



What are turbidity and pH?

Turbidity is the clarity of water expressed as nephelometric turbidity units (NTU's) and is measured with a calibrated turbidity meter (also called a nephelometer or turbidimeter) or with a transparency tube. The level of turbidity is determined by measuring the amount of light that passes through a standard sample of the water.

pH is a measure of the acidity or basicity of a solution and is measured using pH indicator paper or a calibrated pH meter. pH ranges from 0 to 14, with 7 being neutral. pH of less than 7 indicates an acidic condition, whereas pH of greater than 7 indicates a basic condition.

Code Authority

The Clearing and Grading Code (BCC 23.76.090 and BCC 23.76.160) permits the Director of the Development Services Department to require performance monitoring during permitted clearing and grading to verify compliance with Bellevue code requirements and State Surface Water Quality Standards.

Turbidity and pH Monitoring Plan Requirements

An acceptable turbidity and pH monitoring plan must include the following:

1. Project Description – This section of the plan must identify the purpose of the site clearing and grading, including a discussion of the extent of site disturbance required for the proposal, any proposed phasing of the project, the extent of concrete work, and/or cement treatment, and a brief description of the Erosion and Sediment Control (ESC) Plan.
2. Drainage Analysis – This section, at a minimum, must include a discussion of:
 - a. The general topography
 - b. Existing drainage patterns on-site, including existing drainage features (i.e. wetlands, streams, ditches, catch basins, pipes, ponds, etc.)
 - c. Location of protected areas (i.e. steep slopes, wetlands, riparian corridors and shorelines)
3. Standards for Turbidity and pH – Describe and provide the standards that will be used for turbidity and pH thresholds. Specify which water quality standards will be used:
 - a. Comparing upstream and downstream turbidity (used when construction site stormwater discharges into a stream or storm drainage system) or,

- b. Using turbidity benchmarks (for direct sampling of stormwater discharging from the site or dewatering water being discharged into the storm system).

Describe in detail which action will be taken when thresholds have been surpassed. Current standards are presented in the Appendix.

4. Field Testing Methods – Describe and specify the turbidity and pH monitoring equipment that will be used. The equipment must comply with requirements of the EPA (Environmental Protection Agency) and provide immediate results in the field. Identify a qualified, professional third-party monitoring company that will be responsible for providing turbidity and pH monitoring. The company may not be affiliated with any party with a vested interest in the project. The individual(s) who will be conducting the monitoring must be a certified erosion and sediment control lead (CESCL).
5. Frequency of Monitoring – Describe the frequency and duration of turbidity and pH monitoring. Current frequency requirements are provided in the Appendix.
6. Sampling Locations – All sampling point(s) must be identified on the ESC plan or on a separate site plan included with the monitoring plan. The sampling points must be clearly marked in the field with a flag, tape, paint, stake or other visible marker.
7. Reporting Requirements – Describe the requirements and process for reporting monitoring data to the appropriate jurisdictions (City of Bellevue, Washington State Department of Ecology, etc.). Provide e-mail addresses, fax numbers or links for report submittals. Some information on submittal requirements is included in the Appendix.
8. Termination of Monitoring Services – Describe the process for terminating services. Upon termination of monitoring services, the third-party monitoring company must submit a final report to the clearing and grading inspector. The report must indicate the reason for termination of services, a summary of turbidity and pH data obtained throughout the project, final turbidity and pH levels, and any outstanding issues that have not been fully addressed.
9. Turbidity and pH Monitoring Data Sheet – Include in the monitoring plan a data sheet template to record daily monitoring data. An example Data Sheet is included in the Appendix. The example may be used directly, or as a reference to develop a project-specific data sheet. Project-specific data sheets must include all the information on the example sheet and may provide additional information.

Appendix

Standards for Turbidity and pH

Using State Surface Water Quality Standards (WAC 173.201A-200):

Aquatic Life Turbidity Criteria in Fresh Water: Turbidity is not to exceed 5 NTU over upstream turbidity when upstream turbidity is 50 NTU or less; and not to exceed 10 percent above upstream turbidity when upstream turbidity is greater than 50 NTU.

Using Turbidity Benchmarks:

For construction turbidity monitoring, turbidity benchmarks of 25 and 250 NTU are typically used. It is presumed that turbidity of 25 NTU or less is not likely to cause an exceedance of state water quality standards under most conditions, and BMPs are thought to be functioning well. If the turbidity benchmark of 250 NTU is exceeded, there is a much higher risk of exceeding standards.

The standard range for pH is:

6.5 to 8.5 with a human caused variation within the range of less than 0.2 units.

Exceeding Turbidity Benchmarks – Upon determination of turbidity levels is in excess of the 25 NTU benchmark (26 to 249 NTU); the CESCL must immediately notify the contractor. The contractor must make all necessary efforts to correct the condition(s) on site that is (are) causing, or contributing to, the excess turbidity. It is the responsibility of the contractor to determine the most appropriate measures and implement them immediately, although they may solicit input from the inspector, the CESCL, or any other outside resource. The CESCL must make the appropriate revisions to the CSWPPP.

Upon determination that turbidity levels exceed the 250 NTU benchmark, the CESCL must immediately notify the contractor and the Clearing and Grading Inspector. In this event, immediate corrective actions must be taken, and Washington State Department of Ecology (Ecology) must be notified within 24 hours (206-594-0000). The CESCL must continue to sample discharge daily until Turbidity is <25 NTU or the discharge is eliminated. The clearing and grading inspector has the authority to require additional TESC measures and/or issue a Stop Work Order to mitigate water quality concerns.

Exceeding pH Benchmark – The benchmark value for pH is 8.5 standard units. Any time sampling indicates that pH is 8.5 or greater, the high pH water (8.5 or above) must be prevented from entering the storm drainage system or surface waters, and, if necessary, the high pH water must be adjusted or neutralized. If necessary, adjust or neutralize the high pH water using an appropriate treatment BMP such as CO₂ sparging or dry ice. Written approval from Ecology must be obtained before using any form of chemical treatment other than CO₂ sparging or dry ice.

Frequency of Monitoring – During the Dry Season (May 1 – September 30) sampling must be performed no less than one sample weekly. Additional samples must be taken during or immediately after each rainfall event. No more than one sample will be required in a day if the test indicates that turbidity complies with allowable levels. If the test indicates that turbidity is in excess of the standard or turbid water is observed

coming from the site after the initial sample is taken, additional samples may be required. Sampling during the Rainy Season (October 1 – April 30) must be done daily.

Reporting Requirements – Sampling data sheets must be delivered, e-mailed, or faxed to the City of Bellevue Clearing and Grading Inspector the same day they are taken (e-mail address: clearandgradereview@bellevuewa.gov; FAX # ((425) 452-7930). Delivery of data sheets must be arranged with the inspector prior to collection of the data.

Turbidity and pH Monitoring Data Sheet

Project Name _____ Permit Number _____

Site Address _____

Name of CESCL _____ Phone Number _____

Name of Monitoring Company _____

Date & Time of Sample _____

Weather Conditions:

Sampling Location	Turbidity Reading (NTU)	Turbidity Above Benchmark? (Y/N)	pH Reading	pH Above Benchmark? (Y/N)	Contractor Notified of results? (Y/N)

Corrective measures taken by contractor (if turbidity increases above standard):

Other comments: