Index Galena Road Flood Repair
M.P. 6.4 to M.P. 6.9
RC 1532, UPI #06-0150
FEDERAL AID #ER-0701(063), LA6506
Floodplain Discipline Report

Snohomish County Public Works
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Introduction

In November 2006, Index-Galena Road was extensively damaged by a major flood event on the North Fork Skykomish River (NFS) that washed out multiple sections of the roadway between Milepost (MP) 6.4 and Milepost 6.9. This event resulted in Index Galena Road being closed at MP 6.4, just east and upstream of the Trout Creek Bridge.

The purpose of the proposed Index-Galena Milepost (MP) 6.4 to MP 6.9 project is to restore essential travel and prevent future damage to the roadway. Essential travel includes re-establishing access for property owners with land holdings in the North Fork Skykomish River valley upstream from the town of Index, re-establishing vehicular access for emergency service providers to these properties, re-establishing public recreational access to the North Fork Skykomish River valley, and re-establishing administrative access for the U.S. Forest Service to manage their lands located in the Mt. Baker Snoqualmie National Forest.

A preliminary design analysis for this project was conducted as part of the project’s 2011 Design Report. The design report included the alternatives recommended in the 2009 Route Feasibility Study for further investigation. Based on the analysis conducted as part of the Design Report, the preferred alternative, IG-3 - Lower Alignment – Option 1 with 10% Walls & 35% Reinforced Slopes was recommended to be carried forward for further design. The proposed project has carried forward with the recommended alternative.

The proposed project would restore roadway connectivity for the area, and would relocate the existing roadway outside the 100-year flood zone and the channel migration zone. The proposed design features have been refined as more detailed geotechnical, seismic, hydraulic and environmental data becomes available. This proposed relocation would require a new right-of-way easement area to relocate the new alignment near the toe of the adjacent hillside.

Analysis and Methods

This report evaluates the proposed relocated roadway alignment and identifies potential impacts to the floodplain associated with relocating the roadway further landward from its existing alignment. The potential impacts were identified by determining the area to be disturbed by project construction activities, determining how much of the relocated roadway would be located within the 100-year floodplain compared to the existing alignment, and then determining whether proposed project activities in the flood plain would adversely affect the floodplain compared to the existing roadway or whether there would be beneficial impacts.

The 100-year floodplain boundary used for analysis was developed based on HEC-RAS modeling completed in 2009 during the project’s Design Report effort. The project’s 60 percent plans have provided the needed information to determine the environmental impacts associated with the proposed project, and have been used to determine the extent of project activity within the 100-year floodplain and resultant impacts. The area (square feet) of disturbance and areas of the floodplain that would be reconnected by the project were identified as part of this analysis.
Floodplain Regulatory Review

National Flood Insurance Program

Snohomish County has participated in the National Flood Insurance Program (NFIP) since 1984. The program requires the county to adopt and enforce minimum floodplain development regulations to reduce future flood risks, and in return, the federal government makes flood insurance available to county homeowners for protection against flood losses. All development activity in the floodplain, including filling, grading, excavation, new construction, substantial improvement or repairs, requires a flood hazard permit.

The NFIP is a Federal program created by Congress to mitigate future flood losses nationwide through sound, community-enforced building and zoning ordinances and to provide access to affordable, federally backed flood insurance protection for property owners. The NFIP is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. Participation in the NFIP is based on an agreement between local communities and the Federal Government that states that if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses.

In support of the NFIP, FEMA identifies flood hazard areas throughout the United States and its territories. Most areas of flood hazard are commonly identified on Flood Insurance Rate Maps (FIRMs). Areas not yet identified by a FIRM may be mapped on Flood Hazard Boundary Maps (FHBMs). Several areas of flood hazards are identified on these maps. One of these areas is the Special Flood Hazard Area (SFHA).

The SFHA is a high-risk area defined as any land that would be inundated by a flood having a 1-percent chance of occurring in a given year (also referred to as the base flood). The high-risk-area standard constitutes a reasonable compromise between the need for building restrictions to minimize potential loss of life and property and the economic benefits to be derived from floodplain development. Development may take place within an SFHA, provided that development complies with local floodplain management ordinances, which must meet the minimum Federal requirements. Flood insurance is required for insurable structures within high-risk areas to protect Federal financial investments and assistance used for acquisition and/or construction purposes within communities participating in the NFIP.

Snohomish County Special Flood Hazard Regulations

The Index-Galena Road project site is located within the 100-year floodplain of the North Fork Skykomish River, and would be subject to Snohomish County Flood Hazard regulations and would apply for a Flood Hazard Permit and reviewed for consistency with Snohomish County Code (SCC 30.65) Special Flood Hazard Areas. Flood Hazard Permits regulate all development within the designated floodplains of Snohomish County. Any projects located within the flood plain must examine the potential impacts of proposed activities on floodwater storage and flow. Depending on the proposed activity, a flood hazard permit, variance, or exemption must be
granted. Provided that the project would result in no net increase in the volume of fill material within the floodplain (in relation to the pre-existing roadway prism), the project would be expected to meet the displacement and obstruction thresholds of the flood hazard code and receive a flood hazard permit. However, if the proposed work increases the volume of fill within the floodplain, a detailed hydraulic analysis may be required to support expected effects on flood elevations.

**Floodplain Related Definitions**

The following definitions and graphic illustration from Snohomish County Code (SCC) describe some of the floodplain features found in the project area that would be regulated by the Snohomish County Flood Hazard Areas regulations (SCC 30.65) and the Shoreline Management Program regulations (SCC 30.44).

**Base flood. (SCC 30.91B.020)**

"Base flood" means the flood having a one percent chance of being equaled or exceeded in any given year.

**Flood or flooding (SCC 30.91F.360)**

“Flood or flooding" means a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters or the unusual and rapid accumulation of runoff of surface waters from any source.

**Flood hazard area, special. (SCC 30.91F.370)**

"Flood hazard area, special" ("Special flood hazard area") means the land in the flood plain that is subject to a one percent or greater chance of flooding in any given year.

**Flood hazard permit. (SCC 30.91F.380)**

"Flood hazard permit" means written approval applied for and obtained in accordance with such rules and regulations as are established under this title.

**Flood insurance rate map (FIRM). (SCC 30.91F.390)**

"Flood insurance rate map" (FIRM) means the official map on which the federal insurance administration (FEMA) has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

**Flood insurance study. (SCC 30.91F.400)**

"Flood insurance study" means the official report provided by the federal insurance administration that includes flood profiles, the flood boundary-floodway map, and the water surface elevation of the base flood.
**Floodplain. (SCC 30.91F.410)**

"Floodplain" means a land area adjoining a river, stream, watercourse, ocean, bay, or lake which is likely to be flooded. The extent of the floodplain may vary with the frequency of flooding being considered. The floodplain typically consists of the floodway and the floodway fringe.

**Floodplain. (SCC 30.91F.415)**

"Floodplain" means the 100-year floodplain based upon flood ordinance regulation maps. *(See typical floodplain graphic below)*

**Floodproofing. (SCC 30.91F.420)**

"Floodproofing" means any combination of structural and nonstructural additions, changes or adjustments to properties and structures which reduce or eliminate flood damages to lands, water and sanitary facilities, structures and contents of buildings.

**Floodway. (SCC 30.91F.430)** "Floodway" means the regular channel of a river, stream, or other watercourse, plus the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.

**Floodway. (30.91F.435)** "Floodway" means the area, as identified in a *(Shoreline)* master program, that either: (i) has been established in federal emergency management agency flood insurance rate maps or floodway maps; or (ii) consists of those portions of a river valley lying streamward from the outer limits of a watercourse upon which flood waters are carried during periods of flooding that occur with reasonable regularity, although not necessarily annually, said floodway being identified, under normal condition, by changes in surface soil conditions or changes in types or quality of vegetative ground cover condition, topography, or other indicators of flooding that occurs with reasonable regularity, although not necessarily annually. Regardless of the method used to identify the floodway, the floodway shall not include those lands that can reasonably be expected to be protected from flood waters by flood control devices maintained by or maintained under license from the federal government, the state, or a political subdivision of the state.

**Floodway fringe. (SCC 30.91F.440)**

“Floodway fringe" means that portion of a floodplain which is inundated by floodwaters but is not within a defined floodway. Floodway fringes serve as temporary storage areas for floodwaters.
Background Information, Studies and Coordination

Snohomish County has developed several guiding goals and objectives related to flood hazards and infrastructure. These goals and objectives have been integrated into the Snohomish County Growth Management Act comprehensive plan as part of its comprehensive planning process, the 2010 Snohomish County Natural Hazard Mitigation Plan Update, and implementation regulations such as the Special Flood Areas Regulations and Shoreline Management.

Preliminary Drainage Design-Flood Hazard Mapping

As part of the project’s preliminary drainage design, and coordinated with Snohomish County’s Upper Skykomish River Floodplain Mapping Project [Snohomish County, 2009], Snohomish County developed and mapped the 100-year floodplain boundary for the North Fork Skykomish River which includes the Index-Galena Road washout area. Boundaries for the 100-year and 500-year discharges were mapped in the detailed study reach (River Mile (RM)0.0 to RM 4.2) and for the 100-year discharge in the approximate study reach (RM 4.2 to RM 11.3). A HEC-RAS model was used to develop the mapping. Backwater areas were mapped for the 100-year event in the detailed study reach only. Backwaters are typically areas of water that are open to the channel at one end (usually the downstream end). They are connected to the main channel, sometimes seasonally or periodically, and are characterized by slow currents, shallow water and silt substrates. Backwaters can be formed naturally as the main river migrates across the floodplain, cutting off meanders. Floodplain boundaries were smoothed using a buffering procedure to produce cartographically acceptable lines. The accuracy of these lines was verified to meet FEMA standards for flood hazard mapping. The floodplain boundaries for the project area are shown in Floodplain Impact drawings provided in Appendix C.

