

Water Quality Monitoring Plan *for the* **New NY Bridge Project**

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Attachments

Attachment A. Visual Observation Forms

1.0 Introduction

The New York State Department of Environmental Conservation Permit DEC ID 3-9903-00043/00012 (NYSDEC Permit) and subsequent modifications through and including July 3, 2014 letter from NYSDEC for the Tappan Zee Hudson River Crossing Project (Project) sets forth the requirements for water quality monitoring during construction. This Water Quality Monitoring Plan reflects these requirements and meets the Environmental Performance Commitments (EPCs) identified in the Final Environmental Impact Statement (FEIS). The Water Quality Monitoring Plan is described in the sections below.

2.0 Monitoring Objectives

The overall objective of this program is to monitor construction activities for total suspended solids (TSS) and contaminants via the collection and analysis of whole water samples or for turbidity through visual inspection as described in Table 1.

Table 1. Water Quality Monitoring Required by Construction Activities Associated with the Tappan Zee Hudson River Crossing Project

Construction Activity	Water Quality Monitoring
Pile Driving Operations in Zone C	Daily visual monitoring for turbidity extending beyond 500-ft mixing zone during pile driving operations; collection of whole water samples for TSS and contaminants for compliance with WQ Standard Permit Condition 60, 61, and 64 at the edge of a 500-foot mixing zone daily (every day the activity occurs) at the start of pile driving, once during the flood or once during the ebb tide stage as the activity and tidal stages provide. Per NYSDEC approval: Reduced to daily visual monitoring for turbidity extending beyond the 500-ft mixing zone during pile driving operations.
Pile Driving Operations Outside Zone C	Daily visual monitoring for turbidity extending beyond 500-ft mixing zone during pile driving operations.
Pile Dewatering	Daily visual monitoring for turbidity in the vicinity of the pump discharge during pile dewatering.
Cofferdam Construction	Daily visual monitoring for turbidity extending beyond 500-ft mixing zone during sheet pile driving. Daily visual monitoring for turbidity extending beyond 500-ft mixing zone during construction within the cofferdam.
Cofferdam Dewatering	Daily visual monitoring for turbidity in the vicinity of the pump discharge during cofferdam dewatering.
Dredging and Bottom Profiling	Daily visual monitoring for turbidity extending beyond 500-ft mixing zone; collection of whole water samples for TSS and contaminants for compliance with WQ Standard Permit Condition 60, 61, and 64 at the edge of a 500-foot mixing zone daily (every day the activity occurs) at the start of the dredging, once during the flood or once during the ebb tide stage as the activity and tidal stages provide. Per NYSDEC approval: Reduced to daily visual monitoring for turbidity extending beyond 500-ft mixing zone; collection of whole water samples for TSS twice per week or twice per every seven days dredging occurs;

