

MEMORANDUM

To: Chehalis River Basin Flood Authority **Date:** January 20, 2011
From: Paul Schlenger and Jim Shannon, Anchor QEA **Project:** 100705-01.01
Re: Preliminary Assumptions Used in Fish Study Analysis

The Chehalis River Basin Flood Authority (Flood Authority) is conducting a phased evaluation of the feasibility of using flood retention structures to reduce flooding of the Chehalis River. The Anchor QEA Team is conducting an analysis of the potential effects of the upper Chehalis mainstem flood water retention structure on the salmon populations of the basin. The investigation of the potential impacts to salmon in the mainstem Chehalis entails characterizing existing and predicted future conditions that are relevant to the quantity and quality of available habitat. These characterizations are being conducted through data compilation, field data collection, and modeling analyses. The modeling efforts require data inputs related to the proposed flood retention structure and its operation. Because some of the details related to the structure and its operation have not been determined, it is necessary to make assumptions to inform the modeling. To the extent possible, the model assumptions are based on information on the flood retention structure that was provided in the EES Consulting report *Chehalis River Flood Water Retention Project Phase IIB Feasibility Study Review Draft* dated November 10, 2010. The purpose of this memorandum is to describe the preliminary assumptions being applied in the fish study and solicit feedback from the Flood Authority if there are assumptions that should be revised. As the analyses proceed and more information is gathered, it is possible that additional assumptions will be necessary and/or assumptions may change. As necessary, this memorandum will be updated and the Flood Authority will be notified of changes to the assumptions being applied in the modeling.

The following table documents the Anchor QEA Team's understanding of the attributes of the Upper Chehalis mainstem flood retention structure that are relevant to the fish study and related assumptions about the structure and its operations.

Flood Retention Structure or Operational Element	Flood Storage Only	Multi-Purpose
Structure Location	RM 106	RM 106
Watershed Area above Structure	68.8 square miles	68.8 square miles
Structure Height	238 feet	288 feet
Lowest Streambed Elevation at Structure Axis	432 feet	432 feet
Crest Elevation	670 feet	720 feet
Base Width	1,300 feet	1,600 feet
Reservoir Capacity	80,000 acre-feet for flood storage when reservoir filled to elevation 650 feet	145,000 acre-feet when reservoir filled to elevation 700 feet (80,000 acre-feet for flood storage and 65,000 acre-feet for hydropower generation)
Reservoir Surface Area	1,000 acres when reservoir filled to elevation 650 feet	1,450 acres when reservoir filled to elevation 700 feet
Maximum Water Depth in Reservoir during Non-flood Conditions	Water depths will be determined by flows from upper watershed; no water impoundment during non-flood conditions	203 feet
Minimum Water Depth in Reservoir during Non-flood Conditions		179 feet
Maximum Water Depth during Flood Conditions	237.5 feet when reservoir filled to elevation 669.5 feet	287.5 feet when reservoir filled to elevation 719.5 feet
Flow at which Structure Starts to Hold Water	A pre-determined maximum flow threshold, probably 1,000 cubic feet per second (cfs)	Flood storage aspect of structure is in effect when reservoir water surface elevation exceeds 635 feet
Flow Release Rate during Flooding	A constant pre-determined maximum flow release during downstream flooding conditions (probably 1000 cfs); after downstream flood risks are reduced, discharge greater than 1000 cfs can occur	A constant maximum flow release until the reservoir water surface elevation exceeds 635 feet; assumed 1,000 cfs
Duration of 1,000 cfs Flow Release following Event Utilizing Flood Storage Capacity of 80,000 acre-feet	Up to 40 days	Up to 40 days
Flow Release Rate during Non-flood Conditions	Natural flows from upper watershed will continue through the reservoir reach and structure; no water impoundment during non-flood conditions	Based on average year conditions: 732 cfs between November 24 and March 31; 140 cfs between April 1 and November 23
Elevation of Water Release Within Reservoir	Intake towers will allow water to be released at varying depths depending on reservoir water surface elevation	Intake towers will allow water to be released at varying depths depending on reservoir water surface elevation

Flood Retention Structure or Operational Element	Flood Storage Only	Multi-Purpose
Spillway Capacity	50,000 cfs when reservoir filled to elevation 669.5 feet	50,000 cfs when reservoir filled to elevation 719.5 feet
Upstream and Downstream Fish Passage Facilities	Yes, fish passage will be provided; fish study will analyze with- and without-passage facilities	Yes, fish passage will be provided; fish study will analyze with- and without-passage facilities
Sediment Transport from Upper Watershed	Because the reservoir will be emptied during non-flood conditions, it will be assumed that the structure will allow some percentage of sediment to be transported past the structure; an estimate of the percentage will be developed	Because the reservoir will be maintained throughout the year, it will be assumed that the structure does not allow sediment transport from the upper watershed, except for entrained sediments released during flooding
Large Woody Debris (LWD) Transport from Upper Watershed	Because the reservoir will be emptied during non-flood conditions, it will be assumed that the structure will allow some percentage of LWD to be transported past the structure; an estimate of the percentage will be developed	Because the reservoir will be maintained throughout the year, it will be assumed that the structure does not allow LWD transport from the upper watershed