Chehalis River Basin Flood Control Zone District

Erik P. Martin, P.E., District Administrator

2025 NE Kresky Ave
Chehalis, WA 98532-1900

November 30, 2018

United States Army Corps of Engineers, Seattle District Regulatory Branch
Attn: Bob Thomas and Janelle Leeson
PO Box 3755, Seattle, WA 98124-3755

RE: Chehalis River Basin Water Retention Facility - Project Purpose and Need Clarification

Mr. Thomas and Ms. Leeson:

This letter is written in response to the letter received by the Flood Control Zone District (District) on November 5th, 2018. It is our understanding that the Army Corps of Engineers is requesting clarification on the project Purpose and Need, specifically relating to 1) the rational for the selection of the targeted geographic area of Pe Ell and Centralia relative to other areas within the Chehalis River Basin; and 2) the rationale for choosing the specific stream gage metrics and location for flood elevation reduction relative to other gauges within the Chehalis River Basin.

We stated in the Purpose and Need Letter that the objective of the flood retention project is to reduce peak flood levels during a 100-year flood or greater from Pe Ell to Centralia for the protection of families, communities, schools, businesses, churches, farms, industry, and major federal, state, and local infrastructure. This goal is in line with the goal of the Chehalis Basin Strategy to significantly reduce flood damages across a larger geographic area. The Dam plays a part in the Strategy by reducing severity and duration from periodic catastrophic flooding triggered by rainfall emanating from the Willapa Hills, but it is not intended to address flooding in all parts of the basin or tributaries. No single project can achieve that effect, which is why this project has been developed as a cohesive element in a basin wide approach that will utilize other projects to fully address the Chehalis River flooding problem.

The project has a long history, and many decisions have been informed by the various studies and reports evaluating hydrology, hydraulics, geology, environment, economics, and more. In an attempt to summarize the abundance of information, we have extracted pertinent conclusions and added abbreviated supporting quotations from these previous works that have helped form the foundation of the project selections. These studies are also listed at the end of the letter for further reference.

The rationale for the selection of the targeted geographic area of Pe Ell and Centralia relative to other areas within the Chehalis River Basin.

Centralia was selected as a particular area of interest because:

1. The Upper Chehalis floodplain has a history of catastrophic floods (Pe Ell to Centralia). The annual peak flow record at the Chehalis River gage near Doty indicates that significant floods (greater than

20,000 cfs) occurred in January 1972, January 1990, November 1990, February 1996, December 2007, and January 2009.

In the past 60 years, major floods occurred eight separate times starting in 1972, with flood levels and flood damage in the Chehalis Basin increasing. The 1996, 2007, and 2009 floods are the three largest floods on record. The 2007 and 2009 floods occurred only 13 months apart, with minimal opportunity to restore the area between floods.
Peak annual flows from the 1996, 2007, and 2009 floods rank in the top five at stream gages at the Chehalis River near Grand Mound, the Newaukum River near Chehalis, and the South Fork Chehalis River. These extreme floods caused the losses of homes, farms, and businesses, and floodwater inundation resulted in the closure of Interstate 5 (I-5) for several days. The majority of the flood damage occurred in the cities of Chehalis and Centralia where there is more intensive development in the floodplain (PEIS 1.2 pg 4-5)

2. Centralia is centered around Interstate 5. I-5 is of statewide importance as it connects Portland to Seattle and is particularly vulnerable in the Centralia area. In the 1996, 2007, and 2009 floods, the interstate was underwater near the Centralia area, halting commerce, delaying emergency response, and provided a major barrier for travelers.

   The flooding of I-5 is a national, regional, and local issue because the roadway is a major corridor for the movement of people and goods, as well as a primary route for local trips. Flooding in the Chehalis Basin has affected access to I-5, closing it for 4 days in 1996 and 2007, and 2 days in 2009 (WSDOT 2014). WSDOT estimated the total cost of freight delays along I-5 in 2007 in the tens of millions of dollars (Ruckelshaus Center 2012). This amount includes estimates for freight-related business losses and associated reductions in economic output, as well as an estimate of state-wide economic impact, such as employment, personal income, and sales tax receipts. It does not include local economic impacts, impacts due to passenger vehicle delay, BNSF rail closures, or roadway maintenance and repair. WSDOT also modeled the costs of I-5 closure that would occur with a modeled 100-year flood (WSDOT 2014). The predicted costs for a 5-day closure of I-5 are more than $11 million, including costs of additional time and mileage for those who travel on detour routes." (PEIS 3.1.3.1 pg 217)

3. Centralia is in close proximity to Chehalis with a combined population of 23,595 people. Together, the cities constitute one of the highest populations in the Chehalis Basin and consequently, represent one of the highest risk areas to life and property due to flooding. Critical life and safety facilities are located in the metro center, serving the surrounding small towns and rural region.

