FINDING OF NO SIGNIFICANT IMPACT (FONSI)
PILCHUCK AND MARSHLAND LEVEE REPAIR
PROJECTS SNOHOMISH COUNTY, WASHINGTON

The U.S. Army Corps of Engineers, Seattle District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended. The Final Environmental Assessment (EA) dated June 2023, for the Pilchuck and Marshland Levee Repair Projects addresses flood damage to these levees near the city of Snohomish, Washington.

The Final EA, incorporated herein by reference, evaluates various alternatives to restore flood protection to the damaged levee. There is one major federal action requiring NEPA compliance and analyzed in the Final EA summarized below.

Proposed Action: The preferred alternative is the Slope Layback and Armored Slope Alternative. This alternative will repair the Pilchuck and Marshland Levees within the horizontal and vertical profiles as they were designed and as they existed when first built. All riverward repairs will remain within the pre-damage levee footprint, i.e., the levee will not encroach farther into the river. Repair activities for all sites under this alternative are summarized in section 2.5 of the Final EA and are hereby incorporated by reference.

Alternatives: In addition to a “no action” plan, four alternatives were evaluated. The alternatives include the Nonstructural, Levee Setback, and the Repair In-Kind, and Slope Layback and Armored Slope Alternatives. Of these, the potential effects were evaluated for the No Action and Slope Layback and Armored Slope Alternatives. See section 2 of the Final EA for alternative formulation and selection. A summary assessment of the potential effects of the recommended plan is listed in Table 1:

Table 1: Summary of Potential Effects of the Proposed Action

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Vegetation	☐	☒	☐
Navigation	☐	☐	☒
Water Resources	☐	☒	☐
Geology and Soils	☐	☐	☒
Wetlands	☐	☐	☒
Threatened and Endangered Species	☐	☒	☐
Fish and Wildlife	☐	☒	☐
Cultural Resources	☒	☐	☐
Hazardous, Toxic, and Radiological Waste	☐	☐	☒
Air Quality and Noise	☐	☒	☐
Land Use, Utilities, and Infrastructure	☒	☐	☐
Recreation	☒	☐	☐

Impact Minimization: All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs), as detailed in section 2.8 the Final EA, will be implemented to minimize impacts. Measures include water quality monitoring and adaptive management, limiting the hours of construction, restricting in-water work to July 1 to August 31 to minimize construction-related impacts to protected salmon.

Mitigation: The recommended plan will result in unavoidable adverse impacts to water quality and vegetation due to construction activities**.** To mitigate for these unavoidable adverse impacts, the Corps will incorporate approximately 150 willow bundles into the levee repairs and plant 38 native trees at an off-site mitigation location. These plantings will provide shade and other beneficial habitat functions to aquatic and terrestrial species in the Pilchuck and Snohomish Rivers. See section 2.6 in the Final EA for more mitigation details.

Public Review: Public review and comment of the Draft EA/FONSI for the proposed Pilchuck and Marshland Levee Repair Projects was completed on January 2, 2022. Comments and responses are included in Appendix D of the Final EA.

Treaty Tribes: The Confederated Tribes and Bands of the Yakama Indian Nation, Sauk-Suiattle Indian Tribe, Snoqualmie Indian Tribe, Stillaguamish Tribe of Indians, Swinomish Indian Tribal Community, and Tulalip Tribes were contacted regarding the levee repairs and the Corps will continue to coordinate throughout the project to meet Tribal Treaty obligations. To date, no comments have been received from the contacted Tribes.

Compliance:

a. **Endangered Species Act:**

The National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), and the U.S. Fish and Wildlife Service (USFWS) are responsible for the Endangered Species Act of 1973 (ESA). The Corps evaluated potential effects to endangered species in a Biological Assessment (BA). ESA consultation was initiated with submission of a BA to the USFWS and NMFS on November 23, 2021. Consultation is not yet concluded. The Corps reached the following effect determinations for ESA-listed species from the project in the BA:

- May affect, is likely to adversely affect Puget Sound Chinook salmon (*Oncorhynchus tshawytscha)* and Puget Sound Chinook salmon critical habitat.
- May affect, is likely to adversely affect Puget Sound steelhead (*O. mykiss*) and Puget Sound steelhead critical habitat.
- May affect, likely to adversely affect Coastal/Puget Sound bull trout (*Salvelinus confluentus*) and Coastal/Puget Sound bull trout critical habitat.

- May affect, not likely to adversely affect southern resident killer whale (*Orcinus orca*) and southern resident killer whale critical habitat.
- May affect, not likely to adversely affect marbled murrelet (*Brachyramphus marmoratus*) and no effect to marbled murrelet critical habitat.

Due to the urgent nature of completing the emergency action to protect human safety and property and the effort to limit impacts to listed species by working within the work window, and because the repair is time-critical in light of the ensuing flood season, the Corps may proceed with construction prior to completion of the consultation with the Services pursuant to the "emergency circumstances" provisions of the ESA consultation regulations. The Corps will commit to fully funding and performing all Reasonable and Prudent Alternatives necessary to avoid the likelihood of jeopardy to listed species or destruction or adverse modification of designated critical habitat, as well as Reasonable and Prudent Measures necessary and appropriate to minimize the impact of Incidental Take, that are described if a Biological Opinion is received from USFWS and NMFS. The EA will be reevaluated at the time that consultation is complete. If necessary, the EA will be supplemented with necessary and applicable corresponding modifications to the scope and/or nature of the project, the procedures and practices used to implement the project, and/or the type and extent of compensatory mitigation associated with the project, and this FONSI will be reassessed.

b. Magnuson-Stevens Fishery Conservation and Management Act:

The Corps determined that the proposed action would adversely affect Essential Fish Habitat (EFH) for Chinook and coho (*O. kisutch*) salmon. This determination was included in the BA sent to the NMFS. Consultation is not yet concluded. The Corps intends to proceed with construction prior to completion of consultation with NMFS pursuant to the "emergency Federal actions" provision of the EFH regulations, and to complete EFH consultation after the fact pursuant to 50 CFR Section 600.920(a). The Corps will reevaluate the EA at the time that EFH consultation is complete. If necessary, the Corps will supplement the EA with necessary and applicable corresponding modifications to the scope and/or nature of the project, the procedures and practices used to implement the project, and/or the type and extent of compensatory mitigation associated with the project, and this FONSI will be reassessed.

c. Clean Water Act:

The Corps has determined that the proposed repairs constitute maintenance or emergency reconstruction of a currently serviceable structure under 33 CFR 323.4(a)(2), and therefore are exempt from regulation under Section 404 of the Clean Water Act. The proposed project does not include the jurisdictional discharge of fill material subject to regulation under Section 404. Since the project does not result in any discharge into waters of the U.S., a Section 404 (b)(1) Evaluation or Section 401 Water Quality Certification is not required. Section 402 of the CWA is triggered when a construction site would have greater than 1 acre of ground disturbance. Proposed repairs at each levee do not exceed 1 acre of ground disturbance.

d. Coastal Zone Management Act:

The Corps has determined that the proposed repairs are consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Management Program. The Corps sent a CZMA Consistency Determination to Ecology on April 29, 2022, requesting concurrence that the proposed repairs are consistent to the maximum extent practicable with the enforceable policies of the approved Coastal Zone Management Program. Ecology concurred with the Corps' consistency determination on June 24, 2022.

e. National Historic Preservation Act:

The Corps initiated consultation with the Washington State Department of Archeology and Historic Preservation (DAHP) on the Area of Potential Effect (APE) on March 10, 2021. The DAHP concurred with the APE for both levee repairs on March 11, 2021. The Corps also coordinated with the Confederated Tribes and Bands of the Yakama Indian Nation, Sauk- Suiattle Indian Tribe, Snoqualmie Indian Tribe, Stillaguamish Tribe of Indians, Swinomish Indian Tribal Community, and Tulalip Tribes about the APE on and March 10, 2021. The Corps completed a cultural resource survey of the APE and consulted with the DAHP on the survey results and effects determination on October 21, 2020. The DAHP concurred with Corps determination of no historic properties effected on April 27, 2021. To date the Corps has received no comment from the contacted Tribes.

Determination:

a. Summary of Impacts and Compliance:

Impacts of the proposed work will be minor, short-term, and temporary. This project is undergoing ESA consultation; a BA has been prepared and transmitted to NMFS and USFWS. Impacts to ESA listed fish and their prey will be minimized by construction during the in-water work window of July 1 to August 31. Consultations under the Section 7 and EFH regulations are not complete, but the Corps will proceed with urgently needed repairs under the emergency circumstances provisions of those regulatory regimes, as described above. NMFS provided draft Incidental Take Statement Terms and Conditions, to which the Corps replied. The Corps anticipates that the project description, its Conservation Measures, and its Best Management Practices will fulfill all the requirements specified in the ITS conditions, as previewed by NMFS. This project does not require a Section 404(b)(1) Evaluation or a Water Quality Certification under the Clean Water Act since the repair does not include the discharge of regulated fill into the waters of the U.S. The project complies with the National Historic Preservation Act and the Corps has coordinated the work with the Washington SHPO and affected Indian Tribes.

District Engineer's Conclusion: All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on the analysis presented in the Final EA, which has incorporated or referenced the best information available; the reviews by other federal, state, and local agencies, Tribes; input of the public; and the review by my staff, it is my determination that the recommended plan will not cause significant effects on the quality of the human environment and does not require preparation of an environmental impact statement.

6/15/23

Date

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Alexander "Xander" L. Bullock
Colonel, Corps of Engineers
District Commander

ENVIRONMENTAL ASSESSMENT

PILCHUCK AND MARSHLAND LEVEE REPAIR PROJECTS
SNOHOMISH COUNTY, WASHINGTON

June 2023

Seattle District
Corps of Engineers

Cover shows the view looking downstream the Snohomish River at the damaged Marshland Levee.

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Acronyms and Abbreviations

AQI	Air Quality Index
BA	Biological Assessment
BMP	Best Management Practices
CA	Cooperation Agreement
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulation
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers, Seattle District
CWA	Clean Water Act
CY	Cubic yards
CZMA	Coastal Zone Management Act
DAHP	Washington State Department of Archeology and Historic Preservation
dB	Decibel
DBH	Diameter at breast height
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
ER	Engineering Regulation
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FONSI	Finding of No Significant Impacts
H:V	Horizontal to Vertical ratio, measured in feet
LWM	Large Woody Material
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service / NOAA Fisheries
OHWM	Ordinary High-Water Mark
RM	River Mile
Sp., Spp	species (singular and plural)
SRKW	Southern Resident Killer Whale
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Survey
WDFW	Washington Department of Fish and Wildlife

1 INTRODUCTION

The purpose of an Environmental Assessment (EA), as reflected in 40 Code of Federal Regulations (CFR) sections 1500.1(c) and 1508.9(a)(1) of the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act of 1969 (NEPA), as amended, is to "*provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement [EIS] or a finding of no significant impact [FONSI]*" on actions authorized, funded, or carried out by the federal government, and "*to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment*." Pursuant to Section 102(C) of the NEPA, this assessment evaluates environmental consequences of the proposed rehabilitation action to be implemented by the U.S. Army Corps of Engineers (Corps) at the Pilchuck Levee and Marshland Levee located near the city of Snohomish, Snohomish County, Washington.

1.1 BACKGROUND

1.1.1 Project Design

The Pilchuck Levee, built in the 1940s or 1950s, is a non-federally constructed, operated, and maintained levee system in Snohomish County, Washington on the left bank of the Pilchuck River. The Pilchuck Levee is approximately 5,386 feet long. The levee embankment is made of silty sand with river gravel. Levee height is roughly 9 feet above the landward toe. The levee crest is approximately 12 feet wide and topped with crushed rock. In an undamaged state, a majority of the levee's landward and riverward slopes are approximately 2 horizontal to 1 vertical (2H:1V), with a notable exception at the location where the 2020 damage occurred, where the undamaged riverward slope is steeper, approximately 1.25H:1V, which makes this portion of the levee more susceptible to bank caving, as evidenced by the damage. The undamaged riverward slope of the Pilchuck Levee is armored to the levee crest with Class II to III riprap, which corresponds to a median diameter of 13 and 15 inches and a maximum diameter of 18 and 20 inches, respectively. Vegetation, primarily invasive species, has grown between the riprap or from sediment that has deposited over the riprap along the riverward levee slope. In its undamaged state, the Pilchuck Levee provides a 10-year level of flood protection. The Corps of Engineers Mapping, Modeling, and Consequence center evaluation of the Pilchuck Levee estimates it protects 130 residents, 49 buildings, and $25.8 million worth of property (USACE 2021a). The area behind the Pilchuck Levee includes agricultural, residential, commercial, industrial properties. It also contains railroads and public infrastructure (public roads and utilities). No prior Public Law 84-99 repairs have been made to this levee.

The Marshland Levee, built in the early 1900s, is a non-federally constructed, operated, and maintained levee system in Snohomish County, Washington on the left bank of the Snohomish River. The Pilchuck Levee is approximately 29,400 feet long. The levee embankment is made of sandy silt and silty sand, with a foundation of similar materials with varying percentages of clay and gravel. Levee height is roughly 4 to 10 feet above the landward toe. The levee crest is typically 15 feet wide and surfaced with a crushed gravel driving surface. Both riverward and landward slopes are approximately 2H:1V. The riverward slope and toe of the levee are armored with Class I to V riprap up to the levee crest which corresponds to a median diameter of 8 and 20 inches and a maximum diameter of 12 and 27 inches, respectively. Class V is the dominant armor present along the slope and toe, adjacent to the damaged site. No riprap is present along the slopes above the ordinary high-water mark (OHWM) at the damaged site. This is because, in 2010, the levee system owner completed repairs here above OHWM, replacing riprap with geotextile lifts, willows, and anchored woody debris. After the 2010 repair the installed willows grew, and invasive vegetation colonized the site. This section that had been

repaired in 2010 was damaged by the 2020 event described below and remnants of it are still present at the site after the flood event damaged it, including steel pipes used to mark the limit of the 2010 repair and a single anchored log. In its undamaged state, the Marshland Levee provides a 10-year level of flood protection. The Corps of Engineers Mapping, Modeling, and Consequence center evaluation of the Marshland Levee estimates it protects 590 residents, 100 buildings, and $140 million worth of property (USACE 2021a). The area behind the Marshland Levee includes agricultural, residential, commercial, industrial properties. It also contains an airport, railroads, and public infrastructure (public roads and utilities). No prior Public Law 84-99 repairs have been made to this levee (USACE 2021a).

1.1.2 Disaster Incident

On February 1, 2020, the Snohomish River crested at a flow of 5,130 cubic feet per second (cfs) and river stage of 16.6 feet as measured at the Pilchuck stream gage (U.S. Geological Survey [USGS] gage 12155300; USGS 2020a). A second peak occurred on February 6, 2020, measuring 5,810 cfs and 17.2 feet at the Pilchuck stream gage (USGS 2020a). Figure 1 shows the hydrograph at the Pilchuck stream gage for the two events. The larger event on February 6, 2020, was a 52 percent annual exceedance probability (1.9-year) flood event.

High water from the two events scoured riprap and levee embankment from the riverward toe and slope along 525 feet of the Pilchuck Levee. Erosion and bank caving removed additional levee material to within 4 feet of the levee crest resulting in an over steepened slope of 1H:1V or steeper. In the damaged state, the level of protection of the Pilchuck Levee is diminished from 10 percent (10-year) to 100 percent (1-year) annual exceedance probability. See Appendix A (Photos A1 to A5) for photos of the damaged Pilchuck Levee.

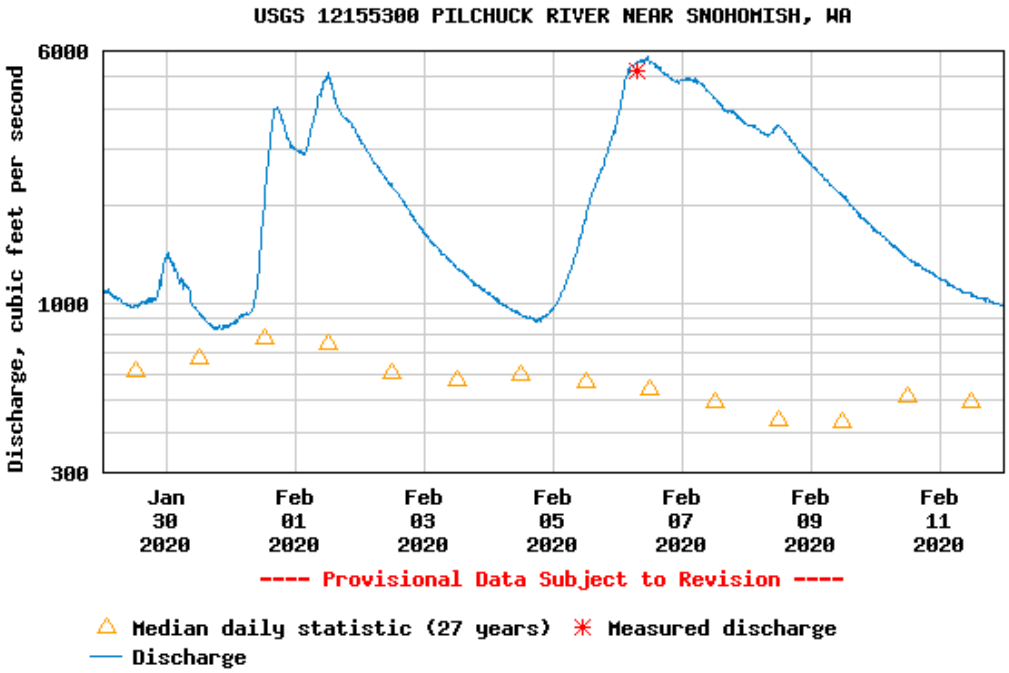

Figure 1. Flow hydrograph at the Snohomish Gage.

On February 1, 2020, the Snohomish River crested at a flow of 76,700 cfs and river stage of 18.44 feet as measured at the Monroe stream gage (USGS gage 12150800; USGS 2020b). A

second peak occurred on February 8, 2020, measuring 67,000 cfs and 16.64 feet at the Monroe stream gage (USGS 2020b). Figure 2 shows the hydrograph at the Monroe stream gage for the two events. The larger event on February 1, 2020, was a 28 percent annual exceedance probability (3.8-year) flood event.

The two events caused damage along 280 feet of the Marshland Levee. The damage included scouring of the levee along 200 feet and 80 feet of bank caving resulting in near-vertical slopes up to 9 feet high. In the damaged state, the level of protection of the Marshland Levee is diminished from 10 percent (10-year flood) to 100 percent (1-year flood) annual exceedance probability. See Appendix A (Photos A6 to A9) for photos of the damaged Marshland Levee.

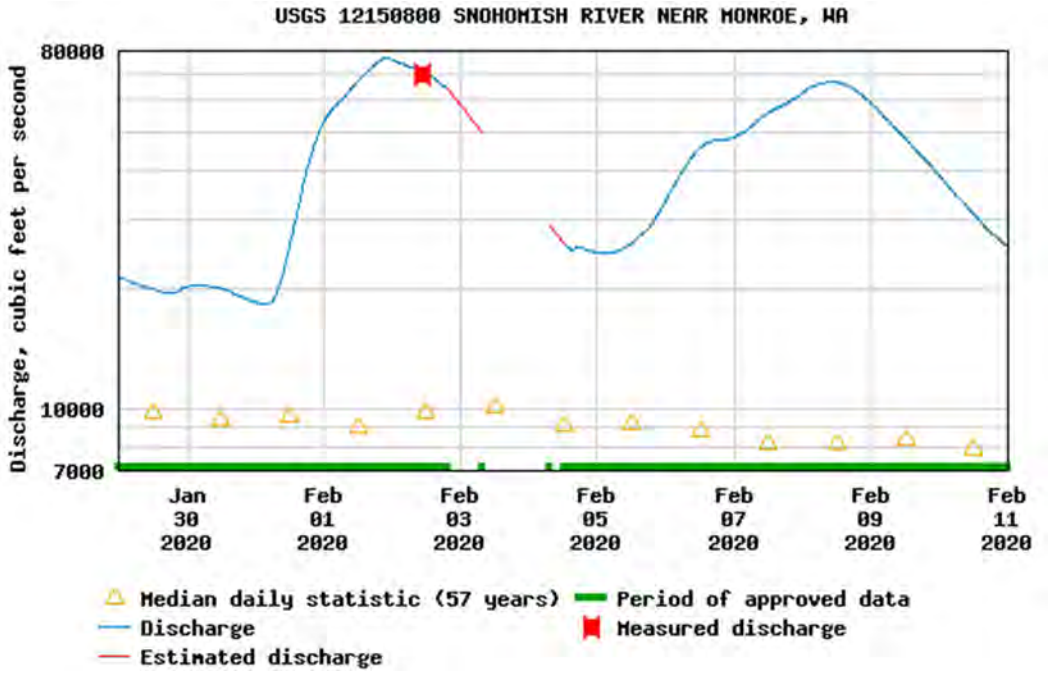

Figure 2. Flow Hydrograph at the Monroe Gage.

1.2 AUTHORITY

Public Law 84-99 (33 U.S. Code [U.S.C.] § 701n) provides the Corps the authority for “the repair or restoration of any flood control work threatened or destroyed by flood, including the strengthening, raising, extending, realigning, or other modification thereof as may be necessary in the discretion of the Chief of Engineers for the adequate functioning of the work for flood control and subject to the condition that the Chief of Engineers may include modifications to the structure or project, or in implementation of nonstructural alternatives.” The Corps’ repair work under this authority is limited to the repair of flood control works damaged or destroyed by floods. The statute authorizes rehabilitation to the level of protection exhibited by the flood control work prior to the damaging event. This authority is delegated to Seattle District through 33 CFR, Part 203 and Engineering Regulation (ER) 500-1-1. From ER 500-1-1: “Improvements to design and equipment (e.g., geomembranes) that are a result of state-of-the-art technology, and are commonly incorporated into current designs in accordance with sound engineering principles, are permissible, and are not considered betterments." The non-federal sponsor for the Pilchuck and Marshland Levees are the French Slough Flood Control District and Marshland Flood Control District, respectively.

1.3 PROJECT LOCATION

The repair sites for the Pilchuck and Marshland Levees are east and south of Snohomish, WA on the Pilchuck and Snohomish Rivers, respectively (Figure 3). The proposed repair to the Pilchuck Levee is approximately 600 feet long (Figure 4). The proposed repair to the Marshland Levee is approximately 300 feet (Figure 5). Mitigation for the proposed repairs is located along the shoreline of the Pilchuck River, approximately 200 feet downstream of the Pilchuck Levee repair (Figure 3). Staging area locations are behind the levee in previously disturbed areas and are shown in the design drawings (Appendix B). Area totals for each part of the two repairs are shown in Table 1.

Table 1. Area in acres of each repair.

	Staging (acres)	Repair (acres)	Total (acres)
Pilchuck Levee	0.16	0.75	0.91
Marshland Levee	0.11	0.46	0.57
Mitigation	0.39		

Figure 3. Project Area Map.

Figure 4. Approximate footprint of the Pilchuck Levee repair.

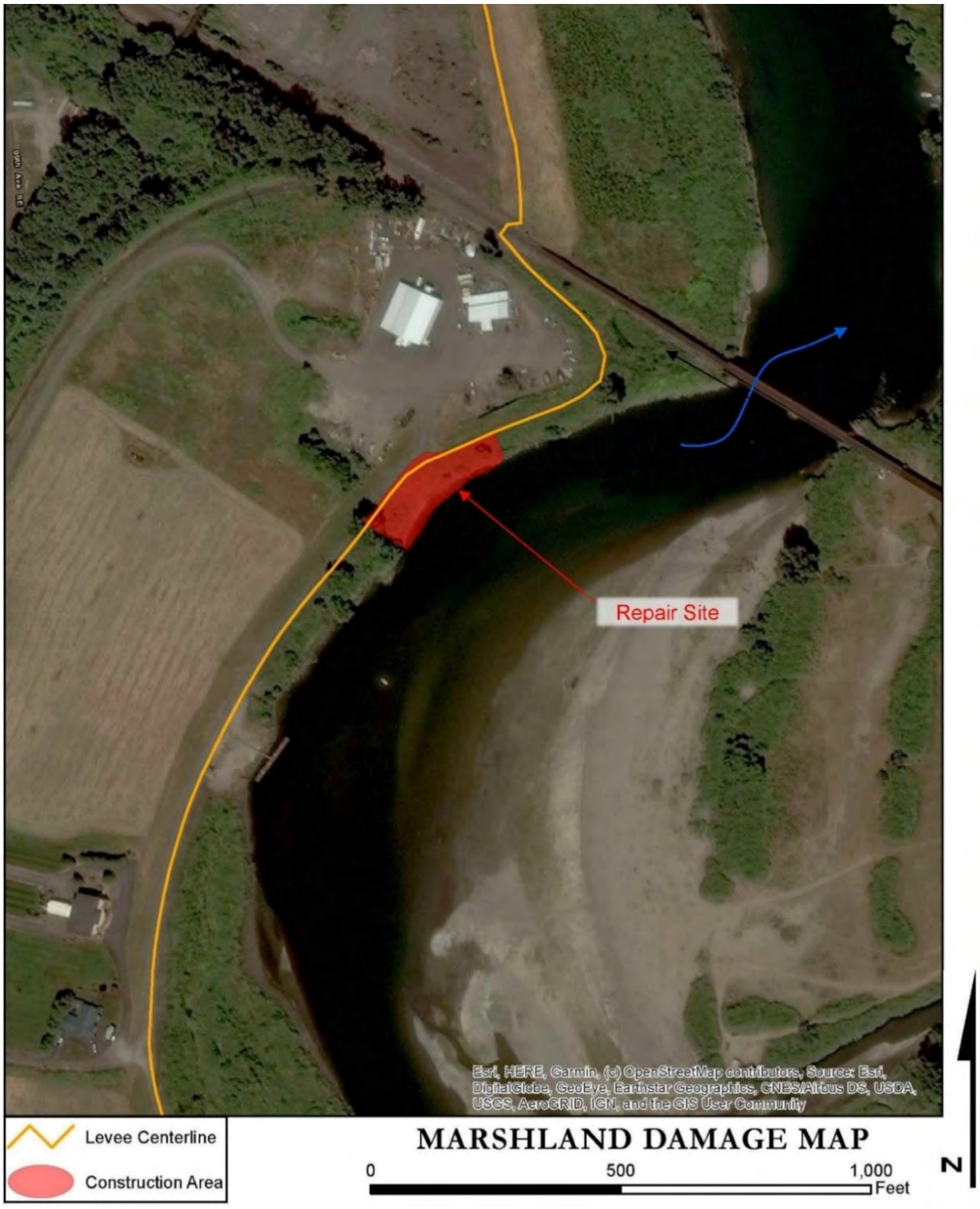

Figure 5. Approximate footprint of the Marshland Levee repair.

1.4 PURPOSE AND NEED

The purpose of the project is to repair the Pilchuck and Marshland Levees to the pre-existing, designed 10-year level of protection. The repairs are needed because the levees were damaged by the February 2020 flood event described in section 1.1.2 and no longer provide the designated level of protection against flooding. Repairs would restore adequate and reliable flood protection to the same level provided by the levees prior to the damaging event. An assessment of the levees confirmed that there is an increased likelihood of damages or breaching of the levees in their current condition (USACE 2020a and 2020b). If the levees were to fail, there would be an increased risk to human safety, improved property, and public infrastructure. In the damaged state, the levees each provide a 1-year flood (100 percent annual exceedance probability) level of protection. If these levees were to be overtopped or breached, approximately 720 people, 149 buildings, and $165.8 million worth of property are at risk from flooding (USACE 2021a). Per Public Law 84-99, the Corps is authorized to repair damaged flood control works to the pre-flood level of protection.

2 PROPOSED REPAIR ACTION AND ALTERNATIVES

A preliminary evaluation has been conducted on the alternatives for fulfilling the purpose of restoring the level of protection, as discussed below. Viable alternatives must restore reliable flood protection to the level of protection prior to the damaging event, must be environmentally acceptable, and should address the identified flood risk. The preferred alternative must be the least cost alternative that restores the level of protection while fulfilling all legal, technical and environmental requirements.

2.1 ALTERNATIVE 1: NO ACTION ALTERNATIVE

Under the No Action Alternative, the Pilchuck and Marshland Levees would remain in their damaged condition. This alternative would not meet the project purpose because the pre-existing level of protection would not be restored and the levees would likely be further damaged in future flood events and could fail, which would endanger protected homes, businesses, and public infrastructure. During any flood event that threatens the integrity of the levee system, the Corps or other federal and non-federal agencies may act under emergency authorities to preserve the levee system and, to the extent possible, maintain protection of safety and property behind the levee. Any response to damages during a flood event would be temporary, less certain of success, potentially more expensive, and could be less protective of environmental and cultural resources. A response would also take time to activate and execute, so there is risk that it would not prevent levee failure, such as overtopping or breaching.

