

Allenstown 40362

Turbidity Sampling and Control Plan for In-Water Work

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Turbidity in the river during all in-water work shall be monitored and controlled as follows:

1. General Condition:

a) All proposed monitoring for turbidity in the river during all in-water work shall be completed by a qualified Contractor approved by NHDOT and shall be conducted in accordance with the specifications below.

b) All turbidity monitoring measurements and visual monitoring (with photo documentation) shall be conducted as described in sections below.

c) With NHDOT approval, turbidity measurements using turbidity meters or probes do not need to be made if the Contractor believes that it would be unsafe for personnel to collect in stream measurements due to conditions such as high water velocity and/or ice conditions. NHDES shall be notified within 24 hours of when it is determined that monitoring cannot be conducted due to unsafe conditions.

2. Monitoring Stations and Monitoring Frequency: Markers (buoys or similar devices) shall be set up in the river at the location of three monitoring stations as described below:

a) **Upstream - Background (UP-1):** A marker designating the background station will be located in the river just upstream from the bridge in an area not disturbed by the construction activity. The purpose of this station is to provide baseline turbidity information. During construction activities that could potentially result in increased in-stream turbidity due to construction activities, visible observations with photo documentation and in-stream monitoring for turbidity shall be conducted each day that in-water work is conducted as follows:

- i. Prior to the commitment of in-water work
- ii. Midday while in-water is being performed, and at the
- iii. Conclusion of in-water work
- iv. If there is visible turbidity within the mixing zone, visual monitoring with photo documentation and turbidity measurements shall be taken hourly.

b) **Downstream 1 (DS-1):** A marker shall be placed 100 feet downstream from the bridge in each channel. Aquatic organism passage within the mixing zone will be assessed at these locations. During construction activities that could potentially result in increased in-stream turbidity, monitoring for turbidity shall be conducted as follows:

Visual Monitoring with photo documentation shall take place every hour.

c) **Downstream 2 (DS-2):** Four markers shall be placed 400 feet downstream from the bridge; 20 feet from each shore and the middle of the northern channel, and

one in the middle of the southern channel. The purpose of this station is to determine compliance with turbidity-related surface water quality standards and to identify the end of the mixing zone which is based on 100 times the river depth. Turbidity measurements shall be taken at each of the four markers.

During construction activities that could potentially result in increased in-stream turbidity, monitoring shall be conducted as follows:

- i. If no visible turbidity is observed at DS-1, visual turbidity monitoring with photo documentation and turbidity measurements shall be conducted a minimum of every two hours spaced evenly throughout the workday with a minimum of five measurements per day (i.e., start of work, mid-morning, noon, mid-afternoon, end of work).
- ii. If visible turbidity is observed at DS-1, visual turbidity monitoring with photo documentation and turbidity measurements shall be conducted every hour at DS-2 for at least two hours (to account for lag time) after visible turbidity is observed at DS-1.
- iii. If there is visible turbidity at DS-2, or if the average of the four turbidity measurements taken at each of the four markers exceeds 10 NTU above background at DS-2, visual turbidity monitoring and turbidity measurements shall be conducted every hour until there is no visible turbidity and average of the four turbidity measurements taken at each of the four markers is no more than 10 NTU above background.

3. Required Actions to Control Turbidity:

- a) **DS-1:** If turbidity is visible in more than 1/4 of the channel at this station, work shall immediately stop and shall not resume until there is no visible turbidity in more than 1/4 of the channel. BMPs shall be assessed and corrective action(s) shall be taken. A description of the corrective action(s) shall be included in the monitoring report. It is assumed that if turbidity is visible in more than 1/4 of the channel, the turbid discharge is impacting aquatic organism passage.
- b) **DS-2:** If there is visible turbidity in any part of the channel, or if the average of the four turbidity measurements taken at each of the four markers is more than 10 NTUs above background, work shall immediately stop and shall not resume until there is no visible turbidity across any part of the channel and the average of the four turbidity measurements taken at each of the four markers drops below 10 NTUs above background. BMPs shall be assessed and corrective action(s) shall be taken if visible turbidity exists and/or if the average of the four turbidity measurements taken at each of the four markers exceeds 10 NTU above background. A description of the corrective action(s) shall be included in the monitoring report.

