

MEMORANDUM

Date: June 4, 2020
To: Chehalis Basin Board
From: Andrea McNamara Doyle, OCB Director
Re: Flood damage reduction alternatives previously considered or currently being evaluated besides the Flood Control Zone District's proposed Chehalis River Basin Flood Damage Reduction Project

Flood Damage Reduction Alternatives Previously Considered

OPTIONS PREVIOUSLY CONSIDERED	SUMMARY OF ANALYSIS & CONCLUSION	LINK TO SOURCE DOCUMENT(S)
USACE Twin Cities Project	<ul style="list-style-type: none">Beginning in 1980s, USACE considered project consisting of 11 miles of new levees (from RM 75 to RM 64) on the Chehalis River, the lower 2 miles of Dillenbaugh and Salzer creeks, and the lower 2 miles of the Skookumchuck River to the confluence with Coffee Creek. This alternative would include raising approximately eight structures near the airport, I-5, Skookumchuck River, and Salzer Creek. This alternative would also modify the Skookumchuck Dam to increase flood storage by 11,000 acre-feetLevees were part of the recommended plan from USACE's 2003 reevaluation reportIn 2011, USACE stopped work on project after determining:<ul style="list-style-type: none">Project would not protect I-5 in 100-year flood eventWould not pass USACE benefit-cost test	<ul style="list-style-type: none">2003 Centralia Flood Damage Reduction Project Chehalis River, USACE.2011 Centralia Flood Risk Management Project, USACE.2012 Chehalis Basin Flood Mitigation Alternatives Report, Ruckelshaus Center.
Floodwater Bypass Routes	<ul style="list-style-type: none">1998 PIE report included evaluation of "hydraulic capacity improvements":<ul style="list-style-type: none">River channel excavationFloodway/floodplain excavationLevee improvementsRecommended combination of Skookumchuck dam modifications, floodway excavation in Mellen Street Bridge, and floodplain modifications in the vicinity of SR 6	<ul style="list-style-type: none">1998 Chehalis River Basin Flood Reduction Project, Pacific International Engineering.2012 Chehalis River Hydraulic Model

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	<ul style="list-style-type: none"> • In 2012, WSE/WEST Hydraulic Model report found floodwater bypass routes evaluated near Mellen Street and SR 6 would: <ul style="list-style-type: none"> – Provide little flood reduction benefit and increase water levels downstream – Create potential to become “fish sink” • In 2012, Work Group decided to not move forward based on hydraulic model results/downstream impacts. 	<p>Development Project, Watershed Science and Engineering and WEST Consultants. (see Appendix J, page 440)</p> <ul style="list-style-type: none"> • 2012 Chehalis Basin Flood Mitigation Alternatives Report, Ruckelshaus Center.
Bridge Replacements	<ul style="list-style-type: none"> • In 2012, Ruckelshaus Center report analyzed several bridge replacements: <ul style="list-style-type: none"> – Removing the SR 6 Bridge and Approach Fills. Move the SR 6 Bridge, west of Chehalis over the mainstem Chehalis River, and associated features, out of the floodplain (Ruckelshaus 2012). – Removing the Mellen Street Bridge and Approach Fills. Move the Mellen Street Bridge, in Chehalis over the mainstem Chehalis River, and associated features, out of the floodplain. – Removing the Galvin Road Bridge and Approach Fills. Move the Galvin Road Bridge, in Galvin over the mainstem Chehalis River, and associated features, out of the floodplain. – Removing the Porter Creek Road Bridge and Approach Fills. Move the Porter Creek Road Bridge, in Porter over the mainstem Chehalis River, and associated features, out of the floodplain. – Removing the Wakefield Road (South Elma) Bridge and Approach Fills. Move the Wakefield Road Bridge, in Elma over the mainstem Chehalis River, and associated features, out of the floodplain. – Removing Multiple Bridges and Approach Fills in the Upper Chehalis Basin. Move the SR 6 Bridge, Mellen Street Bridge, and Galvin Road Bridge over the mainstem Chehalis River, and associated features, out of the floodplain. • In 2012, WSE/WEST Hydraulic Model report found bridge replacements would provide limited upstream flood reduction benefit and would result in increased flows and water levels downstream • In 2012, Work Group decided to not move forward based on hydraulic model results/downstream impacts. 	<ul style="list-style-type: none"> • 2012 Chehalis Basin Flood Mitigation Alternatives Report, Ruckelshaus Center.
I-5 Levees and Walls	<ul style="list-style-type: none"> • In 2014, WSDOT evaluated I-5 levees and walls project, including construction of: <ul style="list-style-type: none"> – Earthen levees and floodwalls along I-5 – New one-mile long Chehalis Ave. levee 	<ul style="list-style-type: none"> • 2014 Chehalis Basin I-5 Flood Protection near Centralia and Chehalis,

