

APPENDIX IID

SAMPLING PLAN FOR MONITORING CROSS-HUDSON PIPELAYING OPERATIONS

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OBJECTIVE

The objective of this sampling plan is to monitor water quality and sedimentation during the Haverstraw Bay dredging and pipelaying operations and verify that the affects predicted by the water quality and sedimentation modeling are not exceeded.

SUMMARY

Water quality will be monitored at multiple upstream and downstream locations during both dredging and backfilling operations. Monitoring will be more intense during initial operations until sufficient data are collected to verify that the affects on water quality are within the limits predicted by the model results. Water quality monitoring will continue at reduced intensity for the duration of the pipelaying operation to assure that water quality affects are minimized. Bottom profiles will also be measured before and after pipelaying to assess changes in sediment levels in the dredge area and adjacent areas. Monitoring results will be reported weekly and operations will be adjusted, if necessary, based on results.

PARAMETERS

The following water quality parameters will be measured:

- total suspended solids (TSS) as mg/l
- settleable solids (SS) as mg/l
- turbidity as NTU

The following sample identification data will be recorded:

station identifier (see table below)
vessel location (as lat/lon or state plane)
date and time (prevailing zone time) of sample (as date, hour, minute)
depth of sample (as near-surface, mid-depth or near-bottom)
total water depth (as ft)

In addition, for each series of stations occupied, the following observations will be recorded at the commencement and during the run:

dredge location at start (as lat/lon or state plane)
dredging/pipe laying/backfilling operations underway at start
weather conditions at start (qualitative)
tidal current phase at start (flood or ebb)
sea conditions (qualitative)

passage of large vessels and barge tows (plus recreational vessels in shallower water) that may influence the turbidity of the waters
dredge location at end (as lat/lon or state plane)
changes in dredging/pipe laying/backfilling operations during transect
tidal current phase at end (flood or ebb)

METHODS

TSS and SS will be determined by laboratory analysis of water samples in accordance with New York State mandated procedures. All reasonable, professional efforts will be made to complete the analyses within 24 hours of receipt of samples.

Turbidity will be determined using a field nephelometer (turbidimeter), calibrated in accordance with the manufacturers requirements.

Total water depth at each station will be determined using a navigational acoustic depth sounder

Depth of water quality sample will be determined by length of cable deployed and cable angle

Time of sample will be determined using an accurate quartz timepiece, calibrated to the National Institute of Science and Technology (NIST) master clock signal available over the internet

Station location will be determined using Differential GPS, based on U.S. Coast Guard broadcast real-time differential corrections for the region

Bathymetric profiles will be measured with a recording acoustic depth sounder and location will be determined by DGPS.

MONITORING SCHEDULE

Pre-Operation

Prior to active dredging, pipe laying and backfilling operations, bathymetric profiles will be measured at perpendicular transects along the proposed pipe route as described below.

Initial Operations Period

Daily sampling will be conducted during the first two weeks of operations to establish the success of the environmental controls on dredging and backfilling operations, and to provide data for adjustment of the sampling program. During each day of water quality sampling, a minimum of four longitudinal transects will be monitored. When shallow water backfilling or deep-water barge dumping operations are to be conducted, at least one additional transect will be monitored. Each transect will consist of six stations. Assuming

subsequent changes in location). The stations will be at:

<u>Station Identifier</u>	<u>Range to Dredge or Barge</u>
U1	1000 ft up current
	500 ft up current
D1	100 ft down current
D2	500 ft down current
D3	1000 ft down current
D4	5000 ft down current

The stations will be occupied sequentially from farthest up current to farthest down current. If the transect will take place during a time near slack water, the direction of the transect will correspond to the previous current phase. Each station will be located such that it is at the specified straight-line range and in approximately the same total depth of water as the dredging operations taking place.

Shallow-water dredging and backfilling will be done sequentially, so the stations will be relative to whatever operation is taking place at a given time. Deep-water dredging and backfilling will be done concurrently, but backfilling is expected to take place approximately twice daily, in contrast to continuous dredging operations. When backfilling takes place, Stations D1 through D4 will be doubled, so that there will be a station at each range down current of the dredge and down current of the dump barge. These doubled stations will be identified with a "d" or a "f" suffix for "dredge" and "fill", respectively (e.g., D2f would be a station 500 ft down current from a dump barge over the same depth contour).

At each station, a 2 liter water sample will be taken using a Niskin bottle or a pumped sample, and a turbidity observation will be made using a field nephelometer (turbidimeter) at each of the following depths:

- 2 ft below the surface
- mid-depth
- 3 ft above the bottom

The water samples will be handled in accordance with New York State standards for analysis of TSS and SS.

EVALUATION AND REPORT

Raw turbidity data will be available in real time and reported at the end of each day of monitoring. Raw TSS and SS data will be available within 36 hours of sample collection (24 hours of arrival at the laboratory).

On completion of each week of monitoring, a brief letter report will be prepared in electronic format summarizing the monitoring results. The resulting water quality and location data

dredging operations will take place for approximately 10 hours each day, the transects will be monitored at approximately 2, 4, 6 and 8 hours after commencement of daily operations. Monitoring will begin while dredging or backfilling operations are underway and will continue until complete, regardless of any changes in operations following the start of the transect, such as a pause in active dredging or shift to backfilling. Survey personnel will coordinate with the dredging contractor to determine anticipated daily work schedule, so that there will be a maximum likelihood that transects will be completed during active dredging or backfilling.

On-going Operational Period

Subject to any adjustments resulting from analysis of data from the Initial Period, conducting sampling during the period following initial operations will be reduced to three days each week to monitor continued success of the environmental controls. During each day of operational period sampling, two longitudinal transects will be monitored. When deep-water barge dumping operations are to be conducted, one of the transects will be timed to coincide with those operations and one to coincide with dredging. Each transect will consist of six stations. The actual timing of those transects will depend on the daily work schedule. Each transect will begin while dredging or backfilling operations are underway and will continue until complete, regardless of any changes in operations following the start of the transect, such as a pause in active dredging. Survey personnel will coordinate with the dredging contractor to determine anticipated daily work schedule, so that there will be a maximum likelihood that transects will be completed during active dredging or backfilling. Also during the Operational Period, we will conduct bathymetric surveying in the areas previously backfilled, as discussed below.

BATHYMETRIC TRANSECTS

The intent of the surveying will be to confirm that the post-backfill bottom contours are approximately the same as those pre-dredging. Bathymetric profiles will be recorded on transects normal to the pipeline route at 500 ft intervals along the route. Each transect will begin approximately 1000 ft up river from the intended trench centerline and will continue 1000 ft down river from the centerline. Pre-operational transects will be performed during the week prior to commencement of dredging. Operational period transects will be conducted 1 week to 10 days after backfilling is completed at the site of a given transect. Differential GPS will be used to position the Operational period transects to coincide with the Pre-operational transects (within small boat navigational accuracy). A water level gage will be installed in the vicinity of each end of the pipeline crossing to provide water surface reference. The water level gages will be surveyed into a common vertical datum. Raw sounder results will be recorded and subsequently adjusted for concurrent water surface elevation. The adjusted soundings will be plotted as water depth relative to MLLW versus distance along transect. The trench centerline will be indicated on each transect plot.

LONGITUDINAL TRANSECTS

Each water quality transect will consist of six stations. The stations will be located relative to the position of the dredge or barge at the beginning of the transect (regardless of any

will be tabulated and plotted as appropriate for comparison with the water quality conditions forecast by the model