

DRAFT

Water Quality Monitoring Plan (WQMP)

Upper Nisqually River Revetment Retrofit Project
(NWS – 2017-674-WRD)

Prepared by

Pierce County Planning and Public Works
Surface Water Management
February 15, 2018

1.0 PURPOSE

The Nisqually River Revetment Retrofit Project - Water Quality Monitoring Plan (WQMP) will be used to track the performance of Best Management Practices (BMPs) used during in-water work within the project limits of the Nisqually River Revetment Retrofit project construction area to insure compliance with state water quality standards.

This WQMP includes a monitoring schedule that identifies the appropriate parameters to be monitored, locations, monitoring and sampling procedures, and frequency.

2.0 OBJECTIVES

This WQMP will:

- Document the performance of BMPs used within waters of the state (Nisqually River), through water quality monitoring and sampling.
- Determine if Water Quality Standards are being met at the point of compliance.
- Help to ensure compliance with the conditions of the Section 401 Water Quality Certification (401) while conducting construction activities above and below the ordinary high water (OHW).

Note: Any changes to WQMP must be approved by Ecology prior to making the changes.

3.0 IN-WATER/OVER WATER ACTIVITY DESCRIPTION

Pierce County Planning and Public Works, Surface Water Management (SWM) proposes to implement a revetment retrofit project on the Upper Nisqually River. Pierce County proposes to construct a series of 28 rock deflectors along the upper Nisqually River flood levee located at approximate RM 64.5 to 65.4. Construction is scheduled for 2019. The purpose of the project is to reduce and divert erosive flows away from the levee toe, to preserve the structure and to reduce overall maintenance costs. The levee is positioned along the north bank of the Nisqually River, south of SR 706 at the Mount Rainier National Park (MRNP) boundary. The levee protects SR 706 East, a state highway and the main entrance to MRNP. The levee also provides flood protection to the Nisqually Park subdivision, an adjacent residential neighborhood.

Pierce County proposes to construct 13 deflectors within MRNP, and 15 deflectors outside the park at a general spacing of approximately 170 feet. Approximately 4,760 lineal feet of the levee will be treated with this proposal; including approximately 2,135 lineal feet contained within the MRNP and 2,625 lineal feet outside of MRNP. The deflectors will be placed on top, and in front of the levee. The deflectors will not be tied in or directly connected to the levee prism in order to keep the levee in compliance with the USACE PL 84-99 program. Each deflector will be triangular shaped, buried to the depth of the existing toe rock, rising at an angle and ending about half way up alongside the levee face.

The deflectors will be built using a combination of 10-15ton sized jetty rock interlocked with 6–8ton rock. The rock will be stacked and interlocked together as detailed in the plans and deflector detail. Large woody debris (LWD) will be integrated into approximately half the structures to provide

additional benefits for fish habitat. Excavated spoils will be used to fill the void spaces between the deflector rocks and used to regrade around each deflector back to the existing river grade **(Attachment A)**. No excavated spoils will be hauled offsite.

The rock deflectors are numbered sequentially (R1 – R28) from downstream to upstream. The deflectors have been designed to not be overtopped although the hydraulic model predicts that deflectors' # R17 – R24 within MRNP may be overtopped during the first few high flows events. However, as the channel deforms in the immediate vicinity of the deflectors, the overtopping should likely diminish or disappear.

Work will be performed by large excavators (350 and larger) with thumbs. Equipment operating below OHW will be equipped with biodegradable or inherently biodegradable hydraulic fluid.

The following activities will occur below the Ordinary High Water Mark (OHW):

