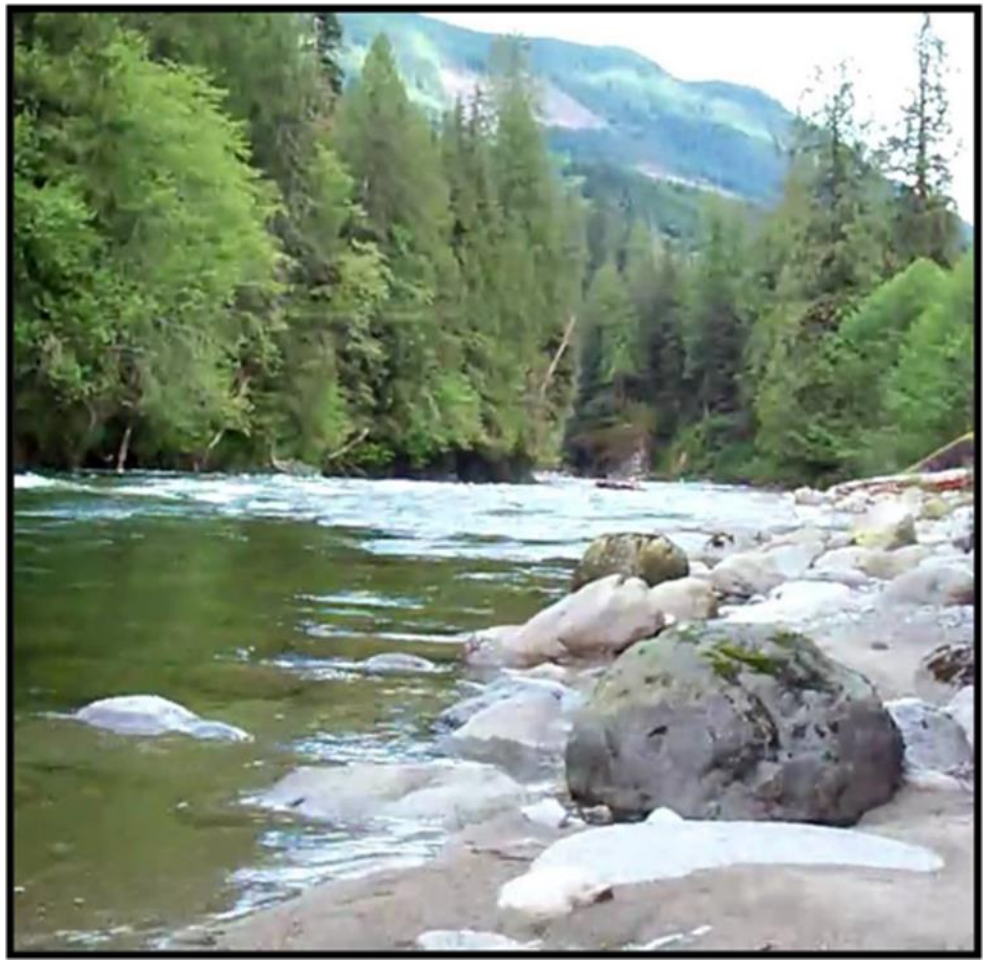
Flood Damage Reduction Project: Avoidance, Minimization and Mitigation

Chehalis River Basin Flood Control Zone District

November 4, 2020

NEPA/SEPA DEIS Impacts

- Impacts will occur during construction and operations
- Principal impacts to:
  - Water quality
  - Aquatic species and habitat
  - Terrestrial habitat
  - Cultural resources



NEPA/SEPA DEIS Impacts Avoidance, Minimization and Mitigation (AMM)

- District working to ***Avoid, Minimize and Mitigate*** impacts
- Response to Governor Inslee's request letter
- Efforts to date include:
  - Reviewing the project configuration – eliminating the bump-out at the airport, eliminating one of the quarry area candidates
  - Construction phase sequencing to avoid and minimize impacts, best management practices to control effects of construction activities
  - Avoiding burning of vegetation during reservoir preparation

NEPA/SEPA DEIS Impacts AMM

- Aquatic Species and Habitat Mitigation Opportunities Report – assess the availability of mitigation

