

Kirkland Road Flooding Study

LOCATION: CITY OF NAPAVINE

EXISTING FLOODING PROBLEMS

Kirkland Road is located just east of the Rush Road Interchange at MP 72 on I-5. During high flow events on the Newaukum River, overland flooding occurs, resulting in shallow sheetflow flooding of Kirkland Road and deeper flooding near the I-5 underpass at the interchange. Per the city, flooding has occurred in 7 of the last 25 years.

PROPOSED STUDY

The proposed project is a study to analyze potential solutions to the current flooding problem. Potential solutions include raising Kirkland Road above flood elevations and the installation of a new culvert on the north side of the Kirkland Road to convey flow into Newaukum River via an existing slough. Other solutions would likely be identified during the study.

PROJECT BENEFITS AND POTENTIAL NEGATIVE IMPACTS

The project benefits and potential negative impacts will be identified during the course of the study. Potential benefits include flood damage reduction to the businesses and homes along Kirkland Road. Additionally, the project would provide better emergency access during high flow events and reduce flood related traffic impacts at the I-5 interchange. Potential negative impacts include the possible impacts to other properties due to the re-routing of overbank flooding from the Newaukum River.

PROJECT CONSTRAINTS

Project constraints will be identified, but may include the following:

- Any impacts to the Rush Road interchange will require coordination with WSDOT
- Existing Newaukum River floodway present on FIRM Maps
- Existing bridge crossing of Newaukum River on Kirkland Road
- Private property and businesses along Kirkland Road

HYDRAULIC MODEL:

The Newaukum River is included in the WSE Chehalis River model and would be able to be modeled if this is a project and not a study. The model uses older cross section data, likely from the original FEMA model. The study may benefit from obtaining new channel survey data.

ESTIMATED COST:

The Newaukum River is included in the WSE Chehalis River model and would be able to be modeled if this is a project and not a study. The model uses older cross section data, likely from the original FEMA model. The study may benefit from obtaining new channel survey data. A preliminary cost of a study has been estimated to be approximately \$40,000.

PROJECT COMPONENT	COST
Study	\$40,000

SR6 Bypass and Road Raise

LOCATION: LEWIS COUNTY

EXISTING FLOODING PROBLEMS

State Route 6 (SR6) presently ponds Chehalis River flood waters on the south side of the road during high flow events on the Chehalis River until eventually overtopping, resulting in closure of SR6. During previous events, SR-6 was closed for approximately 1.2 miles east of Scheuber Road due to overtopping.

PROPOSED PROJECT

The intent of this project is to keep SR-6 open during the 100-year flood event on the Chehalis River. The proposed project includes raising 1.2 miles of SR-6 east of Scheuber Road approximately up to 3 feet in elevation. Additionally, new box culverts will be installed along the newly raised portion of SR-6 to convey flow under SR-6 and prevent an increase of water surface elevations on the south side of the highway. The box culverts will be installed with inverts that match the existing SR-6 road elevation with the goal of maintaining the current distribution of flood flows on the north and south side of SR-6. If necessary, a high flow bypass channel and associated SR-6 crossing in the form of a bridge or series of box culverts will be installed near the east side of the Scheuber Road intersection. Previous work performed by WSE indicates that the bypass and new crossing would be approximately 500-feet wide. The bypass channel will not be constructed to provide fish habitat.

PROJECT BENEFITS AND POTENTIAL NEGATIVE IMPACTS

- Allows SR6 to stay open during flood events
- Reduction of flood levels on south side of SR6; Reduction of flood levels upstream and east of SR6
- Creation of a high flow bypass route
- Potential increase flooding downstream if current flood flow pattern is changed

PROJECT CONSTRAINTS

- Coordination with WSDOT’s Alternative 1 and the County would be necessary
- Acquisition of private parcels or flood easements necessary for bypass channel

HYDRAULIC MODEL:

This reach is in WSE’s Chehalis River model and has the ability to be modeled.

ESTIMATED COST

Existing preliminary cost estimates were available from WSE and Sargent regarding the creation of a high flow bypass and are summarized in the table below. Total cost associated with the creation of the bypass channel is approximately \$30 million. This does not include the road raise portion of the work. WSDOT has estimated the road raise cost to be \$3 to \$5 million.