- Construction of the deflectors will occur within the upper Nisqually River channel bed. Each deflector (28 total) will disturb between 570 sq. ft. and 1,000 sq. ft. of channel bed. The total area of disturbance is estimated to be 21,490 sq. ft. Each deflector will have approximately the same amount of fill below the channel bed as above the channel bed up to OHW. Excavation below OHW for each deflector will range between 104 CY and 133 CY.
- Within MRNP there will be 13 deflectors with a total disturbance area of 8,530 sq. ft., 1,665 CY of excavation, and 3,330 CY of fill below OHW. Downstream and outside of MRNP, there will be 15 deflectors with a total disturbance area of 12,960 sq. ft., 1,731 CY of excavation, and 3,462 CY of fill below OHW.
 - The project's total volume of excavation is estimated to be 3,396 CY.
 - The project's total fill volume is estimated to be 6,792 CY
 - The project's total area of disturbance is estimated to be 21,490 sq. ft.
- The upper Nisqually River exhibits a braided flow that varies each flood season. Channel changes occur even outside of flood season. It is anticipated that the in-channel work will require the diversion of a portion of the river flow away from the area of construction. Diversion of the river will be determined at time of construction depending on site conditions. Typical flow patterns allow for the river to be diverted into other braided channels away from the construction area through the use of push up berms constructed from large logs and channel bed material. A flow containment channel will be constructed along the river side of the construction area as necessary to contain any residual flows from nearby creeks upstream of the construction area; although, this intermittent stream typically is dry during the proposed construction period. This containment channel will also be used to direct any hyporheic flows that may percolate through the adjacent gravel bars into the construction area. This channel will be visually monitored to employ BMPs as necessary to ensure turbidity is within acceptable levels at point of compliance. Pumps may be used to dewater the immediate construction area as necessary, discharged to a settling pit established in the dry gravel bar where the pumped water will infiltrate into the river channel or into the ground on the backside of the levee. **(see Attachment B)**.

- Construction is expected to last up to 10 weeks, ending in late September at the end of the in-water work window, or as established by WDFW and the National Park Service for work within the Park boundary.

4.0 SPECIES UTILIZATION

ESA listed species include marbled murrelet and spotted owl and associated habitat. There are no listed aquatic species. Based on past consultations for maintenance and repair projects, there may be timing restrictions around the marbled murrelet nesting season that will be incorporated into the project construction schedule. Spotted owl habitat will not be impacted from the construction activities.

This upper reach of the Nisqually is upstream of anadromy (current and historic) hence no listed salmon (*Oncorhynchus spp.*) or steelhead (*Oncorhynchus mykiss*) are present. ESA listed bull trout are native to MRNP and can be found in the upper White, Carbon and Puyallup Rivers. However there have been no reported observations of bull trout in the upper Nisqually River so bull trout will not be assessed in this document. Anadromous fish (salmon and steelhead) are confined to the lower Nisqually River below the La Grande Dam located at RM 42.5. Resident fish species in the upper Nisqually River include native coastal cutthroat trout (*Oncorhynchus clarki*) and sculpins (*sp.*). These fish species are common and have a broad distribution. Non-native kokanee salmon (*Oncorhynchus nerka*) and rainbow trout (*Oncorhynchus mykiss*) are stocked annually in Alder Reservoir and may use the Nisqually River as a migratory corridor and the clear water creek at the top of the project reach for spawning. There is also the potential for non-native brook trout (*Salvelinus fontinalis*) to inhabit the upper Nisqually River. The presence of these three (3) resident species in the project reach hasn't been confirmed.

5.0 BEST MANAGEMENT PRACTICES (BMPS) FOR IN-WATER/OVER-WATER ACTIVITIES

The following best management activities will be applied to the construction activities associated with this project:

- Work will be confined only to the area of the river channel adjacent to the levee, access routes and staging areas.
- Vegetation removal will be limited to the minimum extent needed to complete the repairs. No vegetation removal is expected.
- Equipment working below OWH will use biodegradable or inherently biodegradable hydraulic fluid.
- All equipment used near water will be cleaned prior to construction.
- Refueling will occur on the backside of the levee away from the river. Construction equipment shall be regularly checked for drips or leaks, any leak will be fixed promptly or the equipment will be removed from the project site.
- Fuel spill kits and absorbent pads will be onsite.
- Proposed in-water work would be accomplished only during the approved in-water work window of July 16 – September 30th, unless a variance or extension is provided by regulating agencies.

- All aggregate used will be individually placed, no end dumping directly into flowing water is allowed.
- Mitigation will include incorporating woody debris and slash into a subset of the deflector structures below OHW. The woody debris shall be clean and free of dirt and plant material.
- Continuous visual water quality monitoring will be conducted during construction; with measurements taken when a visual plume is noted. Additional BMPs will be employed as necessary to reduce turbidity within the construction zone. If water quality standards in the downstream mixing zone are exceeded, in water work will be halted until corrections are made.