Construction Activity	Water Quality Monitoring
Dredging of East Sediment Mound #3 and Dredging of Stage 2 Access Area	Daily visual monitoring for turbidity extending beyond 500-ft mixing zone; collection of whole water samples for TSS and contaminants for compliance with WQ Standard Permit Condition 60, 61, and 64 at the edge of a 500-foot mixing zone daily (every day the activity occurs) at the start of the dredging, once during the flood or once during the ebb tide stage as the activity and tidal stages provide. Per NYSDEC approval: Reduced to daily visual monitoring for turbidity extending beyond 500-ft mixing zone; collection of whole water samples for TSS twice per week or twice per every seven days dredging occurs;
Barge Decanting	Daily visual monitoring for turbidity extending beyond 500-ft mixing zone; Collection of whole water samples for TSS and contaminants for compliance with WQ Standard Permit Condition 60, 61, and 64 at the edge of a 500-foot mixing zone daily (every day the activity occurs) at the start of barge decanting, once during the flood or once during the ebb tide stage as the activity and tidal stages provide. Per NYSDEC approval: Reduced to daily visual monitoring for turbidity extending beyond 500-ft mixing zone.
Dredged Area Armoring	Daily visual monitoring for turbidity extending beyond 500-ft mixing zone; Collection of whole water samples for TSS and contaminants for compliance with WQ Standard Permit Condition 60, 61, and 64 at the edge of a 500-foot mixing zone daily (every day the activity occurs) at the start of dredged area armoring, once during the flood or once during the ebb tide stage as the activity and tidal stages provide. Per NYSDEC approval: Reduced to daily visual monitoring for turbidity extending beyond 500-ft mixing zone.
Drilled Shafts	Daily visual monitoring for visible turbidity extending beyond the turbidity curtain secured to the floating cofferdam; In the event a visible plume beyond the turbidity curtain is observed, collection of whole water samples for TSS for compliance with WQ Standards Permit Conditions 60 and 61 collected at the nearest practicable distance from the turbidity curtain. Whole water samples are only required in the event a plume is observed.
Permanent Maintenance Platform Drilled Shafts	Daily visual monitoring for visible turbidity extending beyond the turbidity curtain surrounding the piles; In the event a visible plume beyond the turbidity curtain is observed, collection of whole water samples for TSS for compliance with WQ Standards Permit Conditions 60 and 61, collected at the nearest practicable distance from the turbidity curtain. Whole water samples are only required in the event a plume is observed.
Drilled Shaft Barge Decanting	Daily visual monitoring for visible turbidity extending beyond the turbidity curtain; Collection of whole water samples for TSS and contaminants for compliance with WQ Standard Permit Condition 60, 61, and 64 at the nearest practicable distance from a turbidity curtain daily (every day the activity occurs) at the start of decanting once during the flood or once during the ebb tide stage as the activity and tidal stages provide. Per NYSDEC approval: Reduced to daily visual monitoring for visible turbidity extending beyond the turbidity curtain.
Bridge Demolition (subsurface pile, cofferdam, and debris field removal) and Other Activities that	Daily visual monitoring for turbidity extending beyond 500-ft mixing zone or at the nearest practicable distance outside of a silt curtain should one be used; Collection of whole water samples for TSS and contaminants for compliance with WQ Standard Permit Condition 60, 61, and 64 at the edge of a 500-foot mixing zone or at the nearest practicable distance from a silt curtain, should one be used, within the first five days or tide stages of monitoring. The NYSDEC may specify water quality monitoring requirements that differ from those listed in conditions 59 through 67 to reflect the details of the demolition plans or for other activities that may suspend bottom sediments.

Construction Activity	Water Quality Monitoring
may Resuspend Bottom Sediments	Per NYSDEC approval: Reduced to daily visual monitoring for turbidity extending beyond 500-ft mixing zone; Collection of whole water samples for TSS twice per week or twice per every seven days the activity occurs following the first five days or tide stages of whole water sample collection.

3.0 Methods

Water quality monitoring methods will vary based on in-water construction activity (i.e. visual observation or vessel based whole water sample collection). Based on the width of the Hudson River and hydrodynamics in the area, multiple activities can be monitored or sampled each day with one survey crew. If all activities can not be monitored or sampled by a single crew, additional crews or vessels will be used as necessary.

The sections below describe the methods for the water quality monitoring plan.

3.1 Visual Observations

Visual observations of activities will be conducted by a barge-based or vessel-based observer during the activities identified in Table 1.

An observation of turbidity that extends beyond the 500-ft mixing zone or in the vicinity of the construction activity, as specified in Table 1, will be reported immediately to the Environmental Compliance Manager (ECM) or designee who will then inform NYSTA, OECM, and NYSDEC. The ECM or designee will immediately coordinate with Tappan Zee Constructors, LLC. (TZC) operations to implement corrections actions as to comply with water quality standards.

Visual observations will be documented on one or more field forms (Attachment A). Observations forms include but are not limited to:

- Environmental Checklists (ENV CL)
- Field Compliance Reports (FCR)
- Visual Inspection Forms (VIF)

If an exceedance is reported during reduced monitoring for an activity listed in Table 1 then additional monitoring will be implemented as specified in Section 3.3.

