

Draft Environmental Assessment

Nooksack River – Hannegan Levee Rehabilitation of Flood Control Works Whatcom County, Washington

June, 2003



**US Army Corps
of Engineers®**
Seattle District

**Nooksack River Hannegan Levee
Rehabilitation of Flood Control Works
Draft Environmental Assessment
June 2003**

Responsible Agency: The responsible agency for rehabilitation of flood control works is the U.S. Army Corps of Engineers, Seattle District.

Abstract:

This Environmental Assessment (EA) evaluates the environmental effects of the proposed repair and reconstruction of Hannegan levee, located on the Nooksack River near Lynden, Washington. This levee is on the left bank at approximately River Mile 19.0, just upstream of the Hannegan Road Bridge. The levee protects the only intake structure for the City of Lynden's water supply, the Hannegan Road Bridge, and a private residence. The U.S. Army Corps of Engineers, Seattle District, is proposing the following project under the authority of Public Law 84-99 (33 USCA 701n). The proposed project consists of pulling the riverward slope back to 2H: 1V, reshape the back slope, armoring the riverward slope, and incorporating large woody debris along with willow plantings into the design.

The project is located on the Left Bank of the Nooksack River at approximately RM 19 extending from the Hannegan Road bridge 550 linear feet upstream. The Nooksack River rose above the zero damage flood stage in January 2002 resulting in significant erosion to approximately 400 linear feet of the levee in this area. The severe erosion resulted in armor rock being lost and the levee has been scoured to an almost vertical slope in the damaged segment. The Corps has determined that the levee is in need of permanent repair. The riverward bench is vegetated primarily with Himalayan Blackberry, Japanese Knotweed and grass. The top and back slope of the levee is vegetated primarily with grass and weeds.

The proposed project will not constitute a major Federal action and will not significantly affect the quality of the human or natural environment. The Corps will use best management practices to minimize potential adverse effects to aquatic and terrestrial resources. The proposed project was determined to not significantly affect the quality of the human or natural environment, and best management practices will be employed to minimize potential adverse effects to aquatic and terrestrial resources.

This document is also available online at:

<http://www.nws.usace.army.mil/ers/envirdocs.html>

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1. INTRODUCTION

This Environmental Assessment (EA) evaluates the environmental effects of the proposed repair and reconstruction of Hannegan levee located on the Nooksack River near Lynden, Washington. This levee is on the left bank at approximately River Mile 19.0, just upstream of the Hannegan Road Bridge. The levee protects the only intake structure for the City of Lynden's water supply, the Hannegan Road Bridge, and a private residence. The Nooksack River rose above the zero damage flood stage in January 2002 resulting in significant erosion to approximately 400 linear feet of the levee immediately upstream of the water intake structure and the Hannegan Road Bridge. The severe erosion resulted in armor rock being lost and the levee has been scoured to an almost vertical slope in the damaged segment. The Corps has determined that the levee is in need of permanent repair. The proposed project consists of pulling the riverward slope back to 2H: 1V, reshape the back slope, armoring the riverward slope, and incorporating large woody debris along with willow plantings into the design.

There is a high potential that during the upcoming flood season around October, the river would overflow the levee again, posing a major threat to the water supply intake, if no action is taken to contain the floodwaters.

The project is located on the Left Bank of the Nooksack River extending on the upstream end to the downstream terminus at Hannegan Road Bridge. The damaged section extends approximately 400 linear feet along an outside bend of the river. The levee was constructed of earthen materials with a riverward and back slopes of about 2H: 1V. As stated previously, this section has been scoured to an almost vertical slope at present. The proposed project consists of pulling the riverward slope back to 2H: 1V, reshape the back slope, armoring the riverward slope, and adding large woody debris along with willow plantings. The proposed levee will be set back from the pre-flood bank by a distance that varies between 3 to 8 feet (see construction drawings).

The proposed work is not expected to significantly affect the quality of the natural environment because the damaged section of shoreline will be returned to the pre-flood condition as built in place. Construction will employ best management practices to minimize potential adverse effects to aquatic and terrestrial resources.

1.1 Location and Setting

The project is located on the left bank of the Nooksack River at RM 19.0, approximately 1 mile south of the city of Lynden, Washington, within Whatcom County, Washington at Range 3 East, Township 40 North, Sections 21. A location map can be found in Figure 1.

