0			ft	Debris
95	565	589,617.3	707,142.0			ft	Debris
96	565	589,324.3	707,249.1			ft	Debris
97	565	589,031.2	707,356.1			ft	Debris
98	565	588,738.2	707,463.2			ft	Debris
99	565	588,445.2	707,570.2			ft	Debris
100	565	588,152.1	707,677.3			ft	Debris
101	565	587,859.1	707,784.3			ft	Debris
102	565	587,566.1	707,891.4			ft	Debris
103	565	587,273.0	707,998.4			ft	Debris
104	565	586,980.0	708,105.5			ft	Debris
105	565	586,687.0	708,212.5			ft	Debris
106	565	586,393.9	708,319.6			ft	Debris
107	565	586,100.9	708,426.6			ft	Debris
108	565	585,807.9	708,533.7			ft	Debris
109	565	585,514.8	708,640.7			ft	Debris
110	565	585,221.8	708,747.8			ft	Debris
111	565	584,928.8	708,854.8			ft	Debris
112	565	584,635.7	708,961.9			ft	Debris
113	565	584,342.7	709,068.9			ft	Debris
114	565	584,049.7	709,176.0			ft	Debris
115	565	583,756.6	709,283.0			ft	Debris
116	565	583,463.6	709,390.1			ft	Debris
117	565	583,170.6	709,497.1			ft	Debris
118	565	582,877.5	709,604.2			ft	Debris
119	565	582,584.5	709,711.2			ft	Debris
120	565	582,291.5	709,818.3			ft	Debris
121	565	581,998.4	709,925.3			ft	Debris
122	565	581,705.4	710,032.4			ft	Debris
123	565	581,412.4	710,139.4			ft	Debris
124	565	581,119.3	710,246.5			ft	Debris
125	565	580,826.3	710,353.5			ft	Debris
126	565	580,533.3	710,460.6			ft	Debris
127	565	580,240.2	710,567.6			ft	Debris
128	565	579,947.2	710,674.7			ft	Debris
129	565	579,654.2	710,781.7			ft	Debris
130	565	579,361.1	710,888.8			ft	Debris
131	565	579,068.1	710,995.8			ft	Debris
132	565	578,775.1	711,102.9			ft	Debris
133	565	578,482.1	711,209.9			ft	Debris
134	565	578,189.0	711,317.0			ft	Debris
135	565	577,896.0	711,424.0			ft	Debris
136	565	577,603.0	711,531.1			ft	Debris
137	565	577,309.9	711,638.1			ft	Debris
138	565	577,016.9	711,745.2			ft	Debris
139	565	576,723.9	711,852.2			ft	Debris
140	565	576,430.8	711,959.3			ft	Debris
141	565	576,137.8	712,066.3			ft	Debris
142	565	575,844.8	712,173.4			ft	Debris
143	565	575,551.7	712,280.4			ft	Debris
144	565	575,258.7	712,387.5			ft	Debris
145	565	574,965.7	712,494.5			ft	Debris
146	565	574,672.7	712,601.6			ft	Debris
147	565	574,379.6	712,708.6			ft	Debris
148	565	574,086.6	712,815.7			ft	Debris
149	565	573,793.6	712,922.7			ft	Debris
150	565	573,500.5	713,029.8			ft	Debris
151	565	573,207.5	713,136.8			ft	Debris
152	565	572,914.5	713,243.9			ft	Debris
153	565	572,621.4	713,350.9			ft	Debris
154	565	572,328.4	713,458.0			ft	Debris
155	565	572,035.4	713,565.0			ft	Debris
156	565	571,742.4	713,672.1			ft	Debris
157	565	571,449.3	713,779.1			ft	Debris
158	565	571,156.3	713,886.2			ft	Debris
159	565	570,863.3	713,993.2			ft	Debris
160	565	570,570.2	714,100.3			ft	Debris
161	565	570,277.2	714,207.3			ft	Debris
162	565	569,984.2	714,314.4			ft	Debris
163	565	569,691.2	714,421.4			ft	Debris
164	565	569,398.1	714,528.5			ft	Debris
165	565	569,105.1	714,635.5			ft	Debris
166	565	568,812.1	714,742.6			ft	Debris
167	565	568,519.0	714,849.6			ft	Debris
168	565	568,226.0	714,956.7			ft	Debris
169	565	567,933.0	715,063.7			ft	Debris
170	565	567,639.9	715,170.8			ft	Debris
171	565	567,346.9	715,277.8			ft	Debris
172	565	567,053.9	715,384.9			ft	Debris
173	565	566,760.9	715,491.9			ft	Debris
174	565	566,467.8	715,599.0			ft	Debris
175	565	566,174.8	715,706.0			ft	Debris
176	565	565,881.8	715,813.1			ft	Debris
177	565	565,588.7	715,920.1			ft	Debris
178	565	565,295.7	716,027.2			ft	Debris
179	565	565,002.7	716,134.2			ft	Debris
180	565	564,709.7	716,241.3			ft	Debris
181	565	564,416.6	716,348.3			ft	Debris
182	565	564,123.6	716,455.4			ft	Debris
183	565	563,830.6	716,562.4			ft	Debris
184	565	563,537.5	716,669.5			ft	Debris
185	565	563,244.5	716,776.5			ft	Debris
186	565	562,951.5	716,883.6			ft	Debris
187	565	562,658.5	716,990.6			ft	Debris
188	565	562,365.4	717,097.7			ft	Debris
189	565	562,072.4	717,204.7			ft	Debris
190	565	561,779.4	717,311.8			ft	Debris
191	565	561,486.3	717,418.8			ft	Debris
192	565	561,193.3	717,525.9			ft	Debris
193	565	560,900.3	717,632.9			ft	Debris
194	565	560,607.3	717,740.0			ft	Debris
195	565	560,314.2	717,847.0			ft	Debris
196	565	560,021.2	717,954.1			ft	Debris
197	565	559,728.2	718,061.1			ft	Debris
198	565	559,435.1	718,168.2			ft	Debris
199	565	559,142.1	718,275.2			ft	Debris
200	565	558,849.1	718,382.3			ft	Debris
201	565	558,556.1	718,489.3			ft	Debris
202	565	558,263.0	718,596.4			ft	Debris
203	565	557,970.0	718,703.4			ft	Debris
204	565	557,677.0	718,810.5			ft	Debris
205	565	557,383.9	718,917.5			ft	Debris
206	565	557,090.9	719,024.6			ft	Debris
207	565	556,797.9	719,131.6			ft	Debris
208	565	556,504.9	719,238.7			ft	Debris
209	565	556,211.8	719,345.7			ft	Debris
210	565	555,918.8	719,452.8			ft	Debris
211	565	555,625.8	719,559.8			ft	Debris
212	565	555,332.7	719,666.9			ft	Debris
213	565	555,039.7	719,773.9			ft	Debris
214	565	554,746.7	719,881.0			ft	Debris
215	565	554,453.7	719,988.0			ft	Debris
216	565	554,160.6	720,095.1			ft	Debris
217	565	553,867.6	720,202.1			ft	Debris
218	565	553,574.6	720,309.2			ft	Debris
219	565	553,281.5	720,416.2			ft	Debris
220	565	552,988.5	720,523.3			ft	Debris
221	565	552,695.5	720,630.3			ft	Debris
222	565	552,402.5	720,737.4			ft	Debris
223	565	552,109.4	720,844.4			ft	Debris
224	565	551,816.4	720,951.5			ft	Debris
225	565	551,523.4	721,058.5			ft	Debris
226	565	551,230.3	721,165.6			ft	Debris
227	565	550,937.3	721,272.6			ft	Debris
228	565	550,644.3	721,379.7			ft	Debris
229	565	550,351.3	721,486.7			ft	Debris
230	565	550,058.2	721,593.8			ft	Debris
231	565	549,765.2	721,700.8			ft	Debris
232	565	549,472.2	721,807.9			ft	Debris
233	565	549,179.1	721,914.9			ft	Debris
234	565	548,886.1	722,022.0			ft	Debris
235	565	548,593.1	722,129.0			ft	Debris
236	565	548,300.1	722,236.1			ft	Debris
237	565	548,007.0	722,343.1			ft	Debris
238	565	547,714.0	722,450.2			ft	Debris
239	565	547,421.0	722,557.2			ft	Debris
240	565	547,127.9	722,664.3			ft	Debris
241	565	546,834.9	722,771.3			ft	Debris
242	565	546,541.9	722,878.4			ft	Debris
243	565	546,248.9	722,985.4			ft	Debris
244	565	545,955.8	723,092.5			ft	Debris
245	565	545,662.8	723,199.5			ft	Debris
246	565	545,369.8	723,306.6			ft	Debris
247	565	545,076.7	723,413.6			ft	Debris
248	565	544,783.7	723,520.7			ft	Debris
249	565	544,490.7	723,627.7			ft	Debris
250	565	544,197.7	723,734.8			ft	Debris
251	565	543,904.6	723,841.8			ft	Debris
252	565	543,611.6	723,948.9			ft	Debris
253	565	543,318.6	724,055.9			ft	Debris
254	565	543,025.5	724,163.0			ft	Debris
255	565	542,732.5	724,270.0			ft	Debris
256	565	542,439.5	724,377.1			ft	Debris
257	565	542,146.5	724,484.1			ft	Debris
258	565	541,853.4	724,591.2			ft	Debris
259	565	541,560.4	724,698.2			ft	Debris
260	565	541,267.4	724,805.3			ft	Debris
261	565	540,974.3	724,912.3			ft	Debris
262	565	540,681.3	725,019.4			ft	Debris
263	565	540,388.3	725,126.4			ft	Debris
264	565	540,095.3	725,233.5			ft	Debris
265	565	539,802.2	725,340.5			ft	Debris
266	565	539,509.2	725,447.6			ft	Debris
267	565	539,216.2	725,554.6			ft	Debris
268	565	538,923.1	725,661.7			ft	Debris
269	565	538,630.1	725,768.7			ft	Debris
270	565	538,337.1	725,875.8			ft	Debris
271	565	538,044.1	725,982.8			ft	Debris
272	565	537,751.0	726,089.9			ft	Debris
273	565	537,458.0	726,196.9			ft	Debris
274	565	537,165.0	726,304.0			ft	Debris
275	565	536,871.9	726,411.0			ft	Debris
276	565	536,578.9	726,518.1			ft	Debris
277	565	536,285.9	726,625.1			ft	Debris
278	565	535,992.9	726,732.2			ft	Debris
279	565	535,699.8	726,839.2			ft	Debris
280	565	535,406.8	726,946.3			ft	Debris
281	565	535,113.8	727,053.3			ft	Debris
282	565	534,820.7	727,160.4			ft	Debris
283	565	534,527.7	727,267.4			ft	Debris
284	565	534,234.7	727,374.5			ft	Debris
285	565	533,941.7	727,481.5			ft	Debris
286	565	533,648.6	727,588.6			ft	Debris
287	565	533,355.6	727,695.6			ft	Debris
288	565	533,062.6	727,802.7			ft	Debris
289	565	532,769.5	727,909.7			ft	Debris
290	565	532,476.5	728,016.8			ft	Debris
291	565	532,183.5	728,123.8			ft	Debris
292	565	531,890.5	728,230.9			ft	Debris
293	565	531,597.4	728,337.9			ft	Debris
294	565	531,304.4	728,445.0			ft	Debris
295	565	531,011.4	728,552.0			ft	Debris
296	565	530,718.4	728,659.1			ft	Debris
297	565	530,425.3	728,766.1			ft	Debris
298	565	530,132.3	728,873.2			ft	Debris
299	565	529,839.3	728,980.2			ft	Debris
300	565	529,546.3	729,087.3			ft	Debris
301	565	529,253.2	729,194.3			ft	Debris
302	565	528,960.2	729,301.4			ft	Debris
303	565	528,667.2	729,408.4			ft	Debris
304	565	528,374.2	729,515.5			ft	Debris
305	565	528,081.1	729,622.5			ft	Debris
306	565	527,788.1	729,729.6			ft	Debris
307	565	527,495.1	729,836.6			ft	Debris
308	565	527,202.1	729,943.7			ft	Debris
309	565	526,909.0	730,050.7			ft	Debris
310	565	526,616.0	730,157.8			ft	Debris
311	565	526,323.0	730,264.8			ft	Debris
312	565	526,029.9	730,371.9			ft	Debris
313	565	525,736.9	730,478.9			ft	Debris
314	565	525,443.9	730,586.0			ft	Debris
315	565	525,150.9	730,693.0			ft	Debris
316	565	524,857.8	730,800.1			ft	Debris
317	565	524,564.8	730,907.1			ft	Debris
318	565	524,271.8	731,014.2			ft	Debris
319	565	523,978.8	731,121.2			ft	Debris
320	565	523,685.7	731,228.3			ft	Debris
321	565	523,392.7	731,335.3			ft	Debris
322	565	523,099.7	731,442.4			ft	Debris
323	565	522,806.7	731,549.4			ft	Debris
324	565	522,513.6	731,656.5			ft	Debris
325	565	522,220.6	731,763.5			ft	Debris
326	565	521,927.6	731,870.6			ft	Debris
327	565	521,634.6	731,977.6			ft	Debris
328	565	521,341.5	732,084.7			ft	Debris
329	565	521,048.5	732,191.7			ft	Debris
330	565	520,755.5	732,298.8			ft	Debris
331	565	520,462.5	732,405.8			ft	Debris
332	565	520,169.4	732,512.9			ft	Debris
333	565	519,876.4	732,619.9			ft	Debris
334	565	519,583.4	732,727.0			ft	Debris
335	565	519,290.4	732,834.0			ft	Debris
336	565	518,997.3	732,941.1			ft	Debris
337	565	518,704.3	733,048.1			ft	Debris
338	565	518,411.3	733,155.2			ft	Debris
339	565	518,118.3	733,262.2			ft	Debris
340	565	517,825.2	733,369.3			ft	Debris
341	565	517,532.2	733,476.3			ft	Debris
342	565	517,239.2	733,583.4			ft	Debris
343	565	516,946.2	733,690.4			ft	Debris
344	565	516,653.1	733,797.5			ft	Debris
345	565	516,360.1	733,904.5			ft	Debris
346	565	516,067.1	734,011.6			ft	Debris
347	565	515,774.1	734,118.6			ft	Debris
348	565	515,481.0	734,225.7			ft	Debris
349	565	515,188.0	734,332.7			ft	Debris
350	565	514,895.0	734,439.8			ft	Debris
351	565	514,602.0	734,546.8			ft	Debris
352	565	514,308.9	734,653.9			ft	Debris
353	565	514,015.9	734,760.9			ft	Debris
354	565	513,722.9	734,868.0			ft	Debris
355	565	513,429.9	734,975.0			ft	Debris
356	565	513,136.8	735,082.1			ft	Debris
357	565	512,843.8	735,189.1			ft	Debris
358	565	512,550.8	735,296.2			ft	Debris
359	565	512,257.8	735,403.2			ft	Debris
360	565	511,964.7	735,510.3			ft	Debris
361	565	511,671.7	735,617.3			ft	Debris
362	565	511,378.7	735,724.4			ft	Debris
363	565	511,085.7	735,831.4			ft	Debris
364	565	510,792.6	735,938.5			ft	Debris
365	565	510,499.6	736,045.5			ft	Debris
366	565	510,206.6	736,152.6			ft	Debris
367	565	509,913.6	736,259.6			ft	Debris
368	565	509,620.5	736,366.7			ft	Debris
369	565	509,327.5	736,473.7			ft	Debris
370	565	509,034.5	736,580.8			ft	Debris
371	565	508,741.5	736,687.8			ft	Debris
372	565	508,448.4	736,794.9			ft	Debris
373	565	508,155.4	736,901.9			ft	Debris
374	565	507,862.4	737,009.0			ft	Debris
375	565	507,569.4	737,116.0			ft	Debris
376	565	507,276.3	737,223.1			ft	Debris
377	565	506,983.3	737,330.1			ft	Debris
378	565	506,690.3	737,437.2			ft	Debris
379	565	506,397.3	737,544.2			ft	Debris
380	565	506,104.2	737,651.3			ft	Debris
381	565	505,811.2	737,758.3			ft	Debris
382	565	505,518.2	737,865.4			ft	Debris
383	565	505,225.2	737,972.4			ft	Debris
384	565	504,932.1	738,079.5			ft	Debris
385	565	504,639.1	738,186.5			ft	Debris
386	565	504,346.1	738,293.6			ft	Debris
387	565	504,053.1	738,400.6			ft	Debris
388	565	503,760.0	738,507.7			ft	Debris
389	565	503,467.0	738,614.7			ft	Debris
390	565	503,174.0	738,721.8			ft	Debris
391	565	502,880.9	738,828.8			ft	Debris
392	565	502,587.9	738,935.9			ft	Debris
393	565	502,294.9	739,042.9			ft	Debris
394	565	502,001.9	739,150.0			ft	Debris
395	565	501,708.8	739,257.0			ft	Debris
396	565	501,415.8	739,364.1			ft	Debris
397	565	501,122.8	739,471.1			ft	Debris
398	565	500,829.8	739,578.2			ft	Debris
399	565	500,536.7	739,685.2			ft	Debris
400	565	500,243.7	739,792.3			ft	Debris
401	565	499,950.7	739,899.3			ft	Debris
402	565	499,657.7	740,006.4			ft	Debris
403	565	499,364.6	740,113.4			ft	Debris
404	565	499,071.6	740,220.5			ft	Debris
405	565	498,778.6	740,327.5			ft	Debris
406	565	498,485.6	740,434.6			ft	Debris
407	565	498,192.5	740,541.6			ft	Debris
408	565	497,899.5	740,648.7			ft	Debris
409	565	497,606.5	740,755.7			ft	Debris
410	565	497,313.5	740,862.8			ft	Debris
411	565	497,020.4	740,969.8			ft	Debris
412	565	496,727.4	741,076.9			ft	Debris
413	565	496,434.4	741,183.9			ft	Debris
414	565	496,141.4	741,291.0			ft	Debris
415	565	495,848.3	741,398.0			ft	Debris
416	565	495,555.3	741,505.1			ft	Debris
417	565	495,262.3	741,612.1			ft	Debris
418	565	494,969.3	741,719.2			ft	Debris
419	565	494,676.2	741,826.2			ft	Debris
420	565	494,383.2	741,933.3			ft	Debris
421	565	494,090.2	742,040.3			ft	Debris
422	565	493,797.2	742,147.4			ft	Debris
423	565	493,504.1	742,254.4			ft	Debris
424	565	493,211.1	742,361.5			ft	Debris
425	565	492,918.1	742,468.5			ft	Debris
426	565	492,625.1	742,575.6			ft	Debris
427	565	492,332.0	742,682.6			ft	Debris
428	565	492,039.0	742,789.7			ft	Debris
429	565	491,746.0	742,896.7			ft	Debris
430	565	491,452.9	743,003.8			ft	Debris
431	565	491,159.9	743,110.8			ft	Debris
432	565	490,866.9	743,217.9			ft	Debris
433	565	490,573.9	743,324.9			ft	Debris
434	565	490,280.8	743,432.0			ft	Debris
435	565	489,987.8	743,539.0			ft	Debris
436	565	489,694.8	743,646.1			ft	Debris
437	565	489,401.8	743,753.1			ft	Debris
438	565	489,108.7	743,860.2			ft	Debris
439	565	488,815.7	743,967.2			ft	Debris
440	565	488,522.7	744,074.3			ft	Debris
441	565	488,229.7