The No Action Alternative is not recommended because it would maintain the increased likelihood of damages or breaching of the levee, presenting a risk to safety and property. It does not meet the project purpose and need, nor is it acceptable to the non-federal sponsors. While the No Action Alternative is not recommended, it is carried forward for further evaluation to serve as a base condition for evaluation of other alternatives.

2.2 ALTERNATIVE 2: NONSTRUCTURAL ALTERNATIVE

This alternative consists of floodplain management strategies that are offered by other federal and state programs and generally involve changes in land use. Such strategies would include zoning, easements, flood-warning procedures, floodplain evacuation, and flood insurance. Nonstructural strategies involve acquiring, relocating, elevating, and flood-proofing existing structures. The cost and timeframe for implementing this alternative make it impractical. The participation of the non-federal sponsors would be required to implement a nonstructural alternative, and the French Slough Flood Control District and Marshland Flood Control District

have not agreed to meet their various obligations in executing a nonstructural alternative. Therefore, this alternative is not carried forward for detailed consideration.

2.3 Alternative 3 – Levee Setback Alternative

This alternative would shift the alignment of the levee embankment landward to avoid or minimize direct contact with the river and provide additional space for water conveyance. Typically, the setback would involve construction of a new earthen embankment structure and abandonment of the existing levee located on the riverbank. In this instance, a setback levee may be more costly than other alternatives due to the need for more embankment material and real estate requirements. This approach could also encroach on existing structures, privately-owned land, and public infrastructure. Implementing this alternative would also require participation of the non-federal sponsor. While a setback levee would meet the project purpose, the French Slough Flood Control District and Marshland Flood Control District have not agreed to meet their obligations, including land acquisition and additional cost-share funding, to execute a setback alternative, which place this alternative outside agency control. Therefore, this alternative is not carried forward for detailed consideration.

2.4 Alternative 4 – Repair In-Kind

This alternative would repair the damaged levees to their pre-damage level of protection as they are described in section 1.1.1. The levee embankment would be restored to their pre-damaged conditions. An increase in rock size would occur below OHWM, but repairs would remain within the pre-damaged footprint and slope. The Corps does not recommend repairing the levees in-kind due to the expected velocities and scour potential at the sites from their location on an outside bend. This alternative would likely need repeated repairs from future flood events. At the Marshland Levee, replacing the non-federal sponsor's previous repair in-kind is not recommended due to concerns about the durability of the levee under flood conditions. At the Pilchuck Levee, repairing the levee in-kind would maintain a steep slope that is not stable and susceptible to damage, as evidenced by the damage inflicted by the February 2020 flood event. Due to engineering and safety concerns this alternative is not carried forward for analysis.

2.5 Alternative 5 – Slope Layback and Armored Slope Alternative

This alternative is the preferred alternative and meets the project's purpose and need. The repairs to the Pilchuck and Marshland Levees would occur within the pre-damage levee footprint (i.e., the levee would not encroach farther into the river).The levee crest and landward slope of the Pilchuck Levee would be shifted landward from their current position, while maintaining the location of the riverward toe. The Marshland Levee would be repaired in-place using embankment material and riprap to restore the damaged levee.

Alternative 5 is the preferred alternative to repair the Pilchuck and Marshland Levees to their pre-damage level of protection. Each site would be repaired as shown in the cross sections in Appendix B. The levee would be rebuilt within or landward of the horizontal and vertical profiles as they were designed.

Shoreline and river areas impacted by construction activities would be restricted to access routes, staging areas, the damaged section of the levee, the transition to the undamaged upstream and downstream sections of the levee, and the mitigation area. Work would require removing shrubs and trees from the levee within the construction project footprint. No additional fill material volume would be added on the riverward levee slope below the OHWM or beyond the existing levee footprint.

Construction is scheduled to start in the summer of 2023. From start to completion, repair to each levee is expected to take 4 weeks and any in-water work for the repairs would occur within the NMFS-approved in-water work window, which is from July 1 to August 31. A typical work week includes six days of construction, eight to ten hours a day depending on available daylight.

Materials would be purchased from local, privately owned companies. However, any borrow site, quarry, or gravel mine would be fully permitted by the state. Armor rock pieces would be inspected upon delivery and prior to placement for quality, integrity, and absence of excessive imported sediments. During the designated work window, in-water work would include the salvage and replacement of riprap on the toe and riverward face of the levee. Some excavation and placement of repair materials would take place below the OHWM elevation. Salvaged riprap would be temporarily stockpiled on the levee crown or staging area to enable sorting for reuse. Material that is not suitable for reuse would be disposed of off-site at an appropriately permitted location. All work on the levee would be from land, no equipment drive trains would enter the river. Construction vehicles would access from existing levee roads and paths (Appendix B.1 and B.2 sheet CS100). Equipment and materials, including those excavated from the repair site, would be staged within the levee footprint and at designated staging areas. Tables 2 and 3 list anticipated equipment and estimated materials involved in the repair.

Table 2. Estimated materials and quantities for the proposed 2023 Pilchuck and Marshland Levee repairs.

Material	Quantity		Location	Use
	Pilchuck Levee	Marshland Levee		
Repair Length (feet)	600	300		
Embankment Material (cubic yards [CY])	2,700	N/A	Levee profile, landward and riverward of the levee centerline)	Levee structure
Quarry spalls (CY)	670	660	Levee slope between riprap and levee embankment material	Bedding course
Class V riprap (CY)	3,100	3,200	Levee slope	Levee armor
Topsoil (CY)	40	20	With willow stakes at existing vegetation line	Soil medium for willows
Willow stakes in bundles of 6 (3-5 ft long, 6 ft on center)	100	50	As close to OHWM as possible	Riparian habitat
Crushed Surface Base Course (CSBC)*	120	90	Levee crown	Access road
Tree plantings (one or two gallon in size and 2'-3' tall)	21	17	Off-site riparian planting area downstream of the Pilchuck Levee Repair site	Planting trees off-site for riparian habitat

Quarry spalls are between 4-8 inches in diameter.
Class V riprap ranges in size between 13-34 inches diameter, weight between 188-3,000 lbs.
Embankment material consists of soil mixed with unsorted small rock. Suitable existing bank material would be reused.
*CSBC is small gravel material, typically sized at 1 ¼ inches.

Table 3. Anticipated equipment used in the proposed 2023 Pilchuck and Marshland Levee repairs at each site.

Equipment	Equipment Notes	Number	Location	Activities	General Description	In-water?
Bulldozer	Blade length 12 ft.	1	Throughout the repair footprint	Manipulates materials. Move and place rock, vegetation, and other materials	Move and place material	No, placement from levee toe
Grader	Similar to 12H, min hp 140, min lbs. 30,000, min blade length 12 ft	1	Haul route	Road grading, blade levels dirt or grave for roads	Road construction	No
Excavator	Track-mounted hydraulic excavator w/hydraulic thumb, similar to 300 series, min hp 200, min lbs. 70,000, min reach 30 ft.	2	Throughout the repair footprint	Workhorse of the repair. Manipulates materials. Move and place rock, vegetation, and other materials.	Move and place material	Only bucket and thumb attachment
Vibratory Compactor		1	Levee top	Compact fill material	Compact material	No
Water truck	Holds up to 3,000 gal	1	Haul route Existing roads	Wets road surface to control dust	Dust control	No
Dump truck	10-12 CY Solo Dump truck, haul up to Class V riprap	Dependent on delivery	Haul route Existing roads	Transport of materials to and from the project	Material transport	No

2.5.1 Detailed Pilchuck Levee Repair Description

At the Pilchuck Levee the Corps would implement a slope layback while restoring the levee to its pre-damaged level of protection. This approach would shift the levee crest and landward slope inland from their pre-damaged position by approximately 15 feet, while maintaining the location of the riverward toe, resulting in a more stable slope of 2H:1V. Construction would follow the design plans (Appendix B.1).

Some excavation and placement of repair materials would take place below the OHWM. Sloughed material would be removed from the scoured toe and the levee embankment. A buried toe would be constructed of Class V riprap. The rebuilt slope would be armored with a 4-foot-thick blanket of Class V riprap, which is an increase in size from the existing Class II to Class III riprap, placed over a layer of quarry spalls. Hydraulic analysis, described below, determined Class V riprap as the recommended size to achieve the same level of flood protection as was projected to be provided by the levee design before the flood damage.

During the designated work window, in-water work would include the salvage and replacement of riprap on the toe and riverward face of the levee. Riprap pieces would be placed individually or in small bucket loads to aid in interlocking. There would be no uncontrolled dumping of rocks in-water or along the levee slope. Large rock would be placed and manipulated using the thumb attachment. Small rock that is impracticable to manipulate with the thumb attachment, such as quarry spalls, would be transferred from the bucket to the levee slope using a pouring motion. To achieve good compaction and tight interlocking, the slope would be "plated." Plating involves mechanically working the rock until it locks up. This could be applied force perpendicularly, or a smoothing motion while applying force. This action occurs after all the riprap has been placed on the slope.

Additional embankment material would be placed and compacted on the landward slope of the levee, as necessary, to maintain a 2H:1V slope and a 10-foot-wide levee crest. Material excavated from the over steepened riverward slope may be repurposed for this fill, provided it meets the current requirements for suitable levee embankment fill. Otherwise, embankment material will be purchased through a contract bidding process from vendors fully permitted by the state.

All riverward repairs would occur within the pre-damage levee footprint and initial fill design prism (i.e., the levee would not encroach further into the river). Total repair length is 600 feet, including necessary transitions and adjustments for the layback design into the adjacent, undamaged slopes (refer to construction drawing CS101 and C-301 for alignment shift of the levee crest in Appendix B.1).

Repairs to the Pilchuck Levee would increase the rock size of the levee. The age of the levee and project documentation reported riprap size classes correspond to the older sizing method under which the median diameters are 13 and 15 inches and maximum diameters are 18 and 20 inches for Class II and Class III riprap, respectively. Design of this repair is based on updated hydrology information from a Federal Emergency Management Agency flood insurance study for Snohomish County (FEMA 2005). Hydraulic analysis was used to estimate the minimum size rock recommended during a 100-year flow event for the Pilchuck Levee repair. Conservative values were used in the Corps' analysis because a 2D hydraulic model does not exist for the area and the damage location has complex hydraulics associated with the river bend that increases the velocities oriented toward the bank. The analysis found that rock with a median diameter of 18.7 inches is needed for stability at the 100-year flow event. This size falls between Class IV and Class V riprap under the Seattle District rock sizing guidelines for riverbank armoring (Table 4). Due to the uncertainty inherent in riprap sizing calculations using 1-dimensional model results, the Corps would use Class V riprap for the Pilchuck Levee repair. Class V riprap has a median diameter of 21 inches and a maximum diameter of 34 inches (Table 4).

Table 4. Riprap Class by diameter under the current Corps rock sizing guidelines. Percent passing refers to the percent volume of material that passes through a mesh or grid of the diameter indicated.

Class	I	II	III	IV	V	VI
Percent Passing	**Inches (diameter)**					
100	12	20	27	29	34	42
50	9	14	16	17	21	27
10	7	9	10	11	13	19

2.5.2 Detailed Marshland Levee Repair Description

The Corps would restore the Marshland Levee to its pre-damaged level of protection. The levee alignment and riverward toe would be reconstructed to the pre-flood location. The slope and toe would be reconstructed with armor restored to the slope above the OHWM to replace the failed bioengineered slope that had been installed in 2010 as a modification of the initial fill design. Construction would follow the design plans (Appendix B.2).

Some excavation and placement of repair materials would take place below the OHWM. Sloughed material would be removed from the scoured toe and the over steepened embankment deconstructed. A buried toe would be constructed of Class V riprap. The rebuilt slope would be armored with a 4-foot-thick blanket of Class V riprap placed over a layer of quarry spalls. The hydraulic analysis described above determined Class V riprap as the recommended size to achieve the same level of flood protection as was projected to be provided by the levee in its pre-damaged condition. During the designated work window, in-water work would include the salvage and replacement of riprap. Riprap would be salvaged from and adjacent to the toe and riverward face of the levee. Riprap would be placed per the design drawings. Material excavated from the levee may be reused in the repair provided it meets the current requirements for suitable levee embankment fill. Placement of riprap would take place as it is described under the Pilchuck Levee repair above.

All riverward repairs would occur within the pre-damage levee footprint and initial fill design prism (i.e., the levee would not encroach further into the river) below the OHWM. The repaired riverward face would protrude riverward within the last vertical foot approaching the crest. The rest of the repair below the riverward crest would remain within or landward of the initial fill design prism. Total repair length is 300 feet, including necessary transitions into the adjacent undamaged slopes.

Prior to 2010, the Marshland Levee slope and toe were armored with up to Class V armor to the levee crest. In 2010, the Marshland Flood Control District completed repairs to the levee slope above the OHWM at the damaged site by replacing the pre-existing armor rock of the original fill design with geotextile lifts, willows, and anchored logs. These repairs were to address bank damages where high water threatened breaching the levee. The armor rock of the initial fill design, that had been in place prior to 2010 below OHWM, was not affected by the 2010 repair. The proposed repair would not replace the geotextile lifts in-kind but would re-armor the levee slope above OHWM. Riprap sizing from hydraulic calculations indicate Class V riprap is the minimum acceptable size under current Corps rock sizing guidelines, which is approximately 4 inches wider in diameter than the existing Class V under the old sizing guidelines. The maximum rock size for Class V riprap under current rock sizing guidelines is 34 inches in diameter (Table 4).

2.5.3 Construction Overview

- Hold pre-construction meeting to ensure safety, project compliance, goals, and objectives are understood.
- Field-stake project footprints; clearly identify vegetation clearing limits; and install proper best management practices (BMPs).
- Clear and prepare site as necessary. Invasive vegetation would be disposed of properly and in a manner to prevent the spread of invasive vegetation.
- Construct the levee project in accordance with the details shown in the plans:
    a. Remove remnant riprap and other materials from levee slope. Salvage and stockpile materials to be re-used, as practicable or for removal from the site.

    b. Excavate sloughed embankment material at the scoured riverward toe and regrade slope. Place quarry spalls over re-graded slope.
    c. Reconstruct buried toe and place slope armor.
    d. Incorporate willow bundles at 6-foot intervals along the OHWM.
    e. Continue repair above the willow bundles to the top of the slope.
    f. Transition upstream and downstream ends of the repair to smoothly tie into existing slope.
- All disturbed soils of the project not covered by armor rock would be covered with topsoil and hydroseeded (e.g., staging areas, access paths that are not graveled or paved, and the off-site mitigation site).
- Clean up and restore all disturbed landward staging and access sites.
- Complete off-site mitigation (see section 2.6).

Access to the repair site would be from existing roads, ramps, paths, public rights-of-way, etc. Storage and staging would occur along the levee top or adjacent to the levee (or at an identified location), and would consist of temporary stockpiling of excess rock, embankment materials, supplies, equipment, and vehicles.

2.5.4 Construction Sequence

Construction would occur in a single construction period within the NMFS-approved construction window and generally consists of the following major components described below.

Site Preparation

The first component of construction includes the preparation of access routes and the existing prism for material removal. A pre-construction meeting would be held. The project limits would be clearly marked using stakes and flagging, and the repair area cleared and grubbed as necessary. Invasive vegetation, including Japanese knotweed (*Fallopia japonica*) and Himalayan blackberry (*Rubus armeniacus*), would be disposed of off-site in a manner to prevent the spread of invasive vegetation. Refer to CS101 in Appendix B for storage and staging locations. Staging activities would consist of temporarily stockpiling rock, supplies, equipment, and vehicles.

Deconstruct Damaged Levee

The damaged portion of the levee would be deconstructed by removing, salvaging, and stockpiling remnant riprap and other existing material as practicable. As necessary, sloughed embankment material, including the geotextile fabric and an anchored log at the Marshland Levee, would be excavated from the scoured riverward toe. These materials would be stockpiled in approved areas for reuse (e.g., embankment material) in the repair or disposed of off-site (e.g., geotextile fabric).

Construct Levee Repair

Construction would commence at the toe, starting upstream and working downstream, to deflect flows and minimize turbidity in the construction area. The construction would adhere to the construction documents. The buried toe, levee prism, and slope would be constructed per design requirements. The repair would smoothly transition at the upstream and downstream limits of construction into the adjacent slopes.

Complete Construction

Access routes and staging areas would be restored to pre-construction condition as necessary. The non-federal sponsors and the Corps would complete mitigation off-site, downstream of the repair Pilchuck Repair.

2.6 ENVIRONMENTAL MITIGATION

The necessary repairs to the Pilchuck and Marshland Levees are extensive, and newly repaired sites would take time to provide shoreline habitat functions, such as shade. Because of a long history of riverbank modification dating back to the 1940s, the existing riparian vegetation is primarily invasive but does provide a modicum of function, primarily shade along the immediate shoreline with some trees providing shade past the bank and into the river. The Corps is proposing mitigation to compensate for impacts resulting from removal of riparian vegetation. To avoid and offset impacts to habitat, salmon recovery, and water quality resulting from vegetation removal, the Corps is proposing the following mitigation:

- On-site: Willow bundles would be incorporated at 6-foot intervals along the OHWM in the repaired levee slopes. See design plans for willow bundle details (Appendix B.1 an B.2 sheet C-301). Approximately 150 bundles would be planted between the two repair sites. These plantings would create overhanging cover along the river's edge.
- Off-site: The Corps estimates 10 trees would be removed to complete repairs at both sites. An area covering approximately 0.39 acre and 200 feet downstream of the Pilchuck Levee repair, on the left bank and riverward of the levee, would be cleared of invasive vegetation, mostly Himalayan blackberry and Japanese knotweed, and planted with 38 native trees and hydroseeded (Table 5; Appendix B.1 an B.2 sheet L-101 and L-105). The number of mitigation trees was determined by using a tree replacement ratio of 3:1, which accounts for temporal habitat loss due to the time lag for the trees to reach maturity and accounts for the possibility that not all planted trees would survive. An additional eight trees are included to offset removal of one anchored log from the Marshland Flood Control District's previous repair at the Marshland Levee. This log has been in place for more than a decade and is likely to erode during a future flood event. Table 5 shows the species and number of mitigation plantings resulting from each repair site.
- The mitigation for the two repairs is combined to improve the establishment of shoreline vegetation cover over time, such as shade and organic input. These plantings would offset impacts to aquatic species (including ESA-listed salmonids) and water quality in the Pilchuck River, which the Washington State Department of Ecology (Ecology) has placed on the 303(d) list for pH, dissolved oxygen, and temperature.
- The proposed Pilchuck Levee repair would have minor benefits due to laying back the levee slope. This will broaden the river channel width, which tends to slow a river down and increase conveyance. Slower flows along the river's edge are beneficial to rearing juveniles.

Table 5. Off-site mitigation plantings for repairs to the Pilchuck and Marshland Levees.

Species	Mitigation for Pilchuck	Mitigation for Marshland	Total Plantings at Mitigation Site
Black Cottonwood (*Populus trichocarpa)*	3	2	5
Red Alder (*Alnus rubra)*	5	5	10
Douglas Fir (*Pseudotsuga menziesii)*	5	5	10
Pacific Willow (*Salix lucida)*	3	2	5
Sitka Spruce (*Picea sitchensis)*	5	3	8
Total	21	17	38

Monitoring and adaptive management, including replacement and maintenance, after the first year would be conducted by the Corps. If after the first year less than 80 percent of each of the

willow bundles and off-site compensatory mitigation trees survive, all the unsuccessful bundles or dead plantings would be replaced at that location. Each site would be evaluated separately for 80 percent survival and replanting needs. In preparation for any required adaptive management re-plantings, the Corps would evaluate why the plantings failed and plan the best path forward for successful replacement. The Corps would engage with the non-federal sponsors to assist in identifying the problem and alternative planting practices for successful replanting. These may include planting different species, changing the planting location, or adding pest control or exclusion devices. If replacement occurs, the plantings would be monitored for an additional year by the Corps. The Corps would report the success of the mitigation plantings to the resource agencies with which it coordinated for the repair. The plantings would be evaluated in September of each year before leaf drop.

The following information would be provided in a post-construction report to the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) by December 1, 2024 and constitutes the maintenance, monitoring and adaptive management plan:

1) Project identification:
   i) Project name
   ii) Corps point of contact
2) Construction details
   i) Starting and ending dates for work completed for construction
   ii) Total area (square feet) of in-water construction footprint
   iii) Total area (square feet) of riparian disturbance (i.e., water-ward face of the levee)
   iv) Results of turbidity monitoring
   v) A description of any elements of the project that were constructed differently from those depicted in the Biological Assessment (BA), associated addendums, and communications.
   vi) Willow bundle survival of 80 percent, based on how many bundles of the total installed survive, at the end of the first growing season, and if necessary, remedial measures planned or undertaken to replace dead plants. Each repair site would be evaluated separately.
   vii) Plant survival of 80 percent, based on how many of the total plants installed survive at the off-site mitigation area at the end of the first growing season, and if necessary, remedial measures planned or undertaken to replace dead plants.
3) If replanting is required due to less than 80 percent survival, submit an additional monitoring report of the survival of all plantings following one growing season after re-planting.

2.7 In-Water Work Windows

All work done in the water is scheduled to occur during the in-water work window for the Pilchuck and Snohomish Rivers (July 1 to August 31; USACE 2021b).

2.8 Best Management Practices

Below are BMPs that would be incorporated into the action. Some are integrated into the repair, while others are guides to operation and care of equipment.

1. All construction activities would occur during daylight hours to minimize noise impacts to the surrounding community.
2. In-water work would be limited to the in-water work window (July 1 to August 31) and minimized to the extent possible.

3. Temporary erosion control measures will be installed for all phases of work as required to prevent the discharge or accumulation of sediment into the river or off-site. A Certified Erosion and Sediment Control Lead will choose and install erosion control materials for specific site conditions as necessary. These may include silt fencing, mats, blankets, check dams, bonded fiber matrix, and straw. Accumulation of sediment in any adjacent swales or storm drains will be monitored daily and cleared to ensure continued service throughout construction.
4. Water quality monitoring for turbidity would be performed as outlined in the Water Quality Monitoring Plan (Appendix C). If a potential exceedance is detected at the early warning sample locations, on-site personnel would stop work, assess sediment generating activities, and proceed under corrective measures. Examples include slowing down a specific in-water activity and changing the amount of material that is moved below the waterline.
5. Vegetation removal would be limited to the repair site and mitigation location.
6. Noxious weeds would be disposed of separately from other organic materials at an approved off-site location. Himalayan blackberry and Japanese knotweed, including the root system, would be removed and disposed of appropriately. Because knotweed can regrow from small pieces, care would be taken to prevent fragments from falling into the river. Removed Himalayan blackberry and Japanese knotweed would not be placed in a compost pile or left to root on-site.
7. Construction equipment would be cleaned prior to site delivery.
8. Drive trains would not operate in the water. Only the excavator bucket with thumb attachment would extend into the water.
9. Fueling would occur on the landward side of the levee, and biodegradable hydraulic fluids would be used as appropriate in any portion of the equipment that would work in the water.
10. Construction equipment shall be regularly checked for drips or leaks and immediately removed from service until corrected.
11. At least one fuel spill kit with absorbent pads would be on site at all times.
12. Material placement into the water would be done in a controlled manner to reduce turbidity and in-water noise generation. No end dumping of rock into the water would occur.
13. Rock placement would occur only within the authorized project footprint.
14. Rock placement and underwater excavation would occur from the upstream end of the project to the downstream end. Rock is placed shortly after excavation so it would act as a localized flow deflector and help manage flows in the installation areas.
15. All disturbed soils would be topped with topsoil and hydroseeded with a native grass mix. This includes the staging areas, access paths that are not graveled or paved, and the off-site mitigation site.
16. Should any large woody material (LWM) be generated or found on site during repairs, it shall be salvaged and placed along the completed toe of the repaired levee where it can continue to provide habitat function. This includes any tree trunks, large native shrubs, or anchored wood at the Marshland Levee repair site. The woody material may be placed after a section of levee is completed or after the entire repair. Depending on the water height, the material may be placed above or below the willow bundles. Root wads would be oriented to face upstream.
17. All trash and unauthorized fill (including concrete blocks or pieces, bricks, asphalt, metal, treated wood, glass, floating debris, and paper) generated during the repair would be removed from the project and staging areas after work is complete.

18. A pre-construction meeting would be conducted to look at existing conditions and any possible fine-tuning that could be done for BMPs or environmental requirements. The pre-construction meeting may include outside resource agencies like USFWS or NMFS.
19. Plantings would be watered at the time of installation as necessary.
20. Tree plantings would be planted in late February when the risk of floods inundating the mitigation site is low and while plantings are still dormant.

In addition, a Fueling and Spill Recovery Plan would be developed prior to construction that would include specific BMPs to prevent any spills and to prepare to react quickly should an incident occur.

2.9 CONSERVATION MEASURES

The Corps has developed a list of conservation measures and incorporated these into the levee repair to reduce environmental impacts of the proposed repair. For this project the measures are the following:

- Native Plantings and Monitoring: Willow bundles would be incorporated into the levee repair and native trees would be planted at an off-site location. See section 2.6 for more details.
- Post-Construction Review of Conservation Measures: The Corps would inspect the repair sites after the repair is completed. If conservation measures and repairs are different from those described here, or what is depicted in the plans, they would be recorded and described, and consultation reinitiated as necessary. The Corps would assess whether changes are needed, such as change in type or location of plantings.

3 ENVIRONMENTAL RESOURCES OF CONCERN AND EFFECTS

This section evaluates impacts to various resources by the different alternatives carried forward for evaluation against the levee's designed condition. A list of the resources considered for evaluation are shown in Table 6. Not all resources are carried forward for analysis.

Table 6. List of resources considered for detailed effects analysis and rationale for inclusion or exclusion

Resource	Included in Detailed Analysis	Rationale for Inclusion or Exclusion
Vegetation	Yes	Aquatic vegetation is not located in or immediately adjacent to the project area, but shoreline vegetation is present. Analysis is required to investigate what vegetation exists and to determine the extent of any potential effects.
Navigation	No	Repairs to the levees would not affect navigation.
Water Resources	Yes	The proposed action may affect water quality. Analysis is required to investigate what water quality conditions are present and to determine the extent of any potential effects.
Geology and Soils	No	The proposed action repairs an existing structure. While there would be ground disturbance, it is restricted to the project footprint, which is artificially placed material.

Resource	Included in Detailed Analysis	Rationale for Inclusion or Exclusion
		Repairs would cause negligible effects to soil conditions and would not affect geology.
Wetlands	No	Wetlands are not located in or immediately adjacent to the project area. The proposed repair would have no effect on wetlands.
Threatened and Endangered Species	Yes	The proposed action may affect protected species in the project area. Analysis is required to determine what species are present and the extent of potential effects.
Fish and Wildlife	Yes	Same rationale as above.
Cultural Resources	Yes	Analysis is required to investigate cultural resources and to determine the extent of any potential effects.
Hazardous, Toxic, and Radiological Waste	No	The project area does not have contaminants. The closest superfund site is approximately 15 miles away. This resource would not be carried forward for evaluation.
Air Quality and Noise	Yes	The proposed action involves construction equipment that generate exhaust and noise. Analysis is required to investigate what air quality and noise conditions there are and to determine the extent of any potential effects.
Land Use, Utilities, and Infrastructure	Yes	The proposed action may affect land use, utilities, and infrastructure within the project area. Analysis is required to investigate what conditions at the project site and surrounding area are, and to determine the extent of any potential effects.
Recreation	Yes	Analysis is required to investigate recreational activities in the area and to determine the extent of any potential effects.

3.1 VEGETATION

3.1.1 Existing Conditions

Shoreline conditions at both repair sites are heavily modified. Almost no intact riparian buffer exists, especially in the lower Pilchuck River (Cardno 2018). Landward slopes of both levees are covered in sod. A gravel road runs the length of each levee along its crest and is routinely mowed or kept free of sod by the non-federal sponsor per their operation and maintenance requirements.

The riverward slope of the Pilchuck Levee is vegetated with a dense cover of Japanese knotweed, Himalayan blackberry, and snowberry (*Symphoricarpos albus*) overgrowing the riprap armor layer of the initial fill design. This vegetation was present before the damaging event and more has grown since. One butterfly bush (*Buddleja davidii*) is found in the construction footprint and reed canarygrass (*Phalaris arundinacea*) is found throughout. These invasive plants, such as Japanese knotweed, spread rapidly, forming dense thickets that crowd and shade out native vegetation. This reduces species diversity, alters natural ecosystems, and negatively impacts wildlife habitat. For example, the ground under knotweed thickets tends to have very little other growth. This bare soil is very susceptible to erosion, posing a particular threat to riparian areas. There is a small grove of mostly non-native trees landward of the

Pilchuck levee that provide shade and temperature buffers in the riparian area. The trees consist of two 12-inch diameter at breast height (DBH) walnut trees (*Juglans* spp.), three 10- to 12-inch DBH Port Orford cedars (*Chamaecyparis lawsoniana*), one 14-inch DBH black cottonwood and one 8-inch DBH juniper (*Juniperus* spp.). Across the river from the Pilchuck Levee repair the shoreline is vegetated with large black cottonwood and big-leaf maple (*Acer macrophyllum*) with a dense understory of Japanese knotweed that limits understory riparian diversity.

