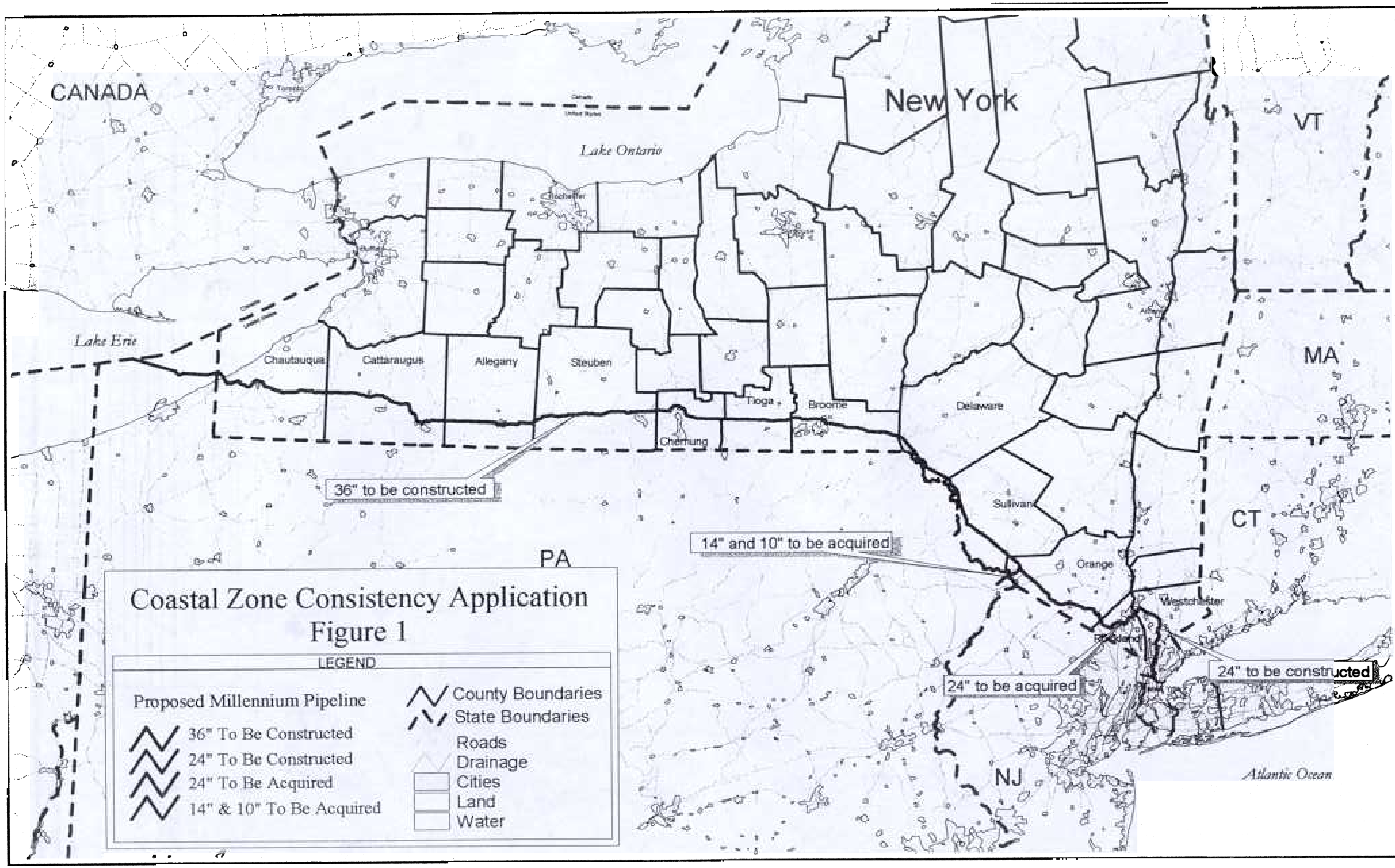
APPENDIX J

MILLENNIUM PIPELINE PROJECT - NEW YORK COASTAL ZONE MANAGEMENT POLICY CONSISTENCY DETERMINATION
March 2001

ATTACHMENT A-1

FIGURES 1-4

TABLES 2 & 3



30 30 60 Miles

2,800,000

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8525-GIS-5398

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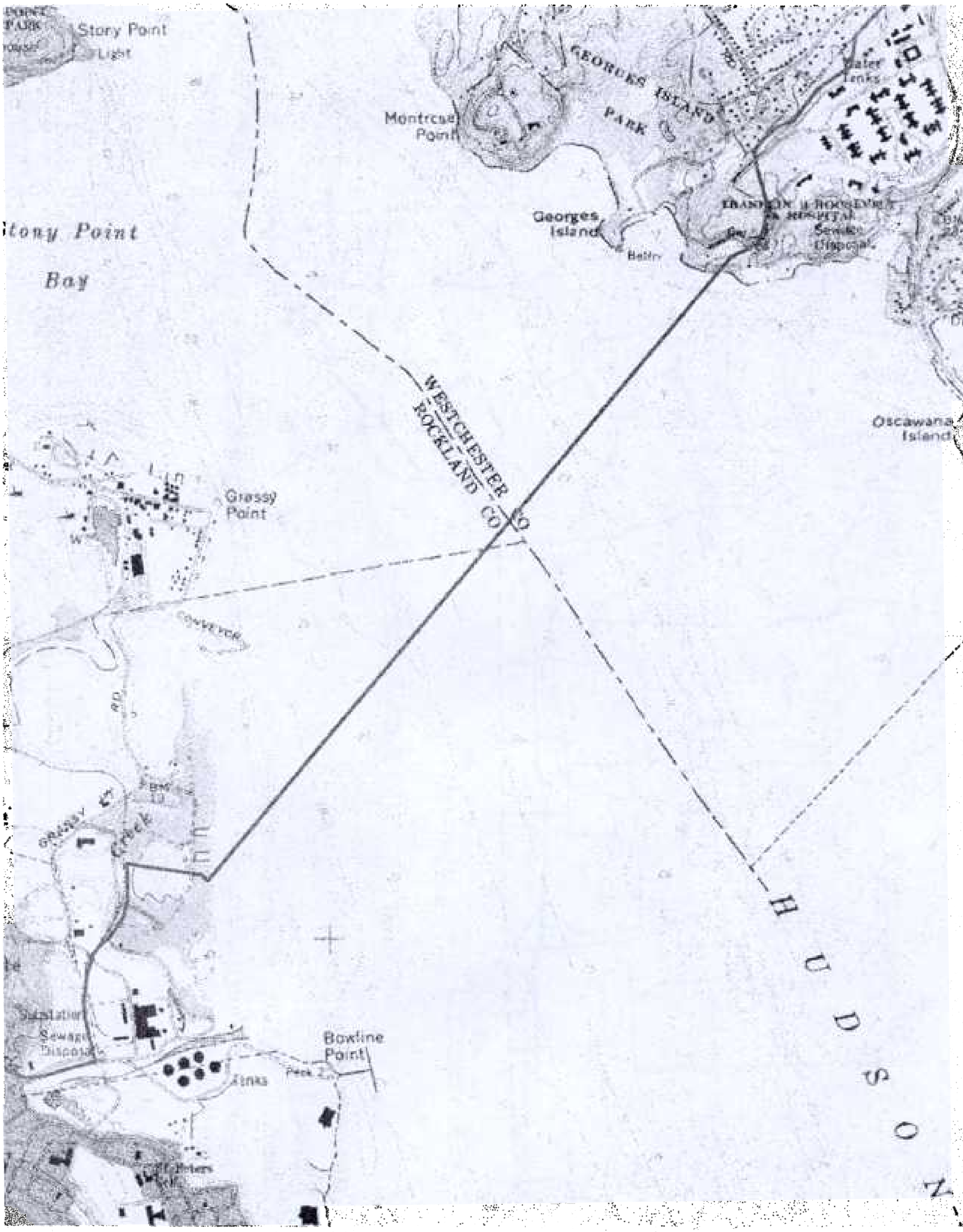
Millennium Pipeline System