Channel Migration Zone Analysis

A Channel Migration Study (AnchorQEA, LLC, 2009 – Updated 2011) addressing channel stability was prepared and is included in the project’s Design Report. The report provides a channel migration zone for use in project design and has been included in project plan drawings. The channel migration zone boundaries are shown in Channel Migration Zone Impact drawings provided in Appendix C.

Existing Land Use and Structures in the Project Area

Currently, within the project limits, there are no residential structures or developed areas located in proximity to the floodplain. The surrounding land areas are undeveloped National Forest lands. There is no public infrastructure such as bridges within the river. The Index-Galena Road roadway is the sole developed land area. Portions of the of the remnant roadway from Milepost 6.4 to Milepost 6.9 are located both within the side channel that was established with the 2006 high flow damage event. Other portions of the remnant roadway remain more intact and are located immediately adjacent to the side channel on a slightly elevated terrace, portions of which are located within the 100-year floodplain. See Exhibit 1, a photo showing the river’s main channel in proximity to the project area near the upper roadway washout at Milepost 6.9.
Exhibit 2: Vicinity Map provides a vicinity view of the project area, and Exhibit 3: Existing Damaged Index-Galena Road at M.P. 6.7 to 6.9 shows a portion of the damaged roadway. Exhibits that show the proposed project alignment, the 100-year Floodplain, and Channel Migration Zone relative to the proposed roadway relocation alignment are provided in Appendix C.

Exhibit 1: North Fork Skykomish River mainstem channel looking downstream near MP 6.9
Exhibit 2: Vicinity Map
Proposed Project Description

The proposed project would shift the project area roadway alignment to the south and establish a relocated roadway upslope from the existing damaged roadway. The alignment would shift from the existing Index Galena Road approximately 200 feet east from Snohomish County Trout Creek Bridge #494 (near Milepost 6.1, at approximately 841 feet in elevation). The relocated roadway would extend for 0.95 mile and match into the existing roadway approximately 400 feet east of the Milepost 6.9 washout. At the project start, the roadway would ascend the sideslopes at a 9 percent grade in order to raise the roadway out of the 100-year floodplain and channel migration zone. The relocation would enable the roadway to be elevated above the 100-year flood elevation and channel migration zone for most of the project length and to be located landward of the river side channel stream that has formed in the existing roadway alignment.

This initial climb would use approximately 700 feet of the existing Trout Creek Road, a gravel road maintained by the U.S. Forest Service. It will be necessary to excavate (cut) into the adjacent upslope areas to accommodate the roadway relocation, and fill would be placed on the downslope area. This type of cut and fill construction would be present for much of the proposed alignment, except where retaining walls, reinforced soil slopes, or other stabilization measures are installed instead of cut and fill slopes. A new Index-Galena Road/Trout Creek Road intersection would be constructed near Station 19+50 to allow for future continued use of Trout Creek Road by the U.S. Forest Service to carry out its long-term land management plans in the vicinity.
Trout Creek sub-basin. Trout Creek Road is presently closed to motor vehicle use until the U.S. Forest Service re-opens it for future use.

After the initial climb from the existing roadway, the roadway grades would be more moderate for the remainder of the project length. The relocated roadway would cross the side slopes and parallel the existing roadway. With slight curves in the alignment, the distance from the relocated roadway to the existing roadway would range from 40-100 feet for most of the project length. At the upper end of the project, extending from Station 39+50 the relocated roadway would more closely parallel the existing road. The highest elevation achieved by the project, 920 feet, would be near Station 35+00. The roadway would begin its descent to the existing roadway near Station 36+00 and would tie back into the existing roadway at Station 59+93, near milepost 7.0 (at approximately 884 feet in elevation).

All culverts would be sized to convey the predicted 100-year flow with the associated debris flows and would be constructed where the roadway crosses non-fish bearing slope streams. A concrete box culvert vented ford structure would be installed in proximity to Station 29+00 where there is a debris chute with evidence of historic debris flows. The concrete box culvert vented ford may have a removable top that would facilitate culvert clean out and debris removal by road maintenance crews in the future. Specific design features would be determined during final design.

A 180-foot bridge would be constructed near the project’s east end near Station 54+00 to provide for unimpeded flow of a seasonal stream located in the large wetland located in this area. The proposed bridge would be a steel girder single span structure with a concrete slab deck and concrete parapet. The bridge would be supported by a deep foundation and concrete abutments. There will also be concrete cheek walls at the sides of the abutment. Steel girders would be galvanized and then top coated with paint in accordance with U.S. Forest Service visual quality requirements for structures constructed near recommended wild and scenic rivers. The bridge would maintain existing water levels in the wetland that provides important habitat for wildlife and winter/spring seasonal use by juvenile salmon. The bridge would also help to prevent future blockages that would be anticipated from seasonal high flows and extensive beaver activity in the project area, and prevent blockages that could potentially occur from landslide debris near Station 53+00.

Where the relocated roadway is located adjacent to or within the channel migration zone, from approximately Station 35+00 to 45+00, a buried rock revetment would be placed adjacent to the toe of the roadway embankment slope. Subsurface areas located within the existing undamaged roadway would be overexcavated to remove materials subject to scour erosion and replaced with large rock material. This buried rock revetment is intended to prevent future scour erosion damage to the roadway. In the absence of further migration of the river prior to roadway construction, this would not require in-water work. The trench would also be filled with large woody debris on the river side so that in the event of channel migration large woody debris would be launched in place and exposed. A two foot layer of salvaged forest duff and other organic materials would be placed on top of the overexcavated revetment in preparation for riparian restoration planting.
Proposed design standards

The proposed roadway design is based on design standards contained in the 2001 AASHTO Guidelines for Geometric Design of Very Low-Volume Roadways (ADT < 400). The use of these design standards responds to comments made during the NEPA scoping period to consider use of design standards that would help to reduce the footprint of the proposed roadway relocation repair. These design standards enable the project to match the character of the existing roadway and fit in with the forested natural environment in the project area.

The proposed design would include a pavement width of 22 feet that would feature 10-foot travel lanes and 1-foot shoulders. Additional land area would be required to install guardrail where warranted. The roadway posted speed limit would be 35 MPH. Based on these lane width design standards and other design criteria, including laying back of cut slopes, the project would require an estimated 12.2 acres of land disturbance. The project’s design report estimated 9.5 acres of disturbance. The additional disturbance is associated with design changes, including additional excavation of potentially unstable soils from Station 44+00 to Station 48+00. The increase in area also assumes an additional 10 feet offset beyond the cuts and fills to account for accommodation of equipment access. It was determined based on further geotechnical soil analysis that removal and laying back of slopes could be more feasible and pose less risk than constructing retaining walls in this area of the project, but the final determination would be made in final design. Of the 12.2 acres, approximately 3.3 acres would be permanently impacted for the roadway prism footprint and 8.9 acres would be cleared to accommodate roadway cuts and fills. These 8.9 acres would be restored after construction is completed.

The use of low-volume roadway design standards enables the roadway width to be reduced by 26 percent from the 30-foot width standard identified previously in the design report. The proposed project would require a new right-of-way easement from the U.S. Forest Service due to the newly aligned roadway’s location on U.S. Forest Service lands in the Mt. Baker-Snoqualmie National Forest. The existing damaged roadway would be decommissioned and restored where feasible to natural riparian habitat once the new roadway has been constructed. The restored areas and adjacent areas downslope from the roadway that would be used for roadway stormwater runoff dispersion would be included in the new roadway easement and would be permanently protected from future development.

Design Features

Areas that would be disturbed by clearing and grading in addition to the roadway travel lanes would include cut and fill side slopes, and retaining walls and reinforced soil slopes where necessary, to support the roadway. Reinforced soil slopes in fill sections would typically be 0.5 Horizontal (H):1 Vertical (V), approximately 63 degree slopes, in most areas. Along the cut side of the alignment, slopes would range from 1.5 (H) to 2 (H):1(V) depending on whether the cuts are made through colluvium (landslide) and lacustrine (former glacial lake) deposit areas. Soldier pile retaining walls would be constructed in areas based on geotechnical recommendations, and are currently proposed from Station 42+75 to 44+75, 45+20 to 46+25 and 49+80 to 52+55, subject to change as the design progresses. The remaining retaining walls would be structural earth walls (SEWs). The linear extent of these features may change during final design based on further analysis of detailed survey, geotechnical, seismic, hydrologic, and hydraulic information.
and construction considerations. The current estimates for the linear extent (linear feet) of the various types of retaining walls or reinforced slopes includes the following:

- Reinforced Soil Slopes (RSS): 1,255 Linear Feet
- Structural Earth Walls (SEW): 200 Linear Feet
- Soldier Pile: 575 Linear Feet
- Rock Fill Slopes: 1,505 Linear Feet

Near Station 53+00, a diversion berm would be constructed in the upslope area and would tie into the roadway fill. The berm would prevent debris slide deposition onto the roadway in an area where geotechnical investigations have identified a risk for future debris flows.