Ongoing AMM Efforts

- **Aquatic Species/Habitat Mitigation**
  - Additional assessment to determine potential benefits by species/location and capacity to mitigate higher levels of impact
- **Slope Stabilization**
  - Additional review of existing geo-technical report to assess mitigation opportunities within temporary storage reservoir site
- **Rainbow Falls/Fisk Falls**
  - Review of operational procedures to assess linkage with aquatic and cultural impacts

Ongoing AMM Efforts

- Construction Phase Fish Passage

- Avoidance, Minimization, Mitigation Measures Project Database
  - Prepare a cross indexed list of all measures proposed by the District to the resources affected and impacts addressed

Minimizing Water Temperature Impacts

- SEPA/NEPA Draft EISs found that water temperature was likely to increase as a result of FRE operations
- Some temperature increases (not due to climate change) are related to management of vegetation in the FRE temporary reservoir area
  - DEIS's assumed all trees would be removed and minimal shading of streams would result within the FRE temporary reservoir area
  - Computer models predicted summertime water temperatures would increase to levels that would impact habitat suitability in the project area
  - Modeling assumptions about vegetation management were based on the conceptual vegetation management plan in the Programmatic EIS - 2017

Vegetation Management Plan Update

- District is updating the Vegetation Management Plan (November 2020)
- Objective – determine if an adaptive vegetation management approach will minimize temperature impacts
- Updated water quality modeling
  - Updated VMP to be input into model
  - Water quality changes forecasted and compared to DEIS results

Conceptual Vegetation Management Plan Update

Chehalis River Basin Flood Control Zone District

November 4, 2020

Overview

- Conceptual VMP includes 6 key elements:

1) More detailed mapping of vegetation communities in FRE temporary reservoir area

2) More detailed analysis of flood frequency, flow and inundation duration

3) Inundation mapping based on flood frequency and storage duration

4) Defining inundation zones (i.e., reservoir evacuation zones)

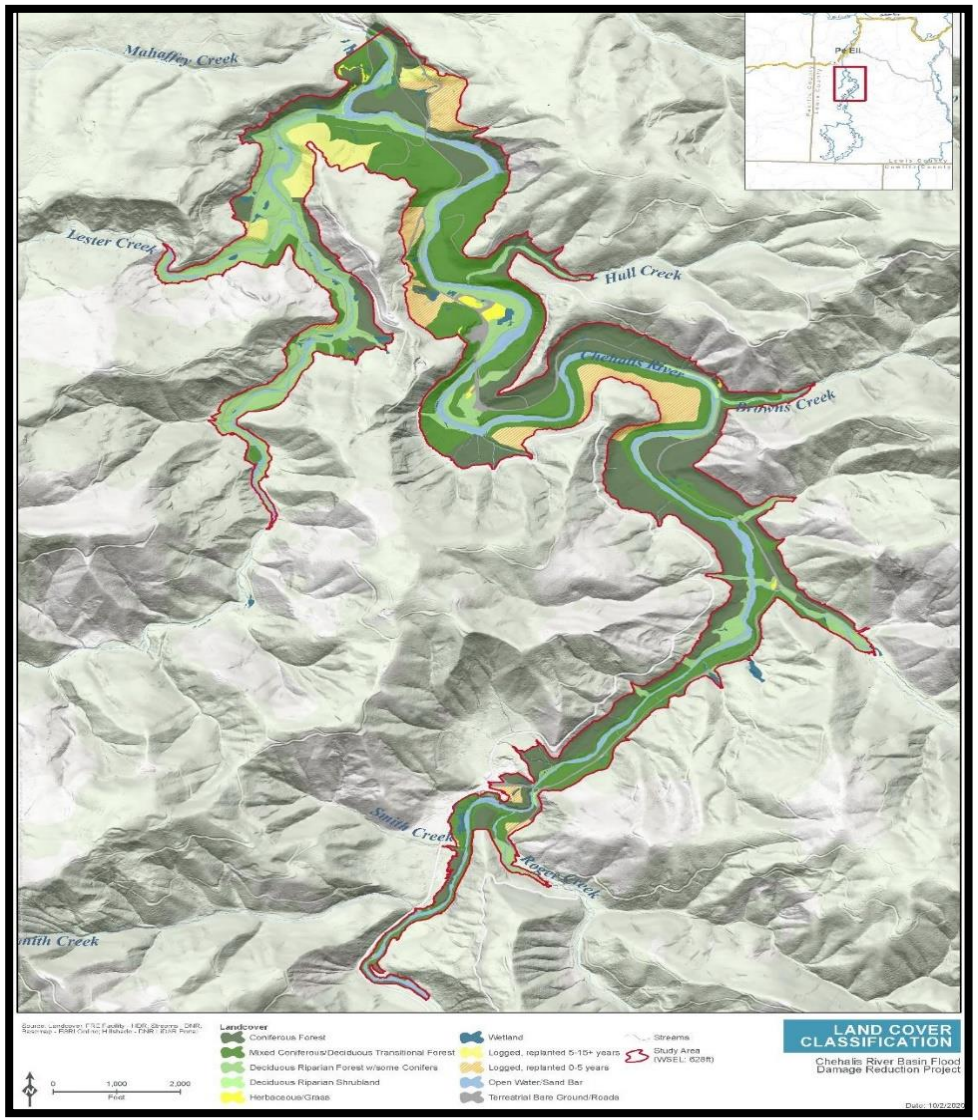
5) Overlay of proposed inundation zones on vegetation mapping to assess impacts to vegetation