LEGEND

Proposed Millennium Pipeline as Filed 11/98

(MP 387.5 to MP 390.5)

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NO.	DATE	DESCRIPTION	DWN	APPD	APPD

REVISIONS

FLUOR DANIEL WILLIAMS BROTHERS

MILLENNIUM PIPELINE COMPANY

Coastal Zone
Consistency Application
Figure 2

Hudson River Crossing
Haverstraw Bay

SCALE 1 : 24,000

FDWB JOB NO. 11652500

MILLENNIUM DWG. NO.

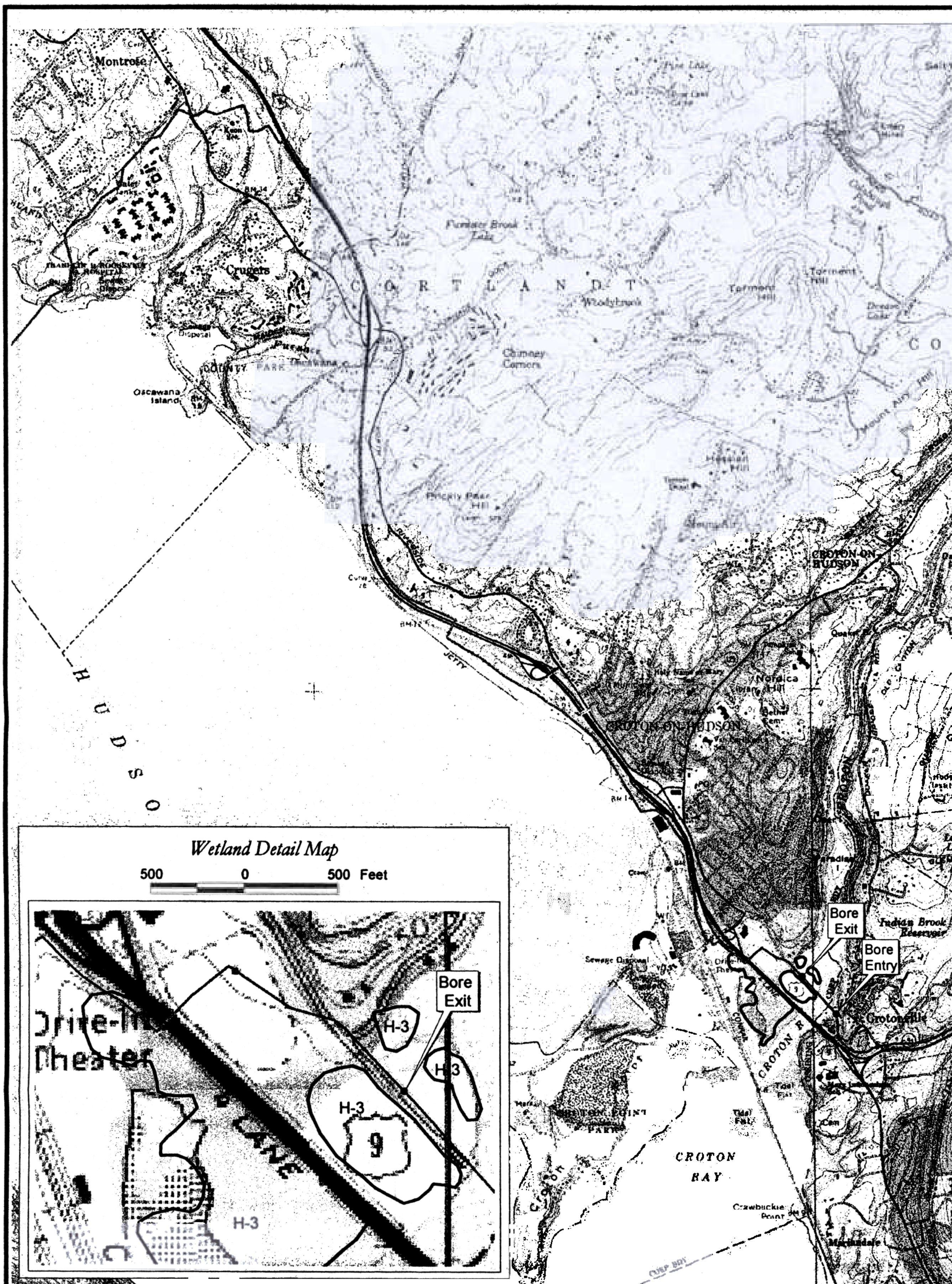
AREA | DISTRICT

DRAWING NO. 8525-GIS-5396

GIS NO.

