Update Chehalis Flooding: Synthesis

Prepared for

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Transportation Synthesis Reports (TSRs) are brief summaries of currently available information on topics of interest to WSDOT staff. Online and print sources may include newspaper and periodical articles, NCHRP and other TRB programs, AASHTO, the research and practices of other state DOTs and related academic and industry research. Internet hyperlinks in the TSRs are active at the time of publication, but host server changes can make them obsolete.

Request for Synthesis

Bart Gernhart, Assistant Regional Administrator, Engineering, Southwest Region Transportation Office, WSDOT, requested an update of the Synthesis on Chehalis Flooding 2008 and contains current published reports since the last Synthesis. Draft reports were included until Final document reports are available.

Databases Searched

- TRID - A Transportation Research Database at the Transportation Research Board (TRB)
- Research in Progress (RiP) – A Database of Current Transportation Research at TRB
- Previous Synthesis Reports on WSDOT Research Website
- Google
- Wisconsin DOT Transportation Synthesis Reports
- Federal Transit Administration (FTA) website
- Federal Highway Administration (FHWA) website
- International Transportation and other Research Websites

Published Sources:

Review of Chehalis River Water Retention Structures Scoping Document and Proposed Studies
Prepared by ENVIRON International Corporation; Prepared for Chehalis River Basin Flood Authority, Chehalis River Fish and Aquatics Work Group, Chehalis, WA; 2010

This report presents the results from a peer review of the draft titled, "*Chehalis River Water Retention Structures – Scoping Document and Proposed Studies – Revised Working Draft*" (RWD) dated November 10, 2009 and authored by EES Consulting. The goal of the review is to assist in improving the RWD to better scope and prioritize the studies needed to address the potential impacts of the water retention structures... Prior to issuing a contract for the next phase of fish studies, the Washington State Legislature, in a capital budget appropriation, required "an independent peer review of completed …

hydrological studies of possible upper basin retention structures." This review has been authorized and funded by Chehalis River Basin Flood Authority.
http://quickdocs.lewiscountywa.gov/attachment/3250/ENVIRONReview7222010FinaltoLewisCo.pdf

Chehalis River Flood Water Retention Project: Phase IIB Feasibility Study
Draft Submitted to Chehalis River Basin Flood Authority for Review, Original Draft Submitted November 10, 2010 Revised and Final Submitted April 14, 2011, EES Consulting; 2010

Executive Summary
This Phase IIB Feasibility Study is part of the second of several phases initiated by the Chehalis River Basin Flood Authority (Flood Authority) to explore the option of flood reduction structures on the Chehalis River. The purpose of this study is to analyze the cost-effectiveness of the proposed projects using methodology used by and acceptable to the U.S. Army Corps of Engineers. Results of this study can be used to determine if a more detailed study of the benefits and costs is warranted in the future.

The Lewis County Public Utility District contracted EES Consulting, Inc. (EESC) to analyze whether flood retention structures in the Chehalis River Basin might be part of a solution to basin-wide flooding following the severe flood in 2007. In the initial scope (Phase I) EESC reviewed the possible benefits of developing water retention facilities, or flood storage structures, in the upper Chehalis River Basin.

After reviewing several sites, EESC identified and reviewed two locations at a level of detail consistent with an initial study. One site is located upstream of Pe Ell on the Upper Chehalis River, the other is on the South Fork of the Chehalis River. Total flood storage assumed for both sites was approximately 100,000 ac-ft. Flood water retention was the primary purpose, with instream flow augmentation secondary, and hydropower an ancillary benefit. The Phase I study, which examined potential costs and benefits, preliminarily showed that multi-purpose retention structures could be a cost-effective means to reduce flooding in the Chehalis River Basin.

Following the release of the Phase I report, EESC received important feedback about this initial study. The Flood Authority subsequently contracted for additional work in Phase II. The original scope of work for Phase II was split into Phase IIA, and Phase IIB. Phase IIA included a geology and geotechnical study of the potential sites; this study concluded that no major impediments exist to the construction of flood storage structures at either site. Phase IIA also included the development of an environmental scoping document describing future environmental studies related to the potential structures.