6) Conceptual selective tree harvest and vegetation replanting plan during construction and operation, and adaptive management plan

Updated Vegetation Community Mapping

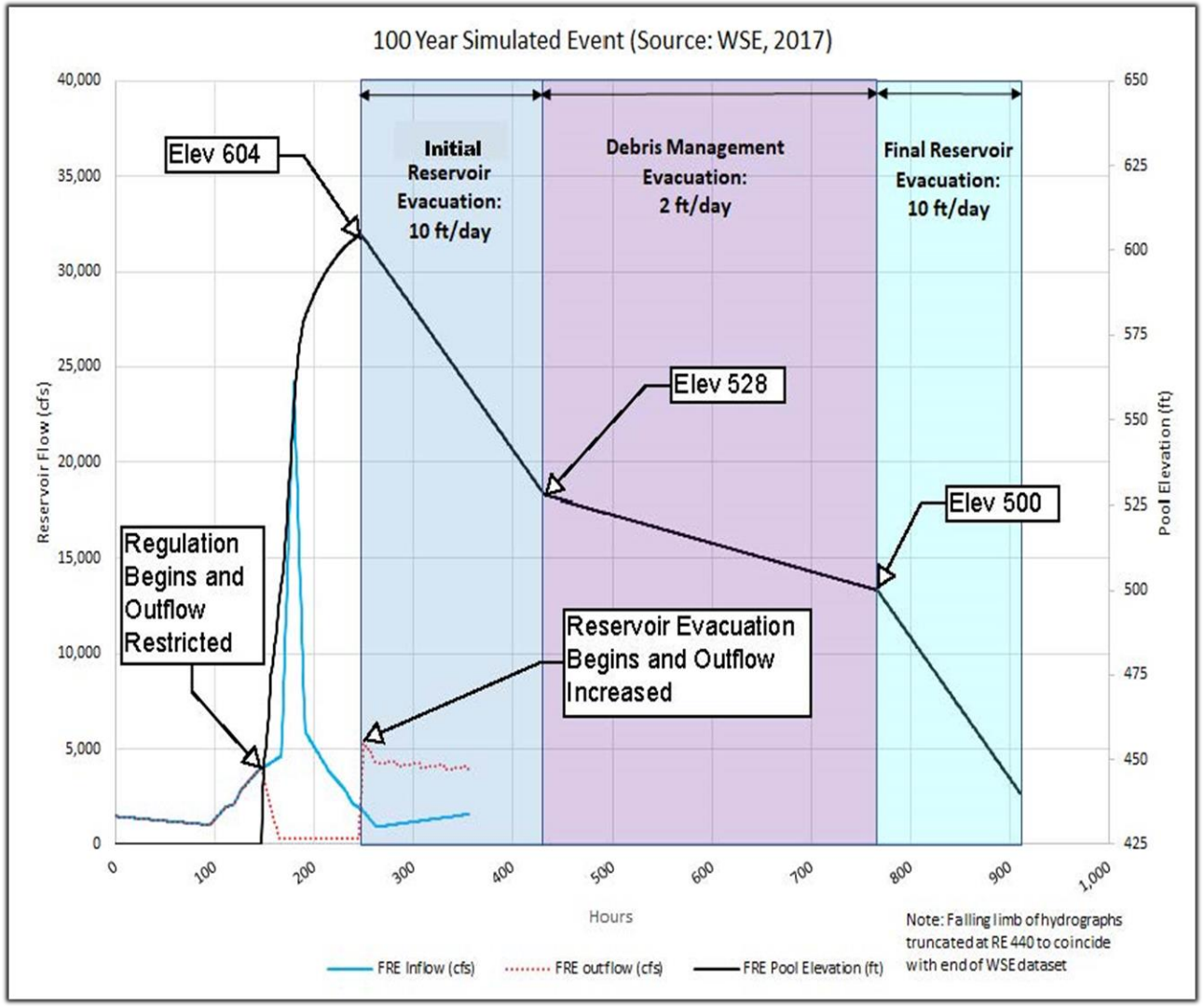
- Higher resolution mapping of vegetation within the FRE temporary reservoir area using publicly available geographic information system (GIS) data and aerial photography

