

# Chehalis River Basin Flood Control Zone District

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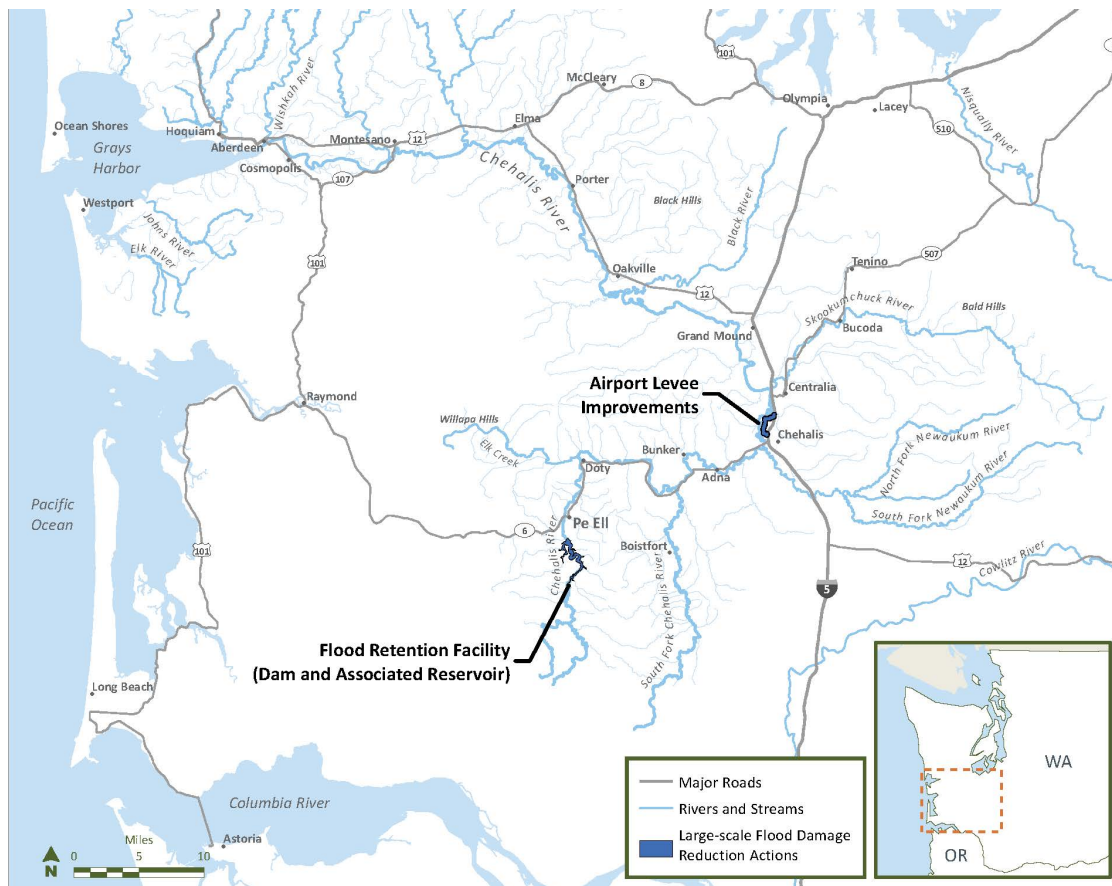
## Chehalis River Basin Flood Damage Reduction Project

### Project Description

Occasional catastrophic flood damage from the Chehalis River devastates homes, farms, businesses, churches, and schools. It also freezes transportation in much of Southwest Washington when I-5 and Highways 6 and 12 are closed.

The Chehalis River Basin Flood Control Zone District (FCZD) is proposing to construct a flood retention facility, or dam, near Pe Ell, Washington, and levee improvements around the Centralia-Chehalis Airport in Chehalis, Washington, to reduce flood damage during a major or catastrophic flood (see Figure 1, Vicinity Map below). This document provides a description of FCZD's proposal to inform the public scoping process for the separate federal and state Environmental Impact Statements.