Earthworks

Plate 33: Magnetic field density map with targets for the Hackensack River, segment 2

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



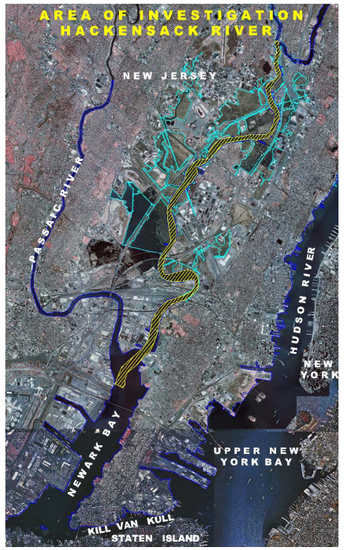
List of crossings (red), debris (cyan), and other major targets (gray) (>200nT) observed in the magnetic density field and side-scan sonar.

Target	Amplitude	Position in UTM zone 18 (meters)		Position in NJ State Plane (feet)		Rotation	Target Size	Description
	nT	N (Y)	E (X)	N (Y)	E (X)	Rotation		Description / Comments
	498	4661.55.83	585.762.02				50	Debris
	300	4661.564.23	585.767.99	697,249.39	1,535,476.00			Pipeline crossing
	782	4661.564.23	585.767.99				50	Debris
	1000	4661.564.23	585.767.99				50	Debris - Barge crossing
	562	4661.564.23	585.767.99				50	Debris
	1000	4661.564.23	585.767.99				50	Debris
	400	4661.564.23	585.767.99	697,249.39	1,535,476.00			Pipeline crossing
	300	4661.564.23	585.767.99				50	Pipeline crossing
	562	4661.564.23	585.767.99				50	Debris
	1000	4661.564.23	585.767.99				50	Debris
	300	4661.564.23	585.767.99	697,249.39	1,535,476.00			Pipeline crossing

Earthworks

Plate 34: Magnetic field density map with targets for the Hackensack River, segment 3

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



List of crossings (red), debris (cyan), and other major targets (gray) (>200nT) observed in the magnetic density field and side-scan sonar.