SHT 1 OF 1 SHTS

DRAWN: CFC DATE: 10/22/99 CHECKED: REH DATE: 10/22/99 PROJ. ENGR. JRA
APPR: REH DATE: 10/22/99 DATE: 10/22/99



LEGEND

- HDD Entry and Exit Holes
- Proposed Millennium Pipeline
- Wetlands

GENERAL NOTES AND REFERENCE DRAWINGS

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REVISIONS

MILLENNIUM PIPELINE

Coastal Zone Consistency Application

Figure 3

1 : 28,000

LEGEND

Proposed Millennium Pipeline

NO.	DATE	DESCRIPTION	DWN	APPD	APPD
1	6/28/00	Change from Figure 3 to Figure 4.	CFC		

REVISIONS

MILLENNIUM PIPELINE

MILLENNIUM PIPELINE COMPANY

Coastal Zone Consistency Application

Figure 4

Lake Erie Landfall

SCALE 1 : 24,000

SHT 1 OF 1 SHTS

Table 2 Hudson River Plume Data Summary (June 20, 2000)

Area/ Component[1]	Single Event Dimensions[2] Width (feet)	Length (feet)	Area (feet squared)	Trench Length[3] (feet)	Estimated Time to Complete Work on Trench Length[4]		Average Work Rate[6]		Number of Moves or Dumps per day[7] (#)	Area Impacted per Day per Component[8] (feet Squared)	Area Impacted per Component[8] (%)	Total area of Haverstraw Bay Impacted by Project[9] (feet squared)	Total area of Haverstraw Bay Impacted by Project[9] (%)
Component 1	60	35	2,100	1000	13	days	77	feet/day	1.5	3,150	0.001	--	--
Component 2	90	170	15,300	1000	16	days	63	feet/day	1.3	19,890	0.006	--	--
Component 3	90	460	41,400	9900	30	days	330	feet/day	6.6	273,240	0.089	--	--
Component 4	500	400	200,000	9900	52	dumps	1.7	dumps/day	2	400,000	0.13	--	--
Haverstraw Bay	13,940	22,000	306,680,000									4,724,000	1.5

Notes
1. Haverstraw Bay values are the approximate physical dimensions of the bay.
Component 1 – Dredging shallow water using 6 cubic yard closed bucket.
Component 2 - Backfilling in shallow water using a 6 cubic yard closed bucket.
Component 3 - Dredging in deep water using a 22 cubic yard closed bucket.
Component 4 - Backfilling in deep water using a bottom dump barge.
2. Dimensions of plume created without moving equipment. For Components 1, 2, and 3 it is assumed the 50 feet can be excavated or backfilled between equipment moves.
3. The length of the trench which will be excavated or backfilled with the methods specified by the components.
4. The time required to complete the specified trench length with this component.
5. The number of barge dump cycles to fill the specified trench length with this component.
6. Trench length for each component divided by the estimated time to complete each specified operation.
7. Assumes equipment can work on a 50 foot length without moving.
8. Computed by increasing the plume width by the number of moves and then multiplying this with by the plume length.
9. Calculated as sum of length (single event plume dimensions) X length of trench for components 2 and 4.

TOTAL	(mg/kg)	(mg/l)	(mg/l)	(mg/l)		(mg/l)	
Arsenic	6.7333	35	2.36E-04	6.30E-02	no	none	no comparison
Barium	51.5	35	1.80E-03	none	no comparison	none	no comparison
Cadmium	2.18	35	7.63E-05	7.70E-03	no	0.043	no
Chromium	97.8333	35	3.42E-03	5.40E-02	no	1.1	no
Lead	93.6667	35	3.28E-03	8.60E-03	no	0.14	no
Mercury	0.998	35	3.49E-05	none	no comparison	0.0021	no
Selenium	nd	35	nd	none	no comparison	0.41	no
Silver	1.92	35	6.72E-05	none	no comparison	0.0023	no
SEMI-VOLATILE ORGANICS	(µg/kg)	(mg/l)	(µg/l)	(µg/l)		(µg/l)	
Benzo(a)anthracene	365	35	1.28E-02	none	no comparison	300	no
Benzo(b)fluoranthene	230	35	8.05E-03	none	no comparison	300	no
Benzo(k)fluoranthene	500	35	1.75E-02	none	no comparison	300	no
Benzo(a)pyrene	346.6667	35	1.21E-02	none	no comparison	300	no
Bis(2-ethylhexyl)phthalate	780	35	2.73E-02	none	no comparison	none	no comparison
Butyl benzyl phthalate	2300	35	8.05E-02	none	no comparison	2994	no
Chrysene	413.3333	35	1.45E-02	none	no comparison	300	no
Fluoranthene	880	35	3.08E-02	none	no comparison	40	no
Phenanthrene	400	35	1.40E-02	none	no comparison	300	no
Pyrene	1010	35	3.54E-02	none	no comparison	300	no

Borehole B-8 Parameter	Maximum Concentration in Sediment	Predicted TSS Concentration	Predicted Aqueous Concentration	Water Quality Standards New York SB Classification	Does Predicted aqueous Concentration Exceed the New York SB Classification ?	USEPA Marine Acute Criteria	Does Predicted aqueous Concentration Exceed the USEPA Marine Acute Criteria ?
TOTAL	(mg/kg)	(mg/l)	(mg/l)	(mg/l)		(mg/l)	
Arsenic	6.52	35	2.28E-04	6.30E-02	no	none	no comparison
Barium	21.0833	35	7.38E-04	none	no comparison	none	no comparison
Cadmium	0.72	35	2.52E-05	7.70E-03	no	0.043	no
Chromium	33.75	35	1.18E-03	none	no comparison	1.1	no
Lead	19.4083	35	6.79E-04	8.60E+00	no	0.14	no
Mercury	1.9	35	6.65E-05	3.00E-02	no	0.0021	no
Selenium	nd	35	nd	none	no comparison	0.41	no
Silver	nd	35	nd	none	no comparison	0.0023	no
SEMI-VOLATILE ORGANICS	(µg/kg)	(mg/l)	(µg/l)	(µg/l)		(µg/l)	
Benzo(a)pyrene	390	35	1.37E-02	none	no comparison	300	no

Borehole B-16 Parameter	Maximum Concentration in Sediment	Predicted TSS Concentration	Predicted Aqueous Concentration	Water Quality Standards New York SB Classification	Does Predicted aqueous Concentration Exceed the New York SB Classification ?	USEPA Marine Acute Criteria	Does Predicted aqueous Concentration Exceed the USEPA Marine Acute Criteria ?
TOTAL	(mg/kg)	(mg/l)	(mg/l)	(mg/l)		(mg/l)	
Arsenic	nd	35	nd	6.30E-02	no	none	no comparison
Barium	21.6667	35	7.58E-04	none	no comparison	none	no comparison
Cadmium	nd	35	nd	7.70E-03	no	0.043	no
Chromium	18.3333	35	6.42E-04	5.40E-02	no	1.1	no
Lead	8.5	35	2.98E-04	8.60E-03	no	0.14	no
Mercury	0.1267	35	4.43E-06	none	no comparison	0.0021	no
Selenium	nd	35	nd	none	no comparison	0.41	

ATTACHMENT A-2

ESSENTIAL FISH HABITAT ASSESSMENT

BASELINE INFORMATION

Essential Fish Habitat Assessment-Baseline Information

The National Marine Fisheries Service (NMFS) has indicated that Essential Fish Habitat (EFH) exists in Haverstraw Bay for the following species: red hake (Urophycis chuss), winter flounder (Pleuronectes americanus), windowpane flounder (Scopthalmus aquosus), bluefish (pomatomus saltatrix), Atlantic butterfish (Peprilus triacanthus), and fluke (Paralichtyus dentatus). The NMFS has also indicated that EFH for the Atlantic herring (Clupea harengus) may exist in Haverstraw Bay. The life history for each of above fish species is summarized below.

