

2018

Monitoring Guidance for In-Water Work

Guidance for ensuring compliance with state
surface water quality standards per
WAC 173-201A



Prepared by:



Washington State
Department of Transportation

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1. Background and Applicability

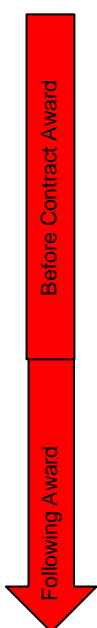
This document provides guidance for Washington State Department of Transportation (WSDOT) environmental staff and project teams to help them ensure in-water construction activities are in compliance with state surface water quality standards per [Washington Administrative Code \(WAC\) 173-201A](#).

This document does not provide sampling guidance for complying with the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit. NPDES Construction Stormwater General Permit Sampling Procedures can be found in [Chapter 4 of WSDOT's Temporary Erosion and Sediment Control Manual](#).

WSDOT project teams are responsible for understanding these requirements along with any additional monitoring or documentation requirements listed in permits or approvals obtained for their project. WSDOT staff is encouraged to first contact their region environmental office if they have specific questions regarding sampling or water quality requirements. Alternatively, staff may contact the WSDOT Environmental Services Office [Permitting Compliance Program](#) or WSDOT's Washington State Department of Ecology (Ecology) [liaison](#) if they have questions concerning this guidance.

2. Planning to Ensure Compliance

In-water work is a high-risk activity. It's essential that WSDOT and the contractor carefully plan and discuss the work to avoid non-compliance with water quality standards. WSDOT needs to take the following steps before allowing the contractor to perform in-water work:



1. **Know your project.** Review environmental permits and approvals to determine project-specific requirements for in-water work and sampling. Visit the project site to determine access points to the water body and potential limitations;
2. **Procure sampling equipment.** Acquire the necessary sampling equipment to ensure compliance with state surface water quality standards (WAC 173-201A). See Section 5, Sampling Equipment and Procedures. WSDOT typically monitors for turbidity and pH;
3. **Right-size your approach.** Determine if a sampling plan needs to be prepared to document how the project will ensure compliance with state water quality standards. The appropriate level of documentation depends on your project specific permit requirements (see the next section);
4. **Collaborate.** Make sure the monitoring plan is consistent with the activities and locations where the Contractor will conduct in-water work. Coordinate with the appropriate regulatory agencies and tribes to provide advance notifications and a copy of the monitoring plan (if required); and
5. **Communicate.** Ensure the contractor is aware of the requirements and will implement the necessary best management practices (BMPs) during in-water work to reduce the risk of an exceedance of water quality standards.

Whether or not you prepare a sampling plan for your project, WSDOT must comply with the state surface water quality standards (WAC 173-201A) when performing in-water work unless you have an extended temporary area of mixing granted by Ecology in a 401 Certification.

What is a Water Quality Monitoring and Protection Plan (WQMPP) and when do I need to prepare one?

The WQMPP is a compliance tool that provides Ecology with the “reasonable assurance” of the protection of water quality. Whether or not you need to prepare one depends if your project’s been issued an Individual [401 Water Quality Certification](#) from Ecology. If your project has an Individual 401 Water Quality Certification from Ecology, there is often a condition in the permit requiring WSDOT to prepare a WQMPP. WSDOT usually needs to obtain input from the contractor on their work methods, timing, and materials to prepare the WQMPP. Ecology typically requires the plan to be submitted for their review and approval at least 20 days prior to the start of in-water work. Coordinate closely with the Ecology Federal Project Coordinator listed on the permit, prior to the submittal of the plan, to understand their expectations. Let Ecology know when you plan to submit the WQMPP. Follow the requirements listed in your permit when determining what to include in the WQMPP.

What if my project’s been issued a Letter of Verification (LOV) from Ecology or the Army Corps determines No Further Action (NFA)?