Target	Feature # on plate	Position in state plane coordinates (ft) Existing Easting	Existing Northing	Proposed Easting	Proposed Northing	Description (magnetometer / sidescan)
	47	614,917.29	717,381.21			Debris
	48	615,047.00	717,387.00	615,046.96	717,386.96	Pipeline crossing
	49	615,081.00	717,385.00			50 Debris
	50	615,097.00	717,383.00			42 Debris
	51	615,099.00	717,381.00			54 Debris
	52	615,101.00	717,379.00			428 Outside crossing
	53	615,103.00	717,377.00			56 Debris
	54	615,107.00	717,375.00			428 Pipeline
	55	615,109.00	717,373.00	615,109.00	717,373.00	Pipeline crossing
	56	615,111.00	717,371.00			17 Pipeline
	57	615,113.00	717,369.00			Pipeline crossing
	58	615,115.00	717,367.00	615,115.00	717,367.00	Pipeline crossing
	59	615,117.00	717,365.00			Pipeline crossing
	60	615,119.00	717,363.00	615,119.00	717,363.00	Pipeline crossing
	61	615,121.00	717,361.00			Pipeline crossing
	62	615,123.00	717,359.00			Pipeline crossing
	63	615,125.00	717,357.00			Pipeline crossing
	64	615,127.00	717,355.00			Pipeline crossing
	65	615,129.00	717,353.00			Pipeline crossing
	66	615,131.00	717,351.00			Pipeline crossing
	67	615,133.00	717,349.00			Pipeline crossing
	68	615,135.00	717,347.00			Pipeline crossing
	69	615,137.00	717,345.00			Pipeline crossing
	70	615,139.00	717,343.00			Pipeline crossing
	71	615,141.00	717,341.00			Pipeline crossing
	72	615,143.00	717,339.00			Pipeline crossing
	73	615,145.00	717,337.00			Pipeline crossing
	74	615,147.00	717,335.00			Pipeline crossing
	75	615,149.00	717,333.00			Pipeline crossing
	76	615,151.00	717,331.00			Pipeline crossing
	77	615,153.00	717,329.00			Pipeline crossing
	78	615,155.00	717,327.00			Pipeline crossing
	79	615,157.00	717,325.00			Pipeline crossing
	80	615,159.00	717,323.00			Pipeline crossing
	81	615,161.00	717,321.00			Pipeline crossing
	82	615,163.00	717,319.00			Pipeline crossing
	83	615,165.00	717,317.00			Pipeline crossing
	84	615,167.00	717,315.00			Pipeline crossing
	85	615,169.00	717,313.00			Pipeline crossing
	86	615,171.00	717,311.00			Pipeline crossing
	87	615,173.00	717,309.00			Pipeline crossing
	88	615,175.00	717,307.00			Pipeline crossing
	89	615,177.00	717,305.00			Pipeline crossing
	90	615,179.00	717,303.00			Pipeline crossing
	91	615,181.00	717,301.00			Pipeline crossing
	92	615,183.00	717,299.00			Pipeline crossing
	93	615,185.00	717,297.00			Pipeline crossing
	94	615,187.00	717,295.00			Pipeline crossing
	95	615,189.00	717,293.00			Pipeline crossing
	96	615,191.00	717,291.00			Pipeline crossing
	97	615,193.00	717,289.00			Pipeline crossing
	98	615,195.00	717,287.00			Pipeline crossing
	99	615,197.00	717,285.00			Pipeline crossing
	100	615,199.00	717,283.00			Pipeline crossing
	101	615,201.00	717,281.00			Pipeline crossing
	102	615,203.00	717,279.00			Pipeline crossing
	103	615,205.00	717,277.00			Pipeline crossing
	104	615,207.00	717,275.00			Pipeline crossing
	105	615,209.00	717,273.00			Pipeline crossing
	106	615,211.00	717,271.00			Pipeline crossing
	107	615,213.00	717,269.00			Pipeline crossing
	108	615,215.00	717,267.00			Pipeline crossing
	109	615,217.00	717,265.00			Pipeline crossing
	110	615,219.00	717,263.00			Pipeline crossing
	111	615,221.00	717,261.00			Pipeline crossing
	112	615,223.00	717,259.00			Pipeline crossing
	113	615,225.00	717,257.00			Pipeline crossing
	114	615,227.00	717,255.00			Pipeline crossing
	115	615,229.00	717,253.00			Pipeline crossing
	116	615,231.00	717,251.00			Pipeline crossing
	117	615,233.00	717,249.00			Pipeline crossing
	118	615,235.00	717,247.00			Pipeline crossing
	119	615,237.00	717,245.00			Pipeline crossing
	120	615,239.00	717,243.00			Pipeline crossing
	121	615,241.00	717,241.00			Pipeline crossing
	122	615,243.00	717,239.00			Pipeline crossing
	123	615,245.00	717,237.00			Pipeline crossing
	124	615,247.00	717,235.00			Pipeline crossing
	125	615,249.00	717,233.00			Pipeline crossing
	126	615,251.00	717,231.00			Pipeline crossing
	127	615,253.00	717,229.00			Pipeline crossing
	128	615,255.00	717,227.00			Pipeline crossing
	129	615,257.00	717,225.00			Pipeline crossing
	130	615,259.00	717,223.00			Pipeline crossing
	131	615,261.00	717,221.00			Pipeline crossing
	132	615,263.00	717,219.00			Pipeline crossing
	133	615,265.00	717,217.00			Pipeline crossing
	134	615,267.00	717,215.00			Pipeline crossing
	135	615,269.00	717,213.00			Pipeline crossing
	136	615,271.00	717,211.00			Pipeline crossing
	137	615,273.00	717,209.00			Pipeline crossing
	138	615,275.00	717,207.00			Pipeline crossing
	139	615,277.00	717,205.00			Pipeline crossing
	140	615,279.00	717,203.00			Pipeline crossing
	141	615,281.00	717,201.00			Pipeline crossing
	142	615,283.00	717,199.00			Pipeline crossing
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	149	615,297.00	717,185.00			Pipeline crossing
	150	615,299.00	717,183.00			Pipeline crossing
	151	615,301.00	717,181.00			Pipeline crossing
	152	615,303.00	717,179.00			Pipeline crossing
	153	615,305.00	717,177.00			Pipeline crossing
	154	615,307.00	717,175.00			Pipeline crossing
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	158	615,315.00	717,167.00			Pipeline crossing
	159	615,317.00	717,165.00			Pipeline crossing
	160	615,319.00	717,163.00			Pipeline crossing
	161	615,321.00	717,161.00			Pipeline crossing
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	172	615,343.00	717,139.00			Pipeline crossing
	173	615,345.00	717,137.00			Pipeline crossing
	174	615,347.00	717,135.00			Pipeline crossing
	175	615,349.00	717,133.00			Pipeline crossing
	176	615,351.00	717,131.00			Pipeline crossing
	177	615,353.00	717,129.00			Pipeline crossing
	178	615,355.00	717,127.00			Pipeline crossing
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	181	615,361.00	717,121.00			Pipeline crossing
	182	615,363.00	717,119.00			Pipeline crossing
	183	615,365.00	717,117.00			Pipeline crossing
	184	615,367.00	717,115.00			Pipeline crossing
	185	615,369.00	717,113.00			Pipeline crossing
	186	615,371.00	717,111.00			Pipeline crossing
	187	615,373.00	717,109.00			Pipeline crossing
	188	615,375.00	717,107.00			Pipeline crossing
	189	615,377.00	717,105.00			Pipeline crossing
	190	615,379.00	717,103.00			Pipeline crossing
	191	615,381.00	717,101.00			Pipeline crossing
	192	615,383.00	717,099.00			Pipeline crossing
	193	615,385.00	717,097.00			Pipeline crossing
	194	615,387.00	717,095.00			Pipeline crossing
	195	615,389.00	717,093.00			Pipeline crossing
	196	615,391.00	717,091.00			Pipeline crossing
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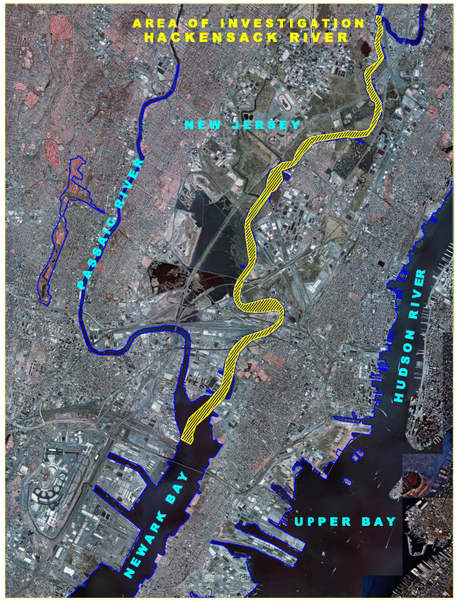
	207	615,413.00	717,069.00			Pipeline crossing
	208	615,415.00	717,067.00			Pipeline crossing
	209	615,417.00	717,065.00			Pipeline crossing
	210	615,419.00	717,063.00			Pipeline crossing
	211	615,421.00	717,061.00			Pipeline crossing
	212	615,423.00	717,059.00			Pipeline crossing
	213	615,425.00	717,057.00			Pipeline crossing
	214	615,427.00	717,055.00			Pipeline crossing
	215	615,429.00	717,053.00			Pipeline crossing
	216	615,431.00	717,051.00			Pipeline crossing
	217	615,433.00	717,049.00			Pipeline crossing
	218	615,435.00	717,047.00			Pipeline crossing
	219	615,437.00	717,045.00			Pipeline crossing
	220	615,439.00	717,043.00			Pipeline crossing
	221	615,441.00	717,041.00			Pipeline crossing
	222	615,443.00	717,039.00			Pipeline crossing
	223	615,445.00	717,037.00			Pipeline crossing
	224	615,447.00	717,035.00			Pipeline crossing
	225	615,449.00	717,033.00			Pipeline crossing
	226	615,451.00	717,031.00			Pipeline crossing
	227	615,453.00	717,029.00			Pipeline crossing
	228	615,455.00	717,027.00			Pipeline crossing
	229	615,457.00	717,025.00			Pipeline crossing
	230	615,459.00	717,023.00			Pipeline crossing
	231	615,461.00	717,021.00			Pipeline crossing
	232	615,463.00	717,019.00			Pipeline crossing
	233	615,465.00	717,017.00			Pipeline crossing
	234	615,467.00	717,015.00			Pipeline crossing
	235	615,469.00	717,013.00			Pipeline crossing
	236	615,471.00	717,011.00			Pipeline crossing
	237	615,473.00	717,009.00			Pipeline crossing
	238	615,475.00	717,007.00			Pipeline crossing
	239	615,477.00	717,005.00			Pipeline crossing
	240	615,479.00	717,003.00			Pipeline crossing
	241	615,481.00	717,001.00			Pipeline crossing
	242	615,483.00	716,999.00			Pipeline crossing
	243	615,485.00	716,997.00			Pipeline crossing
	244	615,487.00	716,995.00			Pipeline crossing

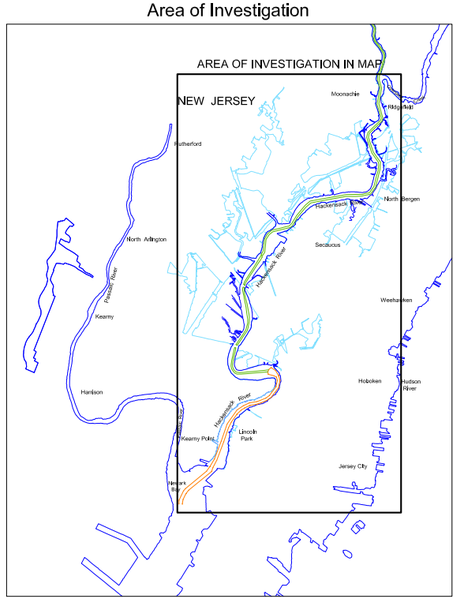
Earthworks

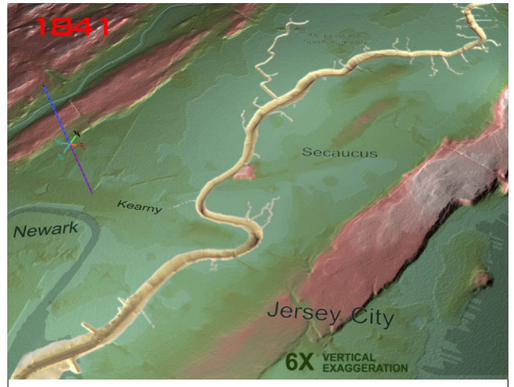
Plate 35: Geomorphological Evolution of the Hackensack River in Three Dimensions

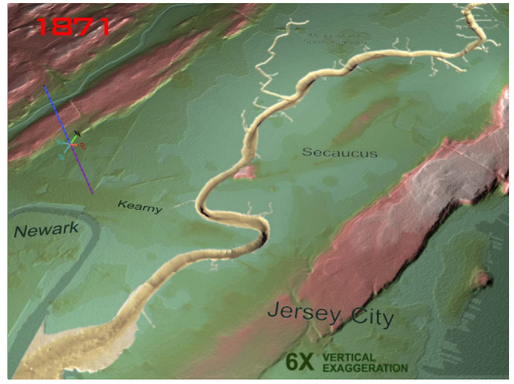
Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance

