

TECHNICAL MEMORANDUM

Date: October 11, 2024
To: Matt Dillin, Chehalis River Basin Flood Control Zone District
From: MaryLouise Keefe, PhD, Kleinschmidt Associates
Cc: Jason Kent, PE, PMP, Kleinschmidt Associates
Re: Mitigation Early Actions

Chehalis Basin Strategy Proposed Flood Retention Expandable Mitigation Plan – Mitigation Early Actions

Introduction

In association with submittal of the Revised Project Description for the Flood Retention Expandable (FRE) flow-through dam project on the upper Chehalis River (HDR 2024), the Chehalis River Basin Flood Control Zone District (Applicant) has also prepared and submitted a Revised Mitigation Plan (RMP; Kleinschmidt 2024). This plan describes a watershed scale approach to offset the potential effects of the construction and operation of the flood control dam at River Mile (RM) 108.4 (Kleinschmidt 2024) and follows standard mitigation sequencing guidelines for avoiding, minimizing, and compensating. One proposed minimization measure included in the plan is the reduction of tree mortality and associated shade loss associated with construction and operation of the facility. Through active planting and maintenance in the inundation area, the Vegetation Management Plan (VMP), included as Appendix D to the RMP (Kleinschmidt 2024), will minimize potential shade and water temperature impact, losses to sedentary wildlife and their habitat, and risk of erosion and runoff to reduce water quality, but some residual impact is expected. To address this residual impact, a Riparian and Stream Buffer Enhancement and Expansion Mitigation Plan (see Chapter 8 of the RMP; Kleinschmidt 2024) was proposed that included rehabilitation of riparian habitats downstream of the flow-through dam. Residual impacts to wetlands, and aquatic and wildlife species and their habitats are also anticipated. Resource specific mitigation plans have been presented in Chapter 8 of the RMP.

While the benefits of some mitigation actions are immediate, other mitigation actions require more time to improve ecological function. For example, planting native vegetation in riparian areas for shade mitigation may take several years before reduced solar input to the river is evident, and could be decades before trees reach maximum height and the full ecological benefit is attained. However, some ancillary benefits, such as increased function to reduce runoff and wildlife habitat, may be realized within a year or two after plant establishment. Mitigation ratios are typically applied to increase the quantity of mitigation replaced to habitat lost beyond a direct 1:1 ratio. These ratios are intended to account for temporal delay in offsetting impact as well as uncertainty of performance over time.

The implementation of mitigation actions before the impact has occurred presents an opportunity to reduce the potential impact with a maximum potential benefit of complete avoidance. Early implementation of mitigation actions also allows for early monitoring to ensure that mitigation was implemented as designed and intended and to assess early performance metrics. The proposed early actions include habitat rehabilitation that also would provide for increased habitat resilience in the face of impact from the operation of the flow-through dam or from future flooding during non-operational periods. Finally, by implementing these mitigation actions early, there will be a period of a few to several years for mitigation effectiveness monitoring and potential for early adaptive management and corrective actions; therefore, reducing the risk of mitigation failure. For mitigation actions, such as riparian reforestation, early action would also reduce the timeframe needed post-impact before full functional benefit is attained.

This technical memorandum summarizes the mitigation actions identified by the Applicant that would be planned and implemented during the pre-construction and construction periods to minimize impacts by increasing ecological resiliency of habitats prior to impact and reducing the time to attain full functional benefit from the proposed mitigation. It is the intent of the Applicant to implement the actions once the Proposed Action is permitted to take advantage of the full construction period as well as any non-operational years prior to the first flood that would trigger operation.

Early Mitigation Actions

The Applicant is proposing early initiation of several mitigation actions that will allow for earlier realization of mitigation benefits as described below. Three of these early actions were presented in Chapter 10 of the RMP including planting riparian and recently harvested areas under the VMP, a complex mitigation site (RM 87.6-89.3) along the mainstem Chehalis River, and an aquatic habitat and riparian shade mitigation site in lower Bunker Creek. A fourth early action, proposed herein, is riparian shade planting along the mainstem Chehalis River consistent with the Riparian and Stream Buffer Enhancement and Expansion Mitigation Plan (see Chapter 8 of the RMP). Each of these mitigation sites contains habitat rehabilitation elements that would help to avoid and minimize impacts associated with operations through increased habitat resiliency.