   The Chehalis-Centralia area has the highest concentration of residential and commercial structures in the Chehalis River floodplain and sustains the most damage during a major flood. (PEIS 3.1.2.2 pg 85)

   Roads in the cities of Centralia and Chehalis (Twin Cities) have experienced some of the most substantial flooding and flood damage in the Chehalis Basin. The Chehalis-Centralia Twin City Town Center has been inundated by floodwaters. At the height of the December 2007 storm, 20

square blocks near downtown Centralia were flooded, with resulting access limitations. (PEIS 3.13.2.1 pg 219)

…during past flooding events in the Chehalis Basin, access to the Providence Centralia Hospital has been restricted for days at a time (PEIS 3.14.1.4 pg 226).

Multiple feasibility studies have been conducted to narrow the possible dam locations. Ultimately, Pe Ell was selected as the site for the water retention facility because:

1. The Willapa Hills is the wettest part of the upper Chehalis Basin and high flows in this area are well correlated with the large flooding events in the downstream portions of the basin. Additionally, it was found that flooding on the other main tributaries did not always translate to flooding on the Chehalis River Mainstem.

   In the Chehalis River headwaters, the Willapa Hills average more than 120 inches of precipitation per year. Previous studies estimate an average rainfall of 73 inches for the entire Chehalis Basin, including its tributaries. (PEIS 3.1.1 pg 77)

   In an effort to further understand the variability of Chehalis River floods, WSE analyzed data from the top ten annual peaks at the USGS Grand Mound gage (just downstream of Centralia and Chehalis) and the corresponding peaks at major upstream USGS gages, including the South Fork of the Chehalis River at Doty, the Newaukum River, and the Skookumchuck River at Bucoda. A key finding of this analysis is that extreme flood events near Grand Mound are always accompanied by high flows in the Chehalis River headwaters above Doty. WSE made the following observations:

   1. A large flow on the Chehalis at Grand Mound has never been observed without a correspondingly large flow upstream on the Chehalis River at Doty.

   2. A large flow at Doty is a reliable (although not perfect) indicator of a large flow downstream at Grand Mound.

   3. A large flow on the Chehalis at Grand Mound can happen with or without a significant flow contribution from the Skookumchuck River. A large flow on the Skookumchuck is not a very good indicator of large flows downstream at Grand Mound.

   4. Peak flows on the Newaukum River and South Fork Chehalis are similarly correlated to the downstream flows at Grand Mound; less so than the Doty flows but more so than the Skookumchuck flows.

   5. Major flood events can be isolated on a single tributary or set of tributaries, and not affect the whole Basin. For example, the 1997 flood on the Satsop was the highest flood on record there, but did not cause major flooding anywhere else in the Basin (Chehalis River Hydraulic Model Development Project pg 454, WSE 2012)

When storms are centered over the Black Hills and Cascade foothills, they can cause flooding in the Skookumchuck and Newaukum Rivers and locally near the confluence of these rivers with the Chehalis in the Centralia/Chehalis area; however, they generally do not cause major flooding downstream on the Chehalis. (CBFHM Alternatives Report, pg 20, Rucklehaus 2012)

…[It is true that] portions of the basin can see extreme floods while other portions see smaller flood events [the analysis] also supports the conclusion that a basin-wide extreme flood (as determined using the gage at Grand Mound) is only possible with a large contribution from the Upper Chehalis basin. (Chehalis River Hydraulic Model Development Project pg 511, WSE 2012)

2. The reservoir is compatible with the surrounding land uses. The temporary reservoir that would be created will not flood any homes or displace any people. The Dam and associated reservoir will be located on commercial forestland and the land adjacent to the reservoir would continue to remain as working forestland.

   The property immediately surrounding the Flood Retention Facility would remain in use as commercial forestland, and the use of the Flood Retention Facility would be compatible with surrounding land uses. No other changes in land use, including new residential or community development, are anticipated within or adjacent to the reservoir area. (PEIS 4.2.10.2 pg 321)

3. A multi-stage site characterization study found that the geologic conditions at the selected site has favorable geology for a dam.

   Results of the Phase 1 Site Characterization work at the potential Chehalis Dam site have confirmed that foundation conditions are suitable for construction of either an RCC or rockfill dam type. (Phase 1 Site Characterization, Conclusions and Recommendations pg 55)

   Results of the Phase 2 Site Characterization work at the potential Chehalis Dam site have reinforced that foundation conditions are suitable for construction of either an RCC or rockfill dam type with the RCC dam type being preferred. (Phase 2 Site Characterization, Conclusions and Recommendations pg 79)

The rationale for choosing the specific stream gage metrics and location for flood elevation reduction relative to other gauges within the Chehalis River Basin.