3.2 Vessel Based Whole Water Samples

Vessel-based water quality monitoring will be conducted for activities as specified in Table 1. TSS and contaminant whole water samples will be collected during either the flood or ebb tide stage during daylight hours. Water quality monitoring via whole water sample collection will be conducted daily for each activity.

Daily visual observations as described in Section 3.1 will continue through the duration of activities described in Permit Condition 59. If there is an exceedance of 100 mg/l above ambient TSS value or the observation of turbidity extending beyond 500-ft mixing zone, then corrective actions will be taken and the NYSDEC will be consulted to determine if additional monitoring is required. The NYSTA and OECM will notify NYSDEC to any corrective actions implemented. Vessel-based monitoring may be temporarily suspended due to weather or other safety concerns. If monitoring is temporarily suspended NYSTA and

OECM will be notified who will inform the NYSDEC. Conditions resulting in suspension of monitoring due to weather or other safety concerns will be documented in the reports described in Section 4.1 and 4.3.

3.2.1 In-Plume (Downcurrent)

In-plume surveys will be collected at the edge of the 500-ft mixing zone, or at the nearest practicable proximity to a silt curtain, if one is used. An Acoustic Doppler Current Profiler (ADCP) will be used to identify the plume. An Optical Backscatter Sensor (OBS) configured to record turbidity (NTU), depth (meters), temperature (°C) and salinity (ppt) will be mounted to a submersible pump and used to collect vertical profiles at water sample station locations. Simultaneously, the pump will be used to collect discrete whole water samples at separate depths for laboratory analysis of TSS and contaminants. When water depth is less than 10 feet only mid-depth samples will be collected. When water depth is between 10 and 20 feet samples will be taken from near-surface and near-bottom. When water depth is greater than 20 feet samples will be taken from near-surface, mid-depth, and near-bottom. Near-surface samples will be collected from approximately three feet below the surface, mid-depth will be collected approximately half-way between the bottom and surface and bottom samples from approximately three feet above the bottom. The water samples will be preserved at 4° C and sent to the laboratory for analysis under full Chain-of-Custody protocols.

3.2.2 Background (Upcurrent)

In addition to in-plume surveys, ambient surveys will be conducted using the same methods and procedures described above. Ambient surveys will be conducted along a transect a minimum of 500-ft up current of the source to provide data for comparison with the in plume surveys. This transect will be conducted at a location up current of the source where the water quality effects of the project are no longer discernible. Samples will be collected in the same manner as the in-plume surveys.

3.2.3 Contaminant Analyses

To obtain measurements of water quality within the water column, whole water samples will be collected per Section 2.0 during each survey at the upcurrent and downcurrent transect. These samples will be collected using the pump sampler at the required depths, and will be analyzed for the parameters listed in Permit Condition 61.

The samples to be analyzed for dissolved nickel, copper, lead and zinc will be filtered in the field. All samples will be prepared, preserved as required, maintained at 4°C and shipped to a New York State Department of Health Environmental Laboratory Approval Program certified lab under full Chain-of-Custody protocols.

If an exceedance is reported during reduced monitoring for an activity listed in Table 1 then additional monitoring will be implemented as specified in Section 3.3.

3.2.4 Modified Whole Water Sample Collection due to Limited Access, Safety, or Other Operational Concerns

In the event that the site configuration would prevent the collection of whole water samples as outlined in Section 3.2.1 or Section 3.2.2 as described above, due to limited access, monitoring crew safety, or other operational concern, TZC will request to modify the collection of whole water samples for a specific operation to allow for representative samples to be collected while ensuring the safety of staff and equipment.

