

Chehalis Basin Local Actions Program • Technical Advisory Group

MEETING 7 SUMMARY

Date: Monday, February 8, 2021

Time: 1:00 to 4:45 pm PST

Location: Zoom online meeting

Purpose of Meeting

The purpose of the Local Actions Program Technical Advisory Group (TAG) Meeting 7 was to discuss TAG work completed to date and next steps regarding:

- Phasing of next steps and the TAG's role
- Modeling, including climate change
- Floodplain storage
- Additional analyses for structural options
- Acquisition program
- Erosion strategy
- Urban stormwater

The TAG members also discussed suggested revisions to planning assumptions and outcomes related to different flood events.

Next Steps and Summary of Follow-Up Actions

A co-meeting with the Implementation Advisory Group will occur on Monday, February 22, 2021, from 3:00 PM to 5:00 PM PST.

Below is a summary of follow-up actions identified during the meeting:

- The Office of Chehalis Basin (OCB) will work with Guillaume to come up with a succinct statement of how to describe the spatially distributed climate change scalars (e.g., 50%, 40-65%, other) to others.
- The methodology for the hydraulic analysis will include the information provided by Climate Impacts Group (CIG) and clearly discuss if late century 100-year tributaries are being modeled independently from the mainstem Chehalis River for determining the inundation extents.
- Additional input on the near- and long-term hydrology and hydraulic modeling will be sought from members of Natural Systems Design, since they were not in attendance at the meeting.
- Jim said that the OCB technical team will research and report on what is required in the basin to meet the stormwater manual (Ecology) and whether there are gaps.

Meeting Notes

These meeting notes are intended to be a public record of key points, questions, and discussion topics raised during the meeting. They are not intended to be transcripts. The meeting was recorded on Zoom.

Phasing of Next Steps/TAG Role

Jim Kramer provided a summary of the initial TAG work plan and reviewed the remaining issues identified by the TAG in Meeting #6. He then described how we will walk through how each identified issue has or will be addressed during the meeting.

To address the question regarding phasing of next steps and the TAG's future role, the OCB will summarize results from advisory group discussions and staff work, and identify differing technical and policy perspectives to the Chehalis Basin Board (Board).

The OCB will bring forward potential options of projects or further study to the Board – highlighting the kinds of projects and where some of those projects could potentially happen. Information on what studies may be required for this analysis will also be provided to the Board. For example, what merits further study and what would that look like? Based on the results of this further study and additional work, the Board could make future decisions on implementation of the projects.

Continuation of the TAG as a formal group past March will depend on the Board's recommendation and participant interest and availability.

The OCB has not brought consensus recommendations from the TAG to the Board, but acknowledged and reported back on the various feedback provided by TAG members. TAG members are welcome to provide individual input to the Board through written correspondence (to Andrea or the Board) or provide comments directly to the Board during their meetings.

There is not a Local Actions Program resulting from this effort. Instead, the various elements reviewed and analyzed over the last few months will be incorporated into the overall Chehalis Basin Strategy (such as structural flood protection options, acquisitions, floodproofing, erosion strategy, etc.).

Climate Modeling

Larry Karpack, Watershed Science and Engineering, recapped work completed to date on near-term modeling. To determine the extent of flooding and floodplain extents in the Chehalis River mainstem and tributaries, existing models were incorporated into CIG's recent climate change analysis. Where models are not available, adjustments to FEMA's model were made upward based on increased precipitation predictions due to climate change.

Larry then reviewed the results from CIG's precipitation analysis, which shows that there are distinct variations in projected precipitation increases across the basin. Differences are relatively consistent among of the climate models evaluated. Changes in the upper Chehalis Basin are larger than changes in the lower Chehalis Basin. Within the upper basin, projected increases are somewhat lower for the Upper Chehalis and Newaukum Rivers (50%) than for the Skookumchuck River and Scatter Creek (60%). Elk Creek and Lincoln Creek are slightly higher (65%) and are the upper bound of the modeling. The lower basin was generally around 40%. The analysis suggests that spatially distributed scaling factors should be used to characterize future flows across the Chehalis basin, as opposed to a uniform scaling factor across all subbasins.

The 2080 high end climate change simulations were updated to use spatially distributed scaling factors based on the maximum change projected among 12 global climate models (GCMs). The recommended

scalars for all sub-basins (2080, high emissions [RCP 8.5]) ranged from 40% to 65% across the basin. Results using these high-end scalars can be considered as a complement to the results with the 26% scaling used for the SEPA Draft EIS. The 26% increase is comparable to the average precipitation increase among the 12 GCMs evaluated, so no additional adjustments are required.