Diversion and fish removal

- A preliminary stream diversion/dewatering plan has been prepared for the project. The selected contractor will submit a stream diversion/dewatering plan to Pierce County for approval using the preliminary plan or a stream diversion/dewatering plan of their own.
- A biologist will be on site or available via phone during construction.
- Fish exclusion protocols will be conducted prior to any in water work; consistent with “WDFW- Integrated Streambank Protection Guidelines”, “Regional Road Maintenance ESA Program –Part E “Fish Exclusion Guidelines”.
- Biologists will remove fish at the location of the proposed diversion and downstream as needed. Given the gradient and porous substrate, it is likely that a containment channel will be necessary to control the hyporheic flows away from the area of construction. This containment channel will also be used as necessary to contain flows from the small creek situated at the upstream point of the project; although this stream is typically dry this time of year when the project will be constructed. A fish screen will be utilized on this creek as necessary to contain fish away from the construction area. If channels dewater to the point that fish can’t be sustained, fish biologists will capture and relocate the fish from those channels. Biologists will employ small beach seines, hand seines and dip nets as needed. An electro-fisher may be used if needed, but given the turbid snow melt conditions of the upper Nisqually, visibility needed to effectively capture fish is low.
- If an active channel exists at a deflector location, a seine net may need to be deployed through the work area to capture and relocate fish life. Depending on flow and channel configuration at the time of construction, a block net may be deployed to isolate a structure so fish cannot move back into the work area.

6.0 WATER QUALITY STANDARDS FOR SURFACE WATERS

The levee is positioned along the north bank of the upper Nisqually River, between river mile post 64.5 and 65.4. The project site falls within WRIA 11.

The Water Quality Standard for the following parameter(s) for this waterbody is:

- Turbidity- increase of 0.5 NTU or greater; or 10 percent increase in turbidity when the background turbidity is more than 50 NTU
- pH- change of 0.1 units or greater
- Dissolved Oxygen – decrease of 0.2 mg/l or greater

- Oil and Grease- No Visible Sheen

Note: This project will not be monitoring for PH or Dissolved Oxygen.

7.0 MONITORING PLAN

The monitoring plan for this program is focused on monitoring turbidity within the Nisqually River channel.

7.1 Sampling Personnel

Sampling will be completed by Pierce County personnel; (the project engineer, or designated Engineering/Water Quality Technician) will be responsible for sampling water as specified in this monitoring plan. All project engineers, water quality technicians and maintenance staff are CESCL certified. Visual inspections will be performed by Pierce County Maintenance Field Supervisor at the direction of the project engineer.

7.2 Monitoring Contacts:

Mr. Marty Ereth will be responsible for providing Ecology with the necessary notifications and results of the water quality monitoring per the frequency specified in the Section 401 Water Quality Certification (401). Mr. Matt Barnhart will be the Water Quality Technician lead for conducting the water quality monitoring.

Contact info:

Mr. Marty Ereth, Environmental Biologist/Environmental Lead (point of contact)
Pierce County Planning and Public Works
Surface Water Management Division
Environmental Services
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Tacoma, WA 98409-7322
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Phone: (253) 798-2479

Mr. Matt Barnhart, Environmental Biologist
Pierce County Planning and Public Works
Surface Water Management Division
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2702 South 42nd Street, Suite #201
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Email: mbarnha@co.pierce.wa.us
Phone: 253-798-4694 office, 253-208-1937 cell

7.3 Turbidity Monitoring for the Nisqually River Flow Deflector Project

Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC) specify the levels of pollutants allowed in receiving water to protect aquatic life. These standards are designed to protect human health, fish, shellfish, and wildlife. The Aquatic Life use designation for WRIA 11 in the program area includes the Nisqually River.

Turbidity is measured in nephelometric turbidity units (NTUs). Measurements of turbidity can quickly estimate the amount of sediment within a sample of water. Turbidity will be monitored to assure that the BMPs are effective in minimizing construction impacts to listed species, and to allow prompt correction of onsite erosion and sediment control measures. Turbidity monitoring will also help improve our ability to assess the downstream extent of sediment impacts.

The following monitoring plan also incorporates turbidity criteria established under WAC 173-201A-200(1) (e). Turbidity criteria are as follows for the Nisqually River at the project site (WAC 173-201A-200):

- 5 NTU over background when the background is 50 NTU or less; or
- A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

Construction activities that may potentially result in discharges to waters of the state will be schedule between July 16 through September 30ⁱ, (or as authorized); which is also the period of glacial melt from Mount Rainier. During the melt, background turbidity levels are naturally high in the river and are expected to range from 75 to 300 NTU. Since the background turbidity is expected to be above 50 NTU, it is anticipated that the program will be subject to the requirement that the turbidity may not increase more than 10 percent. Based on USGS stream gage records (#12082500 at National), river levels should continually drop throughout the construction period with diel changes due to snow melt ranging from 50 to 200 cfs. Turbidity levels may track increases and decreases in these changes in flow.