Early Planting Under the Vegetation Management Plan

The VMP (Appendix D, Kleinschmidt 2024) was developed to minimize the loss of trees and streamside shade associated with inundation during temporary floodwater retention operations, thereby minimizing potential shade-related effects on river temperature and related water quality impacts to aquatic habitat. To minimize potential effects, the VMP focused on plantings that will enhance the resiliency and recovery of the plant communities within the inundation area to flooding and inundation. This would be accomplished by converting existing habitats, dominated by Douglas fir monoculture timberlands of various age classes in the uplands and mixed forests in riparian areas, to a diverse array of native flood-tolerant species. During the construction, implementation of the VMP would entail pre-

emptively planting in recently harvested areas, in-planting within existing riparian buffers, and expanding buffer widths where feasible through selective tree cutting to open the canopy and facilitate planting in the understory. Plant survival would be monitored and invasive species would be managed to facilitate the establishment of a native flood-tolerant riparian buffer. Key early actions of the VMP to be implemented prior to or during construction include:

- Planting and in-planting within 238 acres of riparian buffer habitat located within the inundation zone. Deciduous riparian shrubs and tree species expected to take hold and grow rapidly in these areas will be the primary focus. Herbaceous species will also be seeded to help stabilize soil and reduce runoff and erosion.
- Planting in commercial timberlands that were harvested approximately 10 years prior to land acquisition. While the size and location of this area is anticipated to change over the next 5 years related to active timber management, the 2023 estimate of the inundation area that had trees younger than 10 years old was 120 acres. Planting riparian and upland trees and understory trees and shrubs would be the focus.

The Applicant would begin planting flood-tolerant species once the project is permitted and land acquisition has been completed, allowing the flood-tolerant trees, shrubs, and other plants to establish and grow for at least 4 years prior to flood facility operations, thereby reducing potential impacts before they occur. These native habitats would include both structural and plant species diversity, and would help to minimize wildlife habitat degradation. The presence of diverse native plants in the understory would also provide enhanced ecological function by improving capture and retention of surface runoff and reducing erosion. The target habitats are much more complex than current conditions with increased structure and plant diversity, and would support increased ecological function associated with dead and downed wood, leaf litter, and associated nutrient cycling that occurs on the forest floor. These native forests, with a multi-layered canopy, would also help to retain water and provide localized temperature reductions compared to clear cuts and commercial stands with stand-age less than 10 years that currently occupy about 16 percent of the current landscape upstream of the proposed FRE facility.

Mainstem Chehalis River Riparian and Stream Buffer Expansion and Enhancement

Riparian expansion and enhancement would occur along the mainstem Chehalis River between the proposed FRE facility and the town of Adna and in Bunker Creek to mitigate residual impacts related to loss of riparian trees, summer shade reduction, and aquatic habitat degradation associated with the construction and operation of the FRE facility. The current condition of the riparian habitat within the mitigation area is degraded as it has been impacted by decades of agriculture practices, tree clearing, and the establishment of invasive species. As described in Chapter 8 of the RMP (Kleinschmidt 2024), the proposed mitigation will offset the shade loss associated with project construction and operation by a factor of 2.5:1 with plantings in 131 land parcels covering 16.6 miles of mainstem stream bank. Reforesting these degraded habitats with native plants would not only reduce thermal loading across

20+ miles of the Chehalis River but will result in a variety of additional benefits to both aquatic and terrestrial species, including improved complexity and structure of habitat, water quality improvements related to interception of runoff, reduced BOD in slow water habitats, and nutrient recycling.

RM 87.6-89.3

One complex mitigation site is located within RM 87.6-89.3. The existing conditions at this site present several different opportunities to co-locate mitigation measures that address impacts to fish and aquatic habitat degradation, loss of wetlands and buffers, wildlife habitat degradation, and shade loss. The mitigation enhancements proposed include expanding off-channel rearing habitat for aquatic species, increasing the habitat complexity by enlarging/maintain split flow side channels, restoring wetlands and buffers, increasing floodplain channel engagement, and restoring floodplain forest along relic Chehalis River channels. In-channel feature improvement with wood debris and process-based restoration features such as post-assisted log structures would also improve habitat complexity for native fish species. Implementing multiple mitigation measures at this site would provide for ecological lift by substantially increasing aquatic, riparian, and wetland habitat complexity; replacing invasive with native riparian plants; and co-locating multiple mitigation actions across this site.