If your project’s been issued a LOV from Ecology or the Army Corps determines NFA or if your project has a Nationwide Permit that’s been automatically certified by Ecology, it’s up to your region to determine whether or not to prepare a project specific water quality monitoring plan. For example, the Northwest Region requires water quality monitoring plans for all projects that involve work in streams, rivers, and open water to document how WSDOT will monitor to ensure the project is in compliance with the state surface water quality standards.

What information should I include in a water monitoring plan?

Follow the requirements listed in your permit. If you don’t have a permit or your Ecology permit does not require a monitoring plan, but your team decides to prepare one, here are some recommended components:

- Description of in-water activities;
- BMPs to protect water quality during in-water work;
- Applicable water quality standards and parameters (e.g. turbidity, pH) for your water body and planned activity;
- Sampling locations and monitoring frequency based on project activities;
- Sampling procedures;
- Name and phone number of the person(s) responsible for sampling and reporting;
- Documentation and reporting protocols;
- Coordination with contractor if water quality standards are exceeded;

- Attachment: Map showing sample locations; and
- Attachment: Monitoring form for recording sample results in the field.

3. Determining Sample Locations and Standards

Follow the guidance below to establish sampling locations and schedules for your project. Please note that this document only addresses sampling for turbidity and pH because these are two most common parameters for which WSDOT is required to sample.

Sampling locations are based on the location and type of in-water activity occurring. The type of parameter you are monitoring for will also influence where your samples must be taken. Ecology has established water quality standards for different parameters. Standards are determined by the type of water body you're working in and the designated uses and criteria established in WAC 173-201A-200 (for freshwater) and WAC 173-201A-210 (for marine water). Note, you may have been granted an extended temporary area of mixing for turbidity, beyond what is granted in WAC 173-201A-200(e)(i), for a specific activity or period of time through an Individual [401 Water Quality Certification](#) so be sure to consider this when determining your sample locations.

How do I determine the water quality standards for a water body?

You must first identify the name of the water body and the specific location where the in-water work will occur. Then you can determine the water quality standards you will have to comply with. Follow these easy steps:

1. Determine the Designated “Aquatic Life Use” Category for the Water Body Where In-Water Work Will Occur.

Ecology has guidance on their [web site](#) to help you determine the aquatic life use for your water body. To find designated uses for rivers and streams, use [Table 602](#). Many waters are not specifically named. Those water bodies not specially named have their designated uses assigned in [WAC 173-201A-600](#). To find designated uses for marine water bodies, use [Table 612](#).

2. Look up the Water Quality Criteria for the Aquatic Life Use Category that Applies to Your Water Body.

Now that you've determined the aquatic life use category, it's time to look up the specific water quality criteria your project will be required to comply with. Look in [WAC 173-201A-200](#) for freshwater criteria and [WAC 173-201A-210](#) for marine criteria.

WSDOT typically samples for turbidity, pH, and sheen. Sheen is not physically sampled, just visually observed. If your in-water work occurs within a [303\(d\) listed](#) water body or has a [Total Maximum Daily Load](#) (TMDL) established by Ecology, you may need to implement specific BMPs and sample for additional parameters. If you have access to WSDOT's GIS Environmental Workbench, there are [instructions](#) to see where these areas are located. Projects that receive additional permit conditions or sampling requirements, such as those

for 303(d) or TMDL-listed water bodies or contaminated sites, should coordinate with their region environmental office or the Headquarters Environmental Services Office for assistance with incorporating additional sampling parameters and procedures into their protocols. Contact the [TMDL Lead](#) for assistance with 303(d) and TMDL-related permit conditions.

How do I establish locations for sampling turbidity in rivers and streams?