Detailed information on the effects of the pipeline construction on the habitat and fishery resources of Haverstraw Bay is presented in response to Policy #7 in Section 3.1.6. The lack of any significant effects on physical habitat of Haverstraw Bay, or the fish and invertebrate species which could be prey for EFH species is important for evaluating EFH species.

Red Hake (Urophycis chuss) – The red hake is distributed in the Atlantic from the Gulf of St. Lawrence to North Carolina and is most abundant between Georges Bank and New Jersey. Red hake undergo extensive seasonal migrations. They move into the shallower waters to spawn in the spring and summer and move offshore to winter in deep waters. Spawning occurs from May through November. Red hake feed primarily on crustaceans; however, adult red hake also feed extensively on fish. The maximum length attained by this species is approximately 20 inches. The maximum age reported is approximately 12 years, but few fish survive beyond 8 years.

Winter Flounder (Pleuronectes americanus) – The winter flounder is distributed in the Atlantic from Labrador to Georgia and is most abundant from the Gulf of St. Lawrence to Chesapeake Bay. Winter flounder make small scale migrations into estuaries, embayments and saltwater ponds in winter to spawn and subsequently move into deeper water during summer. Winter flounder feed primarily on benthic invertebrates. The maximum length attained by this species is approximately 23 inches.

Windowpane flounder (Scopthalmus aquosus) – The windowpane flounder is distributed in the Atlantic from the Gulf of St. Lawrence to Florida. This species inhabits large estuaries. Spawning occurs from April through December, with peaks in May and October.

Bluefish (Pomatomus saltatrix) – Bluefish are found in the Atlantic from Maine to Florida. They migrate northward in the spring and southward in the fall. Bluefish spawn during summer in the Middle Atlantic. Bluefish are voracious predators that feed on a wide variety of fish and invertebrates. They may attain lengths over 39 inches and weights over 31 pounds. The average life span is about 12 years.

Atlantic butterfish (Peprilus tricanthus) – The Atlantic butterfish is a small bony foodfish weighing up to 1 pound with a thin oval body and oily flesh. They are found in the Atlantic from Newfoundland to Florida, but are the most abundant from the Gulf of Maine to Cape Hatteras. During the summer Atlantic butterfish move northward and inshore to feed and spawn. Spawning occurs during June to August. Atlantic butterfish move southward and offshore in the winter to avoid cooler waters. They are primarily pelagic and form loose schools that feed on small fish, squid and crustaceans. Atlantic butterfish are preyed upon by many species including silver hake, bluefish, swordfish and long-finned squid. Juvenile Atlantic butterfish associate with jellyfish during summer months to avoid predators. The approximate life span is 3 years.

Fluke (Paralichthyus dentatus) – Fluke occur in the Atlantic from the southern Gulf of Maine to South Carolina. Fluke concentrate in bays and estuaries from late spring through early autumn. Spawning occurs during autumn and early winter. The larvae are transported toward coastal areas by prevailing water currents. Development of post-larvae and juveniles occurs mostly in bays and estuarine areas, notably Pamlico Sound and Chesapeake Bay. Female fluke may live up to 20 years; however, males rarely live more than 7 years. Growth rates very between the sexes. Females may attain weights up to 26 pounds.

Atlantic herring (Clupea harengus) – Atlantic herring occur from Labrador to Cape Hatteras. Gulf of Maine herring migrate from summer feeding grounds along the Maine coast to southern New England and mid-Atlantic areas during winter. Spawning in the Gulf of Maine occurs in late August-October, beginning in northern locations and progressing southward. Herring eggs are demersal and are generally deposited on gravel substrates. Incubation is temperature dependent; hatching usually occurs within 7 to 10 days. Larvae metamorphose by late spring into juvenile brit herring that may form large aggregations in coastal waters during summer. Atlantic herring are not fully mature until age 4.

The construction plans for the Hudson River Haverstraw Bay crossing have been extensively studied and discussed in various documents submitted to the FERC and NYSDEC. The present construction plan was initially described in Millennium's September 17, 1999 filing. The Hudson River crossing is scheduled for September 1 through November 15.

The long-term effects of the Project on the habitat available in Haverstraw Bay will be minimal. The construction work area (CWA) does not include any identifiable structures that might provide preferred habitat for fish or invertebrate species. Thus, the dredging operation will not disrupt or dislocate any reefs, bars, or submerged objects that would be difficult to restore or replace.

Aquatic vegetation, either emergent or submergent, has not been observed at the crossing location. Thus, dredging operations will not damage or disrupt any such habitat. Similarly, wetlands do not occur along the banks of the Hudson River in or adjacent to the construction work area. Thus, the Project will not affect important wetland areas within Haverstraw Bay.

Effects on habitat within the Hudson River will be restricted to temporary, localized effects on substrate within the space occupied by dredging operations and adjacent areas and temporary, localized effects on water quality associated with construction activities. The physical disturbance of the substrate will be restricted to the trench and adjacent areas identified during the modeling of the Hudson River crossing construction method (see Section 3.1.4).

In summary, the results indicate that near-shore dredging activities will result in an average deposition of 0.18 feet of settled sediments within the area of the visible plume generated during dredging activities. The visible plume is predicted to be approximately 60 feet wide (measured across the river) and 35 feet long (measured along the axis of river). The near-shore trench will be 70 feet wide, thus the plume would be confined to the trench much of the time and most of the sediment would redeposit in the trench.

Near-shore backfilling activities will result in an average deposition of 0.11 feet of settled sediments within the area of the visible plume. The visible plume is predicted to be approximately 90 feet wide and 170 feet long.

Deep water dredging activities will result in an average deposition of 0.02 feet of settled sediments within the area of the visible plume. The visible plume is predicted to be approximately 90 feet wide and 460 feet long.

Deep water backfilling activities will result in an average deposition of 0.25 feet of settled sediments immediately outside of the trench, with deposition decreasing with increasing distance from the trench centerline. The visible plume is predicted to be approximately 500 feet wide and 400 feet long. Deposition of settled sediments is predicted to be negligible outside of the area of the visible plume.