Additional work is currently underway to prepare an approximate delineation of the late-century 100-year floodplain in the Chehalis Basin. This is being accomplished through updating and refining existing models or constructing new models using the spatially distributed climate change scalars (40-65%). With this information, the floodplains for the mainstem Chehalis River and a number of tributaries are being modeled.

Discussion from the TAG:

- What is the best way to describe the spatially distributed climate change scalars (e.g., 50%, 40-65%, other)? The group discussed that it is the high-end emissions scenario, using the high end of the GCMs. OCB will work with Guillaume to come up with a succinct statement of how to describe it to others.
- One TAG member noted that it is important to be transparent about the results. For example, there could be a statement that the results are the high end of the climate change predictions (50%) based on precipitation with a range of 40-65%.
- The methodology for the hydraulic analysis will include the information provided by CIG and clearly discuss if late century 100-year tributaries are being modeled independently from the mainstem Chehalis River for determining the inundation extents.

Larry then reviewed the comparison between current modeling of climate change effects (26% universal increase and 50% spatial increase) compared to WSDOT's analysis (25% increase in flows). This was completed in response to the TAG's request at Meeting 6 to understand the differences and potential effects. Part of the analysis was to determine whether the 3 feet of free board would be adequate, which it would be for 25% increase in flows. Based on a preliminary review, the current analysis shows water level increases as large as 3.2 feet (for 26% scenario) or 5.3 feet (for 50% scenario). However, the various analyses are not comparable due to differences in analysis method and project versus non-project condition. The relative changes can be compared, though.

There are other scenarios that could be used and climate projections will continue to evolve. At this time, OCB is not recommending the use of other climate models, but this is something that should be evaluated over time.

The TAG provided input via Jamboard regarding the following question:

Do TAG members have additional comments regarding evaluating climate effects on hydrology/flooding?

- Would like to see a clear description of the GCM outputs (spatial and temporal) and what assumptions are undertaken to incorporate them into H&H models/analyses. This has been an issue in the past so would like to make sure it has been resolved and clearly described.
- Necessary to continue looking not at exact numbers, but estimated percent changes. Precipitation forecasting is rapidly evolving, but historically has not been as reliable as temperature changes. Also, it is important (if incorporated at the project level) to convey the range of the modeling.

Evaluation of Different Flood Events

Casey Kramer, Natural Waters, LLC, reviewed a draft technical statement that he prepared on behalf of the TAG. This statement was sent to the TAG in advance of the meeting for review, and the purpose is to provide a clearer approach to one aspect of the Board's planning effort, specifically Planning Assumption 2. Future Flood Conditions. The technical statement made a clear separation between flood inundation hazards and erosion hazards.

Casey reviewed the components of the technical statement and asked TAG members to consider if there are other elements (besides the transportation example) that would be good to include as other examples that would benefit from evaluation at a lower magnitude / higher frequency flood events. In addition to the draft technical statement, Casey reviewed the draft recommended flows for evaluation if the Board were to adopt modification to include smaller, more frequent flooding events as part of the Board's planning assumption 2 and associated desired outcomes. The memorandum was also to serve as an example for a potential effective way to communicate TAG beliefs to the Implementation Advisory Group (IAG) and Board for other planning effort assumptions and desired outcomes.

One TAG member asked if the climate change scalars have been applied to lower-level floods at this time (2-, 10-, 20-year). They have as part of the long-term strategy assessment.

Discussion from the TAG (break out room):

- Agree with statement to look at more frequent flood events. TAG members will review the memorandum and provide feedback (Andrea resent the memorandum with a deadline of February 12). Important to hear from others on other assets and interests, where looking at a suite of various flood levels would be beneficial.
- Suggestion to include bankfull flow and 2-year flow as consideration for erosion hazards.
- Helpful to break out erosion hazards from flood hazards, since the peak flows typically do not correlate with erosion. Instead, break out erosion hazards into a low, medium, high risk zone?
- Erosion is caused by many other factors than flood events, such as localized removal of vegetation, bank armoring, etc. so do not necessarily need to focus on flood events for identifying erosion hazards.
- It would help to correlate the flow magnitude and frequency based on the stage level that the flood authority already has on their flood warning system (Stage 1, 2, 3 and 4).
- While at WSDOT, Casey would heavily rely on the maintenance personnel as well as the people who lived in the location where the flood or erosion hazard occurred. These folks are typically the ones that know the systems the best as they see them on a daily basis. Once this information was obtained, technical experts would investigate the identified issue (e.g., culvert blocked, high flow event, etc.) to determine what caused the hazard. This method served as a good way to tie locals' vast experience with the river/transportation system to identify and learn more what may have cause the identified erosion hazard and to assist in being more proactive for future events. This knowledge also served as a key piece of understanding if a hydraulic model were to be developed to attempt to re-create the identified hazard. This process is commonly known as a vulnerability assessment, which serves as one way to prioritize assets.
- Collaborative efforts and a common set of terms and definitions between climate change scientists, hydrologists, hydraulic engineers are essential to harmonize climate change inputs into the H&H model inputs. This has been an area of confusion in the basin in the past, a

document that clearly states the assumptions undertaken to align the climate model outputs as inputs into the H&H models is needed or clearly referenced.