Asphalt, concrete, and other debris from the decommissioned section of the damaged existing roadway would be removed. Roadway debris would be removed from the river channel to the extent that it would be safe and practicable. The decommissioned roadway would then be restored with soil preparation and plantings where feasible to provide a forested riparian corridor adjacent to the North Fork Skykomish River. Natural stream channel conditions would be restored with the asphalt removal where plantings do not occur. Large woody material would be placed in areas adjacent to the side channel to enhance riparian habitat.

Roadway stormwater runoff quality treatment and flow control would be provided through natural dispersion in accordance with *Highway Runoff Manual* provisions and U.S. Forest Service standards and guidelines. Accordingly, the relocated roadway would be “outsloped” to the areas downslope from the roadway to maintain sheet flow throughout the project length. Natural dispersion treats stormwater by infiltration into the existing soils and through vegetation root zones; evaporation; and uptake and transpiration by the vegetation. Sheet flow (not concentrated or otherwise channelized) runoff is intercepted without containment or conveyance and uses the infiltration capacity of the roadside soils to effectively infiltrate the stormwater. Those areas that maintain 100 linear feet of flow path through established native vegetation provide both runoff flow control and quality treatment per the state drainage standards. The existing forested slopes downslope from the project, and the area where the existing damaged roadway would be removed and enhanced with riparian restoration, would be preserved to provide the needed area for dispersion. These areas would be protected with permanent protection in the project’s right-of-way easement.

**No Action Alternative**

The no-action alternative proposes that nothing would be done in the areas where the existing roadway is currently washed-out. The existing pavement and other damaged roadway debris would be left in the river channel. Damaged debris includes remnants of concrete associated with an extensive section of concrete-reinforced roadway, and a damaged 90-foot long 8 foot 9-inch diameter aluminum bottomless culvert with concrete footings located at Milepost 6.7. This culvert is lodged in roadway rubble near the Milepost 6.7-Milepost 6.9 damage area where the river avulsed into a new side channel and formed the upper extent of the washed-out roadway. Other roadway cross culverts are included in damaged roadway portions that would remain. The proposed roadway relocation would not occur. Relocation with the action alternative by comparison would include removing the existing damaged roadway out of the floodplain and
channel migration zone, and would restore roadway connectivity to maintain essential travel. No clearing, grading, or other land disturbance would occur. The no-action alternative would not require a new Right-of-Way easement.

**Affected Environment**

The land area in proximity to the damaged Index-Galena Road corridor has a variety of environmental and recreational resources. These resources include the North Fork Skykomish River, the river’s floodplain/floodway, the forested riparian corridor that lies landward of the river, and the Wild Sky Wilderness Area which lies upslope from the river valley. The river and its riparian corridor provide recreation opportunities for the public, and fish and wildlife habitat including habitat for threatened and endangered species. The riparian corridor has a narrow floodplain on the left bank where the existing roadway is located. Steep forested sideslopes are prevalent with wetlands and slope tributary streams interspersed throughout the river corridor that function to regulate the river’s flow and maintain water quality.

The North Fork Skykomish River watershed drains an estimated 93,960 acres, most of which is located in the Mt. Baker Snoqualmie National Forest. Riparian habitat is largely second growth deciduous and conifer forest along the North Fork Skykomish River, although old-growth is abundant in the watershed, primarily at higher and more remote locations. While there is generally good riparian habitat along much of the river, roads that parallel the river have somewhat reduced floodplain and riparian functions.

Most of the lower North Fork Skykomish River flows in a relatively confined, incised channel heavily armored with cobbles and boulders. Sections of the river have exhibited channel widening in recent years after many years of logging and other disturbance activities. The river’s flows are subject to recurrent rain-on-snow and other high flow events that promote channel meandering and pose risks for roads located near the channel migration zone. An increase in rain-on-snow and an increased frequency of high flow events are anticipated effects resulting from climate change that could pose greater risk to infrastructure located within flood hazard areas and channel migration zones.

Endangered Species Act (ESA)-listed terrestrial species occurring in the greater project vicinity include Marbled Murrelet and Spotted Owl, while aquatic species such as Chinook salmon, bull trout, and steelhead are found in the North Fork Skykomish River. The river has also been designated as critical habitat for both Chinook salmon and bull trout. Wintering and nesting populations of bald eagle are also present in the river corridor.

**North Fork Skykomish River Hydrology- Flood History and Expected Changes to Watershed and River**

Hydrology for the North Fork of the Skykomish River (NFS) was historically recorded by a U.S. Geological Survey (USGS) stream gauge between 1910 and 1948. During this period, there were 21 peak stream flows on record, the highest of which occurred in December 1933 at 28,400 cubic feet per second (cfs). More recent stream flow data do not exist for the NFS, although a gauge on
the mainstem Skykomish River near Gold Bar, Washington, has been in operation since 1928. The magnitude of discharge recorded at this gauge station is much higher than on the NFS; however, trends in the frequency and relative magnitude of discharge over time may be of interest in considering likely future hydrologic conditions in the NFS.

Annual peak discharge data on the mainstem Skykomish River show that the highest peak discharge events have occurred in recent years. In general, the Skykomish River has progressively experienced more frequent flood events with higher magnitudes of flow. This is a common trend in Pacific Northwest rivers, where the frequency and magnitude of rainfall events has also been increasing over the past several decades.

It is expected that future evolution of the NFS will include expansion of the active channel and increased deposition of Large Woody Debris (LWD) and sediment. This will lead to increased side channel and floodplain connectivity, expanding the flood area and the area at risk to channel avulsion. In addition, hydrologic conditions (frequency and magnitude of flood events) have been increasing, and with a greater awareness of climate change, many have predicted that this trend will continue into the foreseeable future. For these reasons, it is expected that the river will occupy a greater percentage of the valley floor over the next 50 years than it has done throughout the previous 50 years. In this way, the future of the NFS may not resemble the most recent past [North Fork Skykomish Channel Migration Study Index Galena Flood Repairs MP 6.4 to 6.9, March 2009, AnchorQEA, LLC].

Environmental Effects

Proposed Alternative

The proposed project roadway relocation elevates the roadway largely outside the 100-year flood zone and the channel migration zone. A portion of the relocated roadway near Station 35+00 and the area from Station 53+00 to 54+00 would be in proximity to the floodplain and construction activity would occur to install a buried rock revetment. The close proximity in area from 53+00 to 54+00 arises from the need for the relocated roadway to tie back into the lower elevation of the existing roadway at the upstream project limits. Approximately 7,100 square feet of disturbance would occur within the 100-year floodplain for the buried revetment installation. This buried rock revetment would provide toe protection for the roadway in case of future lateral river migration. Existing site elevations would be restored once pavement has been removed, and revetment overexcavation has been completed, and restoration plantings have been completed. Consequently, there would be no increase in elevation resulting from construction activity in the floodplain and channel migration zone areas. (See Floodplain Impact Plan drawings in Appendix C.)

Overall, moving the roadway further landward is expected to reduce future roadway flood hazard risk and associated damages to the relocated roadway. The roadway relocation is expected to improve floodplain conditions by restoring floodplain connectivity that has been impeded by the existing roadway alignment. By relocating the existing Index Galena Road outside of the current right-of-way, it is estimated that floodplain connectivity would be restored to approximately
208,650 square feet (4.78 acres) of floodplain that is currently disconnected. (See Floodplain Impact Plan sheets in Appendix C.)

Constructing the relocated roadway outside the flood hazard areas, and largely outside of the channel migration zones, is also expected to contribute to improved floodplain functionality with regard to attenuation of flood flows. Enabling the river to be conveyed in a wider area than has been available for more than 100 years would contribute to providing more conveyance of flood flows that would benefit downstream residential areas during high flow events. It is estimated that approximately 7.1 acres of the channel migration zone is reconnected by removing the existing damaged roadway and relocating it further landward from the river. A total of 1 acre of road construction activity associated with fill embankment placement would occur within the channel migration zone. This area would not be reconnected because it would be resistant to erosion that would limit the predicted lateral migration that was identified as part of the project’s channel migration zone analysis. The 1 acre of subgrade disturbance would occur from the area adjacent to Station 35+00 to Station 49+00, and an additional area from Station 53+00 to Station 54+00.

A portion of the relocated roadway would remain in proximity to the floodplain near the upstream portion of the project that transitions back down to the valley floor to match into the proposed bridge crossing near Station 54+00. Toe erosion protection (installed landward of the ordinary high water mark) would be constructed by overexcavating portions of the existing remnant roadway and backfilling with rock to keep the river channel from eroding the proposed roadway embankment. The construction activity in this area located within the 100-year floodplain boundary would not result in increased elevation. Therefore it is not expected to adversely affect floodplain functions nor adversely affect floodplain connectivity restored by the project because the grade elevations that would be established at the end would not be greater than those that currently exist. These areas would also be restored with native plantings subsequent to establishment of final grades.

Preliminary estimates indicate that there would be net removal of material from the floodplain associated with roadway asphalt removal, concrete removal, and removal of existing damaged culverts and other debris. It has been estimated that the volume of old concrete to be removed will be at least 65 cubic yards and as much as 180 cubic yards. The removal of this material will reduce the effects of the new alignment to achieve no net rise in the base flood elevation due to the project. Due to inaccessibility, quantities of asphalt currently located within the side channel that would be removed have not been calculated.