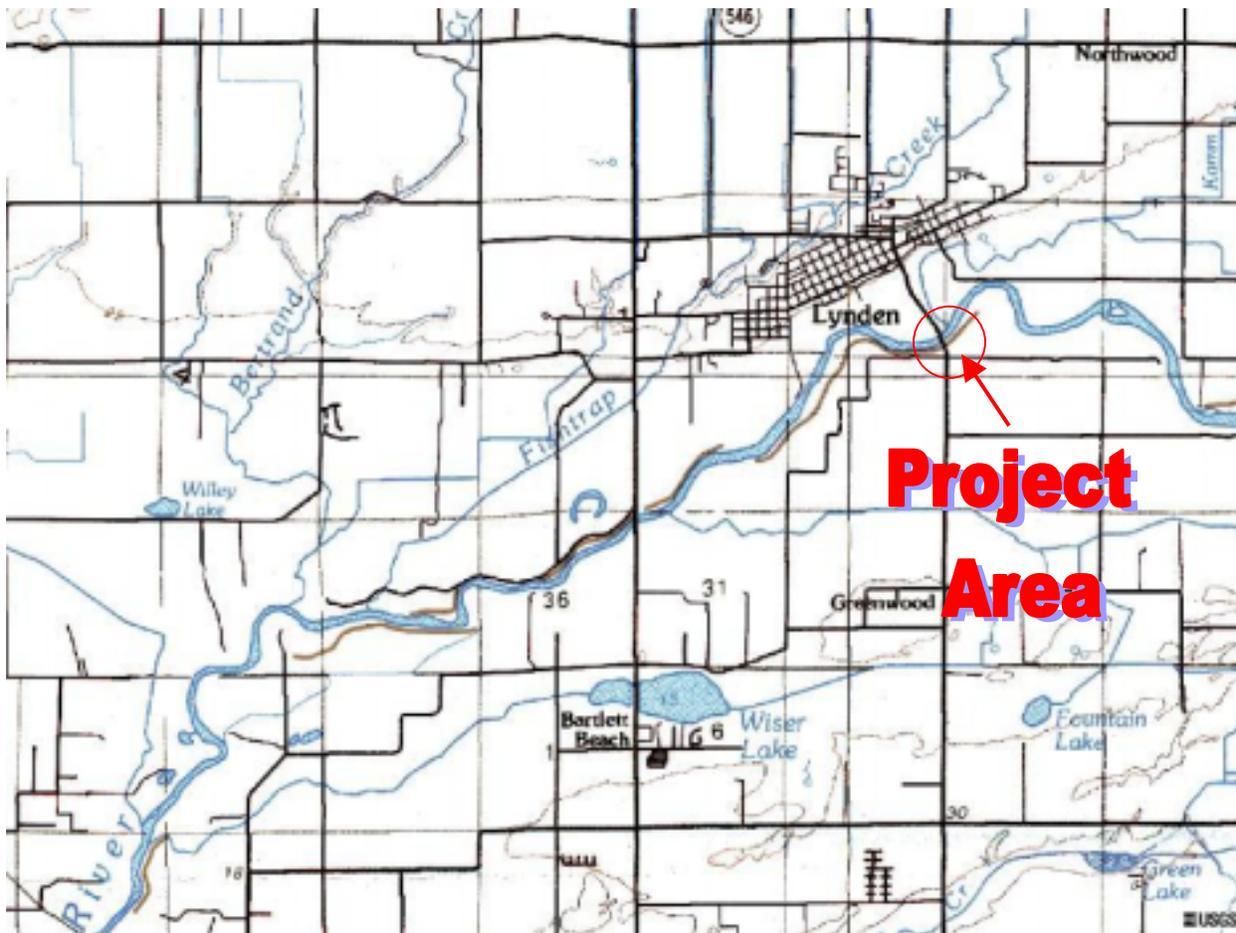


Figure 1. Project Location

1.2 Background

The project was originally constructed in the early 1900's, by local farmers, to protect crops, roads, and structures. Over the years, separable segments became interconnected to form a contiguous levee segment. The estimated completion of a contiguous segment is prior to 1936 when the Corps performed levee upgrades using Works Progress Administration (WPA) funding. After the WPA upgrades, Corps involvement have been limited to flood fights and levee rehabilitation.

The levee is constructed of earthen materials with grass and sod used for erosion control and provides protection to the City of Lynden Water Treatment and Intake Facility, which is the sole source of water for many local communities. There are no special features, drainage structures, or culverts along the levee segment. The levee was constructed with riverward and back slopes of about 2H: 1V. Several concrete slab and rock riprap locations were evident along the site during the October 2002 site visit.

Prior to the flood event the levee was set back from the river edge by a distance that varies between 10 to 30 feet. At present the levee is immediately adjacent to the rivers edge. The riverward bench is vegetated primarily with Himalayan blackberry, Japanese Knotweed, and grass. The top and back slope of the levee is sparsely vegetated with grass and smaller weeds.

The County performs annual maintenance including the removal of blackberries and thinning or removal of trees that would jeopardize levee integrity.

Moderately strong rains from a series of frontal systems from the eastern Pacific Ocean hit Western Washington on January 07 and 08, 2002. Warm air in advance of these systems lifted the freezing level as high as 8000 feet on January 6, 2002. As a result, over 15 Western Washington rivers exceeded flood stage. Flooding on the Nooksack River began on January 07 at 2030 hours when the river rose above National Weather Service zero damage flood stage of 12 feet (30,500 cfs) at Deming gage (USGS 12210500). At 0345 hours on January 8, 2002, the river proceeded to rise to its eventual crest of 13.8 feet (41,800 cfs), corresponding to a 16-year flood event.

During this flood event the levee sustained significant damage by erosion for approximately 400 linear feet immediately upstream of the water intake structure and the Hannegan Road Bridge. The armor rock was lost and the levee has been scoured to an almost vertical slope in the damaged segment.

1.3 Project Purpose and Need

The purpose of this project is to repair and reconstruct a portion of Hannegan levee to preclude imminent flooding danger and erosion potential to the intake structure for the City of Lynden's water supply, the Hannegan Road Bridge, and a private residence. This section of the levee sustained significant damage by erosion during a flood event in January 2002 and is in need of permanent repair.

There is a high potential that during the upcoming flood season around October, the river would overflow the levee again, posing a major threat to the water supply intake, if no action is taken to contain the floodwaters.

1.4 Authority

The Hannegan Levee Rehab is authorized by Public Law 84-99 (USCA 701n). Corps rehabilitation and restoration work under this authority is limited to flood control works damaged or destroyed by flood. The rehabilitated structure will normally be designed to provide the same degree of protection as the original structure. This project has been authorized as having *emergency* status as stated under the PL 84-99 regulations. The Corps has determined that if the levee is not repaired by the next flood event, an *imminent threat* of loss of private and/or public property exists.

2. DESCRIPTION OF THE PROPOSED ACTION

2.1 Proposed Action

The Seattle District Corps of Engineers will repair the erosion and essentially return the levee to its pre-flood condition. The project is located on the left bank of the Nooksack River at RM 19.0, approximately 1 mile south of the city of Lynden, Washington. The proposed project consists of armoring and pulling the riverward slope back to 2H: 1V. A one-foot thick blanket of quarry spalls will be placed as a filter, and then a three-foot thick blanket of class IV riprap will be placed for armor rock. The project also includes reshaping the back slope, and adding large woody debris along with willow plantings. The proposed levee will be set back from the pre-flood bank by a distance that varies between 3 to 8 feet (see construction drawings).

3. NON-SELECTED ALTERNATIVES

Several other alternative actions were considered before the recommended alternative was selected. These alternatives include:

- the No-Action Alternative,
- the Non-Structural Alternative,
- the Recommended Alternative (repair the erosion).

In order for any alternative to be acceptable for consideration it must meet certain objectives. The alternative must afford flood protection similar to the rest of the levee segment, it must be economically justified, it should be environmentally acceptable, and it should minimize costs for both the sponsor and the Federal government

3.1 No Federal Action

The No-Action alternative would provide no federal action and leave the levee in its currently damaged condition with no further action to repair the levee damage. This alternative was quickly discarded because of the high potential of additional flood damages.

3.1.1 Effects of No Federal Action.

With no Corps assistance, the bank erosion would continue, reaching City of Lynden's Water Intake and eventually Hannegan Road. The river intake serves as the only potable water and fire protection supply for the City's 9,300 residents and businesses, in addition to supplying potable water to several surrounding water districts.

3.2 Non-Structural Alternative

The Non-Structural alternative would buy-out the existing farmland and would also relocate the water treatment and intake facility as well as the Hannegan Road. This alternative was quickly discarded because the costs were deemed to high.

3.3 Recommended Plan - Repair the Erosion Alternative

The Recommended Plan is the Repair the Erosion Alternative. This alternative would fix the riverward erosion and reshape both the riverward and back slope.

Drawings, maps, and other pertinent design information are located are in Appendix D. Access to the site will not require the construction of a road. Equipment will simply travel through the existing project area. Presently this area consists of a gravel parking area for monitoring/servicing the water intake, and a grass pasture for the existing private residence. It is very likely that the temporary access will not require any roadbed aggregate/material. In the unlikely scenario of having saturated soils, the appropriate substrate will be placed on the access road/path to minimize erosion and provide a safe path for the equipment to travel on.

The riverward slope and the levee back slope will be constructed to have a 2H: 1V slope. The riverward slope will include soil layers planted with willow cuttings, and several pieces of large woody debris, with 18 inch minimum diameter. In the sections of the project that include large woody debris, the amount of armor rock will need to be increased to maintain the structural integrity of the levee (Appendix D). The existing bench located immediately upstream of the project will be planted with native tree species such as Douglass fir and Western Red Cedar. The entire back slope area disturbed will be seeded with an appropriate species of grass.

4. EXISTING ENVIRONMENT AND ENVIRONMENTAL EFFECTS

In the Lynden area, the Nooksack River is a confined, single channel, low gradient system. The river serves mainly as a transportation zone for all salmon species utilizing the upper watershed. Some spawning occurs within this reach, principally above Lynden, with a few Chinook, pink, and chum using the increasing number of riffle areas. Coho are found year round in tributaries including Fishtrap Creek that is adjacent to the project area. Juvenile rearing could occur through the reach. The riparian zone adjacent to the levees is well developed with medium age cottonwoods, however in the immediate project area the vegetation consists primarily Himalayan blackberry and grass. The riparian vegetation serves as habitat for a variety of raptors, woodpeckers, passerines and water-oriented mammals.