The riverward slope above the OHWM of the Marshland Levee is vegetated with small willow saplings and invasive species, including Japanese knotweed, Himalayan blackberry, and reed canarygrass overgrowing the riprap armor layer of the initial fill design. The willows were installed as part of the 2010 repair and the invasives colonized the site in the following years and after the damaging event. There are three trees within the Marshland Levee repair footprint, two 30-inch DBH black cottonwoods and one 10-inch DBH bigleaf maple. The Marshland Flood Control District's previous repair used Sitka willow (*S. sitchensis*) stakes between the soil lifts, but most either failed or were washed away during flooding. The top and back side of the levee is covered in sod and gravel.

The mitigation site is located on the Pilchuck Levee's riverward side. The site is vegetated with a Himalayan blackberry interspersed with Japanese knotweed and bamboo.

3.1.2 No Action

Depending upon the magnitude and duration of future flood events, the levee at the damaged site may start to erode and fail. Under these circumstances, a flood fight would likely be conducted to try to save the levee and protect properties, facilities, and human safety from threat. Construction during a flood event is difficult and is completed as quickly as possible; therefore, vegetation would be removed or buried as needed to accomplish the levee repair under difficult construction conditions, regardless of the type of vegetation. It is not possible to manage the construction process so as to install willow bundles during flood fights and levees cannot practicably be revegetated following the flood fight actions. If flood fights were infeasible or unsuccessful and the levees failed, inundation and possible channel migration could have considerable impacts on vegetation.

3.1.3 Slope Layback and Armored Slope Alternative

Because of human disturbances, the proposed construction and staging areas are relatively free of native vegetation. The area that would be disturbed for repairs to the Pilchuck Levee is approximately 0.91 acre of which 0.20 acre contains mostly invasive vegetation. Additionally, seven non-native trees would be removed from the landward side of the levee as the levee prism is shifted landward. These trees provide shade to the Pilchuck River and its bank. The area that would be disturbed for repairs to the Marshland Levee is approximately 0.57 acre of which 0.26 acre contains mostly invasive riverside vegetation including three native trees. Mitigation planting of 38 native trees would disturb approximately 0.39 acre riverward of the Pilchuck River dominated by invasive species, primarily Himalayan blackberry. Additionally, approximately 150 willow bundles would be installed at the repair sites and 38 native trees at the mitigation site. There would be a temporary loss in habitat until this vegetation establishes. As the mitigation plantings grow, they would regain ecological functions, providing food and substrate for insects and contributing organic material to the river, including LWM. The mitigation plantings for the trees removed from the landward side of the Pilchuck Levee repair site will provide greater benefits than if they were replaced in-kind on the landward side outside of the active floodplain. Shading and other functions along the levee could be limited by maintenance trimming and clearing to protect levee integrity and allow inspection through the

non-federal sponsor's maintenance regimen. Offsite mitigation would not be subject to these maintenance requirements. Effects on vegetation would be temporary and negligible.

3.1 WATER RESOURCES

3.1.1 Existing Conditions

Ecology designated the water resource uses listed in Table 7 for the Snohomish and Pilchuck Rivers. Ecology lists the Pilchuck River in the project area on the 303(d) list for pH, dissolved oxygen, and temperature (Ecology 2021a). The river is also listed as Category 4a for bacteria. Category 4a waters have an approved total maximum daily load plan in place to improve impaired water conditions. The Lower Pilchuck River Assessment compares the running 7-day average daily maximum temperature from the summer of 2016 to the Washington State water quality standard of 16°C (Figure 6; Cardno 2018). From late June through late August, every site exceeded the preferred temperature limit, suggesting considerable impairment. The Snohomish River next to the repair site is not listed on Ecology's 303(d) list. However, Ecology lists the Snohomish River on the 303(d) list for temperature downstream of the repair site (Ecology 2021a).

Table 7. Designated aquatic uses for Pilchuck and Snohomish Rivers at the damaged sites (Ecology 2021a).

Use	Type of Use
Aquatic Life	Salmonid spawning, rearing, and migration
Recreation	Primary contact (includes swimming, skin diving, and water skiing)
Water Supply	Domestic
	Industrial
	Agricultural
	Stock
Miscellaneous	Wildlife Habitat
	Harvesting
	Commerce and Navigation
	Boating
	Aesthetics

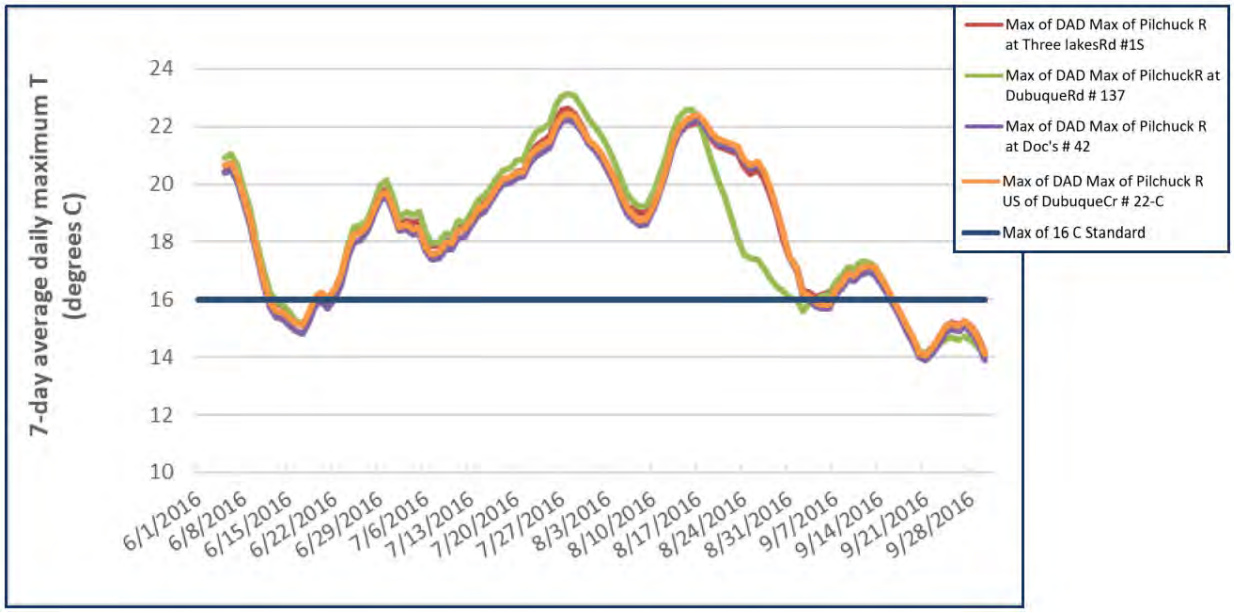

Figure 6. Mainstem Lower Pilchuck River temperatures for summer 2016. Locations listed from downstream to upstream (at Three Lakes Rd, river mile (RM) 3.25; Dubuque Rd, RM 5.37; Doc's (local name), RM 7.87; Dubuque Cr, RM 8.1). State water quality standard provided for reference. The '#' in the legend is the Snohomish County gage reference (Cardno 2018). The in-water work period for the proposed repairs is July 1 to August 31.

In general, the water quality is in moderate condition in the Snohomish River basin. Ecology monitors water quality in the Snohomish River at Snohomish (gage 07A090), approximately 2,700 feet downstream from the Marshland Levee repair site. In 2018, Ecology calculated the overall water quality index score at this station at 70, adjusted for flow (Ecology 2021b). To calculate water quality index scores, Ecology converts monitoring results from monthly grab samples into scores ranging from 1 to 100. In general, scores less than 40 indicate poor water quality, scores of 40 through 79 indicate moderate quality, and scores of 80 and greater indicate water quality met expectations and was good. The lowest monthly scores in water year (1 October through 31 September) 2018 at this station occurred in October 2018 (monthly average score of 57). By individual components, annual scores were in the moderate range for suspended solids (51), total phosphorus (54), and turbidity (48). Other components including temperature, oxygen, pH, fecal coliform bacteria, and total persulfate nitrogen were in the good range. The lowest monthly score recorded in the 1997-2018 period was for total suspended solids (score of 15 in water year 2015 Month August; Ecology 2021b).

3.1.2 No Action

Under this alternative, the damaged levee could sustain further damage, which may lead to flood fighting measures and fill placement during future high-water events. This would increase sediment and turbidity in the river, which may be a minor concern during a flood event. Levee failure, if flood fighting efforts were infeasible or unsuccessful, could allow floodwater to transport debris, sediment, and pollutants back into the river from adjacent properties with substantial impacts to water quality and potential for sediment contamination. Adjacent areas include industrial, recreational, agricultural, and residential properties.

3.1.3 Slope Layback and Armored Slope Alternative

Under this alternative, the Pilchuck and Marshland Levees would be repaired. All riverward repairs would occur within the pre-damage levee footprint (i.e., the levee would not encroach farther into the river).

Repairing the levee in-kind would require work in the active channel with some work below the OHWM. Construction could be expected to cause minor, temporary, and localized increases in turbidity. BMPs, including restrictions on fueling and prevention of fluid leaks from construction equipment, would be employed to minimize and prevent discharge of pollutants into the river. Materials used for the repair would be clean and contaminant free and purchased through a contract bidding process from vendors fully permitted by the state. Turbidity would be monitored upstream and downstream of the project sites during construction (Appendix C). If turbidity exceeds state water quality standards, the Corps will modify or stop particulate-generating activities and commence contingency sampling requirements as outlined in the water quality monitoring plan (Appendix C).

This alternative would remove shoreline vegetation at each repair location that has overgrown the riprap armor layer of the initial fill design and replace it with rock armor, reducing shading and increasing localized water temperatures along the shoreline. The effect to water temperature would be mitigated by on-site willow bundles incorporated into the repaired levee slopes, planting native vegetation for mitigation at the off-site location, and placement of hydroseed. Shading from the willow bundles and off-site mitigation would increase over time. The mitigation plantings for the trees removed from the landward side of the Pilchuck Levee repair site will provide greater shade than if they were replaced in-kind on the landward side outside of the active floodplain. This alternative would not have measurable effects to pH, bacteria, and dissolved oxygen levels in the river. Only clean, uncontaminated materials would be used, and no pollutants are expected to be introduced to the river. Effects to water quality from this alternative would be temporary and localized.

3.2 Threatened and Endangered Species

In accordance with Section 7(a)(2) of the Endangered Species Act (ESA), federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species. The species listed in Table 8 are protected under the ESA and may occur in the project area. The following sections briefly summarize relevant information about the protected species; current knowledge on the presence and use of the project and action areas by these species; and then evaluates how the proposed project may affect the species, concluding with a determination of effect. Pursuant to Section 7 of the ESA, the Corps submitted a BA to the USFWS and the NMFS regarding effects to these species. See section 7.5 for compliance details with the ESA consultation.

Table 8. ESA-listed species and designated or proposed critical habitat found in the project areas of the proposed action.

Species (Common Name and Scientific Name)	Distinct Population Segment or Evolutionarily Significant Unit	Federal Listing	Critical Habitat in Action Area	Potential Occurrence (Likely, Unlikely, or Absent) in Action Area
Chinook salmon (*Oncorhynchus tshawytscha*)	Puget Sound	Threatened, Critical Habitat Designated	Yes	Likely
Steelhead (*O. mykiss*)	Puget Sound	Threatened, Critical Habitat Designated	Yes	Likely
Bull Trout (*Salvelinus confluentus*)	Coastal/Puget Sound	Threatened, Critical Habitat Designated	Yes	Likely
Killer whale (*Orcinus orca*)	Southern Resident	Endangered, Critical Habitat Designated	No	Absent
Gray wolf (*Canis lupus*)	Western	Proposed Endangered, Critical Habitat Not Designated	N/A	Unlikely
Marbled murrelet (*Brachyramphus marmoratus)*	N/A	Threatened, Critical Habitat Designated	Designation does not include Action Area	Unlikely
Streaked Horned Lark (*Eremophila alpestris strigata*)	N/A	Threatened, Critical Habitat Designated	Designation does not include Action Area	Unlikely
Yellow-billed Cuckoo (*Coccyzus americanus*)	N/A	Threatened, Critical Habitat Designated	Proposed does not include Action Area	Unlikely
Oregon Spotted Frog (*Rana pretiosa*)	N/A	Threatened, Critical Habitat Designated	Designation does not include Action Area	Absent

The proposed action would have no effect to gray wolf, streaked horned lark, yellow-billed cuckoo, and Oregon spotted frog. The closest gray wolf pack is east of the Cascade mountains (Wiles et al. 2011). The current range of streaked horned lark in Washington is limited to south Puget Sound, the coast, and lower Columbia River islands (Anderson and Pearson 2015). The Washington Department of Fish and Wildlife (WDFW) priority habitats and species database does not record the presence of streaked horned lark occurring in or near the project area, and no suitable habitat for this species occurs in the area (WDFW 2020). There are no records of yellow-billed cuckoo near the repair site (USFWS 2014a; BirdWeb 2020; WDFW 2020). The riparian vegetation at each repair site is limited to scattered trees or shrubs, most often invasive in origin. The surrounding area includes agricultural fields and roadways, which do not support yellow-billed cuckoo. The Oregon spotted frog is the most aquatic native frog in the Pacific Northwest. Typically, they are found in or near a perennial body of water that includes zones of

shallow water and abundant emergent or floating aquatic plants (USFWS 2014b). This habitat is not present in the project area. No critical habitat for these species is designated in the action area. Thus, these species and their critical habitat would not be affected by any action alternatives and are not discussed further in this document.

3.2.1 Existing Conditions

3.2.1.1 Puget Sound Chinook Salmon

Puget Sound Chinook salmon was listed as threatened on March 24, 1999, and revised on June 28, 2005 (NMFS 1999; NMFS 2005a). Critical habitat was designated for Puget Sound Chinook salmon in 2005 and includes the Pilchuck and Snohomish Rivers in the project area (NMFS 2005b).

Chinook salmon are most often found in large streams or rivers, and many stocks spawn far inland. Chinook salmon are considered main channel spawners, although they do use smaller channels and streams with sufficient flow. Due to their large size, Chinook salmon can spawn in larger substrate (up to 14 cm or about 5.5 inches) than most other salmon species (Anchor Environmental, L.L.C. 2003).

Two different stocks of Chinook salmon occur in the Pilchuck and Snohomish River, described by differences in return, or run timing. Summer Chinook salmon are the early returning stocks and fall Chinook salmon are the late-returning stocks (Ruckelshaus et al. 2006). Summer Chinook salmon adults migrate upstream in August and September and spawn from September through early November (NMFS 2007a). Juveniles of this stock remain in freshwater for a full year before migrating to the ocean. Fall Chinook salmon adults migrate upstream in September, and spawn between mid-September and late-November (NMFS 2007a). Typically, fall Chinook salmon juveniles move downstream during their first spring to enter the estuary (SBSRTC 1999). Spawning is unlikely to occur at either repair site but may occur elsewhere in the Pilchuck and Snohomish Rivers where spawning conditions exist (Cardno 2018; WDFW 2021; M. Rustay, personal communication, Snohomish County Department of Public Works Senior Habitat Specialist, August 13, 2020; P. Verhey, personal communication, WDFW Fish Biologist, September 17 & 18, 2020).

3.2.1.2 Puget Sound Steelhead

The Puget Sound Steelhead distinct population segment was listed in 2007 (NMFS 2007b). Critical habitat for steelhead was designated in 2016 and includes the Pilchuck and Snohomish Rivers in the project area (NMFS 2016).

Steelhead exhibit considerable diversity in age at smoltification, age at return or maturation, and spawning timing. Steelhead can also be repeat spawners (iteroparity). They generally reside longer in freshwater than salmon species (commonly one to four years) and use diverse tributary habitats with cool, clean water. Channel features such as side channels, adjacent small tributaries and floodplains, and abundant LWM and coarse substrate (boulders and cobble) provide important habitat for juvenile steelhead, including as cover from predators and as refuge from fall and winter floods (NMFS 2019).

Several summer-run and winter-run wild steelhead stocks occur in the Snohomish Basin (SBSRF 2019). Both run types are documented in the Pilchuck and Snohomish Rivers, however, only winter steelhead spawn in the Pilchuck River and neither are documented as spawning in the footprint of the Marshland Levee repair site (WDFW 2021; SBSRF 2019). The Snohomish Basin has two summer runs of wild steelhead in the Tolt and North Fork Skykomish

Rivers. Steelhead enter freshwater as sexually immature fish from May to October, although some may enter as early as February, and spawn several months to a year later (SBRTT 2008). They need deep pools for holding until they are ready to spawn. Summer run steelhead spawn in upper reaches of tributaries with steep gradients (SBSRF 2019). The Snohomish Basin hosts three winter runs of wild steelhead: Pilchuck, Snohomish/ Skykomish, and Snoqualmie. Wild winter-run fish enter the river between February to May (SBRTT 2008). Spawning occurs within 3 to 12 weeks. Young steelhead disperse widely and rear in pools and along stream banks where they find protection beneath wood and vegetation. Wild juvenile steelhead in the Snohomish basin typically spend two years in freshwater before outmigrating to the marine environment in the late winter and spring (SBRTT 2008), so steelhead of multiple life stages move through the project area. Juveniles rearing in the area may include fry and yearling fish. Warmer waters can keep steelhead from migrating downstream to the Puget Sound.

3.2.1.3 Coastal-Puget Sound Bull Trout

The Coastal-Puget Sound bull trout distinct population segment was listed as threatened on November 1, 1999, and is thought to contain the only anadromous form of bull trout in the coterminous U.S. (USFWS 1999). Critical habitat was originally designated for bull trout in 2005 and revised in 2010 and includes the Pilchuck and Snohomish Rivers in the project area (USFWS 2010).

Bull trout prefer cold streams, but are occasionally found in larger, warmer river systems and may use certain streams and rivers in the fall and winter when water temperatures seasonally drop. Because bull trout inhabit side channels and the margins of streams, they are highly sensitive to flow patterns and channel structure. They need complex forms of cover such as LWM, undercut banks, boulders, and pools to protect them from predators and to provide prey. Unlike other salmonids like Chinook salmon, bull trout survive to spawn year after year. Since many populations of bull trout migrate from their natal tributary streams to larger water bodies such as rivers, lakes and saltwater, bull trout require two-way passage for repeated spawning as well as foraging.

Bull trout express both resident and migratory life history strategies (Rieman and McIntyre 1993). Resident forms complete their entire life cycle in the tributary or nearby streams in which they spawn and rear. Migratory bull trout spawn in tributary streams, where juvenile fish rear before migrating to either a lake (adfluvial form; Downs et al. 2006), river (fluvial form; Fraley and Shepard 1989), or to saltwater in certain coastal areas (amphidromous; Brenkman and Corbett 2005). Juvenile bull trout from fluvial populations spend one to four years in their natal streams and then migrate to larger streams or rivers (Goetz et al. 2004; Goetz 2016).

Anadromous bull trout may migrate through Pilchuck and Snohomish Rivers to tidally influenced areas in the lower Snohomish River and Puget Sound in late winter/spring, and then return to the freshwater in late spring and early summer. Anadromous and fluvial bull trout may remain in the Pilchuck and Snohomish Rivers to overwinter rather than migrating into the upper basin with spawning adults.

3.2.1.4 Southern Resident Killer Whale

Southern Resident Killer Whales (SRKWs) were listed as endangered on February 16, 2006 (NMFS 2005c). Their customary range is thought to be primarily within Puget Sound, and through and within the Georgia and Johnstone Straits. SRKWs occasionally migrate as far south as Monterey Bay, California and as far north as the northern Queen Charlotte Islands in Canada (Krahn et al. 2004). Critical habitat was originally designated for the SRKW in 2005 (NMFS

2006) and revised in 2021 (NMFS 2021). The action area is not designated as SRKW critical habitat, but critical habitat is designated in the Puget Sound.

SRKWs are large mammals requiring abundant food sources to sustain metabolic processes throughout the year. Prey availability changes seasonally, and SRKWs appear to depend on different prey species and habitats throughout the year. The seasonal timing of salmon returns to southern Puget Sound river systems likely influence the movements of SRKWs out of core summer areas. Whales may travel significant distances to locate prey aggregations sufficient to support their numbers (NMFS 2006). SRKWs spend large amounts of time in "core" inland marine waters coinciding with congregations of migratory salmon returning from the Pacific Ocean to spawn in U.S. and Canadian Rivers (NMFS 2006). The topographic and oceanographic features in these core areas include channels and shorelines that congregate prey and assist with foraging. Their core range during the spring, summer, and fall includes the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Georgia Strait. Little is known about the winter movements and range of the SRKW (NMFS 2005c).

SRKW do not use the Pilchuck and Snohomish River. Even though SRKWs do not directly occupy the shallow waters of the rivers, they show a strong preference for Chinook salmon (primarily Fraser River Chinook salmon), with chum salmon as the second-most preferred (NMFS 2008). The survival of these whales has been shown to positively correlate with Chinook salmon abundance (Ford et al. 2010). Seventy-two percent of the 396 salmon taken by killer whales sampled from 1974 to 2004 were Chinook, despite the much higher abundance of the other species (Ford et al. 2005). SRKWs likely include Chinook salmon from the Snohomish River basin in their diet.

3.2.1.5 Marbled Murrelet

The marbled murrelet was listed as threatened on October 1, 1992 (USFWS 1992). Marbled murrelet critical habitat was designated in 1996 and revised in 2011 and does not include the project area (USFWS 1996; USFWS 2011). The nearest marbled murrelet critical habitat is approximately 11 miles east of the Pilchuck Levee.

The marbled murrelet is a robin-sized, diving seabird that spends most of its time on the ocean and flies inland to nest in old growth forest stands. The range of the marbled murrelet is defined by breeding and wintering areas that extend from the northern terminus of Bristol Bay, Alaska, to the southern terminus of Monterey Bay in central California. In Washington, this species occurs in the greatest numbers in the Puget Sound and Strait of Juan de Fuca.

Marbled murrelets nest inland in forests of large trees with large branches or deformities for use as nest platforms. Most nests are in conifers over 150 years old, and trees greater than 55 inches DBH. Potential suitable nesting habitat for marbled murrelets includes large trees with 4-inch platforms that typically occur at least 33 feet off the ground (USFWS 2012). Murrelets nest in mixed conifer stands varying in size from several acres to thousands of acres. However, larger, unfragmented stands of old growth appear to be the highest quality habitat.

3.2.2 No Action

The No Action Alternative could result in continued erosion of the bank, especially in a flood event, and could leave the levee vulnerable to continued damage and breaching. A breach would result in inundation behind the levee with associated turbidity and potential pollution impacts to the river. A flood fight would likely be undertaken to prevent a breach and could require in-water work that could affect Chinook, steelhead, and bull trout near the emergency action site. Emergency actions would entail more in-water work and could have greater impact

on aquatic dependent ESA-listed species habitat than a scheduled repair action. Flood fight actions that remove vegetation and disturb the river would have negative impacts, the severity of which is determined by timing, location, and extent which cannot be accurately predicted. If flood fights were unsuccessful and the levee failed, inundation and possible channel migration could have considerable impacts on ESA-listed species. The size of the flood and the degree of levee failure would determine the magnitude of impacts to ESA-listed species and their critical habitat.

3.2.3 Slope Layback and Armored Slope Alternative

Pursuant to Section 7 of the ESA, the Corps submitted a BA to the USFWS and NMFS regarding effects of this alternative to the ESA-listed species and their critical habitat listed in Table 8. See section 7.5 for compliance details with the ESA consultation. Effects on ESA-listed species and their critical habitat would be negligible.

3.2.3.1 Puget Sound Chinook

Construction activities in the work area could affect Chinook salmon juveniles, if present, rearing in the project area. Adults could also be present and affected by construction activities. Impacts to Chinook salmon from the proposed levee repairs would be similar to those from previous repairs. The 600 feet of Pilchuck Levee repairs and 300 feet of Marshland Levee repairs would be completed over 4 weeks at each site during the summer. All in-water work would be completed during the in-water work window (July 1 to August 31) when average river flows are generally at their lowest and water temperatures at their highest.

Impacts from in-water work may include elevated turbidity, physical disturbance, and noise from the excavation and placement of material that could result in interruption of foraging and migration behavior, elevated stress levels, and physical damage. In general, larger fish, like adult Chinook salmon, would be less impacted and better able to avoid these stressors. Juvenile Chinook salmon would be the most vulnerable because of their tendency to seek refuge along the shoreline. At the Pilchuck and Marshland Levee repair sites, it is anticipated that juveniles would avoid the high velocities at the thalweg, which runs near where the work would occur on the outside bend of the river and would instead take refuge along the opposite bank where lower velocities occur, and less energy has to be expended.

Physiological effects of increased turbidity can include gill trauma (Servizi and Martens 1987; Noggle 1978; Redding and Schreck 1987), and affect osmoregulation, blood chemistry (Sigler, 1988), growth, and reproduction. Behavioral responses include feeding disruption from olfactory and visual impairment (Sigler 1988); gill flaring; and curtailment of territorial defense (LaSalle 1988). Turbidity would be monitored (see Appendix C, Water Quality Monitoring Plan) during in-water work to track compliance with water quality standards, thereby minimizing its effects on aquatic biota.

The proposed action could produce underwater sound from the removal and placement of rock along the shoreline. The construction activity's greatest underwater sound levels would likely be generated by removal and placement of rock below the waterline. Work conducted above the waterline could create sound that propagates through the ground to the water, albeit at a lower level than the source (Reinhall and Dahl 2011, Hawkins and Johnstone 1978). Studies directly measuring underwater sound from underwater rock placement are lacking (Wyatt 2008; Kongsberg Maritime Limited 2015). Underwater sound generated from rock placement along a riverbank has not been studied. One study did measure sound from rock placement from a vessel through a steel/HDPE pipe in an open-water marine environment. This study measured sound levels up to 120 decibels (dB) which were attributed primarily to the vessel (Nedwell and

Edwards 2004). Underwater removal of rock conducted under the proposed action has similarities with backhoe dredging with respect to the equipment and material involved. A backhoe dredge is considerably larger and more powerful than excavators that would be used to conduct work under the proposed action, so the sound created by a backhoe would be louder than what would occur from the proposed action. Sound from backhoe dredging was measured between 124 and 148 dB at 60 meters (Reine and Dickerson 2012). The authors estimated a maximum intensity at 1 meter of 179 dB.

NMFS fish injury thresholds for both continuous and pulsed sound are 183 dB for cumulative sound and 206 dB for peak sound (NMFS et al. 2008). The limited data available suggests sound potentially created by the proposed action would not exceed these thresholds and therefore not cause fish injury. Popper et al. (2014) and Reine and Dickerson (2012) both indicate there is no direct evidence for fish mortality or mortal injury from continuous sound such as that resulting from the proposed action.

The NMFS threshold for fish harassment is 150 dB (NMFS et al. 2008). It is possible this harassment threshold could be exceeded by the proposed in-water excavation work based on Reine and Dickerson (2012) discussed above. If this were to occur, it would result in salmon moving away from the immediate project site. This behavior is likely to occur regardless simply due to the ground and water disturbance associated with removing and placing rock along the levee. Since the river at the Pilchuck Levee repair site is approximately 45 to 60 feet wide and 350 feet wide at the Marshland Levee repair site, it is anticipated that the harassment threshold would extend across the rivers during rock placement activities. Exceedance of this threshold would be intermittent and would occur only during rock placement activities below the waterline. Therefore, there could be intermittent periods when movement of fish is hindered.

It is anticipated that intermittent passage would occur during breaks in the in-water work and at night when work is not occurring. Potential noise impacts would be minimized by operating within the approved fish window, which is based on a time when migrating salmonids are least likely to be present.

Bank excavation and placement of rock in the water may lead to elevated turbidity levels downstream. Suspension of sediments can increase biochemical oxygen demand and reduce dissolved oxygen levels in the water. Salmonids are naturally exposed to some elevation in suspended sediment levels in estuaries and in streams carrying heavy loads of glacial silt (Gregory and Northcote 1993). Therefore, it is not inevitable that juvenile salmonids would suffer major impacts from such levels of turbidity, but ideal conditions tend toward lower turbidity levels. For the proposed action, rock free of excessive sediment would be used, and turbidity during project construction would be continually monitored as outlined in the Water Quality Monitoring Plan (Appendix C). In order to reduce temporary increases in turbidity and potential related effects on juvenile salmonids, all in-water construction work would take place during the established in-water work window (July 1 to August 31). Construction techniques, sequencing, and timing would minimize soil disturbance to the extent practical to reduce the generation of turbidity during construction. Similarly, implementation of the BMPs, placement of staging areas in uplands, minimizing the number of trips heavy equipment make through the site, and revegetation of disturbed areas will further reduce the duration and magnitude of the temporary increases in turbidity. If a plume is noted, measurements would be taken downstream of the project at the Ecology-designated downstream point of compliance (300 feet), which allows for acceptable permissible mixing and dilution of any released sediment (Appendix C). It is anticipated at this time that effects of increased turbidity would be negligible. If rain occurs during construction, it is possible that soil would be washed into the river although this should be

minimized by BMPs and construction timing during summer months when rainfall is less frequent.