Removing asphalt and concrete debris from the side channel of the North Fork Skykomish River is expected to improve conveyance and provide for more natural floodplain habitat conditions. The channel conveys moderate flows during low flow periods but experiences larger flow conveyance during winter and spring high flow conditions and would convey substantially more during future 100-year flow events. While quantities of asphalt removal have not been identified due to the difficulty in estimating volumes of asphalt material inundated by stream flows, it is expected that the volumes removed would enhance floodplain connectivity and the ability of the side channel to convey high flow that would enhance flood flow attenuation.
The eleven culverts proposed along the alignment to convey hillside streams under the relocated roadway are located above the 100-year floodplain and are not expected to affect the floodplain areas.

The proposed bridge to span the wetland and seasonal salmon stream located at the north end of the newly aligned roadway would maintain hydraulic connectivity to the river and would maintain seasonal pool habitat created in part by backwater of high river levels and from groundwater flows into the wetland. In addition to maintaining floodplain hydrologic functionality, the bridge would also support other functions provided by this floodplain backwater area by avoiding fill impacts to an area that provides spawning salmon habitat, juvenile salmon rearing habitat, and other wildlife habitat for beaver and amphibians. The bridge has been proposed as a method of reducing impact to the wetland, allowing the natural hydraulic connectivity of the river to remain intact and provide a roadway crossing that would be less vulnerable to future damage associated with river high flows. The bridge design reduces impediments to flood flow conveyance in the land area behind (landward) the road prism, and would contribute to improved attenuation of flood flows.

The short-term effects of relocating and realigning the roadway on the channel dynamics and sediment regime of the North Fork Skykomish River would be minimal. Most construction work would occur outside the ordinary high water mark (OHWM) and on the fringes of the valley. Very little sediment would be created during construction activities because erosion and sediment control BMPs (Best Management Practices) would be used and construction would be done primarily during the dry season. Road fills would be outside the OHWM and consist of large rock and other materials that would not produce measurable sediment.

Approximately 12.2 acres of vegetation would be cleared to accommodate roadway relocation. It is expected that there would be negligible effects to peak runoff rates due to the ability of project area soils to infiltrate, and similar negligible effects to streamside shade/stream temperatures due to vegetation removal that could potentially affect floodplain habitat functions. As noted previously, the existing road bed associated with the existing alignment would be decommissioned, with the roadway soils de-compacted (ripped), and then restored with native plantings. The restoration planting is expected to increase shade and help promote lower stream temperatures as the restoration area mature.

There may be some minimal short term sediment generated and delivered to the river due to construction activity occurring in proximity to the floodplain. Implementation of appropriate erosion and sediment control measures outlined in the project BMPs would minimize this risk. Where determined necessary, erosion control measures would separate the work area from the active flow of the river during construction and reduce sediment delivery into the river. Other techniques (silt fencing, seeding, and mulching of disturbed soil areas) throughout the project site would further reduce the potential for erosion and sediment transport to the river.

It is expected that the introduction of sediment from the proposed road construction would not alter channel processes or aquatic habitat. Any physical changes that do result from transport and deposition of sediment would not materially restrict channel migration, floodplain connections, peak flows, or the natural sediment regime. It is expected that in-channel, streambank, and
floodplain stability will be maintained or enhanced by relocating the roadway further landward from the North Fork Skykomish River and removing existing bank armoring.

**No Action**

Large flood events would continue to erode portions of the floodplain where the existing Index-Galena Road remnants are located. Roadway remnants are located in the side channel and in adjacent areas that are on a floodplain terrace slightly elevated above the side channel. The recurring high flow events would likely result in continued wash-outs of the asphalt road surface and roadway embankments, including areas of riprap that have been placed along portions of the roadway. Without relocating the road and restoring the damaged areas, would leave the damaged sites vulnerable to continued erosion. There is the potential that a major avulsion event could occur, resulting in flows redirected from the river’s mainstem channel to the side channel. Major avulsion events that would cause more roadway washouts would likely release large amounts of sediment in short periods of time, causing increases in turbidity in receiving waters. Over time a floodplain with more conveyance capability and ability to attenuate flood flows could become established, but it would be accomplished by transporting asphalt, concrete, and other materials that would be to the detriment of other floodplain functions such as aquatic habitat.

These armoring and riprap effects do not support several Aquatic Conservation Strategy Objectives, including: maintain and restore spatial connectivity including lateral drainage network connections in floodplains, wetlands and upslope areas; and maintain and restore the physical integrity of the aquatic system, including shorelines and banks.

Channel migration analysis suggests that the roadway in its current alignment from MP 6.4-6.9 is at great risk of failure. The channel migration analysis determined that the river has the potential to migrate further inland to capture much of the existing roadway. See Channel Migration Zone Impact Plan in Appendix C. Without roadway relocation, the river would continue to incrementally erode portions of the floodplain terrace now occupied by the existing roadway remnants. Large amounts of sediment would enter the river in short periods of time due to slope failures, causing acute increases in turbidity that affect aquatic habitat function of floodplains.

There are areas of armored roadway embankment and riprap that are present along the existing roadway that would continue to influence the river’s side channel movement. Riprap is typically found to adversely affect river morphological processes, continuity of sediment processes, and habitat forming processes. Specific functions that would likely be adversely affected included stream evolution, riparian succession, and sedimentation resulting from restricted lateral channel migration, decreased natural sediment deposition, reduced recruitment of gravel and large woody debris, and hydrological changes such as reduced ability to attenuate flood peaks. Negative effects due to the riprap would persist under the No Action Alternative.

**Consistency with Mt. Baker Snoqualmie National Forest Plan - Aquatic Conservation Strategies (ACS)**

Outlined below are preliminary findings of how the proposed Index-Galena Road Milepost 6.4-6.9 project would be consistent with U.S. Forest Service adopted plans, policies, standards and guidelines. Final findings of consistency and conditions that would be applied to the proposed
The project as proposed would be consistent with Aquatic Conservation Strategies as provided in the Mt. Baker Snoqualmie National forest Plan, as amended. The following discussion outlines how the proposed Index-Galena Milepost 6.4-6.9 project would not potentially prevent, retard, or contribute significantly to the achievement of the Aquatic Conservation Strategy Objectives at the scale the ACS Objectives were described. It is expected that the project as proposed at a minimum would not prevent achievement of ACS Objectives and would help to contribute significantly to achievement of some of the ACS Objectives. A brief description of how the proposed project relates to each objective is provided below in *italics*:

- **Objective 1**: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

  The project would relocate the roadway from the river and its floodplain to restore roadway connectivity. Relocation would contribute to maintaining diversity and complexity of watershed features by relocating the roadway out of the floodplain and restoring free flow of the North Fork Skykomish River. Portions of the roadway would also be located out of the channel migration zone. Relocation enables the existing damaged roadway asphalt to be removed and natural riparian site conditions to be restored. This promotes aquatic restoration including benefits to in-stream habitat, and the adjacent riparian habitat that would provide greater habitat diversity and promote enhanced wildlife habitat conditions in proximity to the river. River flow conditions would also be restored to more natural conditions without the existing roadway’s constrictions to channel migration. Removal of the failing, eroded roadway is expected to maintain the distribution, diversity, and complexity of watershed and landscape scale features by preventing future roadway failure. Incorporation of habitat restoration plantings and LWD placement would add habitat complexity and roughness elements in the channel.

  Approximately 1.5 acres of riparian buffer would be enhanced by abandoning the existing roadway. This area would be replanted with native shrubs and trees. This would occur in the area at the project’s beginning near Milepost 6.1, upstream from Milepost 6.4 and extend to Milepost 6.7, and in some of the area upstream from Milepost 6.9. All temporarily disturbed areas associated with asphalt removal and access to this area would be treated with salvaged duff and mulch and planted with native trees and shrubs above the ordinary high water mark, out of the most flood susceptible zone.

- **Objective 2**: Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to critical areas for fulfilling life history requirements of aquatic and riparian-dependent species.
The project would maintain and restore hydrologic connectivity within the watershed. The damaged roadway would be removed and the roadway relocated further landward of the North Fork Skykomish River outside of the floodplain and substantial portions out of the channel migration zone. Effects from vegetation clearing and road construction would be offset in part by removing the damaged roadway in the river side channel and adjacent riparian areas that would restore hydrologic connectivity by restoring floodplain connectivity. The project would restore existing connectivity within the watershed and would not affect connectivity between watersheds. The proposed action would maintain and enhance the integrity of the riparian buffer over the long term. Removal of the existing roadway and relocation further landward is expected to enhance aquatic refugia as side channel development over time has a positive effect on riparian connectivity. Similarly, the project is not expected to obstruct the movement of terrestrial species, dependent upon riparian corridors for their habitat needs or movement between habitat areas. The long-term improvement in the riparian buffer in the project area would ultimately result in increased LWD recruitment, which could contribute to an increase of complex in-stream wood features that, in turn, would enhance the connectivity of productive rearing and foraging habitats for native fish and aquatic macroinvertebrates.

- **Objective 3:** Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

The project would maintain and restore the physical integrity of the river aquatic system, including shorelines, banks, and bottom configurations with relocation of the damaged roadway landward from the river. During construction, the physical integrity of the aquatic system would be maintained with limiting all in-water work associated with the project to the dry season and containment systems and other measures would be installed to separate construction activity from the active flow of the river. After construction is completed, riparian mitigation in proximity to the river would include removing existing roadway asphalt located both from the channel and adjacent to the river. Restoration plantings would aid in restoring the overall integrity of the aquatic system. Large woody debris would be placed as part of the riparian restoration efforts. Restoring this area to a more natural channel and riparian buffer corridor would maintain and restore the physical integrity of the streambed configuration and would have a positive effect on sediment transport and deposition processes within the North Fork Skykomish River.

