



US Army Corps
of Engineers®
Seattle District

Notice of Preparation / Clean Water Act Public Notice

Planning and Project Management Division
Environmental and Cultural Resource Branch
P.O. Box 3755
Seattle, WA 98124-3755
ATTN: Bobbi Jo McClain (PM-ER)

Public Notice Date: 16 April 2012
Expiration Date: 16 May 2012
Reference: PM-ER-12-7

Name: Union Slough Levee Rehabilitation Project

Interested parties are hereby notified that the U.S. Army Corps of Engineers, Seattle District (Corps) plans to prepare, pursuant to the National Environmental Policy Act (NEPA) Section 102(C), an environmental assessment (EA) for proposed and previously completed levee repairs on the Snohomish River and Union Slough near Everett, Snohomish County, Washington. Repairs were conducted, and are intended, to address damage to flood control works caused by flooding. Emergency work was completed from 21 to 23 February 2012; further repair is expected to be conducted in summer 2012.

AUTHORITY

The proposed levee repair is authorized by Public Law 84-99 (33 U.S. Code Section 701n). Corps rehabilitation and restoration work under this authority is limited to 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. The local sponsor for this project is Snohomish Diking District No. 5.

NEED

The Diking District 5 levee system is approximately 45,000 linear feet in length and protects much of Smith Island. Approximately 13 businesses exist on Smith Island, including the City of Everett Water Pollution Control Facility, Dagmar's Marina, Buse Timber Sales Hima Farm and the City of Everett's Humane Society. Interstate 5 also traverses the island, but the highway is raised above flood stage through this area.

Flooding occurred on the Snohomish River in January 2009 with a 15-year flood event occurring at the Monroe gage. Before repairs could be completed, flooding again occurred in February 2012. The Snohomish River Gage at Snohomish shows that the Snohomish River rose above flood stage at 1730 PST (0130 UTC) on 23 February 2012 and fell below flood stage at 1900 PST (0300 UTC) on 23 February 2012, with a peak of 25.09 ft at 0200 on 23 Feb. In both events, intense rainfall and rapid snowmelt from a high velocity jet stream, a common weather pattern experienced in this region, resulted in the river exceeding flood stage. River flows damaged the right bank levee (site 1) of the Snohomish River at the south end of Smith Island and the left bank levee on Union Slough at the north end of the island. Loss of embankment material occurred at both sites. Site 1, along the Snohomish River, is approximately 1,000 LF

long. Site 2, along Union Slough, consists of two areas of damage, 850 and 605 LF long. The entire bank of Site 1 is covered in vegetation (blackberry and knotweed) that obscures the extent of damage. Throughout this reach small erosion areas are visible and stress cracks exist along the paved path. When the area can be cleared and grubbed, the smaller damaged and repair areas would be better defined within the reach, it is anticipated to be 600-700 ft of repair in total within that 1000 ft reach. There is active erosion as well as evidence of stress cracks visible along site 2 also.

In the current condition, the levee offers a 5-year level of flood protection. While the level of protection can be difficult to determine in tidally influenced areas and previous reports have used various protection levels, the levee did not overtop during the 15 year flood event in 2009, therefore the levee is estimated to offer a 20-year level of protection in its undamaged condition.

PURPOSE

The purpose of the project is to repair and restore the damaged levees to the 20-year level of flood protection as found prior to the January 2009 flood event in order to protect lives and property from subsequent flooding.