Haverstraw Bay covers approximately 7,040 acres. Construction activities will take place within approximately 33 acres, or less than 0.5 percent, of the bay. The total area of substrate predicted to be impacted by the Project is approximately 1.5% of the total area of Haverstraw Bay. However, the effects of the Project on the physical habitat available within the Hudson River will be temporary, since the trench will be restored as closely as possible to original contours following construction. Temporally, these effects should cease as construction activity ends at any particular location within the river crossing.

The potential effects from construction on fish are effects from direct contact with construction equipment, effects from turbidity and redistribution of sediments during construction, and effects of construction on benthic food organisms. The effects from redistribution of sediments include not only the effects on food organisms, but also the possible effects of chemical contaminants contained in sediments on local water quality.

Based on numerous observations of dredging, this is extremely rare because even slow moving fish can avoid the bucket. In addition, the general disturbance created by dredging would create an avoidance response by fish.

Review of literature pertaining to effects of construction of open cut pipeline crossings on aquatic resources indicates that adverse effects are due primarily to direct effects at the site of dredging and direct and indirect effects due to elevated levels of suspended solids. These effects have been found to be spatially limited to the immediate vicinity of the dredging location and temporally limited to days to months following completion of construction activities.

As indicated above, the effects of suspended solids for the Hudson River crossing construction should be restricted to the area of the visible plume, which varies depending on the particular phase of construction that is taking place. Total suspended solids concentrations are predicted not to exceed 1,000 mg/l within 30 feet of dredging and backfilling operations. Total suspended solids concentrations of between 500 mg/l and 35 mg/l are predicted to occur within the area of the visible plume outside of 30 feet from dredging and backfilling operations. Elevated levels of suspended solids would cease shortly after construction ends.

The result of modeling of the effects of the Hudson River construction method indicate that the disturbance of the sediments will not result in concentration of heavy metals or organic compounds that exceed New York water quality standards or U.S. Environmental Protection Agency acute criteria for the protection of aquatic life (see Table 3). Thus, the effects of the construction on water quality will not be deleterious to fish and invertebrates in or near the CWA.

A summary of the modeling of sediment deposition associated with the Hudson River crossing construction was given above. However, studies of the long-term effects of pipeline construction have generally indicated that any sediment deposits generated during construction dissipate during the succeeding spring run-off, if not before. In the Hudson River, the processes of sediment scour and deposition would begin sorting the sediment particles and smoothing irregularities caused by the backfilling operations. Because these sediments are fine-grained and lack cohesiveness they will be redistributed by natural processes into a substrate similar to predredge conditions.

Alteration of benthic macroinvertebrate and fish distribution is reported to be a short-term effect of open cut pipeline construction. Fish have been reported to be displaced in the area of the construction site in some, but not all studies. Most fish species are thought to actively avoid turbidity. Complete recovery of the fish community to pre-construction conditions, which has been defined as a return to pre-construction composition and distribution of the fish community, occurs within 8 to 12 months. However, these studies have generally been conducted on small streams or moderate sized rivers. In the case of a large body of water, such as Haverstraw Bay, where the total disturbance for construction is predicted to be confined to a small fraction of the total area, it is expected that any disturbance to the distribution of fish in the bay will be negligible and that distributions even within the CWA itself should return to normal as construction activity ends at any particular location. Pipeline operation will have no effect on fish distribution.

In addition, benthic invertebrate communities have been found to recover rather rapidly from construction disturbance in the type of substrate found in Haverstraw Bay. Complete recovery for benthic invertebrate communities has been reported to occur within 2 to 12 months. In the case of the Hudson River, the benthic community is expected to recover quickly after backfilling is completed, since there would be large areas of undisturbed habitat on either side of the CWA which would serve to provide recruitment to the disturbed area. In addition, estuarine benthic organisms are adapted to the dynamic nature of sediments in their environment. Estuarine sediments particularly in shallow water, are often disturbed by wind and ship generated waves, by unusually high and low tides which create higher than normal tidal currents, and by riverine flooding which creates high current velocities and carries a high sediment load. Thus, benthic organisms are expected to respond quickly and favorably to the artificial disturbance of dredging. Pipeline operation will have no effect on distribution of invertebrates.

The occurrence of EFH species in Haverstraw Bay provides a basis for evaluating the importance of this reach of the Hudson River as habitat for these species. An available long-term database for determining species occurrence and relative abundance is the fish sampling associated with impact assessment studies for the Bowline Point Power Plant. Two major sampling programs were undertaken at Bowline: river sampling with conventional fishing gear at standardized sampling stations in the vicinity of the plant, and impingement monitoring of the plant intake screens.

Sampling with conventional fishing gear took place in the river proper and in Bowline Pond, a small embayment off the river used as the intake area for the power plant. Fish were sampled with surface and bottom trawls, trap nets, gill nets, and seines. Over the ten year interval from 1971 through 1980, a composite total of approximately 1500 samples were obtained with these gear types. The fish collected were identified, counted by species and measured for total length.

The conventional gear sampling showed extremely low abundance of all EFH species except bluefish, which were very low in abundance (Table 1). All EFH species were less than 1% of the total fish collected in each year.

Impingement data are available in summary form for the interval 1981 through 1990. This sampling consisted of weekly, 24 hr samples of fish impinged on the plant intake screens. The fish collected were identified, counted by species and measured for total length. The long term impingement monitoring programs at power plants throughout the country have shown that this is an effective method for monitoring the occurrence and relative abundance of fish in a waterbody in the vicinity of a plant.

With the exception of bluefish, the EFH species occurred in extremely low numbers (Table 1). Bluefish numbers were very low, representing less than 1% of the total number collected in all years. Other species were less than 0.1% of the total collections in all years.

EFH species identified by NMFS for Haverstraw Bay are not significant components of the fish community in Haverstraw Bay. The two databases on fish occurrences are consecutive 10 year intervals, thus there is a consistent pattern of very low to extremely low abundance over a 20 year period. Although six of seven EFH species occur in Haverstraw Bay, the Bay is clearly not important habitat for any of these species.

OCCURRENCE OF EFH SPECIES

EFH SPECIES	BOWLINE POINT IMPINGEMENT TOTAL NUMBER COLLECTED 10 YEARS OF SAMPLING (1981-1990)	HAVERSTRAW BAY SAMPLING TOTAL NUMBER COLLECTED 10 YEARS OF SAMPLING (1971-1980)
Atlantic Butterfish	7	2
Atlantic Herring	0	0
Bluefish	645	815
Red Hake	8	9
Summer Flounder	33	71
Windowpane	4	1
Winter Flounder	23	20

The bluefish is the only EFH designated species likely to occur in substantial numbers in the vicinity of the construction work area. The bluefish is a pelagic, open water species that has little contact with the substrate. It is a sight-feeding predator that would avoid areas with increased turbidity. In addition, bluefish spawn in offshore marine waters, thus the early life stages of this species could not be affected by the pipeline construction. All of the other EFH designated species occur infrequently and in low numbers in Haverstraw Bay. No seasonal restriction on dredging would be needed to protect these species.