- **Objective 4:** Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

The project’s relocation of Index-Galena Road would aid in prevention of catastrophic failure of the roadway for the long term, eliminating a source of material that could be potentially introduced to the river that does not promote healthy riparian, aquatic ecosystems. Short term water quality impacts associated with construction would be
managed by implementing project sedimentation control best management practices. All stormwater runoff on the completed roadway would be dispersed on the downslope adjacent areas, before sheet flowing and infiltrating through vegetated buffer areas. This process would filter and infiltrate the runoff. Thus, no measurable increases in the concentration or loading of stormwater contaminants would be expected to enter the North Fork Skykomish River, and indirect effects to aquatic species would be nonexistent or insignificant.

Although water quality would be maintained over the long term, construction activities may cause minor, short-term increases in sedimentation and turbidity in the river and in sideslope streams crossed by the relocated roadway. However, sediment would be minimized or eliminated because construction will be limited to the dry season and appropriate sediment and erosion control construction best management practices (BMPs) would be employed; and all water quality standards imposed by state and federal laws (e.g., Clean Water Act 404/401) will be met. Temporarily disturbed areas would be mulched and planted to reduce sediment mobilization after construction.

Likewise, the proposed riparian buffer restoration along the damaged portion of Index-Galena Road to be removed would provide improvement in long-term water quality in the river by removing existing impervious surface area adjacent to the river, and replacing it with a vegetated riparian buffer. Short-term effects from asphalt removal could occur. BMPs would be in place to reduce sedimentation levels while conducting in-water work. Therefore, no measurable adverse effects to water quality are expected.

- **Objective 5**: Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage and transport.

The project would not adversely affect the sediment regime in the North Fork Skykomish River, which is greatly influenced by recessional glacial material deposition and subsequent alluvial transport and deposition. The project design would prevent catastrophic failure of the road for the long term and is anticipated to meet Objective 5 at the project and reach scale, and promote restoration at the watershed scale by improving the long-term sediment filtration process, and by relocating the damaged roadway and converting the existing damaged roadway into native riparian vegetated buffer habitat. An area where debris torrents could be expected will be designed so that debris slide deposition would still occur. Culverts would be designed to maintain current sediment transport processes. Use of appropriate BMPs, management requirements, and mitigation measures would minimize and mitigate potential short-term increases in sediment mobility associated with any soil disturbance from construction activities. At both the reach and watershed scale, changes in the overall sedimentation rates attributable to the project would likely be non-detectable given the high variability in natural rates of sediment input along the river.

- **Objective 6**: Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient and
wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

No effect to in-stream flows for the North Fork Skykomish River is expected from the Index-Galena Milepost 6.4-6.9 project. The project would contribute to maintaining stream flows because stormwater associated with the project is not expected to alter the hydrologic cycle, including low or peak river flows. Relocating the roadway further landward out of the floodplain would reduce the potential for floodwaters to overtop roadway surfaces, erode roadway prisms and associated roadway embankments. There would be a net decrease in impervious surface compared to the pre-damage roadway conditions, and stormwater would be intercepted and filtered by the existing native vegetation buffers as part of the project’s stormwater runoff dispersion with sheet flow. In addition, approximately 1.5 acres of impervious surface would be removed in proximity to the project as part of project mitigation. The project would result in a net reduction of .03 acre of impervious surface area. Therefore, any changes would be negligible and unmeasurable.

- **Objective 7:** Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

The current floodplain function would be maintained and conveyance improved with the project due to the removal of the damaged roadway from the floodplain, relocation of the roadway above the floodplain, and restoration of more natural vegetated buffer floodplain conditions. The project would enable more extensive floodplain inundation than currently exists with the existing roadway and would help to restore water table conditions at both the project and the watershed scales. Floodplain connectivity would be enhanced with removal of obstacles and constructions presented by the existing roadway and its roadway prism. This would improve flood conveyance in the project area and not contribute to elevated flood flows. The hydrology of the wetland located near the project’s upstream terminus would be maintained by spanning the wetland with a bridge that maintains hydrological connectivity at the roadway crossing of the wetland. The project has minimized wetland impacts.

- **Objective 8:** Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

The project would maintain and restore the current plant communities in the riparian areas located where the existing roadway would be removed and restored to natural riparian conditions. The project would contribute to the restoration of Objective 8 over the long term at both the project and watershed scales. While the project would disturb and remove riparian trees and shrubs further landward of and upslope from the river as part of the road relocation, the disturbance and removal would be offset by riparian restoration. The mitigation would contribute to long-term improvement of riparian
vegetation that would provide shade, nutrient and sediment filtering, and a source of woody debris and other organic matter.

- **Objective 9:** Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian dependent species.

  The project would maintain and restore the composition and diversity of plant communities in the riparian areas adjacent to the river. The project would contribute to the restoration of Objective 9 over the long term at both the project and watershed scales. While the project would disturb and remove riparian trees and shrubs further landward from the river, restoration in the riparian zone that extends from Milepost 6.4-6.7 would contribute to a long-term improvement of riparian vegetation that would provide shade, nutrient and sediment filtering, and a source of woody debris and other organic matter that promotes beneficial riparian habitat for riparian dependent invertebrate and vertebrate species. Salvage of native duff during construction for placement on disturbed soils after construction is anticipated to promote re-establishment of native plant species and help to restore conditions suitable for invertebrate and vertebrate riparian dependent species.

**Consistency with Riparian Reserves Standards and Guidelines for Roads Management**

The following describes how the proposed Index-Galena Milepost 6.4-6.9 project would be consistent with Riparian Reserves standards and guidelines that apply to the Index-Galena Road project. A brief description of how the proposed project relates to each objective is provided below in *italics*:

**RF-1** - Federal, state, and county agencies should cooperate to achieve consistency in road design, operation, and maintenance necessary to attain Aquatic Conservation Strategy objectives.

  *The Snohomish County project team has coordinated with U.S. Forest Service, the Washington State Department of Transportation, the Federal Highway Administration and other agencies to ensure that road design and operation and maintenance will promote attainment of Aquatic Conservation Strategy objectives. Specific measures are discussed further below.*

**RF-2** - For each existing or planned road, meet Aquatic Conservation Strategy objectives by:

  a. minimizing road and landing locations in Riparian Reserves.

  *The project proposes to use the AASHTO Low Volume Roadway Design Standards to minimize the project footprint of the relocated roadway. The use of these design standards enables the proposed project design to match the character of the existing roadway. Use of these standards and incorporation of design features such as retaining walls, structural earth walls (SEW walls), and reinforced slopes have reduced the clearing required for construction. With the proposed design, approximately 3.3 acres would be converted to a new roadway prism footprint, while the remaining 8.9 acres would result in long term temporary impacts associated with grading cuts and fills that would be restored with placement of native duff and native vegetation planting after construction is completed. The existing damaged roadway would be removed from the
river’s side channel and floodplain and natural conditions restored through asphalt removal and revegetation where site conditions are favorable outside of the wetted river channel. When the roadway is relocated, there will be a net reduction of impervious surface compared to the pre-damage roadway prism footprint, and approximately 1.5 acres would be restored that is located within the channel migration zone and 100-year floodplain.

b. completing watershed analyses (including appropriate geotechnical analyses) prior to construction of new roads or landings in Riparian Reserves.

The U.S. Forest Service has completed a watershed analysis for the North Fork Skykomish watershed as part of its 1997 Skykomish Forks River Watershed Analysis, prepared for the Skykomish Ranger District, Mt. Baker-Snoqualmie National Forest. The project has completed a channel migration zone analysis that was prepared as part of the project’s early feasibility analysis. Roadway design efforts have been closely integrated and coordinated with extensive geotechnical analysis to determine the best location for the relocated roadway. The proposed design relocates the roadway out of the floodplain, moves most of the relocated roadway out of the channel migration zone, and has been located to minimize disturbance to the slopes located above the floodplain.

c. preparing road design criteria, elements, and standards that govern construction and reconstruction.

The project’s design criteria, project elements, and standards have been closely coordinated with U.S. Forest Service oversight to ensure consistency with the MBSNF Plan.

d. preparing operation and maintenance criteria that govern road operation, maintenance, and management.

Snohomish County will coordinate with the U.S. Forest Service to ensure that long term road operation, maintenance and management are consistent with USFS standards and guidelines as established in roadway right-of-way easement and special use permit requirements.

e. minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.

The project design has been developed to maintain natural hydrologic flow paths and minimize disruption of natural flow patterns. Removing the damaged roadway from the river, dispersing roadway stormwater flow, maintaining surface flow channels, constructing a bridge to span the wetland and seasonal stream near Milepost 6.9, and minimizing net new impervious surface area as compared to the existing roadway, help to achieve these objectives.

f. restricting sidecasting as necessary to prevent the introduction of sediment to streams.

The project proposes no sidecasting. Excavated spoils would either be incorporated into the roadway prism as part of constructed roadway embankments or exported from the project site to approved disposal sites. Native duff that is salvaged during construction would be placed both upslope and downslope from the finished roadway to help stabilize exposed soils and to provide a good source of organic debris that would promote revegetation and site restoration post construction.

g. avoiding wetlands entirely when constructing new roads.

The relocated road would avoid impacts to most of the wetland areas with the roadway design but roadway geometric constraints would require that wetland impacts occur. The
The project would compensate for unavoidable wetland impacts (0.02 acre current estimate) in compliance with federal, state, and local regulations.