Rivers and streams require a sampling location upstream and downstream of the in-water work. The upstream sample determines the background value and the downstream sample reveals the effect of the work on water quality (by comparing it to the background). Locate and clearly name the sampling points on a map and in the field according to the following (see Figure 1 below):

- Upstream (Background) – locate where the water body enters the WSDOT right-of-way or 100 feet upstream of construction activities, whichever is closer to the in-water work. The key consideration for determining a background sample location is that it has to be outside the area of influence from the project. Be mindful of water quality influences that may occur between your background sample location and the in-water activity that could affect your sample readings (e.g., outfalls, tributaries, etc.); and
- Downstream – locate the point of compliance downstream of the construction activity based on the parameters for which you will be sampling. Remember that there is no area of mixing for pH. Use the area of mixing granted in the standards (based on the velocity of the water (cubic feet per second) at the time of construction), or the area of mixing granted in the 401 Certification to determine the compliance point for turbidity. If the edge of WSDOT right of way prevents access to sample at the point of compliance, the project team can either: (a) obtain a temporary easement or “right of entry” from the property owner to conduct sampling or (b) sample at the edge of WSDOT right of way and that point becomes the new “compliance point.” If the project has an Individual 401 Certification, WSDOT should notify Ecology of that change.

The following page provides an example of how to apply the freshwater criteria.

Here's an example of how to apply the freshwater criteria:

Water body: Middle Nemah River

Aquatic Life Use: Core Summer Salmonid Habitat

Aquatic Life Turbidity Criteria in Freshwater: Turbidity shall not exceed 5 NTU over background when the background is 50 NTU or less; or a 10% increase in turbidity when the background turbidity is more than 50 NTU.