**Figure 1**  
**Vicinity Map**



The proposed facilities are intended to substantially reduce damages during a major or catastrophic flood. The amount of flood risk reduction will vary throughout the basin. Previous studies and research have predicted that the project will:

1. Reduce of the closure due to overtopping of Interstate 5 freeway to 24 hours or less during a 100-year flood event.
2. Reduce damage from major flooding along the Chehalis River main stem. Hydraulic analysis shows that 100-year flood peak levels will be lowered by 10 feet or more at the Doty gauge, and by 1 foot or more at the Mellen Street gauge in Centralia. This level of reduction in flood levels translates to a substantial decrease in the severity of flooding on more than 4,000 acres as well as substantial relief from the more than \$900 million of economic impacts estimated to occur during a major flood event.
3. Provide future leaders in the Chehalis Basin the flexibility to address additional increases in peak flood levels and decreases in stream flow during summer months through an adaptable design approach.

The project would have significant reductions to flood risk, however it will not protect communities from all flooding, nor is it designed to stop regular, small-scale annual flooding from the Chehalis River. Flood protection provided by the facilities would not result in immediate changes to Federal Emergency Management Agency (FEMA) flood hazard mapping; however, FEMA mapping updates would continue to occur. This large scale flood project is also not intended to supplant the need for smaller local flooding projects, such as flood proofing or farm pads. Projects constructed within the existing floodplain will continue to follow floodplain development regulations.

The temporary reservoir associated with the dam would be present only during major flooding. The water in the reservoir would be released as soon as it is safe to do so after the flood event, and is therefore considered to be temporary. At all other times, the river will flow through the dam's low level outlet works at its normal rate of flow and volume and allow fish passage both upstream and downstream. This system will achieve dual goals of flood damage reduction benefit while having minimal, if any, impacts on normal streamflow in the Chehalis River.

A "major flood" along the Chehalis River is the level at which flooding in Lewis County results in road closures and floodwaters encroach on some homes and businesses. In addition, major flooding in Thurston County results in the inundation of farmlands and roads, including U.S. 12. The threshold for a major flood is defined as 38,800 cubic feet per second (cfs) at the Grand Mound gage located along the Chehalis River in Thurston County. This flood has about a 15% probability of occurrence in any year (or a 7-year recurrence interval). Major floods include events greater than 38,800 cfs with a lower frequency of occurrence such as 10-year, 100-year, and 500-year floods (10%, 1%, and 0.02% probability of occurrence in any year).

The type of dam that has been selected for EIS analysis is known as a Flood Retention Expandable (FRE) facility, which consists of a dam with a temporary reservoir. The FRE dam would temporarily retain water in the event a major flood as previously described. The river would flow normally during regular conditions or in smaller floods. The dam would only transition to flood retention operations during a major flood. Specific flow release operations would depend on inflow and the need to hold water to relieve downstream flooding as flood waters recede.

The FRE dam is considered to be expandable because it is proposed to be built with a foundation and hydraulic structure capable of supporting future construction of a larger dam with up to 130,000 acre feet of storage. This project, which may or may not occur, would be subject to a separate NEPA and SEPA process and permitting if pursued in the future.

Conceptual FRE plan views and cross-section views are provided in Figures 2 through 4.