- Rather than running a basin-wide model for every project, a smaller effort could be undertaken that focuses on the parameters required to support the basis for design. Once the project/reach level model is developed to support a given project, the model outputs could be then be assessed in a basin-wide model as a check to make sure the proposed project fits within the context of a basin-wide solution. The scale of any model is developed for a specific purpose, to utilize the model outside of the original purpose should be used with extreme caution as it may lead to erroneous results or misinform important decisions.
- It is difficult and expensive to map all flood events in every part of the basin. As a start, one could work with locals to identify areas of priority. It is important to understand from people who experience flooding/erosion where there are problem areas rather than just relying only on a model result. This information could help determine the location and potential cause and frequency of flooding or erosion problems.
- Concern that allowing each jurisdiction/entity to select their own flood levels for design will lead to different levels of protection in different places, and this could leave some areas at risk even if a flood reduction project is completed.

Additional Near-term and Long-term Hydrologic and Hydraulic Modeling Options

Larry reviewed additional near- and long-term hydrologic and hydraulic modeling options. In the near term, WSE is using available Chehalis River mainstem and tributary models to delineate the 2080 floodplain (using scalars based on CIG's precipitation analysis). In the long term, there is an option to develop new or updated hydraulic modeling to facilitate evaluation of flood damage reduction in eight tributaries. There is also an option to develop a Stormwater Master Plan for Aberdeen/Hoquiam. The Board will be considering updating prioritization using the latest modeling and the 2080 floodplain analysis.

The following TAG input was provided on how to integrate additional hydrologic and hydraulic modeling to support both the flood damage and Aquatic Species Restoration Plan (ASRP) needs:

- All of the models lend themselves to various aspects of the strategy (ASRP, flood damage reduction). For ASRP, some of the Early Action Reach projects used the relevant part of the basin model and built more detail into what is already being used. To date, there is good cross-coordination across basin-wide strategy elements.
- The model could be used, then scaled to a localized level as needed.
- Additional input will be sought from members of Natural Systems Design, since they were not in attendance at the meeting.
- May need to have a short qualifier for what the original model was built for (flood routing, restoration focused, or other).

Flood Storage

Larry summarized the work to date on flood storage. There are limited additional locations to increase flood storage either through restoration of natural conditions or removal of infrastructure:

- Additional flood storage along mainstem Chehalis at 2080 100-year flow is insufficient to reduce flood damage, but could provide localized benefits at lower flows or in tributaries.
- Additionally, there is potential for a multi-benefit synergy when combining additional floodplain storage with habitat restoration through the ASRP.

For the Board's consideration, a long-term option could be to expand the analysis to additional tributaries.

Additional Analyses for Structural Options

Structural Options

Merri reviewed the work conducted to date with the TAG regarding approaches to protect high value structures and critical infrastructure such as improving or building new levees, floodwalls, or pump stations. Areas of higher density development within the 2080 100-year floodplain were identified for potential local infrastructure such as levees; these areas could also be considered for floodproofing or relocations. For the Board's consideration, a long-term option could be to further analyze the 14 areas identified in the near-term analysis (modeling, concept design, etc.).

Corps and WSDOT Study Comparison

Based on the TAG's request at Meeting 6, Merri provided a side-by-side comparison of the Corps and WSDOT studies. A high-level summary is provided below:

- Both studies were focused on protection of I-5 and Chehalis; the Corps study included Centralia.
- Both studies resulted in upstream and downstream effects, but to varying degrees.
- The Corps study did not address China Creek, and noted that effects of floodgates on Salzer and Dillenbaugh creeks would need further analysis. The WSDOT study resulted in concerns about Dillenbaugh Creek flooding and effects on the roadbed.
- The Corps study did not address stormwater, while the WSDOT's conceptual plans included options for accommodating stormwater from I-5, but not from the urban areas.
- The Corps study identified an initial mitigation plan (for wetlands, etc.), whereas mitigation was not specifically identified in the WSDOT study.
- Costs, funding, and other considerations were also summarized.