The Flood Authority then approved moving forward with Phase IIB to refine the basic engineering estimates developed during Phase I, and to update the economic information using the Corps of Engineers' methodology. During the Phase IIB process, the Authority asked what a single purpose flood water retention structure might look like, and whether it might be cost effective. Accordingly, this Phase IIB Feasibility Study examines both single purpose (flood only) and multi-purpose (flood, stream augmentation, and hydropower) structures. The Flood Authority also elected to defer work related to environmental issues. Instead, much of this work is currently underway by Anchor QEA as part of the fisheries studies; results are currently expected in June 2011.
http://quickdocs.lewiscountywa.gov/attachment/4399/Phase2BWaterRentionReportFinal41411.pdf

Flood Protection and Ecosystem Services in the Chehalis River Basin
Prepared by David Batker, Maya Kocian, Briana Lovell, Jennifer Harrison-Cox, Edited by Allyson Shrier, Earth Economics; Prepared for the Chehalis Basin Flood Authority; May 2010

Executive Summary

The Chehalis Basin experienced catastrophic flooding in 2007 and 2009. In response, the Chehalis

River Basin Flood Authority was created to take action to protect public safety and assets, prevent flood damage, and reduce flood hazards. The purpose of this study is to inform the Flood Authority's decision-making process and ensure maximum return on future flood protection investments. *Flood protection* in this study is defined as flood damage prevention and hazard reduction.

This report identifies and estimates the economic value of natural systems in the Chehalis River Basin. One benefit these natural systems provide is flood protection. An asset value of these benefits is also provided, allowing traditional flood project cost/benefit analysis to include ecosystem services. This study also identifies and maps some of the residents who benefit from flood protection in the Chehalis Basin. The study examines modeling systems, proposes flood protection criteria, provides recommendations, and suggests next steps.
http://www.eartheconomics.org/FileLibrary/file/Reports/Chehalis/Earth_Economics_Report_on_the_Chehalis_River_Basin_compressed.pdf

Comprehensive Flood Hazard Management Plan for Confederated Tribes of the Chehalis Reservation
Prepared by GeoEngineers, Inc. and Herrera Environmental Consultants, Inc.; March 17, 2009

The Confederated Tribes of the Chehalis Reservation (Chehalis Tribe) was awarded a grant by the State of Washington Department of Ecology (Ecology) under the Flood Control Assistance Account Program (FCAAP) to fund preparation of this Comprehensive Flood Hazard Management Plan (CFHMP). An addendum to the original grant awarded additional funds by Ecology to evaluate the effect of Black River discharge on Chehalis River flooding within the Chehalis Reservation. The Chehalis Tribe provided matching funds to complete this project. The Confederated Tribes of the Chehalis Reservation adopted the CFHMP and it was approved by Washington State Department of Ecology.
http://www.chehalistribe.org/resources-services/docs/plans/Chehalis%20Tribe%20CFHMP.pdf

DRAFT Lewis County PUD Chehalis River Water Retention Facilities Potential Study
Lewis County PUD; February 18, 2009

Introduction and Purpose
The purpose of this study is to review the possible benefits of developing water retention facilities in Lewis County, primarily the Chehalis River Basin. According to The Chronicle, public and private property loss totaled $500 million after the December 2007 Chehalis River flood.3 Given the magnitude of loss; it may be beneficial to consider additional water retention alternatives for the Chehalis River Basin.

In an effort to determine if water retention facilities are feasible, Lewis County and the Lewis County PUD (PUD) have been conducting some preliminary review of the upper basin contour maps for the upper Chehalis (above Pe Ell), the South Fork of the Chehalis (above Boistfort at River Mile 19) the North Fork of the Newaukum, and the South Fork of the Newaukum. Based on this review, it was decided to focus this study on the feasibility and cost of building retention facilities at two sites: Upper Chehalis River site and South Fork Chehalis River site. The Newaukum sites were excluded due to lack of drainage area.

Benefits of flood control in the Chehalis River basin include:

- Avoided costs for damages to residential, commercial, industrial, and agricultural property;
- Avoided emergency assistance costs for flood victims;
- Crop values for some farmers not able to replant their fields the year following the flood;
- Increased residential and commercial property values;
- Avoided infrastructure damages and costs for infrastructure improvement; and
- Avoided impacts to fisheries habitat and water quality.