PROJECT COMPONENT	COST
Bypass Design	\$4,492,000
Bypass Construction	\$19,370,000
Bypass Property Acquisition	\$2,939,000
Bypass Construction Management	\$3,594,000
Road Raise (WSDOT)	\$3 to \$5 Million

Dillenbaugh Creek Realignment

LOCATION: CITY OF CHEHALIS

EXISTING FLOODING PROBLEMS

Flooding occurs along I-5 and within the City of Chehalis during high flow events due to overbank flooding of Dillenbaugh Creek and backwater flooding of the Chehalis and Newaukum Rivers. Backwater enters the City of Chehalis through multiple openings under I-5 associated with Dillenbaugh Creek, two rail lines and one private road.

PROPOSED PROJECT

The proposed project includes realigning Dillenbaugh Creek from the undercrossing at Rice Street through Stan Hedwall Park. Currently Dillenbaugh Creek crosses Interstate 5 at three locations before discharging to the Chehalis River. A new channel would be constructed and ultimately reroute Dillenbaugh Creek through Stan Hedwall Park to the right bank of the Newaukum River, eliminating two of the I-5 creek crossings. Two new stream crossings would be necessary within the Stan Hedwall Park. In addition to realigning Dillenbaugh Creek, the openings under I-5 would need to be closed to prevent backwater from flowing under I-5 to the east. Closure of the openings could be accomplished with a variety of structures on a temporary or permanent basis, which will be investigated during the conceptual design.

PROJECT BENEFITS AND POTENTIAL NEGATIVE IMPACTS

- Alleviates flooding along I-5 and through southwest Chehalis
- Habitat enhancement in new channel
- Could potentially have negative impacts downstream, on west side of I-5

PROJECT CONSTRAINTS

- Coordination with WSDOT Alternative 1 and the City of Chehalis would be necessary
- Coordinating with Rail entities and Private property owners
- Wetland located downstream on Dillenbaugh Creek
- Acquisition of private parcels or flood easements necessary
- Fish passage in in the new channel
- Interior drainage concerns in City of Chehalis

HYDRAULIC MODEL:

Dillenbaugh Creek is included in the hydraulic model; however, it is likely to not make a difference during the 100-year Chehalis River flood as it is backwatered by the Chehalis and Newaukum Rivers. It is assumed the closure of the openings under I-5 is able to be modeled.

ESTIMATED COST

A preliminary estimate includes H&H analysis, preliminary design, alternatives analysis, costing, final design, permitting and construction for the realignment portion of project was estimated at \$500,000 (CRBFA Potential Projects Reference Document, 11/09/2014). Preliminary costs have not been developed yet for the closure of the openings under I-5.

PROJECT COMPONENT	COST
Channel Realignment	\$500,000
I-5 Opening Closures	

Main Street Regrade

LOCATION: CITY OF CHEHALIS

EXISTING FLOODING PROBLEMS

Flooding occurs along West Main Street in the City of Chehalis during high flow events on Dillenbaugh Creek and the Chehalis River which prevents access to I-5 at interchange 77.

PROPOSED PROJECT

The proposed project is to elevate approximately 700 to 900 feet of Main Street above the 100-year frequency flood level (approximate elevation 185.4 feet) to maintain access between the City of Chehalis and I-5 during high flow events. The existing road would need to be raised approximately 1 to 2 feet. An existing 36" CMP culvert crosses under Main Street and may potentially be replaced or retrofitted with a flapgate depending on analysis completed during the conceptual design.

PROJECT BENEFITS AND POTENTIAL NEGATIVE IMPACTS

- Maintain access between I-5 and City of Chehalis
- Provide protection to residences on north side of Main Street
- Potential higher water surface elevations on south side of Main Street

PROJECT CONSTRAINTS

- Coordination with WSDOT Alternative 1
- City Stormwater system
- Coordination with Railroad if the road raise extends to the existing rail crossing

HYDRAULIC MODEL:

This proposed project has the ability to be modeled with the existing hydraulic model.

ESTIMATED COST

Preliminary cost estimates have not been determined for this project yet.

PROJECT COMPONENT	COST
Design	
Construction	
Property Acquisition	
Contingency	
Total	

Salzer Creek

LOCATION: LEWIS COUNTY

EXISTING FLOODING PROBLEMS

The east side of I-5 is flooded by overbank flooding of Salzer Creek and backwater flooding from the Chehalis River.

PROPOSED PROJECT

The proposed project is to install a backwater control structure in Salzer Creek to prevent backwater flooding under I-5. The control structure will likely be installed immediately downstream of the Salzer Creek and I-5 crossing. Additional analysis will be performed to determine the height of the structure and if it is necessary to provide interior drainage of Salzer Creek when the control structure is closed.