Lower Bunker Creek Aquatic Habitat and Riparian Enhancement

The second mitigation site is situated along the lower reaches of Bunker Creek, a tributary to the Chehalis River. Implementing mitigation enhancement on this property represents a unique location for off-channel habitat for juvenile salmon in the middle Chehalis River. The channel is incised with largely unvegetated and eroding banks. Several actions are proposed to mitigate for loss of stream channel, aquatic habitat degradation, and shade-related thermal load increases. Proposed activities include culvert removal, excavation of an inset floodplain to support natural river processes, revegetation of the stream banks and buffer with native species, and installation of large wood within the ordinary high-water channel. Implementing multiple mitigation measures at this site would provide for ecological lift and enhance resilience to project impacts by substantially increasing aquatic and riparian complexity, replacing invasive plants with native riparian plants, enhancing access to approximately 30 miles of salmon habitat upstream through barrier removal, and co-locating multiple mitigation actions across approximately two miles of aquatic and riparian habitat.

Early Implementation Timeline

The overall construction management approach and corresponding implementation schedule will be developed during the final design and permitting phase of the project. However, to the extent practicable, the Applicant plans to initiate activities that will facilitate mitigation implementation in Year 1 of the Construction Period. As described in the revised project description (HDR 2024), phased construction is anticipated to last a total of 52 months, without consideration of the timing to obtain permits, weather delays, or in-water work constraints (HDR 2024). Implementation of early mitigation actions will occur in Years 1 and 2 of the Construction Period. A broad array of activities would need to

be completed by the end of the Pre-construction Period to support the early mitigation action program and include the technical, administrative, and management tasks described. Examples of the task list for each of the early mitigation actions is presented in Table 1.

Technical activities to support early actions would include collecting additional information to support completion of site-specific plans and prepare materials for construction. Wetland assessments and delineations would have to be completed through the Impact Area and delineations at proposed mitigation sites to confirm sufficiency of mitigation. Current habitat designs and planting plans will need to be advanced to 100% design for incorporation into plans and specifications for construction management documents. Site-specific details on planting areas as well as densities and numbers of plants by species would be needed to coordinate with local nurseries to ensure that sufficient supply is available for planting starting in Year 1. Additional landowner coordination and site visits to collect relevant information such as soil type, exposure, and drainage and to delineate any wetland or stream buffer habitats would need to have been completed. It would also be necessary to complete any site preparation that might require more than one season, such as removal of invasive species or soil treatments.

Administrative and management activities required to support refinements to funding mechanisms and schedule include selection of a construction management approach, preparation of bid package materials, and selection of contractors. Organization of an appropriate mitigation oversight committee (e.g., the Monitoring and Adaptive Management Committee proposed in Chapter 9 of the RMP) would be needed during this period to assist with any adaptive management measures required once habitat rehabilitation has been completed. Additional activities would include selecting the necessary permits, securing easements, and the completion of land acquisition.

This pre-construction preparation would facilitate installation of early action habitats enhancement within the first two years of the Construction Period. Immediately after completion of installation, implementation monitoring would be conducted and results would be reported back to the oversight committee. The year following installation, effectiveness monitoring would begin and would continue throughout the construction period again with reporting out of results. It is anticipated that some replanting or mitigation refinements may be needed during this period.

For early action sites, post-construction activities would consist of continued monitoring, replanting as required to account for unexpected mortality, implementation of protective measures such as wildlife exclusion fencing as needed, reporting implementation and effectiveness monitoring results and coordination with the Adaptive Management committee, as well as implementation of any adaptive management measures deemed necessary.

Table 1
Example of Site-specific Task Lists and Timeframe for Early Mitigation Actions.