Based on information available, the benefits of the water retention facilities were determined and compared to the cost of building the facilities. A separate analysis explored the potential cost and benefits of adding power generation turbines at the two retention facilities.
http://www.lcpud.org/images/2-18-09%20EES%20Draft%20Report.pdf

Geologic Reconnaissance Study Proposed Chehalis River and South Fork Dam Sites, Lewis County, Washington
Prepared by Shannon and Wilson, Inc.; Submitted to EES Consulting; Lewis County PUD, October 27, 2009

Executive Summary

This report offers an initial geologic evaluation of two potential dam sites on the Chehalis Rivers and South Fork Chehalis River in Lewis County, Washington. Every potential dam site has its geological and engineering challenges. Given that fact, what we look for in our analysis in this initial evaluation that would preclude the development of dams at the two prospective sites. Additional studies, including subsurface exploration, are required to further examine the potential for the sites and the challenges that will have to be addressed. . .
http://www.lcpud.org/images/SW%20Geologic%20Report%2011-9-09.pdf

Reconnaissance Level Geotechnical Report, Proposed Chehalis River and South Fork Dam Sites, Lewis County, Washington
Prepared by Shannon and Wilson, Inc.; Submitted to EES Consulting; Lewis County PUD; October 28, 2009

Executive Summary

This report provides reconnaissance-level geotechnical considerations and recommendations for two potential dam sites in western Lewis County, Washington. The proposed structures include a 280-foot-high dam on the main stem of the Chehalis River about 11 miles south of Curtis. The primary purpose of the dams would be flood control and summertime flow augmentation, with a secondary purpose of hydroelectric power generation. . .
http://www.lcpud.org/images/SW%20Geotechnical%20Report%2011-9-09.pdf

Chehalis River Basin Flood Authority (multiple documents)
CRBFA Website; PDF links to document below; 2011
Chehalis Basin Watershed Management Plan
The Chehalis Basin Watershed Management Plan provides a current vision, as expressed in the Chehalis Basin Partnership's mission statement, goals, and objectives, and framework for water resource management in the Chehalis Basin. The plan examines water quantity, water quality, instream flow, and habitat.

The Watershed Management Plan was developed to ensure that future management of water resources of the Chehalis Basin remains in the hands of its residents to the greatest extent possible. Through this planning process, the local citizenry has shared issues and concerns related to water resource management and has worked with utilities and local governmental entities to develop the plan.
http://www.chehalisbasinpartnership.org/watershed_plan/watershed_plan.htm

Chehalis Basin Watershed Implementation Plan
Prepared by The Chehalis Basin Partnership ,With assistance from Lee Napier, Watershed Coordinator Janel Spaulding, Watershed Facilitator John Kliem and Debbie Holden, Creative Community Solutions; Volume 1, Strategies 1 through 5; June 2009 Update

Introduction

The Chehalis Basin Partnership (CBP) first adopted its Chehalis Basin Watershed Management Plan in April 2004. The plan lays out the goals, objectives, and framework for water resource management in Water Resource Inventory Areas (WRIA) 22 and 23. Goals and objectives in the plan focus on:

- Planning
- Public Involvement
- Water Quantity
- Water Quality
- Habitat

The next step in the watershed management planning process for the CBP was to begin working on the details regarding how best to bring these WMP goals to fruition. . .
http://www.chehalisbasinpartnership.org/watershed_plan/DIP%202009%20Amendment%20June%202009.pdf

Chehalis River Basin Comprehensive Flood Hazard Management Plan
Prepared for Chehalis River Basin Flood Authority; June 2010

Introduction and Goals

Background
The Chehalis River Basin Flood Authority (Flood Authority) prepared this Comprehensive Flood Hazard Management Plan (CFHMP) for the Chehalis River basin to define flood problems in the basin and to propose solutions for those problems. The CFHMP will remain a work in progress and revised as the Flood Authority or a Flood District in the future continues to develop solutions to flooding problems.
http://lewiscountywa.gov/chehalis-river-basin-flood-authority

PUD Revised Chehalis River Water Retention Project Phase 2b Feasibility Study
Prepared for the Chehalis River Basin Flood Authority; Draft Submitted to Chehalis River Basin Flood Authority for Review, Original Draft Submitted November 10, 2010; EES Consulting; Revised and Final Submitted April 14, 2011

Executive Summary

Introduction

This Phase IIB Feasibility Study is part of the second of several phases initiated by the Chehalis River Basin Flood Authority (Flood Authority) to explore the option of flood reduction structures on the Chehalis River. The purpose of this study is to analyze the cost-effectiveness of the proposed projects using methodology used by and acceptable to the U.S. Army Corps of Engineers. Results of this study can be used to determine if a more detailed study of the benefits and costs is warranted in the future . . .

