



# Technical Memorandum

Date: April 24, 2024

Project: Chehalis River Basin Flood Damage Reduction Project

To: Chehalis Basin Flood Control Zone District

From: HDR Engineering, Inc.

Subject: **FRE Hydraulic Design Assumptions - Additional Information**

## 1.0 Background

As a part of recommended measures to reduce damage to communities of the Chehalis River Basin during major flood events, identified as part of the Chehalis River Basin Flood Damage Reduction Project, the Chehalis Basin Flood Control Zone District is proposing a Flood Retention Expandable (FRE) structure located on the Chehalis River, south of the town of Pe Ell, Washington (WA).

## 2.0 Purpose

A key element of the Proposed Project was the set of hydraulic assumptions for the proposed FRE structure used to determine the structure's foundation and cross-sectional design. This Technical Memorandum clarifies some of the hydraulic design assumptions for the Proposed Project FRE structure.

During the programmatic development phase of the project, Flood Retention Only and Flood Retention – Flow Augmentation alternatives were developed (HDR 2017). The proposed FRE was developed out of these alternatives such that the proposed FRE replaced the Flood Retention Only alternative but added that the structure would not preclude future expansion. Therefore, so as not to preclude future expansion, the hydraulic design criteria and other design criteria for the FRE incorporated design criteria for the Flood Retention – Flow Augmentation alternative.

The proposed option referred to as the FRE-FC (Future Construction) has been used to describe the design criteria, matching that of the Flood Retention – Flow Augmentation alternative, required for the FRE to not preclude future expansion. The FRE design does not preclude expansion that would incorporate a permanent storage pool and provide downstream flow augmentation capabilities to enhance river flows and conditions for maintenance and/or recovery of fisheries in the Chehalis River.



As stated, the proposed FRE structure is being designed to not preclude expansion should it be proposed in the future. The parameters incorporated into the FRE design that are intended to not preclude future expansion are the following (also depicted in Figure 1):