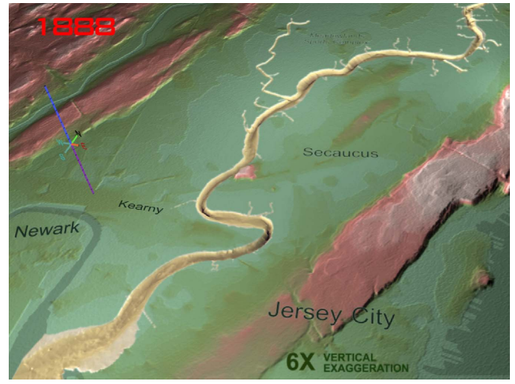


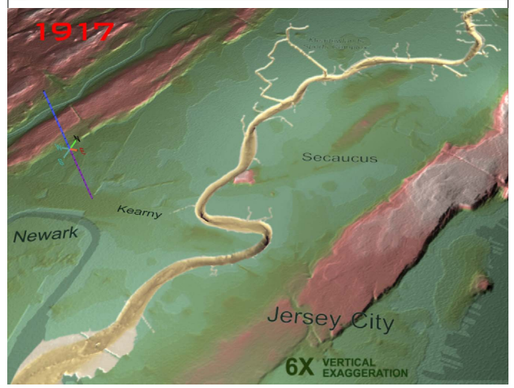
Area of Investigation

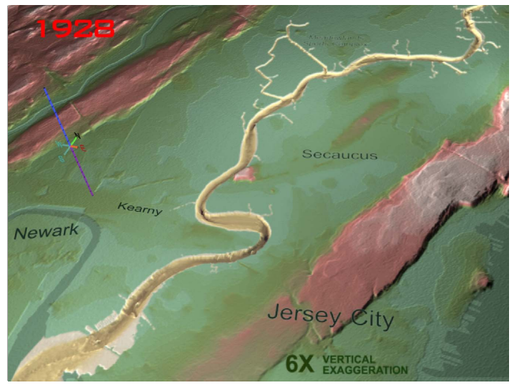


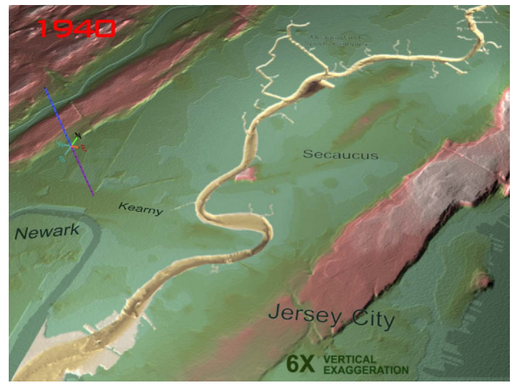


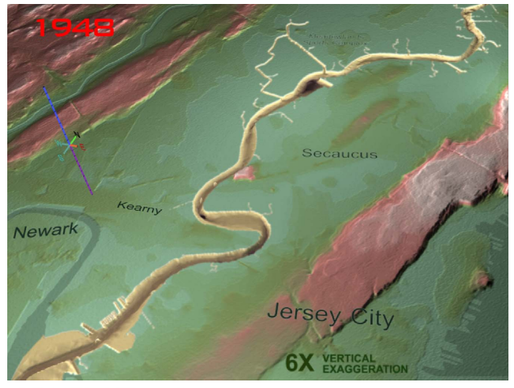


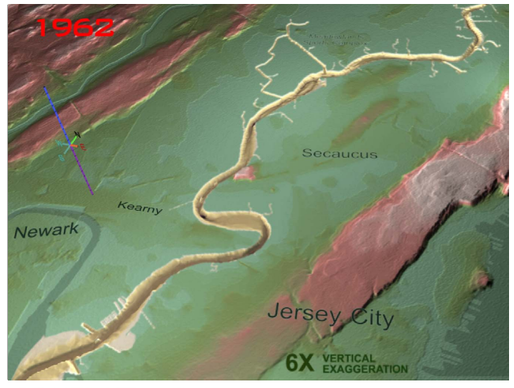


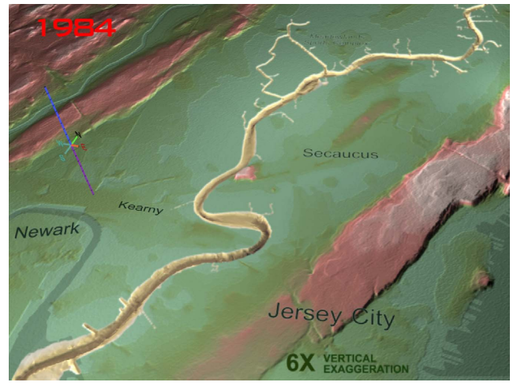




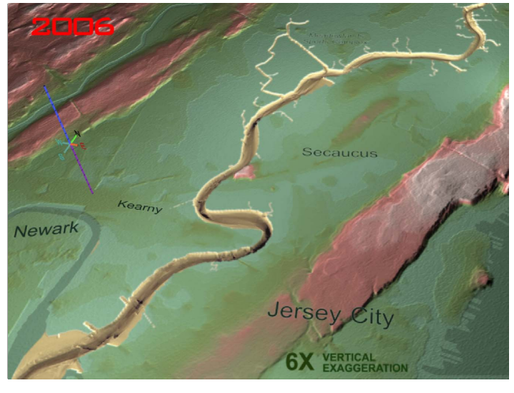


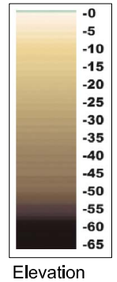












Elevation
Color Scale
Feet

Drawn By:
Approved By:
Date: June 28, 2007

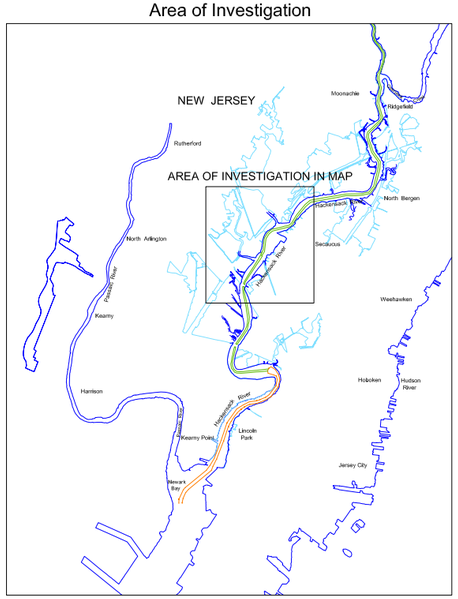
Earthworks

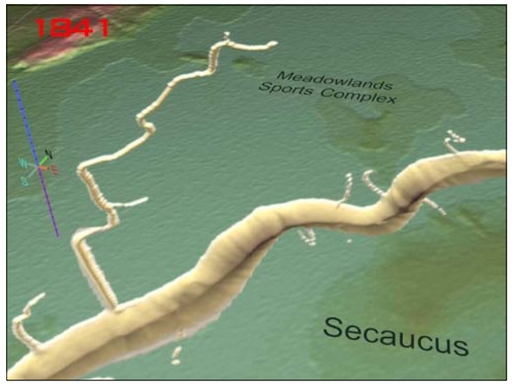
Plate 36: Geomorphological Evolution
of Harmon Cove Reach
in Three Dimensions

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses,
and Field Reconnaissance



Area of Investigation





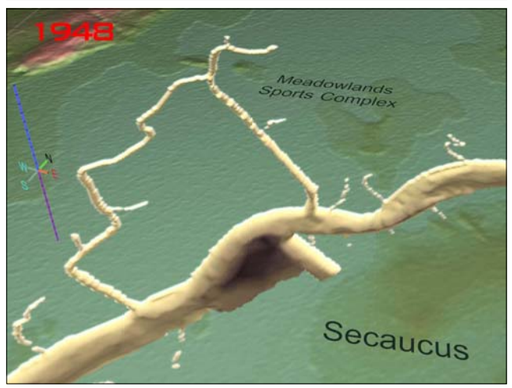


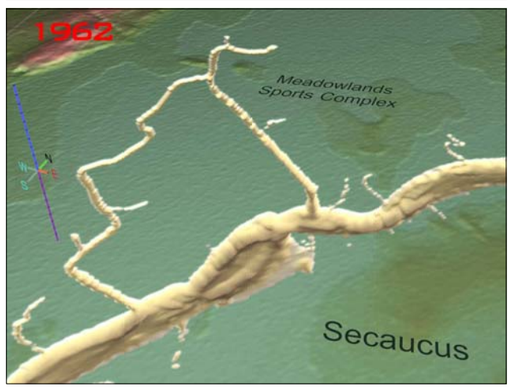








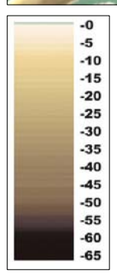










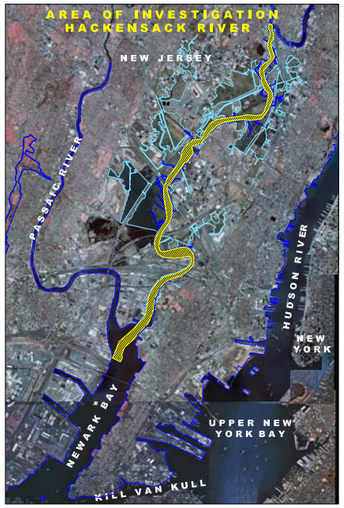


Elevation
Color Scale
Feet

Drawn By:
Approved By:
Date: June 28, 2007

Plate 37: Boring locations in the Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Sediment Types	
Black Silt	Oily black silt
Mud	Black-brown clay-rich mud
	Black clay-rich mud
	Black gray mud
	Brown silt-rich mud
	Gray mud
	Mud with red brown clay
Sand	Sand
Peat	Peat
	No recovery due to sand or hard bottom

Shallow Cores: Acquired May 30-June 7, 2007
HR07-sed-001 thru HR07-sed-117

Vibra-Cores (deeper borings): Acquired June 15, 2007
HR07-vc-01
HR07-vs-02
HR07-vs-03
HR07-vs-04
HR07-vs-05
HR07-vs-07

Riverbank, Tributaries edited from "NJDEP Shoreline Typing for Coastlines of New Jersey Along Its Atlantic and Inland Bays," 1986-1993.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

Wetlands Boundaries from "NJDEP Upper Wetlands Boundary/Upper Wetlands Limit for New Jersey," 2002.
New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA)

Federal Channel coordinates obtained from USACE November 2006

Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 N0. 64, covering sporadical spot maintenance dredging.

New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

Drawn By:
Approved By:
Date: June 7, 2007

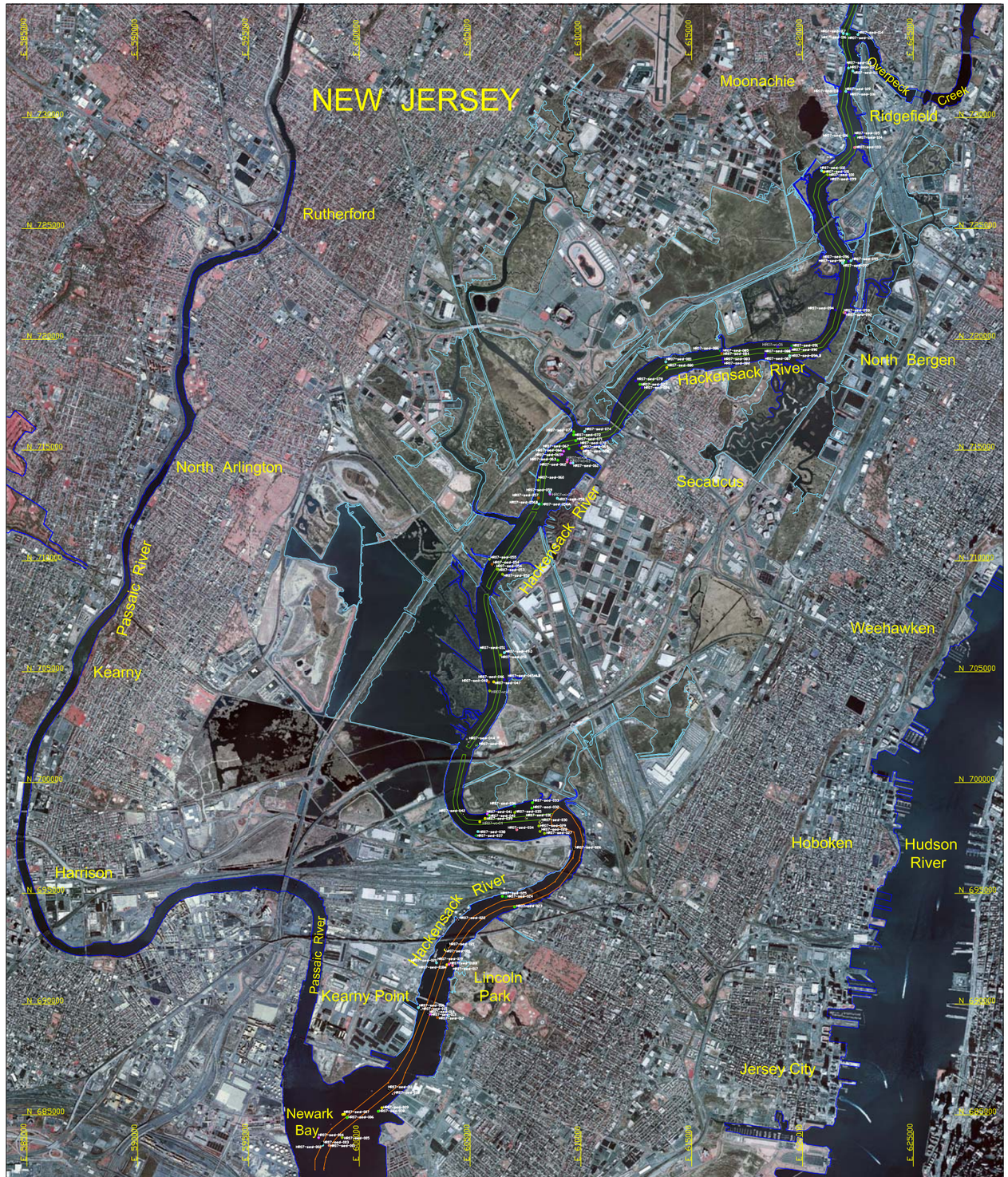
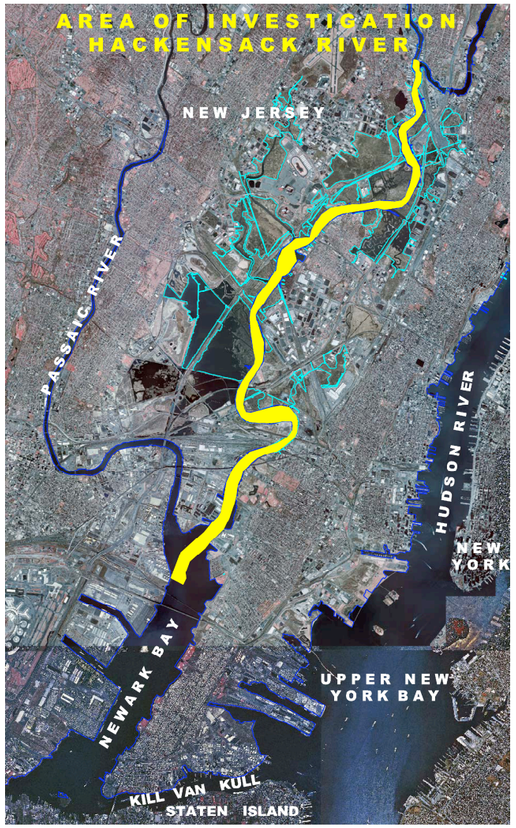