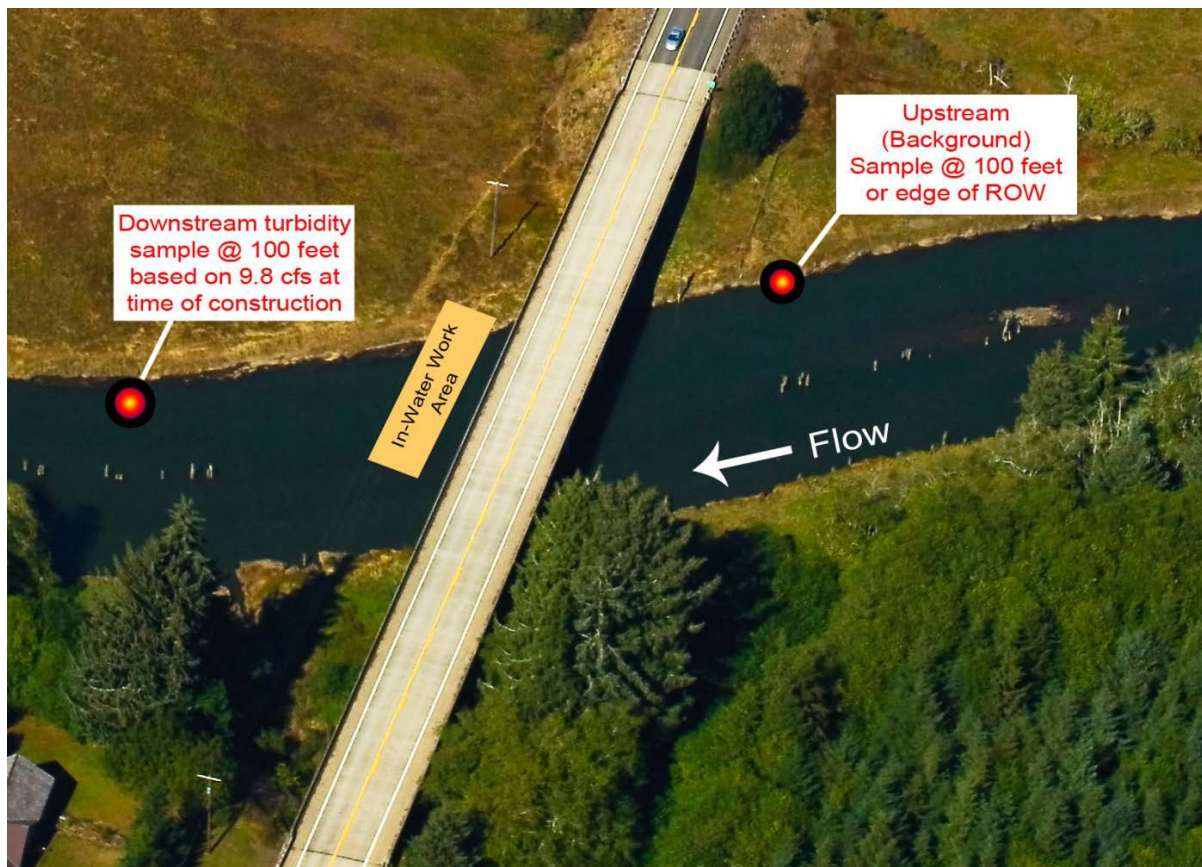
Flow at time of construction: 9.8 cfs

Temporary area of mixing for turbidity: 100 feet

Aquatic Life pH Criteria in Freshwater: pH shall be within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.2 units from the background pH. Note: no temporary areas of mixing are allowed for pH and discharges of concrete process water are not allowed (including high pH process water that has been treated).

Considerations: Sample locations may need to change if the stream or river is tidally influenced. It's possible that your upstream (background) sample could become your downstream sample and vice versa depending on when the in-water work occurs. Note: sampling locations may need to change if the location of the in-water activity changes. Also, the point of compliance for turbidity can change if flow changes during construction.

Figure 1: Sample locations for turbidity for the Middle Nemah River.



When and where should I sample turbidity?

- Sample daily when in-water work activities occur. One upstream and one downstream sample should be collected shortly after work begins each day. No further sampling is required if the sample meets standards and visual inspections reveal no change in water quality throughout the day unless otherwise required in your 401 Certification or approved WQMPP.
- Additional downstream samples must be collected if in-water work activities change. No further sampling is required if standards are met and there is no visible change in water quality unless otherwise required in your 401 Certification or approved WQMPP.
- Additional upstream and downstream samples must be collected if there is a visible change in water clarity during in-water work.

How do I establish locations for sampling turbidity in lakes, ponds, wetlands, and marine waters?

Lakes, ponds, wetlands, estuaries, and marine waters require a different sampling approach than rivers and streams. A background sample determines the value of the water quality parameter before the construction work occurs and a radius sample reveals the effect of the construction work on water quality (by comparing it to the background). Locate and clearly name the sampling points on a map and in the field according to the following (see Figure 2 below):

- Background – should be located in close proximity to where the radius sample will be taken. The sample needs to be taken PRIOR to the start of the in-water work; and
- Radius – For turbidity, sampling should occur at a radius of one hundred fifty feet from the in-water activity. Establish and position the necessary number of sample points to accurately capture project impacts on water quality. Ecology recommends a minimum of three sample points, spread around the radial boundary – see Figure 2 on the following page.

Here's an example of how to apply the marine water criteria:

Water body: Eagle Harbor (Bainbridge Island)

Aquatic Life Use: Extraordinary (AA)