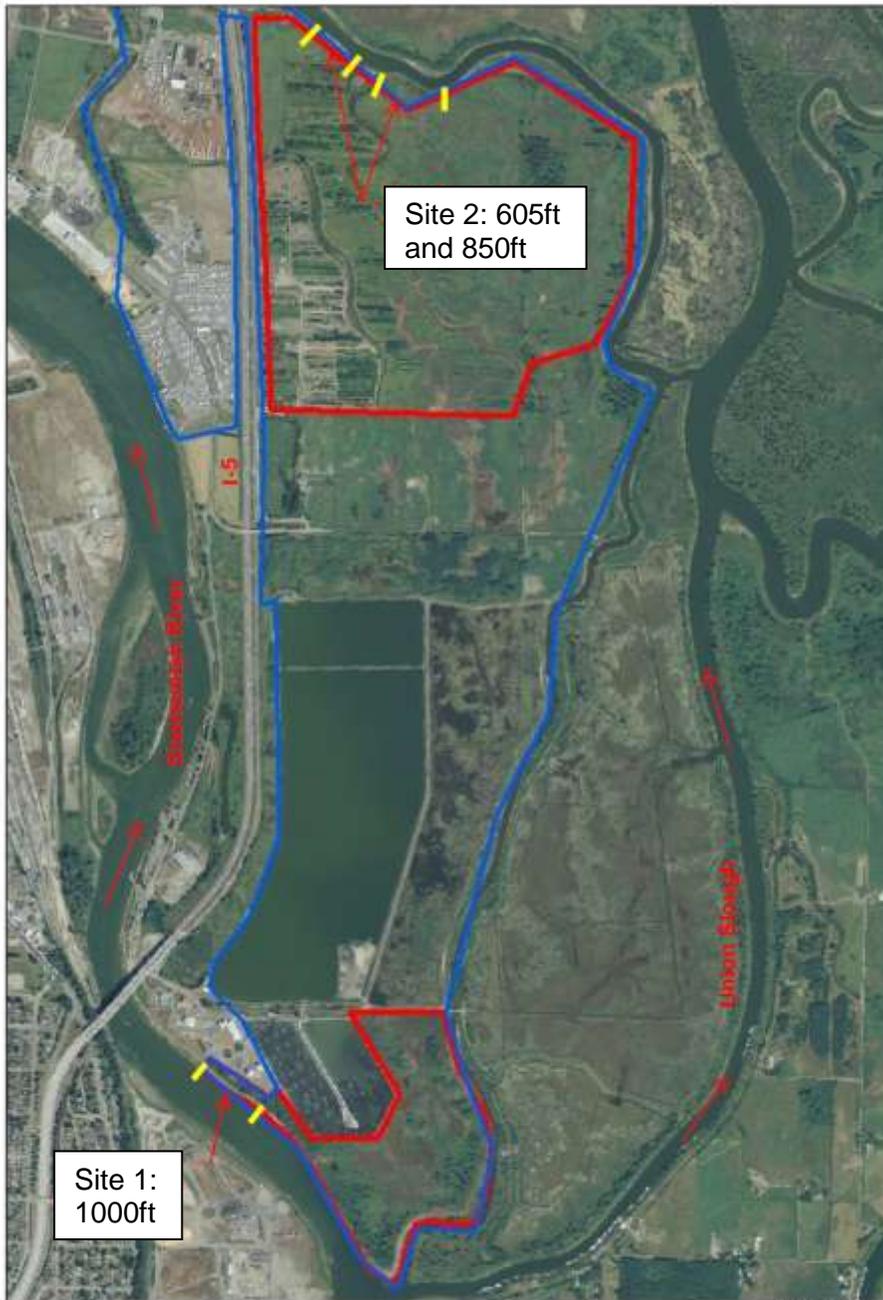
PROPOSED AND COMPLETED ACTION

Emergency repairs at site 2 were completed during flood fight activities on 21-23 February 2012. During the flood event the Corps determined that immediate repairs were required to protect the integrity of the levee, however these repairs were hampered by accessibility. On 21 February, the Corps began efforts to reinforce an existing agricultural farming road so that it would be stable for construction vehicles. On 23 February, the construction crew completed the access road and began work on the levee. Approximately 88 feet of levee stabilization was completed, including placement of Class II/III riprap on the riverward. Also, approximately 735 feet of the levee top was improved with a depth of 2 to 5 inches of crushed rock to create a driving surface for construction vehicles. No emergency work was conducted at site 1.

The emergency action did not complete the repairs that are necessary to fully restore flood protection of the levee. Multiple alternatives for prospective work are being considered as follows.

- No Action. No levee repairs would be done.
- Repair In Kind. This alternative repairs the levee by returning it to the pre-flood condition with minimal or no change to the character, scope, or size of the levee. This alternative maintains the status quo of the river and levee at the repair location as existed prior to the flood damage.
- Repair In Place. This alternative repairs the levee by returning it to the pre-flood condition. Changes to the levee character may be needed to meet current design standards or river conditions.
- Setback Levee. This alternative removes all or part of the existing levee and builds a new levee landward of the existing location. This alternative maintains the level of flood protection but increases floodplain access for the river.
- Nonstructural. This alternative would include no repairs to the damaged levee and would instead relocate all existing structures, utilities and infrastructure protected by the levee beyond the flood inundation zone.

Snohomish River - Union Slough



This map is the without project conditions. The average depth of the 5-year floodplain is less than 1 foot and it encompasses 418 acres. The 20-year floodplain has an average depth of 2-3 feet and encompasses 1169 acres.

Legend

- 20 year floodplain
- 5 year floodplain

Figure 1. Plan view map showing Site 1 (South) and Site 2 (North) along with estimated flood plain



Figure 2. Closer view of the two sites, the red lines indicate the damaged areas.

Final selection of the preferred alternative and finalization of the design for the remaining repair sites would occur during the NEPA process and before construction. At this time, the proposed action at the remaining damage sites is the Repair In Place alternative as detailed below by site.

Preferred Alternatives by site:

- Site 1: Up to 1,000 ft of levee would be re-sloped and worked to achieve a 1.75H:1V slope. A 12 inch thick filter blanket of spalls would be placed and overlain with a 24 inch thick layer of Class II riprap armor. The repair would tie into the existing slope protection upstream and downstream of the repair site. While work would extend below OHW, efforts would be made to place rock during periods of low tide to eliminate or reduce placing rock in-water. Topsoil would be placed on top of the levee face to achieve a one foot thick layer which would be planted with willows or other acceptable native riparian vegetation. All noxious weed species would be removed where work is being accomplished. Disturbed areas would be hydro seeded upon completion.
- Site 2: This site consists of two areas, 850 and 605 ft, for a total of 1455 ft. This repair includes re-sloping the riverward bank to achieve a 1.5H:1V slope with a 14 ft top width for safe driving access along the top of the levee. A 12 inch thick filter blanket of spalls would be placed and overlain with a 36 inch thick layer of Class I riprap armor. While work would extend below OHW, efforts would be made to place rock during periods of low tide to eliminate or reduce placing rock in-water. Topsoil would be placed on top of the levee face to achieve a one foot thick layer which would be planted with willows or other acceptable native riparian vegetation. Disturbed areas would be hydro seeded upon completion.