Plate 38: Sub-crop map and sediment classification of the lower Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance



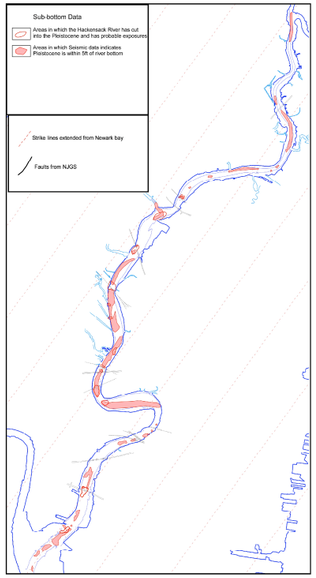
Sediment Types

Black Silt	Oily black silt
Mud	Black-brown clay-rich mud
	Black clay-rich mud
	Black gray mud
	Brown silt-rich mud
	Gray mud
	Mud with red brown clay
Sand	Sand
Peat	Peat
	No recovery due to sand or hard bottom

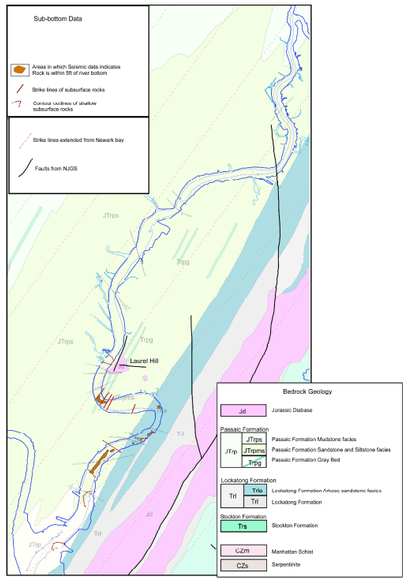
Distribution of Rock and Pleistocene Sediments

From orthosonograph, bathymetry, sub-bottom, and core data.

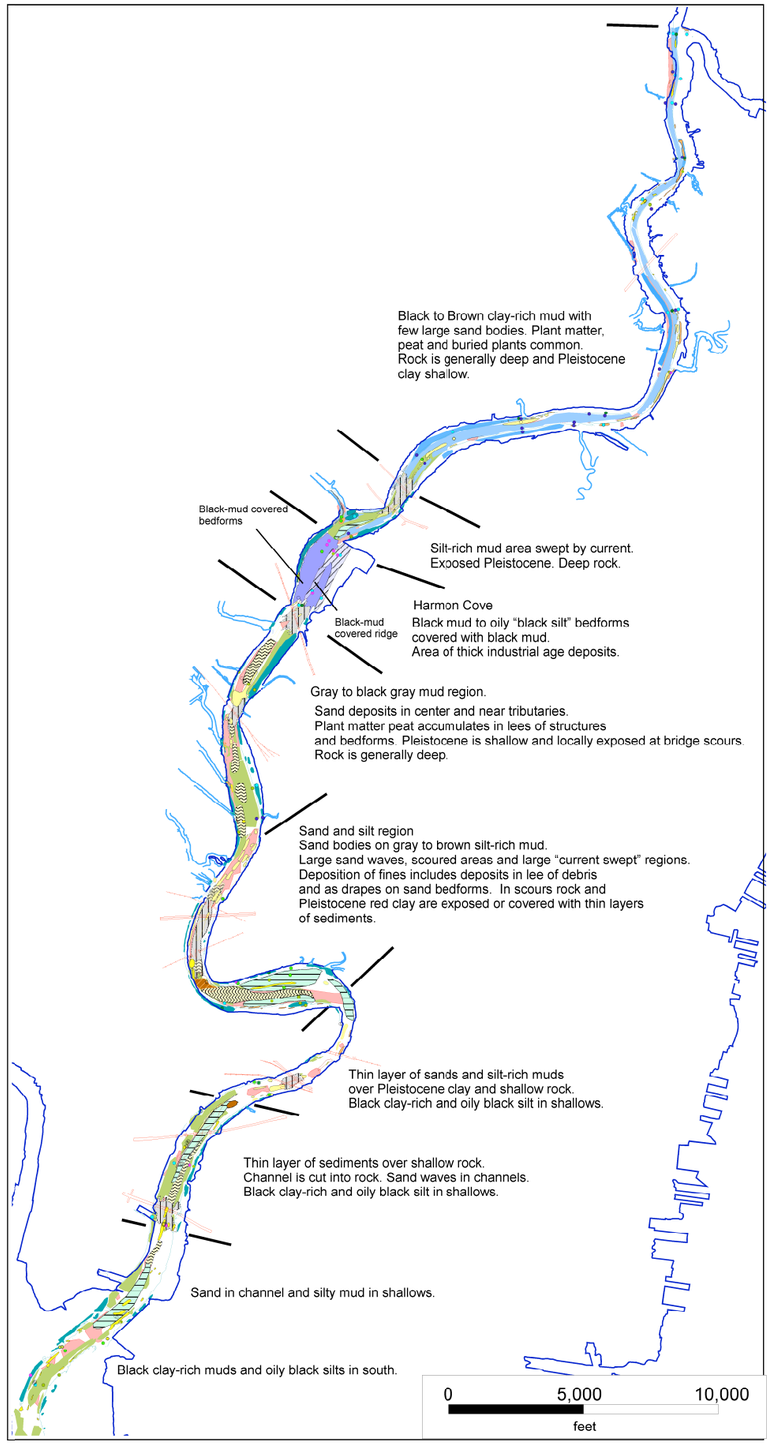
Regions of Shallow Pleistocene (< 5ft bellow river bottom)
In these areas the Pleistocene sediment is either exposed or the is the base of a thin layer of Holocene sediments.



Regions of Shallow Rock (< 5ft bellow river bottom)
In these areas rock is either exposed or or the is the base of a thin layer of Holocene sediments.



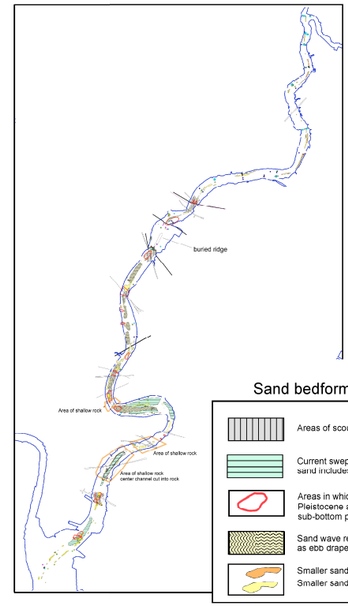
Reconnaissance Sub-crop of the Lower Hackensack River



Distribution of Holocene sand and mud

From orthosonograph, bathymetry, sub-bottom, and core data.

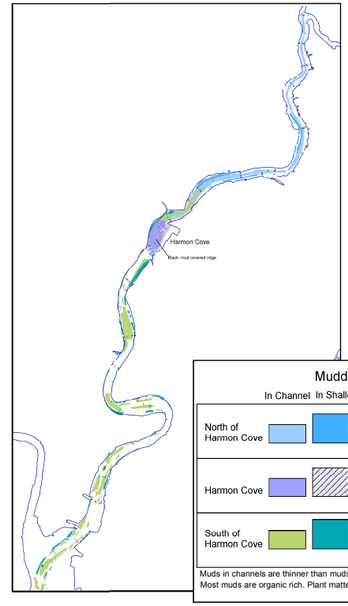
Regions of Holocene sand deposits and scours



Sand bedforms and scour areas

- Areas of scour and deposits around bridge abutments.
- Current swept regions silt rich. Deposition of fines and sand includes deposits in lee of debris. Adjacent to sand.
- Areas in which the Hackensack River has cut into Pleistocene as revealed by truncated strata in sub-bottom profiles.
- Sand wave regions. Deposition of fines and as ebb drapes over sand.
- Smaller sand bodies in center channel.
- Smaller sand bodies in shallows.

Distribution of Holocene muddy deposits.



Muddy Sediments

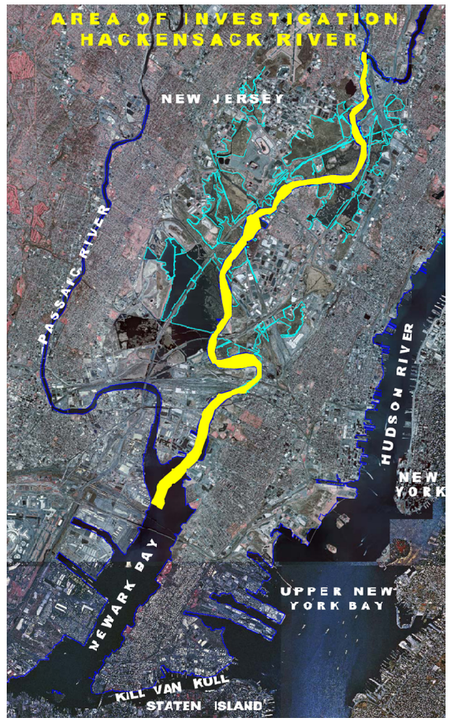
	In Channel	In Shallows	
North of Harmon Cove			Predominantly black and brown clay-rich muds. Plant matter is abundant.
Harmon Cove			Predominantly black clay rich muds and oily black silt. Bedforms in channels are covered in black mud.
South of Harmon Cove			Predominantly gray and black silt-rich muds.

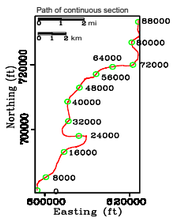
Muds in channels are thinner than muds in shallows and may drape over sand deposits. Most muds are organic rich. Plant matter is common to abundant throughout.