**Figure 2**  
**FRE Site Plan View**

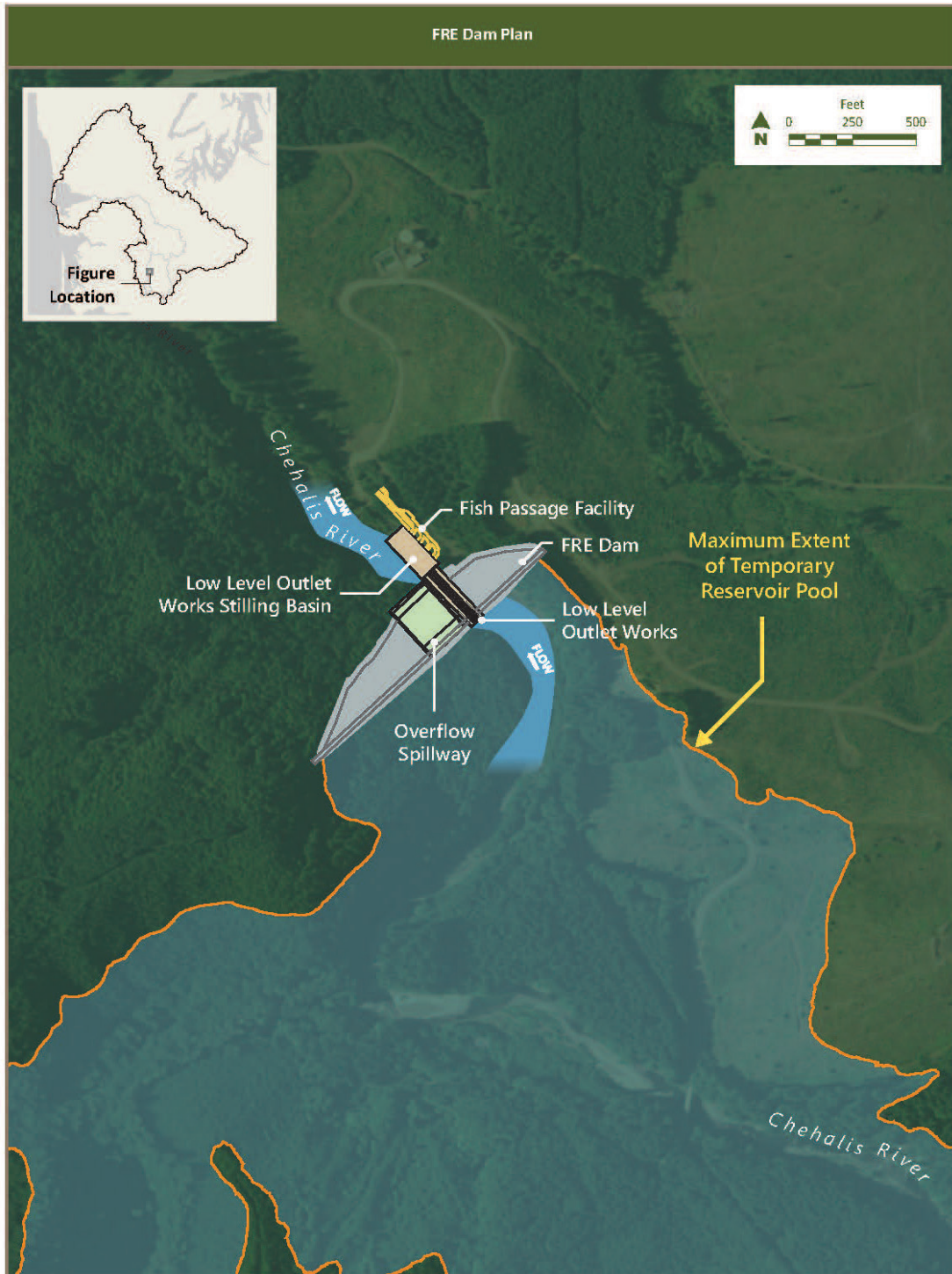