ANTICIPATED AND COMPLETED IMPACTS

Impacts from the completed flood fight and impacts anticipated from the proposed repairs are discussed below.

Wetlands. During the flood fight efforts, the access road construction occurred within a wetland. Vegetation communities adjacent to the access road consisted primarily of creeping buttercup

(*Ranunculus repens*) and reed canarygrass (*Phalaris arundinacea*), with pockets of Himalayan blackberry (*Rubus armeniacus*). Redoximorphic features were consistently observed within 6 to 8 inches of the soil surface. The road measured approximately 1,875 feet long, averaged 17 feet wide and 14 inches deep. This equates to roughly 0.73 acres and 1,377 cubic yards of fill. This material was placed as part of an emergency operation requested by the Diking District, therefore the impact and final disposition of the road is the responsibility of the Diking District. The Diking District has stated that they plan to leave the road in place for use during the proposed repairs for site 2 and then they expect to remove the fill. The Diking District will work with the Corps's Regulatory Branch to complete any permits or mitigation needed.

The proposed work would restore the prism of the levee to its pre-damaged footprint. On the riverward side of the levee this is expected to have some wetland impact. The sloughing levee embankment material at site 2 and the silt bench at the toe of site 1 supports estuarine wetland vegetation in some locations. Lyngby sedge (*Carex lyngbyei*) is the dominant plant on these riverward wetland benches. Assuming that the entire riverward face were a wetland, up to 1 acre (44184 sq ft) of wetland could be impacted. A wetland delineation will be needed to better quantify this impact, and is likely to decrease the area of impact, as portions of the bank at both sites are bare soil and parts of Site 1 are armored. Adequate mitigation would be proposed and could include placement of soil over the riprap along the upper slope to be vegetated with native plantings and potentially offsite enhancement plantings in nearby wetlands.

Biological Resources. The Snohomish River in the project area separates into numerous sloughs and channels within the lower river section. This area receives twice daily tide cycles but generally retains its fluvial characteristics. Vegetation along the levee and lower slopes are grasses, rushes and other species capable of tolerating estuarine conditions. Union Slough and the lower Snohomish River supports runs of seven salmonids: coho (*Oncorhynchus kisutch*), chum (*O. keta*), pink (*O. gorbuscha*), Chinook (*O. tshawytscha*), coastal cutthroat (*O. clarki*), steelhead (*O. mykiss*), and bull trout (*Salvelinus confluentus*). All of these species are important in recreational fisheries, and five are important for commercial and Native American fisheries. All salmonid species spawn in freshwater upstream of the estuary. Spawning timing varies between species: from August and September for pink and Chinook salmon, and from May through June for steelhead and cutthroat trout.

The following species, listed as threatened under the Endangered Species Act, and their associated critical habitat are located in the project area:

- Puget Sound Chinook salmon
- Puget Sound steelhead
- Bull trout

The Union Slough levee at site 2 had been an earthen embankment prior to the completed flood fight effort. The flood fight created a permanent change of approximately 0.03 acres (1520 sq ft). The completed flood fight is fully within the proposed repair. In total the final repair will create a substrate change of approximately 0.74 acres (32,184 sq ft) within the slough. The previously undercut bank and muddy bottom habitat was or would be transformed into a rock embankment. Site 1 along the Snohomish River was armored prior to the damaging event.

The flood fight work was completed in slow moving backwater areas within Union Slough. Because flows in the slough would be less than the mainstem river, fish would likely use this area as refuge during flooding. Juvenile salmon presence in the lower river can increase during flood events, as they are swept downstream due to the higher velocity flows. If they are unable

to find refuge, they risk being swept out into the estuary, where they become prey for a number of species. Rock placement could crush or displace fish from the project vicinity. The inwater repair area was small in comparison to available habitat within Union Slough. It is likely that displaced fish would have found suitable habitat nearby. Rock was placed into the water individually (as opposed to dumped into the river) to minimize possibility of crushing and turbidity increases. Also, the operations to free a dump truck stuck on the levee crown occurred for a number of hours prior to rock placement. This may have caused increased vibration and noise along the project area such that fish were displaced prior to rock placement.

Substrate change from mud to rock has a long-term impact on recruitment of vegetation and benthic species colonization of the area. Juvenile salmon rely heavily on estuarine productivity to feed, rear, and regulate prior to entering Puget Sound. Salmonids from nearby systems will also utilize estuaries such as this to rear. Shorebirds and waterfowl also use these habitats extensively to feed on rushes, grasses, and invertebrates.

Although bald eagle was delisted on June 28, 2007, they continue to be protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. These acts require some measures to continue to prevent bald eagle "take" resulting from human activities. Impacts to bald and golden eagles will be considered as a part of the NEPA process.

Proposed construction would occur during the in-water work window for salmonids to limit impacts to listed species. Adequate mitigation would be proposed to offset short term and long term impacts to fish and wildlife. Appropriate mitigation for substrate change is likely to include creation or restoration of similar mud substrate and appropriate revegetation with native species at a nearby location.