Millennium supplied the following information to assist the FERC in preparing an EFH assessment.

i. *Results of on-site inspection to evaluate habitat* – As mentioned above, Millennium has conducted investigations in Haverstraw Bay related to issues raised by the proposed construction of the Hudson River crossing. The results of fieldwork conducted in the bay are discussed in the report *Predicted Sediment and Contaminant Concentrations, Hudson River Millennium Pipeline Crossing, Haverstraw Bay, New York* by GAI Consultants, Inc. and in the modeling results discussed in the responses to Data Request Nos. 8, 9, and 10.

ii. *Site specific effects of the project* – As indicated in the responses to Data Request Nos. 8, 9, and 10, the turbidity plume from the project is expected to affect much less than 1 percent of Haverstraw Bay during any particular day. Thus, it will always be possible for fish species to move to unaffected areas within Haverstraw Bay to avoid turbidity. A short-term loss of benthic invertebrates will be incurred during Project construction and will affect feeding opportunities for some fish. However, this effect should be temporary and minor, since such a small portion of Haverstraw Bay will be affected during construction on any given day. Pipeline operation will have no effect on fish species.

iii. *Views of recognized experts on the habitat or species effects* – The modeling of construction impacts was performed by Dr. Donald Hayes of the University of Utah, who has authored models presently used by the U.S. Army Corps of Engineers to evaluate effects of dredging. Millennium has also used the services of LMS, Inc. to provide information relative to the Hudson River crossing. LMS, Inc. has performed ecological surveys in the Hudson River for over 20 years.

iv. *A review of the pertinent literature and related information* – Information on the life histories of the fish species of concern and essential fish habitat designations were obtained through review of the National Marine Fisheries Service internet site.

An analysis of alternatives to the proposed action – Millennium has evaluated 2 alternative routes near the Hudson River crossing and an alternative crossing location to Haverstraw Bay. Each of the alternative routes involved substantial construction on new ROW through residential subdivisions. In addition, insufficient workspace was available at the alternative Hudson River crossing location due to the presence of existing gas pipeline infrastructure and industrial development. A complete discussion of these alternatives can be found in Millennium's response to FERC's March 2, 1999 Data Request No. 12.

Millennium also studied the feasibility of crossing Haverstraw Bay via directional drill. As discussed in response to Data Request No. 12 above, it was determined that this crossing method was not feasible.

ATTACHMENT A-3

HUDSON RIVER SAMPLING PROGRAM

MILLENNIUM PIPELINE PROJECT
HUDSON RIVER SAMPLING PROGRAM
DECEMBER 2000

1.1 Program Objective

The objective of the aquatic sampling program was to characterize the proposed Hudson River-Haverstraw Bay Millennium Pipeline route. The results of this program were used for comparison with extensive information previously published on Haverstraw Bay, which was the primary basis for the consistency determination. The program consisted of four parts: fish sampling, macroinvertebrate sampling substrate examination, and diver observations.

1.2 Bottom Trawling

Samples were collected at the seven stations in the survey area as well as one channel reference station located approximately one mile south of the pipeline route (Figure 1). The bottom trawls were designated as follows:

Station Number	Station Location/Name	Sample Depth (ft)
MWSS-1	West Shoal	9
MWSD-2	West Shoal	20
MWC-3	West Channel	35
MEC-4	East Channel	38
MESD-5	East Shoal	20
MESS-6	East Shoal	13
MCS	Reference Channel	36

At each station fish samples were collected using a 30-foot (9.1m) standard Hudson River otter trawl. All seven sampling stations were located by means of GPS coordinates. GPS coordinates were recorded to the nearest hundredth of a minute (i.e. 40^{o} 35.36' North). Soundings and landmarks were used in concert with the GPS coordinates to accurately establish station location.

Each sample began with the vessel in forward gear and at idle speed, with slight tension on the tow cable to ensure a good net set. All stations were towed for exactly ten minutes except for station MWC-3 which was towed for only nine minutes and fifteen seconds. The time was cut short of the standard duration because of possible net interference. Bottom trawls were executed at all stations during sunlight hours against the prevailing current with an adjusted speed over the bottom of 4.9 feet/sec (150cm/sec). Boat tow speed over the bottom was maintained using a General Oceanics Model 2035 Electronic Flowmeter with on-deck readout. In order to ensure that the trawl was in contact with the bottom, a minimum ratio of 5:1 tow cable length to maximum station water depth was implemented.