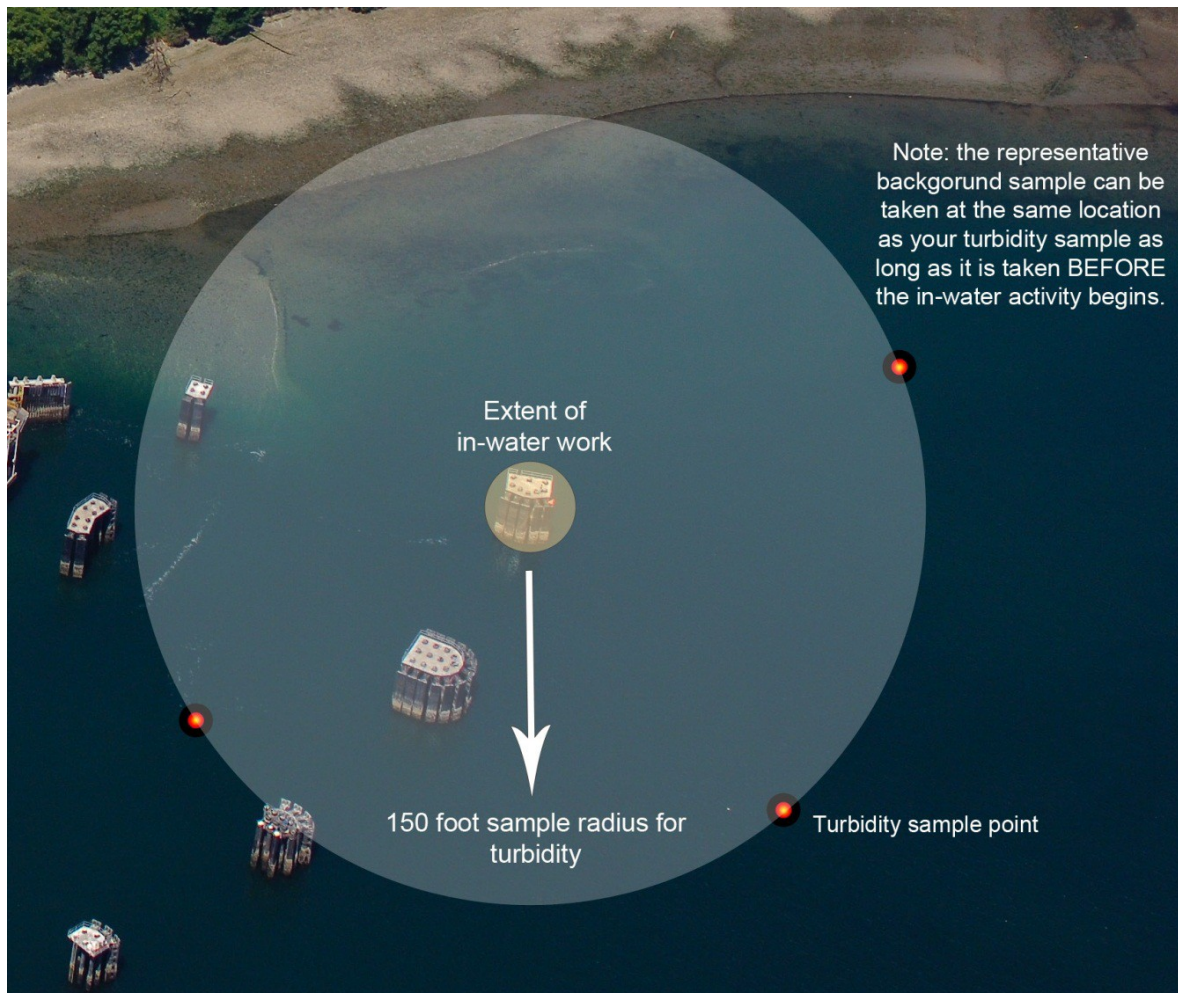
Aquatic Life Turbidity Criteria in Marine Water: Turbidity shall not exceed 5 NTU over background when the background is 50 NTU or less; or a 10% increase in turbidity when the background turbidity is more than 50 NTU.

Turbidity point of compliance for a temporary area of mixing: A radius of 150 feet from the activity causing the turbidity.

Aquatic Life pH Criteria in Marine Water: pH shall be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.2 units from the background pH. Note: no temporary areas of mixing are allowed for pH.

Considerations: Sample locations may change based on the location where the in-water activity is occurring or due to tidal influences at the time of work. For example, if the tide is going out during in-water work, the sample shall be taken at a location where the water is moving towards (i.e., best representative sample).

Figure 2: Sample locations for turbidity based on a marine water body – Eagle Harbor.



When and where should I sample turbidity?

- Take a background turbidity sample at the edge of the 150 foot radius (near the location where you will take your radius sample) 30 minutes before the contractor begins the in-water work.
- Take turbidity samples 15 minutes after the activity begins at the 150 foot radius to determine if the project's in compliance. If the work is occurring within in a tidally influenced water body, sample at a location in which the tide is moving towards. If you're in a lake, you may need to take more than one sample since turbidity could travel in any direction.
- Visually monitor the clarity of the water within the 150 radius as work occurs. If you observe a visual change, take turbidity samples to ensure compliance. If the samples exceed water quality standards, the contractor must stop the in-water work until samples demonstrate compliance. If necessary, work with the P.E. and the Contractor to discuss additional procedural or physical BMPs to ensure compliance.