Repairs to the Pilchuck and Marshland Levees would increase the rock size of the levee's riverward armor. Riprap sizing from hydraulic calculations indicate Class V riprap is the minimum acceptable size under current Seattle District rock sizing guidelines after taking into account the hydraulic analysis described in section 2.5. Class V rock has a maximum size of 34 inches (Table 4). This is approximately 14 to 16 inches larger in diameter than what was previously at the Pilchuck Levee repair site, and 4 inches larger in diameter than what was previously at the Marshland Levee repair site below the OHWM. However, a minor change in rock size along an already stabilized bank has not been shown to have considerable effects on fish species. In fact, in some cases larger rock size has been shown to be better (Lister et al. 1995; Schmetterling et al. 2001; Zale and Rider 2003). For example, artificially placed boulders and shoreline irregularities associated with a stabilized bank likely attract juvenile salmon, especially in severely degraded river reaches. However, riprap does not provide the intricate habitat requirements for multiple age classes or species provided by natural vegetated banks. This deviation in rock size is not expected to adversely impact Chinook salmon or its habitat. The rock will be tightly interlocked so that interstitial spaces used by invasive species are reduced. Furthermore, the larger rock size is expected to increase the durability of the levees so that future damage necessitating consequent repair episodes is less likely to occur.

At the Pilchuck Levee repair site, there would be a minor benefit due to laying back the levee slope. As a consequence, the levee crest and landward slope would shift inland from their current position by approximately 15 feet, while maintaining the location of the riverward toe, changing the riverward side slopes from approximately 1H:1V to 2H:1V. Refer to construction drawing CS101 and C-301 for alignment shift in Appendix B.1. This design would broaden the river channel width, which tends to slow a river down and increase conveyance. Slower flows along the river's edge are beneficial to rearing juveniles.

The shorelines at the repair sites are heavily modified and lack a natural riparian buffer. A vast majority of vegetation along the 600 feet of the Pilchuck Levee and 300 feet of the Marshland Levee repair footprints is invasive and provides only localized shade and no LWM input. The temporary loss of 900 feet of riparian vegetation from the two repair sites could decrease organic input to the river and decrease shading. This would negatively impact foraging opportunities from insect fall for fish that juvenile chinook forage on. This loss would be offset by the on-site willow bundles and off-site tree plantings on the riverward side of the levees, although there would be a temporary loss in habitat until this vegetation establishes. The willow bundles would reestablish shoreline vegetation at each repair site. Mitigation plantings are located riverward of the levee, even for the trees removed from the landward side of the Pilchuck Levee. The off-site mitigation for the trees removed from the landward side at the Pilchuck Levee repair site will provide greater benefits because they are located within the active channel (e.g., greater shade, closer temperature buffer, increased organic input, LWM, etc.). The off-site plantings would occur to at a 3:1 replacement ratio to compensate for the time lag until the mitigation site reaches a functional level similar to the pre-damage habitat function provided by the trees removed at each site. The off-site tree plantings would benefit aquatic species (including ESA-listed salmonids) and water quality in the Pilchuck River, which the Ecology has placed on the 303(d) list for pH, dissolved oxygen, and temperature. Growth in good conditions can reach 6-8 feet a year for the willow bundles, while the off-site tree plantings would take longer. Site conditions may not be ideal so growth at this rate is not expected to occur. Overall, river temperatures are not expected to discernibly change due to this project.

3.2.3.2 Puget Sound Steelhead

Potential effects from the proposed repairs to the Pilchuck and Marshland Levees are similar to those listed above for Chinook salmon. However, there is a reasonable expectation that more steelhead adults and juveniles would be present in the action area than Chinook salmon since steelhead stay in freshwater longer. During the proposed construction period, steelhead adults could be migrating through and juveniles could be rearing in the action area. At the Pilchuck Levee repair site a vast majority of the steelhead migrate upstream of the repair site to spawn. The river reach next to the Pilchuck Levee repair site has particularly unfavorable conditions for salmonids, with the lowest redd density in the lower Pilchuck River. Redd monitoring has documented only limited winter steelhead spawning in the river below the 2nd Avenue bridge but not in the Pilchuck Levee repair footprint (Cardno 2018; M. Rustay, personal communication, Snohomish County Department of Public Works Senior Habitat Specialist, August 13, 2020). At the Marshland Levee repair site spawning habitat is not present due to lack of appropriate spawning substrate and excessive amounts of silt and sand (P. Verhey, personal communication, WDFW Fish Biologist, August 17 & 18, 2020).

3.2.3.3 Coastal-Puget Sound Bull Trout

Potential effects from the proposed repairs to the Pilchuck and Marshland Levees on bull trout are similar to those discussed above for Chinook salmon and steelhead. However, due to in-water summer temperatures and migration behaviors, bull trout are unlikely to be present during the in-water work window. During this time, most sub-adult and adult bull trout have moved through the project area to upstream habitat areas or spawning sites. Some adults and sub-adults may not have migrated or have delayed their migration upstream and so could still be in the action area. Juveniles are not expected to occur in the action area since most juveniles rear in natal streams in the upper Skykomish River (SBSRF 2005).

3.2.3.4 Southern Resident Killer Whale

Repairs to the Pilchuck and Marshland Levees would not directly affect SRKW, as they do not inhabit the project or action area. There is potential for indirect impacts through project effects to their prey base, which includes Chinook and chum salmon. Construction related impacts to these prey species would be minor and temporary, and they would be mitigated with willow bundles and off-site plantings. Because the percentage of Snohomish River Chinook and chum salmon that make up the SRKW diet is likely small, the Corps expects little to no discernable far-reaching effect to their food base.

3.2.3.5 Marbled Murrelet

Marbled murrelets are not documented to occur in the action area, nor is suitable habitat present for nesting or foraging. Suitable old growth conifer forest stands for nesting are not present within or near the action area. Given the project location between Puget Sound and inland nesting areas to the east, there is the potential that marbled murrelets could fly over the action area while transiting between marine foraging areas and inland nesting sites.

3.3 Fish and Wildlife

3.3.1 Existing Conditions

The existing levee systems in the lower Pilchuck and Snohomish Rivers have effectively channelized the reach through the project area, leading to localized sediment aggradation/degradation and increased erosional forces, which in turn impacts instream habitat. Natural processes such as channel migration, development of side channels, and LWM recruitment are hampered within the project area due to the channel constraints, including levees, which limit channel-floodplain interaction. The degradation and loss of aquatic habitat,

especially side channels, are limiting factors for ESA-listed Chinook salmon, steelhead and bull trout, as well as other fish and wildlife species. Specific problems include the following:

- Degraded channel structure and complexity which limits available rearing, foraging, migratory, and overwintering habitat.
- Loss of refuge and rearing habitats such as side channels, back channels, shallow habitat with cover from predators, slow-water refuge areas, riparian wetlands, and other off-channel habitat.
- Reduced floodplain connectivity and lost functions such as floodwater storage, groundwater recharge, exchange of nutrients and organic material between land and water, and floodplain sediment sink.
- Degraded riparian vegetation contributing to elevated water temperatures and reduced availability of terrestrial food sources for aquatic organisms.
- Fewer pools and less cover for juvenile fish, historically provided by LWM recruited into the channel from the floodplain.

The WDFW documents a variety of species in the area. These species and their recorded uses of the Pilchuck and Snohomish Rivers are listed in Table 9.

Table 9. Fish species documented in the lower Pilchuck River (WDFW 2021).

Species	Pilchuck River Use	Snohomish River Use
Bull Trout (*S. confluentus*)	Rearing	Rearing
Chinook, summer (*O. tshawytscha*)	Presence	Spawning
Chinook, fall (*O. tshawytscha*)	Spawning	Presence
Chum, fall (*O. keta*)	Presence	Rearing
Coho salmon (*O. kisutch*)	Rearing	Rearing
Largemouth Bass (*Micropterus salmoides*)	Presence	Presence
Pink salmon, odd-year (*O. gorbuscha*)	Presence	Presence
Pink salmon, even-year (*O. gorbuscha*)	not recorded	Presence
Resident Coastal Cutthroat (*O. clarkii*)	Presence	Presence
Sockeye (O*. nerka*)	Presence	Rearing
Steelhead, summer (O*. mykiss*)	Presence	Presence
Steelhead, winter (*O. mykiss*)	Spawning	Rearing

Sediment size in the Pilchuck and Snohomish Rivers are generally small with limited deposition, although some gravel, silt, and sand does naturally accumulate at the opposite bank of each repair site. Due to the small sediment size, pools easily develop where LWM occurs (Cardno 2018; M. Rustay, personal communication, Snohomish County Department of Public Works Senior Habitat Specialist, August 13, 2020; P. Verhey, personal communication, WDFW Fish Biologist, September 17 & 18, 2020; J. Curran, personal communication, Seattle District Corps Geomorphic Engineer, August 9, 2021). A comprehensive survey of fish habitat throughout the Lower Pilchuck River found the best spawning opportunities in the middle portion of the lower Pilchuck River, with particularly unfavorable conditions in the lowermost reaches (Cardno 2018). Spawning redd survey data from 2009 to 2017 noted two Chinook salmon and two steelhead redds along the opposite bank from the repair between 2012 and 2017, where gravel is accumulating (M. Rustay, personal communication, Snohomish County Department of Public Works Senior Habitat Specialist, August 13, 2020; P. Verhey, personal communication, WDFW Fish Biologist, August 17 and 18, 2020). Approximately two-thirds of all salmon redds were found about one mile upstream of the Pilchuck Levee repair site (reaches 5, 6, and 8). Table 10

summarizes conditions within the lower Pilchuck River. In summary, a vast majority of fish, including steelhead and Chinook salmon, migrate upstream of the repair site before spawning (Cardno 2018; M. Rustay, personal communication, Snohomish County Department of Public Works Senior Habitat Specialist, August 13, 2020). Conversely, rearing opportunities in this reach are somewhat better.

Table 10. Summary of fish habitat data for the lower Pilchuck River (Cardno 2018). The repair site is in Reach 1. Note that the shaded colors (green = "better," tan = "worse") are relative to the Lower Pilchuck River only. According to Cardno (2018), none of these attributes would rate as "Properly Functioning Conditions" on an absolute scale but they do highlight those reaches where impairments are least and most severe.

Reach	Reach Length (miles)[1]	Chinook Redd Density (redds/mile/yr)	Steelhead Redd Density (redds/mile/yr)	LWD Jam Frequency (jams/mile)	Pool Frequency (pools/mile)	Percentage of Intact 150-foot Riparian Buffer	Percentage of Modified Bank	7-day Avg Daily Max Temp Mainstem) (°C)
8	1.35	1.4	6.7	0.8	12.1	55%	33%	22.4
7	0.74	0.5	3.3	0.0	11.7	59%	31%	
6	0.66	3.0	10.8	4.0	13.4	59%	22%	
5	1.27	2.6	7.6	2.3	19.0	40%	34%	23.2
4	0.55	2.4	6.8	0.0	11.5	36%	31%	
3	1.11	1.1	5.0	1.0	21.1	25%	47%	22.6
2	1.10	0.3	2.6	0.0	19.9	31%	27%	
1	1.80	0.1	0.2	0.6	19.1	17%	63%	

Fish habitat at the Marshland Levee repair site is similarly poor for spawning. The mainstem of the Snohomish River includes spawning and freshwater rearing habitat for a variety of fish, including Chinook salmon. It is also a key migratory corridor for all salmon species present in the basin (SBSRF 2019). However, the repair site itself likely does not have spawning habitat, or very poor spawning habitat. This reach of the Snohomish River does not have decent spawning gravel and accumulates too much silt and sand (P. Verhey, personal communication, WDFW Fish Biologist, September 17 & 18, 2020).

Aquatic and terrestrial invertebrates are found in and along waterways in the region. According to Plotnikoff (1992), communities typical of rivers in the Puget Sound lowlands are dominated by stonefly, caddisfly, common midge, mosquito, aquatic isopods, and blackfly larvae. Other taxa present include worms, snails, slugs, ants, beetles, amphipods, and terrestrial isopods. Many lowland invertebrate assemblages are characterized as shredder-gatherer communities. Invertebrates found in the estuary and salt marsh area include oligochaete and polychaete worms, fly larvae, and crustaceans such as aquatic isopods, amphipods, and copepods (Cordell et al. 1999).

In addition to aquatic habitat, the existing levees also negatively impact adjacent riparian habitat by preventing overbank flooding and sediment deposition, and by reducing hydrologic connectivity with the river. Specific problems include the following:

- Reduced floodplain connectivity and lost functions such as floodwater storage, groundwater recharge, exchange of nutrients and organic material between land and water, and floodplain sediment sink.
- Degraded riparian vegetation contributing to elevated water temperatures and reduced availability of terrestrial food sources for aquatic organisms, and reduced habitat for mammals and birds.

The repair sites are surrounded by human development, including an airport, agricultural fields, parks, residential homes, roads, railroads, and industrial businesses. Terrestrial species inhabiting the area are limited to those acclimated to co-existing with humans in disturbed and developed areas. Mammal species using the action area include black-tailed deer (*Odocoileus hemionus*), raccoons (*Procyon lotor*), foxes (*Vulpes spp.*), coyote (*Canis latrans*), skunks (*Mephitis mephitis*), ground squirrels (*Spermophilus spp.*), marmots (*Marmota spp.*), mice (*Peromyscus spp.*), and voles (*Microtus spp.*).

Washington Birder (2020) lists 346 bird species in Snohomish County across a diversity of habitats. More locally, birders visiting five eBird hotspots around the city of Snohomish have recorded more than 150 species (eBird 2020). A variety of passerines, raptors, water birds, swallows, and other birds likely use the project area and the riparian habitat associated with it for nesting, feeding, and other life requirements. Query of the WDFW Priority Habitats and Species Database (WDFW 2020) indicates that no bald eagle (*Haliaeetus leucocephalus*) nests are currently recorded as being near the levee repair site, and none were observed during site visits.

3.3.2 No Action

The No Action Alternative could result in continued erosion of the bank, especially in a flood event, and could leave the levee vulnerable to continued damage and breaching. A breach would result in inundation behind the levee with associated severe turbidity and potential pollution impacts to the river. A flood fight would likely be undertaken to prevent a breach. Such activities would likely cause fish and wildlife to leave the area. Emergency actions would entail more in-water work and vegetation clearing that would have greater impact on fish and wildlife than a scheduled repair action. The exact effect to fish and wildlife associated with emergency flood actions is difficult to quantify or predict but does have the potential to be considerable if the flood event warrants repairs at a damaged site.

3.3.3 Slope Layback and Armored Slope Alternative

Repairs under this alternative would cause short-term impacts to fish and wildlife. Impacts to fish would be similar to those described in section 3.2.3. The primary impacts would be a temporary increase in turbidity and an increase in noise, vibration, and human activity caused by heavy equipment use. These impacts may temporarily displace fish and wildlife during the 4 weeks of construction, but fish would be expected to return as soon as construction is complete. Effects to fish and wildlife due to this alternative would be temporary and localized.

3.4 Cultural Resources

3.4.1 Existing Conditions

The Pilchuck Levee was originally constructed in the 1940s by local interests and updated in 1963. The Marshland Levee was originally constructed in the early 1900s by local interests and updated in the 1960s. Since the levees are over 50 years old, they may be potential historic property as per the National Historic Preservation Act. A literature review and a records search found no previous surveys for cultural resources in the repair footprint. However, it did indicate

six previously recorded historic period archaeological sites within one mile of the repair sites. No archaeological sites are recorded within the repair footprints at either levee. A cultural resource survey was complete by a Corps archaeologist on October 21, 2020. No cultural resources were observed during the survey.

3.4.2 No Action

The No Action Alternative would result in continued degradation of the levees through natural processes. It is likely that at an unknown time the levees would fail causing irreparable damage to the structure potentially causing an adverse effect to a historic structure that is potentially eligible for inclusion on the National Register of Historic Places.

3.4.3 Slope Layback and Armored Slope Alternative

Under this alternative, the Pilchuck and Marshland Levees would be repaired and would avoid adverse effects to historic structures and archaeological sites. Consultation with the Washington State Department of Archeology and Historic Preservation (DAHP), the Snoqualmie Indian Tribe, Stillaguamish Tribe of Indians, Swinomish Indian Tribal Community, Tulalip Tribes, Sauk-Suiattle Indian Tribe, and Confederated Tribes and Bands of the Yakama Indian Nation has been completed (see section 7.9). Based on the literature review and a records search, cultural resource survey, and coordination with DAHP and the contacted Tribes, the Corps determined that the proposed repairs would have no adverse effect to historic properties. Effects on cultural resources would be negligible.

3.5 Air Quality and Noise

3.5.1 Existing Conditions

Air quality in Snohomish County and at the site is regulated by the Puget Sound Clean Air Agency (Ecology 2020a). The main sources of outdoor air pollution are motor vehicles, outdoor burning, and wood smoke.

Under the Clean Air Act, the Environmental Protection Agency sets standards for air quality to regulate harmful pollutants. National ambient air quality standards are set for six common air pollutants: ozone, carbon monoxide, nitrogen dioxide, particulate matter (solid and liquid particles suspended in the air), sulfur dioxide, and lead. Areas that do not meet the national ambient air quality standards are designated non-attainment areas. The Environmental Protection Agency sets *de minimis* thresholds for pollutants in non-attainment areas. National ambient air quality standards are met across Washington state, but Ecology and other clean air agencies continue to monitor air quality at 55 locations (Ecology 2020b). Two of these 55 sites are in Snohomish County, in Marysville and Darrington, both for particulate matter. Neither site is near the project area.

The Environmental Protection Agency established the Air Quality Index (AQI) as a simplified tool for communicating daily air quality forecasts and near real-time information to people for planning their daily activities. The AQI indicates how clean or polluted air is and what associated health effects might be a concern. It focuses on health effects that may be experienced within a few hours or days after breathing polluted air. An AQI value of 100 generally corresponds to the air quality standard for the pollutant set to protect public health. Table 11 shows the AQI rating for 2021 by county in the region of the Puget Sound Clean Air Agency (PSCAA 2022). A higher AQI indicates higher levels of air pollution and greater health concern.

Table 11. AQI ratings for 2021 (PSCAA 2022).

County	AQI Rating (percent of year)					Highest AQI
	Good (0-50 AQI)	Moderate (51-100 AQI)	Unhealthy for Sensitive Groups (101-150 AQI)	Unhealthy (151-200 AQI)	Very Unhealthy (201-200 AQI)	
Snohomish	82.5	16.7	0.8	0	0	137
King	84.1	14.8	0.3	0.5	0.3	246
Pierce	83.6	15.6	0.8	0	0	139
Kitsap	98.4	1.4	0.3	0	0	113

The project site and its surroundings have been developed, with a wide variety of human activities contributing to ambient noise levels. Human-related existing noise sources at the project site include traffic, construction, internal combustion engines, and agricultural activities.

3.5.2 No Action

The No Action Alternative would have no direct effect on air quality or noise. Emergency actions may be required to protect lives and property in the event of a flood. These actions would likely have similar air emissions and noise effects as the preferred alternative but could differ depending on timing and scope of the emergency action. Effects to air quality and noise would be temporary and within the range of intensity of noise produced by on-going activities in the area. Effects on air quality and noise would be negligible.

3.5.3 Slope Layback and Armored Slope Alternative

Construction vehicles and heavy equipment used in construction would temporarily and locally generate increased gasoline and diesel exhaust fumes. The small area of construction and the short duration of the activities would limit the impact to air quality. The proposed project would constitute routine repair of an existing facility, generating an increase in direct emissions of a criteria pollutant or its precursors that would be *de minimis*, and would therefore be exempt by 40 CFR Section 93.153(c)(2)(iv) from the conformity determination requirements. Emissions generated by the construction activity are expected to be minor, short-term, and would not affect the implementation of Washington's Clean Air Act implementation plan. Unquantifiable but negligible exacerbation of effects of CO_2 emissions on global climate change would be anticipated.

During construction activities there would be a localized increase in ambient noise levels from equipment operation. Proposed repairs would be conducted during daylight hours from 7 AM to 7 PM to limit noise impacts on surrounding properties. Construction-related traffic may cause temporary increases to local traffic, which is expected to cause a minor increase in vehicle emissions. Effects on air quality and noise would be negligible.

3.6 Land Use, Utilities, Infrastructure, and Traffic

3.6.1 Existing Conditions

Land use in the vicinity of the levee is a mix of residential, commercial, and agricultural. The city of Snohomish is west and north of the Pilchuck and Marshland Levees, respectively. The left bank of the Pilchuck Levee is predominantly commercial, residential, and agricultural. Landward of the Pilchuck Levee is a utility pole with an electrical box and power coming to it from underground. The electricity appears to power a pump that is connected to buried pipes. In addition, the mobile home park has sewer lines that extend from the development to a drain

field east of the levee. The sewer lines are buried 2 to 3 feet deep near the landside toe of the levee. Adjacent properties include residential homes, a construction equipment rental shop, paintball field, agriculture, and an urgent vet care center. There are no public roads in the footprint of the damaged levee. A major east-west road through the city of Snohomish is located north of the damaged site, crossing over the Pilchuck River on the 2nd Street bridge. Access to the levee is from 2nd Street onto Sexton Road, and then through private property.

The left bank of the Snohomish River is predominantly agricultural. North (downstream) of the proposed Marshland Levee repair site is a railroad bridge that crosses the Snohomish River. Landward of the levee are roads important to local and regional transportation. Further inland are commercial properties and the Harvey Airfield, which services small fixed-winged and rotary aircraft. There are no utilities in the proposed Marshland Levee repair footprint. The repair footprint does not include public roads; however, private roads behind the levee, and the levee crest, are used by landowners and non-federal sponsor. Access to the Marshland Levee repair site would occur from Airport Way and through private property.

3.6.2 No Action

Under the No Action Alternative, a higher risk exists for flood damage to land use, utilities, and infrastructure. If the levee isn't repaired, and flooding occurs due to breaches in weak sections of the levee, public infrastructure could be damaged or lost and local area traffic could be affected. This could affect commercial traffic, access to private residences, evacuations, and emergency response services. Depending on the severity of flooding, emergency flood fight efforts may occur to protect safety and property. These activities and local efforts to maintain the levees are expected to be sufficient to maintain existing land use, utilities, and infrastructure. Effects on land use, utilities, and infrastructure would be negligible.

3.6.3 Slope Layback and Armored Slope Alternative

Under this alternative there would be minor and temporary impacts to land use, utilities, and infrastructure. Land use in the project area would not change but may be disrupted temporarily from construction activities and equipment. Repair activities avoid the drain field behind the Pilchuck Levee. Before work is started, a utility locate would be completed to verify the presence and absence of utilities in the construction footprints. Construction-related traffic may cause temporary increases to, and disruption of, local traffic. Flaggers and signs would be used, as needed, to direct traffic safely around the construction site. Existing infrastructure would not be altered to prevent their intended purpose and use. Damaged utilities and infrastructure would be replaced or repaired as necessary. Effects to land use, utilities, infrastructure, and traffic would be negligible.

3.7 RECREATION

3.7.1 Existing Conditions

Several outdoor recreational facilities and businesses exist in the project vicinity, although no recreational sites or facilities are present at the damaged sites. About 170 acres of parks and open space are located in the city limits of Snohomish, offering access to natural resources, community recreation, and local heritage. Across the river from the Pilchuck Levee is Pilchuck Park. Pilchuck Park provides outdoor recreation and access to the Pilchuck River and has the city's only athletic fields. Behind the Pilchuck Levee is the DoodleBug Sportz Outdoor Paintball Park. The paintball park is separated from the levee by fencing and suspended netting. Approximately 1,000 feet downstream from the damaged Marshland Levee site is the Pilchuck Julia Landing. Opened in 2017, the Pilchuck Julia Landing is a city-owned boat launch for motorized and non-motorized boats accessing the Snohomish River (City of Snohomish 2021).

3.7.2 No Action

Under the No Action Alternative, a higher risk exists for flood damage to recreation. If the levee isn't repaired, and flooding occurs due to breaches in weak sections of the levee, recreational use behind the levee could be interrupted or damaged. Depending on the severity of flooding, emergency flood fight efforts may occur to protect safety and property. These activities and local efforts to maintain the levees are expected to be sufficient to maintain existing recreation. Effects on recreation would be negligible.

3.7.3 Slope Layback and Armored Slope Alternative

Under this alternative there would be minor and temporary impacts to recreation. Construction would not prevent recreational activities or change recreational facilities and property. However, due to its proximity to various recreational facilities in the area, construction operations may cause temporary and minor impacts from construction related traffic and noise, which would not persist after repairs are completed. Effects to recreation would be negligible.

4 UNAVOIDABLE ADVERSE EFFECTS OF THE PREFERRED ALTERNATIVE

Unavoidable adverse effects associated with the preferred alternative at each site would be: (1) temporary and localized increases in noise, activity, and emissions which may affect fish and wildlife in the area; (2) temporary and localized disruption of local traffic by construction activity and vehicles; (3) irretrievable commitment of fuels and other materials for repairs; (4) temporary and localized increase in turbidity levels during in-water construction, which may affect aquatic organisms in the area; and (5) removal of vegetation from within the proposed construction areas in the riparian zone. The vegetation removal has the longest duration of impact due to the length of time needed for vegetation to regrow to a similar size. Vegetation loss would be mitigated by the proposed plantings.

5 COMPENSATORY MITIGATION

As mitigation for loss of vegetation on the riverward slope due to construction activities the Corps would complete the on- and off-site mitigation described in section 3.6. Plantings would provide shade and other habitat benefits to aquatic and terrestrial species.

The Corps would inform the non-federal sponsors that the on-site mitigation is part of the repair and should only be trimmed to the minimal amount necessary to retain adequate visual fields for inspection. No trimming would be done to the off-site mitigation. The Corps would maintain and monitor the on- and off-site plantings for one-year after construction to ensure 80 percent survival at each location. If less than 80 percent survival is recorded after one year at a location, the Corps would replace all the dead plants or unsuccessful bundles (via mechanical installation or hand installation) and all replaced plants would be monitored for an additional growing season. The Corps would monitor and replace plantings as needed.

6 COORDINATION

The following agencies and entities have been involved with the environmental coordination of the proposed project:

- Confederated Tribes and Bands of the Yakama Indian Nation
- DAHP
- Ecology
- French Slough Flood Control District
- Marshland Flood Control District

- NMFS
- Sauk-Suiattle Indian Tribe
- Snohomish County
- Snoqualmie Indian Tribe
- Stillaguamish Tribe of Indians
- Swinomish Indian Tribal Community
- Tulalip Tribes
- USFWS
- WDFW

The Corps released a draft EA/FONSI for the proposed project on December 3, 2021, for a 30-day public review and comment period. Two comments were received (Appendix D).

7 ENVIRONMENTAL COMPLIANCE

7.1 BALD AND GOLDEN EAGLE PROTECTION ACT

The Bald and Golden Eagle Protection Act (16 U.S.C. § 668-668d) prohibits the taking, possession or commerce of bald and golden eagles, except under certain circumstances. Amendments in 1972 added to penalties for violations of the act or related regulations. No take of either bald or golden eagles is likely through any of the actions discussed in this EA, since there are no known nests near any of the work locations.

7.2 CLEAN AIR ACT OF 1972

The Clean Air Act as Amended (42 U.S.C. § 7401 et seq.) prohibits federal agencies from approving any action that does not conform to an approved State or federal implementation plan. The operation of heavy equipment, removal and placement of rock, and the operation of vehicles during construction would result in increased vehicle emissions and a slight increase in fugitive dust. These effects would be localized and temporary. The project area is not part of a non-attainment area (Ecology 2020b). The Corps has determined that the proposed repairs constitute a routine facility repair generating an increase in emissions that is clearly *de minimis*, and thus a conformity determination is not required, pursuant to 40 CFR 93.153 (c)(2)(iv).

7.3 CLEAN WATER ACT – FEDERAL WATER POLLUTION CONTROL ACT

The Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.) is more commonly referred to as the Clean Water Act (CWA). This act is the primary legislative vehicle for federal water pollution control programs and the basic structure for regulating discharges of pollutants into waters of the U.S. The CWA was established to “restore and maintain the chemical, physical, and biological integrity of the nation’s waters.” The CWA sets goals to eliminate discharges of pollutants into navigable waters, protect fish and wildlife, and prohibit the discharge of toxic pollutants in quantities that could adversely affect the environment.

This EA evaluates possible impacts to water quality, primarily with respect to suspended solids, turbidity, and temperature. The proposed permanent repair action would require work in the active channel with some work below OHWM for most of the repair areas along the Pilchuck and Marshland Levees, approximately 300 and 600 feet, respectively. Construction could be expected to cause minor, temporary, localized increases in turbidity. BMPs, including restrictions on fueling and prevention of fluid leaks from construction equipment would be employed to minimize and avoid discharge of pollutants into the river.

Three sections of the CWA are pertinent to the proposed actions: Section 401 covers water quality standards and evaluation of the effects discharges would have on those standards; Section 402 addresses non-point discharges including, but not limited to, stormwater runoff from construction sites; and Section 404 addresses discharge of fill into Waters of the U.S. Requirements of those three CWA sections are briefly discussed below.