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	<ul style="list-style-type: none"> – Bridge replacements over Dillenbaugh and Salzer Creeks • In 2014, WSDOT’s report stated that this alternative was not advanced “since it is anticipated that construction of a dam will be pursued.” The report also stated this I-5 Levees & Walls alternative “would be recommended if a dam was not planned to be constructed.” • WSDOT has not yet evaluated how to mitigate for impacts of the I-5 levees and walls project, e.g., initial modeling showed that 100-year water levels in areas not protected by the levees could rise by as much as two feet or more, and landowners affected by this voiced significant concerns. A detailed mitigation strategy/approach would need to be developed if WSDOT pursues this project in the future. 	<p>Washington Dept. of Transportation.</p> <ul style="list-style-type: none"> • 2017 Chehalis Basin Strategy Programmatic Environmental Impact Statement, Washington Dept. of Ecology.
Other I-5 Protection Projects	<ul style="list-style-type: none"> • In 2014, WSDOT evaluated other I-5 protection projects: <ul style="list-style-type: none"> – <u>Raise and Widen I-5</u>. Raise I-5 using fill material to elevate the road surface above the desired flood protection elevation, widening I-5 from four to six lanes, and raising bridges. Raising I-5 would require reconstruction of all pavement, stormwater systems, illumination systems, and guardrail in the affect area. In addition, the I-5 interchanges at 13th Street, SR 6, and Chamber Way, and the West Street bridge would need to be reconstructed. – <u>I-5 Express Lanes (berms)</u>. Construct 4 miles of new express lanes adjacent to I-5 to provide traffic the opportunity to bypass I-5 if the main interstate was closed by floods. The express lanes would diverge from I-5 at 13th Street and follow the existing Tacoma Rail line through Chehalis. This alternative would include construction of new bridges over West, Prindle, and Main streets in Chehalis. The express lanes would be at least 3 feet above the 100-year flood elevation and would be available to traffic with or without flood conditions. – <u>I-5 Temporary Bypass</u>. Construct 4 miles of temporary bypass lanes diverging from I-5 at 13th Street, and then follow the existing Tacoma Rail line through Chehalis, with a bridge over Main Street. These lanes would only be used during floods. The intersections with Prindle and West Streets would be at-grade, and flood gates would close during flood events to keep floodwaters out of the temporary bypass. The bypass lanes would be constructed a minimum of 3 feet above the 100-year flood elevation. This would provide a local bypass opportunity if the main part of I-5 were to be closed by major floods. – <u>I-5 Viaduct</u>. Elevate I-5 on piers to build a viaduct from SR 6 to Mellen Street, widen I-5 to six lanes, and reconstruct all interchanges in the affected area. 	<ul style="list-style-type: none"> • 2014 Chehalis Basin I-5 Flood Protection near Centralia and Chehalis, Washington Dept. of Transportation.

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	<ul style="list-style-type: none"> – <u>I-5 Relocation</u>. Relocate I-5 outside the flood area, including widening I-5 to six lanes and constructing new interchanges. • In 2014, WSDOT did not recommend further evaluation of these projects, deeming them either: <ul style="list-style-type: none"> – Cost prohibitive – Negatively impactful to built and natural environment – Increasing flood elevations in urban areas 	
Restorative Flood Protection Alternative (RFPA)	<ul style="list-style-type: none"> • In 2017, Programmatic EIS evaluated RFPA that would rebuild natural flood storage capacity by reversing landscape changes that contribute to downstream flooding and erosion. • In 2018, NSD reported preliminary results of pilot feasibility evaluation in Newaukum, which showed peak flood flow reductions ~1/4th of what was predicted in the PEIS in larger floods. Feasibility evaluation findings transferrable to other parts of Chehalis Basin. • In Fall 2018, Chehalis Basin Board elected not to move forward with further development of the RFP based on preliminary results. The Board agreed that RFPA findings related to erosion/channel migration should be incorporated into CMZ component of the Community Flood Assistance & Resilience (CFAR) program. • In 2020, NSD’s final advanced feasibility evaluation for the North and South forks of the Newaukum River completed. “The Restorative Flood Protection Evaluation benefited the Chehalis Basin by exploring an important alternative to traditional flood protection, adding valuable data and information on the basin, and demonstrating that some elements of the RFP can be integrated into comprehensive floodplain management, reducing risks and improving environmental conditions.” • More specifically, it found: “Based on the RFP work, we can identify low gradient areas that once had a more significant role on attenuating downstream flood peaks. One example is the main stem Chehalis River between the Newaukum and Skookumchuck confluences... This same area has become heavily developed and not viable for an RFP approach, but highlights the area’s susceptibility to flooding. Since many other low gradient areas within the Chehalis Basin have not yet been analyzed in a meaningful way, it is recommended the RFP analysis be expanded to assess these areas throughout the basin.” 	<ul style="list-style-type: none"> • 2017 Chehalis Basin Strategy Programmatic Environmental Impact Statement, Washington Dept. of Ecology. • 2017 Restorative Flood Protection Technical Report, Natural Systems Design. • 2020 Restorative Flood Protection Feasibility Assessment, Natural Systems Design.