Water Quality. There may be a temporary increase in turbidity due to construction and fill placement into the river and slough. Best management practices such as the use of clean rock and individual placement of rock minimize such impacts. Further practices such as the installation of compost socks to prevent runoff from construction sites or staging area may be needed. No turbidity increases during the flood fight were noted. Continual monitoring of similar past construction activities both in mainstem rivers and in slower moving tidal sloughs has occurred with no exceedances. At a minimum, visual turbidity monitoring did and would occur during all inwater construction. If turbidity plumes are noted, measurements would be taken to assess the level of impact. If turbidity exceeds state standards, construction would be halted and construction methods altered to avoid further exceedances. Impacts to water temperature from loss of shade-producing vegetation are expected to be minimal. No long-term impacts to water quality are expected.

Flood Storage. The pre-damaged levee was determined to provide protection from a 20-year flood event. Flood storage is not anticipated to be significantly impacted by the flood fight or the proposed repairs. The flood fight did place fill in the floodplain to create the access road. However, due to the relative size of the fill compared to the size of the floodplain and the temporary nature of this fill, no significant impact to flood storage occurred. In addition to the placement of fill in the floodplain, the road improvement to the levee crown also changed the height of the levee. Up to 5 inches depth of rock over 735 feet was placed on the crown to create a driving surface during the flood fight. It is anticipated that a similar improvement to the driving surface on the crown will be required during the proposed construction to create a safe, driveable access route. This does not change the height of the entire levee system, but would change the height through this reach and will have an impact on the stage at which floods would

overtop the levee in this location. Further investigation and coordination of this impact will occur as a part of the NEPA process.

Cultural Resources. Prior to repairs, a Corps archeologist will conduct a cultural resources survey of the project area to determine whether there is a potential for the proposed repairs to cause effects to historic properties. If a potential exists, a National Historic Preservation Act Section 106 compliance report will be prepared for all proposed 2012 levee repairs. The report will include the findings of the investigations for each repair site, recommendations for archaeological monitoring during construction, and a determination of effects to archaeological and historic properties. If archaeological monitoring is recommended at some repair locations, the report will include a monitoring plan and protocols to be followed. The protocols will include an inadvertent discovery clause that will apply when an archaeological monitor is not present. The Corps' determinations of effects to historic properties, the investigation report, and monitoring plan will be reviewed and approved by the Washington State Historic Preservation Officer (SHPO) and the appropriate tribes prior to construction.

Air Quality. Construction vehicles and heavy equipment did and would temporarily and locally generate gasoline and diesel exhaust fumes, carbon dioxide (CO₂), carbon monoxide, and dust on roadways. These emissions would be exempt from the conformity requirements under the Clean Air Act, because the project constitutes a routine facility repair activity generating an increase in emissions that is clearly *de minimis*, under 40 CFR 93.153(c)(2)(iv). Unquantifiable but insignificant exacerbation of effects of CO₂ emissions on global climate change is also anticipated.

Noise. Temporary local increases in noise have or would occur as a result of construction activities. Work was completed 24 hours a day during the flood fight, but proposed work would be done during daylight hours. Because no private residences occur near the work sites, impacts of noise are expected to be minimal.

Recreation. The top of the levee at Site 1 is a paved trail that is used by walkers, runners, and cyclists. Site 2 is on private land and is not used for recreation. For safety, recreational access at Site 1 would be disrupted during construction. Upcoming repairs include the peak summer months for recreation. All trails and access points would reopen after construction of the repairs was completed.

Traffic. Construction-related traffic may cause disruption of traffic during construction. Efforts would be made to minimize disturbances to local traffic patterns through signage, notifications, and proper traffic controls.

Cumulative Effects. The levee system was constructed in the 1930s by the Diking District. The Diking District and the Corps have completed various repairs to the levee and completed work during flood fight efforts in the past. The City of Everett has completed several repairs within the last few years along the bank line that surrounds the sewage treatment plant near Site 1. In 2006, the Corps constructed a setback levee and restoration project with the City of Everett on Smith Island near the sewage treatment plant to restore 93 acres of tidal habitat. Modifications to this project occurred in 2012 to improve water movement within the newly opened area.

The Diking District is responsible for annual operation and maintenance of the Union Slough Levees. Maintenance includes mowing, vegetation removal, small repairs, removal of burrowing animals, etc. Snohomish County has plans to complete a 400-acre setback of the Union Slough levee along the northern portion of the island. The eastern repair area at site 2 is within the

portion of the levee expected to be removed after the setback is complete. The proposed repair of this section is expected to provide flood protection until such time that the setback is completed. The proposed repair would not hamper the construction of the setback or the removal of the existing levee. The County has completed an Environmental Impact Statement for the setback and restoration effort.

Cumulative effects will be assessed during the development of the EA to determine whether the incremental contribution of the completed and proposed Union Slough levee repair projects to the overall past, present, and future environmental impacts would be significant.