ACTION TASKS	PRE- CONSTRUCTION	CONSTRUCTION	POST- CONSTRUCTION
VMP			
Land acquisition	X		
Site reconnaissance for finalize access, planting, and selective tree removal plans	X		
Conduct wetland delineations within the project construction area and temporary pool	X		
Obtain permits	X		
Secure sufficient supply of native plants	X		
Develop access plan	X		
Delineate planting areas and finalize planting plans, treatments, and goals for each area	X		
Develop wood management plans for planting areas	X		
Develop access plan and identify existing roads that can be decommissioned	X		
Consult with permitting agencies to attain approval of final plans	X		
Establish temporary access pathways as needed	X		
Conduct site preparation (invasive species removal, soil treatments, selective removal of dead or unhealthy trees, etc.)	X		
Complete planting		X	
Restore any temporary construction disturbance areas		X	
Conduct implementation monitoring and reporting		X	
Conduct effectiveness monitoring and reporting		X	X
Implement corrective actions as needed (e.g., replanting to address unexpected mortality, wildlife exclusion, etc.)		X	X
RIPARIAN AND STREAM BUFFER EXPANSION			
Landowner coordination	X		
Secure riparian easements	X		
Conduct wetland assessments and delineations, as needed	X		
Delineate planting areas and finalize planting plans, treatments, and goals for each land parcel	X		
Secure sufficient supply of native plants	X		
Complete riparian rehabilitation monitoring and adaptive management plan	X		
Consult with permitting agencies to attain approval of final plans	X		

Conduct site preparation (invasive species removal, soil treatments, removal of unhealthy trees, etc.)	X		
Complete plantings across all land parcels		X	
Install livestock exclusion devices as needed		X	
Restore any temporary construction disturbance areas		X	
Conduct implementation monitoring and reporting		X	
Conduct effectiveness monitoring and reporting		X	X
Implement corrective actions as needed (e.g., replanting to address unexpected mortality, wildlife exclusion, etc.)		X	X
CHEHALIS RIVER RM 87.6-89.3 (MARWOOD)			
Conduct wetland delineations	X		
Collect new terrain and bathymetry data, and more detailed hydraulic modeling, as needed	X		
Delineate planting areas	X		
Complete 100% engineering designs for off-channel, floodplain engagement, and tributary mitigation actions	X		
Complete 100% design for wetland and wetland buffer mitigation actions	X		
Finalize planting plans for relic channel forest rehabilitation, tributary channel riparian habitat, wetland and stream buffers, Chehalis River riparian habitat	X		
Complete site-specific monitoring and adaptive management plan	X		
Consult with permitting agencies, finalize site plans, and obtain necessary permits	X		
Develop plans and specification documents	X		
Complete excavation and contouring for off-channel, floodplain engagement and new tributary channel mitigation actions		X	
Install large wood structures for off-channel and floodplain engagement mitigation actions		X	
Site preparation for forest rehabilitation along relic channel	X		
Implement forest rehabilitation and tributary buffer planting plans		X	
Site preparation for wetland enhancement (removal or control of invasive plants)	X		
Complete excavation and grading for wetland mitigations		X	
Implement wetland and riparian buffer planting plans		X	
Restore any temporary construction disturbance areas		X	
Conduct implementation monitoring and reporting for 9 distinct mitigation actions onsite		X	
Conduct effectiveness monitoring and reporting for 9 distinct mitigation actions onsite			X

Completion of any corrective actions (e.g., replanting to address unexpected mortality, wildlife fencing, etc.)			X
BUNKER CREEK			
Landowner engagement	X		
Secure riparian easement	X		
Advance aquatic habitat engineering design to 100%	X		
Develop plans and specification documents	X		
Consult with permitting agencies, finalize site plans, and obtain necessary permits	X		
Secure supply of native plants	X		
Complete site preparation as needed (e.g., invasive species removal)	X		
Complete culvert removal		X	
Complete excavation and contouring of inset floodplain		X	
Implement riparian planting		X	
Install large wood pieces		X	
Complete installation monitoring and reporting		X	
Conduct effectiveness monitoring and reporting			X
Completion of any corrective actions (e.g., replanting to address unexpected mortality, wildlife fencing, etc.)			X

References

HDR (HDR, Inc.), 2024. Revised Project Description: Flood Retention Expandable Structure. Prepared for the Chehalis River Basin Flood Control Zone District. Unpublished.

Kleinschmidt (Kleinschmidt Associates), 2024. Revised Draft Flood Retention Expandable Facility Habitat Mitigation Plan: Aquatic Species and Habitat, Riparian and Stream Buffer, Wildlife Species and Habitat, Large Woody Material, Surface Water Quality. Prepared for Chehalis Flood Control Zone District. July 2024.