When do I need to sample for pH?

During concrete work, there should be BMPs in place that prevent any discharges of concrete, pH modifying substances or any concrete slurry into waters of the state. There are some situations where this may not be possible such as underwater pier cutting with a diamond wire saw. If this is the case, WSDOT should work with Ecology during the permitting process to discuss situations where a discharge cannot be prevented.

Monitoring/sampling should supplement BMPs in preventing discharges. Visual monitoring should be conducted during pouring activities to identify any leaks or unauthorized discharges of concrete, slurry etc. from sealed forms or contained/isolated work areas. The contractor should be monitoring the volume of concrete on a pour since exceeding the required amount could be an indicator that a form is not sealed properly and an unauthorized discharge may be occurring. This situation is particularly applicable when pouring into a structure or form that is in the water – example would be a bridge pier/column/shaft/footing.

Sampling for pH is needed in the event there is an unauthorized discharge from concrete activities. If a discharge occurs the following sampling should be done:

- Collect a sample of the slurry (if possible, there may not be any slurry left) that discharged to state waters and test for pH.
- Collect a water sample from the waterbody at the point where material entered the water (or as close as possible within a 50 foot radius*) and use a pH meter to test for pH. It is important to collect this sample right away or as soon as possible after the discharge occurs**. If the sample cannot be safely collected within that first 30 minutes, document that and proceed with reporting the incident in accordance with Section 5 of this guidance.

If an in-water form might be losing concrete/slurry, sampling right adjacent to the form might help determine the effect to water quality. Sampling may also be conducted as means to try and determine if there is a leak. This approach should be discussed with the contractor and the regulatory agency as this approach may or may not be effective. It will be dependent on the type of activity.

Remember, the physical characteristics of the discharge can be affected by the waterbody your working in. The discharge could be a discrete amount that goes into the water and sinks to bottom (such as concrete) or it could be slurry that contains fine particles and could create a visual plume or the slurry could be diluted/dispersed by the current or tides and impossible to capture within a water quality sample. Regardless, an effort should be made to sample.

*Although Ecology does not grant a temporary area of mixing for pH, consideration is given to worker safety when entering an in-water work zone. If you have an individual 401 Certification and are required to develop a WQMPP, it is important to discuss pH sampling distances with the 401 permit manager/transportation liaison.

**If more than 30 minutes has passed, then it is highly likely that any effect on pH from the discharge has dissipated due to current and/or depth of the waterbody. A sample could be taken but would not necessarily capture the resulting changes to pH.

4. Sampling Equipment and Procedures

Information regarding sampling equipment, equipment calibration, a field equipment checklist, and sampling location setup is provided below:

Sampling Equipment

In order to provide consistent instruction for sampling, WSDOT has provided a [list of recommended equipment](#). Functionally equivalent turbidimeters, pH meters, and wide range pH test strips are allowed. Sampling equipment was selected for the purpose of legal compliance and should be maintained according to manufacturers' guidelines.

Equipment Calibration and Documentation

For data to be legally defensible, follow the manufacturers' recommendation for calibration schedules and procedures. Most manufacturers' recommend a standard calibration schedule and a verification procedure. The verification procedure is a quick way to verify that equipment is still calibrated and ready to use. Additional calibration may be needed based on the results of a verification procedure or if data appears suspect (measuring higher or lower than expected).

Maintain a calibration log and keep it in a convenient location (for example, in the equipment case) so it can be updated and referred to as needed. Key factors to remember when using sampling equipment:

- Use primary calibration standards that are not expired.
- Verify calibration before use, especially if equipment travels or is abused
- Keep pH meter probes submerged in storage fluid when not in use so they do not dry out and break.
- Clean sample vials with distilled water (preferred) immediately after use.
- Dry or wipe sample vials with glass cleaning wipes or microfiber cloth (paper based material can scratch glass which affects measurements).
- Use proper storage and good housekeeping methods and visually examine equipment for dirt or damage that may affect measurements.
- Replace sample vials if they appear scratched or damaged.
- Contact product manufacturers if further assistance is needed.