PROJECT BENEFITS AND POTENTIAL NEGATIVE IMPACTS

- Alleviate flooding to I-5 and along Salzer Creek
- Potential downstream impacts and increased water surface on west side of I-5

PROJECT CONSTRAINTS

- Coordination with WSDOT Alternative 1
- Interior drainage concerns

HYDRAULIC MODEL:

Salzer Creek is included in the Chehalis River hydraulic model. The proposed backwater control will be modeled using the Chehalis River model.

ESTIMATED COST

Preliminary costs have not been estimated for the Salzer Creek project yet.

PROJECT COMPONENT	COST
Design	
Construction	
Property Acquisition	
Contingency	
Total	

Main Street Regrade

LOCATION: TOWN OF BUCODA

EXISTING FLOODING PROBLEMS

Overbank flooding on the Skookumchuck River results in the closure of Main Street near the intersection with 11th Street in the Town of Bucoda. Approximately 50 residences on the south side of 11th Street are isolated from emergency services during high flow events. In January 2009, the homes and citizens were cutoff from the rest of town for two days.

PROPOSED PROJECT

The proposed project involves elevating 1,500 feet of Main Street a height of 1 to 2 feet (approximate elevation 246 ft). Additionally, a 50 foot opening would need to be installed near the intersection of Main Street and 11th Street to provide an overflow path for Skookumchuck River flood waters. The opening will likely consist of multiple box culverts or a bridge.

PROJECT BENEFITS AND POTENTIAL NEGATIVE IMPACTS

- Main Street remains open during flood events, providing emergency service access to approximately 50 residences.

PROJECT CONSTRAINTS

- Acquisition of private property likely needed

HYDRAULIC MODEL:

Skookumchuck River is included in the Chehalis River hydraulic model. This project has the ability to be modeled using the Chehalis River model.

ESTIMATED COST

A preliminary cost estimate was prepared by WSE and Sargent. Total cost is estimated to approximately \$3.7 million. A separate, additional cost estimate of \$174,263 was provided in the CRBFA Potential Projects Reference Document, 11/09/2014. This estimate does not include construction costs. During the conceptual design, it will necessary to determine the difference in these preliminary cost estimates.

PROJECT COMPONENT	COST
Design	\$536,000
Construction	\$2.31 Million
Construction Management	\$429,000
Property Acquisition	\$434,000
Total	\$3.7 Million

Moon Road

LOCATION: CHEHALIS TRIBE

EXISTING FLOODING PROBLEMS

At its current grade, the portion of Moon Road south of US Highway 12 is overtopped in multiple locations during moderate flood events on the Chehalis River, thus preventing access to reservation properties. During moderate flood events, US Highway 12 remains open.

PROPOSED PROJECT

The intent of this project is to keep Moon Road open while US Highway 12 is not being overtopped. Once US12 is overtopped, it is not necessary to keep Moon Road open. This project includes the elevating the low portions of Moon Road to the same elevation as US Highway 12 at the intersection of Moon Road. Culverts and/or bridges will be installed as necessary in the new raised sections of Moon Road to prevent overtopping. This project is similar to the Anderson Road project located approximately one mile west of Moon Road, completed several years ago.

PROJECT BENEFITS AND POTENTIAL NEGATIVE IMPACTS

- Moon Street remains open and provides access into the reservation while US12 still open

PROJECT CONSTRAINTS

Project constraints have not been identified for this project yet. The project is located in a rural area with little development.

HYDRAULIC MODEL:

Moon Road is included in the Chehalis River hydraulic model; however it is modeled with a storage area. This project likely has little impact during the 100-year Chehalis flood event because it will still be overtopped.

ESTIMATED COST

Preliminary costs have not been estimated for this project yet.

PROJECT COMPONENT	COST
Design	
Construction	
Property Acquisition	
Contingency	
Total	

Black River Bridge

LOCATION: CHEHALIS TRIBE

EXISTING FLOODING PROBLEMS

During high flows on the Black River and Chehalis Rivers, the Black River bridge on US Highway 12 causes a flow constriction, resulting in bank scour, bed erosion and loss of riparian habitat. In 2001, repairs were made to the bridge to protect the bridge piers and abutments. The failure of the bridge piers and abutments could result in loss of the bridge during a high flow event. Existing flooding problems at the bridge are documented in the Chehalis Tribe's 2009 Comprehensive Flood Hazard Management Plan.