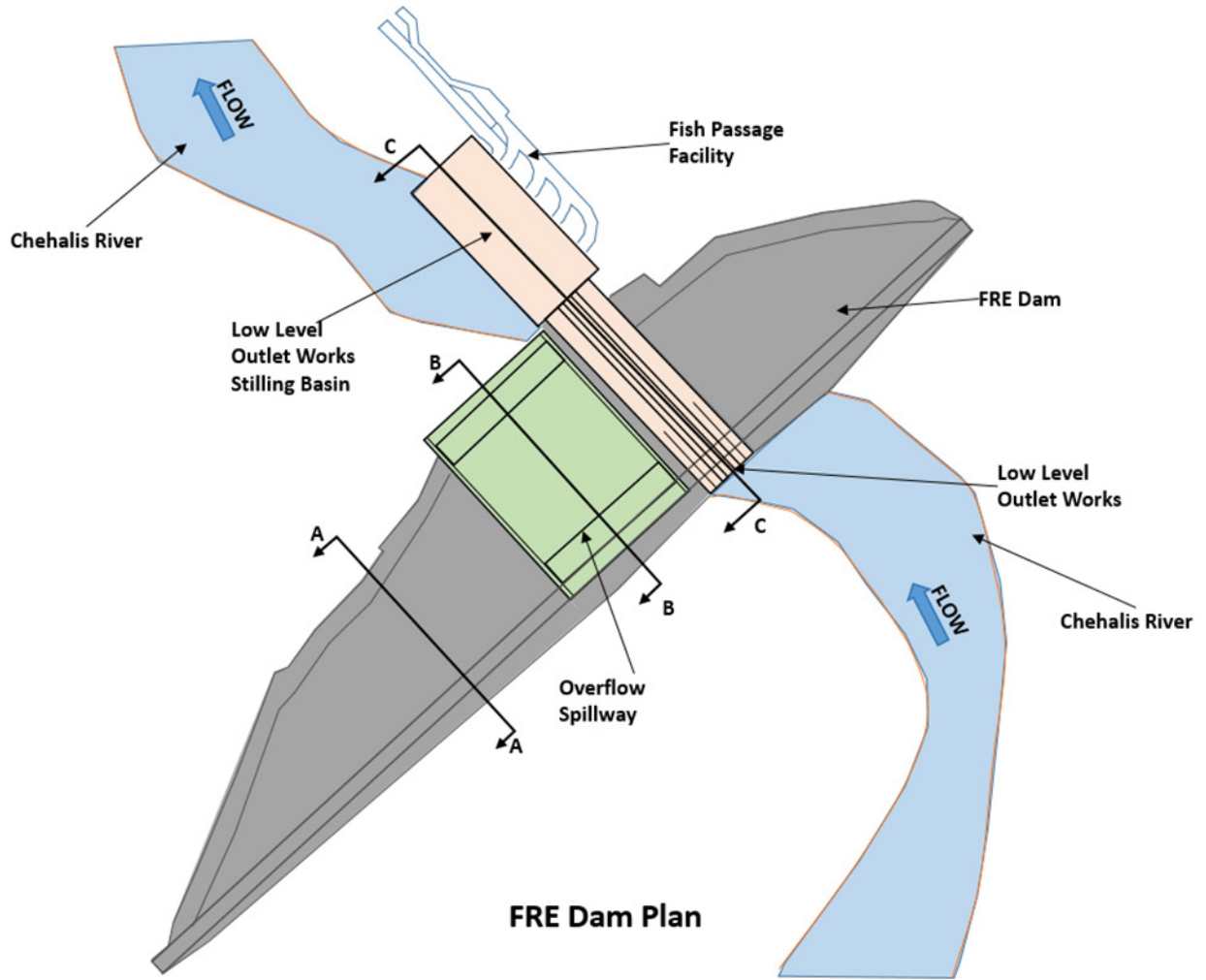
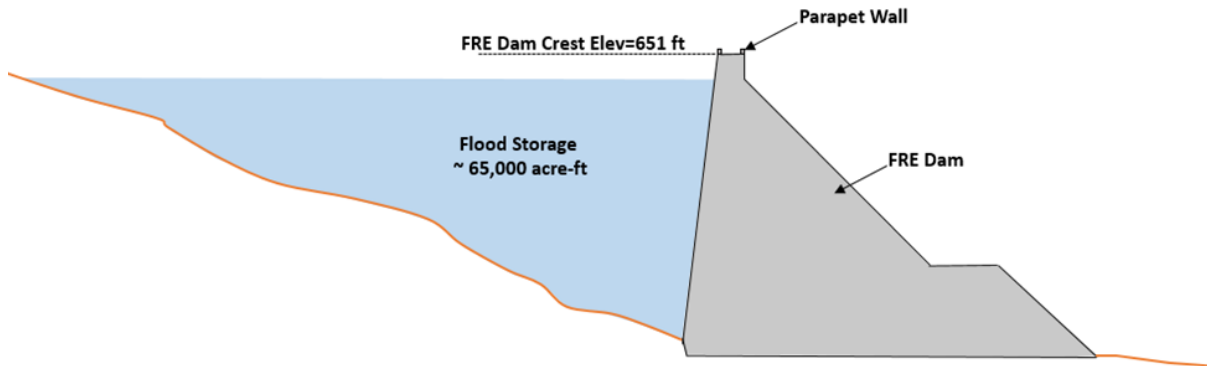