State-of-the-River Report for The Chehalis River Basin, 2006 - 2009 A Water Quality Study
Joel Green, Ph.D. ,Don Loft, B.A.,Randy Lehr, Ph.D. ,Grays Harbor College,Aberdeen, WA 98520
Contributors: Chehalis Basin Partnership, Confederated Tribes of the Chehalis Reservation and Washington State Department of Ecology; Funded by: Washington State Department of Ecology, Grays Harbor College and the Confederated Tribes of the Chehalis Reservation; September 14, 2009

Executive Summary
To better manage the Chehalis Basin, it is important to understand water quality in the Chehalis River and its tributaries. Previous studies throughout the Chehalis Basin have suggested that ambient water quality conditions range widely, and the primary water quality parameters of concern are temperature, dissolved oxygen, fecal coliform, pH and turbidity due to sediment runoff. To advance knowledge of water quality in the Chehalis Basin, we initiated a study in 2006 to collect and analyze water samples from 83 sites on a monthly basis for dissolved oxygen, pH, temperature, turbidity, and fecal coliform. During 2008, the number of sites was expanded to 94. The project was a collaborative effort of Grays Harbor College, which was responsible for study design, analysis, and reporting, and the Chehalis Tribal Natural Resources Department, which was responsible for collecting water samples and conducting chemical analyses of samples. . .
http://www.chehalisbasinpartnership.org/technical/State-of-the-River%20JAG%2010-11-09.pdf

The Chehalis Basin Salmon Habitat Restoration and Preservation Work Plan for WRIA 22 and 23
Prepared by The Chehalis Basin Partnership, Habitat Work Group, With Assistance by Lee Napier, Lead Entity Coordinator, Grays Harbor County, Chad Stussy, Washington Department of Fish and Wildlife, Brett DeMond, Streamworks, LLP, John Kliem, Consultant, Creative Community Solutions; Updated September 2008

Introduction to the Work Plan

The Chehalis Basin Salmon Habitat Restoration and Preservation Work Plan is the Lead Entity strategy for providing guidance to project planners and funding agencies in developing, evaluating, and implementing salmon habitat restoration and protection actions within Water Resource Inventory Areas (WRIA) 22 and 23. The Work Plan relies on six sections to achieve this purpose. . .
http://www.co.grays-harbor.wa.us/info/pub_svcs/ChehalisBasin/Docs/WRIA20080922-23.pdf

Other Articles, Photos, and Sources

Photo gallery of epic January 2009 flooding
KATU.com News, Portland, Oregon, January 9, 2009

These images, captured by professional and amateur photographers alike, capture the scope of the flooding in Washington and Oregon from the epic January rainstorms.
http://www.katu.com/news/37289544.html

Ruckelshaus Center Chehalis Flooding Project

Ruckelshaus Center Website; Current Projects; February 2012
Current Projects
Chehalis Flooding

The Center has been asked by the Washington State Governor's Office to help the Department of Enterprise Services (formerly the Office of Financial Management)--in collaboration with the Department of Transportation, Department of Ecology, and affected and interested federal agencies, tribal governments and local governments--produce a report to the Governor and Legislature required by Engrossed Substitute House Bill 2020 that identifies recommended priority flood hazard mitigation projects in the Chehalis River Basin in southwest Washington. The Center's tasks are to coordinate the report, using technical information provided by other agencies and organizations, and to conduct a situation assessment of flood alternatives and relationships between the responsible parties and stakeholders. The project began November 1, 2011, with the report due in July 2012. For more information, contact Project Manager Jim Kramer.
http://www.ruckelshauscenter.wsu.edu/projects/current.html

Engrossed Substitute House Bill 2020
Chapter 49, Laws of 2011, 62nd Legislature, 2011 1st Special Session
2011-2013 Capital Budget—Funding from General Obligation and Other Bonds; Effective Date: 06/15/11

New Section. Sec. 1033. For the Office of Financial Management, Catastrophic Flood Relief (20084850)

. . . appropriations are provided solely for the Chehalis basin flood control authority or other local flood districts to study, develop, construct, maintain, operate, and fund flood control measures throughout the basin, . . . to complete by December 2011 the ongoing study of the effect of possible retention structures on fish in the basin, and . . . complete the hydraulic model for the Chehalis river to calculate flood levels, flood damages, and benefits of proposed flood mitigation projects for the lower portions of the river; and . . .
http://leap.leg.wa.gov/leap/budget/lbns%5C1113Cap2020-S.SL.pdf