PROPOSED PROJECT

In 2005, WSDOT authored a Black River Bridge Feasibility Study to examine replacement of the existing Black River Crossing on US Highway 12 at the request of the Chehalis Tribe. The study recommended replacing the existing bridge with a wider, longer bridge. The proposed bridge will be 40 feet wide and a length of 125 feet.

PROJECT BENEFITS AND POTENTIAL NEGATIVE IMPACTS

- Potential decrease in flood damages associated with constriction including lower water surface elevations upstream of Highway 12.
- Potential downstream impacts
- Habitat improvement
- Correction of deficient sight distance on existing bridge and improvement of traffic problems associated with oversized vehicles weight restrictions
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PROJECT CONSTRAINTS

- Coordination with WSDOT
- Potential levee on right bank, upstream of bridge
- Proximity to railroad on right bank
- Existing boat ramp on left bank, downstream of bridge
- Franchise utilities, including a Department of Ecology flow gage

HYDRAULIC MODEL:

Black River is included in the Chehalis River hydraulic model and the proposed bridge will be incorporated into the model. Larry Karpack of WSE has indicated that this area of the model is hydraulically complex and is the least well modeled area.

ESTIMATED COST

Per WSDOT's 2005 feasibility study, the preliminary cost is \$5.6 million.

PROJECT COMPONENT	COST
Habitat Study and Monitoring	\$500,000
Preliminary Engineering	\$640,000
Right of Way	\$65,000
Construction	\$4.4 Million
Total	\$5.6 Million

Source: WSDOT, 2005

Roundtree Creek

LOCATION: CHEHALIS TRIBE

EXISTING FLOODING PROBLEMS

Roundtree Creek has been rerouted to flow along Highway 12 into Harris Creek, which flows through the City of Oakville. During high flow events, Harris Creek leaves its banks and floods portions of Oakville.

PROPOSED STUDY

The proposed project is a study to analyze potential solutions to the current flooding problem on Roundtree Creek and Harris Creek near the eastern city limits of Oakville. Potential solutions include restoring Roundtree Creek to its historical flowpath from its current alignment, which is adjacent to US 12. Other sources of flooding and solutions would likely be identified during the study.

PROJECT BENEFITS AND POTENTIAL NEGATIVE IMPACTS

The project benefits and potential negative impacts will be identified during the course of the study. Potential benefits likely include flood damage reduction within Oakville and improvement to fisheries habitat. Potential negative impacts may include the downstream flood impacts associated with the relocating flowpaths.

PROJECT CONSTRAINTS

- Coordination with WSDOT if US Highway 12 is impacted
- Fish Passage

HYDRAULIC MODEL:

No modeling will be done for this project because it is a study. During the course of the study, it is likely that hydraulic model will be created.

ESTIMATED COST

Preliminary costs of the study have not been estimated yet.

PROJECT COMPONENT	COST
Study	
Contingency	
Total	

Wynoochee Valley Road Regrade

LOCATION: GRAYS HARBOR COUNTY

EXISTING FLOODING PROBLEMS

Wynoochee Valley Road is subject to flooding from the Wynoochee River and Chehalis River backwater and closure during a flood having a 20-year frequency or occurrence or larger. Flooding occurs at a low section of road in the vicinity of Mile 1.0. When this road is closed, access to the entire Wynoochee Valley is cut off, as well as the ability to use this road as an alternate route when US Highway 12 is closed. About 800 people use the road daily.

PROPOSED PROJECT

The proposed project includes elevating 400 to 500 feet of Wynoochee Valley Road a height of approximately 1 foot near the intersection with Valentine Gardens Lane. The intent of the project is to keep Wynoochee Valley Road passable during at least the 50-year event.

PROJECT BENEFITS AND POTENTIAL NEGATIVE IMPACTS

Wynoochee Valley Road would remain open during flood events, which would prevent needing to provide an alternate route to Highway 12. Water surface elevations may increase on the west side of Wynoochee Valley Road after the road has been elevated.

PROJECT CONSTRAINTS

No project constraints have been identified at this time.

HYDRAULIC MODEL:

Wynoochee River and the proposed project area are included in the Chehalis River hydraulic model. The flow modeled on the Wynoochee River is the flow corresponding the 100-year event on the Chehalis River and is not necessarily the same as the 100-year flow on the Wynoochee River.

ESTIMATED COST

Russ Esses, Grays Harbor County Engineer, has preliminarily estimated the cost of the proposed project to be \$150,000.

PROJECT COMPONENT	COST
Design	
Construction	
Property Acquisition	
Contingency	
Total	\$150,000

Source: Russ Esses, County Engineer