The following threatened species are expected to be found in the project area:

- Puget Sound Chinook salmon (2 essential stocks)
- Bull trout
- Bald Eagle

It is also anticipated that marbled murrelet could transit the area going to nesting areas in the upper watershed, or feeding areas in Puget Sound. It is anticipated that there will be no adverse effect to any threatened or endangered species.

There will be short-term impacts from construction of the replacement levee. The primary impact will be a temporary increase in turbidity due to fill placement. Because the work will be accomplished during the established work window (July 15 – August 31), the potential disruption of salmonid movement in the area will be minimized. If present, adult and juvenile salmonids will be temporarily displaced from this area.

Due to the timing of construction and design of the levee, no long-term impacts to the environment are anticipated. Any effects to fish and wildlife will be temporary and primarily occur during construction. A decrease in sediment loading to the river by arresting or slowing of bank erosion likely will have a positive effect to fish. Additional woody material added to the site will increase some fish habitat values. Overall effects, both adverse and favorable, are insignificant.

The National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Dept of Ecology (DOE), Whatcom County Public Works and a biologist representing the Nooksack tribe have visited the site.

4.1 Action Area

The action area for the project extends from the project site on the left bank of the Nooksack River, downstream to the terminus point at Hannegan Road, including the staging area and access road/route.

4.2 Hydrology , Soils and Topography

Topography at the site consists of primarily flat terrain on the southern bank of the river at the project. The existing levee contains the river on the southern bank. On the north bank, a high and steep slope contains the river. Soil composition at the site is primary alluvial deposits with various gravel deposits intermixed atop hardened mud. Large quantities of concrete riprap are also present in the project area. Hydrologically, the repaired levee should return the area to its pre-flood river characteristics. The riverward slope will be returned to the pre-flood slope of 2:1 and the cross-sectional hydraulic capacity will remain the same since the existing material will be redistributed, and an insignificant total amount of new material added. Frequency and depth of floodplain inundation of the site should be returned to pre-flood conditions. Overall project effects to hydrology, soils and topography will be insignificant.

4.3 Vegetation

The project site is located in a coastal upland agricultural area. Vegetation at and near the vicinity of the project site is limited to that which occurs near the river. These include:

- Cottonwood (*Populus angustifolia*)
- red-osier dogwood (*Cornus sericea*),
- Nootka rose (*Rosa nutkana*),
- salmonberry (*Rubus spectabilis*),
- snowberry (*Magnoliopsida dilleniida*),
- red alder (*Alnus rubra*),
- Alaskan cedar (*Chamaecyparis nootkatensis*),
- Himalayan blackberry (*Rubus discolor*),

- Evergreen blackberry (*Rubus laciniatus*),
- Japanese Knotweed (*Fallopia japonica*), and
- a variety of native and non-native grasses.

The most prominent species at the project site are Himalayan blackberry, Japanese Knotweed and grass.

Grass and weeds will be removed from the back slope along the 550 –foot levee reach. Vegetation to be removed from the riverward slope will consist primarily of Japanese knotweed, Himalayan Blackberry, grasses, and a few red-osier dogwoods.

The repaired levee and disturbed areas will be hydro-seeded after construction. In addition, willow cuttings will be included in the design as well as several pieces of large woody debris. In addition the existing bench immediately upstream of the project will be planted with cedar and fir. Japanese knotweed is well established presently and will be removed during construction. Overall project effects to vegetation will be insignificant as the existing vegetation is very limited and consists primarily of non-native invasive species. In addition, our replanting efforts will increase vegetation in the project area.

4.4 Fish and Wildlife

The Nooksack River supports several species of salmon and trout. Trout species occasionally present include bull trout, dolly varden, steelhead and cutthroat trout. The salmon species are chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), chum (*O. keta*), pink (*O. gorbuscha*), and perhaps sockeye (*O. nerka*).

The agricultural area surrounding the project site along the Nooksack River is frequented by a variety of wildlife species. Mammals include raccoon (*Procyon lotor*), Douglas squirrel (*Tamiasciurus douglasi*), little brown myotis (*Myotis lucifugus*), mink (*Carnivora mustelidae*) and Columbia black-tailed deer (*Odocoileus hemionus*). Bird species could include bald eagles (*Haliaeetus leucocephalus*), marbled murrelets (*Brachyramphus marmoratus marmoratus*), and chestnut-backed chickadee (*Parus rufescens*).

Effects to fish and wildlife, if any, will be temporary and occur primarily during construction. The addition of woody material will be added to the site increasing some fish habitat values. Overall effects, both adverse and favorable, will be insignificant.

4.5 Threatened and Endangered Species

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species. Three species listed as either threatened or endangered are potentially found in the area of the project, and are listed in Table 1.

Table 4-1. Endangered Species in the Project Vicinity

| Scientific Name | Common Name | Status |
|---------------------------------|----------------------------|------------|
| <i>Haliaeetus leucocephalus</i> | Bald Eagle | Threatened |
| <i>Oncorhynchus tshawytscha</i> | Puget Sound Chinook Salmon | Threatened |

| | | |
|---|------------------|------------|
| <i>Salvelinus confluentus</i> | Bull Trout | Threatened |
| <i>Brachyramphus marmoratus marmoratus</i> | Marbled Murrelet | Threatened |

Information on known occurrences of candidate and threatened species in the project vicinity, and the impacts of the proposed projects on these species are addressed in Appendix C, Nooksack River Hannegan Levee Repair ESA documentation, dated June 2003. This document includes a revegetation plan requiring the vegetative plantings be monitored and maintained, and replanted if necessary, for up to five years. The plan also requires monitoring and maintenance for invasive species to ensure that the riparian plantings are able to survive and enable the damaged riparian area to recover back to its original pre-flood condition.

Bald eagle is listed as threatened in Washington pursuant to the Endangered Species Act and can be found in coastal areas. The project area is more than 1 mile away from any bald eagle nesting territory, and the closest nest is not visible from the project area. Nesting territory extends along much of the Nooksack River, as far north as Pioneer Park. The project impacts are not a concern to nesting behavior due to construction timing. No construction activity restrictions are identified in the ESA documentation due to known bald eagle ground feeding or perch areas not being within close proximity to the project area. The ESA document addressed the expected effect of the project on bald eagles and made a “May affect, not likely to adversely affect” determination.

Marbled murrelet is listed as threatened and is found in coastal Old-growth forest areas of Washington. Marbled murrelets do not nest or feed in the project area. The project site lacks old-growth forest and does not contain suitable marbled murrelet habitat. The project would not occur during marbled murrelet nesting season and would not have a detrimental effect on the species. The ESA document addressed the expected effect of the project on marbled murrelet and made a “May affect, not likely to adversely affect” determination.

Bull trout and Dolly Varden have been found to co-exist in streams in this region. Because these two species are closely related and have similar biological characteristics, the WDFW manages bull trout and Dolly Varden in the Nooksack together as "native char." Bull trout and Dolly Varden are very difficult to distinguish based on physical features and share similar life history traits and habitat requirements. Dolly Varden, were not listed as a threatened species in the Coastal/Puget Sound Distinct Population segment when the USFWS listed bull trout in November 1999. However, the USFWS indicated on January 9, 2001 that Dolly Varden are being considered for listing as threatened due to their similarity of appearance to bull trout.