Earthworks

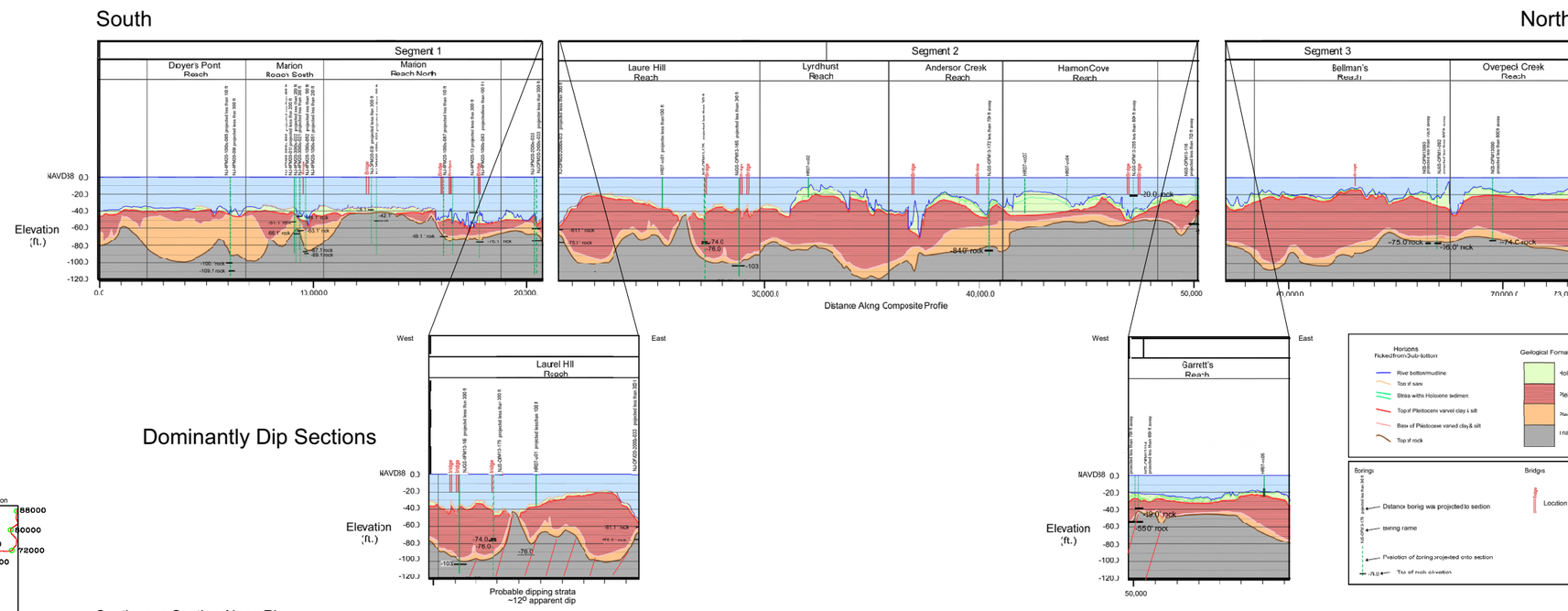
Plate 39: Geological Sub-Surface Horizons in the Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigation, Historical Analyses, and Field Reconnaissance



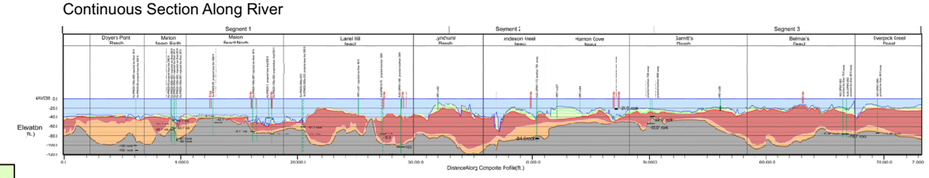


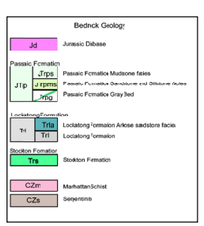
Dominantly Strike Sections

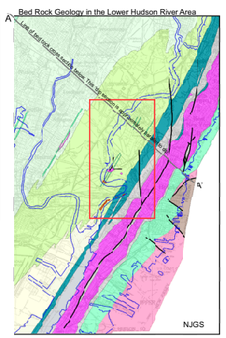


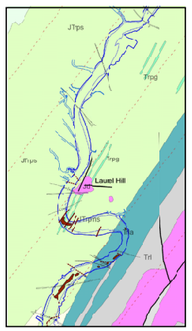
Dominantly Dip Sections

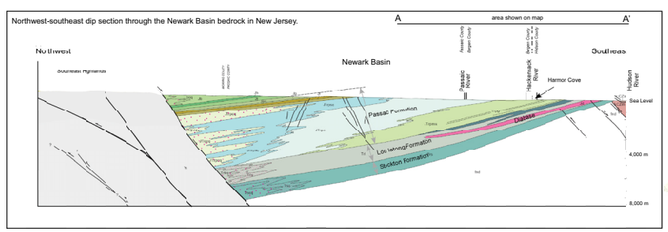
Continuous Section Along River

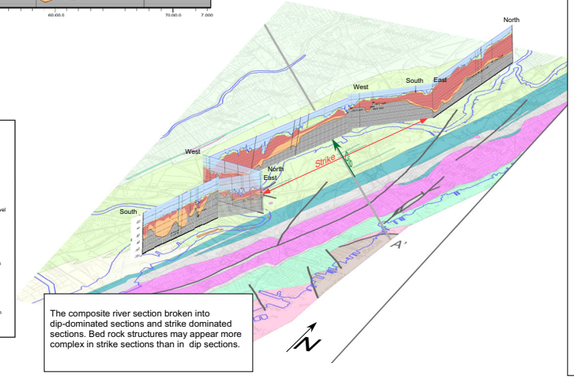




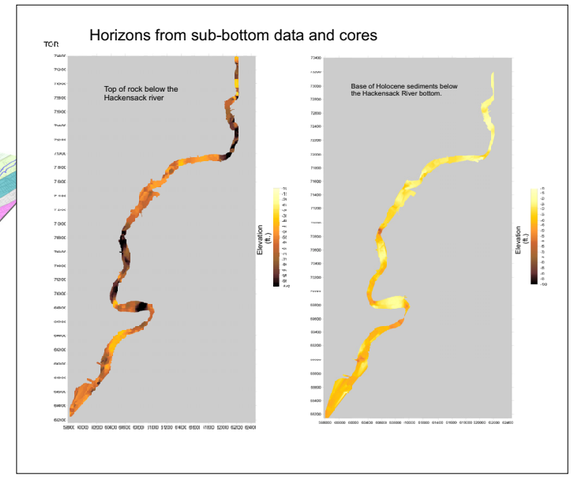








The composite river section broken into dip-dominated sections and strike dominated sections. Bed rock structures may appear more complex in strike sections than in dip sections.



Date: July 6, 2007
Drawn by:

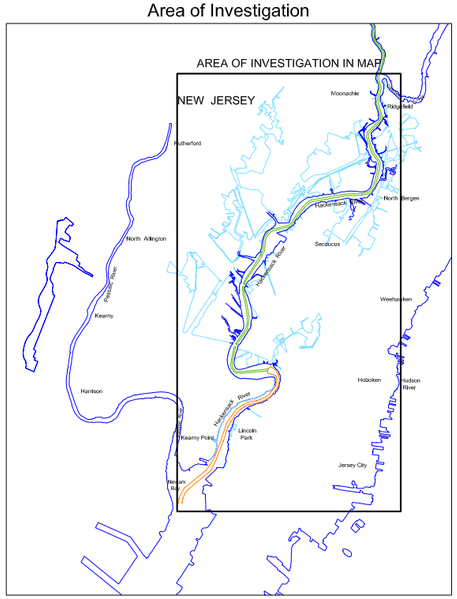
Earthworks

Plate 40: Potential high net-deposition areas in Hackensack River (1917-2006)

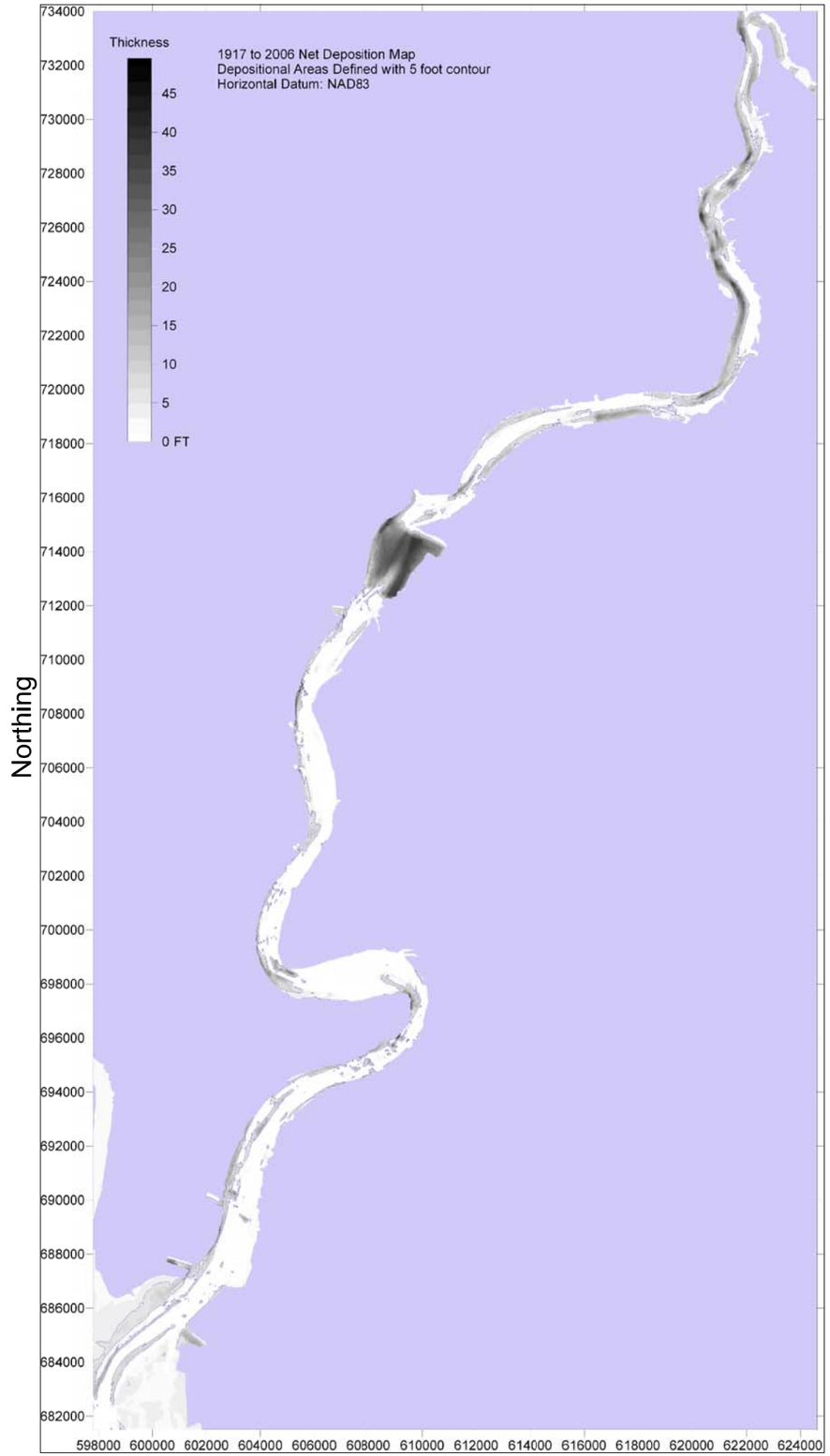
Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of Investigation



Drawn By:
Approved By:
Date: June 28, 2007



Earthworks

Plate 41: View of details in Laurel Hill Reach, Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