COMPLIANCE WITH OTHER LAWS AND REGULATIONS

In accordance with Section 7(a)(2) of the Endangered Species Act, the Corps will draft a Biological Assessment (BA) and will seek consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS), regarding the impact of the project on listed species and designated critical habitat. This report will be submitted to the NMFS and USFWS for consultation. Because of the substrate change of up to 0.74 acres within the slough and the work completed for the emergency repair outside of the fish window, the Corps has made a preliminary determination that the project is likely to adversely affect Chinook, steelhead, and bull trout. Similarly, the Corps has also made a preliminary determination that the project is likely to adversely affect designated critical habitat for both Chinook and bull trout.

An evaluation will be made as to any possible adverse effect to Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act.

Elements of the project involve discharges of fill material into waters of the United States that will be evaluated for substantive compliance with guidelines promulgated by the Environmental Protection Agency under authority of Section 404(b)(1) of the Clean Water Act (CWA). Both the completed flood fight repairs and the proposed repairs include fill placement in a wetland. The Corps will seek Certification under CWA Section 401 from the Washington Department of Ecology that the project provides a reasonable assurance of compliance with State water quality standards.

Snohomish County is considered coastal under the Coastal Zone Management Act (CZMA). A determination of consistency with state and county shoreline management plans pursuant to the CZMA will be made and submitted to the Washington Department of Ecology for their concurrence.

The project is not anticipated to cause violations of any standards under the Clean Air Act.

EVALUATION

The Corps has made a preliminary determination that the environmental impacts of the proposal can be adequately evaluated under the NEPA through preparation of an EA. Preparation of an EA addressing potential environmental impacts associated with the proposed action is currently underway.

In preparation of the environmental documentation for this project, coordination has been conducted or is ongoing with the following public agencies:

- (1) U.S. Fish and Wildlife Service
- (2) National Marine Fisheries Service;
- (3) Environmental Protection Agency;

- (4) Washington Department of Fish and Wildlife;
- (5) Washington Department of Ecology;
- (6) Tulalip Tribes
- (7) Snohomish Tribe of Indians
- (8) Suquamish Tribe
- (9) Swinomish Indian Tribal Community
- (10) Lummi Nation;
- (11) State Historic Preservation Office.

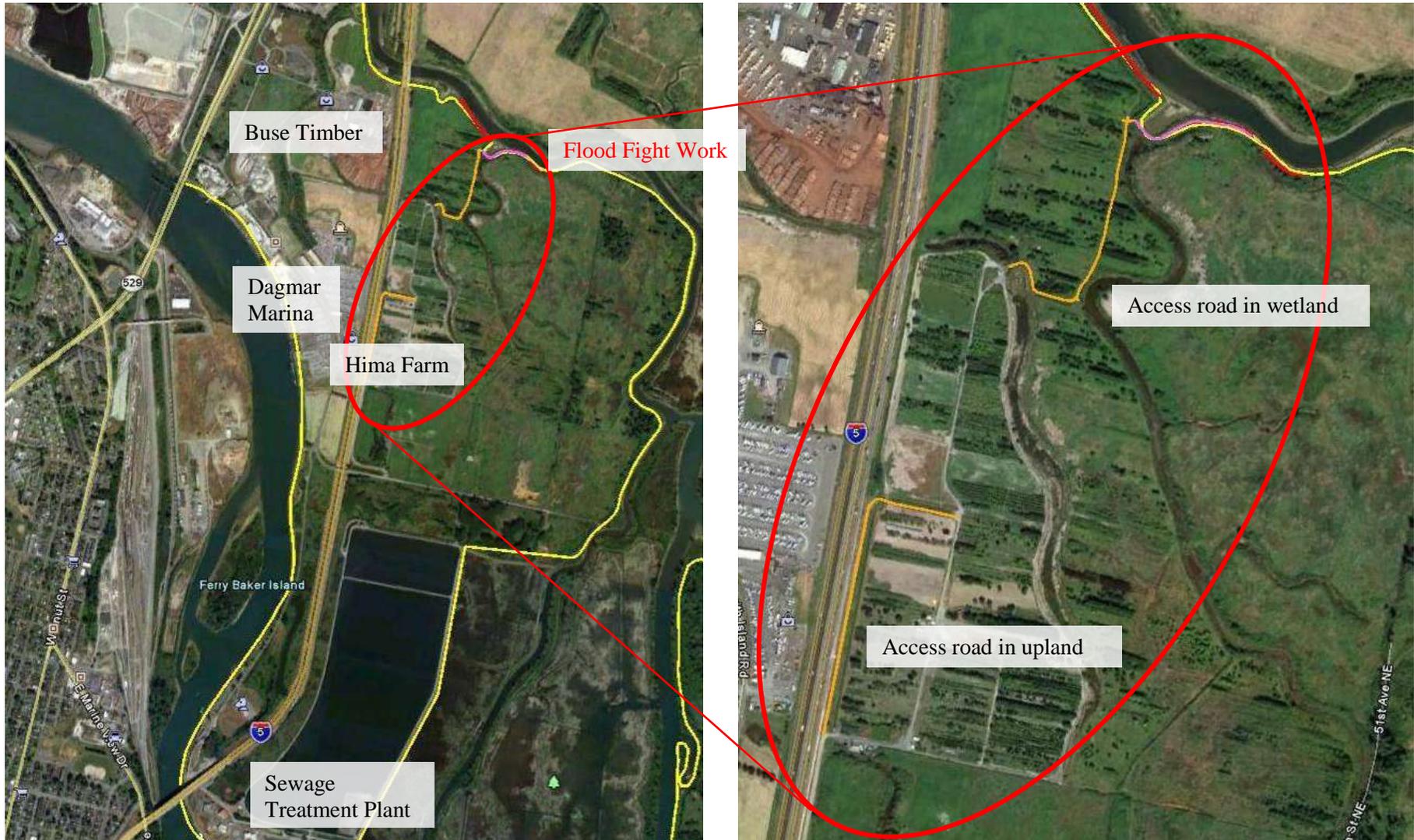
Any person who has an interest that may be affected by this disposal of fill or dredged material may request a public hearing. The request must be submitted in writing to the District Engineer within the comment period of this notice, and must clearly set forth the following: the interest that may be affected, the manner in which the interest may be affected by this activity, and the particular reason for holding a public hearing regarding this activity.