- June 2020 site reconnaissance to refine vegetation mapping



Flood Frequency, Flow and Inundation Duration

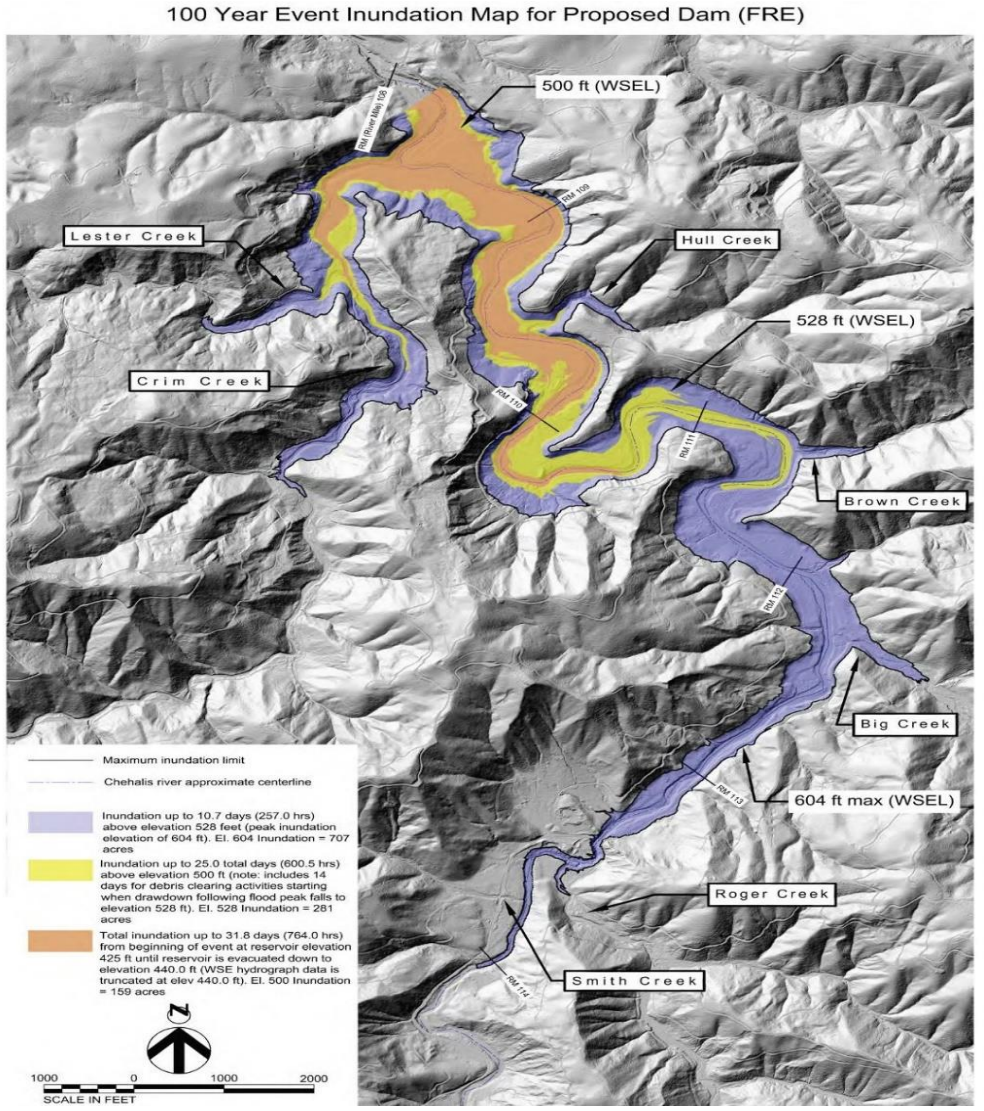
- Unregulated flood hydrographs from the SEPA EIS were obtained. Three stages of temporary reservoir evacuation were evaluated
- Maximum Water Surface Elevation (WSEL) that would occur after a major flood event and total inundation time were plotted for 10-year, 100-year, 1996, 2007, and 2009 flood events for each stage of evacuation
- 3 Reservoir Evacuation Zones defined – Initial, Debris Management and Final