Bull trout was designated on June 10, 1998, as threatened in the contiguous U.S.A. (lower 48 states). Anadromous and resident bull trout spawn in the upper Forks of the Nooksack River. Although existing habitat suitability for char along this length of shoreline is moderately-low and the habitat is not unique, its value is greater than that of an early successional off-channel pool formed by the ring dike that has a high potential of continued erosion with fall and winter flooding. In order to increase the quality and quantity of bull trout over-wintering habitat in the project area, large woody debris was installed strategically along the toe of the new levee repair. The project submerged and secured 16 large root wads at the extreme toe of the new levee breach site and along the levee access route. Depending on the tree species, life of the structures is estimated at 20 or more years. Ensuring recovery of the riparian area located on the bench riverward of the levee was also identified as an important element in mitigating project effects on

bull trout. The revegetation plan, in Appendix C, identifies the measures required to ensure vegetation recovery and prevention of invasive species.

These enhancements are expected to create several hundred square feet of preferred rearing habitat for char. The proposed installation of root wads within the mainstem channel is consistent with preliminary ecosystem restoration measures identified by the Nooksack Endangered Species Action Team and complementary to other bull trout protection measures underway in the basin.

Puget Sound Chinook Salmon, an anadromous fish run in the Nooksack River area, is listed as threatened under the ESA. Chinook salmon in the Nooksack Basin are considered part of the Puget Sound chinook salmon Evolutional Significant Unit (ESU) that was listed as threatened in March 1999. Three chinook stocks have been identified in the Nooksack River basin; the North Fork spring-run, the South Fork spring-run and the Samish/Mainstem fall-run. The two spring-runs are distinct wild stocks of native origin while the Samish/Mainstem fall-run is a non-native introduced hatchery stock from the Green River.

Spring-run chinook generally enter the Nooksack River between April and June, migrate rapidly upstream to the forks and hold there until July through early August, and spawn generally from July through October. Fall-run chinook enter the river beginning in early June and migrate upriver through mid-October, migrate to the spawning grounds or hatchery of origin, and generally spawn from early September through December. Juvenile and fry chinook migrate downstream through the project reach from early April through mid June. Available feeding and predator avoidance habitat in the lower river, during downstream migration to the estuary and marine environment, is usually associated with slow velocities along the shoreline or around woody debris and along shallow margin habitats of cobble and gravel bars. Given the general lack of rearing habitat and their migratory behavior, residence time of out-migrating chinook fry in the project reach is likely less than a few days.

Repairing the levee with the addition of large woody debris and overhanging vegetation will complement recovery efforts by other groups throughout the Nooksack Basin. The procedure to repair the levee was designed to avoid or minimize potential "take" during construction, including scheduling the in-water construction period to avoid periods of greatest chinook vulnerability and highest expected use. The ESA document addressed the expected effect of the project on chinook salmon and made a "May affect, not likely to adversely affect" determination.

Coho salmon within the Puget Sound/Strait of Georgia ESU are presently classified as a "candidate" for ESA listing. Candidate species are species that may be proposed or are under review for possible listing as a threatened or endangered species in the future. In its ESA status review, the Biological Review Team stated that although many coho populations within this ESU are abundant and apparently stable, there are a number of factors (high harvest rates, habitat degradation, and hatchery production) that may lead to substantial risks to whatever native production remains. The Biological Review Team stated that if the population continues to decline, this ESU is likely to become endangered in the foreseeable future.

Coho salmon of the Nooksack are dominant Puget Sound contributors to U.S. and Canadian sport and commercial fisheries. Nooksack River coho salmon are harvested in pre-terminal fisheries, Bellingham Bay terminal fisheries, and Lummi, Nooksack tribal river net fisheries, and

river sport fisheries. The fish have been managed as a hatchery management unit under the Puget Sound Management Plan for nearly 27 years. Run size each year is large enough to provide both a harvestable surplus and a sufficient hatchery escapement. Between 1989 and 1999 the estimated total number of Nooksack coho salmon returning to Puget Sound has ranged from 43,300 to 244,600 with escapement estimates ranging from 7,950 to 99,000.

Three naturally spawning stocks of coho salmon were tentatively identified by WDFW (1992) in the Samish/Nooksack Basin region. These are the Nooksack, Samish, and North Puget Sound Tributary stocks. Stock separation was primarily based on geographic distribution. Life history timing or morphological differences between the groups of fish do not exist or have not been observed. Within the Nooksack Basin, it is uncertain whether a naturally spawning Nooksack coho population exists that is sufficiently distinct from the hatchery population to be considered a native stock. In the Nooksack River basin, natural escapement has been estimated to range from 500 to 5,500 since 1966. The highest escapement in this period (1987) corresponds to the second highest hatchery release to the system (6.2 million in 1985). Some biologists believe the native Nooksack coho stock is extinct, while others argue that there is high likelihood that a segment of the naturally spawning population retains sufficient genetic distinction to warrant its classification as a native stock. The NMFS has deferred any decisions on this ESU while additional information is gathered.

The Nooksack River coho stocks are typical of the Puget Sound/Strait of Georgia ESU with regard to their life history. Following emergence, the majority of stream-rearing juveniles spend eighteen months in fresh water before migrating downstream to saltwater as river flows increase with annual spring snowmelt and runoff. Following eighteen months in salt water, adult coho return to the Nooksack River and migrate upstream from August through early January. Spawning occurs in the upper mainstem and the accessible portions of the Forks from mid-November through January.

Coho habitat and life history functions in the Action Area are adult and juvenile migration and juvenile rearing (Whatcom County 1994). Neither coho spawning or extended juvenile rearing occur in the Action Area. Adults migrate through the project reach from June through December. Juveniles migrate downstream through the reach from March through July. Although limited rearing may occur in the project reach, the habitat is generally not suitable for coho rearing and functions primarily as a transportation corridor to and from saltwater. The procedure to repair the levee was designed to avoid or minimize potential "take" during construction, including scheduling the in-water construction period to avoid periods of greatest coho vulnerability and highest expected use.

The impact reduction measure of placing rootwads below the ordinary high water line, followed by planting willows and other riparian plants along a constructed submersible bench, as previously described for chinook salmon may also benefit coho adults or juveniles during upstream or downstream migration.

4.6 Cultural Resources

There are no known cultural resources in the project area. The disturbed nature of the levee and bank material (imported fill, sediment deposited from the river, or dredged from the river) significantly reduces the chance of finding cultural resources. A cultural resources

reconnaissance level survey will be conducted in the repair area prior to construction and a cultural resource report prepared as part of the Section 106 of the National Historic Preservation Act compliance process. The construction contract would contain a stop work clause to notify the appropriate officials if evidence of cultural or human artifacts were unearthed.

4.7 Water Quality

Water quality will not be significantly impacted by construction activities. While a temporary increase in turbidity may occur during the construction of the armor, turbidity to the river over the long term will decrease owing to the reduction in bank erosion. Equipment will not enter the water and would remain on dry ground at all times. During construction, best management practices for equipment operation and storage and use of hazardous materials would be employed. Therefore, no leakage or spills of hazardous materials are expected to occur.

According to the Code of Federal Regulations, Title 33, Section 323.4 (a) (2) levee repair is an activity that does not require a Section 404 permit.