The state turbidity criteria allows for a temporary area of mixing during and immediately after necessary in-water construction activities that result in the disturbance of in-place sediments. This temporary area of mixing can occur only after the activity has received all other necessary local and state permits and approvals, and after the implementation of appropriate best management practices to avoid or minimize disturbance of in-place sediments and exceedances of the turbidity criteria. State turbidity criteria requires that a temporary area of mixing be located at 300, 200, or 100 feet downstream of the activity causing the turbidity exceedance (for waters > 100 cfs, 10-100 cfs or <10 cfcs, respectively), above background. WAC 173-201A-200(1)(e)(i)(C)).

7.4 Sampling Locations

Monitoring locations are provided on the attached maps for activities below OHW (**Attachment B**).

7.5 Monitoring Schedule

The following table outlines the monitoring parameters and schedule for all in-water work activities:

In-water Activity	Waterbody	Monitoring Point Location	Frequency	Parameters	WQ Standard
Heavy Equipment Operation	Nisqually River WRIA 11	Nisqually River Mile Post (64.5 approximate) and/or; 300 ft. from point of discharge.	Daily, prior to site work, every 30 min. for first 2 hrs. of commencement of in-water site; then once every 4 hrs. work	Turbidity; Oil/grease	5 NTU <50 NTU < 10 % >50 NTU
Construct Diversion	Nisqually River WRIA 11	Nisqually River Mile Post (66, 65.4 approximate) and/or; 300 ft. from point of discharge.	Likely 1-3 during construction	Turbidity; Oil/grease	5 NTU <50 NTU < 10 % >50 NTU

7.6 Monitoring Duration

Grab samples and visual observations will be collected for as long as the construction activity that has triggered monitoring is being conducted. If monitoring confirms that water quality is out of compliance with standards, then additional samples will be taken to determine the duration and magnitude of the event.

7.7 Contingency Sampling

If sample results confirm that water quality is out of compliance with water quality standards, the Project will modify or stop the activity causing the problem and commence the contingency sampling requirements until standards are met for two consecutive sample periods.

Parameter	Contingency Sampling Location	Contingency Frequency	WQ Standard
Turbidity	Point of Compliance 300 ft. from construction area	Every hour	5 NTU <50 NTU < 10 % >50 NTU
Oil/Grease	Point of Compliance	Continuous-Visual	No Sheen

Note: Once compliance with water quality standards is achieved, the project shall return to its standard sampling schedule.

7.8 Non-Compliance

Oil and Grease seen as a visible sheen on the water's surface is a continuous compliance standard. If sampling indicates the program is out of compliance (greater than a 10% increase in background at the point of compliance 300 ft downstream) with the turbidity standards, then the following actions will occur:

1. Construction activity may immediately stop while the turbidity source is identified.
2. Within 15 minutes re-take turbidity reading at point of compliance and background stations to verify source of turbidity resulted from construction related activity.
3. Implement additional BMPs based on "All known, Available, and Reasonable Treatments" (AKART). The river conditions will be taken into consideration at the time of the release, and the specific operational cause of turbidity when choosing the appropriate BMPs to implement. Likely BMPs may include the following:
 - a. Minimize productivity rate of equipment while working along the river's edge to reduce the amount of turbidity released.
 - b. Utilize / supplement BMPs/erosion control methods to prevent silt-laden water runoff from entering the river.
 - c. Install sump pump to pump discharge to an upland area.
4. Notify Lori Kingsbury, Department of Ecology, within 24 hours of any significant discharge of sediment that exceeds the 10 percent of background.
5. Re-take turbidity readings within 30 minutes of resuming work activity to evaluate effectiveness of newly implemented BMPs.
6. Document event and actions in site inspection log and turbidity levels on data sheet. Complete a report of event within 5 days, if required by the Department of Ecology.