Inundation Zone Mapping

- Topography data were obtained from Washington State Department of Natural Resource's light detection and ranging (LiDAR) program to generate contour lines in the temporary reservoir area

- Key WSEL's from the hydrographs were selected to show areal extent of inundation during each of the three stages of temporary reservoir evacuation

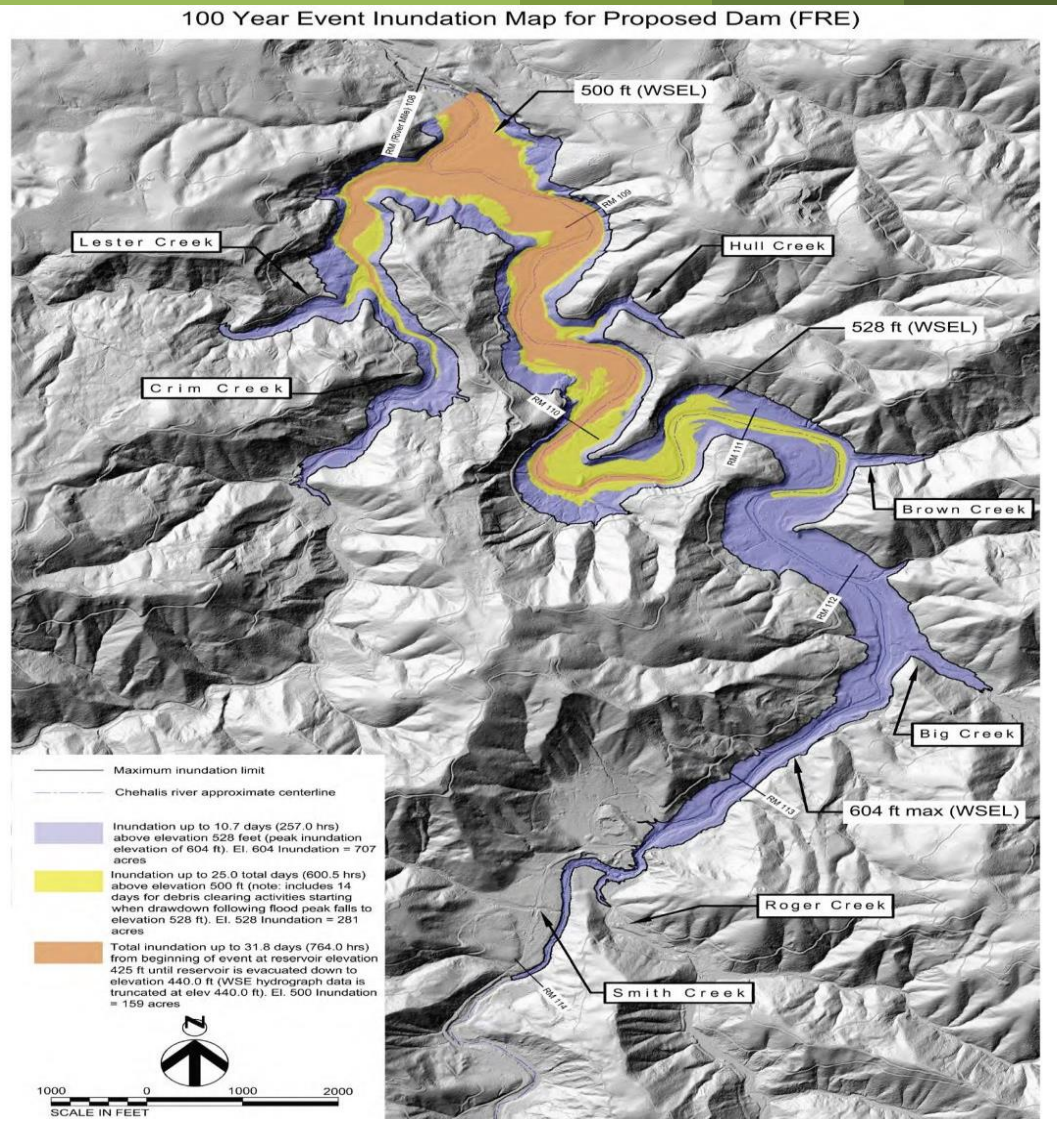


Vegetation Flood Tolerance Assessment

- **Initial Reservoir Evacuation Area** (blue): nearly all trees expected to survive (6-11 days inundation)

- **Debris Management Evacuation Area** (yellow): only highly flood tolerant species expected to survive (20-25 days inundation)

- **Final Reservoir Evacuation Area** (orange): no tree species expected to survive (26-32 days inundation)



Vegetation Management Approach

- Selective Tree Harvest/re-vegetation during construction to minimize loss of shading
  - Tree removal and re-vegetation optimized for each inundation zone
  - Inventory of replacement vegetation species based on inundation tolerance
  - Focus on shading along water courses
- Develop Adaptive Management Goals/Objectives to maintain shading
- Monitoring, vegetation replacement, and implementation of contingency measures in response to FRE facility operations