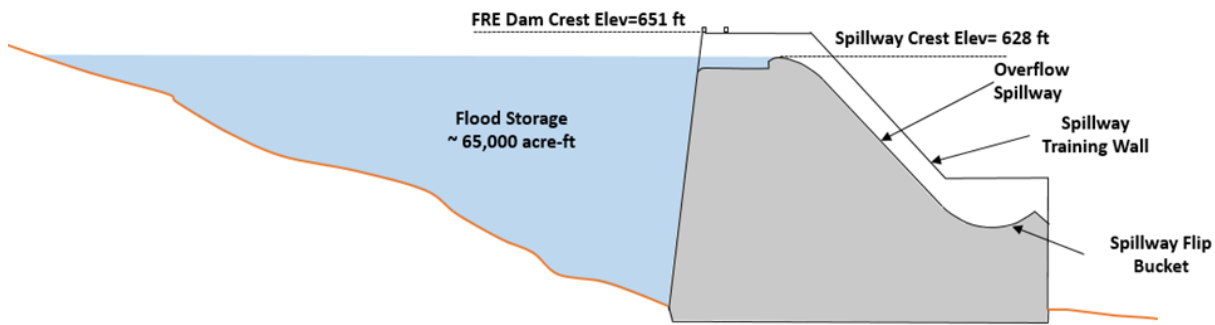
Figure 3  
FRE Dam Plan View



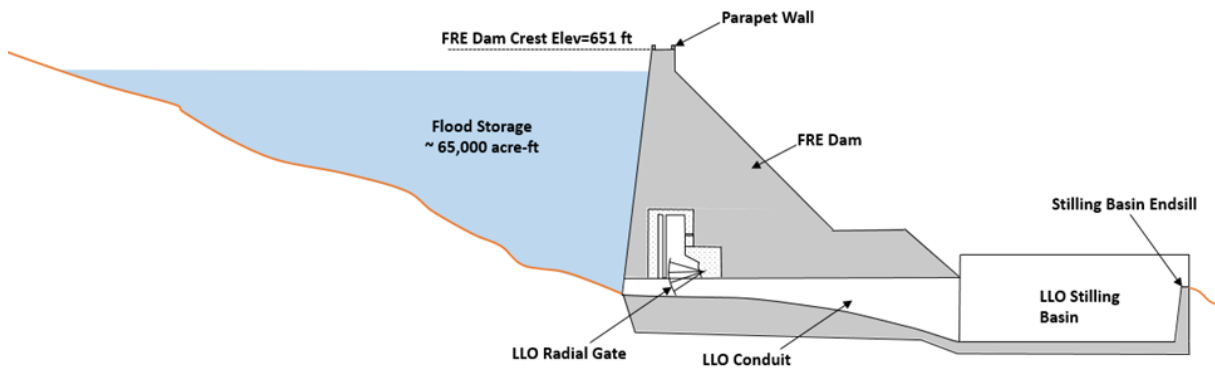
**Figure 4**  
**FRE Section Views**



**Section A-A**  
**FRE Dam Non-Overflow Section**



**Section B-B**  
**FRE Dam Overflow Spillway**



**Section C-C**  
**FRE Dam Low Level Outlet Works (LLO)**

The dam is not intended to result in any residential or community development at or around the reservoir. Creation of a temporary reservoir is not intended to encourage development because it would be contrary to the Chehalis Basin Strategy objectives of reducing flood damage to properties, minimizing threats to human safety from floods, and protecting and restoring aquatic species habitat.

## **Construction Considerations**

A summary of construction and operational considerations for the FRE is described below. For more information, refer to the Combined Dam and Fish Passage Design Conceptual Report (July 2017) and Supplemental Design Report for the FRE Dam Alternative (September 2018) available at <http://chehalisbasinstrategy.com/publications/>.