4.8 Air Quality and Noise

Air quality would meet the standards as set forth by the Washington Department of Ecology and would not be permanently affected by the construction of the project. Noise would be intermittent at the site and varied depending on the frequency of trucks arriving with the material and construction of the identified features. Noise disruption factors were considered for their effect on threatened and endangered species in the ESA document.

During construction, there would be temporary and localized reduction in air quality due to emissions from heavy machinery operating during fill placement, and grading. These emissions would not exceed EPA's de minimis threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone) or affect the implementation of Washington's Clean Air Act implementation plan. Therefore, impacts would not be significant.

Ambient noise levels would increase slightly while construction equipment was operating. However, these effects would be temporary and localized, and occur only during daylight working hours. As a result, impacts would be insignificant.

4.9 Utilities and Public Services

Failure to repair the levee erosion could have a serious impact on local commercial and private citizens if the water intake was to be taken out of service as well as having impacts to transportation traffic if Hannegan Road was to be damaged or flooded for an extended period of time. Construction vehicles associated with the project would have a minimal disruption due to increased truck traffic merging, turning and traveling together with local traffic. Such a disruption would be temporary and highly localized, and therefore impacts would be insignificant.

4.10 Land Use

Land use in the project area is primarily rural residential and agricultural. There are scattered homes and farms in the surrounding area. The project caused no unique effects or impacts to land use.

Effects to land use from the action will not change because the water supply will continue to enable grazing, farming and residential uses to continue with decreased potential for dangerous flooding.

4.11 Recreation

Recreational uses of the Nooksack River at the project site are seasonal and moderate. They include, but are not limited to, sightseeing, wildlife observation, camping, photography, hiking, fishing and boating.

Effects to recreation values are insignificant because the site has been in a degraded condition compared with other nearby locations. Recreational resource and value uses are not changed.

4.12 Hazardous, Toxic, and Radioactive Waste

There are no known sites at the project locations that have any hazardous, toxic, or radioactive waste.

4.13 Aesthetics

Along the Nooksack River, the landscape elements of landform, vegetation, water, color, and related factors have been impaired by the levees and agricultural use of adjacent land. Scenery and visual attractions are limited to the river corridor over this reach of the river. Restoration of the constructed features of the project will not significantly affect the aesthetics of the site or the river.

5. UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects associated with this project included:

- (1) a temporary and localized increase in noise, which may disrupt wildlife in the area,
- (2) a temporary and localized disruption of local traffic by construction vehicles, and
- (3) a temporary and localized increase in turbidity levels in the Nooksack River, which may affect aquatic/estuarine organisms in the area. Some in-water work will be required for the riprap and rootwads placement below the average ordinary high water level.

6. COORDINATION

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

- Washington Department of Ecology (Ecology)
- National Marine Fisheries Service (NMFS)
- U.S. Fish and Wildlife Service (USFWS)
- Washington Department of Fish and Wildlife (WDFW)
- The Nooksack Tribe

- The Lummi Tribe
- Washington State Office of Archaeology and Historic Preservation
- Whatcom County
- Washington Department of Emergency Management

7. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this evaluation. Future federal actions would require additional NEPA evaluation at the time of their development.

There are no significant cumulative effects that can be identified from implementation of this project. Because of frequent flooding in the area, the adjacent property is expected to remain agricultural and no development is anticipated in the vicinity of the project. There are no known plans to raise the levees to provide an increased level of flood protection. The levees would continue to be maintained at their current level. The Corps knows of no other actions that are reasonably certain to occur within the action area.

Cumulative impacts from local, short-term disturbances caused by the construction project (noise, emissions, traffic disruptions, etc.) would be minor and not significant.

8. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The irreversible and irretrievable commitment of resources is the use of materials, resources, or land during implementation of an alternative that makes these resources unavailable for other uses, given known technology and reasonable economics.

Industrial resources required during implementation of the selected alternative included fossil fuels, construction-related materials, as well as labor and capital. The majority of the levee and the alignment of the access road occupy land that was not in use. The scour hole repairs returned most of the land back to its pre-flood agricultural land use.

9. ENVIRONMENTAL COMPLIANCE

9.1 National Environmental Policy Act (NEPA) (42 USC 4321 et seq.)

In accordance with the National Environmental Policy Act, federal projects are required to declare potential environmental impacts and solicit public comment. The purpose of this document is to solicit public comment and fulfill the Corps of Engineers documentation requirements under the National Environmental Policy Act.

9.2 Endangered Species Act of 1973, as Amended (16 USC 1531-1544)

In accordance with Section 7(a)(2) of the Endangered Species Act 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. Prior to construction, a Biological Evaluation was prepared for the project. A finding of May Effect, Not Likely to Adversely Effect was determined for all potentially occurring threatened or endangered species. The National Marine Fisheries Service (NMFS) and USFWS were notified of the project location and action. The ESA document is contained in Appendix C.

9.3 Clean Water Act, as Amended (33 USC 1251 et seq.)

According to the Code of Federal Regulations, Title 33, Section 323.4 (a) (2), levee repair is an activity that does not require a Section 404 permit; therefore, a water quality certification from the Dept of Ecology is not required either.

9.4 Rivers and Harbors Act (33 U.S.C. 403)

The Rivers and Harbors Act of 1899 prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waters of the United States in the absence of Congressional consent and approval of the plans by the Chief of Engineers and the Secretary of the Army. Under Section 10 of the Rivers and Harbors Act, a navigable waterway is defined as those waters that are subject to the ebb and flow of the tide shoreward to the mean high water mark. This act is not applicable to the proposed project because the levee and scour holes repair does not restrict navigation or access to navigable waters.

9.5 Coastal Zone Management Act (16 U.S.C. 1451-1465)

The Coastal Zone Management Act of 1972 as amended (15 CFR 923) requires Federal agencies to carry out their activities in a manner, which is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Zone Management Program.

The proposed action will simply restore the Federal erosion control project to a state comparable to its original condition before damage by the elements occurred. Work will not extend beyond the footprint of the original project, and will not cause substantial adverse effects to shore resources or the environment. Pursuant to Section 173-27-040(b) of the Washington Administrative Code, the Corps believes this proposal is exempt from substantial development permit requirements, making it consistent to the maximum extent practicable with the State of Washington Shoreline Management Program.

9.6 National Historic Preservation Act) (16 USC 470 et seq., 110)

Section 106 of the National Historic Preservation Act (36 CFR PART 800) requires that the effects of proposed actions on sites, buildings, structures, or objects included or eligible for the National Register of Historic Places must be identified and evaluated. As required under Section 106 of the NHPA, the Corps is coordinating with the Washington State Office of Archeology and Historic Preservation (OAHP), the Nooksack Tribe, and other interested parties.

A cultural resources reconnaissance level survey will be conducted in the repair area prior to construction and a cultural resource report prepared as part of the Section 106 of the National Historic Preservation Act compliance process. The report will be submitted to the Washington State Historic Preservation Officer (SHPO) and a copy will be furnished to the Nooksack tribe.

Pending the results of the reconnaissance level survey the Corps may have an Archeologist monitor the excavation portion of the project.

9.7 Clean Air Act As Amended (42 USC 7401, et seq.)

The Clean Air Act requires states to develop plans, called State Implementation Plans (SIP), for eliminating or reducing the severity and number of violations of National Ambient Air Quality Standards (NAAQS) while achieving expeditious attainment of the NAAQS. The act also required Federal actions to conform to the appropriate SIP. An action that conforms with a SIP is defined as an action that will not: (1) cause or contribute to any new violation of any standard in any area; (2) increase the frequency or severity of any existing violation of any standard in any area; or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The U.S. Army Corps of Engineers has determined that emissions associated with this project will not exceed EPA's *de minimis* threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone).