Candidate Revegetation Species

Revegetation Plan:

- Revegetate different inundation zones if goals and objectives are not being met
- Frequency, intensity, and extent of flood events over time will determine which areas need to be revegetated
- Conceptual plant palettes proposed based on evacuation area and analysis of flood tolerance of plant species currently found temporary reservoir footprint

Replanting Zone	Scientific Name	Common Name
Initial Reservoir Evacuation Area	Trees	
	Alnus rubra	Red alder
	Picea sitchensis	Sitka spruce
	Thuja plicata	Western red cedar
	Shrubs	
	Acer circinatum	Vine maple
	Oemleria cerasiformis	Indian plum
	Frangula purshiana	Cascara
	Rubus spectabilis	Salmonberry
	Sambucus racemosa	Red elderberry
	Symphoricarpos albus	Snowberry
Debris Management Evacuation Area	Trees	
	Fraxinus latifolia	Oregon ash
	Populus balsamifera	Black cottonwood
	Salix lasiandra	Pacific willow
	Shrubs	
	Cornus alba	Red-osier dogwood
	Lonicera involucrata	Twinberry
	Rubus spectabilis	Salmonberry
	Rosa nutkana	Nootka rose
	Rubus parviflorus	Thimbleberry
	Rubus spectabilis	Salmonberry
Final Reservoir Evacuation Area	Trees	
	Salix lasiandra	Pacific willow
	Shrubs	
	Cornus alba	Red-osier dogwood
	Salix exigua	Narrow-leaf willow
	Salix hookeriana	Hooker's willow
	Spiraea douglasii	Hardhack