Section 404 and 401: The Corps does not issue Section 404 permits to itself for its own civil works activities, but the Corps accepts responsibility for the compliance of its civil works projects with Sections 401 and 404 under the CWA. Pursuant to 404(f)(1)(B), "[T]he discharge of dredged or fill material . . . for the purpose of maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, and bridge abutments or approaches, and transportation structures…is not prohibited by or otherwise subject to regulation under this section…" Pursuant to 33 U.S.C. 323.4(a)(2), the implementing definition of "maintenance" is: "Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs in order to qualify for this exemption." This project remains within the same prism, profile, and footprint of the original project design, and is replacing a rock armor layer with another rock armor layer, within the relevant jurisdictional zone below the OHWM. As such, it does not present a change in the character, scope, or size of the original fill design in waters of the U.S. Therefore, the project is not subject to regulation under Section 404 of the CWA. The proposed project does not include fill requiring consideration under Section 404. Since the project does not result in any jurisdictional discharge into waters of the U.S., Section 401 Water Quality Certification is not required.

Section 402: Section 402 of the CWA is triggered when a construction site would have greater than 1 acre of ground disturbance. Proposed repairs to the Pilchuck and Marshland Levees do not exceed 1 acre of ground disturbance.

7.4 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972 as amended (16 U.S.C. § 1451-1464) requires federal agencies to conduct activities in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved State Coastal Zone Management Program. In evaluating compliance with CZMA, the Corps determined that the proposed work is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Management Program. The Corps sent a CZMA Consistency Determination to Ecology on April 29, 2022, requesting concurrence that the proposed repairs are consistent to the maximum extent practicable with the enforceable policies of the approved Coastal Zone Management Program. Ecology concurred with the Corps' consistency determination on June 24, 2022 (Appendix E).

7.5 Endangered Species Act

In accordance with Section 7(a)(2) of the ESA of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed threatened or endangered species and their critical habitats. Table 12 lists the Corps' determinations made for ESA-listed species and critical habitat that would be affected by the proposed repair. A BA outlining these determinations was sent to the USFWS and NMFS on November 23, 2021.

Table 12. Species and Effects determinations of the Pilchuck Levee Project made by the Corps in the BA sent to the USFWS and NMFS.

Species	Species Effects Determination	Critical Habitat Effects Determination
Puget Sound Chinook	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Puget Sound Steelhead	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Coastal/Puget Sound Bull Trout	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Southern Resident Killer Whale	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Marbled Murrelet	May Affect, Not Likely to Adversely Affect	No Effect

Consultation has not concluded. NMFS provided an informal draft Incidental Take Statement and draft Terms and Conditions of proposed Reasonable and Prudent Measures on December 7, 2022, to which the Corps has responded. To date the Corps has not received a final biological opinion from NMFS or USFWS. NMFS provided draft Incidental Take Statement Terms and Conditions, to which the Corps replied. The Corps anticipates that the project description, its Conservation Measures and its Best Management Practices will fulfill all the requirements specified in the ITS conditions, as previewed by NMFS.

Due to the urgent nature of completing the repair, the Corps may proceed with construction prior to completion of the consultation with the Services pursuant to the “emergency circumstances” provisions of the ESA consultation regulation, and may complete ESA consultation after the fact rather than delaying the urgent work in order to complete ESA consultation before construction begins. The applicable regulation is set out at 50 CFR § 402.05 (a) and (b) and provides as follows:

a) Where emergency circumstances mandate the need to consult in an expedited manner, consultation may be conducted informally through alternative procedures that the Director determines to be consistent with the requirements of sections 7(a)-(d) of the Act. This provision applies to situations involving acts of God, disasters, casualties, national defense or security emergencies, etc.

b) Formal consultation shall be initiated as soon as practicable after the emergency is under control. The Federal agency shall submit information on the nature of the emergency action(s), the justification for the expedited consultation, and the impacts to endangered or threatened species and their habitats. The Service will evaluate such information and issue a biological opinion including the information and recommendations given during the emergency consultation.

To facilitate conclusion of consultation prior to the necessary date to commence construction, in submitting its BA the Corps has also requested institution of expedited consultation pursuant to 50 CFR 402.14(*l*).

Though consultation is not complete, the Corps has reached an agency determination of species/habitat effect, based on the best factual and technical information available at the time of decision, and following preliminary coordination with the Services. Table 12 summarizes the effect determinations made in the BA for each of the species potentially occurring in the project vicinity. Key conservation measures intended to minimize impacts on listed species and habitat include the BMPs addressed in section 2.8 and the conservation measures addressed in section 2.9.

The Corps has concluded that the levees are a part of the baseline condition of the Pilchuck and Snohomish Rivers in this reach and that the proposed action, with the best management practices/conservation measures and proposed compensatory mitigation, would minimize impacts on listed species.

The Corps would commit to fully funding and performing all Reasonable and Prudent Alternatives necessary to avoid the likelihood of jeopardy to listed species or destruction or adverse modification of designated critical habitat, as well as Reasonable and Prudent Measures (RPMs) necessary and appropriate to minimize the impact of Incidental Take that are described if documents concluding consultation are received from USFWS and NMFS.

This EA will be reevaluated after consultation is complete. If necessary, the EA will be supplemented with necessary and applicable corresponding modifications to the scope and/or nature of the project, the procedures and practices used to implement the project, and/or the type and extent of compensatory mitigation associated with the project, and the associated FONSI will be reassessed.

7.6 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act, (16 U.S.C. § 1801 *et. seq.*), as amended by the Sustainable Fisheries Act of 1996 (PL 104-267) requires federal agencies to consult with the NMFS regarding actions that may adversely affect essential fish habitat (EFH) for Pacific coast groundfish, coastal pelagic species, and Pacific salmon. The Act defined EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” EFH is the habitat (waters and substrate) required to support a sustainable fishery and a managed species’ contribution to a healthy ecosystem. Waters include aquatic areas and their associated physical, chemical, and biological properties used by fish. Substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities.

The Pacific Fishery Management Council has designated EFH for the Pacific salmon fishery, federally managed ground fishes, and coastal pelagic fisheries (PFMC 2016). Though primarily focused on marine species, anadromous fishes like the Pacific salmon have EFH that can occupy freshwater habitats critical to their life cycle. Freshwater EFH for Pacific salmon consists of four major components: spawning and incubation, juvenile rearing, juvenile migration corridors, and adult migration corridors. Chinook also require adult holding habitat (PFMC 2016). The project action area includes EFH for Chinook salmon, coho salmon, and pink salmon. Habitat areas of particular concern within the action area include complex channel, floodplain habitat and spawning (Chinook only; PFMC 2016).

The Corps determined that the proposed project may adversely affect EFH designated for Chinook and coho salmon (Table 13). Effects of the proposed work on EFH would be essentially

identical to those discussed above for Chinook in section 3.2. There could be temporary impacts during construction to include substrate disturbance, increased noise, vibration, and minor turbidity. Additionally, the repairs would perpetuate the existing poor shoreline conditions and limit channel migration and floodplain function. Longer lasting impacts include vegetation removal. Potential adverse effects to EFH have been reduced or eliminated by use of conservation measures and BMPs. The Corps outlined this determination in a BA sent to the NMFS on November 23, 2021.

The Corps intends to proceed with construction prior to completion of consultation with NMFS pursuant to the "emergency Federal actions" provision of the EFH regulations, and to complete EFH consultation after the fact pursuant to 50 CFR Section 600.920(a). The Corps will reevaluate this EA at the time that EFH consultation is complete. If necessary, the Corps will supplement the EA with necessary and applicable corresponding modifications to the scope and/or nature of the project, the procedures and practices used to implement the project, and/or the type and extent of compensatory mitigation associated with the project, and the associated FONSI will be reassessed.

Table 13. EFH species and their life history stages that may be found in the project area.

Scientific Name	Common Name	Adult	Juvenile	Larvae	Egg
Pacific Salmon					
O. tshawytscha	Chinook salmon	X	X		
O. kisutch	Coho salmon	X	X		
O. gorbuscha	Pink salmon	X	X		

7.7 Migratory Bird Treaty Act of 1918 and Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

The Migratory Bird Treaty Act (16 U.S.C. § 703-712) as amended protects over 800 bird species and their habitat and commits that the U.S. will take measures to protect identified ecosystems of special importance to migratory birds against pollution, detrimental alterations, and other environmental degradations. EO 13186 directs federal agencies to evaluate the effects of their actions on migratory birds, with emphasis on species of concern, and inform the USFWS of potential negative effects to migratory birds.

Work is proposed after the prime nesting season (April to mid-June) to comply with the in-water work window (July 1 to August 31). Trees that may provide nesting to migratory birds would be removed. Mitigation to offset tree removal would provide good nesting habitat as the plantings mature. Implementation of the preferred alternative would not have any direct, affirmative and purposeful negative effect to migratory birds. There would be no adverse effect on habitat and the project would only have minimal and temporary incidental effects to a small number of individual birds that may be present in the project area. No permit application for "take" of migratory birds is required.

7.8 National Environmental Policy Act

The NEPA (42 U.S.C. § 4321 et seq.) commits federal agencies to considering, documenting, and publicly disclosing the environmental effects of their actions. It requires that an EIS be

included in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment. The EIS must provide detailed information regarding the proposed action and alternatives, the environmental effects of the alternatives, appropriate mitigation measures, and any adverse environmental effects that cannot be avoided if the proposal is implemented. Agencies are required to demonstrate that decision makers have considered these factors prior to undertaking actions. Major federal actions determined not to have a significant adverse effect on the quality of the human environment may be evaluated through an EA.

This EA evaluates the environmental effects requiring NEPA compliance with the proposed 2023 repairs.

7.8.1 NEPA / Cooperation Agreement

The Corps entered into a Cooperation Agreement with each of the Non-Federal Sponsors, the French Slough Flood Control District and the Marshland Flood Control District, on April 3, 2023. At that time, the Corps had initiated but not yet concluded full NEPA compliance for the levee repair projects. The timing of signature of the Cooperation Agreements was critical, because it was the triggering event in a subsequent series of critical-path steps leading to repair project execution. The Determination of Practicability for NEPA Compliance dated April 3, 2023 articulated the minimum time intervals required for each step in the procurement and execution processes leading up to the deadline for completion of in-water construction, some of which are necessarily sequential, and also took into account the resourcing and sequencing of milestones associated with conducting seven levee repair projects during the summer of 2023 in addition to the Pilchuck and Marshland Levee repairs. If the Corps had failed to timely execute the Cooperation Agreements and initiate a sequence of meeting the subsequent critical-path milestones, the Pilchuck and Marshland Levee repairs would have been in jeopardy of delay, leaving the levees in their current damaged condition into a fourth flood season. Completion of the NEPA documentation prior to executing the Cooperation Agreements, while still fulfilling the agency's emergency levee rehabilitation authorities and responsibilities under P.L. 84-99, was determined to be not practicable. At the time of execution of the Cooperation Agreements the Corps complied with NEPA "to the fullest extent possible" under the circumstances, considering what was practicable given the exigency of the need of reducing the urgent risk presented by these damaged flood control structures before the next flood season.

7.8.2 NEPA / Proposed Action

The prospective federal action is the proposed repairs to the Pilchuck and Marshland Levees as discussed in the body of this EA. The proposed action would include both the levee repair and mitigation. This EA has been prepared pursuant to NEPA. Effects on the quality of the human environment as a result of the proposed levee repair are anticipated to be less than significant. The EA has incorporated any necessary and applicable modifications to the scope and/or nature of the project, any effects to the human environment resulting from these modifications, the procedures and practices used to implement the project, and/or the type and extent of compensatory mitigation associated with the project.

7.8.3 NEPA Summary

A draft EA/FONSI for the proposed project was made available for public review and comment on December 3, 2021. The comment period ended on January 2, 2022. Two comments were received. The comments and responses are provided in Appendix D.

7.9 National Historic Preservation Act of 1966

Section 106 of the National Historic Preservation Act (16 U.S.C. § 470) requires that federal agencies evaluate the effects of federal undertakings on historical, archeological, and cultural resources and afford the Advisory Council on Historic Preservation opportunities to comment on the proposed undertaking if there is an adverse effect to an eligible Historic Property. The lead agency must examine whether feasible alternatives exist that avoid eligible cultural resources. If an effect cannot reasonably be avoided, measures must be taken to minimize or mitigate potential adverse effects.

The Corps initiated consultation with DAHP and the Confederated Tribes and Bands of the Yakama Indian Nation, Sauk-Suiattle Indian Tribe, Snoqualmie Indian Tribe, Stillaguamish Tribe of Indians, Swinomish Indian Tribal Community, and Tulalip Tribes on March 10, 2021. Initial concurrence with the Area of Potential Effect for both of the undertakings was received from DAHP on March 11, 2021 (Appendix F). A cultural resource survey was completed by Agnes Castronuevo, Corps archaeologist on October 21, 2020. No cultural resources were observed during the survey. The Corps consulted with DAHP on the survey results and effects determination on April 16, 2021. DAHP concurred with the Corps' determination of no adverse effect to historic properties on April 27, 2021 (Appendix F). To date the Corps has received no comments from the contacted Tribes.

7.10 Executive Order 11990 Protection of Wetlands

EO 11990 encourages federal agencies to take actions to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands when undertaking federal activities and programs. No wetlands would be destroyed, lost, or degraded by the proposed action.

7.11 Executive Order 11988 Floodplain Management

EO 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. The proposed project is to repair two existing levees to pre-flood conditions and does not include or support construction of any other structures in the flood plain.

7.12 Executive Order 12898, Environmental Justice in Minority Populations and Low-Income Populations and Executive Order 14008, Tackling the Climate Crisis; EO 13985 & 14091, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government; EO 14096, Revitalizing our Nation's Commitment to Environmental Justice for All

"Environmental Justice" is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income regarding the development, implementation, and enforcement of environmental laws, regulations, and policies, with no group bearing a disproportionate burden of environmental harms and risks. Environmental justice and disproportionate impacts to disadvantaged communities shall be considered throughout the Civil Works programs and in all phases of project planning and decision-making, consistent with the goals and objectives of various Administration policies.

EO 12898 directs federal agencies to take the appropriate steps to identify and address any disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on minority and low-income populations. Minority populations are those persons who identify themselves as Black, Hispanic, Asian American, American Indian/Alaskan Native, and Pacific Islander. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population. EO 14008 updates EO 12898 and has expanded Federal agencies' responsibilities for assessing environmental justice consequences of their actions. EO 13985, EO 14091, and EO 14096 charge the Federal Government with advancing equity for all, including communities that have long been underserved, and addressing systemic racism in our Nation's policies and programs.

An analysis of demographic data was conducted to derive information on the approximate locations of low-income and minority populations in the community of concern. Since the analysis considers disproportionate impacts, three areas were defined to compare the area affected by the project and a larger regional area that serves as a basis for comparison and includes the area affected. The larger regional area is defined as the smallest political unit that includes the affected area and is called the community of comparison. For purposes of the analysis, the affected area is approximately a five-mile radius around the project area, and the city of Snohomish, Washington is the community of comparison. Demographic information was also compared against the State of Washington for reference. The EPA's Environmental Justice (EJ) Screening and Mapping tool, also known as the EJScreen tool, was used to obtain the study area demographics (EPA 2022).

As shown in table 14, the aggregate minority population is estimated at 23 percent in the affected area, 16 percent in the city of Snohomish, and 31 percent in the state of Washington. The aggregate population percentage in the affected area does not exceed 50 percent and is less than the state average. The EO does not provide criteria to determine if an affected area consists of a low-income population. For purposes of the assessment, the CEQ criterion for defining low-income population was adapted to identify whether the population in an affected area constitutes a low-income population. An affected geographic area is considered to consist of a low-income population (i.e., below the poverty level, for purposes of this analysis) where the percentage of low-income persons: 1) is greater than 50 percent, or 2) is meaningfully greater than the low-income population percentage in the general population or other appropriate unit of geographic analysis. The U.S. Census Bureau poverty assessment weighs income before taxes and excludes capital gains and non-cash benefits (such as public housing, Medicaid, and food stamps). Table 14 provides a summary of the income and poverty status for the study area. As shown in the table, 12 percent of the individuals in the affected area are considered low-income. This percentage in the affected area does not exceed 50 percent. In addition, the affected area low-income population percentage is smaller than the low-income population in the city (20 percent) and the percentage of the State (26 percent). Therefore, affected area is not considered to have a high concentration of low-income population.

Table 14. Environmental Justice Demographic and Income Statistics (EPA 2022).

Demographic Affected	Affected Area	City of Snohomish	Washington State
Minority Population	23%	16%	31%
Low-Income Population	12%	20%	26%

The EPA's EJScreen tool also provides an index on environmental indicators (EPA 2022). The EJ index is a combination of environmental and demographic information. There are eleven EJ Indexes in EJSCREEN reflecting the 11 environmental indicators. The EJ Index uses the concept of "excess risk" by looking at how far above the national average the block group's demographics are. EPA considers a project to be in an area of potential EJ concern when an EJScreen analysis for the impacted area shows one or more of the eleven EJ Indexes at or above the 80th percentile in the nation and/or state. None of the eleven EJ Indexes are at or above the 80th percentile in the nation and state (EPA 2022).

Additionally, as part of the environmental justice analysis, the CEQ's Climate and Economic Justice Screening Tool was examined for disadvantaged communities. Communities are considered disadvantaged if they are in a census tract that meets the threshold for at least one of the tool's categories of burden and corresponding economic indicator or are on the lands of a Federally Recognized Tribe. Neither project site is within a disadvantaged tract (CEQ 2022).

The preferred alternative of repair of existing levee systems does not involve a facility siting decision and will not disproportionately affect minority or low-income populations nor have any adverse human health impacts. The area is not at or above the 80th percentile in the nation and/or state for any of the eleven EJ indexes. The project will not cause long-term increases to any of the eleven EJ indexes. Only minor and temporary increases related to construction equipment emissions are anticipated. Other EJ Indexes unrelated to emissions will remain unaffected (e.g., Superfund proximity, wastewater discharge indicator, etc.). The project maintains flood protection for the affected area. If the preferred alternative is not implemented, communities would experience greater flood risk. No interaction with other projects will result in any such disproportionate impacts. No cumulative impact to environmental justice is expected from interaction of the proposed levee repairs with other past, present, and reasonably foreseeable projects. Further, tribal governments that are also environmental justice communities in the project area have been engaged and informed about the proposed action. The proposed action will not directly or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin, nor would it have a disproportionate effect on minority or low-income communities.

Because the levees protect the area from overflooding of the Snohomish and Pilchuck Rivers, the area of analysis for environmental justice purposes also includes the floodplain for these rivers. The preferred alternative, which repairs the Pilchuck and the Marshland Levees to their pre-damage level of protection, will provide a universal benefit to persons, including disadvantaged minority, low-income, and tribal communities, residing in the floodplain. Thus, there are no disproportionate adverse impacts imposed on those communities, as compared with the larger reference population, through repair of the levees.

7.13 Executive Order 13007 Native American Sacred Sites

EO 13007, Native American Sacred Sites, directs federal agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners. Agencies are to avoid adversely affecting the physical integrity of such sacred sites and to maintain the confidentiality of sacred sites when appropriate. The act encourages government-to-government consultation with Tribes concerning sacred sites. Some sacred sites may qualify as historic properties under the National Historic Preservation Act.

No sacred sites in the project area have been previously reported; however, Corps sent letters to the Confederated Tribes and Bands of the Yakama Indian Nation, Sauk-Suiattle Indian Tribe, Snoqualmie Indian Tribe, Stillaguamish Tribe of Indians, Swinomish Indian Tribal Community,

and Tulalip Tribes on March 10, 2021, soliciting any knowledge or concerns or religious significance for the Area of Potential Effects. The Corps also sent letters requesting comments on the proposed project and providing the opportunity to initiate Government-to-Government consultation on April 15, 2021. To date the Corps has received no comments from the contacted Tribes.

7.14 Native American Tribal Treaty Rights & Tribal Consultation under EO 13175, Consultation and Coordination with Indian Tribal Governments

The United States has a unique, legally affirmed Nation-to-Nation relationship with American Indians and Alaska Native Tribal Nations, which is recognized under the Constitution of the United States, treaties, statutes, EOs, and court decisions. The United States recognizes the right of Tribal Governments to self-govern and supports Tribal sovereignty and self-determination. The United States also has a unique trust relationship with and responsibility to protect and support Tribal Nations.

Between 1778 and 1871, the United States entered into about 400 treaties with various Indian nations on a government-to-government basis. Under the United States Constitution, treaties are accorded precedence equal to federal law. Treaty rights are binding on all federal and state agencies, and take precedence over State constitutions, laws, and judicial decisions. Treaty terms, and the rights arising from them, cannot be rescinded or cancelled without explicit and specific evidence of Congressional intent – indicating that Congress was aware of the conflict between its intended action on the one hand and Indian treaty rights on the other, and chose to resolve the conflict by abrogating the treaty. A right enumerated in a treaty ratified by the Senate may only be superseded by a subsequent act of Congress.

The Corps has a trust policy to consult with, and consider views of, federally recognized American Indian Tribes when proposing an action that may have the potential to significantly affect tribal rights, resources and lands. See Department of Defense Instruction (DODI) 4710.02, Section 3, Subject: DOD Interactions with Federally Recognized Tribes (24 September 2018). The Corps discharges that duty by notifying, consulting with, and meaningfully considering tribal concerns that are raised through this consultation process.

In the 1850s, in exchange for the cession of their ancestral lands, numerous tribes in the Pacific Northwest entered into treaties with the United States to secure for themselves, amongst other considerations, the preservation of fishing rights in the ceded areas. These treaties were negotiated and signed by the then-Governor of the Washington Territory, Isaac I. Stevens, and are collectively known as the “Stevens Treaties.”

In 1974, many (but not all) of the Stevens Treaties signatory tribes’ “usual and accustomed grounds” (U&A) within Puget Sound were delineated in a federal court adjudication, U.S. V. Washington, 384 F. Supp. 312 (W.D. Wash. 1974). The Stevens treaties reserved the signatory tribes’ right to “take fish at usual and accustomed grounds and stations . . . in common with all citizens of the territory” U.S. v. Washington, 384 F. Supp. at 332. Federal case law has recognized that the signatory Tribes also reserved the right to take up to 50 percent of the harvestable anadromous fish runs passing through those grounds (Fair Share). Over the years, the courts have held that this right also comprehends certain subsidiary rights, such as access to their “usual and accustomed” fishing grounds. *See Northwest Sea Farms v. USACE,* 931 F. Supp 1515 (W.D. Wash.1996).

For this proposed project, the Corps has notified the following tribe: Snoqualmie Indian Tribe, Stillaguamish Tribe of Indians, Swinomish Indian Tribal Community, Tulalip Tribes, Sauk-Suiattle Indian Tribe, and Confederated Tribes and Bands of the Yakama Indian Nation, and evaluated impacts to fish and wildlife in this project and sent letters to the above listed Tribes requesting comments on the proposed project and providing the opportunity to initiate Government-to-Government consultation on April 15, 2021. To date the Corps has received no comments from the contacted Tribes.

8 SUMMARY / CONCLUSION

The No Action Alternative (Alternative 1) does not meet the project's purpose and need. The Repair In-Kind Alternative (Alternative 4) meets the project's purpose and need but would maintain unstable conditions that are susceptible to damages. The preferred alternative (Alternative 5) fulfills the project's purpose and need by repairing the Pilchuck and Marshland Levees to a 10-year level of protection and repairs the levees in a way more resilient and stable than their pre-damaged condition. Based on the above analysis the proposed Pilchuck and Marshland Levee Repair Projects would not constitute a major federal action significantly affecting the quality of the human environment, and therefore do not require preparation of an EIS.

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10 APPENDICES

(A) Photos of the Damaged Levees
(B) Design Drawings
(C) Water Quality Monitoring Plan
(D) Public Comments
(E) Coastal Zone Management Act
(F) Cultural Resources Correspondence

APPENDIX A – PHOTOS OF THE DAMAGED LEVEES

Photos A1 to A5 – Pilchuck Levee
Photos A6 to A9 – Marshland Levee

Photo A1. Bank caving and erosion at Pilchuck Levee toe looking upstream.

Photo A2. Looking downstream from the upstream extent of the proposed repair at the Pilchuck Levee.

Photo A3. Erosion and temporary repair at the Pilchuck Levee looking downstream.

Photo A4. Riprap along the damaged Pilchuck Levee.

Photo A5. View upstream from near the middle of the damaged Pilchuck Levee. Flow is directed towards the damaged area.

Photo. A6. Toe of the damaged Marshland Levee looking upstream.

Photo A7. Armor near damaged section of the Marshland Levee.

Photo A8. Looking downstream at the damaged Marshland Levee.

Photo A9. Slope of the damaged Marshland Levee, which was last repaired above the ordinary high-water mark in 2010 using fabric lifts. No armor is present.