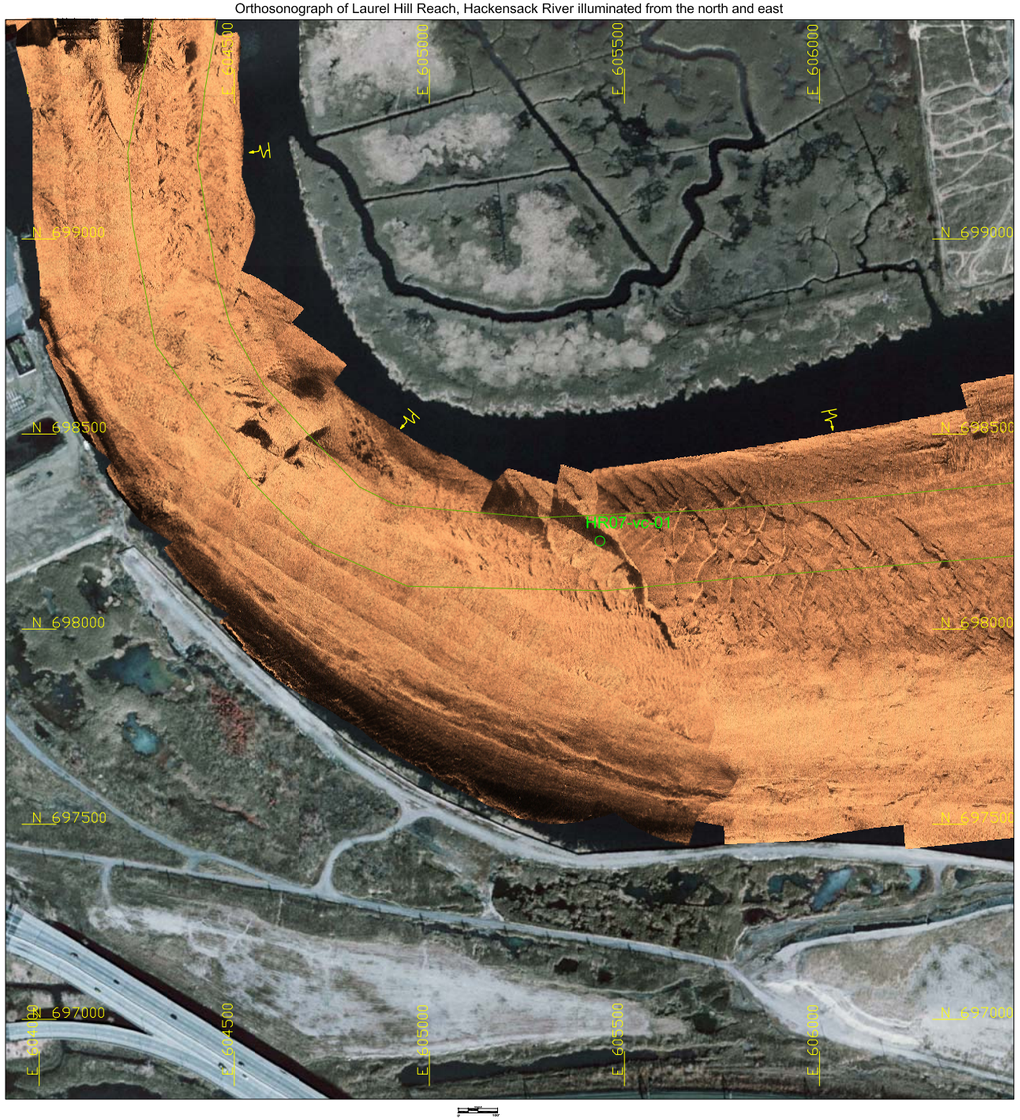
Area of investigation in main map



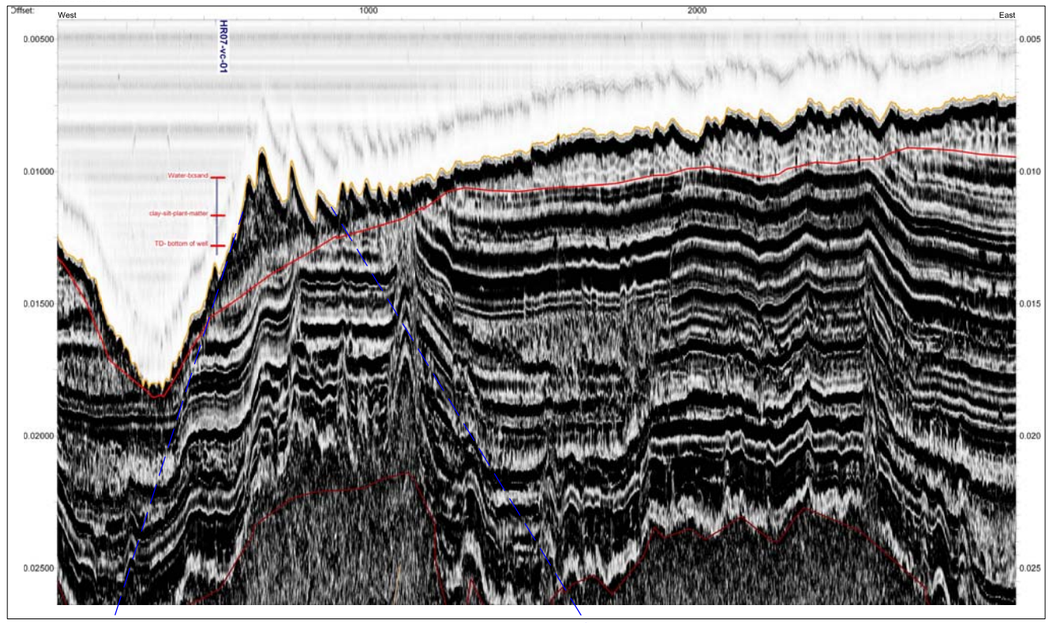
Sub-bottom profiling data acquired by Earthworks July, 2006 and April, 2007.
Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)
Vibra-Cores (long), acquired June 15, 2007
Federal Channel coordinates obtained from USACE November 2006
Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, NJ. (Hackensack River)," 1975 and 1986 ND. 64, covering sporadical spot maintenance dredging.
New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: M.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

Drawn By:
Approved By:
Date: June 7, 2007

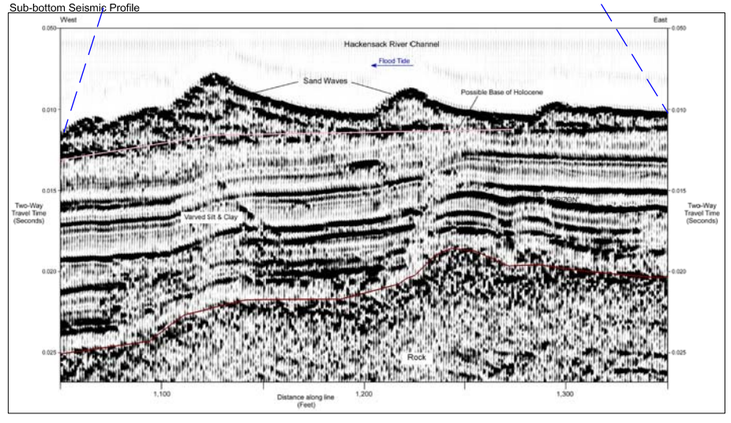
Orthosonograph of Laurel Hill Reach, Hackensack River illuminated from the north and east



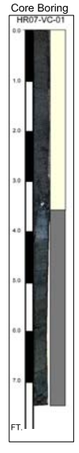
Sub-bottom Seismic Profile



Sub-bottom Seismic Profile



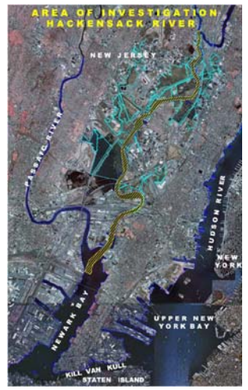
Core Boring



Earthworks

Plate 42: View of details in Lyndhurst Reach, Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



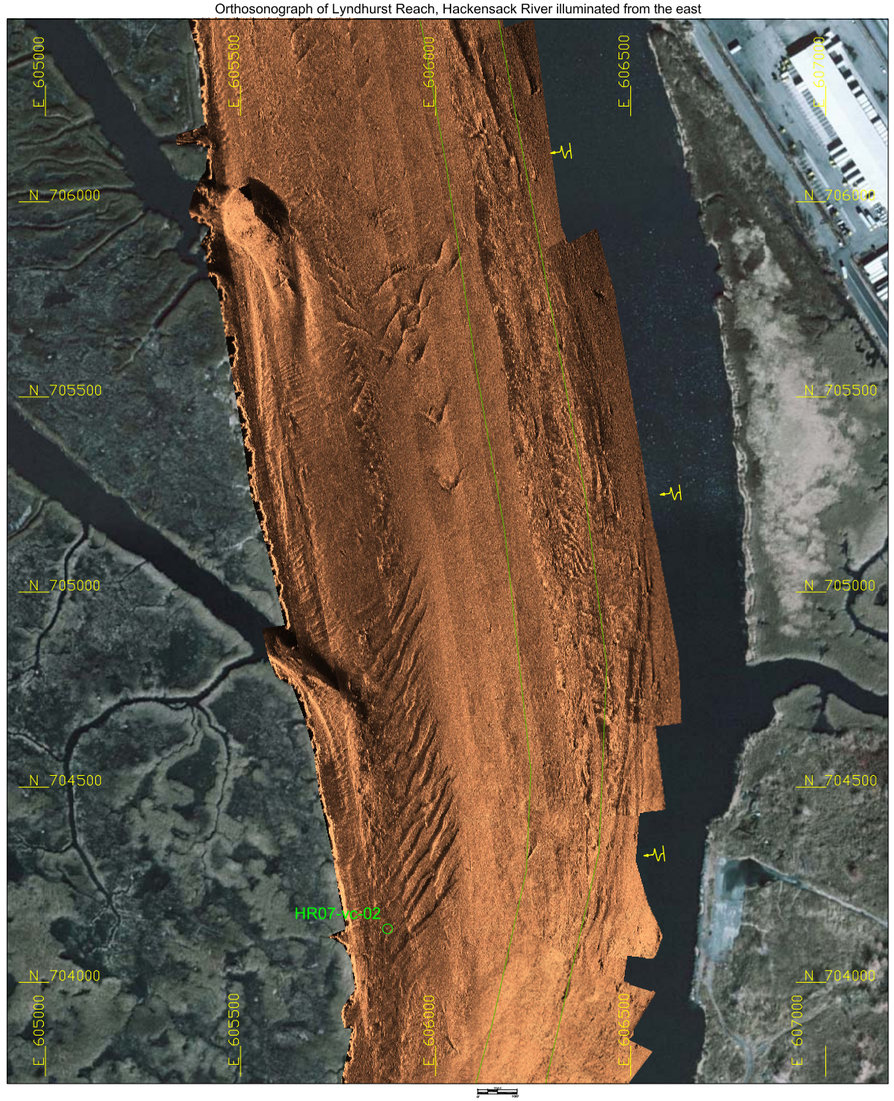
Area of investigation in main map



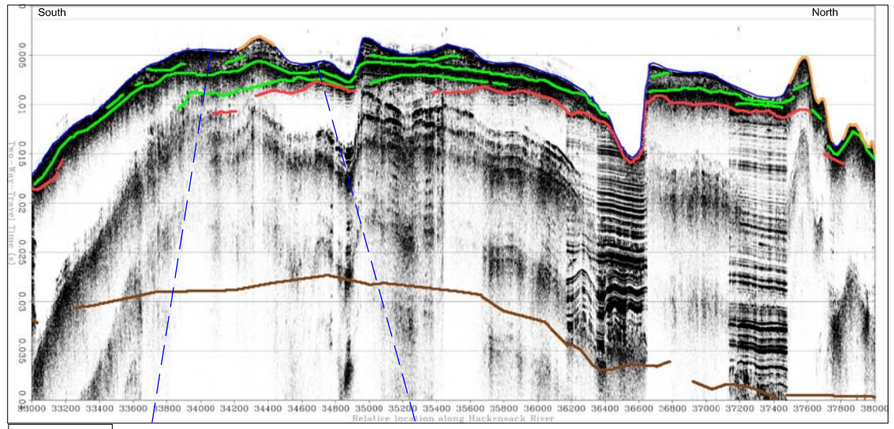
Sub-bottom profiling data acquired by Earthworks July, 2006 and April, 2007.
Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)
Vibra-Cores (long), acquired June 15, 2007
Federal Channel coordinates obtained from USACE November 2006
Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 NO. 64, covering sporadical spot maintenance dredging.
New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

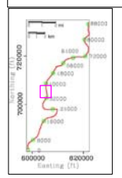
Drawn By:
Approved By:
Date: June 7, 2007

Orthosonograph of Lyndhurst Reach, Hackensack River illuminated from the east

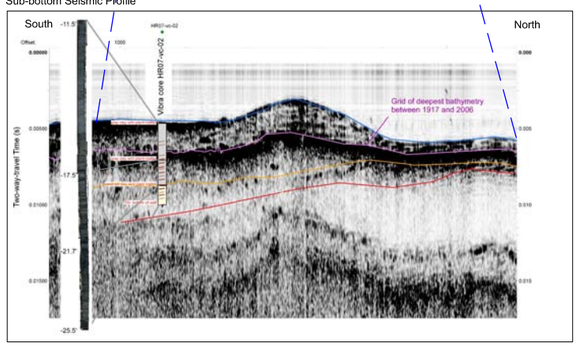


Sub-bottom Seismic Profile

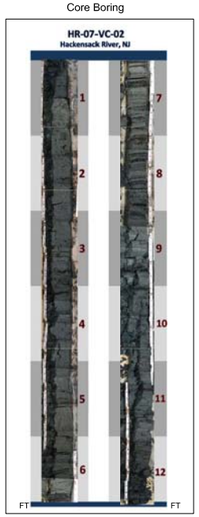




Sub-bottom Seismic Profile



Core Boring



Earthworks

Plate 43: View of details in Harmon Cove Reach, Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map