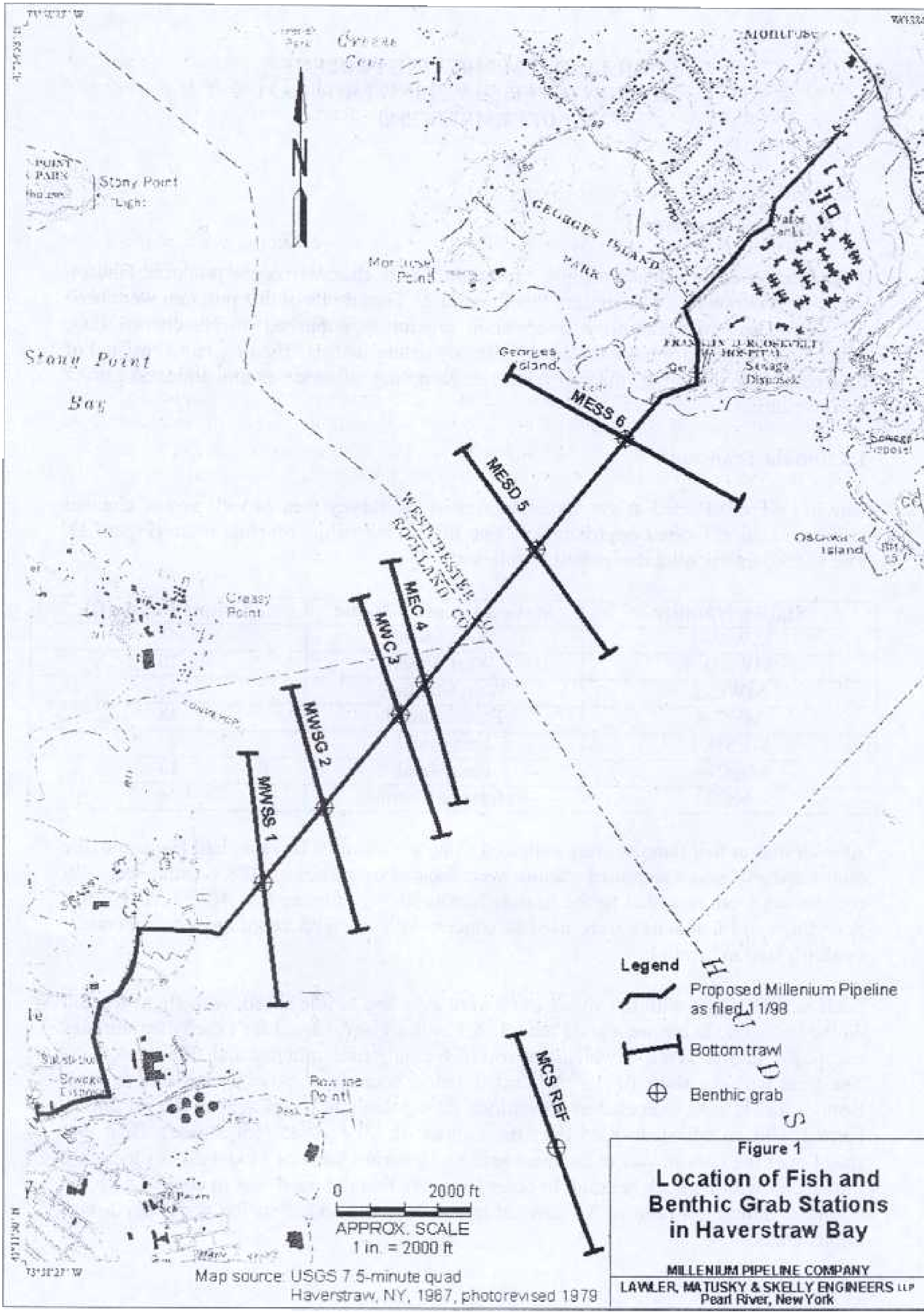

Figure 1

Location of Fish and Benthic Grab Stations in Haverstraw Bay

MILLENIUM PIPELINE COMPANY

LAWLER, MATUSKY & SKELLY ENGINEERS LLP
Pearl River, New York

Once a trawl was completed and the net was brought to the surface, data on the fish collected were compiled on the deck of the research vessel. The analysis consisted of species identification, enumeration, and total length (nearest mm). After analysis, all organisms were released back into the water.

1.3 Benthic Macroinvertebrate Sampling

At each station, one benthic macroinvertebrate sample was collected at the mid-point of each trawl transect using a Kahlsico No. 214WA250 Smith-McIntyre Grab sampler (sample area=0.1m^2). With the vessel anchored at the appropriate coordinates, the bottom sampler was lowered to the bottom by a steel cable. The sampler was lowered at a controlled rate to ensure maximum sample size. Upon contact with bottom, two tripping pads positioned on the sampler frame made contact with the bottom first and released two sets of springs, forcing the two-jaw bucket of the sampler into the bottom sediment. Once a sample was acquired, it was slowly raised to the surface. When the sample arrived at the surface the research crew brought the material onto the deck and began analysis. The temperature of the sediment was immediately taken with a hand held thermometer. Then observations on odor, color, and texture were recorded on the Benthos Field Data Sheet. The bottom samples were processed through a wash frame (No. 18, 1.0mm mesh) and preserved in sample jars with 5% formalin.

1.4 Water Quality Monitoring

Water quality at the sampling stations along the proposed pipeline route was analyzed. Each parameter was measured using calibrated meters and recorded on the Water Quality Field Data Sheet. Water quality data were taken at the surface and bottom for the shallow stations and at the surface, middle and bottom for the deep stations.

Parameter	Units
Temperature	°C
Dissolved Oxygen	mg/L
Salinity	ppt

1.5 Diver Observations

Visual observation by divers offered insight into the actual conditions of the proposed pipeline route. The divers were instructed to proceed along the bottom of the Hudson River, describing what was seen to the dive crew on the boat. Key features such as rubble fields, rock size, areas of aquatic plants, abandoned oyster beds, and aquatic life were identified by the diver. All observations were recorded on the diver field sheet in conjunction with GPS Lat/ Long coordinates, time of observation, diver's name, and descriptions of the bottom.

1.6 Results and Discussion

A total of twenty fish species was collected at the seven sampling stations (Table 1). The fish samples consisted of a mix of marine, estuarine and freshwater forms, reflecting the moderate salinity conditions at the time of sampling. The marine forms included migratory species which use the estuary as juvenile habitat- American shad, blueback herring and alewife-as well as juvenile marine forms which enter the estuary following spawning in coastal waters-weakfish and Atlantic croaker. Tropical marine forms such as lookdown and crevalle jack typically enter the estuary during late summer and fall. Typical estuarine forms such as white perch, hogchoker and Atlantic tomcod were common. A single specimen of shortnose sturgeon was collected. Two other estuarine forms, striped bass and American eel, were present. Both of these species move to the marine environment as part of their life cycles. Freshwater fishes commonly found in low to moderate salinity levels included white catfish, brown bullhead, yellow perch and white sucker. In addition to the fish, blue crab, were collected at most stations.

This assemblage of fishes was typical of the estuarine portion of the Hudson River based on sampling conducted over the past twenty-five years during a variety of study programs. The distribution and abundance of fish among the stations did not reveal any significant concentrations of fish that might indicate special habitat conditions (Table 2). The lone shortnose sturgeon was collected in shallow water (9ft), whereas they are generally found in the channel of Haverstraw Bay.

The benthic sampling showed a substrate made up of fine-grained material throughout the pipeline route. The composition of the fine-grained material varied from primarily clay to silt with oyster shells and some stones. The bottom trawls collected oyster shells and some rocks east of the channel.

The benthic samples produced little macroinvertebrate life at any station (Table 4). Qualitative sampling in the field with a very fine sieve showed that small oligochaete and polycheates worms were very abundant. These worms are typical of the Haverstraw Bay substrate and no attempt was made to quantify their abundance.

The diver observations, which covered the full length of the pipeline route, were consistent with the benthic samples and bottom trawls with regard to bottom type (Table 3). These observations did not reveal any special habitat conditions along the pipeline route. There were no obstructions of any size or shipwrecks, which might indicate the presence of historical resources.

Water quality reflected moderate salinity conditions and near saturated dissolved oxygen conditions (Table 5). Given the extensive mixing in the water column and the lack of pollution sources, these observations were consistent with the expected conditions.