4. **Meter Monitoring Protocols:** Field measurements of turbidity using turbidity meters shall comply with the following:

- a) Monitoring frequency at each location shall comply with item 2 above.
- b) Results for in stream measurements, calibration and QA/QC shall be recorded on field data sheets, as well as the date, time, location and the names of those conducting the monitoring.
- c) Sampling Procedures for Hand-held Meters
 - 1) Rinse the sampling container three times with water from the waterbody.

2) Submerge the sampling container a minimum of an arm's length upstream and allow the container to fill. Collect samples approximately one foot below the surface or at mid-depth (whichever is less) by placing a finger or thumb over the container opening, submersing the container to the appropriate depth, and then removing your finger or thumb from the container opening and allowing the container to fill.

3) Do not collect any water immediately adjacent to legs or boots.

4) Ensure that any introduced air bubbles are removed prior to analysis.

5) Immediately cap the sample container, measure in the field using a turbidity meter and record results on the field data sheet.

d) Quality Control and Quality Assurance

1. Turbidity meters shall have an accuracy of + 2% for readings below 100 NTUs and + 3% for readings above 100 NTUs, and a resolution of + 0.1 NTU. Prior to monitoring, meter specifications shall be provided to NHDOT for approval.

2. Hand-held Meters shall be recalibrated daily with results recorded on the field data sheet.

3. Duplicate samples shall be taken for every 10th sample with results and identification of the duplicate sample clearly identified and recorded on the field data sheet. If the relative difference¹ between the duplicate measurement and the original measurement exceeds 10%, recalibrate the turbidity meter and re-measure turbidity.

4. Blank samples shall be taken every 10th sample and recorded on the field data sheet. Blank samples shall be taken by filling a sample container with deionized water and measuring the turbidity immediately following measurement of the 10th sample.

5. Visual Monitoring with Photo Documentation Protocols: Visual Monitoring for turbidity and photo documentation shall comply with the following:

Visual Monitoring results shall be recorded on field data sheets. Field Data sheets for Visual Monitoring shall include the names of those conducting the observations, the date, time, location and result (i.e., visual turbidity or no visual turbidity) of each observation, and the date/time when work was ordered to be stopped and the date/time when work was allowed to resume.

a) Photos of each station shall be taken during each observation. Each photo shall include the date, time and location.

b) Photos must be taken from a location and angle that will clearly show visible turbidity should it occur. Use of drones for this purpose is recommended. Prior to construction, the Contractor shall provide photos of each monitoring location to NHDOT for approval proving that the proposed method to photograph conditions in-stream will clearly show visible turbidity should it occur.

6. Documentation, Notification and Reporting:

a) The Contractor shall maintain electronic copies of all field data sheets, and photos (with date, time and location) and submit them to NHDOT and/or NHDES within 48 hours of receiving a request.

b) Reports that include the results from the previous week, and shall be transmitted to NHDOT by Tuesday of the following week. The weekly reports shall include the following:

i. If turbidity data was not collected, an explanation as to why and when it wasn't collected with supporting information (i.e., gage information showing high flows, photos showing ice build-up, etc.)

- ii. A summary of any data that was collected that did not meet the QA/QC requirements.
- iii. Turbidity meter results including the date, time and location.
- iv. Photos including the dates, times, and locations.
- v. The dates and times when work was stopped due to exceedances of any of the criteria above.
- vi. The dates, times, associated photos at each location and turbidity meter results, when work was allowed to resume.

7. **Notification:** NHDOT shall be notified immediately when turbidity results indicate that exceedances have occurred and NHDES shall be notified **within 24 hours** when turbidity results (i.e., based on visual observations or measurements with a turbidity meter) indicate that exceedances at DS-2 (the end of the mixing zone) have occurred.