The decision whether to conduct the project will be based on an evaluation of the probable impact on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit, which reasonably may be expected to accrue from the proposal, must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered; among these are: conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, consideration of property ownership and, in general, the needs and welfare of the people.

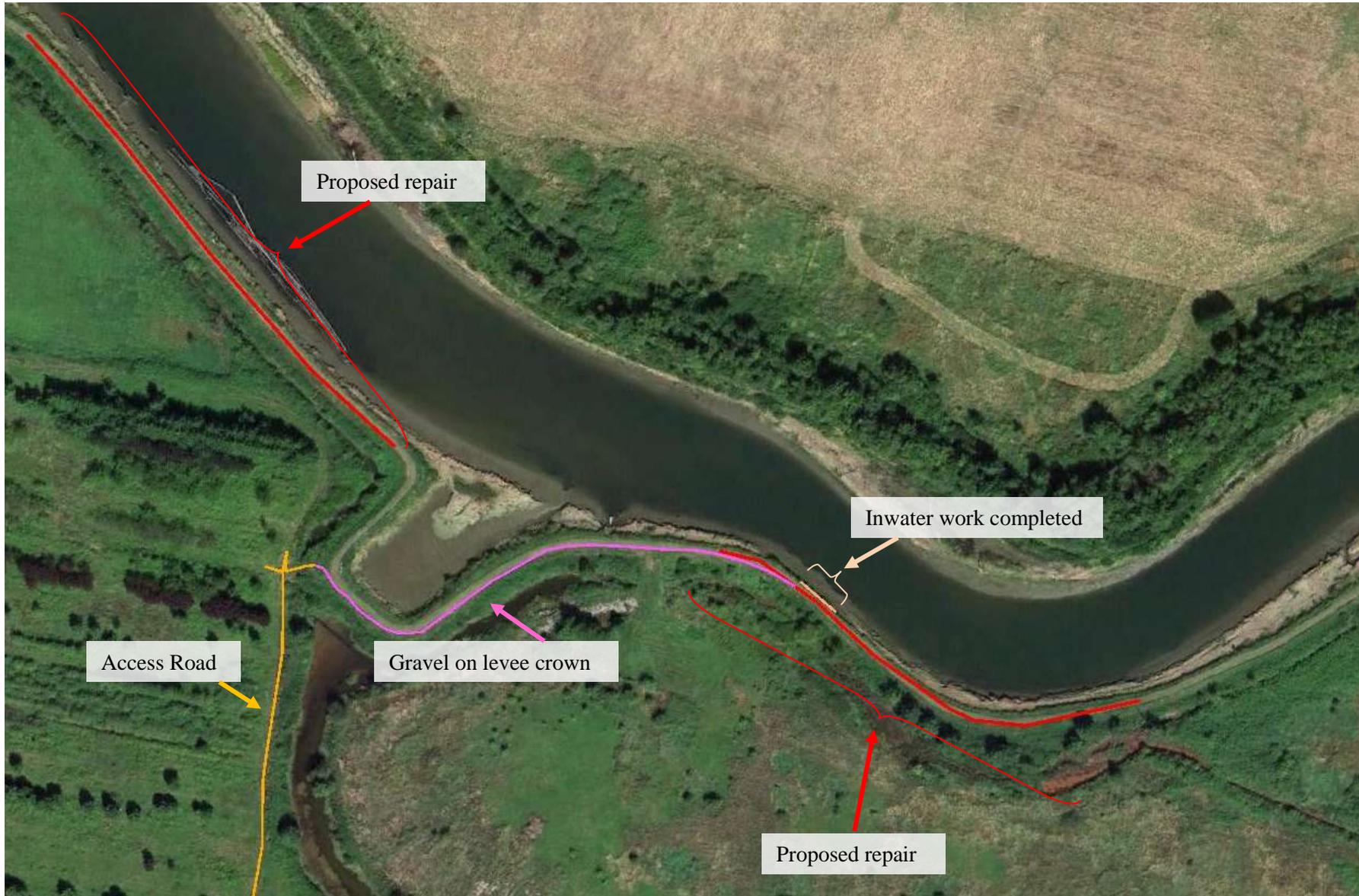
The Corps invites submission of comments on the environmental impact of the completed and proposed project. Comments will also be considered in determining whether it would be in the best public interest to proceed with the proposed project. The Corps will consider all submissions received by the expiration date of this notice. The nature or scope of the proposal may be changed upon consideration of the comments received. The Corps will initiate an Environmental Impact Statement (EIS), and afford all the appropriate public participation opportunities attendant to an EIS, if significant effects on the quality of the human environment are identified and cannot be mitigated.