9.8 Wild and Scenic Rivers Act (16 U.S.C. 1271-1287)

The Wild and Scenic Rivers Act (P.L. 90-542, as amended) selected rivers of the Nation, which, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values. The purpose of the Act is to preserve these rivers in their free-flowing condition, and be protected for the benefit and enjoyment of present and future generations.

An inventory, the National Wild and Scenic Rivers System, was established in December 1, 1992 and is published by the Department of the Interior and the Department of Agriculture, Forest Service and can be found at web site <http://www.nps.gov/rivers/wildriverslist.html#wa>. The Nooksack River is not one of the selected rivers.

The Nationwide Rivers Inventory (NRI) is another listing of more than 3,400 free-flowing river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. This inventory is found at (<http://www.ncrc.nps.gov/programs/rtca/nri/STATES/wa2.html>). The Nooksack River is listed in the NRI, but not the particular reach where the project is located.

9.9 Migratory Bird Treaty Act and Migratory Bird Conservation Act (16 USC 701-715)

The proposed project would be conducted in such a manner that migratory birds would not be harmed or harassed. The proposed work would be outside the nesting season for most birds. Riparian vegetation suitable for nesting would be avoided, where possible. Any shrub removal would be limited to after July 1 to reduce impacts to nesting birds. Where nesting vegetation is removed, adequate riparian vegetation for nesting sites exists upstream and downstream from the project site. Increased vegetative planting would mitigate for riparian vegetation that is removed.

9.10 Fish and Wildlife Coordination Act, as Amended (16 USC 661 et seq.)

While the proposed project is a Federal water resources development project, private funds were originally used to construct the levee. Since the project is not a Civil Works activity, the Corps' Seattle District policy is that emergency PL84-99 projects do not require FWCA coordination. Given the size and scope of the project, fish and wildlife coordination issues were not expected, which would have resulted in a "No Action" determination by USFWS. Fish and wildlife coordination information and issues, if any, can be provided during the EA public review comment period. The project is in compliance with this act.

9.11 Federal Water Project Recreation Act, as Amended (16 USCA 4612 et seq.)

The Federal Water Project Recreation Act (P.L. 89-72), as amended, requires that full consideration be given to opportunities for fish and wildlife enhancement in investigating and planning Federal water resources projects. The proposed project is consistent with this act.

9.12 Watershed Protection and Flood Prevention Act, as Amended (16 U.S.C. 1001 et seq.)

The Watershed Protection and Flood Prevention Act (Public Law 83-566) is commonly known as the Small Watershed Program. USDA-Natural Resources Conservation Service (NRCS) administers this program. The program authorizes Federal assistance to local organizations for planning and carrying out projects in watershed areas for conservation and use of land and water and flood prevention. This project is not a product of the Small Watershed Program and therefore this act is not applicable to this project.

9.13 Farmland Protection Policy Act (7 U.S.C. 4201, et seq.)

The Farmland Protection Policy Act (Public Law 97-98, Sec. 1539-1549) requires identification of proposed actions that would affect any lands classified as prime and unique farmlands. The proposed project would not affect farmland classified as prime and unique. Repairing the levee would be consistent with this act.

9.14 Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq.)

RCRA was enacted in 1976 to address the issue of how to safely manage and dispose of municipal and industrial waste, regulate underground storage tanks (USTs) that store petroleum or hazardous substances, establish a system for managing solid (primarily nonhazardous) waste, including household waste, and set forth the framework for EPA's comprehensive waste management program. No abandoned waste has been observed during project site visits. If abandoned or buried hazardous waste or pesticides were discovered during construction, it would be managed in accordance with RCRA or CERCLA requirements, as applicable. Contractor hazardous materials and waste would be managed in accordance with RCRA requirements. The project is in compliance with this act.

9.15 Executive Order 11988, Floodplain Management (24 May 1977)

Executive Order 11988 requires federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy of the floodplain, and to avoid direct and indirect support of floodplain development where there is a practicable alternative. In

accomplishing this objective, “each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains.”

Section 8 of E.O. 11988 notes that the order does not apply to assistance provided for emergency work essential to save lives or protect public property, health, and safety. The project has not constructed a change that would affect occupancy of the floodplain. By repairing the levee breach, the project would be consistent with the act in reducing the risk of flood and minimize the impact of floods on human safety, health, and welfare, while not changing floodplain occupancy conditions.

9.16 Executive Order 12898, Environmental Justice

Executive Order 12898 directs every federal agency to identify and address disproportionately high and adverse human health or environmental effects of agency programs and activities on minority and low-income populations. The project does not involve siting a facility that will discharge pollutants or contaminants, so no human health effects would occur. Therefore the project is in compliance with this act.

9.17 Executive Order 11990, Protection of Wetlands, May 24, 1977

The purpose of this project is to restore/enhance aquatic and riparian habitat. No wetlands would be impacted by this project.

Table 9.1. Summary of Consistency of Project With Applicable Laws, Regulations and Policies¹

| LAWS AND REGULATIONS RELATING TO THE PROPOSED ALTERNATIVES | REQUIREMENT SUMMARIZED | CONSISTENCY OF PREFERRED ALTERNATIVE |
|---|--|---|
| National Environmental Policy Act (NEPA) | Requires all federal agencies to consider the environmental effects of their actions and to seek to minimize negative impacts. | Consistent |
| State Environmental Policy Act (SEPA) RCW 43.21 | Requires state agencies to consider the environmental effects of their actions and actions of permit applicants. | Consistent; NEPA takes precedence |
| Clean Air Act | Requires federal agencies to consult with state air pollution control agencies to assure that construction plans conform with local air quality standards | Consistent |
| Clean Water Act (CWA) | Requires federal agencies to protect waters of the United States. Disallows the placement of dredged or fill material into waters (and excavation) unless it can be demonstrated there are no reasonable alternatives. Requires federal agencies to comply with state water quality standards. | Consistent |
| Rivers and Harbors Act | Prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waters of the U.S. in the absence of Congressional consent and approval of the plans by the Chief of Engineers and the Secretary of the Army. | Consistent |
| Fish and Wildlife Coordination Act | Requires federal agencies to consult with the US Fish & Wildlife Service on any activity that could affect fish or wildlife. | Consistent |
| Endangered Species Act | Requires federal agencies to protect listed species and consult with US Fish & Wildlife or NMFS regarding the proposed action. | Consistent |
| National Historic Preservation Act | Requires federal agencies to identify and protect historic properties. | Consistent |
| Wild and Scenic Rivers Act | Requires that "In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic and recreational river areas." | Consistent |
| Executive Order 12898 | Requires federal agencies to identify and | Consistent |