Recommended Field Equipment Checklist

- Clean containers, telescoping sampling rod or a "bomb sampler" for discrete depth sampling in lakes or marine waters.
- Calibrated sampling equipment.
- Distilled water and glass wipes for cleaning sampling equipment.
- WSDOT-approved safety vest, hardhat, boots, rain gear.

- Camera and cell phone.
- Survey stakes and marking tape to identify sample locations in the field or a weighted buoy(s) to identify sample locations within a non-flowing body of water.
- Weather-proof field notebook or data sheet for recording data.

Sampling Location Setup

When setting up sampling locations for in-water turbidity sampling:

- Mark all sampling locations with clearly labeled survey stakes immediately adjacent to where the background and downstream turbidity samples will be taken.
- Mark all sampling locations on the map in the water quality monitoring plan or Ecology required Water Quality Monitoring and Protection Plan (WQMPP).
- Sample locations may need to change based on the waterbody flow (cfs) at the time of construction and the location where the in-water activity is occurring.
- If the work is occurring in a marine water body or lake, weighted buoy(s) can be used to identify 150-foot sample radius (or an extended area of mixing if one has been granted by Ecology in a 401 Individual Certification).

Standard Sampling Procedures

Use the following sampling procedures:

- Use clean sampling containers and calibrated equipment.
- Collect samples that are representative of the flow.
- Measure samples as soon as possible (temperature can affect pH).
- Wipe sample vials clear of fingerprints or other residue before inserting into a turbidity meter, use glass cleaning cloth to prevent scratching.
- Invert the sample vial several times (to resuspend particulates) before inserting the sample vial into the turbidity meter. Do not shake sample vials, shaking can create small bubbles that can affect measurement.

5. Documentation and Reporting Requirements

To ensure data is not lost or forgotten, all samples should be recorded on an In-Water Sampling Form (see Appendix A). The project office shall follow project-specific permit requirements for reporting. If the project office has obtained an [Individual 401 Water Quality Certification](#) from the Ecology, they must submit all sample results monthly to the Ecology Federal Project Coordinator listed in the permit. For non-Ecology (Tribal or EPA) issued 401 Water Quality Certifications, check the permit for reporting requirements.

The project office should retain copies of the completed sample forms on the project site so they are readily accessible by interested individuals upon request.

What should I do if sampling indicates an exceedance of water quality standards?

If sampling indicates an exceedance of water quality standards or a condition of your permits or approvals, take the following steps:

1. Work with WSDOT Project Engineer immediately to stop the work that is causing the exceedance;
2. Initiate the Environmental Compliance Assurance Procedure (ECAP) immediately; see the [Construction Manual, SS1-07.5](#). Ensure immediate notification is made to the necessary regulatory agencies and/or tribes per ECAP;
3. Continue sampling so you can quantify the amount of time the project was out of compliance. Also, the regulatory agencies typically like to know the volume of turbid or high pH water released that exceeded standards;
4. Talk with the Contractor to discuss ways to adjust in-water work methods or means. Consider additional BMPs that could be used to prevent the issue from reoccurring; and
5. When sampling indicates that the exceeded parameters are back in compliance, the in-water work may resume.

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Appendix A – Sample Form for In-Water Work

A Word version of the form can be downloaded at the following link:

<http://www.wsdot.wa.gov/Environment/Compliance/Construction/ConstructionGuidance.htm>

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Sampling Form for In-Water Work

Date: _____ Project: _____

Name of Person Sampling: _____

Date of last calibration for Turbidity Meter: _____ Date of last calibration for pH meter: _____

Waterbody: _____

Activity Description: _____

Activity Start Time: _____ Activity Stop Time: _____

Sample Location	Monitoring Point	Time	Turbidity	pH	Sheen?	Notes (include weather , waterbody flow in cfs, other observations of waterbody, etc)

*If you have a 401 Water Quality Certification from Ecology, submit sampling data each month to the Federal Project Coordinator listed in the permit.