Comments should reach this office (address at top), no later than 16 May 2012 in order to ensure consideration. Requests for additional information should be directed to Les Soule, Project Manager, at 206-764-3699, or the Environmental Coordinator, Bobbi Jo McClain, at 206-764-6968, or bobbi.j.mcclain@usace.army.mil.

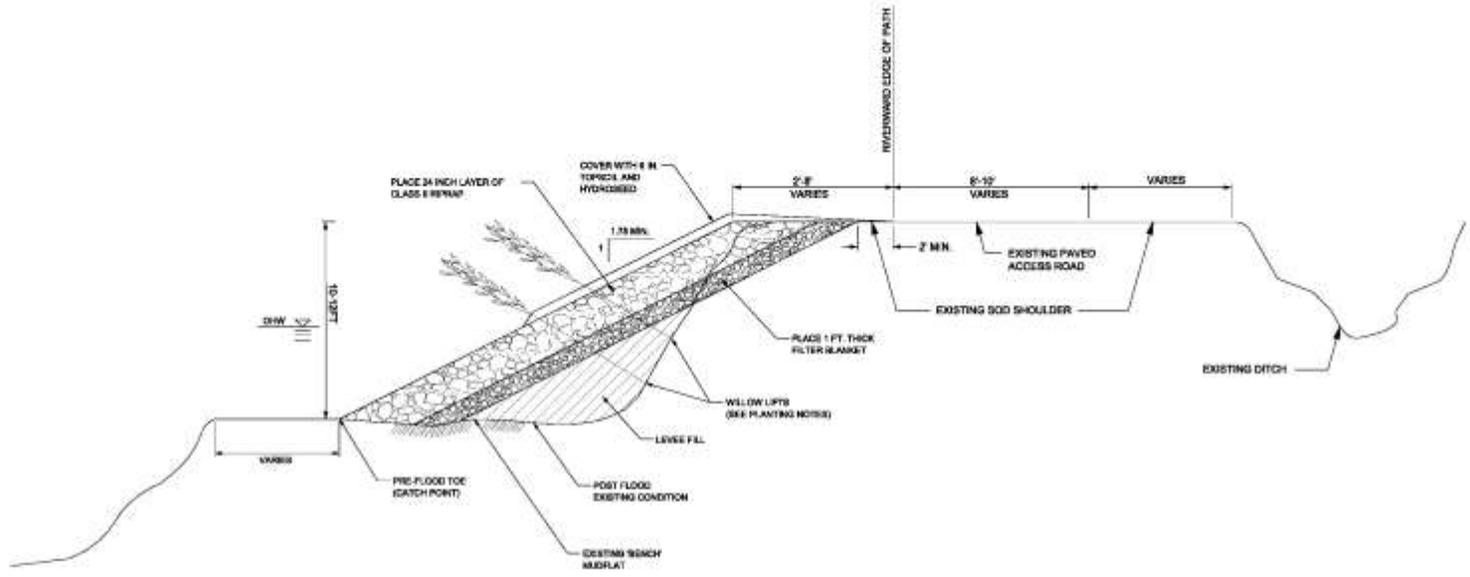
PROJECT LOCATION MAPS AND DESIGNS



Overview maps of the flood fight work completed at site 2. General levee alignment in yellow. Access road improvements shown in orange.



Map showing flood fight work completed on the levee at site 2.



CONSTRUCTION NOTES

1. REGRADE SLOPE TO 1.75:1V MINIMUM.
2. STAGE SOIL FOR REUSE AND DISPOSE OF VEGETATION APPROPRIATELY.
3. FILL SOOUR HOLE WITH CLEAN (2"-4") QUARRY SPALLS.
4. PLACE SPALL FILTER BLANKET (4"-6") OVERLAIN WITH CLASS II REPRAP.
5. COVER EXPOSED ROCK ABOVE CHWL WITH MIXTURE OF TOPSOIL AND EXCAVATED SOIL, HYDROSEED.
7. TOTAL REPAIR LENGTH APPROXIMATELY 1000 LF.

SITE 1 (SOUTH) - TYPICAL REPAIR SECTION (+/- 1000 LF)

NOT TO SCALE

LEVEE FILL MATERIAL	
SIZE	PERCENT PASSING
2"	90-100
1"	75-95
1/2"	60-85
NO. 4	50-65
NO. 10	30-45
NO. 20	10-25

CLASS II REPRAP	
100% SMALLER THAN	50%
50% SMALLER THAN	20%
50% LARGER THAN	10%
50%	25-50%

PLANTING NOTES

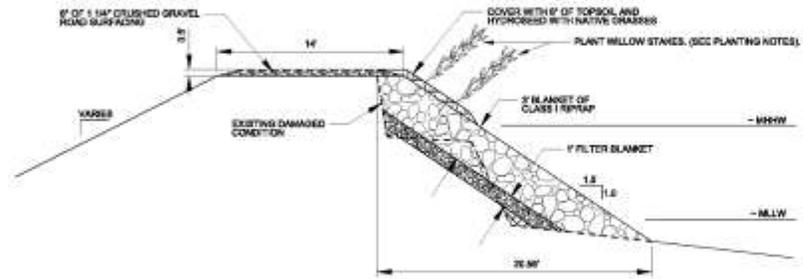
1. HOOKER'S WILLOWS WILL BE PLACED IN TWO ROWS WITH 3 FEET IN BETWEEN ROWS. SPACING SHALL BE 1 FOOT ON CENTER (O.C.) FOR THE LENGTH OF THE REPAIR SITES.
2. DORMANT CUTTINGS SHALL BE 1 INCH TO 2 INCHES IN DIAMETER WITH A POLE LENGTH OF 3 TO 4 FEET.