APPENDIX B – DESIGN DRAWINGS

Appendix B.1 – Pilchuck Levee Repair
Appendix B.2 – Marshland Levee Repair

Appendix B.1 Pilchuck Design Drawings

US Army Corps
of Engineers ®
Seattle District

FY20 P2-486163 PLCH
PILCHUCK LEVEE
2020 LEVEE REHAB
SNOHOMISH, WASHINGTON

PROJECT VICINITY MAP
NTS

PROJECT LOCATION MAP
NTS

INDEX OF DRAWINGS

SHEET ID	TITLE
	GENERAL
G-001	TITLE, VICINITY MAP, PROJECT MAP, AND INDEX
	CIVIL
CS100	ACCESS AND HAUL ROUTE
CS101	SITE PLAN
C-301	CROSS SECTIONS
	LANDSCAPE
L-100	MITIGATION ACCESS AND HAUL ROUTE
L-101	MITIGATION SITE PLAN
L-501	PLANTING DETAILS

SITE PLANS

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers ® Seattle District

Date: 20 NOVEMBER 2020
Solicitation No.: -
File No.: E-6-7-50

Recommended by: GUY L. GHEEN, P.E. Chief, Design Branch 11/20/2020 Date
Approved by: JOANN T. WALLS, P.E. Chief, Engineering Div. 11/20/2020 Date

Submitted by: AARON MEADOWS-HILLS Project Manager 11/20/2020 Date
Reviewed by: ANIL L. NISHGAARD, P.E. Chief, Specs. and Tech Review 11/20/2020 Date

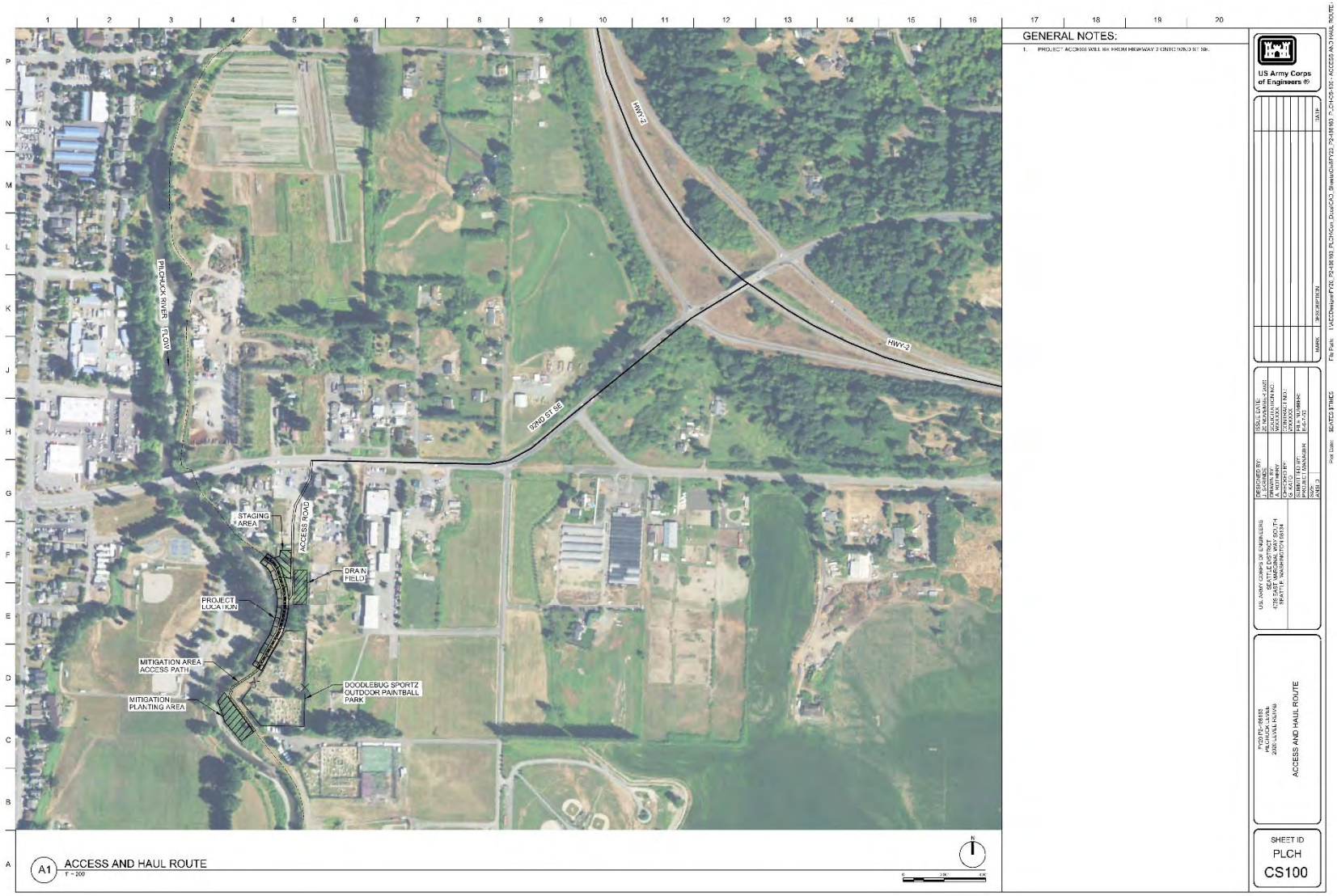
U.S. ARMY CORPS OF ENGINEERS SEATTLE DISTRICT SEATTLE, WASHINGTON
Prepared by: ALICIA N. NOTHERY Chief, Preparing Section 11/20/2020 Date

FY20 P2-486163 PLCH PILCHUCK LEVEE 2020 LEVEE REHAB

TITLE, VICINITY MAP, PROJECT MAP, AND INDEX

SHEET IDENTIFICATION
G-001

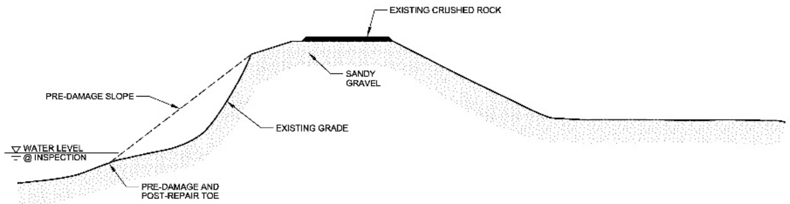
DATE AND TIME PLOTTED: 11/20/2020
DESIGN FILE: RAFC\Designs\FY20\P2-486163_PLCH\Con_Docs\CAD_Sheets\General\FY20_P2-486163_PLCH-G-001CVR.dgn


GENERAL NOTES:
1. PROJECT ACCESS WILL BE FROM HIGHWAY 2 UNTIL 92ND ST. SE.
HWY-2
HWY-2
92ND ST. SE
PILCHUCK RIVER - FLOW
STAGING AREA
ACCESS ROAD
DRAIN FIELD
PROJECT LOCATION
MITIGATION AREA ACCESS PATH
MITIGATION PLANTING AREA
DOODLEBUG SPORTZ OUTDOOR PAINTBALL PARK
A1 ACCESS AND HAUL ROUTE
1" = 200'
US Army Corps of Engineers
ACCESS AND HAUL ROUTE
SHEET ID
PLCH
CS100

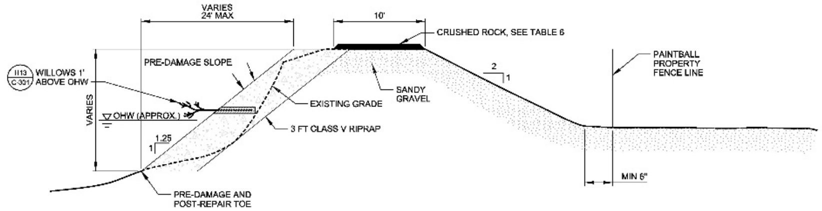

GENERAL NOTES:
1. PROJECT ACCESS WILL BE FROM HIGHWAY 2 ONTO NORTH 31ST SR.
2. STAGING AREA WILL BE COVERED IN TOPSOIL, HYDROSEEDED AND MATCH THE EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
3. LANDWARD TOE OF LEVEE REPAIR SHALL NOT ENCROACH OR IMPACT THE CENTERLINE OF THE PAINTBALL FIELD.
4. IN WATER WORK WINDOW JULY 1 - AUGUST 31.
US Army Corps of Engineers
DRAINFIELD APPROX. LOACTION
ACCESS ROUTE
FENCE LINE
PROPOSED LEVEE CENTERLINE
DOODLEBUG SPORTZ OUTDOOR PAINTBALL PARK
STAGING AREA
CLASS V RIPRAP
PILCHUCK RIVER FLOW
EXISTING LEVEE CENTERLINE
SITE PLAN
A1 SITE PLAN
SHEET ID
PLCH
CS101

GENERAL NOTES:

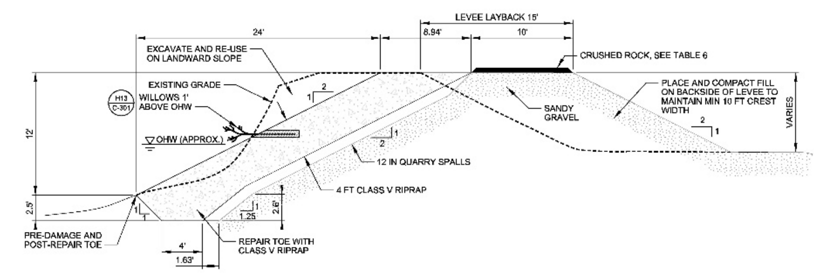
1. PROJECT SITE EXTENDS FOR 600 LINEAL FEET INCLUDING TRANSITIONS FROM NATIONAL LEVEE DATABASE (NLD) FROM STATION 43+00 TO STATION 49+00. ACTUAL STATION OF CROSS SECTIONS WILL VARY DEPENDING ON FIELD CONDITIONS.
2. USACE SHALL BE RESPONSIBLE FOR LOCATING UNDERGROUND AND OVERHEAD UTILITIES AS APPLICABLE PRIOR TO COMMENCING WORK.
3. QUARRY SPALLS SHALL CONFORM TO GRADATIONS IN TABLE 1 ON C-301 AND SHALL CONSIST OF CLEAN, ANGULAR, SCREENED AND CRUSHED ROCK.
4. CLASS V RIPRAP SHALL CONFORM TO THE GRADATIONS IN TABLE 2 ON C-301. STONE SHALL BE HARD, SOUND, AND DURABLE MATERIAL, FREE FROM SEAMS, CRACKS AND OTHER DEFECTS TENDING TO LEAD TO PREMATURE WEATHERING.
5. SOIL FROM EXISTING LEVEE EMBANKMENT TO BE REUSED ALONG THE EMBANKMENT. ADDITIONAL EMBANKMENT SOIL SHALL CONFORM TO THE GRADATIONS IN TABLE 3 ON C-301.
6. TOPSOIL PLANTING MATRIX SHALL CONSIST OF A 75/25 MIXTURE O SOIL AND ORGANIC COMPOST. ENGINEERED TOPSOIL SHALL CONFORM TO GRADATION IN TABLE 4 ON C-301 AND SHALL BE FREE OF ROOTS, CHEMICALS GARBAGE AND DEBRIS.
7. WHERE HISTORICAL RIVERWARD TOE EXCEEDS THE EXTENT OF THE LEVEE REPAIR, EFFORT SHOULD BE MADE FOR EXISTING MATERIAL TO REMAIN INTACT SUCH THAT SAFE CONSTRUCTION PRACTICES AND STABLE SLOPES ARE STILL MAINTAINED.
8. LIMIT CONSTRUCTION ACTIVITIES TO WORK AREAS SHOWN.
9. HYDROSEED MIXTURE SHALL CONSIST OF THE FOLLOWING MINIMUM STANDARDS: 40-80 LBS TACKIFIER PER AC, 2000 LBS MULCH PER AC, 400 LBS FERTILIZER PER AC, 200 LB SEED PER AC WITH 48.24% MAXIMA CREEPING RED FESCUE, 24.51% ELF PERENNIAL RYEGRASS, 14.62% HIGHLAND BENTGRASS, AND 9.93% WHITE DUTCH CLOVER. SUITABLE SUBSTITUTES MAY BE USED AFTER REVIEW AND APPROVAL BY PROJECT BIOLOGIST.



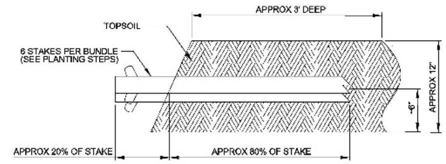
K1 CROSS SECTION EXISTING CONDITIONS
NTS



F1 CROSS SECTION DOWNSTREAM TRANSITION
NTS



A1 CROSS SECTION PROPOSED
NTS



H13 WILLOW BUNDLE CROSS SECTION (SINGLE LIFT)
NTS

PLANTING STEPS:

1 WILLOW STAKES SHALL BE CUT TO 4' IN LENGTH WITH AN ANGLE CUT (45 DEGREES) BASAL END OF 0.5" TO 1.5" IN DIAMETER AND PERPENDICULAR CUT JUST ABOVE A NODE (BUD) AT THE TOP.
2. WILLOW BUNDLES CONSIST OF SIX 4-FOOT LONG WILLOW STAKES OF SITKA AND/OR HOOKER'S WILLOW PLANTED IN A SOIL MATRIX CONSISTING OF TOPSOIL 12 INCHES IN DIAMETER AND 3 FEET DEEP, SPACED 6 FEET ON CENTER.
3. WHEN SLOPE ARMOR IS PLACED TO THE PRE-EXISTING VEGETATION LINE (ORDINARY HIGH WATER), INSTALL WILLOW BUNDLES.
4. LAY DOWN A 6" THICK, 3' DEEP LAYER OF TOPSOIL ALIGNED HORIZONTALLY.
5. PLACE WILLOW BUNDLE HORIZONTALLY AT THE CENTER OF THE LAYER SO THAT APPROXIMATELY 80% WILL BE EMBEDDED.
6. PLACE REMAINING 6" OF TOPSOIL ON TOP AND CONTINUE ROCK PLACEMENT.
7. INSTALL WILLOW BUNDLES EVERY 6' ALONG EACH SITE.
8. TREES AND OTHER WOODY SHRUBS REMOVED AS A RESULT OF THE REPAIR SHALL BE PLACED AT ABOUT 1' ABOVE OHW LINE FOR ALL SITES. DO NOT PLACE VEGETATION ON WILLOW BUNDLES.

TABLE 1: QUARRY SPALL GRADATION

SIEVE SIZE	PRECENT PASSING
8"	100
4"	0

TABLE 2: RIPRAP GRADATIONS (ASSUMED SPECIFIC GRAVITY = 2.80)

DISTRIBUTION	CLASS V	
	WEIGHT (LB)	DIAMETER (IN)
100% SMALLER THAN	3000	34
50% SMALLER THAN	750	21
10% SMALLER THAN	188	13
Cu		2.2

TABLE 3: ENGINEERED EMBANKMENT GRADATION

SIEVE SIZE	PRECENT PASSING BY WEIGHT
3-INCH	100
2-INCH	90-100
1-INCH	70-90
1/2 INCH	55-85
NO. 4	35-75
NO. 40	15-50
NO. 200	10-15

TABLE 4. ENGINEERED TOPSOIL GRADATION

SIEVE SIZE	PRECENT PASSING BY WEIGHT
1/2 INCH	100
NO. 4	75-100
NO. 10	40-75
NO. 18	25-55
NO. 40	25-50
NO. 200	10-20

TABLE 5. LEVEE MATERIAL QUANTITIES

SITE	LENGTH (FEET)	CLASS V RIPRAP (CY)	QUARRY SPALLS (CY)	EMBANKMENT SOIL (CY)	TOPSOIL* (CY)	5/8" MINUS CRUSHED ROCK* (CY)
TOTAL	600	3100	870	2700	40	120 (SEE TABLE 6)

*INCLUDES QUANTITIES FOR RESTORATION TO MATCH EXISTING CONDITIONS PRIOR TO CONSTRUCTION.

TABLE 6. 5/8 INCH MINUS CRUSHED ROCK GRADATION

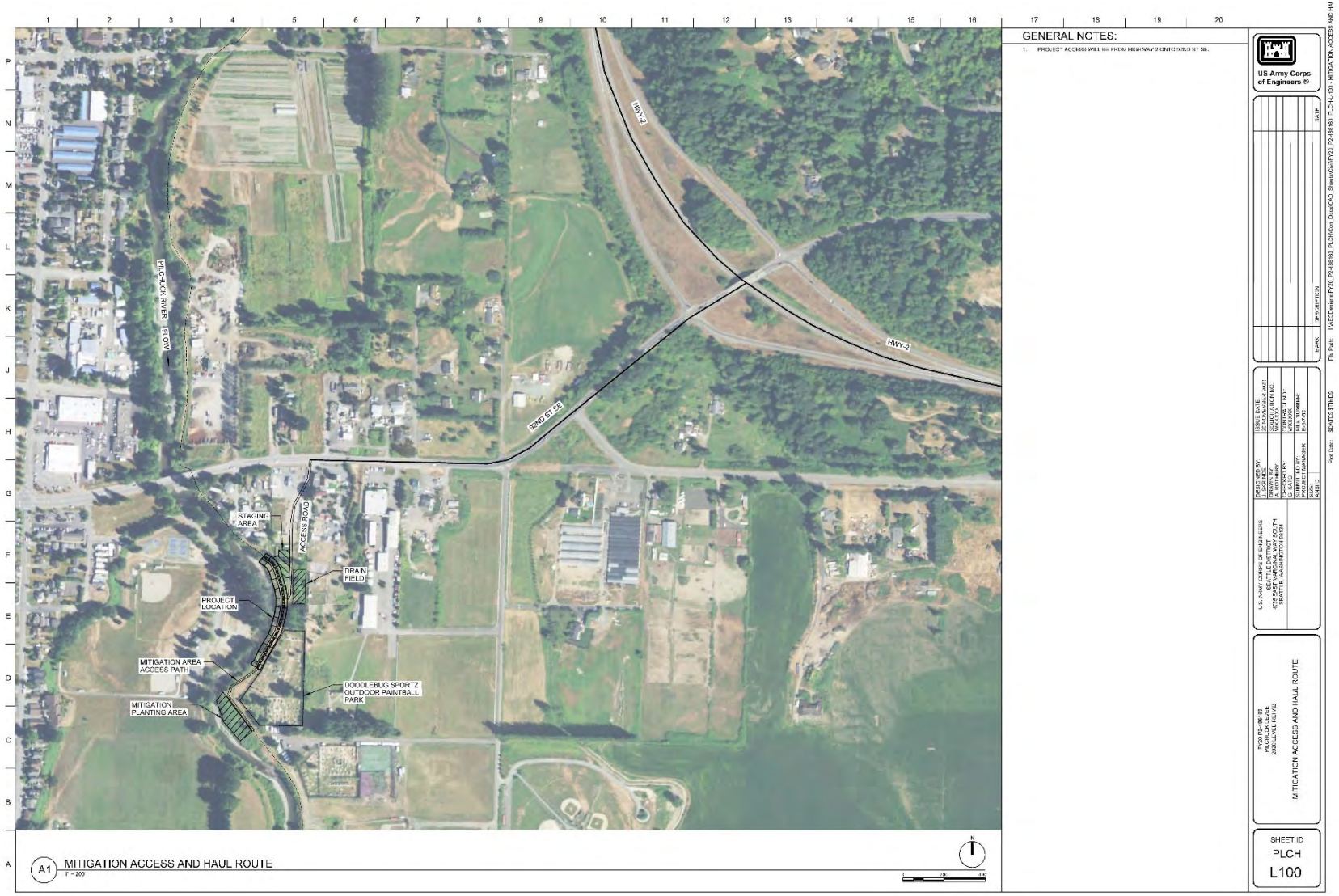
SIEVE SIZE	PRECENT PASSING BY WEIGHT
5/8 INCH	100
1/2 INCH	90-100
NO. 4	25-66
NO. 40	10-26
NO. 200	7 MAX

ALL PERCENTAGES ARE BY WEIGHT. % FRACTURE 75 MIN. SAND EQUIVALENT 40 MIN.

US Army Corps of Engineers

CROSS SECTIONS

SHEET ID
PLCH
C-301


GENERAL NOTES:
1. PROJECT ACCESS WILL BE FROM HIGHWAY 2 UNTIL 92ND ST SE.
PILCHUCK RIVER - FLOW
HWY-2
92ND ST SE
STAGING AREA
ACCESS ROAD
DRAIN FIELD
PROJECT LOCATION
MITIGATION AREA ACCESS PATH
MITIGATION PLANTING AREA
DOODLEBUG SPORTZ OUTDOOR PAINTBALL PARK
A1 MITIGATION ACCESS AND HAUL ROUTE
1" = 200'
US Army Corps of Engineers
MITIGATION ACCESS AND HAUL ROUTE
SHEET ID
PLCH
L100

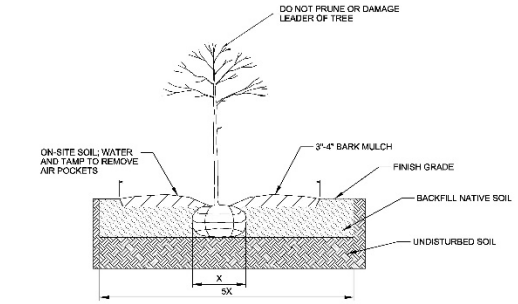

GENERAL NOTES:
LEGEND
REMOVE INVASIVE SPECIES AND HYDROSEED
TREE INFORMATION
PILCHUCK LEVEE REHAB
MITIGATION AREA ACCESS PATH
DOODLEBUG SPORTZ OUTDOOR PAINTBALL PARK
FENCELINE
EXISTING LEVEE CENTERLINE
PILCHUCK RIVER FLOW
43+00
42+50
42+00
41+50
41+00
40+50
40+00
39+50
39+00
38+50
38+00
A1 MITIGATION SITE PLAN
US Army Corps of Engineers
MITIGATION SITE PLAN
SHEET ID
PLCH
L-101

PLANTING NOTES:

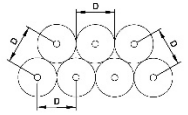
1. NEW TREES SHALL RECEIVE A 4 FT DIAMETER MULCHED CIRCLE.
2. DO NOT STAKE TREES.
3. PLANT PIT DIMENSIONS ARE TYPICAL FOR ALL TREES.
4. PLACE ALL ROOTBALLS SO TOPS ARE LEVEL W/FINISH GRADE.
5. PRUNE ALL DEAD AND BROKEN LIMBS AND ROOTS PER SPECIFICATIONS.
6. REMOVE INVASIVE VEGETATION FROM MITIGATION AREA (I.E. HIMALAYAN BLACKBERRY, REED CANARY GRASS, JAPANESE BLACKBERRY, ETC.)
7. SEE TABLE 1 FOR SPECIES AND NUMBER OF MITIGATION PLANTINGS.
8. HYDROSEED DISTURBED AREAS AREAS AND BARE SOILS WITH SPECIFIED SEED MIX AS PER GENERAL NOTE #9, SHEET C-301.
9. REMOVE INVASIVE SPECIES FROM SITE AND DISPOSE OF PROPERLY TO PREVENT SPREAD. DO NOT ALLOW JAPANESE KNOTWEED TO ENTER THE RIVER.

TABLE 1: PLANTING SCHEDULE

SPECIES	PILCHUCK MITIGATION AREA
BLACK COTTONWOOD	5
RED ALDER	10
DOUGLAS FIR	10
PACIFIC WILLOW	5
SITKA SPRUCE	8
TOTALS	38

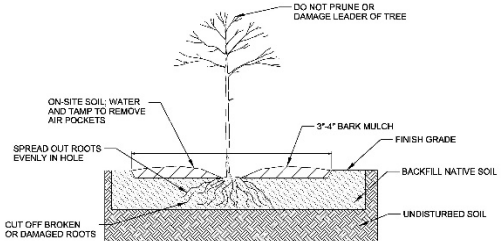


G1 TREE PLANTING, WITH ROOTBALL
NTS



NOTE:
1. D = 10 FEET

G9 TREE PLANTING SPACING
NTS



A1 BAREROOT PLANTING
NTS

US Army Corps of Engineers ®

PLANTING DETAILS

SHEET ID
PLCH
L-501

Appendix B.2 Marshland Design Drawings

US Army Corps
of Engineers ®
Seattle District

FY20 P2-489168 MARSH
MARSHLAND
2020 LEVEE REHAB
SNOHOMISH, WA

SHEET ID	TITLE
	GENERAL
G-001	TITLE, VICINITY MAP, PROJECT MAP, AND INDEX
	CIVIL
CS-100	ACCESS AND HAUL ROUTE
CS-101	PROPOSED SITE PLAN
C-301	CROSS SECTIONS
	LANDSCAPE
L-100	MITIGATION AREA ACCESS ROUTE
L-101	MITIGATION SITE PLAN
L-501	PLANTING DETAILS

PROJECT VICINITY MAP
NTS

PROJECT LOCATION MAP
NTS

SAFETY PAYS

IF SHEET MEASURES LESS THAN 22" X 34" IT IS
A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

DATE AND TIME PLOTTED: 11/20/2020
DESIGN FILE: I:\AECDesigns\FY20_P2-489168_MARSH\Con_Docs\CAD_Sheets\General\FY20_P2-489168_MARSH-G-001CVR.dgn

US Army Corps of Engineers ® Seattle District

Date: 20 NOV 2020
File No.: E-6-7-51
Solicitation No.: -

Recommended by: GUY L. GREEN, P.E. — Chief, Design Branch — XX/XX/XX Date
Approved by: JOANN T. WALLS, P.E. — Chief, Engineering Div. — XX/XX/XX Date

Submitted by: PROJECT MANAGER — Project Manager — XX/XX/XX Date
Reviewed by: — Chief, Specs. and Tech Review — XX/XX/XX Date

U.S. ARMY CORPS OF ENGINEERS
SEATTLE DISTRICT
SEATTLE, WASHINGTON
Prepared by: GABRIEL SIMON — Chief, Preparing Section — XX/XX/XX Date

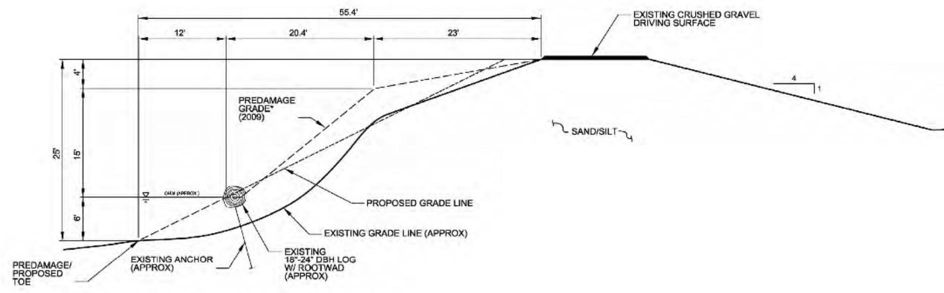
FY20 P2-489168 MARSH
MARSHLAND
SNOHOMISH, WA
2020 LEVEE REHAB

COVER SHEET

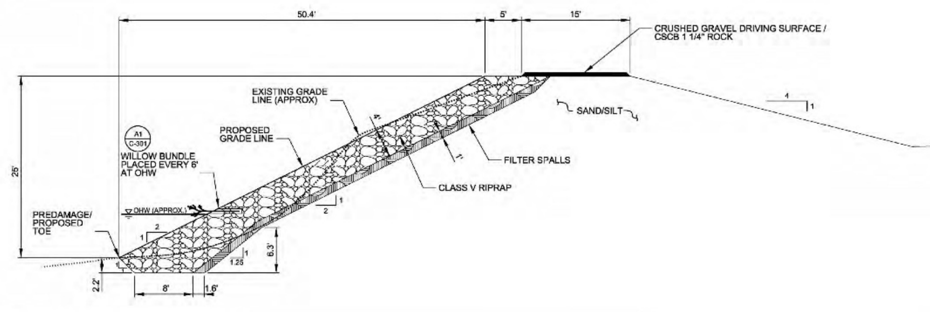
SHEET IDENTIFICATION
G-001


GENERAL NOTES:
1. USE EXISTING ROADS FOR SITE ACCESS.
2. UPON PROJECT COMPLETION, STAGING AREA WILL BE RESTORED TO MATCH EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
TOWNSEND'S ROOTS
AIRPORT WAY
ACCESS ROAD
ACCESS ROAD
STAGING AREA
FLOW
SNOHOMISH RIVER
REPAIR SITE
C-307
A1 ACCESS AND HAUL ROUTE
1" = 200'
US Army Corps of Engineers ®
ACCESS AND HAUL ROUTE
SHEET ID
MARSH
CS100
95% DESIGN SUBMITTAL

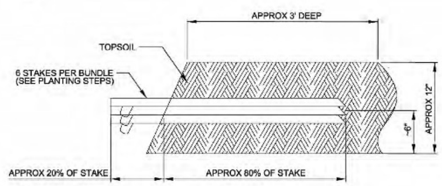

GENERAL NOTES:
1. STATIONING DERIVED FROM THE NATIONAL LEVEE DATABASE (NLD).
2. LEVEE REPAIR SPANS FROM 196+00 TO 199+30 AS SHOWN.
3. IN-WATER WORK WINDOW IS FROM JULY 1 TO AUGUST 31.
4. TRANSITION UPSTREAM AND DOWNSTREAM ENDS OF REPAIR TO SMOOTHLY TIE INTO EXISTING SLOPES AND ELEVATIONS.
ACCESS ROUTE
STAGING AREA
NO SLOPE
2H:1V
EXISTING CRUSHED GRAVEL DRIVING SURFACE
REPAIR SITE
FLOW
SNOHOMISH RIVER
195+50
196+00
196+50
197+00
197+50
198+00
198+50
199+00
199+50
200+00
A1 SITE PLAN
1" = 20'
US Army Corps of Engineers
SITE PLAN
SHEET ID
MARSH
CS101
95% DESIGN SUBMITTAL



J1 EXISTING/PREDAMAGE/PROPOSED GRADE LINES
NTS



D1 PROPOSED CROSS SECTION
NTS



A1 WILLOW BUNDLE CROSS SECTION (SINGLE LIFT)
NTS

PLANTING STEPS:

1. WHEN SLOPE ARMOR IS PLACED TO THE PRE-EXISTING VEGETATION LINE (ORDINARY HIGH WATER), INSTALL WILLOW BUNDLES.
2. WILLOW BUNDLES SHALL BE COMPRISED OF SITKA WILLOW (*SALIX SITHCENSIS*) AND/OR HOOKER'S WILLOW (*SALIX HOOKERIANA*) STAKES.
3. EACH WILLOW BUNDLE SHALL CONSIST OF SIX (6) WILLOW STAKES PLANTED IN A CYLINDRICAL SOIL MATRIX CONSISTING OF TOPSOIL 12 INCHES IN DIAMETER AND 3 FEET DEEP, AS PER DETAIL A1 ON SHEET C-301.
4. EACH STAKE SHALL BE CUT TO 4-FOOT LENGTHS WITH AN ANGLE CUT (45 DEGREES) BASAL END OF 0.5" TO 1.5" IN DIAMETER AND PERPENDICULAR CUT JUST ABOVE A NODE (BUD) AT THE TOP.
5. INSTALL WILLOW BUNDLES EVERY 6 FEET ON CENTER ALONG SITE.
6. CONTINUE SLOPE ARMOR PLACEMENT.