The location for the stream gages were selected because:

1. High flows at the Doty gage are strongly correlated with flooding along the Chehalis River Mainstem through Centralia/ Chehalis (explanation provided in #2 above).

2. The Doty gage was used as a reference because it has long history of reliable streamflow data and is near the proposed Dam location.

> *There are nine active U.S. Geological Survey (USGS) gages (see Figure 3.1-2) on the Chehalis River that provide information on streamflow rates and water surface elevations. Additionally, there are 15 other active USGS gages and five active Ecology gages in the Chehalis Basin on other rivers and streams. Multiple other gages collected streamflow data in the past, but are currently inactive. Three of the active gages, which have been measuring streamflows for more than 60 years, are referred to as primary USGS gages and are typically used to define the flow of the Chehalis River. These three gages are identified as follows:*
> - *Doty – USGS Gage No. 12020000*
> - *Grand Mound – USGS Gage No. 12027500*
> - *Porter – USGS Gage No. 12031000 (PEIS 3.1.2.1)*

3. The Centralia gage is located at the Mellen St. bridge over the Chehalis River, which is adjacent to I-S and a main route to the Centralia Providence Hospital. It is also near business districts, schools, fire stations, and police stations.

The metrics were selected because:

1. They represent a reduction in flood levels at all locations in the basin, with no corresponding increases in flooding. It was important that the project metrics reflected no 'redirected impacts'. In addition, reducing flows in mainstem may allow tributaries to evacuate faster by eliminating backwater. (*See Table 1: Effect of Potential Mainstem Dam Flood Relief Alternative, pg 70 CRBFHM Alternatives Report, Rucklehaus 2012)*

2. It is projected with the proposed reduction levels that I-5 will have only a 1-day shutdown time in the 100-year flood, which was determined to be the most cost effective scenario.

> *After careful evaluation, and in consultation with the Washington State Department of Transportation, the Work Group has concluded that additional efforts to protect Interstate 5 from flooding through walls, levees, or raising the road bed from flooding are not cost-effective. With water retention and improvements to the Airport Levee, I-5 would be closed less than one day in a 100-year flood, compared to the current five days. WSDOT has created a detour route in the case I-5 is closed. WSDOT estimated that the direct cost of closing down I-5 in a 100-year flood event is $21.0 million based on detour costs. If a dam is built, the direct cost of closing down I-5 in a 100-year flood event is reduced to $4.8 million, or a net benefit of $16.2 million assuming a portion of the traffic detours.4 Given these factors, the significant expense ($90– $110 million) associated with an I-5 levees and walls project outweighs the incremental benefit of one less day of flooded interstate highway. (Governor's Work Group Recommendation, pg 4, 2014)*

3. Based on hydraulic modeling study, the selected metrics appear to be achievable.

• The Chehalis HEC-RAS model predicts that in a simulated 100-year flood the project lowers flood elevations in the upper watershed 4-10 feet, 2-3 feet in Twin Cities, 1-2 feet at other locations on the mainstem downstream of the Twin Cities, and 0.7 feet at Montesano.
• The Chehalis HEC-RAS model predicts that in the 2007 flood the project lowers flood elevations in the upper watershed 6-12 feet, 3-4 feet in Twin Cities, 2-3 feet at other locations on the mainstem downstream of the Twin Cities, and 1.7 feet at Montesano. (CRBFHM Alternatives Report, pg. 69, Rucklehaus 2012)

If you would like any further information or clarification please do not hesitate to contact me at erik.martin@lewiscountywa.gov or (360) 740-2697.

Sincerely,

Erik Martin, PE

Cc: Board of Supervisors, Chehalis River Basin FCZD

1. Chehalis Basin Strategy Programmatic Environmental Impact Statement, Department of Ecology, September 2016

2. Chehalis Basin Flood Hazard Mitigation Alternatives Report Rucklehaus Center, July 2012

3. Draft Report - Chehalis River Hydraulic Model Development Project (Appendix to Chehalis Basin Flood Hazard Mitigation Alternatives Report December 2012 Rucklehaus Center), Watershed Science and Engineering and West Consultants, July 2012

4. Shannon & Wilson. October 2009, Reconnaissance-Level Geotechnical Report Proposed Chehalis River and South Fork Structure Site

5. Shannon & Wilson. September 2015, Phase 1 Site Characterization Technical Memorandum

6. Shannon & Wilson. September 2016, Phase 2 Site Characterization Technical Memorandum

7. Governor's Chehalis Basin Work Group 2014 Recommendation Report, November 2014