Contingency Plan

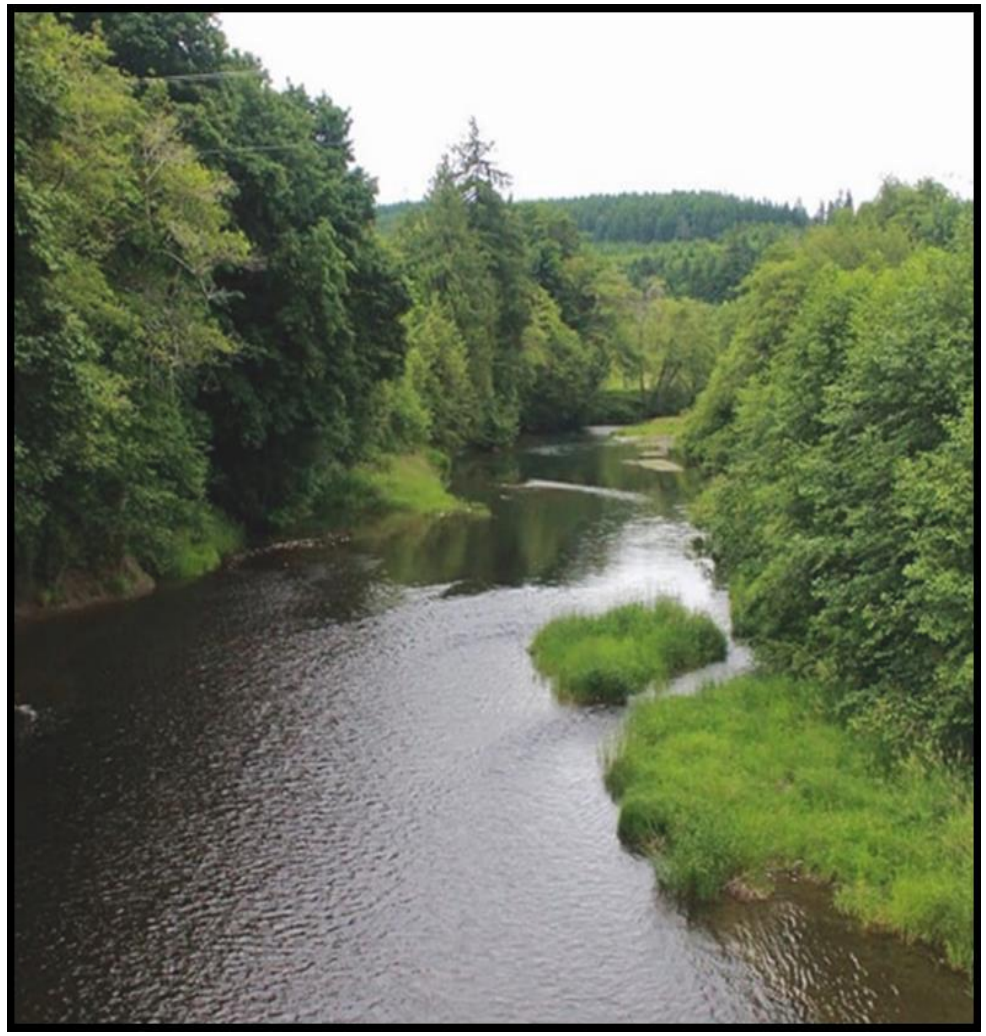
Contingency Plan:

- Flexible so that modifications can be made if portions of the adaptive management plan do not produce the desired results.
- Problems or potential problems and remedial actions will be evaluated by the FCZD and Interdisciplinary Team on an ongoing basis.

Resource/Issue	Contingency Action
Sites do not meet goals and objectives for scrub-shrub or forested cover	• Revegetate with appropriate woody plant species. • Re-evaluate the suitability of the plant species for site conditions. • Consider use of alternate species. • Undertake additional monitoring.
Over-competition by invasive species	• Identify/Evaluate predominant invasive species in the mitigation areas. • Initiate invasive species control protocols appropriate to species type, conditions of infestation area, and level of infestation (e.g., herbicide application, mowing).

Next Steps

- Provide briefings on plan development and contents to those who are interested
- Consult with Ecology, WDFW, DNR, USACE and Tribes regarding water quality modeling
- Conduct additional water quality model simulations that integrate vegetation composition scenarios based on the Conceptual VMP



Avoidance, Minimization and Mitigation Database

Table 1: Lewis County Flood Control Zone District proposed avoidance, minimization and mitigation measures for anticipated effects of the Chehalis Basin Flood Reduction Project on specific resources.