| | | |
|---|--|--|
| Environmental Justice | address disproportionately high and adverse human health or environmental effects on minority and low-income populations. | |
| Executive Order 11988, Floodplain Management | Requires federal agencies to consider how their activities may encourage future development in floodplains. | Consistent |
| Migratory Bird Treaty Act and Migratory Bird Conservation Act | Requires not harming or harassing migratory birds. | Consistent |
| Federal Water Project Recreation Act, as Amended | Requires full consideration for fish and wildlife enhancement opportunities when planning Federal water resources projects. | Consistent |
| Watershed Protection and Flood Prevention Act, as Amended | Authorizes Federal assistance for implementing projects in watershed areas and use of land and water and flood prevention. | Consistent |
| Farmland Protection Policy Act | Requires identification of proposed actions that would affect any lands classified as prime and unique farmlands. | Consistent |
| Resource Conservation and Recovery Act (RCRA) | Requires managing hazardous materials and waste in accordance with RCRA requirements. | Consistent |
| Executive Order 11990, Protection of Wetlands | Requires federal agencies to protect wetland habitats. | Consistent |
| Coastal Zone Management Act (CZMA) | Requires federal agencies to comply with state and local plans to protect and enhance coastal zones and shorelines. | Consistent to the maximum extent practicable |
| Washington Hydraulic Code | Requires proponents of developments, etc. to protect state waters, wetlands and fish life. | Would be consistent with permit requirements |
| Whatcom County Flood Hazard Reduction Plan | Requires implementing projects that would result in innovative, comprehensive and permanent solutions to flooding problems using environmentally sensitive techniques. | Consistent |

10. CONCLUSION

Based on the above analysis, the emergency response action was not a major Federal action significantly affecting the quality of the human or natural environment. Furthermore, the proposed project would not be a major Federal action significantly affecting the quality of the human or natural environment, and therefore does not require preparation of an environmental impact statement.

11. REFERENCES

Corps of Engineers. November 13, 1986. *Final Rule for Regulatory Programs of the Corps of Engineers*. Federal Register 51(219): 41206-41254.

Corps of Engineers and Environmental Protection Agency. August 25, 1993. *Clean Water Act Regulatory Programs*. Federal Register 58(163): 45008-45038.

Environmental Protection Agency. November 30, 1993. *Determining Conformity of General Federal Actions to State or Federal Implementation Plans*. Federal Register 58(228): 63214

Environmental Protection Agency. 2000. *SITEINFO Query Form*. <<http://www.epa.gov/r10earth/r10gis/r10site.html>>.

Washington Department of Ecology. 2000. *Ecology's Final 1998 List of Impaired and Threatened Waterbodies - the 303(d) List*. <<http://www.wa.gov/ecology/wq/303d/index.html>>.

12. PREPARERS

The following Corps personnel prepared and/or reviewed this EA:

- Chuck Ebel, Biologist, Environmental Resource Section (NWS), Author

13. APPENDICES

Appendix A

Requests for Corps Assistance and Other Correspondence

WHATCOM COUNTY
PUBLIC WORKS DEPARTMENT
JERRY M. MONSEN, PE
Director



River and Flood Division

522 N. Commercial Street, Suite 120
Bellingham, WA 98225
Phone: (360) 676-6876, (360) 356-1310
Fax: (360) 738-2468

RICHARD PREEVE, P.E., Assistant Director

January 25, 2002

Doug Weber
US Army Corps of Engineers
P.O. Box C-3755
4735 E. Marginal Way S.
Seattle, WA 98124-2255

Re: Levee Repair Work on the Nooksack River

Dear Mr. Weber:

During the recent flooding on January 8th, 2002 multiple levee breaches occurred along the Nooksack River.

One significant breach occurred within a levee segment currently active in the PL84-99 program. The breach is located on the right bank of the Nooksack River approximately one-half mile east of the Guide Meridian and lies within the Guide Meridian-Hannegan Levee segment (within the Lynden-Everson Subzone).

We are officially requesting your assistance in implementing a repair project at this location. The County is willing to act as the local sponsor on this project.

We would also like to point out that this is the only levee breach that we are currently aware of on a levee segment active in the PL84-99 program resulting from the January 8th flood event. As representatives from the various special districts continue to inspect their levees additional repairs may be discovered. We will notify you immediately should additional damage be discovered.

If you have any questions or need any additional information don't hesitate to contact myself at (360) 676-6876.

Sincerely,

A handwritten signature in black ink, appearing to read "James E. Leo".

James E. Leo, P.E.
River & Flood Engineer

Cc: Richard Preeve, P.E., Assistant Director

Appendix B

ESA Consultation Document

NOOKSACK RIVER HANNEGAN LEVEE
Rehabilitation of Flood Control Works
Whatcom County, Washington
ESA Consultation Document
June 2003

1.0 Introduction

This Biological Assessment (BA) evaluates the environmental effects of the proposed repair and reconstruction of Hannegan levee located on the Nooksack River near Lynden, Washington. This levee is on the left bank at approximately River Mile 19.0, just upstream of the Hannegan Road Bridge. The levee protects the only intake structure for the City of Lynden's water supply, the Hannegan Road Bridge, and a private residence. The Nooksack River rose above the zero damage flood stage in January 2002 resulting in significant erosion to approximately 400 linear feet of the levee immediately upstream of the water intake structure and the Hannegan Road Bridge. The severe erosion resulted in armor rock being lost and the levee has been scoured to an almost vertical slope in the damaged segment. The Corps has determined that the levee is in need of permanent repair. The proposed project consists of pulling the riverward slope back to 2H: 1V, reshape the back slope, armoring the riverward slope, and adding large woody debris along with willow plantings. To access the site, an approximately 50 ft access road would be built along the levee back slope, in the existing easements.

There is a high potential that during the upcoming flood season around October, the river would overflow the levee again, posing a major threat to the water supply intake, if no action is taken to contain the floodwaters.

The project is located on the Left Bank of the Nooksack River extending on the upstream end to the downstream terminus at Hannegan Road Bridge. The damaged section extends approximately 400 linear feet along an outside bend of the river. The levee was constructed of earthen materials with a riverward and back slopes of about 2H: 1V. As stated previously, this section has been scoured to an almost vertical slope at present. The proposed project consists of pulling the riverward slope back to 2H: 1V, reshape the back slope, armoring the riverward slope, and adding large woody debris along with willow plantings. The proposed levee will be set back from the pre-flood bank by a distance that varies between 3 to 8 feet (see construction drawings).

The proposed work is not expected to significantly affect the quality of the natural environment because the damaged section of shoreline will be returned to the pre-flood condition as built in place. Construction will employ best management practices to minimize potential adverse effects to aquatic and terrestrial resources.

The potential impacts to species listed under the Endangered Species Act (ESA) and those candidate species as a result of the Nooksack River Hannegan Levee Repair project are addressed in this biological assessment. There are three species listed by the U.S. Fish and Wildlife Service (USFWS) under the ESA as threatened; bull trout (*Salvelinus confluentus*), bald eagles (*Haliaeetus leucocephalus*), and marbled murrelet (*Brachyramphus marmoratus*). The

National Marine Fisheries Service (NMFS) identified one species under ESA listed as threatened; Puget Sound chinook salmon (*Oncorhynchus tshawytscha*), and one candidate species; Puget Sound / Georgia Strait ESU of coho salmon (*Oncorhynchus kisutch*) as utilizing the proposed project location.

2.0 Effects of the Proposed Action and Effects Determinations

2.1 Chinook Salmon

The proposed project **may affect, but is not likely to adversely affect** chinook salmon or designated critical habitat for this species. Repairing the levee with the addition of large woody debris and overhanging vegetation will complement recovery efforts by other groups throughout the Nooksack Basin. The procedure to repair the levee was designed to avoid or minimize potential "take" during construction, including scheduling the in-water construction period to avoid periods of greatest chinook vulnerability and highest expected use.