GENERAL NOTES:

1. PROJECT SITE EXTENDS FOR 300 LINEAR FEET INCLUDING TRANSITIONS FROM NATIONAL LEVEE DATABASE (NLD) FROM STATION 196+00 TO STATION 198+00. ACTUAL STATION OF CROSS SECTIONS WILL VARY DEPENDING ON FIELD CONDITIONS.
2. USACE SHALL BE RESPONSIBLE FOR LOCATING UNDERGROUND AND OVERHEAD UTILITIES AS APPLICABLE PRIOR TO COMMENCING WORK.
3. FILTER SPALLS SHALL CONFORM TO GRADATIONS IN TABLE 1 ON C-301 AND SHALL CONSIST OF CLEAN, ANGULAR, SCREENED AND CRUSHED ROCK.
4. CLASS V RIPRAP SHALL CONFORM TO THE GRADATIONS IN TABLE 3 ON C-301. STONE SHALL BE HARD, SOUND, AND DURABLE MATERIAL, FREE FROM SEAMS, CRACKS AND OTHER DEFECTS TENDING TO LEAD TO PREMATURE WEATHERING.
5. SOIL FROM EXISTING LEVEE EMBANKMENT TO BE REUSED ALONG THE EMBANKMENT. ADDITIONAL EMBANKMENT SOIL SHALL CONFORM TO THE GRADATIONS IN TABLE 4 ON C-301.
6. TOPSOIL PLANTING MATRIX SHALL CONSIST OF A 75/25 MIXTURE OF SOIL AND ORGANIC COMPOST. ENGINEERED TOPSOIL SHALL CONFORM TO GRADATION IN TABLE 4 ON C-301 AND SHALL BE FREE OF ROOTS, CHEMICALS GARBAGE AND DEBRIS.
7. CRUSHED SURFACING BASE COURSE (CSBC) SHALL CONFORM TO GRADATIONS IN TABLE 2 ON C-301 AND SHALL CONSIST OF CLEAN, ANGULAR, SCREENED AND CRUSHED ROCK. INSTALL TO MATCH EXISTING.
8. WHERE HISTORICAL RIVERWARD TOE EXCEEDS THE EXTENT OF THE LEVEE REPAIR, EFFORT SHOULD BE MADE FOR EXISTING MATERIAL TO REMAIN INTACT SUCH THAT SAFE CONSTRUCTION PRACTICES AND STABLE SLOPES ARE STILL MAINTAINED.
9. LIMIT CONSTRUCTION ACTIVITIES TO WORK AREAS SHOWN.
10. IN-WATER WORK WINDOW IS FROM JULY 1 - AUGUST 31.
11. WOODY DEBRIS FROM TREES AND LARGE SHRUBS REMOVED AS A RESULT OF THE REPAIR SHALL BE PLACED AT ABOUT 1' ABOVE OHW LINE FOR ALL SITES. REMOVE INVASIVE VEGETATION SUCH AS JAPANESE KNOTWEED OR HIMALAYAN BLACKBERRY, BEFORE PLACING WOODY DEBRIS. DO NOT PLACE VEGETATION ON WILLOW BUNDLES.
12. HYDROSEED MIXTURE SHALL CONSIST OF THE FOLLOWING MINIMUM STANDARDS: 40-80 LBS TACKIFIER PER AC, 2000 LBS MULCH PER AC, 400 LBS FERTILIZER PER AC, 200 LB SEED PER AC WITH 48.24% MAXIMA CREEPING RED FESCUE, 24.51% ELF PERENNIAL RYEGRASS, 14.62% HIGHLAND BENTGRASS, AND 9.93% WHITE DUTCH CLOVER. SUITABLE SUBSTITUTES MAY BE USED AFTER REVIEW AND APPROVAL BY THE PROJECT BIOLOGIST.

* AS-BUILT DRAWINGS WERE NOT ACCESSIBLE. PREDAMAGED GRADE IS BASED ON ASSOCIATED HISTORICAL DESIGN RECORDS, SATELLITE IMAGERY, AND BEST PROFESSIONAL JUDGEMENT.

REPAIR STEPS

1. EXCAVATE SLOUGHED MATERIAL FROM TOE OF SLOPE, INCLUDING GEOTEXTILE FABRIC AND ANCHORED WOODY DEBRIS. THE EXISTING 18"-24" DBH LOG W/ ROOTWAD IS TO BE REMOVED AND PLACED ON THE LEVEE ALONG THE WATERLINE. REMOVE AND DISPOSE OF METAL ANCHORING. IF CUTTING LOG IS NECESSARY FOR REMOVAL, DO SO IN AS FEW PIECES AS POSSIBLE.
2. REMOVE EXISTING RIPRAP AND RETAIN AS PRACTICABLE.
3. CLEAR AND PREPARE REPAIR SITE AS NECESSARY. INVASIVE VEGETATION, INCLUDING JAPANESE KNOTWEED AND HIMALAYAN BLACKBERRY, WHICH WILL BE DISPOSED OF PROPERLY AND IN A MANNER TO PREVENT THE SPREAD OF INVASIVE VEGETATION.
4. RECONSTRUCT TOE TO PRE-DAMAGE CONDITION USING CLASS V RIPRAP.
5. INSTALL WILLOW BUNDLES ACCORDING TO THE PLANTING STEPS.
6. RECONSTRUCT THE LEVEE SLOPE BY GRADING THE EMBANKMENT AS NECESSARY AND INSTALLING A 4-FOOT BLANKET OF CLASS V RIPRAP OVER A FILTER SPALLS LAYER TO THE TOP OF SLOPE.
7. TRANSITION UPSTREAM AND DOWNSTREAM ENDS OF REPAIR TO SMOOTHLY TIE INTO EXISTING SLOPE AND EXISTING ELEVATION.
8. RESTORE CROWN WITH CSBC AS NEEDED. MATCH TO ADJACENT EXISTING.
9. HYDROSEED EXPOSED GROUND WITH SEED MIX AS SPECIFIED.

TABLE 1: FILTER SPALL GRADATION

SIEVE SIZE	PERCENT PASSING
4"	100
2"	0

TABLE 2: 1 1/4" MINUS CSBC GRADATION

SIEVE SIZE	PERCENT PASSING BY WEIGHT
1 1/4"	100
1"	80-100
5/8"	50-80
NO. 4	25-45
NO. 40	3-18
NO. 200	7.5 MAX.

TABLE 3: RIPRAP GRADATIONS (ASSUMED SPECIFIC GRAVITY = 2.60)

DISTRIBUTION	CLASS V	
	WEIGHT (LB)	DIAMETER (IN)
100% SMALLER THAN	3000	34
50%	750	21
10%	188	13
Cu		2.2

TABLE 4: ENGINEERED TOPSOIL GRADATION

SIEVE SIZE	PRECENT PASSING BY WEIGHT
1/2"	100
NO. 4	75-100
NO. 10	40-75
NO. 16	25-55
NO. 40	25-50
NO. 200	10-20

TABLE 5: MATERIAL QUANTITIES

SITE	LENGTH (FEET)	CLASS V RIPRAP (CY)	2"-4" FILTER SPALLS	1 1/4" ROCK (CY)	TOPSOIL* (CY)
TOTAL	300	3200	660	90	20

* INCLUDES QUANTITIES FOR RESTORATION TO MATCH EXISTING CONDITIONS PRIOR TO CONSTRUCTION.

US Army Corps of Engineers ®

MARK	DESCRIPTION	DATE

U.S. ARMY CORPS OF ENGINEERS SEATTLE DISTRICT 4735 EAST MARGINAL WAY SOUTH SEATTLE, WASHINGTON 98134	DESIGNED BY: J. SKRINDE	ISSUE DATE: 20 NOV 2020
	DRAWN BY: G. SIMON	SOLICITATION NO.: WXXXXX
	CHECKED BY: G. KATO	CONTRACT NO.: WXXXXX
	SUBMITTED BY: PROJECT MANAGER	FILE NUMBER: E-6-7-51
	SIZE: ANSI D	

FY20 P2 489170 MARSH
MARSHLAND LEVEE REHAB 2020
SNOHOMISH, WA
CROSS SECTIONS

SHEET ID
MARSH
C-301

95% DESIGN SUBMITTAL

File Path: I:\AECDesigner\FY20_P2-489168_MARSH\Con_Docs\CAD_Sheets\Civil\FY20_P2-489168-MARSH-C-301 - CROSS SECTION.cgn
Plot Date: $DATE$ $TIME$


GENERAL NOTES:
1. PROJECT ACCESS WILL BE FROM HIGHWAY 2, 88TH ST SE AND 92ND ST SE.
HWY 2
88TH ST SE
ACCESS ROAD
92ND ST SE
STAGING AREA
DRAIN FIELD
PILCHUCK LEVEE REHAB
MITIGATION AREA ACCESS PATH
MITIGATION PLANTING AREA
SNOHOMISH RIVER
MARSHLAND LEVEE REHAB
A1 MITIGATION ACCESS AND HAUL ROUTE
1" = 200'
US Army Corps of Engineers ®
MITIGATION ACCESS AND HAUL ROUTE
SHEET ID
MARSH
L-100
95% DESIGN SUBMITTAL

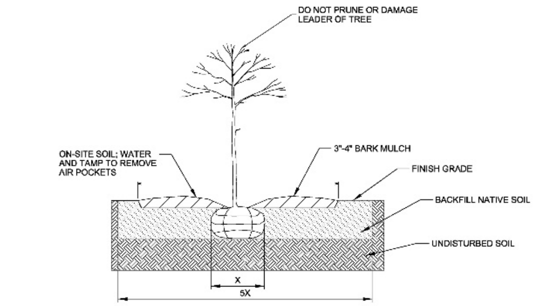

PILCHUCK LEVEE REHAB
43+00
42+50
42+00
41+50
41+00
40+50
40+00
39+50
39+00
38+50
38+00
DOODLEBUG SPORTZ OUTDOOR PAINTBALL PARK
MITIGATION AREA ACCESS PATH
FENCELINE
EXISTING LEVEE CENTERLINE
PILCHUCK RIVER
FLOW
A1 MITIGATION SITE PLAN
1" = 20'
GENERAL NOTES:
1. PROJECT ACCESS WILL BE FROM HIGHWAY 2 ONTO 92ND ST SE.
2. LANDWARD TOP OF LEVEE REPAIR SHALL NOT ENCROACH NOR IMPACT THE FENCELINE OF THE PAINTBALL FEILD.
LEGEND
REMOVE INVASIVE SPECIES AND HYDROSEED
TREE INFORMATION
SYMBOL SPECIES QTY MATURE CANOPY DIAMETER (FT)
BLACK COTTONWOOD 5 40
RED ALDER 10 30
DOUGLAS FIR 10 30
PACIFIC WILLOW 5 30
SITKA SPRUCE 8 30
US Army Corps of Engineers®
MITIGATION SITE PLAN
SHEET ID
MARSH
L-101
95% DESIGN SUBMITTAL

PLANTING NOTES:

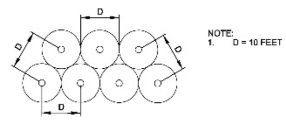
1. NEW TREES SHALL RECEIVE A 4 FT DIAMETER MULCHED CIRCLE.
2. DO NOT STAKE TREES.
3. PLANT PIT DIMENSIONS ARE TYPICAL FOR ALL TREES.
4. PLACE ALL ROOTBALLS SO TOPS ARE LEVEL W/FINISH GRADE.
5. PRUNE ALL DEAD AND BROKEN LIMBS AND ROOTS PER SPECIFICATIONS.
6. REMOVE INVASIVE VEGETATION FROM MITIGATION AREA (I.E. HIMALAYAN BLACKBERRY, REED CANARY GRASS, JAPANESE BLACKBERRY, ETC.)
7. SEE TABLE 1 FOR SPECIES AND NUMBER OF MITIGATION PLANTINGS.
8. HYDROSEED DISTURBED AREAS AREAS AND BARE SOILS WITH SPECIFIED SEED MIX AS PER GENERAL NOTE #9, SHEET C-301.
9. REMOVE INVASIVE SPECIES FROM SITE AND DISPOSE OF PROPERLY TO PREVENT SPREAD. DO NOT ALLOW JAPANESE KNOTWEED TO ENTER THE RIVER.

TABLE 1: PLANTING SCHEDULE

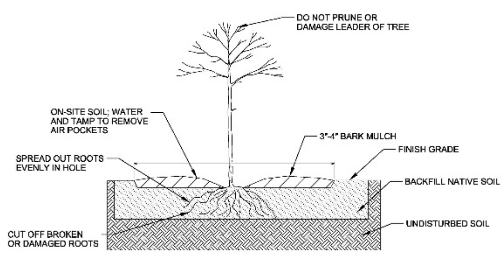
SPECIES	PILCHUCK MITIGATION AREA
BLACK COTTONWOOD	5
RED ALDERS	10
DOUGLAS FIR	10
PACIFIC WILLOW	5
SITKA SPRUCE	8
TOTALS	38



G1 TREE PLANTING, WITH ROOTBALL
NTS



G9 TREE PLANTING SPACING
NTS



A1 BAREROOT PLANTING
NTS

US Army Corps of Engineers ®

PLANTING DETAILS

SHEET ID
MARSH
L-501

95% DESIGN SUBMITTAL

APPENDIX C – WATER QUALITY MONITORING PLAN

Water quality monitoring will occur during in-water sediment-generating activities. Each new type of sediment generating activity will be monitored.

Sediment-generating Activities Triggering Monitoring Efforts
Activities that trigger monitoring efforts include but are not limited to the following:

- In-water toe or bank excavation,
- Rock placement for toe rock, and
- Rock placement for bank construction.

Monitoring Frequency/Duration

- Point of Compliance monitoring will occur once per hour for the first three hours after the start of each new sediment-generating activity and then once every three hours, if no exceedance is noted, until the end of the workday.
- The following will be taken at the same frequency as the Point of Compliance samples:
    a. Early Warning sample
    b. Background sample
- If, after a minimum of one full day, the monitoring results verify that turbidity levels from a certain sediment-generating activity are remaining consistently below the stated water quality standards, physical monitoring may be reduced or stopped for that activity. Physical monitoring will be resumed during new sediment-generating activities or if precipitation events or any other changes will result in higher or lower project-related turbidity. Sampling will resume if visual monitoring indicates possible exceedance at the Early Warning or Point of Compliance sample locations. BMPs will be evaluated to see if additional steps can be taken to reduce and control turbidity.
- Visual monitoring will be done continuously for all in-water work.
- Maximum turbidity levels will meet WAC 173-201A-200. Turbidity must not exceed 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.

Sampling Locations
Sampling locations are shown in Attachment A and are located at the following points:

- Background – 100 feet upstream of the repair site or the closest safe accessible location.
- Early Warning – 150 feet downstream of the project site.
- Point of Compliance – 300 feet downstream of the project site.

Sampling Procedures
Water samples will be collected and analyzed for the appropriate parameters, per the monitoring frequency described above, following the equipment and sampling guidelines below:

- Continuous visual monitoring will occur to identify the presence of oil or grease on the water's surface.
- Turbidity will be monitored using a Hach turbidimeter or equivalent.
- The onsite Corps Biologist or Quality Construction Assurance Personnel will conduct the water quality monitoring and are responsible for providing the results to the Washington State Department of Ecology (Ecology).
- A portable turbidity meter will be used in the field. A representative sample should accurately reflect the true condition of the water source from which the sample was taken. The following protocol will be used to ensure a representative sample is analyzed:

- Use a clean container to obtain a sample from the source.
- Collect the 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.
- Without allowing the sample to settle, take turbidity reading according to turbidimeter manufacturer's instructions.
- Several measurements can be taken, with the average used as the data for comparison.

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.

Non-Compliance
The Corps will notify Ecology if either visual or physical monitoring indicates that water quality standards have been exceeded. See the Reporting section of this plan for reporting details. Notifications will be made per the following requirements:

- Notify Ecology within 24 hours of the exceedance.
- Submit a detailed written report to Ecology within 5 days describing the nature of the event, corrective action taken and/or planned, steps to be taken to prevent a recurrence, results of any samples taken, and any other pertinent information.
- Work will stop and cleanup efforts initiated if an oil or grease sheen is observed in the river. Equipment will be inspected to determine the source of the sheen. All oil and grease spills will be reported immediately.

Contingency Sampling
If sample results confirm that water quality is out of compliance with water quality standards, the Corps will modify or stop the activity causing the problem and commence the contingency sampling requirements (Table 1). Contingency Monitoring will also commence if visual monitoring indicates possible exceedances at the Point of Compliance. The Corps shall return to standard sampling procedures after two consecutive sample periods show compliance with water quality standards.

Table 1. Contingency sampling requirements.

Parameter	Contingency Sampling Location	Contingency Frequency	WQ Standard
Turbidity	Point of Compliance	Hourly	When background < 50 NTU: not to exceed 5 NTU over background When background > 50 NTU: Not to exceed 10 percent over background
Oil/Grease	Throughout project area	Continuous-Visual	No Sheen

Reporting
All water quality monitoring results (visual and physical) will be recorded on the monitoring form (Attachment B).
Turbidity

All sample results or exceedances will be provided to Ecology at the following email addresses:

- fednotification@ecy.wa.gov

Sample results will be provided to Ecology 30 days after construction is completed.

Oil/Grease

The following entities will be contacted immediately in the event of an oil or grease spill. Details of the spill will be recorded on the monitoring form.

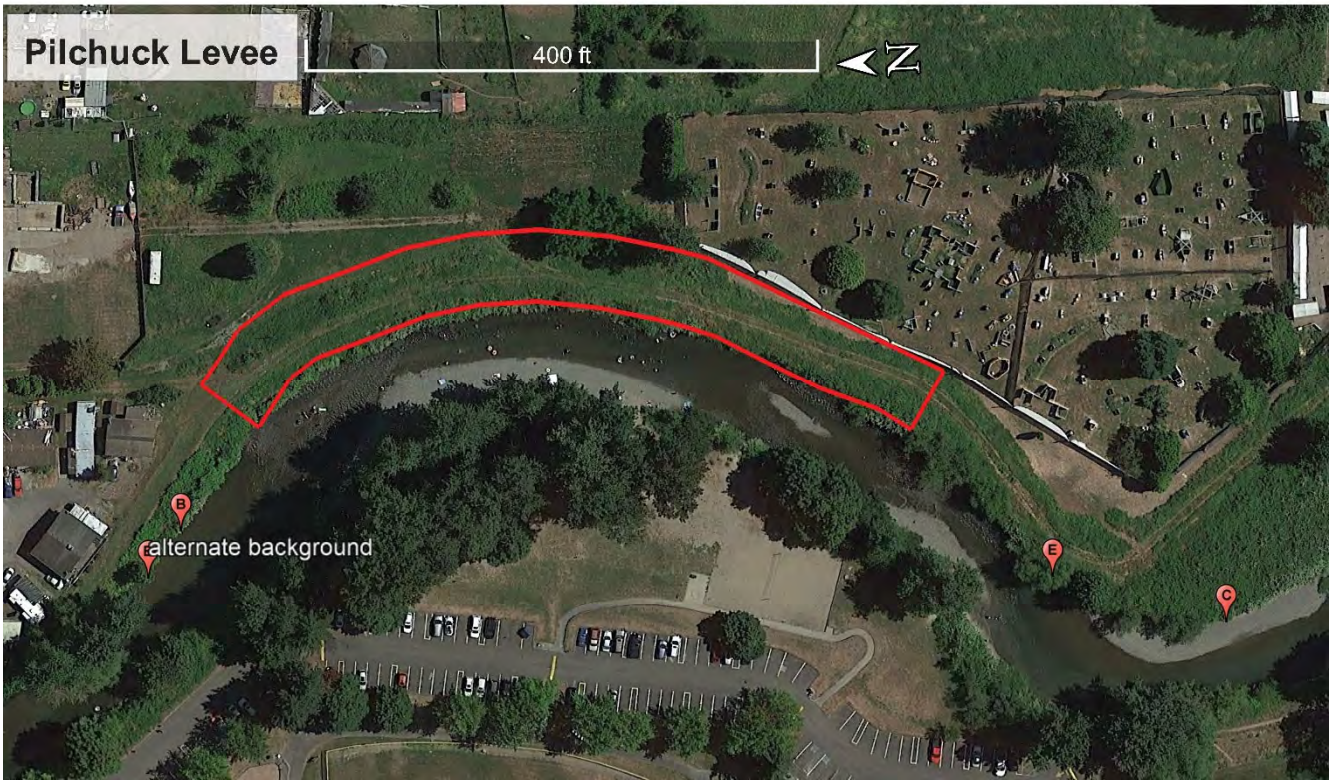
- Ecology. Additional details available online: <https://ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue/Report-a-spill>
  - fednotification@ecy.wa.gov
  - Washington Emergency Management Division, 1-800-258-5990
  - Ecology's Regional Spill Response Office
    - Rob Walls, Spills Manager, 425-649-7130, rob.walls@ecy.wa.gov
  - National Response Center, 1-800-424-8802
- Washington Department of Fish and Wildlife
  - Andy Carlson, Oil Spill Team Manager, 360-902-2530, Andy.Carlson@dfw.wa.gov

Attachment A - Sampling Locations

Sample locations for the Pilchuck and Marshland Levee repairs.

Figure Key

- Background
- Early Warning
- Point of Compliance
- Repair Footprint



Attachment B - Sample Monitor Results Reporting Form

Date:	**Weather:**		**Site Designation/Location:**				
Time of Day	Construction Activity	Background Sample (NTU)	Early Warning Sample (NTU)	Point of Compliance Sample (NTU)	Background & Compliance Change (NTU)	Description of visible plume (length downstream, width as % of channel)	Description of visible sheen (length downstream, width as % of channel)
Example: 0700	Excavation and toe rock placement	20.2	22	21.1	+0.9	Visible plume 50 ft long, <10% of channel width	Visible sheen 12ft long, 1 to 5% of channel width

Notes:

APPENDIX D – PUBLIC COMMENTS

Public Comments

The Corps released a draft EA/FONSI for the Pilchuck and Marshland Levee Repair Projects on December 3, 2021, for a 30-day public review and comment period. Two comments were received.

Comment 1:

Subject: [Non-DoD Source] RE: Notice of Availability - Draft Environmental Assessment and Finding of No significant Impact for Repairs to the Pilchuck and Marshland Levees
Date: Friday, December 3, 2021 6:07:56 PM

Hello Zachary,

The County has a HEC-RAS 2D model that includes the Pilchuck River levee repair site. A link to the H&H report and its appendix are available from the following website. Let me know if you want a copy of the 46GB model.
https://www.snohomishcountywa.gov/5763/Flood-Hazard-Mapping

Regards,
Aaron

Comment 1 Response:
Thank you for the information. The Corps has downloaded the model.

Comment 2:

Subject: [Non-DoD Source] Pilchuck Levee work is not authorized! Comments on draft EA/FONSI for Pilchuck Levee and Marshland Levee Repair Projects
Date: Sunday, December 12, 2021 4:57:44 PM

Reference: PM-21-07

Comments on Draft EA/FONSI for Pilchuck Levee and Marshland Levee Repair Projects

Hey Zach,

Hope you're doing well. I entrust these serious comments to your diligence to modify the proposed action in the EA so it's not proposing actions that are not authorized by PL84-99. Reference the details in the comments below.

Section 1.2 of the draft EA provides that PL84-99 authorizes the Corps the authority for "the repair or restoration of any flood control work threatened or destroyed by flood, including the strengthening, raising, extending, realigning, or other modification thereof as may be necessary in the discretion of the Chief of Engineers for the adequate functioning of the work for flood control and subject to the condition that the Chief of Engineers may include modifications to the structure or project, or in implementation of nonstructural alternatives." The authority can be triggered when a storm results in a river exceeding the pre-determined flood stage on a subject river system.

Section 1.1.2 documents the storm event causing the damage to the Pilchuck Levee resulting in peak stages of the Pilchuck River of 16.6 and 17.2 feet during two storms on Feb. 2, 2020, and Feb. 6, 2020, respectively. These river elevations occurred at the PILW1 gage located about a half mile upstream of the Pilchuck Levee. The designated flood stage for the PILW gage is 18 feet.

While the Snohomish River did exceed flood stage during the storms in early February, the Snohomish River gage closest to the Pilchuck Levee (SNAW1) is located more than mile downstream of the mouth of the Pilchuck River and does not provide insight into the PL84-99 authority threshold, especially since the PILW1 gage is so close to the Pilchuck Levee. It is clear that the nearby PILW1 gage provides data that is representative of conditions at the Pilchuck Levee and, since that nearby gage remained lower than flood stage, PL84-99 authority is not available or applicable for proposed Corps repairs.

Pushing forward with the project without authority would represent a violation of federal law and would result in unauthorized commitments that present adverse legal repercussions for all Corps personnel involved in the action. Due to the circumstances, the legal recourse is to immediately stop any additional Corps work on the proposed Pilchuck Levee repairs. Investigation into federal efforts to date on such a clearly unauthorized activity should be pursued to prevent future missteps.

It's clear that the Feb. 2020 flows did not reach flood stage and therefore PL84-99 can not authorize the proposed repairs. As the Corps documented damage at an eligible flood control work and the damage is not caused by a flood event, the damage should be considered as part of the levee sponsor's normal operations and maintenance which is required to keep the levee eligible for potential future PL84-99 authorized repairs following flood events that occur after Feb. 2020.

In a related comment, given that the Pilchuck River did not reach flood stage, the magnitude and extent of the "damage" reported as resulting from this relatively minor event is suspect. The draft EA provides that the Pilchuck Levee provided a 10 percent level of protection prior to the February storms. After the February storms, the Corps estimates that the level of protection is 100 percent. The Corps should document in the EA how such a sturdy levee was entirely compromised by such a minor storm event. The obvious conclusion is that the levee prior to the Feb. 2020 event did not provide the 10 percent level of protection due to poor levee conditions that the Corps has likely documented in prior inspections.

I note that this comment should be moot for the NEPA action given that the Pilchuck Levee damage is not eligible for PL84-99 repairs and needs to be dropped from the proposed action. However, the comment is relevant to how the Seattle District runs the PL84-99 program in a way that does not hold sponsors to account for poorly maintained and vulnerable levees, thereby increasing flood risks for protected areas. This pattern of practice leads to the Corps finding phony "damage" that is inappropriately attributed to preceding storm events, even though the levee was compromised before the storm even occurred. The result is levees falsely identified as providing a higher level of protection than they actually do. Communities that rely on the levee's protection deserve better from the local sponsors. And the region deserves better from Seattle District. The management of flood risk must be more proactive in a way that benefits vulnerable communities while also better addressing the long-term environmental impacts by applying a planning process that fully addresses legal compliance. This is only provided when PL 84-99 is not abused as proposed for this project.

The abuse of the PL84-99 authority for the flood control work owned by the French Slough Flood Control District is all the more concerning given findings from 10 years ago that the district violated state law regarding bidding of district work. Partnership in suspect deals with the Corps related to this levee may further tarnish the flood district's reputation.

Due to the abuse of the PL84-99 authority proposed in the draft EA, a copy of this comment has been sent to the Corps of Engineers Inspector General.

I've also copied the comment to the Tulalip Tribes. Inappropriate use of PL84-99 by Seattle District is often used to circumvent full compliance with NEPA and ESA and typically is an end-around the tribal trust responsibilities to fully address project impacts to resources like salmon and their habitat. These kinds of actions often end up adversely affecting tribal treaty rights contrary to the treaty provisions.

Comment 2 Response:
The commenter's basic premise that "the Feb. 2020 flows did not reach flood stage and therefore PL84-99 cannot authorize the proposed repairs." (Emphasis added.)

Engineering Regulation (ER) 500-1-1 (Civil Emergency Management Program – Procedures), defines flooding as abnormally high-water flows or water level that overtops the natural or artificial confining boundaries of a waterway. A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of river and/or tidal waters and/or the unusual accumulations of waters from any sources.

One indicator that a flood event is occurring is when river levels exceed flood stage at a specific river gage. Flood stage is determined by the National Weather Service and is defined in ER 500-1-1 as the water surface elevation of a river, stream, or body of water, above which flooding and damages normally begin to occur, typically measured by a specific reference gage. Flood stage is normally the level at which a river overflows its banks. Flood stage for any particular geographic area is unique to that geographic area.

Another indicator of a flood event can be through a physical assessment of river levels in a specific reach of the river. If river levels exceed the natural ground elevation upon which a levee rests and were artificially confined by a levee system, that condition meets the definition of a flood event (pursuant to USACE policy guidance).

On March 4, 2020, a rapid assessment team evaluated the Pilchuck levee to determine if it was impacted by a flood event. A high-water event occurred in early February 2020 and the Pilchuck River stages were above the natural ground elevation at the Pilchuck Levee. The Pilchuck Levee artificially confined the river water to reduce inundation and flood impacts in the area protected by the levee system. The team evaluated information provided by the local sponsor and assessed high water marks on the riverward slope of the levee. The rapid assessment team was aware that the upstream Pilchuck River gage did not reach flood stage but concluded that a flood did occur based on the high-water marks on the levee.

ER 500-1-1 limits rehabilitation assistance to federal and non-federal flood control works that are in an "active" status at the time of the flood event. The Pilchuck levee was found eligible for inclusion in the PL 84-99 Rehabilitation and Inspection Program prior to the February 2020 flood event. The levee received a rating of minimally acceptable, which means the levee had delineated deficiencies but was expected to perform adequately during a flood event. This assessment was validated during the February 2020 episode given that the levee successfully prevented flood waters from entering the leveed area. The rapid assessment team noted recent erosion on the riverward side of the levee. The erosion extended near the crest of the levee and had exposed levee embankment material that was determined by the rapid assessment team to have occurred during the February 2020 event. The rapid assessment team used prior inspection reports and information provided by the local sponsor to determine the damages from the early February 2020 flood event.

A hydraulic analysis employing three river gages, one tidal gage, hydrography of the surrounding area, and a two-dimensional hydraulic model confirmed that "flood" conditions had occurred. Water levels at the Pilchuck levee are influenced by the Snohomish River which was above flood stage during the February flood event. The river and tidal records indicate that both high tide levels and riverine flooding during the first week of February 2020 likely met or exceeded flood stage and contributed to the levee damage on the lower Pilchuck River. The analysis considered more than the water level at the U.S. Geological Survey (USGS) gage on

the Pilchuck River because this gage is upstream of the backwater area of the Pilchuck River. Use of only the gage on the Pilchuck would under-estimate water levels in the lower Pilchuck River and loading on the levee where the damage occurred. See the "Hydraulic Analysis" section below for more information regarding the hydraulic analysis.