RF-3 - Determine the influence of each road on the Aquatic Conservation Strategy objectives through watershed analysis. Meet Aquatic Conservation Strategy objectives by:
   a. reconstructing roads and associated drainage features that pose a substantial risk. Relocating the damaged section of Index-Galena Road would reduce risk for catastrophic damage that poses a substantial risk to in-stream and riparian habitat. Reconstructing the roadway above the floodplain would promote better floodplain connectivity by removing asphalt and the roadway prism fill that constrict flood flows. The relocated roadway would be constructed and operated in accordance with U.S. Forest Service standards and guidelines and consistent with management recommendations developed as part of the U.S. Forest Service watershed analysis prepared for the North Fork Skykomish River as part of its Two Forks Watershed Analysis.
   b. prioritizing reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected. The proposed Index-Galena Road reconstruction would provide beneficial impacts and enhance riparian resources by restoring natural floodplain and riparian habitat where the damaged roadway would be removed from the river side channel and adjacent riparian areas. Its reconstruction has been prioritized because reconstructing the roadway in its current alignment would continue to have adverse effects to riparian resources and the ecological value they provide.
   c. closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short-term and long-term transportation needs. Relocating the existing damaged roadway and obliterating the asphalt pavement to restore natural riparian conditions would promote Aquatic Conservation Strategy objectives as described above and will promote long-term transportation needs by restoring roadway connectivity that provides access for residents, recreation users, emergency service providers, and U.S. Forest Service personnel.

RF-4 - New culverts, bridges and other stream crossings shall be constructed, and existing culverts, bridges and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.
   Proposed roadway culverts and the bridge crossing of the wetland near Milepost 6.9 would be designed to accommodate the predicted 100-year flood flow including the associated bedload and debris. The box culvert vented ford near Station 29+00 would be designed to withstand predicted 100-year flow events and associated debris. In more extreme events greater than the 100-year flow, debris would be conveyed through the ford over the top of the roadway. Road maintenance crews would then remove deposited debris as necessary to restore traffic.
RF-5 - Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes. 

Outsloping the roadway surface is proposed to promote natural dispersion of roadway stormwater runoff. The project design would minimize sediment delivery to project area streams by dispersing stormwater runoff and providing conveyance at roadway culverts and the proposed bridge to route roadway drainage from unstable channels, fills and hillslopes. A Stormwater Pollution Prevention Plan would be developed and implemented during construction to address construction-related sediment and erosion control.

RF-6 - Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams. 
The one road crossing that has a fish-bearing stream, located at the proposed bridge crossing near Milepost 6.9, has been designed to maintain fish passage. All proposed cross-culverts are located at non-fish bearing streams located on steep slopes.

RF-7 - Develop and implement a Road Management Plan or a Transportation Management Plan that will meet the Aquatic Conservation Strategy objectives. As a minimum, this plan shall include provisions for the following activities:

Snohomish County will inspect and maintain Index-Galena Road in accordance with the Regional Road Maintenance ESA Guidelines at or near wetlands and streams, and the following standards and guidelines:

a. inspections and maintenance during storm events.
b. inspections and maintenance after storm events.
c. road operation and maintenance, giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources.
d. traffic regulation during wet periods to prevent damage to riparian resources.
e. establish the purpose of each road by developing the Road Management Objective.

Consistency with Recommended Wild and Scenic River allocation

The project’s proposed relocation of Index-Galena Road, including roadway pavement removal from the river side channel and restoration of riparian areas to natural conditions, would promote protection from degradation the outstanding remarkable values and wild, scenic, and recreation characteristics of the North Fork Skykomish River. The proposed project would include maintaining natural conditions in streamside bank areas so that water quality can be maintained to keep rivers fishable and swimmable.

The proposed Index-Galena Road relocation would protect and enhance the free-flowing condition, water quality, and outstandingly remarkable values of the North Fork Skykomish River. The relocation is designed to prevent repeated roadway washouts (and resultant effects) that Index-Galena Road has experienced in past events.

With the river channel’s 2006 migration and resultant erosion of the Index-Galena Road pavement, the proposed roadway relocation above the active flood plain would enhance free-
flowing conditions by accommodating lateral channel migration that would not adversely affect the road. By relocating the road and enabling river migration to the extent practical (within the project area), there is decreased constriction of the floodplain.

The effects on water quality associated with the relocation construction would be of short duration and minimal when compared to background sedimentation rates that would occur with future roadway washout damage. Long term effects are beneficial for water quality with the roadway located further landward from the active channel flow.

The effects of construction on fisheries would be short-term to accommodate roadway removal, related to short-term increases in roadway construction related noise and sediment. Long term effects are beneficial and in-stream spawning and side channel refugia habitat is expected to be enhanced by roadway removal and restoration of natural riparian conditions.

Changes in wildlife habitat and wildlife populations would be slight due to the relatively small amount of habitat change, and this change occurring in very small areas separated by relatively large distances. There are no substantial effects to wildlife beyond a temporary increase in noise during construction.

The roadway and views would be improved relative to the pre-damage condition and the scenery would be enhanced in areas in proximity to the river. Areas upslope from the river would have bare soils resulting from construction activities. These would be stabilized and revegetated to minimize erosion potential. At the expected effectiveness for these mitigation measures, impacts to scenery would likely be short term.

Impacts to visual quality would be addressed with aesthetics as a consideration. Techniques such as colored and/or textured concrete or rock gabion walls would be considered. Guardrail color would be a muted earth tone color, specifically a guard rail that has been painted with Natina that provides a weathered appearance. Restoration plantings in critical visually sensitive area would also consider placement of earth berming and rock boulders to promote a naturalized appearance for the proposed relocated road. For more discussion of visual quality considerations, see the *Visual Quality Technical Report* prepared for the project.

### Mitigation

#### Mitigation Sequencing

Several iterations of project alignment shifting occurred in the development of the 60 percent design to avoid and minimize cuts, fills, reduce the overall project footprint, and ensure that the project would minimize its footprint in the floodplain and channel migration zone. Placement of the roadway alignment considered roadway geometry, avoidance of unstable slopes, large cuts and fills, the channel migration zone, the base flood elevation, and existing wetlands. For example, a portion of the roadway that is proposed to span a wetland and salmon stream near the project’s north terminus was originally proposed in the design report to be spanned with a multiple large-span culverts and the roadway placed on several feet of fill material to maintain the existing hydraulic connectivity to the river. However, a detailed design based on subsequent
site evaluations, particularly observations of the winter water surface in this area and surrounding floodplain conditions, and proximity to the existing river channel migration zone concluded that a bridge span would be much more conducive to ensuring the integrity of both the roadway section and the floodplain associated wetland/stream habitat. As a result, impacts to the floodplain and associated wetland and stream will be minimized with bridge construction.

Onsite Mitigation

Snohomish County proposes to remove old concrete anchors and barriers from the old roadway alignment, some of which is located now in the active river channel. The volume of old concrete to be removed will be at least 65 cubic yards and as much as 180 cubic yards. The removal of this material will ensure that the new alignment achieves no net rise in the base flood elevation due to the project. The existing roadway that is to be decommissioned would be planted with native species and natural riparian conditions restored.

Permits Required

This project will meet all Federal, State and Local permitting regulations for work in or near the floodplain. Please see Appendix B for a detailed list of permits and regulations, and preliminary determination of consistency with these.

Federal

- National Environmental Policy Act (NEPA) Review
- Mt. Baker Snoqualmie National Forest Plan/Northwest Forest Plan-Special Use Permit and Easement Approval
- Clean Water Act Section 404 Permit (Corps Permit)
- Endangered Species Act Section 7 (and Essential Fish Habitat) Consultation
- National Historic Preservation Act Section 106 Review

State Implementation/Issuance

- Clean Water Act Section 401 Water Quality Certification
- Coastal Zone Management Certification
- Hydraulic Project Approval

Local Implementation/Issuance

- Critical Area Regulations Review and Compliance Certification
- Flood Hazard Permit
- Land Disturbing Activity/Drainage Approval
- Shoreline Substantial Development Permit
- State Environmental Policy Act (SEPA) Review
References

Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400), 1st Edition
American Association of State Highway and Transportation Officials Washington, D.C. 2001


Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measure Standards and Guidelines (USDA, USDI 2001).


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Snohomish County Natural Hazard Mitigation Plan Update Prepared for Snohomish County Prepared by Tetra Tech Volume 1: Planning-Area-Wide Elements. September 2010


Snohomish County Special Flood Hazard Areas - Chapter 30.65, Snohomish County Code Title


Upper Skykomish River Flood Insurance Study Technical Support Data Notebook For the Skykomish River (RM 8.95 to confluence of North Fork and South Fork) North Fork Skykomish River (Skykomish River confluence to Index-Galena Bridge) South Fork Skykomish River (Skykomish River confluence to County Line) Sultan River (Skykomish River confluence to RM 3.40) and May Creek (RM 0.65 to RM 3.70) Snohomish County, Washington City of Index, City of Gold Bar, City of Sultan, and Unincorporated Areas of Snohomish County Prepared for: Federal Emergency Management Agency Prepared by: Snohomish County Department of Public Works, Surface Water Management Division Date Submitted: September 29, 2010


Appendix A - Consistency With Adopted Plans

The project will undergo consistency review as part of regulatory permitting submittals. Some of these requirements are summarized below.