## **Infrastructure**

Construction activities would necessitate a detour or bypass road for Forest Road (FR) 1000, which is a main access road for Weyerhaeuser forestry operations. The FR 1000 bypass or detour would also be needed during flood conditions when the dam is in operation and FR 1000 is inundated. Up to 6 miles of FR 1000 would be inundated and unavailable during major peak flood retention, at which time a detour could be used consisting of FR A-line, FR F line, and FR 2000 to rejoin FR 1000 upstream of the reservoir.

Construction of the FRE dam would include development of a quarry site, material storage, material processing, and areas for construction offices and equipment storage. Concrete aggregate could be mined within the FRE facility site or nearby, depending on aggregate availability and a concrete batch plant would be located nearby to produce concrete. Three potential quarry sites have been identified; the most promising is within the reservoir inundation area approximately 2 miles from the potential dam location and accessed from Forest Road (FR) 1000. Material from the quarry site would be crushed and processed for use in the dam and other structures. A concrete production facility would include both roller compacted concrete (RCC) and conventional concrete production. It would be located above and northeast of the dam. The location was chosen based on access for transport of materials to the site and to allow efficient transport of the RCC to the dam. The site would include the following:

- RCC batch plant
- Conventional concrete batch plant
- Aggregate crushing and screening
- Aggregate storage
- Fly ash storage

The dam would be constructed with roller-compacted concrete, which is more cost-effective than other types of construction methods, and would be designed to retain a flow volume similar to the 2007 flood. A new power line would be needed for the construction and operation of the dam to power pumps, gates, instruments, and other controls. The alignment for new power lines would be selected to avoid

and minimize impacts, including using existing local transmission lines and locating the line along areas cleared for dam construction.

### ***Temporary Construction Flow Diversion and Fish Passage***

A 20-foot modified horseshoe-shaped tunnel would carry water past the construction site. An upstream cofferdam would direct upstream water into the diversion tunnel. A much smaller downstream cofferdam would be constructed to protect the construction area for the stilling basin and fish collection channel.

The temporary diversion tunnel would accommodate fish passage during construction of the dam, and permanent fish passage facilities would be constructed and operated with the dam. Fish passage facility designs are currently conceptual in nature. The most conservative guidance for fish passage and protection was followed, and the following documents provided the engineering design guidelines used during conceptual design:

- *Anadromous Salmonid Passage Facility Design* (NMFS 2011)
- *Best Management Practices to Minimize Adverse Effects to Pacific Lamprey* (*Entosphenus tridentatus*; USFWS 2010)
- *Draft Fish Protection Screen Guidelines for Washington State* (Nordlund and Bates 2000)
- *Draft Fishway Guidelines for Washington State* (WDFW 2000)
- *Water Crossing Design Guidelines* (Barnard 2013)

### ***Vegetation Management***

In addition to removal of vegetation for the dam structure, tree clearing and vegetation removal would occur within the reservoir area; details have been provided in a Pre-construction Vegetation Management Plan (Appendix J to the Programmatic EIS). Goals of the Pre-construction Vegetation Management Plan include reducing the extent of tree clearing and vegetation removal in the reservoir footprint and reducing the amount of woody material that would accumulate in the reservoir during a flood. The FCZD is working to improve the Vegetation Management Plan to address the long-term vegetation management as part of the maintenance and operation of the dam. It is expected that a very conservative approach will be studied as part of the Project EIS, and the final Plan will have fewer impacts than what is being currently assumed.

### ***Permanent Structure***

The top of the dam structure would be 1,220 feet long. The maximum structural height of the dam is estimated to be up to 254 feet, including 3 to 5 feet of freeboard as a factor of safety. The dam includes a 210-foot-wide emergency spillway, which would discharge into a 70-foot-wide and 230-foot-long stilling basin. The stilling basin would allow for containment and control of all flows over the emergency spillway. The spillway crest elevation (628 feet) would be above the maximum estimated reservoir flood



pool elevation for a 100-year flood. The spillway is expected to be used very rarely, and for events of very short duration. A flip bucket would be constructed to launch the spillway flow a safe distance downstream of the dam and to dissipate the energy in the river channel. Upstream of the dam, an anchored log boom would help contain large woody material (LWM). At the dam, steel bar racks would protect the river opening entrances from LWM that could not pass through the low-level outlet works downstream.