The commenter's assertion that the characterization of the scale of damages is inherently suspect because an allegedly "minor" storm event could not be expected to have precipitated reduction of a 10-year level of protection to a 1-year level of protection is unsubstantiated, and the commenter's conclusion that the "obvious" proximate cause is instead the Pilchuck Levee's pre-existing "poor levee conditions" is unwarranted. As noted above, an evaluation for eligibility under the Levee Rehabilitation and Inspection Program identified deficiencies but determined the levee status was nevertheless minimally acceptable pursuant to the Corps' standards, and was expected to perform adequately during a flood event. In like manner, the commenter's generalized contention that the Corps has a practice of identifying "phony 'damage'" and improperly attributing that damage to storm events vice pre-existing levee condition is unjustified and not relevant to the facts of the 2020 Pilchuck Levee damage and the proposed repair. The commenter's contention that the proposed repair of the non-Federal Pilchuck Levee through Federal assistance under the Rehabilitation and Inspection Program reflects an abuse of the Public Law 84-99 Program is unsupported and is in fact contradicted by the Levee's inspection records under the Program, the documented meteorological and river flow conditions of the flood event, and the memorialized damage effects.

Hydraulic Analysis

The levee damage location is on the Pilchuck River upstream of the confluence of the Pilchuck and Snohomish Rivers. The damage site is within Reach 1 of the Pilchuck River, as defined by the Lower Pilchuck River Assessment (Cardno 2018). Reach 1 is described as being tidally influenced by the Snohomish River, with which it shares floodplain area. The use of the gage records, 2D hydraulic model, and site hydrography are described here to summarize how each contributed to the hydraulics analysis of the damage site.

The closest gage locations to the damage site are on the Pilchuck and Snohomish Rivers (Table 1). Because of the potential for backwater at the damage site, additional gages required for the analysis included USGS gages upstream and downstream of the Pilchuck confluence and a tidal gage. The USGS gage on the Pilchuck is upstream of the damage site and outside the area of tidal influence from the Snohomish River. USGS gages on the Snohomish River are downstream of the confluence with the Pilchuck at Snohomish and upstream of the confluence at Monroe. Tides on the Snohomish River are measured by a gage on Ebey Slough.

Table 1. Gages used in evaluating flows at the damage site on the Pilchuck River.

Gage ID	Location	Relative to confluence of Pilchuck and Snohomish
USGS 12150800	Snohomish River near Monroe	6 river miles (RM) upstream of confluence, not tidal
USGS 12155500	Snohomish River at Snohomish	1.4 RM downstream, tidally influenced
USGS 12155300	Pilchuck River near Snohomish	3.3 RM upstream of confluence, not tidal
Snohomish County 594	Ebey Slough above Hwy 2	Records tidal levels downstream

Gage records for the period from January 25 to February 22, 2020, are shown in the figures below with a brief description of how each record contributed to the hydraulic evaluation of the February events.

The gage on the Snohomish River near the city of Monroe is upstream of the tidal area of the Snohomish River and is useful for determining if the Snohomish River was flooding at the time of the levee damage. The records indicate flood levels on February 1 and February 9, 2020, with the maximum level reached on February 1 (Figure 1).

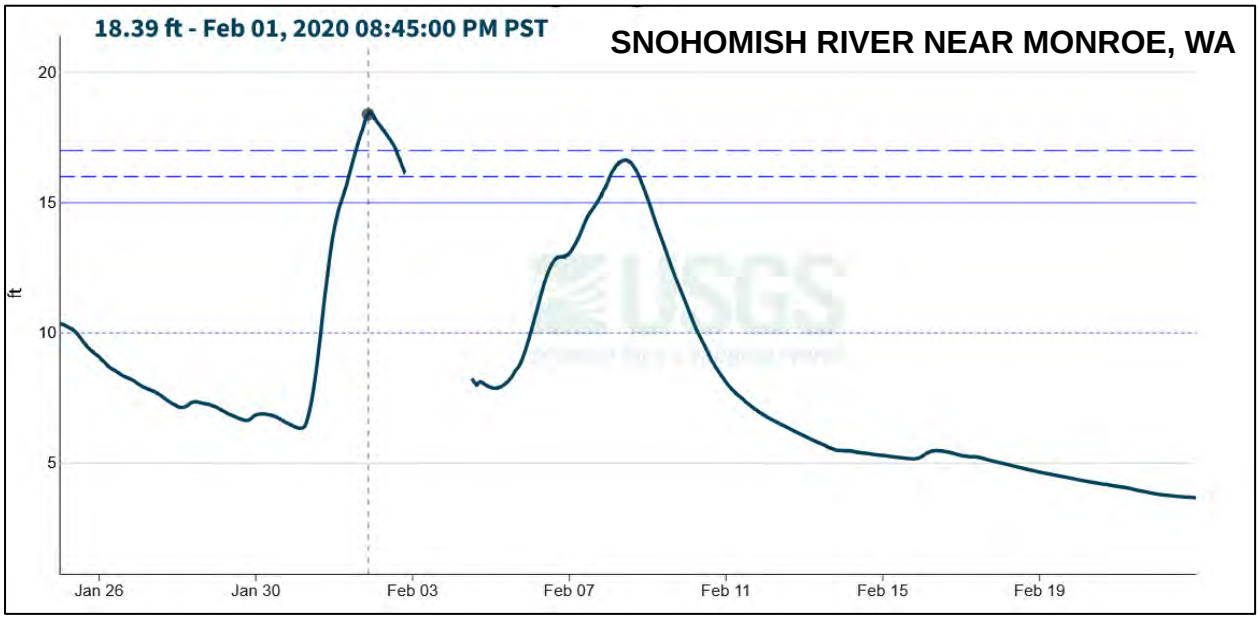


Figure 1. USGS Gage Snohomish River near Monroe, Washington. Top dotted line: major flood stage (17 feet). Middle dotted line: moderate flood stage (16 feet). Solid purple line: minor flood stage (15 feet).

The Pilchuck River gage is far enough upstream of the confluence to be outside of the tidal influence of the Snohomish River. The record indicates the flow in the Pilchuck River reached its peak on February 6 (Figure 2), after the peak of the Snohomish River near the city of Monroe. Because the location of the levee damage is 1.25 RM downstream of the Pilchuck River gage, the information from this gage is most useful to indicate the timing of flood peaks on the two systems.

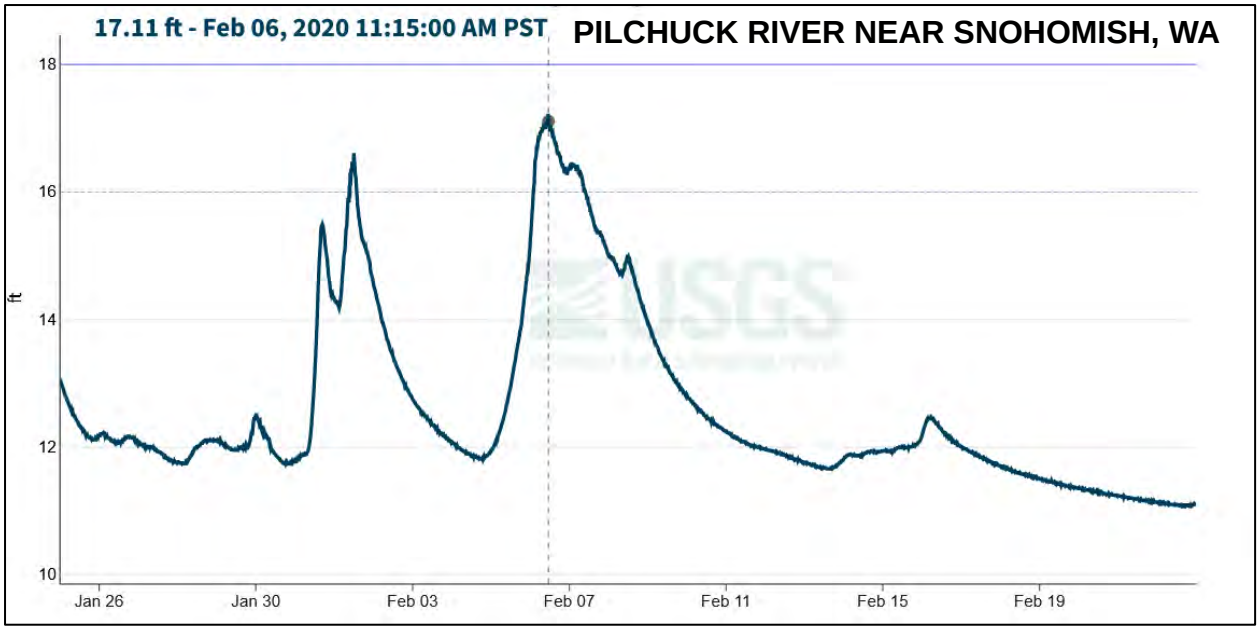


Figure 2. USGS Gage Pilchuck River near the city of Snohomish, Washington. Solid purple line: minor flood stage (18 feet).

The gage on the Snohomish River at the city of Snohomish is downstream of the confluence of the Pilchuck and Snohomish Rivers and illustrates the tidal influence of the Snohomish River at this location (Figure 3). The tidal signal became overwhelmed during the flood events, and recorded water levels at the gage increased by more than 10 feet. Similar to the gage near the city of Monroe, the maximum water level occurred with the first peak. This indicates the first peak was heavily influenced by the downstream travel of floodwaters.

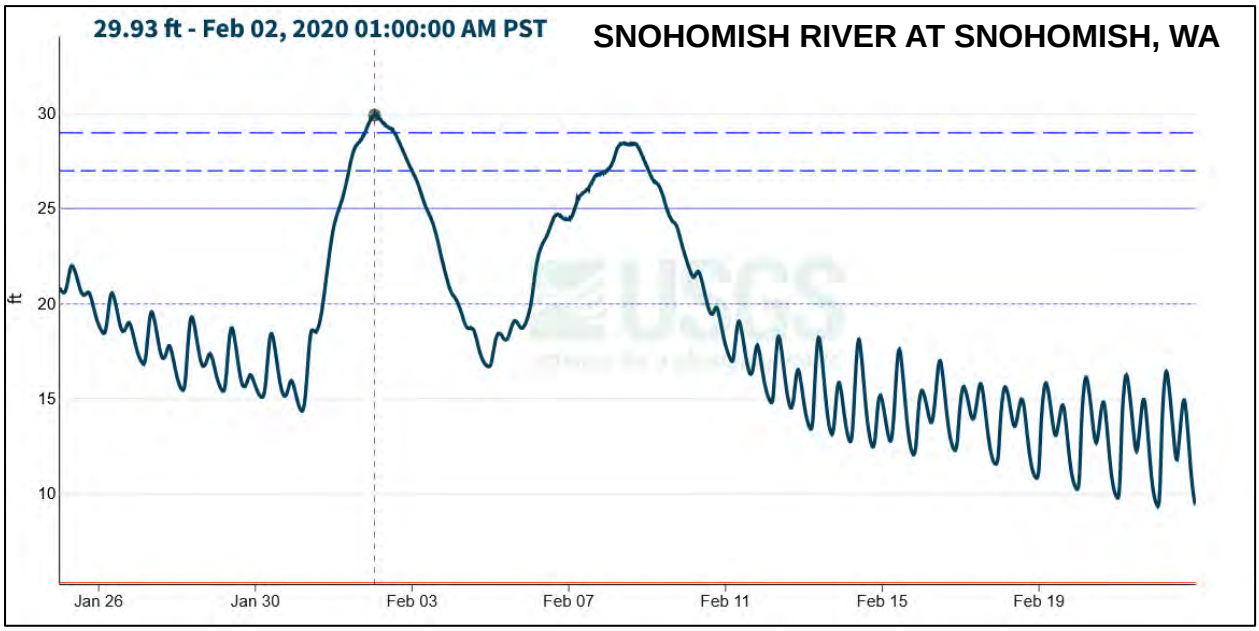


Figure 3. USGS Gage Snohomish River at Snohomish, Washington. Top dotted line: major flood stage (29 feet). Middle dotted line: moderate flood stage (27 feet). Solid purple line: minor flood stage (25 feet).

The tidal record for the Snohomish River is from the gage on Ebey Slough near the city of Marysville, Washington, and is maintained by Snohomish County (Figure 4). This gage is useful for determining whether or not there was a tidal influence on the flood events. The maximum water stages were 10.44 feet on February 2 and 10.60 feet on February 8, with the tidal pattern identifiable throughout the time period. The pattern indicates that there was a significant tidal signal during the event that contributed to the size of the event.

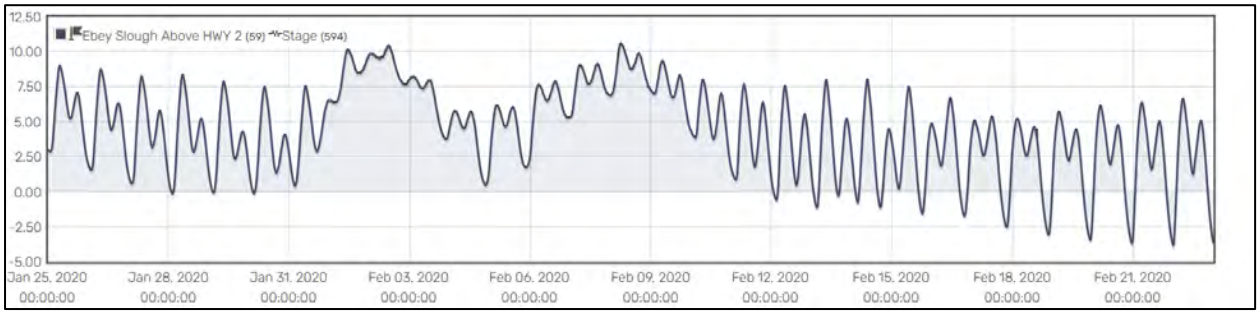


Figure 4. Tidal gage at Ebey Slough near the city of Marysville, Washington.

A recently completed 2D HEC RAS hydraulic model was made available from Snohomish County. The model was built by Watershed Science and Engineering (WSE 2021) and covers the Skykomish River as far upstream as Gold Bar, the Snoqualmie River as far upstream as the King-Snohomish County Line, and the entire length of the Snohomish River from near Monroe to Possession Sound. Modeled flow events included the 50 percent annual exceedance probability (AEP), or a 2-year flood. Model results are an indicator of the peak water levels at the damage location during the event. The model indicates the extent of water inundation around the lower Pilchuck River and the confluence of the Pilchuck and Snohomish Rivers (Figure 5). A cross-section through the damage site models the water level as being within 1-foot of the top of the levee. The levee is assumed to be undamaged in the model and at its full elevation.

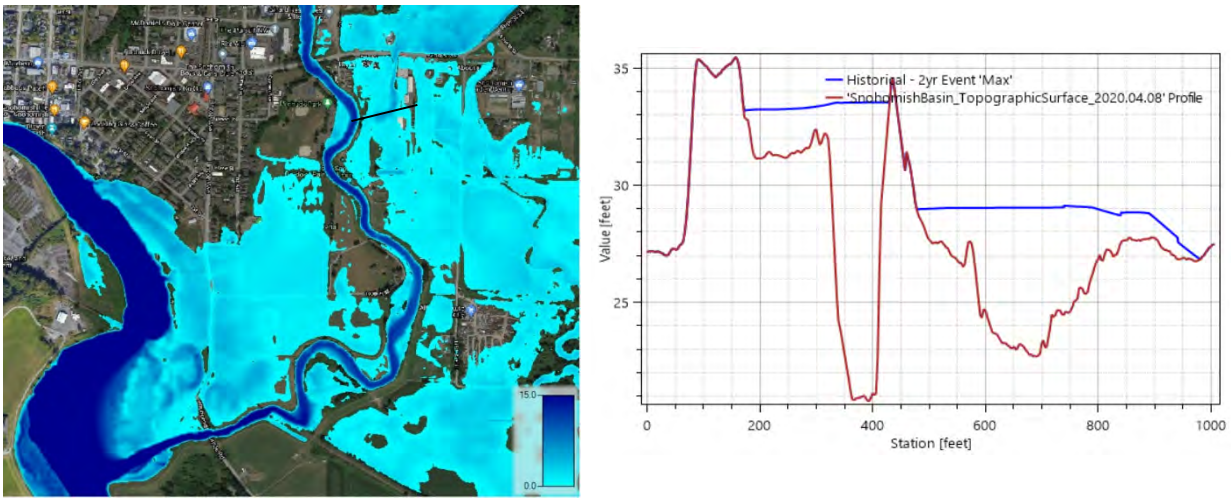


Figure 5. Model results for 50 percent AEP flood event. Left image shows flow depth over the area. Right is he flow depth through the cross-section taken at the damage site (black line on image).

There are two main reasons the model cannot be used as the only piece of information determining water level at the damage site during the event. The first is that the model effort was focused solely on precipitation caused flooding and did not include the influence of tides. During all flood event modeling, from the 99 to 0.02 percent AEP, the tide level was held constant at 9.6 feet and all tide gates were set to operate to prevent any backwater. Therefore, the downstream water level in the model for the 2-year event was a foot lower than the measured tide on February 8, 2020, indicating model results for the tidally influenced lower Pilchuck under-estimate the water surface elevation.

The second is that the model does not account for any influx of water to the Pilchuck River downstream of the gage. The volume of water passing the gage is routed downstream without any additions. An investigation of the bare earth LiDAR and USGS National Hydrography Database reveals the problem with this assumption (Figure 6). There is a small channel visible in the LiDAR that directs flow to the south under 92nd Street Southeast and to the Pilchuck River at the outside of the meander bend and at the site of levee damage. Water flowing toward the Pilchuck levee at this location would have contributed to levee slope instability.

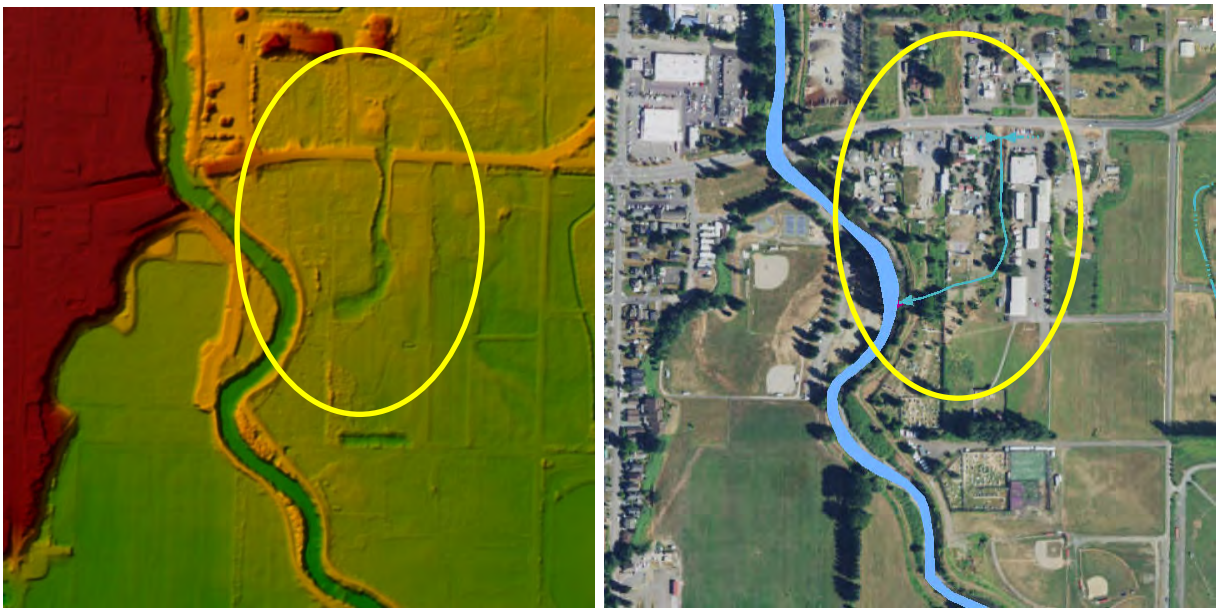


Figure 6. Location of a small channel directing overland flow to the site during flood events. The image on the left is the bare earth LiDAR and the right image is from the USGS National Hydrography Dataset.

All the items detailed here were used along with the initial damage assessment report to determine the hydraulics that may have led to levee damage in February 2020. It is necessary to use all of these sources because of the tidal influence over the lower reach.

- Because the Pilchuck gage is upstream of the lower, tidally influenced, reach it is an under-estimate of water depths in the lower reach.
- A new 2D hydraulic model illustrates floodplain inundation around the damage location during river flows equal to the Feb 2020 event.
- Because the 2D model does not account for tides or ungaged flow contributions downstream of the Pilchuck gage, the model under-estimates flow depth in the lower

Pilchuck river. Despite this under-estimation, the model indicates peak flow depth was within one foot of the top of the levee at the damage location.

- Ungagged inputs to the Pilchuck River downstream of the gage are mapped on the National Hydrography Database. The flow paths direct floodwater toward the damage site, increasing the hydraulic pressure and loading on the levee.
- Backwater from Snohomish tides would have contributed to the water depth and the extent of time the water was high on the levee, or the levee loading time. The tidal levels were increased over a 10-day time period that included the flood event timing.
- Damage to the levee face were noted in the damage assessment report.

Taken together, these lines of evidence indicate a water level that would have fully loaded the levee and exceeded flood stage. Water levels would have been high both sides of the levee: on the river side from the combination of upstream flows, ungaged overland flows, and backwater from the Snohomish River confluence; on the landward side from general overland flooding and small channel directing overland flow to the landward side of the levee. Hydraulic loading would have extended longer than at locations without the contributions of backwater in the river and overland flow outside the channel.

References

Cardno, 2018, Lower Pilchuck River Assessment. Snohomish County Surface Water Management. 61 pages.

NHD, National Hydrography Database. Downloaded from https://apps.nationalmap.gov/downloader/#/.

Tidal gage record for Ebey Slough downloaded from https://snohomish.onerain.com/.

USGS gage records for gages 12150800, 12155500, 12155300 downloaded fromhttps://waterdata.usgs.gov/nwis.

WSE (Watershed Science and Engineering), 2021, Hydraulic and Hydrologic Modeling in the Snohomish Watershed. Snohomish County Surface Water Management. 26 pages plus 5 appendices.

APPENDIX E – COASTAL ZONE MANAGEMENT ACT

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Region Office
PO Box 330316, Shoreline, WA 98133-9716 • 206-594-0000

June 24, 2022

U.S. Army Corps of Engineers, Seattle District
Attn: Laura Boerner, Chief, Planning, Environmental, and Cultural Resources Branch
4735 East Marginal Way South, Bldg 1202
Seattle, WA 98134-2388

RE: Coastal Zone Consistency for Activity Undertaken by a Federal Agency
Repairs to the Pilchuck and Marshland Levees Project
Snohomish County, Washington

Dear Laura Boerner:

On April 29, 2022, the U.S. Army Corps of Engineers, Seattle District (Corps) submitted a Certification of Consistency with the Washington State Coastal Zone Management Program (CZMP). The proposed federal activity includes repair of approximately 600 linear feet of the Pilchuck Levee and approximately 300 linear feet of the Marshland Levee to the pre-damaged level of flood protection.

The project is located along the Pilchuck and Snohomish Rivers, east and south of Snohomish, in Snohomish County, Washington. The mitigation site is located along the shoreline of the Pilchuck River, approximately 200 feet downstream of the Pilchuck Levee repair.

Pursuant to Section 307(c)(3) of the Coastal Zone Management Act of 1972 as amended, Ecology concurs with the Corps' determination that the proposed work is consistent with Washington's CZMP.

If you have any questions regarding Ecology's consistency determination please contact Rebekah Padgett at (425) 365-6571 or by email at Rebekah.Paddgett@ecy.wa.gov.

YOUR RIGHT TO APPEAL

You have a right to appeal this decision to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this decision. The appeal process is governed by

Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do all of the following within 30 days of the date of receipt of this decision:

- File your appeal and a copy of this decision with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this decision on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel RD SW STE 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

Sincerely,

Joe Burcar, Section Manager
Northwest Regional Office
Shorelands and Environmental Assistance Program

Sent by electronic mail: laura.a.boerner@usace.army.mil

U.S. Army Corps of Engineers, Seattle District
Aquatics No. 141264
June 24, 2022

e-cc: Zachary Wilson, Army Corps of Engineers
Jo Gardiner, Army Corps of Engineers
Steph Barney, Department of Ecology
Rebekah Padgett, Department of Ecology
Loree' Randall, Department of Ecology
ecyrefedpermits@ecy.wa.gov

APPENDIX F – CULTURAL RESOURCE CORRESPONDENCE

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

March 11, 2021

Ms. Laura A. Boerner
Environmental Resources Section
Corps of Engineers – Seattle District
PO Box 3755
Seattle, Washington 98124-3755

Re: Pilchuck-French Slough Levee Repair Project
Log No.: 2021-03-01262-COE-S

Dear Ms. Boerner:

Thank you for contacting our department. We have reviewed the materials you provided for the Area of Potential Effect (APE) for the proposed Pilchuck-French Slough Levee Repair Project, Snohomish, Snohomish County, Washington

We concur with your determination of the Area of Potential Effect (APE) as described and presented in your figures and text.

We look forward to further consultations as you consult with the concerned tribal governments, provide the results of the professional cultural resources review, and render your determination of effect.

We would also appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in compliance with the Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations 36CFR800.4. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 890-2615
email: *rob.whitlam@dahp.wa.gov*

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

April 27, 2021

Laura Boerner, LG, LHG
Chief, Planning, Environmental and
Cultural Resources Branch
US Army Corps of Engineers - Seattle District

In future correspondence please refer to:
Project Tracking Code: 2021-03-01262
Property: Pilchuck-French Slough Levee Repair
Re: NO Adverse Effect

Dear Laura Boerner:

Thank you for contacting the State Historic Preservation Officer (SHPO) and Department of Archaeology and Historic Preservation (DAHP) regarding the above referenced proposal. This action has been reviewed on behalf of the SHPO under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800. Our review is based upon documentation contained in your communication.

First, we agree with the Area of Potential Effect (APE) as mapped in the survey report. We also concur that the current project as proposed will have "NO ADVERSE EFFECT" on historic properties within the APE that are listed in, or determined eligible for listing in, the National Register of Historic Places. As a result of our concurrence, further contact with DAHP on this proposal is not necessary. However, if new information about affected resources becomes available and/or the project scope of work changes significantly, please resume consultation as our assessment may be revised. Also, if any archaeological resources are uncovered during construction, please halt work immediately in the area of discovery and contact the appropriate Native American Tribes and DAHP for further consultation.

Thank you for the opportunity to review and comment. Please ensure that the DAHP Project Number (a.k.a. Project Tracking Code) is shared with any hired cultural resource consultants and is attached to any communications or submitted reports. If you have any questions, please feel free to contact me.

Sincerely,

Holly Borth
Project Compliance Reviewer
(360) 890-0174
holly.borth@dahp.wa.gov

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

March 11, 2021

Ms. Laura A. Boerner
Environmental Resources Section
Corps of Engineers – Seattle District
PO Box 3755
Seattle, Washington 98124-3755

Re: Marshland Levee Repair Project
Log No.: 2021-03-01263-COE-S

Dear Ms. Boerner:

Thank you for contacting our department. We have reviewed the materials you provided for the Area of Potential Effect (APE) for the proposed Marshland Levee Repair Project, Snohomish, Snohomish County, Washington

We concur with your determination of the Area of Potential Effect (APE) as described and presented in your figures and text.

We look forward to further consultations as you consult with the concerned tribal governments, provide the results of the professional cultural resources review, and render your determination of effect.

We would also appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in compliance with the Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations 36CFR800.4. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 890-2615
email: *rob.whitlam@dahp.wa.gov*

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

April 27, 2021

Laura Boerner, LG, LHG
Chief, Planning, Environmental and
Cultural Resources Branch
US Army Corps of Engineers - Seattle District

In future correspondence please refer to:
Project Tracking Code: 2021-03-01263
Property: Marshland Levee
Re: NO Adverse Effect

Dear Laura Boerner:

Thank you for contacting the State Historic Preservation Officer (SHPO) and Department of Archaeology and Historic Preservation (DAHP) regarding the above referenced proposal. This action has been reviewed on behalf of the SHPO under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800. Our review is based upon documentation contained in your communication.

First, we agree with the Area of Potential Effect (APE) as mapped in the survey report. We also concur that the current project as proposed will have "NO ADVERSE EFFECT" on historic properties within the APE that are listed in, or determined eligible for listing in, the National Register of Historic Places. As a result of our concurrence, further contact with DAHP on this proposal is not necessary. However, if new information about affected resources becomes available and/or the project scope of work changes significantly, please resume consultation as our assessment may be revised. Also, if any archaeological resources are uncovered during construction, please halt work immediately in the area of discovery and contact the appropriate Native American Tribes and DAHP for further consultation.

Thank you for the opportunity to review and comment. Please ensure that the DAHP Project Number (a.k.a. Project Tracking Code) is shared with any hired cultural resource consultants and is attached to any communications or submitted reports. If you have any questions, please feel free to contact me.

Sincerely,

Holly Borth
Project Compliance Reviewer
(360) 890-0174
holly.borth@dahp.wa.gov