PROJECT NO.	
DATE	
DESIGNED BY	
CHECKED BY	
APPROVED BY	

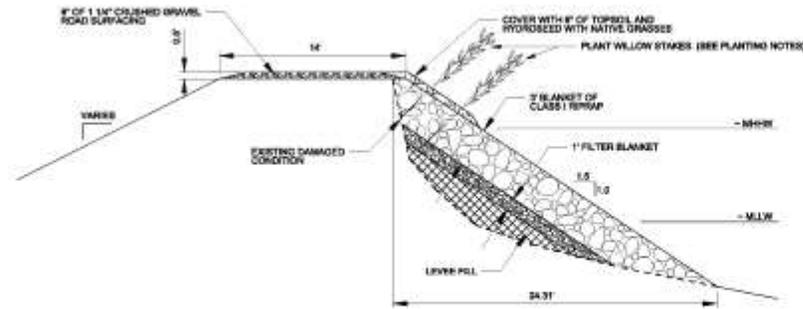
UNION SLOUGH - SITE 1
TYPICAL SECTION

Sheet C-102

IF SHEET MEASURES LESS THAN 20" X 30" IT IS A REDUCED PRINT. RESCALE ACCORDINGLY.



SITE 2 (NORTH) - TYPICAL REPAIR SECTION - WEST SITE (+/- 850 LF)
NOT TO SCALE



SITE 2 (NORTH) - TYPICAL REPAIR SECTION - EAST SITE (+/- 805 LF)
NOT TO SCALE

CONSTRUCTION NOTES

1. CLEAR AND GRUB EMBANKMENT SLOPES.
2. NO-GRADE SLOPE TO PREPARE FOR FILTER BLANKET. USE SUITABLE SPOL AS LEVEE FILL.
3. ADDITIONAL SPOL TO BE STOCKPILED FOR LATER USE.
4. ADD 1 FOOT LAYER OF FILTER BLANKET MATERIAL TO THE GRADED SLOPE.
5. ADD 3 FOOT BLANKET OF CLASS I RIPRAP.
6. COVER THE EXPOSED ROCK SLOPE ABOVE MHW WITH 6" OF TOPSOIL AND SPOL MIXTURE. SOIL SHALL COMPLETELY FILL ALL LARGE VOIDS IN THE ROCK RIPRAP. DEPTH OF SOIL ABOVE THAT RIPRAP WILL BE AT LEAST 6 INCHES.
7. ADD 8 INCHES OF 1 1/2 INCHES OF CRUSHED GRAVEL TO THE LEVEE CROWN.

PLANTING NOTES

1. HOOKER'S WILLOWS WILL BE PLACED IN TWO ROWS WITH 3 FEET IN BETWEEN ROWS. SPACING SHALL BE 1 FOOT ON CENTER (O.C.) FOR THE LENGTH OF THE REPAIR SITES.
2. DORMANT CUTTINGS SHALL BE 1 INCH TO 2 INCHES IN DIAMETER WITH A POLE LENGTH OF 3 TO 4 FEET.

LEGEND

- CLASS I RIPRAP
- FILTER BLANKET
- LEVEE FILL
- TOP SOIL AND HYDROSEED

LEVEE FILL MATERIAL	
SIZE	PERCENT PASSING
2"	80-100
1"	75-85
1/2"	60-80
NO. 4	30-55
NO. 10	10-35
NO. 20	10-20

CLASS I RIPRAP	
10% SMALLER THAN	300
30% SIZE	300
90% LARGER THAN	250
10%	250

DATE: 03/11/2010 11:06 AM
 PROJECT: UNION SLOUGH - SITE 2
 SHEET: C-202
 DRAWN BY: [Name]
 CHECKED BY: [Name]
 APPROVED BY: [Name]

UNION SLOUGH - SITE 2
 TYPICAL SECTIONS
 SAN DIEGO COUNTY

Sheet number:
C-202
 of 1

IF SHEET MEASURES LESS THAN 20" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.



Cracks in the levee crown showing stress from the oversteepened bank at Site 1.



City of Everett repair area near Site 1, with scalloped and eroded bank visible in distance.
Photo taken in 2009.



Photo showing bank sloughing and erosion at the eastern repair area at Site 2. Photo taken in January 2012.



Photo showing bank sloughing at the western repair area at Site 2. Photo taken in 2010.



Photo taken during the flood fight work: Access road construction.



Photo taken during the flood fight work: Riverward slope protection.



Photo taken after the flood fight work: Profile of inwater slope protection.



Photo taken after the flood fight work: Levee crown access road reinforcement.