TZC will collect water quality samples using a battery powered pump sampler or a Niskin water sampler for the downcurrent and upcurrent samples. A field inspector will position themselves in a location that is

safely accessible and collect a representative water quality sample. The water depth will be measured prior to collecting a sample and sample depths will be collected as specified in Section 3.2.1. To fill the requisite sample volumes, multiple niskin samples may be required to be collected from a given depth. An ADCP and OBS unit will not be used during collection as samples. The water samples will be preserved at 4° C and sent to the laboratory for analysis under full Chain-of-Custody protocols. The collected samples will be analyzed for and reported upon according to Section 3.2.3. A site map will be provided showing the location of collected samples relative to the monitored operation.

TZC will request approval from the NYSDEC and provide a justification as to why a monitoring vessel as specified in Section 3.2.1 and 3.2.2 cannot be utilized prior to collecting samples as described above.

3.3 Reduced Water Quality Monitoring

Following the receipt of five consecutive water quality monitoring events with no water quality standard exceedances for an activity listed in Table 1, TZC will provide the results to NYSTA, OECM, and NYSDEC and request to follow a reduced monitoring schedule per Permit Condition 64. Following approval by NYSDEC, documented in the form of a letter or e-mail, TZC will follow the reduced monitoring schedule for that activity as stated in Table 1.

If, during the reduced sampling for any activity, visible turbidity is observed immediately outside of a silt curtain or at the edge of the 500-foot mixing zone (per Table 1) or if there is an exceedance of 100 mg/L above the ambient TSS value, corrective action shall be taken and TSS monitoring frequency shall return to daily (every day that the activity occurs) for that activity until such time as TSS concentrations are less than 100 mg/L above ambient values on two consecutive measurements and visible turbidity is not observed immediately outside of a silt curtain or at the edge of the 500-ft mixing zone (per Table 1). NYSDEC may specify additional monitoring until compliance is demonstrated. Samples shall be collected until NYSDEC approves resumption of reduced monitoring.

4.0 Reporting

4.1 Analytical Results

All analytical results (i.e. TSS and contaminants) of water samples collected in Section 3.1. will be provided to NYSTA and OECM. The OECM will transmit the analytical results to the NYSDEC by fax or email within 48 hours of receipt of the data results from TZC. Any exceedances will be highlighted by TZC. Exceedances will be based on differences in TSS and contaminant concentrations from analytical results of the water samples between the upcurrent and downcurrent stations, when the background concentration exceeds the water quality standards or detection limits in Permit Condition 61. Otherwise, exceedances will be based on the water quality standards or detection limits in Permit Condition 61.

Following receipt of five samples for an activity monitoring TZC will provide the results and request for reduced monitoring to NYSTA and OECM who will forward it to NYSDEC. TZC will follow the reduced sampling schedules provided in Table 1 once approved by NYSDEC.

4.2 Water Quality Standard Exceedances

In the event of an exceedance of a water quality standard for TSS and contaminants based on the analytical results of the water samples or field form documented visual inspections of turbidity as described in Permit Condition 65.c, NYSTA, OECM, and NYSDEC will be notified. Corrective actions will be taken and TSS monitoring will return to daily for that activity until TSS concentrations are less than 100 mg/l above ambient values on two consecutive measurements and turbidity is not observed extending beyond the 500-ft mixing zone. With NYSDEC approval, activity monitoring would return to the reduced schedule stated in Table 1. Based on the plan, in consultation with OECM and NYSDEC, the in-water activities will be re-evaluated in consultation with NYSDEC to determine the need for procedural changes.

If an exceedance of the water quality standards occurs during the dredging operation a Corrective Action Plan (CAP) will be developed as appropriate. The CAP will be provided to NYSTA and OEMC within 24 hours of the exceedance.

4.3 Reporting

Within 15 days of completion of the dredging operation in any calendar year, three (3) copies of the annual dredging monitoring report will be submitted to the New York State Thruway Authority (NYSTA) and provided to NYSDEC within 30 days of completion of dredging. Three (3) copies of the annual water quality monitoring report, summarizing the results of the water quality monitoring program and analyses will be submitted to NYSDEC for review within 30 days following the New Year.

ATTACHMENT A
Visual Observation Forms