Table 1 provides a summary of the potential changes to surface water quantity at and above the dam, and the inundation extent is provided on Figure 5.

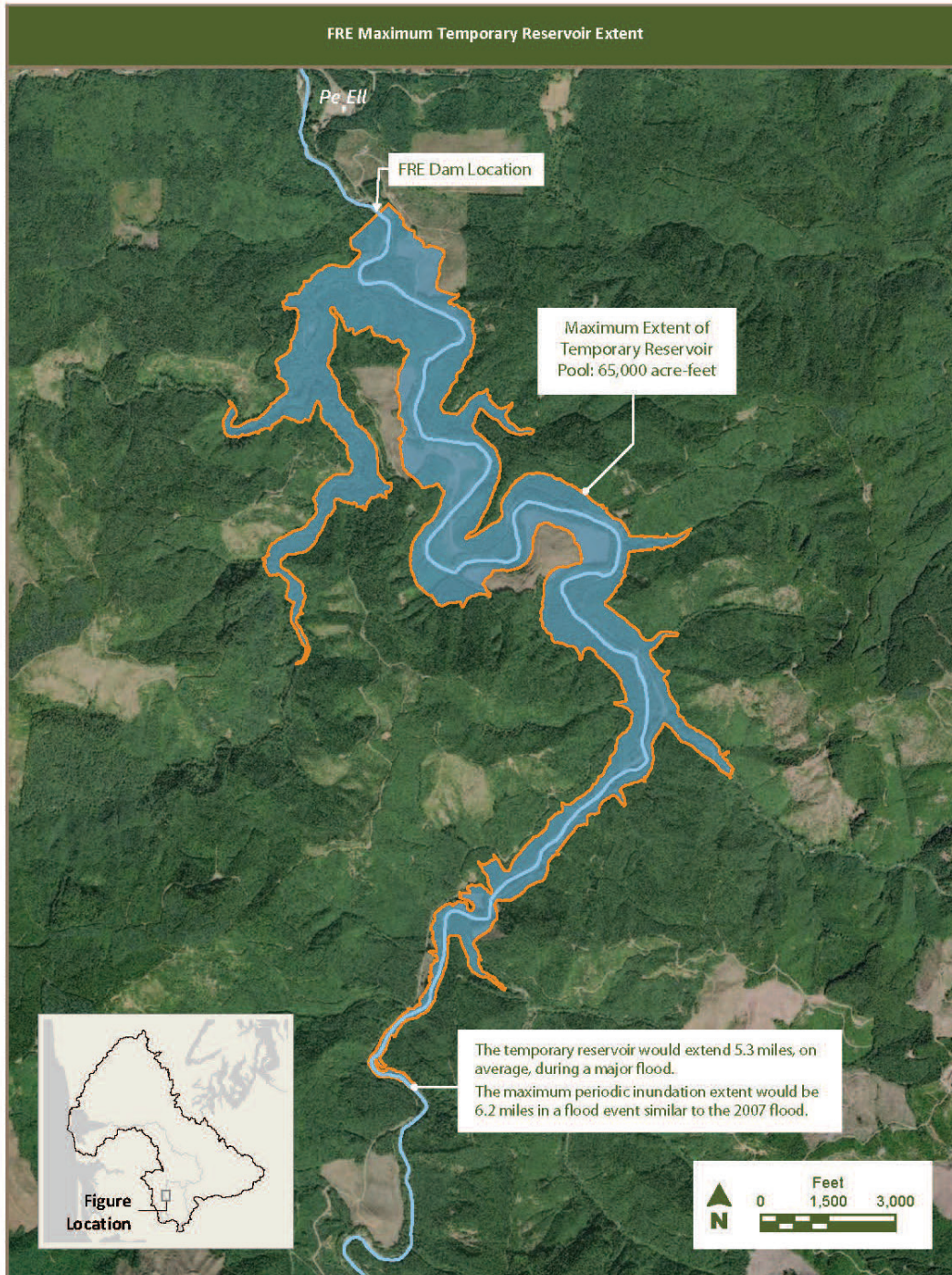
**Table 1**  
**FRE Temporary Reservoir Conditions for Surface Water Quantity**