The site-specific sampling along the proposed Millennium pipeline route revealed conditions typical of Haverstraw Bay. The fish species composition was typical of the fall season in which there is a mix of marine, estuarine and freshwater forms. There were no distinctive habitat features along the pipeline route. These data and conclusions are consistent with the characterizations of the aquatic life community and habitat conditions previously reported in numerous study reports.

Construction of the pipeline crossing would create a temporary disturbance to the habitat in the footprint of the trench and in the nearby benthic habitat. This activity would displace the fishes and cause a temporary loss of benthic invertebrate life. The current sampling shows the type of aquatic life that would be disturbed if a fall construction window were used. All of the fishes (and blue crab) would readily avoid the construction activity. The presence of fine-grained substrate provides assurance that the benthic substrate will redevelop quickly after backfilling of the pipeline trench and in combination with natural sedimentation processes.

Table 1

List of Fish and Crab Species Collected in Bottom Trawls in the Vicinity of the Proposed Millennium Pipeline Route across Haverstraw Bay.

Common Name	Scientific Name	Total # Collected*
Alewife	*Alosa pseudoharengus*	1
American Eel	*Anguilla rostrata*	1
American Menhaden	*Breevoortia tyrannus*	1
American Shad	*Alosa sapidissima*	19
Atlantic Croaker	*Micropoganias undulatis*	3
Atlantic Tomcod	*Microgadus tomcad*	31
Blueback Herring	*Alosa aestivalis*	15
Blue Crab	*Callinectus sapidus*	22
Brown Bullhead	*Ameiurus nebulosus*	2
Crevalle Jack	*Caranx hippos*	1
Fourspot Flounder	*Paralichthys oblongus*	4
Gizzard Shad	*Dorosoma cepedianum*	1
Hogchoker	*Trinectes maculatus*	15
Lookdown	*Selene vomer*	1
Shortnose Sturgeon	*Acipenser brevirostrum*	1
Striped Bass	*Morone saxatilis*	20
Weakfish	*Cynoscion regalis*	22
White Catfish	*Ameiurus catus*	36
White Perch	*Morone americana*	213
White Sucker	*Catostomus commersoni*	7
Yellow Perch	*Perca flavescens*	2
Total		**418**

**All stations combined*

Table 2.

Bottom Trawl Data

Species	# Collected	Length Range (mm)
MWSS-1		
White Perch	33	111-243
Striped Bass	2	147-157
Yellow Perch	2	188-220
American Shad	2	107-112
White Sucker	7	226-386
Brown Bullhead	1	180
Blue Crab	5	75-115
White Catfish	2	309-336
MWSD-2		
White Perch	48	72-215
Lookdown	1	70
Striped Bass	2	86-171
Gizzard Shad	1	160
Blue Crab	5	80-121
Atlantic Croaker	1	58
MWC-3		
Striped Bass	2	295-302
Hogchoker	3	110-137
White Perch	34	108-217
Weakfish	9	113-146
Atlantic Croaker	2	90-97
Atlantic Tomcod	7	102-159
White Catfish	5	202-240
Brown Bullhead	1	203
American Shad	1	100
MEC-4		
Striped Bass	2	240-250
White Perch	7	144-230
Weakfish	4	113-140
Atlantic Tomcod	7	105-190
White Catfish	8	195-282
American Menhaden	1	114
Fourspot Flounder	2	179-209
Hogchoker	7	99-136
MESD-5		
White Perch	46	247-72
Striped Bass	3	151-311
Crevalle Jack	1	148
White Catfish	2	258-360
Blue Crab	11	81-121

MESS-6		
Shortnose Sturgeon	1	840
White Perch	5	145-227
Striped Bass	8	57-204
American Shad	16	67-107
Blue Back Herring	15	57-77

MCS-Reference Channel		
White Perch	40	109-234
Fourspot Flounder	2	156-195
Alewife	1	182
American Eel	1	600
Atlantic Tomcod	17	111-147
Blue Crab	1	133
Hogchoker	5	120-144
Striped Bass	1	211
Weakfish	9	107-145
White Catfish	19	198-243

Table 3.

Diver Observations

DEPTH (ft)	FISH OCCURANCE	SOIL TYPE	OYSTER SHELLS	VEGETATION
8	None	east shore- silt(soft)	yes	none
20	None	silt, scattered small rocks	yes	none
20	None	hard pack mud	yes	none
28	None	soft silt 4’ thick, no rock	none	none
35	None	soft silt 4-5’ thick, no rock	yes, some	3’ branch
40	None	hard pack mud	yes, scattered	3 trees and limbs sticking out of mud in channel
40	None	6”-1’ loose silt on top of hard pack mud	none	none
--	None	2’ silt on top of mud	none	none
10	None	hard pack mud (clay), to shore (w), small stone 8”	none	none

Table 4.

Macroinvertebrate Sampling

STATION	DEPTH (ft)	TAXON	NUMBER COLLECTED
MWSS-1	10	*Mulinia lateralis*	15
		Cyathura polita	1
		Spionidae	6
		Chironomidae	1
		Ampharetidae	
		Gammaridae	3
MWSD-2	20	*Mulinia lateralis*	1
		Cyathura polita	1
		Spionidae	1
		Ampharetidae	
		Hirudinea	
MWC-3	35	*Chironomidae*	2
MEC-4	36	*Chironomidae*	4
		Oligochaeta	2
		Mulinia lateralis	1
MESD-5	26	*Mulinia lateralis*	7
		Spionidae	9
		Ampharetidae	
		Gammaridae	
		Oligochaeta	
		Chironomidae	
MESS-6	9	*Mulinia lateralis*	61
		Mytilus edulis	2
		Spionidae	
		Cyathura polita	
		Idotea sp.	
		Gammaridae	
MCS-control	36	no catch	

Table 5.

Water Quality

Station	Depth (ft)*	Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/L)
MWSS-1	s	13.0	7.1	8.3
	-	-	-	-
	b	13.0	7.8	8.6
MWSD-2	s	12.6	7.2	9.1
	-	-	-	-
	b	12.6	9	9.2
MWC-3	s	12.5	7.1	9
	m	12.5	7.9	8.8
	b	12.7	12.1	8.3
MEC-4	s	12.9	7.2	8.8
	m	12.5	7.2	8.8
	b	12.7	13.7	7.8
MESD-5	s	12.7	12.38	8.8
	-	-	-	-
	b	13.0	10.31	8.7
MESS-6	s	12.4	6.9	9
	-	-	-	-
	b	12.4	7	9
MCS	s	13.0	7.1	8.8
reference	m	12.6	7.5	8.2
station	b	12.7	11.3	7.9

**Water sampling depth was taken at the surface (s) and bottom (b) for the shallow stations and the surface (s), middle (m) and bottom (b) for the deep stations.*