Flood Damage Reduction Alternatives Currently Being Evaluated

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Community Flood Assistance & Resilience Program (CFAR)	<p>To reduce flood losses by providing technical and funding support to property owners for the acquisition, relocation, or modification of individual floodprone buildings.</p> <p>To prevent property losses by providing funding support for identifying hazard areas, and the acquisition or relocation of buildings threatened by a migrating stream channel. Fund small habitat enhancing and permittable bank protection projects; large-scale, traditional levees and landward revetments intended to stop erosion are not eligible project types.</p> <p>The Chehalis Basin Board is evaluating the CFAR program as a potential element of the long-term Chehalis Basin Strategy.</p>	<ul style="list-style-type: none"> • CFAR Program Strategy Outline
Local Flood Damage Reduction Projects	<p>In general, local projects reduce flood damage caused by floods of the Chehalis River and its major tributaries. The damage could be to public or private improvements. If a local project is proposed to reduce flood damage to private property, there must be a public benefit. Local projects are generally:</p> <ul style="list-style-type: none"> • Projects that improve emergency response. • Projects that protect public infrastructure from major river flooding or erosion. • Projects that improve local or community flood hazard reduction, including local flood planning and local flood proofing (e.g., elevations, buy-outs, foundation venting, demolitions, etc.) caused by major river flooding or erosion. • Projects that implement Conservation District initiated flood hazard reduction (e.g., farm pads, evacuation routes, landowner support/participation, etc.). <p>The Chehalis Basin Board is continuing its biennial evaluation of additional local project proposals as part of the long-term Chehalis Basin Strategy.</p>	<ul style="list-style-type: none"> • Local Projects Background Document
Land Use Management	<p>The following actions were evaluated in the Programmatic SEPA EIS:</p> <ul style="list-style-type: none"> • Land Use Management. Revising land use regulations and practices on the local level to protect floodplain functions and minimizing floodplain development. This alternative may include restricting the creation of developable parcels in the floodplain through open space preservation, 	<ul style="list-style-type: none"> • 2017 Chehalis Basin Strategy Programmatic Environmental Impact

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	<p>subdivision set asides, and low-density zoning. Other elements may involve increasing the cost of future development in the floodplain and include filling restrictions and freeboard requirements on new or elevated structures.</p> <ul style="list-style-type: none"> • Regulatory Flood Data. Requiring additional flood data beyond those provided on Flood Insurance Rate Maps (FIRMs) to be used in flood regulations. The regulatory floodplain and flood elevation would be defined by the flood of record where there is no Base Flood Elevation (BFE) on the FIRM, or where the flood of record is higher than the BFE. In addition, all permit applicants in areas without a BFE on the FIRM would be required to conduct an on-site flood study, or use an existing, current study, to calculate the BFE. Permit applicants for single-family residences on existing lots would have the option of elevating the house 5 feet or more above grade without funding a study. • Floodplain Protection. Implementing higher development standards in flood-prone locations, including the following: <ul style="list-style-type: none"> – Preserving open space in the floodplain – Requiring new subdivisions and other large developments to set aside all or part of their flood-prone areas as open space – Prohibiting any fill in the floodplain or requiring compensatory flood storage – Not allowing low-density zoning districts within the floodplain to be amended to allow more dense development • Modifying Construction Standards. Setting more stringent construction standards in the floodplain, including the following: <ul style="list-style-type: none"> – Increasing the amount required freeboard for new construction or substantial improvements of existing structures – Prohibiting new critical facilities (e.g., hospitals, fire stations, hazardous materials facilities) from the 500-year floodplain or protect them from damage or loss of access during a 500-year flood – Requiring a permit applicant seeking to elevate or improve a building on floodwalls to sign an agreement that areas below the Base Flood Elevation or flood protection elevation would not be converted to a use (e.g., a residential living space) or be constructed with materials that are subject to water damage • Flood Warning System Improvements. Improving the existing Chehalis River Basin Flood Warning System. 	Statement, Washington Dept. of Ecology.