CONDITIONS	DURING FLOOD OPERATIONS <sup>1</sup>	MAXIMUM PERIODIC OPERATIONS <sup>2</sup>	COMMENT
Reservoir permanency	Reservoir inundation upstream of the FRE dam would be temporary (up to 32 days)	Up to 32 days	
Inundation extent	Temporary reservoir would extend 5.3 miles, on average	6.2 miles	
Inundated area	188 acres (median)	778 acres	
Reservoir elevation	513 feet (median)	620 feet	Elevation of the river bed at the proposed dam site is 420 feet
Maximum design reservoir elevation	628 feet		Design reservoir elevation is defined as the invert of the spillway
Reservoir depth	88 feet	195 feet	
Maximum design reservoir depth	203 feet		
Capacity	65,000 acre-feet		Capacity is defined as from the base of the dam to the invert of the spillway

1. Major is any time flood retention occurs. That threshold is measured at Grand Mound and corresponds to emergency management declarations. "Major Flood" has flow of 38,800 cfs at Grand Mound

2. To account for a flood similar to the 2007 flood

**Figure 5**  
**FRE Reservoir Extent**



## **Permanent Fish Passage**

Fish passage would be provided primarily through five openings installed along the river bottom at the base of the dam. During construction, a river bypass tunnel would be constructed for use until the dam openings are operational. The dam outlet openings would be 230 feet in length. They are anticipated to replicate the stream discharge and velocity rating curves exhibited by the natural channel at the dam site (through which fish currently pass without the dam), up through river discharges of 4,000 cfs.

The primary means of upstream and downstream fish passage at the dam is via the low-level outlet openings. However, when water is impounded behind the dam during high-flow events, the low-level outlet would be closed. Fish passage would be provided via a collection, handling, transport, and release (CHTR) facility during the high-flow, short-term periods of time when the dam outlets are closed. The CHTR facility is also commonly referred to as a trap-and-haul facility. The CHTR would be operated as needed, which is anticipated to be approximately 30 days after a major flood event, while the reservoir is being drawn down. The CHTR would consist of a short fish ladder, a fish lift, holding galleries, sorting stations, and transportation via trucks to release sites upstream of the reservoir. A detailed description of the need, research, methods, and physical design can be found in the CHTR Preliminary Design Report, available at <http://chehalisbasinstrategy.com/publications/>.

## **Location**

The proposed dam would be located on Weyerhaeuser and Panesko Tree Farm property, south of State Route (SR) 6 in Lewis County, on the main-stem Chehalis River at approximate River Mile 108, about 1 mile south of (upstream of) the Town of Pe Ell. The legal description of the property is: Section 03 Township 12N Range 05W Gov Lot 13 Pt Gov Lot 14 W2 SW & SE SW EX RD, and the parcel number is 016392004000.

Property acquisition within the dam and reservoir footprint would be required, and the land would no longer be managed as commercial forestland.

The watershed area upstream of the dam is 68.9 square miles.

## **Project Description – Airport Levee Improvements**

The Airport Levee Improvements include raising the existing levee around the Centralia-Chehalis Airport as well as a portion of Airport Road, to provide protection from 100-year flood levels for the Chehalis-Centralia Airport, local businesses, and a portion of I-5 (see Figure 6). This would elevate the height of the existing 9,511-foot-long levee by 4 to 7 feet. The existing levee would be raised by adding earthen materials or floodwalls on top. There is no proposed change to the extent or location of the levee unless it is raised by 7 feet. This would affect the northwest corner of the levee and could require “bumping” the levee out to avoid interference with the flight path of the airport runway.



In addition to the levee, 1,700 feet of Airport Road would be raised to meet the airport levee height along the southern extent of the airport. All utility infrastructure would be replaced, and the West Street over-cross approach would be terminated. Overall, these improvements result in up to 11,211 lineal feet of protective levee.

The legal description of the property is: Section 30 Township 14N Range 02W -- PT SEC 19 & 30 BTWN HWY, ST HELENS AVE. The parcel number is 005605080001.

**Figure 6**  
**Airport Levee**



## References

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