Consistency with existing watershed and floodplain planning

Snohomish County has developed several guiding goals and objectives related to flood hazards and infrastructure. These goals and objectives have been integrated into the Snohomish County Growth Management Act comprehensive plan as part of its comprehensive planning process, the 2010 Snohomish County Natural Hazard Mitigation Plan Update, and implementation regulations such as the Special Flood Areas Regulations and Shoreline Management. The proposed Index-Galena Road Milepost 6.4-6.9 project will be consistent with applicable goals and objectives. These include the following:

**Snohomish County GMA Comprehensive Plan-General Policy Plan**

**Transportation**

Goal TR 6 Implement transportation improvements that have positive or minimal adverse impacts on the natural environment, air quality, water quality and energy consumption
And its related policy:

6.A.2 Transportation systems, including circulation roadways and driveways, shall be located and designed to minimize the disruption of natural habitat, floodplains, wetlands, geologically hazardous areas, resource lands, and other elements of the environmentally sensitive areas. Where disruption cannot be avoided, designs shall minimize the disruption and impacts shall be mitigated.

**Capital Facilities**

Goal CF 3 Provide for the management of storm, flood, and base surface waters in Snohomish County that protects public health and safety, wisely uses public finances, and preserves a legacy of beneficial surface water uses for present and future generations.
And its related Objective:

CF 3.B Provide a system of flood hazard management that protects public infrastructure investments and minimizes impacts to natural water resources.
And its related policy:

3.B.5 The County shall consider relocating public roads and other public infrastructure located within floodplains, when feasible, to prevent future damage or loss of facilities.

**Natural Environment**

Goal NE 8 Protect public health and safety by minimizing the potential for physical injury and property damage from natural hazards.
And its related Objective:
NE 8.A Reduce the potential for physical injury and property damage from natural hazards. And its related policy:

8.A.3 The County shall reduce the number of existing flood damage prone structures through acquisition, relocation, incentives, and regulation.

Snohomish County Shoreline Management Program

Transportation, Circulation and Parking Facilities

The transportation and circulation element of the Snohomish County Management Program addresses the general location and extent of existing and proposed major thoroughfares, transportation routes, terminals, and other public facilities, all correlated with the shoreline use element. The transportation system provides access to shoreline areas and scenic viewpoints but at the same time can damage shoreline ecological functions. The transportation goals and policies must balance the requirements needed to support shoreline uses with the protection of the shoreline ecology.

Goals

- Permit safe and convenient circulation systems appropriate to the shoreline environment which cause minimum disruption to shoreline access, shoreline environment, and minimum conflict between the different users.

Policies

- New nonwater oriented transportation facilities should be located outside of shoreline jurisdiction unless there is no reasonably feasible alternative alignment or location.
- To the extent feasible, encourage joint use transportation corridors by consolidating transportation and utility facilities in shared rights-of-way when they must cross shoreline areas.
- New and expanded transportation facilities should be designed and located away from shoreline areas so as to ensure no net loss of shoreline ecological functions, preserve the natural landscape, and minimize conflicts with existing and planned uses.
- Locate and design new and expanded transportation facilities so as to avoid the need for structural shoreline stabilization within a channel migration zone or floodway.
- Permit the repair and maintenance of transportation structures within a channel migration zone or floodway so as to minimize significant ecological impacts.
- Encourage the use of waterborne transportation and commuter ferry service.
- Require development and redevelopment with shoreline areas to manage stormwater impacts consistent with the county’s surface water management program or current stormwater management manual.
- Encourage low impact development techniques.
• Locate and design new circulation systems consistent with the Snohomish County GMA comprehensive plan to provide for alternative modes of transportation in the shoreline jurisdiction.
• New transportation facilities should be located outside of shoreline areas wherever feasible.
• Encourage provision of viewpoints, rest areas and picnic facilities in public shoreline areas along transportation corridors.
• Retain portions of old highways having high aesthetic quality as alternative scenic routes, unless this conflicts with agriculture or fish and wildlife habitat.
• Promote the use of abandoned railroad rights-of-way for trail systems, especially where they would provide public access to or enjoyment of the shorelines.
• Encourage creation of trail systems adjacent to new roads and railroads where feasible and safe.
• Transportation facilities should be located and designed to avoid, or if that is not feasible, minimize impacts to shoreline ecological functions, especially channel migration and conveyance of flood waters and large woody debris.
• When necessary in shoreline areas, transportation facilities should be located where routes will have the least impact to shoreline ecological functions and will not adversely impact existing or planned water dependent uses.
• Road and railroad bridges should be designed to accommodate the existing floodways of streams and rivers.
• Design and maintain roads to minimize erosion and preserve natural drainage ways.
• Construction debris, overburden and other waste materials should not be allowed to enter into any water body by disposal or erosion from drainage, high water or other means.
• Provide safe pedestrian and other non-motorized travel facilities in public shoreline areas.
• Parking is not a preferred shoreline use and should be allowed only to support a use authorized under the SMP.
• Parking facilities should be located outside of shoreline jurisdiction or as far landward from the ordinary high water mark as feasible. When located within shoreline jurisdiction, the location and design of parking facilities should:
  • Minimize visual and environmental impacts to adjacent shoreline and critical areas.
  • Provide for pedestrian access through the facility to the shoreline; and
  • Facilitate public access to and enjoyment of the shoreline.
• Parking, storage, loading and service areas and facilities serving commercial uses should minimize their visual impact on the shorelines, utilize low impact development techniques and be placed a minimum of 200 feet away from the ordinary high water mark.
• Provide public transportation services that support and are supported by the land use element, natural environment element, and economic development element of the county comprehensive plan.
• Plan, design, program, construct, and promote use of non-motorized transportation facilities in Snohomish County and in cooperation with WSDOT and the cities.
• A safe system of bicycle and pedestrian facilities shall be planned for, tying together residential areas, schools, recreation areas, business areas, transit stops and transfer points, and centers.
• Ensure that new development accommodates non-motorized transportation facilities in its site planning.

A substantial development permit may be granted only when the development proposed is consistent with the policies and procedures of the Shoreline Management Act, the adopted local master program, the provisions of the State Environmental Policy Act, and other applicable county plans, policies, objectives, and land use regulations.

Snohomish County Flood Hazard Management

Snohomish County addresses flood risk through a comprehensive flood hazard management program that integrates planning, engineering, and environmental protection measures. Traditional flood control measures generally refer to engineering projects intended to control flood waters, such as the building of levees and dikes and river dredging. Snohomish County’s current focus on floodplain management includes regulations limiting development in the floodplain, coordinating levee heights to allow for controlled flooding in the floodplains, and providing connection between the floodplain and the rivers to benefit habitat and the local communities as a whole.

The county’s floodplain management efforts include:
• Participation in the National Flood Insurance Program (NFIP)
• Adoption of floodplain development regulations that meet NFIP requirements,
• Participation in an NFIP incentive program, Community Rating System (CRS),
• Emergency preparedness plans, and
• Comprehensive flood hazard management plans for the main rivers, which propose actions to minimize future flood damage.

2010 Snohomish County Natural Hazard Mitigation Plan Update

The Natural Hazard Mitigation Plan identifies five mitigation goals as part of its 2010 update. These include:
• Goal 1 – Reduce natural hazard–related injury and loss of life.
• Goal 2 – Reduce property damage.
• Goal 3 – Promote a sustainable economy.
• Goal 4 – Maintain, enhance and restore the natural environment’s capacity to absorb and reduce the impacts of natural hazard events.
• Goal 5 – Increase public awareness

The Natural Hazard Mitigation Plan includes an action plan that Snohomish County will implement through various County initiatives. The proposed Index-Galena Road Milepost 6.4-Milepost 6.9 project falls under Action Plan item **SC-15 - Retrofit, Rehabilitate or Replace Vulnerable Road and Bridge Facilities and Infrastructure Throughout Snohomish County.**

Of 14 objectives developed to measure success toward achieving plan goals, the plan identifies four objectives that are met by implementing action item SC-15. These include:
• Objective Number O-1 Eliminate or minimize disruption of local government operations caused by natural hazards.
• Objective Number O-2 Increase resilience of infrastructure.
• Objective Number O-4 Reduce natural hazard-related risks and vulnerability to potentially isolated populations in Snohomish County.
• Objective Number O-14 Retrofit, purchase, or relocate structures in high hazard areas, including those known to be repetitively damaged.
Appendix B
Regulatory Requirements Applicable to the Proposed Project

Federal Implementation/Issuance

**National Environmental Policy Act (NEPA) Review** - The Index-Galena Milepost 6.4 - 6.9 project has applied for federal funding from the Federal Highway Administration (FHWA) through its Emergency Repair (ER) program. Federal funding is a federal nexus that requires the project to be subject to environmental review in compliance with the National Environmental Policy Act (NEPA). Emergency repairs are normally classified as NEPA categorical exclusions under 23 CFR 771.117 (c)(9) or 23 CFR 771.117 (d). Based on preliminary coordination with FHWA and WSDOT, the project would prepare a NEPA Environmental Assessment (NEPA EA). Documentation will include preparation of discipline reports and documentation associated with other federal laws that are conducted concurrent with the NEPA EA document review.

Due to the physical intrusion onto and associated impacts to the Mount Baker-Snoqualmie National Forest, the U.S. Forest Service will be a cooperating agency with FHWA. Technical analysis of the proposed project, including a no-action alternative, effects on surface water, wetland, floodplain, and biological resources (and potentially additional resources) would be required in the discipline reports/specialist reports.