Joint Transportation Committee, Washington State Legislature
Remarks by: COMM Ron Averill (Lewis County) Work Session – Agenda Item 1: Update on Funding Related to the December 2007 Floods—Capital funding for flood hazard mitigation projects; September 17, 2008

BACKGROUND: House Bill 3374 authorized $50 M in state bonds for flood hazard mitigation projects in the Chehalis River Basin House Bill 3375: appropriated $50 M to OFM, to work with others on Chehalis River flood projects, including $2.5 M to a local “authority” to work on projects throughout the basin directs OFM to be the nonfederal sponsor of federal flood projects, in partnership with basin governments, requires formal agreement between state and basin governments on any project, including operations/maintenance and land use issues, before construction can begin. . .
http://www.leg.wa.gov/JTC/Meetings/Documents/RegionalOranizationsBriefing091708.pdf

Chehalis Basin Partnership
The Chehalis Basin Partnership provides a framework for local citizens, interest groups, and government organizations to work collaboratively to identify and solve water-related issues.
http://www.chehalisbasinpartnership.org/

Chehalis River Basin Flood Authority

The Chehalis River Basin Flood Authority, formed in April of 2008, consists of officials from jurisdictions in the Basin affected by flooding.
http://lewiscountywa.gov/chehalis-river-basin-flood-authority

Chehalis River Council
The Chehalis River Council (CRC) is a volunteer-run nonprofit corporation, dedicated to the conservation and restoration of natural resources in the Chehalis River Basin.
http://www.crcwater.org/Welcome.html

Chehalis Tribe
Manages and protects the natural resources of the reservation.
http://www.chehalistribe.org/

City of Centralia
Provides flood information for the City of Centralia
http://www.cityofcentralia.com/

City of Chehalis
Provides Chehalis Area River Readings and Road Closures from Lewis County
http://ci.chehalis.wa.us/

Department of Ecology – Washington State
Manages Washington State water supplies
http://www.ecy.wa.gov/

Grays Harbor County Lead Entity – Chehalis Basin Partnership
The Chehalis Basin Lead Entity for Salmon Recovery (Lead Entity) is responsible for evaluating and submitting habitat project applications to the Salmon Recovery Funding Board (SRFB) for funding consideration.
http://www.co.grays-harbor.wa.us/info/pub_svcs/Lead_Entity/library/library.htm

Lewis County Conservation District
The LCCD provides technical and financial assistance for the conservation, protection, and development of natural resources within Lewis County.
http://lccd.scc.wa.gov/about.html

Lewis County PUD
The mission of Lewis County Public Utility District #1 is to provide a low-cost reliable source of electrical energy and quality service commensurate with prudent business practices to present and future Lewis County residents and business.
http://www.lcpud.org/

Thurston County Emergency Management
TCEM provides information on disaster recovery including maps showing current level of flood risk on properties throughout the county.
http://www.co.thurston.wa.us/em/

US Army Corps of Engineers – Seattle District

The USACOE mission is to provide service to the Armed Forces and a Nation at peace or war by designing, constructing, operating, and permitting military / civil works infrastructure and projects that build the Nation's military and long term economic might in an environmentally sustainable way. On order, execute Emergency Operations in support of local, state, and federal agencies.
http://www.nws.usace.army.mi/

US Fish & Wildlife Service
The Fisheries and Habitat Conservation Program . . .within the U.S. Fish & Wildlife Service in its abilities to apply a dual approach to natural resource management; it focuses on both helping manage species and helping to conserve their habitats . . .
http://www.fws.gov/

SalmonScape
WDFW SalmonScape Website; 2012
SalmonScape, the Washington Department of Fish and Wildlife's interactive, computer mapping system, is one of the most important tools created thus far to deliver scientific information to those involved in on-the-ground salmon recovery projects.
http://wdfw.wa.gov/mapping/salmonscape/

Timberland Regional Library Communities - Chehalis River Basin Flood Resources
TRL Website; 2011
Website contains publications and reports related to Chehalis River Basin Flood Resources and links to involved agencies.
http://www.trlib.org/Research/Internet%20Resources/Pages/ChehalisRiver.aspx