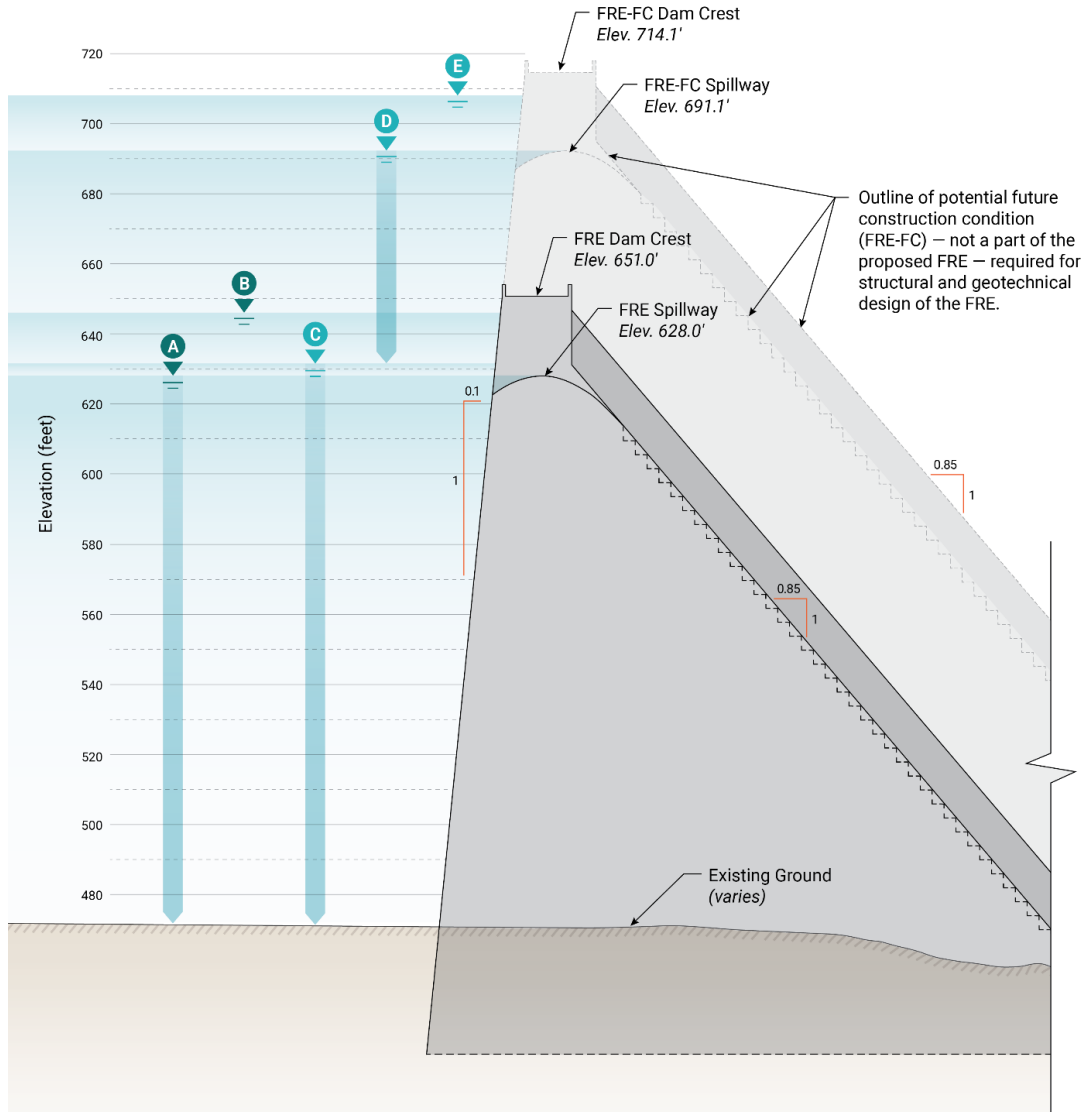
- Flood storage volume: .....Minimum 65,000 acre-feet
- Maximum flow augmentation reservoir elevation: ..... 631.5 feet (msl – NAVD88\*)  
\* msl - NAVD88 = mean seal level, North American Vertical Datum of 1988
- Minimum flow augmentation reservoir elevation: .....588 feet msl (585 feet msl with climate change scenario)
- Water storage volume:.....Up to 65,000 acre-feet
- Flood regulation storage volume\*\*: .....Up to 65,000 acre-feet

\*\*The flood regulation storage volume is the equivalent flood volume of the December 2007 flood event of record (Anchor QEA 2014)

- Total storage volume to spillway crest: .....Up to 130,000 acre-feet
- Spillway crest elevation: ..... 691.1 feet (msl - NAVD88)
- Spillway capacity: ..... PMF (69,800 cfs peak inflow)
- Probable Maximum Flood (PMF) peak reservoir elevation:..... 706.4 feet (msl - NAVD88)
- Dam crest elevation: ..... 714.1 feet (msl - NAVD88)
- PMF freeboard (top of parapet wall): ..... 717.6 feet (msl - NAVD88)
- Low-level flood regulation sluices: .....7,400 cfs design flow
- Low-level reservoir evacuation conduit: .....5,000 cfs design flow

Figure 1. Hydraulic Design Criteria for FRE and FRE-FC Typical Section

WATER LEVELS			
POINT	ELEVATION	STRUCTURE	SIGNIFICANCE
A	628.0'	FRE	Flood Storage: ~62,000 Acre-feet
B	643.3'	FRE	PMF Pool
C	631.5'	FRE-FC	Permanent Storage: 65,000 Acre-feet
D	691.1'	FRE-FC	Flood Storage: 65,000 Acre-feet
E	706.4'	FRE-FC	PMF Pool





### **3.0 References**

HDR Engineering, Inc. (HDR)

2017 Combined Dam and Fish Passage Conceptual Design Report. June 2017.

### **4.0 Acronyms/Abbreviations**

FRE	Flood Retention Expandable (FRE)
FRE-FC	Flood Retention Expandable – Future Condition
HDR	HDR Engineering, Inc.
msl	mean surface level
NAVD88	North American Vertical Datum of 1988
PMF	Probable Maximum Flood