7.9 Sampling Procedures

1. The project supervisor will visually inspect surface waters and temporary erosion and sediment control BMPs daily during the activity. The inspections will consist of making sure the BMPs are installed correctly and are functioning as intended. Damaged BMPs will be repaired and additional measures needed will be implemented as soon as possible to minimize impacts to water quality.
2. Turbidity will be monitored by the water quality technician using a (Hach 2100Q Turbidimeter). A calibration check of the turbidimeter using secondary standards will be carried out regularly (at least once per week). The instrument will be recalibrated using primary standards at least once every 3 months, or more when a calibration check indicates there is a problem. The manufacturer's calibration procedures will be followed.
3. Water samples will be collected by the water quality technician and analyzed for the appropriate parameters, per the Monitoring Schedule above, following the equipment and sampling guidelines below:

- A representative sample should accurately reflect the true condition of the water source from which the sample was taken. A background sample must be taken outside the area of influence and immediately prior to the downstream or radius samples.
 - The first sample collected will be upstream of the construction activity, the sampling will continue moving to the downstream sampling locations to the point of compliance.
 - The first compliance sample for turbidity will be taken every 30 minutes after the in-water activity starts for the first 2 hours, then every 4 hours; unless there is a visual plume of sediment influx at the point of compliance prior to each scheduled reading.
 - County staff will access the river's edge and fill a large, clean container (0.5 L to 1 L) to obtain a grab sample.
 - Use a clean container to obtain a grab sample from the source;
 - The sampled water will be gently mixed and poured into the small tube used to read the sample in the turbidimeter.
 - Collect sample with care to avoid disturbance of sediments and collecting surface contaminants;
 - Gently but thoroughly mix the sample before pouring it into the small vial used to read the sample in the turbidimeter; and
 - Without allowing the sample to settle, take turbidity reading according to turbidimeter manufacturer's instructions. The sample will be analyzed using the manufacturer's instructions as a guide and the results will be recorded on data sheet.
 - Procedure will be repeated for each sample location.
4. Monitoring will occur during sediment-generating activities, at stations as described below:
- a. Pierce County shall monitor downstream turbidity levels in the Nisqually River during sediment generating activities (i.e., during in-water construction), and after construction.
 - b. A background sample will be taken upstream and away from the influence of in-water construction activities prior to commencement of work. Background turbidity shall be monitored at least once daily during each day of in-water construction. In the event of a visually appreciable change in background turbidity, an additional sample shall be taken.
 - c. Monitoring shall be conducted at 30-minute intervals for the first 2 hours each day of in-water construction; then additional monitoring will be conducted during the remainder of the workday at a frequency of every 4 hours.
 - d. Monitoring shall be conducted at the following stations:
 - i. Within the construction zone, along the hyporheic flow containment channel as construction proceeds, a visual inspection will be conducted for signs of increased turbidity. If turbidity is observed, then higher level BMPs will be employed with the intent to contain sediment, and disperse sediment flows. In the event of a visually appreciable change in background turbidity, an additional sample shall be taken.
 - ii. Outside the construction zone, monitoring will be conducted at a distance of 300 ft.
 - e. Monitoring shall be conducted at 30-minute intervals for the first 2 hours during each day of in-water construction, then additional monitoring will be conducted for the remainder of the workday at a frequency of once every 4 hours.

- f. If monitoring is conducted 300 feet downstream of in-water construction activities indicates turbidity in excess of 5 NTUs over background of 50 NTUs or less, or in excess of 10% over background levels of greater than 50 NTUs, the activity causing the sediment delivery to the river will be stopped, and action will be taken to correct the exceedance. This measure is required to comply with WAC 173-201A-200 and for within the National Park the EA and FONSI standards.

8.0 REPORTING

All water quality monitoring results (visual and physical) will be recorded on the monitoring form attached (**Attachment C**).

All sample results will be submitted to the Ecology Federal Permit Manager/Coordinator per the frequency specified in the 401 Permit Water Quality Certification.

If sample results or visual monitoring indicate an exceedance of water quality standards, notification shall be made within 24 hrs. to Ecology's Federal Permit Manager/Coordinator.

Sampling results and notifications will be sent to:

Lori Kingsbury
Washington State Department of Ecology
(360) 407-6926
Loch461@ecy.wa.gov

ATTACHMENTS

Attachment A – Construction Details

Attachment B – Preliminary Flow Diversion Plan/ Monitoring Location

Attachment C – Sample Monitor Results Reporting Form

ⁱ Work within MRNP will be subject to the approved work window as approved by the National Park Service and USFW to address potential impacts upon marbled murrelet and spotted owl habitat. Pierce County has requested that the work window be from July 16th to October 31st to adjust to fluctuating river conditions due to snow melt and rainfall.