2.2 Bull Trout

The proposed project **may affect, but is not likely to adversely affect** bull trout. Best management practices to reduce or eliminate the possibility of turbidity during construction will be implemented. This determination is based upon the low likelihood that bull trout would be present in the action area during construction activities and the potential positive benefits attributed to the added salmonid habitat features such as the large woody debris and willow plantings.

2.3 Bald Eagles

Since construction activities will not occur during the nesting season, it will not affect nesting habitat or behaviors, prey (salmonid) production may increase due to added habitat features, and only minor disruptions to foraging activities are expected during construction, the proposed project **may affect, but is not likely to adversely affect** the bald eagle.

2.4 Marbled Murrelet

Marbled murrelets do not nest or feed in the project area. The project site lacks old-growth forest and does not contain suitable marbled murrelet habitat. The project would not occur during marbled murrelet nesting season and would not have a detrimental effect on the species. The proposed project **may affect, but is not likely to adversely affect** the marbled murrelet.

Appendix C

Vegetation Monitoring

Nooksack River – Hannegan Levee Repair Rehabilitation of Flood Control Works Whatcom County, Washington

Revegetation Plan

Planting – willow stakes will be planted on the riverward side of the levee as the levee repair is constructed in the summer of 2003. Approximately 70 to 80 willow cuttings will be planted on the riverward side of the levee. In the area immediately upstream of the project 8 cedars (rooted stock) and 10 Douglass fir (rooted stock) will be planted.

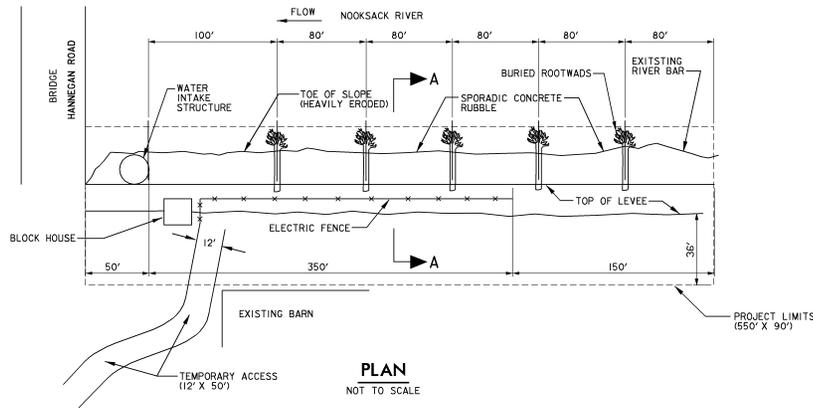
Monitoring to ensure survival – when the project is turned over to the sponsor (Whatcom County Flood Control Zone District), there will be a maintenance agreement to ensure the levee is periodically inspected and maintained. Also in that agreement will be the requirement to monitor and maintain the vegetative plantings, and replant if necessary, for up to five years.

Management of invasive species – The monitoring and maintenance of invasive species will also be included in the maintenance agreement. Japanese Knotweed is well established presently. A section of Japanese Knotweed will be mechanically removed during the levee repair. The County and local farmers indicate there is very little that can be done to control it, and it is prolific along the Nooksack riverbanks. The Sponsor will contact their local weed control board for recommendations on control methods, and will implement those controls to ensure that riparian plantings are able to survive, and the riparian area, over time, is able to recover back to its original, pre-flood condition.

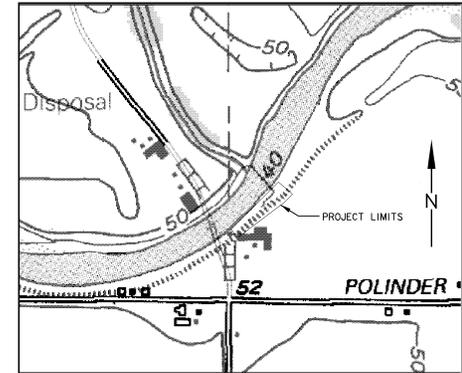
Appendix D

Proposed Project Drawing

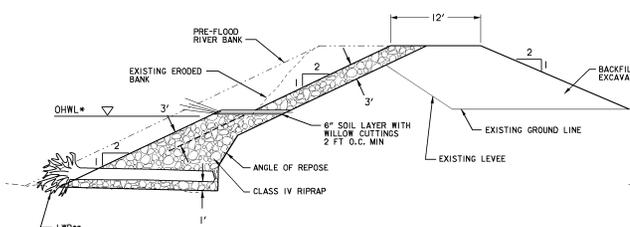




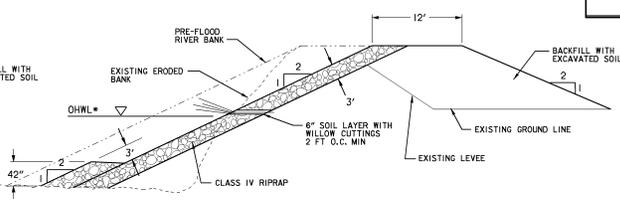
PLAN
NOT TO SCALE



SITE LOCATION



ELEVATION SECTION A - A WITH LWD
NOT TO SCALE



ELEVATION SECTION A - A WITHOUT LWD
NOT TO SCALE

*OHWL = ORDINARY HIGH WATER LINE
**LWD = LARGE WOODY DEBRIS

NOTE: SECTION EXTENDS 6 FT UPSTREAM & 5 FT DOWNSTREAM OF LARGE WOODY DEBRIS

NOTES:

1. REMOVE 350CY OF GRAVEL AND WASTE ROCK FROM RIVERWARD SLOPE AND PLACE ON LANDWARD SLOPE.
2. REMOVE 1000 TONS OF CONCRETE RUBBLE TO BE DISPOSED OF AT A LOCATION IDENTIFIED BY SPONSOR.
3. PLACE 1500 TONS OF SPALLS.
4. PLACE 4500 TONS OF CLASS IV RIPRAP.
5. IT IS THE SPONSOR'S RESPONSIBILITY THAT ALL EXISTING FENCE SHALL BE REMOVED FROM LEVEE PRISM PRIOR TO CONSTRUCTION.
6. PLANT RIPARIAN SPECIES ON BENCH IMMEDIATELY UPSTREAM OF PROJECT.
7. THIS PROJECT IS LOCATED IN TOWNSHIP 41 NORTH RANGE 3 EAST SECTIONS 20 AND 21.
8. LANDWARD TOE OF REBUILT LEVEE WILL BE 20 FEET LANDWARD OF EXISTING LEVEE TOE.

This project was developed by the Seattle District U.S. Army Corps of Engineers, and the site conditions and design were developed by the contractor under their employment as required by 48 CFR 101-11.802, Professional Registration.

DATE AND TIME PLOTTED: 30-JUN-2003 14:01
DESIGN FILE: P:\CIVIL\SOILS\JEN\HANNEGAN LEVEE.DGN



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| U.S. ARMY ENGINEER DISTRICT, SEATTLE CORPS OF ENGINEERS SEATTLE, WASHINGTON HANNEGAN LEVEE PROJECT | | | |
| LYNDEN | WASHINGTON | | |
| DATE | DESCRIPTION | FILE NO. | PLAC. |
| D | | | 11/01/02 |
| BY KAISER | CHK FISCHER | DATE | 1 OF 1 |