To qualify for Federal funding through Corps participation, there would need to be a positive cost-benefit ratio (4 to 6, based on recent feedback from the Corps to be competitive) and reauthorized by Congress with an updated plan.

Local Perspective

Emil Pierson reviewed a potential levee concept in the Centralia area – modified from the Corps' original plan. The base map included the 500-year floodplain and took into consideration the Shoreline Master Program; this information was overlain by existing development within the Urban Growth Area and City of Centralia limits. The question was whether there could be an option that benefited human and ecosystem needs. For example, a levee could be placed landward to protect some of the existing development, while leaving room to allow flood storage in floodplain areas that are undeveloped. The levee could be extended farther landward but would then require acquisitions that could be expensive (like a school). Emil also looked at other areas that are typically under water (1 to 3 feet) or require road closures. The floodplain that is remaining for flood storage could allow habitat connectivity and use by waterfowl, etc. There is also a potential to have holding tanks instead of allowing development to

sprawl. This concept has not been vetted by City Council or others, but is an idea that could be considered in other areas as well.

TAG input was solicited, but no comments were provided.

TAG and IAG Feedback on Potential Next Steps for Local Structural Flood Reduction Actions

Merri reviewed TAG and IAG feedback on what should be considered if the Board decided to move forward with local structural flood reduction actions. These include:

- Status of existing levees (height, condition, etc.)
- Identify types of structures in priority areas (residential, commercial, etc.)
- Outreach to jurisdictions and public in priority areas on interest and need for local actions (potential interest in lower flood levels)
- Identify land use, zoning, buildout, economic and social justice considerations for each jurisdiction
- Consider identifying initial alignment possibilities
- Modeling, if any areas worth analyzing further to help determine height and costs

TAG input was solicited via Jamboard regarding questions, comments or recommendations TAG members have on additional analysis for structural options:

- Where else could structural elements or augmentation work in the basin?
- Who should lead the local public outreach if the Board wants to pursue any of the 14 identified areas?
 - For local public outreach, Andrea noted that this commented would be best addressed by the IAG (it is a policy approach versus technical approach).
- What would it take to compile relevant data on the status of all existing certified and uncertified levees?
- When looking at any kind of storage or inundation areas, the big picture of continuity of operations from jurisdiction to jurisdiction (community to community) through the county should be considered (maintain connectivity during an event, big or small).
- When analyzing effects (zero rise) of local projects, there should be exceptions for rise in undevelopable properties (wetlands, ponds, etc.) Some local projects would provide benefit while impacting these areas.

There are location-specific technical questions that would need to be addressed. For example, it is important to consider what flood should be planned for, as well as the source of the flooding.

Acquisition Program

Jim highlighted what the Board has seen, along with options that the Board will consider in March 2021. Different ideas were discussed at the IAG and Board, divided into two main categories:

- Whether an acquisition program approach proactively seeks acquisitions and relocation to reduce all or most at-risk structures in certain strategic areas and/or...

- Responds to acquisition requests across a dispersed area. Doesn't necessarily have to provide relocation support, but could if needed.

Input from the experts included the following:

- Program that is responsive to interest across the Basin - one of the tools in the toolbox (CFAR). Jim noted that CFAR could be more robust in terms of funding.
- Relocation of major portion of communities in specific areas is a challenge because of the need for available locations to move to, as well as individual interest and potential economic/social equity issues. Many of the areas are rentals, or in low-income communities, which poses a significant challenge in terms of relocating in a way that does not place additional burden on these communities.
- Determination of feasibility requires significant advance work (master planning and outreach). This would also take time.

TAG input was solicited, but no comments were provided.

Erosion Strategy

Merri reviewed the work conducted to date with the TAG regarding near-term and the following potential long-term options that will be considered by the Board:

- Identifying one or more pilot subbasins (such as from the high priority areas) to outline how to develop a pilot technical assistance program for landowners or public entities with relative cost and staffing needed for a program (in coordination with staff from the Office of Chehalis Basin CFAR and ASRP).
- Potential to complete CMZ delineations in high priority areas.

Merri then reviewed the following updated erosion management strategy based on previous TAG input:

- Channel migration and bank erosion are natural processes that form and maintain habitats. However, erosion rates can become accelerated above natural rates due to land uses, facilities, hard bank protection or other factors.
- Recommend that erosion management projects should be developed and implemented in the context of reach-scale conditions and geomorphic processes...and promote the use of bioengineering techniques.
- Recommend that erosion management projects included within the Chehalis Basin Strategy occur only where they can be combined with habitat enhancement or where critical infrastructure is present and threatened and an expanded reach-scale project can be pursued that benefits both public and private landowners and enhances habitat.