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	The Chehalis Basin Board is evaluating how land use management can be incorporated as a potential element of the long-term Chehalis Basin Strategy.	
Aberdeen-Hoquiam North Shore Levee	<p>In 2017, Ecology evaluated an alternative in the Programmatic SEPA EIS to construct approximately 5.8 miles of levees to protect the Cities of Aberdeen and Hoquiam, and the North Shore Levee, which would encircle Aberdeen’s city center and portions of Hoquiam along the north side of Grays Harbor.</p> <p>In addition, the City of Hoquiam is currently evaluating the North Shore Levee West project, which aims to install a levee (earthen, concrete and sheet pile) for 4.7 miles bordering the City of Hoquiam. This</p> <p>The Chehalis Basin Board is evaluating continued support for the North Shore Levee as a potential element of the long-term Chehalis Basin Strategy.</p>	<ul style="list-style-type: none"> • 2017 Chehalis Basin Strategy Programmatic Environmental Impact Statement, Washington Dept. of Ecology.
Forest Practices Study	DNR is conducting an independent and peer-reviewed study to evaluate how contemporary forest practices affect streamflow in the Chehalis Basin. At the conclusion of the study (estimated in 2024), watershed specific ecohydrology models informed by basin specific information will allow managers to understand the effects of patterns associated with forest management, expected changes in land use and impacts to streamflow, and a more thorough understanding of the effects of increased precipitation in the future to better inform and prioritize projects that may influence local or basin-scale flooding	<ul style="list-style-type: none"> • RCO-DNR Interagency Agreement #18-2275
Local Actions Program	<p>The Quinault Indian Nation’s comments on the draft SEPA EIS stated:</p> <p>“It is our conclusion that the shortcomings in the DEIS analyses and conclusions result in an underestimation of potential viability of the LAA [Local Actions Alternative] and related actions that could be taken to accomplish flood damage reduction at a lower environmental, social, and economic cost to the Chehalis Basin. We believe that the Local Actions Alternative could be developed into a viable Local Actions Program with enough specificity to enable comparison of benefits and impacts against the proposed project, and to enable the State to evaluate implementation feasibility and community support.”</p> <p>As part of the Nation’s SEPA comments, NSD/NHC developed a technical memo that explores key elements needed for development of a viable Local Actions Program and offer examples of area-</p>	<ul style="list-style-type: none"> • 2020 Local Actions Alternative Technical Analysis Review, Natural Systems Design and Northwest Hydraulic Consultants

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	<p>specific strategies for applying Local Actions Program elements in the Chehalis Basin. Below is a summary of the elements outlined in the NSD/NHC memo:</p> <ul style="list-style-type: none"> • Develop more accurate flood models for entire Chehalis Basin with focus on sub-basins. • Develop a comprehensive strategic plan for prioritizing local actions. • Delineate erosion hazards through a comprehensive channel migration zone delineation of Chehalis and its tributaries. Develop recommendations of areas where bank protection is acceptable and guidelines on how it should be done. • Improve floodplain function with regards to temporarily storing flood waters. • Land use management actions. • Local flood protection actions. • Floodplain agriculture 'stay-in-place' assistance tailored to address site-specific flood and erosion risks. • Acquisition of flood-prone land • Relocating people out of harm's way • Improving flood emergency response actions. • Increase floodplain water storage along South Fork Chehalis River, Newaukum River, mainstem Chehalis River from Pe Ell to Centralia and other upper watershed sub-basins. <p>The Chehalis Basin Board agreed at its May 7 Board meeting to learn more about the Nation's recommendations, and to look into other new ideas or re-examining previous ideas in a new way. It is currently determining how to evaluate and consider elements of the Local Actions Program as an element of the long-term Chehalis Basin Strategy.</p>	