**Mt. Baker Snoqualmie National Forest, Northwest Forest Plan - Special Use Permit and Easement Approval** - The Northwest Forest Plan presents a vision for a sustainable future for Federal natural resources (lands managed by the USDA Forest Service and the USDI Bureau of Land Management) and for local timber dependent communities within the range of the northern spotted owl (area in gray on the map below). This area encompasses all or portions of 17 National Forests in Washington, Oregon, and California and Bureau of Land Management (BLM) managed public land in Oregon and California.

Implementation of the Northwest Forest Plan is required for actions on lands managed by the Mount Baker-Snoqualmie National Forest. The Survey and Management Program of the Plan will necessitate surveys of biotic resources in the project area that can span multiple years. U.S. Forest Service approvals are required for roadway construction and realignment of Index-Galena Road onto forest lands outside of the existing roadway easement.

The proposed project will need to be consistent with all applicable standards and guidelines of the Forest Plan, as amended by the 1994 and 2005 Records of Decisions. These three planning documents have specific standards and guidelines pertaining to the North Fork Skykomish key watershed, riparian reserve habitat, the matrix management area, visual quality, the recommended Recreation River, and invasive plant prevention, which must be addressed for new road construction.

**Clean Water Act Section 404 Permit (Corps Permit)** - Under Section 404 of the Clean Water Act (CWA), a project requires a permit from the Army Corps of Engineers (Corps) for any discharge of dredged or fill material waterward of the ordinary high water mark (or the mean higher high tide in tidal areas) in waters of the United States, including special aquatic sites such as wetlands (33 U.S.C. §1344). In Washington State, a Section 404 permit is typically applied for with a Joint Aquatic Resources Permits Application (JARPA) and requires drawings meeting Corps specifications and other documentation. Completion of processing for receipt of the Section 404 permit typically requires up to 6 months for a Nationwide permit and up to 12 months or more for an individual permit.
For the Index-Galena Road project, proposed project elements would involve both placement/removal of fill materials within the ordinary high water mark (OHWM) of the North Fork Skykomish River, and within wetlands located along the proposed alignment. Thus the project would be subject to Section 404 of the Clean Water Act (CWA), requiring a Corps permit. Based on what is known at this time about the potential alignments, the project would likely require a Nationwide permit. If an Individual permit is needed, it would trigger an Alternatives Analysis. That analysis examines proposed options to the preferred action with regard to impacts.

**Endangered Species Act Section 7 (and Essential Fish Habitat) Consultation**

Section 7 of the Endangered Species Act (ESA) requires that federal agencies ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of designated critical habitat (16 U.S.C.1536 (a)(2)). In addition, when applicable, federal agencies must also evaluate potential impacts to Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (as amended by the Sustainable Fisheries Act of 1996, Public Law 104-267). These provisions also apply to local government activities in which federal funding and/or authorization(s) are involved.

A federal nexus will exist for this project due to FHWA funding and the need for a Section 404 permit from the Corps. Compliance with Section 7 of the Endangered Species Act will be required. The project will prepare a Biological Assessment to address ESA-listed species potentially affected by the project. Given the likely substantial construction activities along the river, it is likely that formal consultation will be required for the project. It is also expected that consultation on designated critical habitat for both aquatic and terrestrial species would be a significant component of ESA consultation.

**National Historic Preservation Act Section 106 Review**

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effect of any proposed federal or federally assisted undertaking on any site that is included in or eligible for inclusion in the National Register of Historic Places (16 USC §470(f)).

The Index-Galena Road project has a federal nexus both through federal funding and due to its location on federal land, and compliance with Section 106 of the NHPA will be required. Since project elements would be constructed in previously undeveloped areas, the Area of Potential effect (APE) would be identified to determine the potential for project effects on protected cultural resources. Archaeological field surveys have occurred and a Cultural Resources Assessment is being prepared by the U.S. Forest Service for Section 106 agency/tribal consultation.

**State Implementation/Issuance**

**Clean Water Act Section 401 Water Quality Certification**

Under Section 401 of the CWA, the Washington Department of Ecology (DOE) reviews all projects that require a federal permit or approval, and which might pollute waters of the U.S including wetlands. In order to determine and certify whether projects comply (or would comply given additional conditions) with various water quality standards and plans for preventing pollution. In Washington State, a Section 401 Certification is typically applied for using the JARPA. The processing time for the certification typically lasts less than 3 months and typically occurs after the Corps permit is issued.
Because the proposed Index-Galena Road project requires a Section 404 Permit, a Section 401 Certification would be required. It is not known whether, the project would require an Individual Water Quality Certification.

**Coastal Zone Management Certification** - In accordance with the federal Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. 1451-1456), a project in Washington that affects coastal resources (within Washington’s 15 coastal counties) and which requires federal permits or receives federal funding requires a Coastal Zone Management (CZM) Certification from DOE stating that the project is consistent with Washington’s Coastal Zone Management Program (WCZMP) to the “maximum extent practicable.” Applicants for CZM Certification prepare a Determination of Consistency Checklist and develop a Federal Consistency Document (FCD), which are submitted to the CORPS and DOE. For proposed federal development projects, receipt of the certification can take 60 days. For federal licensing, permitting, or funding, the certification can take 180 days.

The Index-Galena Road project’s Corps Section 404 federal nexus requires compliance with the Coastal Zone Management Act. Given the project’s location in direct proximity to water resources, DOE is likely to require certification of compliance if the project requires an individual Water Quality Certification (DOE determines this on a case-by-case basis). Should DOE determine that such certification is necessary, the County would prepare a Coastal Zone Management consistency certification for the project (submitted to DOE) showing it complies with the enforceable policies of Washington’s Coastal Zone Management Program (including the Shoreline Management Act, State Environmental Policy Act, CWA, Clean Air Act). Determination of the project’s effects on Waters of the US, including wetlands, would be required prior to certification of compliance with the CWA.

**Hydraulic Project Approval** - The Washington Department of Fish and Wildlife (WDFW) requires a Hydraulic Project Approval (HPA) for any project that will use, divert, obstruct, or change the natural flow or bed of fresh waters or marine waters of the State (RCW 77.55.100). Since construction of the Index-Galena Road project would involve in-water work, it would be subject to Hydraulic Project Approval by WDFW.

**Local Implementation/Issuance**

**Critical Area Regulations Review and Compliance Certification** - All development activity conducted by a public agency within Snohomish County is subject to compliance with Snohomish County Critical Areas Regulations (CAR), and applicable more specifically to the proposed Index-Galena project are SCC 30.62 A– Wetlands and Fish & Wildlife Habitat Conservation Areas and SCC 30.62B Geologically Hazardous Areas. In the area affected by the proposed alignments, CAR regulates activities in streams, wetlands, primary association areas for critical species, and the associated buffers, and geologic hazard areas. Generally, a critical area study is required for development activities that occur within a critical area or associated buffer. A habitat management plan and a mitigation plan that mitigates for project impacts will also be required as part of the critical area study.

**Flood Hazard Permit** - SCC 30.65 – Special Flood Hazard Areas and SCC 30.43C – Flood Hazard Permits regulate all development within the designated flood plains of Snohomish County. Any projects located within the flood plain must examine the potential impacts of proposed activities on floodwater storage and flow. Depending on the proposed activity, a flood hazard permit, variance, or exemption must be granted. The Index-Galena Road project site is located within the 100-year floodplain of the North Fork Skykomish River, and would be subject
to Snohomish County Flood Hazard regulations. Provided that the project would result in no net increase in the volume of fill material within the floodplain (in relation to the pre-existing roadway prism), and that the work conducted is considered normal maintenance and repair, the project would be expected to meet the displacement and obstruction thresholds of the flood hazard code and receive a flood hazard permit. However, if the proposed work increases the volume of fill within the floodplain, a detailed hydraulic analysis may be required to support expected effects on flood elevations.

**Land Disturbing Activity / Drainage Approval** - Snohomish County requires a land disturbing activity permit be obtained prior to implementing projects that would involve clearing, filling, or excavation activities in sensitive locations, along public right-of-ways, or in excess of threshold levels established in the County code. Regardless of whether a permit is required, clearing and/or grading must conform to County requirements, and must incorporate best management practices (BMPs) to protect adjacent properties and critical areas from runoff, erosion and sedimentation.

Given the amount of clearing and grading required for the potential project construction, a land disturbing activity permit would be required.

**Shoreline Substantial Development Permit** - Pursuant to the Shoreline Management Act of 1971 (RCW 90.58), Snohomish County requires a Shoreline Substantial Development Permit for certain types of development within shoreline environments (SCC 30.44 – Shoreline Management).

The Index-Galena Road project site is located within the 100-year floodplain, and would be subject to Shoreline Management regulations. A Shoreline Substantial Development Permit would be required for the project. Compliance with conditions of the Snohomish County Shoreline Management Master Program would also be required.

**State Environmental Policy Act (SEPA) Review** - Under Washington’s State Environmental Policy Act (SEPA), local jurisdictions or state agencies must evaluate the environmental effects of projects proposed in the State, as documented in an environmental checklist, and consider and identify measures to avoid or mitigate adverse effects. A threshold determination (TD) regarding the significance of the project’s environmental effects is then made. If the project would not have adverse effects, or if effects could be effectively mitigated through implementation of adopted development regulations, then Determination of Non-Significance (DNS) will be issued. If the project would result in unavoidable adverse effects on the environment, then a Determination of Significance (DS) will be issued. If a DS is issued, an Environmental Impact Statement (EIS) must be prepared for the project. The project would adopt the NEPA EA and anticipated Finding of No Significant Impact (FONSI) to meet SEPA requirements.
Appendix C- Floodplain and Channel Migration Zone Impact Plan drawings