Merri also reviewed the following updated criteria based on TAG input in order to determine potential for an erosion management project. Broke it into the following tiers:

MUST MEET FIRST TWO CRITERIA:

1. A local project sponsor is willing to develop a reach-scale project with multiple landowners.
2. Erosion risk is immediate or near-term (within next 5 years) that that would cause significant damage to valuable structures, infrastructure, or productive agricultural land ("significant" loss or damage).

MUST MEET AT LEAST THREE OF THE BELOW CRITERIA:

1. Landowner is willing to consider relocation that would provide long-term reduced erosion (or flooding) risk (either with or without an associated bioengineered or habitat solution).
2. Landowner is interested in a bioengineered solution and willing to maintain a bioengineered solution as part of a funding agreement.
3. Opportunities exist for a reach-scale approach to reduce velocities through reconnecting former channels/swales, placement of large wood, riparian revegetation, bank sloping/terracing, or other elements that would benefit the reach and maintain or restore natural processes and/or habitats.
4. Project is likely to provide significant benefits for the cost to multiple landowners.

TAG input included:

- Item 4 (of the 3 out of 4 conditions) should go beyond the number of landowners and multiple benefits, such as also protecting infrastructure.
- CMZs are currently not delineated. Right now, a bank stabilization project would be put in if there is an immediate risk. This is consistent with the Shoreline Master Program, which is what the criteria currently consider.
- How does the 5-year near-term risk work with the 30-year implementation timeline? May need to define risk over a certain time period, versus an immediate risk.
- Need to define risk in some quantitative way; there is similar language in the shoreline codes.

Urban Stormwater

The final element considered as part of the TAG's work was urban stormwater. Jim noted that the percentage of impervious surfaces in the basin is small, and not a factor in mainstem or tributary flood flows, but the effects could be significant in small urban drainages. Stormwater is being addressed as part of current projects, including in the Cities of Aberdeen and Hoquiam as part of the North Shore Levee design. For future planning, urban stormwater will be considered as part of structural improvements consistent with the Chehalis Basin Strategy.

One TAG member noted that stormwater concerns were raised related to the ASRP, specifically toxins (metals, tires etc.). New developments will need to be treated in accordance with evolving standards. Jim said that the OCB technical team will research and report on what is required in the basin to meet the stormwater manual (Ecology) and whether there are gaps.

Conclusion of Meeting Series

In conclusion, the group discussed in break out rooms whether they had additional comments on the work completed through the TAG meetings or comments on future technical work.

The following TAG input was provided:

- There are a lot of aspects of the local action plan. It needs to be presented that no single action is the magic action. It is a suite of actions at multiple locations in the basin that will reduce flood damage. Instead of challenging each individual action, it would be good to look at this in a more comprehensive manner. This is also addressing flood damage throughout the basin, not just one part of it. There are multiple items in the plan that can help and should be looked at more in depth.

- Suggest some careful messaging around the local actions being a basin-wide approach, while there is confusion on whether the proposed dam is or is not a basin-wide approach.
- There is a lot of work going on, so communication is key amongst the various groups so that everyone understands what the other is doing. This would create efficiencies and a good learning opportunity.
- Helpful to synthesize all of the different elements and how they can be applied. Seems like we are just starting to scratch the surface. It will be hard to prioritize where to go next without additional analysis. At this point, we have only been looking at existing analysis. For the structural solutions, how do you know how feasible they are, what areas will be affected (especially when considering climate change in 2080). For restoration ideas, need better ideas of what those flood storage solutions could look like.
- It was an overwhelming experience for those who did not have a sense of what the models show or do not show. The erosion component was especially helpful, since it tends to be what is impacting local communities the most. It is important to project out the erosion and what can be done over immediate and long-term time periods. Would like to have advanced planning to save structures. When you get ahead of it, work can be completed outside the ordinary high water mark.
- Grays Harbor is well aware of where the erosion issues are (suggest talking with road supervisors to take an inventory fairly quickly). When it comes to the landowners, the most vocal people are often the most recent landowners that have not seen things over time.
- Appreciate the approach taken, and gathering all of the past data and presenting it in a way that allows for a good comparison of potential projects. The next phase – studies, analysis, and seeing if it works on the ground – is important.
- Unfortunately understanding the effects of forest practices on flooding in the basin is years away. Forest practices information that could be helpful (generalized studies so far), is not well correlated at this point in time. If there is active harvest, is there a potential for accelerating downstream flood flows and peaks?
- When looking at this from a basin-wide component, it is difficult to get down to the local level. Similar to the ASRP, you do some, learn from it, and take a different approach for the next project.