Resource Code	Type	Measures	Document Source
Construction-Related Measures[1]			
MaMu	General Construction BMP	Nesting habitat suitability surveys for marbled murrelets and timing restrictions for tree removal in or near suitable nesting habitat. • The FCZD will conduct pre-construction marbled murrelet nesting habitat suitability surveys in all forested areas proposed for tree removal, and within disturbance-based threshold distances from tree clearing activities (buffer distance = 328 feet for noise disturbance from tree clearing). This includes the FRE construction footprint, access roads (temporary and permanent), staging areas, quarry site development areas, Pe Ell water system corridor, debris removal yard, and temporary inundation areas to be cleared as proposed under the VMP.	BA Section 4.14.1
MaMu	General Construction BMP	If surveys identify any trees suitable for marbled murrelet nesting, these trees, and trees within 150 feet of suitable nest trees, would be removed outside of the marbled murrelet nesting season (i.e., no tree removal from April 1 to September 23).	BA Section 4.14.1
MaMu	General Construction BMP	Forested areas that are determined unsuitable for marbled murrelet nesting habitat would have no seasonal timing restriction for tree removal (i.e., tree removal may occur year-round). • Tree removal within 328 feet of suitable nesting trees + 150 foot buffer (i.e., 478 feet from suitable nest tree) would be subject to daily limiting operating procedures (LOPs) during the nesting season (April 1–September 23). LOPs would restrict tree removal activities within 478 feet of suitable nest trees to avoid sensitive diurnal periods: tree removal in these areas would not begin until 2 hours after sunrise, and would stop 2 hours before sunset.	BA Section 4.14.1

[1] Construction related measures will be included in bid-specifications in addition to all terms and conditions of permits received for the project, and will be requirements of the selected contractor.

Avoidance, Minimization and Mitigation Database

Resource Code	Type	Measures	Document Source
		• All captured and collected fish will be transported to the upstream end of the project area and released at a location sufficient for fish to recover and re-orientate to the stream environment (slow moving pool habitat).	
Fish Protection	Construction BMPs for the Protection of Fish	Screening of intakes - screens must have enough surface area to ensure that the velocity through the screen is less than 0.4 foot per second.	BA Section 4.14.4
Fish Protection	Construction BMPs for the Protection of Fish	Maintaining fish screen to prevent injury or entrapment of fish.	BA Section 4.14.4
Fish Protection	Construction BMPs for the Protection of Fish	During construction, the FCZD would require the Contractor to monitor the condition of the bypass tunnel to ensure passage is maintained and that the tunnel meets design passage criteria.	BA Section 19.4.1
Fish Protection	Blasting In and Adjacent to the Chehalis River or Bypass Tunnel	Additional attenuation measures such as the use of bubble curtains directly waterward of blast locations would be applied if future blasting plans (to be developed as part of the construction contract) determine that explosive charge sizes exceed those typical for trenching.	BA Section 4.14.5
Fish Protection	Blasting In and Adjacent to the Chehalis River or Bypass Tunnel	If buffer distances are not defined by the governing jurisdictions, buffer distances identified in industry standards and by other government entities will be considered and employed, such as the Alaska Department of Fish and Game's Blasting Standards for the Protection of Fish (1991) which recommends at 50-foot buffer distance for use of 1–2 pound explosive charges typically used for trenching excavation. Larger buffer distances may be required for larger explosive charges.	BA Section 4.14.5
Fish Protection	Blasting In and Adjacent to the Chehalis River or Bypass Tunnel	Charges shall be no larger than necessary to accomplish the task and shall be set in a manner (timing, frequency, location) such that instream concussion is minimized. Timing shall include microsecond delays to minimize impacts to fish.	BA Section 4.14.5
Fish Protection	Fish Passage Design Criteria	The FRE conduits fish passage design flows are based on guidelines for fish passage developed by NMFS (2011) and WDFW. NMFS requires the high fish passage design flow to be the mean daily streamflow that is exceeded 5 percent of the time during periods when target fish species are migrating. WDFW (2000) suggests a 10 percent exceedance flow be used as a high design flow. NMFS (2011) requires a low fish passage design flow equal to the mean daily streamflow that is exceeded 95 percent of the time during periods when migrating fish are typically present. WDFW recommends that a low flow be established based upon site-specific conditions.	BA Section 5.1.3