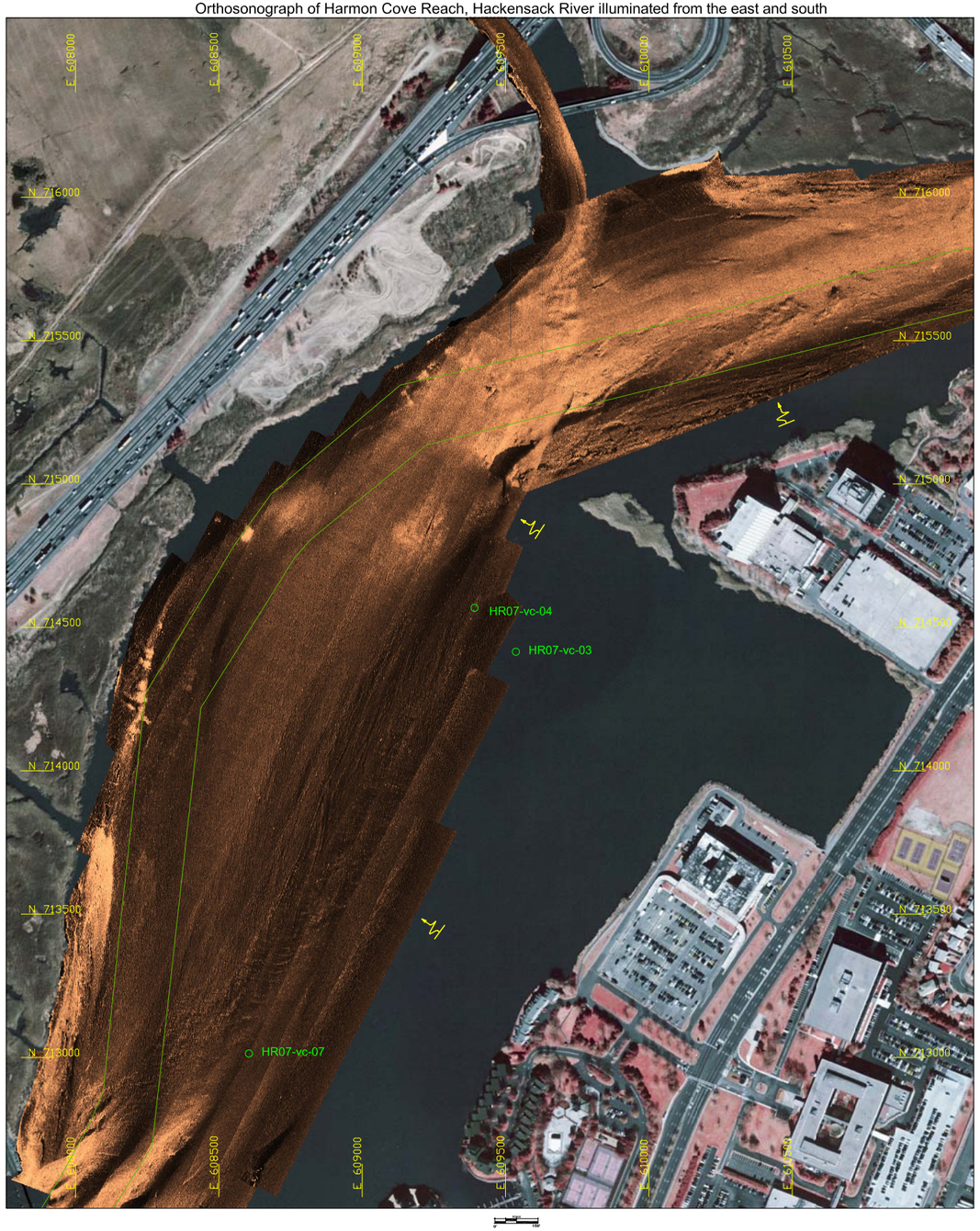


Sub-bottom profiling data acquired by Earthworks July, 2006 and April, 2007.
Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)
Vibra-Cores (long), acquired June 15, 2007
Federal Channel coordinates obtained from USACE November 2006
Maintenance Channel boundary digitized from 1990 NOAA Chart No. 12337 and USACE, NY District project map "Newark Bay, Hackensack & Passaic Rivers, N.J. (Hackensack River)," 1975 and 1986 N0. 64, covering sporadical spot maintenance dredging.

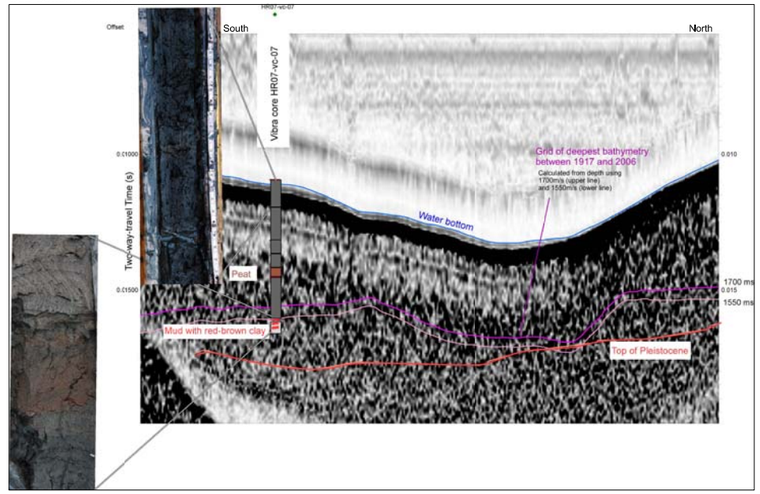
New Jersey State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical Datum: N.A.V.D. 1988
Orthophotograph: State of New Jersey Office of Information Technology, Office of Geographic Information Systems, 2002
Orthophotograph: USGS, 1995

Drawn By:
Approved By:
Date: June 7, 2007

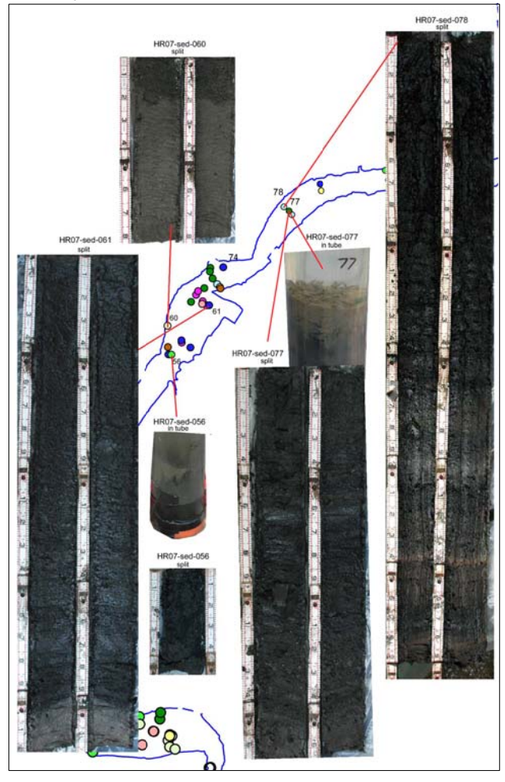
Orthosonograph of Harmon Cove Reach, Hackensack River illuminated from the east and south



Sub-bottom Seismic Profile



Core Boring



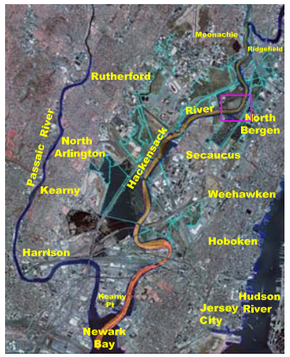
Earthworks

Plate 44: View of details in Garrett's Reach, Hackensack River

Hackensack River Habitat Enhancement Site
Phase I. Geophysical Investigations, Historical Analyses, and Field Reconnaissance



Area of investigation in main map



Sub-bottom profiling data acquired by Earthworks July, 2006 and April, 2007.
Orthosonograph data acquired by Earthworks November 2006 - January 2007
Travel direction of sonar signal (direction of illumination)
Vibra-Cores (long), acquired June 15, 2007
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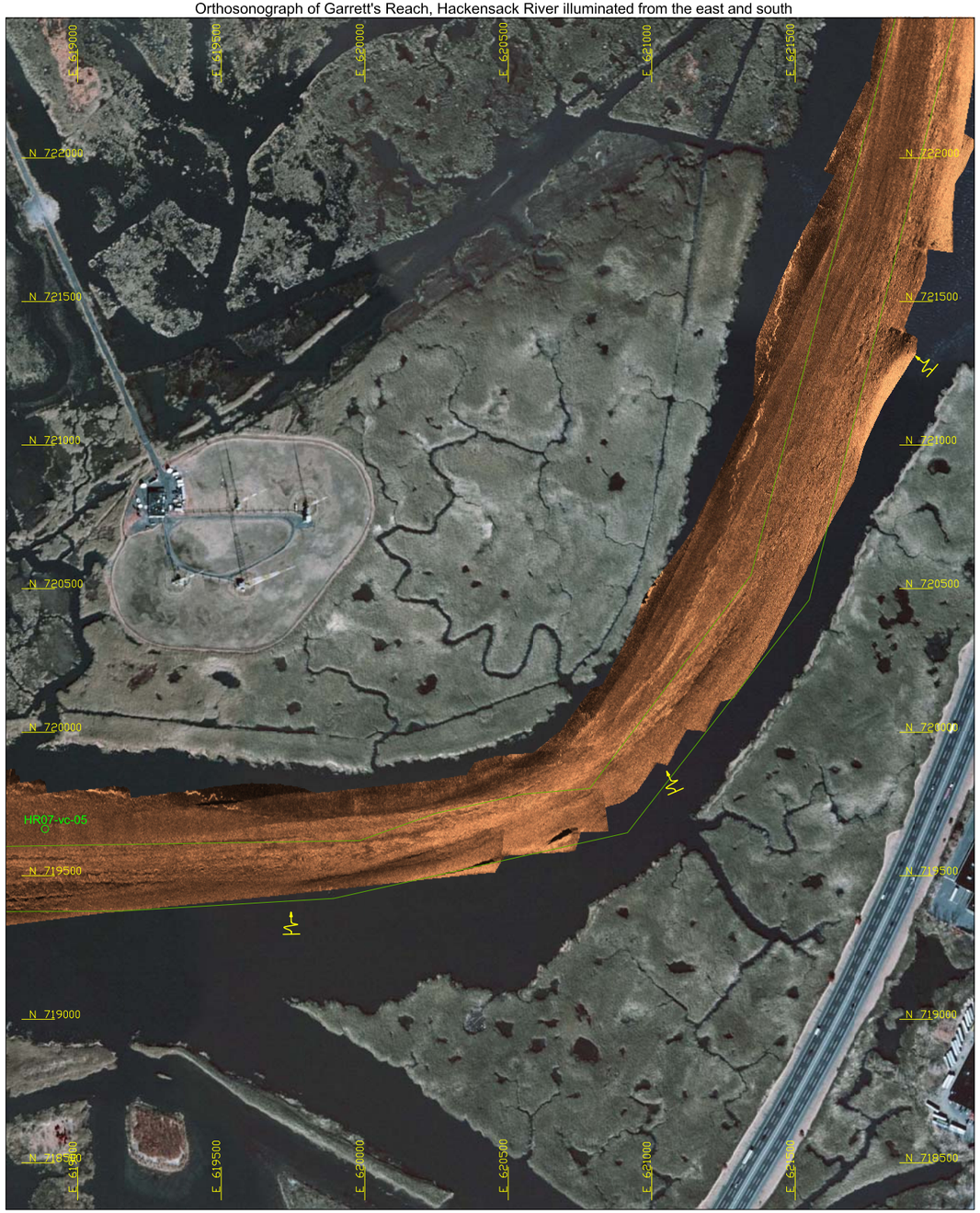
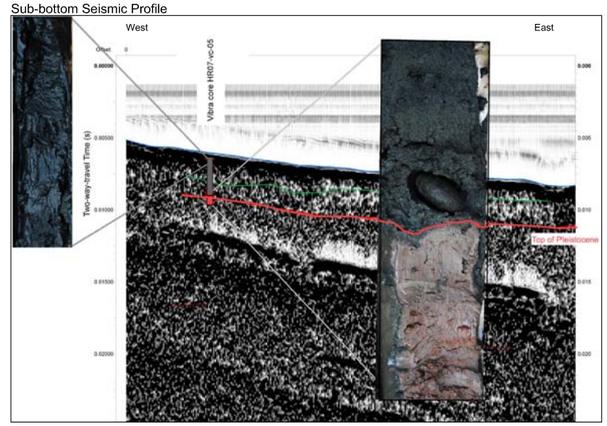
Drawn By:
Approved By:
Date: June 7, 2007

Orthosonograph of Garrett's Reach, Hackensack River illuminated from the east and south



Sub-bottom Seismic Profile



Core Borings

