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**Subject:** Cowling Creek Feasibility Report  
**Date:** October 13, 2017 at 5:55 PM  
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Hello Antonia,

We are pleased to send you the updated Feasibility Report for the Cowling Creek Culvert Replacement Project. In addition to some minor updates to the report, we have provided additional responses to the comments from the stakeholder team below. Please share these responses along with the final report with the rest of the team.

### **Kitsap County Comments**

1. The estimate for the bridge seemed low but it might be due to this only being at 15%.

We updated the cost estimate in the report and attachment to incorporate some additional costs associated with miscellaneous construction items. We also agree that the cost estimate will be refined as the design moves forward from a 15% level.

2. Has WDFW been involved at all? They could significantly impact the direction of the design so getting them involved early may help in the long run.

We have not corresponded directly with WDFW, but based our field reconnaissance, analysis, and crossing design on their Stream Crossing Design Guidelines. We agree that they will have feedback on the proposed crossing design as it moves forward and now that the team has settled on the preferred concept for the crossing it may be a good time to reach out to your local WDFW habitat biologist and share the concept with them. Coordination with WDFW and other permitting agencies would likely be incorporated in to the next phase of design work. We did not make any edits in the report regarding this comment.

### **Suquamish Tribe Comments**

1. Dogfish as modeled may exaggerate peak flow as we may expect slightly enhanced precipitation relative to Cowling Creek. The precipitation zones very frequently span 10" in less than 10 miles and it appears Dogfish could often receive more than Cowling Creek – they are separated by less than 1 mile, centers approximately 3 miles, furthest extents about 5 mi. 2016 KPUD map has the westernmost extent of Dogfish near the 60" divide and the easternmost of Cowling near the 50" divide. I got slightly less than 55" at Keokuk that year.

This is great information about the local hydrology and some of the differences between these nearby basins. For our hydraulic modeling we used 2- and 100-year flows based on a regression analysis of basin area and annual precipitation at the crossing location. The Dogfish Creek hydrology was used as a reference point to compare with the regression flows, but we applied the regression flows to the model. We did not make any edits in the report regarding this comment.

2. It appears that the 2 year and 100 year discharges are being used primarily to predict whether the culvert/bridge will allow the stream to flow freely under a variety of likely

whether the culvert/bridge will allow the stream to flow freely under a variety of flow conditions. Given how low the stream elevation is underneath the roadway, I just wanted to point out that our highest tides are quite a bit above MHHW 8.95' NAVD88, which is roughly equal to 11.23' measured at Seattle relative to MLLW. Jan 4, 2018, at 7:11am the Seattle high tide is predicted to be 13.2ft. Stormy conditions could easily add a foot or so, so the potential for peak discharges to occur concurrently with marine water levels 3 or 4 feet above design thresholds (if set to MHHW) would not be out of the question.

Our hydraulic modeling focused on the MLW and MHHW tidal events to provide a better understanding of frequent tidal conditions at the crossing, but during the design process we did look at larger tide events up to a 15' tide to see what effect that would have on the crossing structures. With the preferred design of the bridge on soldier piles, the crossing will be resilient to high tides and sea level rise because of the very large opening between the streambed and the bridge deck. It is a good point that tides above MHHW will certainly occur during the lifespan of the proposed structure and that they could occur in combination with peak discharges in the creek. During the next phase of design we would recommend taking an additional look at more extreme tidal and discharge events for the proposed crossing. While this may not have much of an effect on the bridge itself, it will be very relevant to the stream grading and any restoration designs for the channel itself. We felt that our hydraulic analysis in the report was sufficient for the current conceptual level of design and did not make any edits to this portion of the report.

3. extraneous bits: when I consulted the earthquake page, I got figures quite a bit higher than the ones they got... 30%(?). I'm not a real seismologist and it appears USGS may have just changed how they do this, but it is definitely worth a 2nd look before designs solidify, so to speak. And... I seem to remember encountering a lot of clay stumping around as Grovers transitions into Miller Bay. Not sure how deep it is before it is encountered under the prospective culvert/bridge but it could influence design as well.

These items are areas that would be addressed during the future design phases. Now that a bridge has been selected as the preferred design concept the next phase of design would include additional geotechnical analysis and explorations at the location of the proposed soldier pile walls. The seismic analysis would also be updated as the design moves forward.

It has been great working with you and the rest of the team on this project. Let us know if you have any further questions about this study and best of luck on the next steps for this project!

Have a wonderful weekend,  
Joey

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