DRAFT MEMORANDUM

Date: December 3, 2020
To: Andrea McNamara-Doyle, Office of Chehalis Basin
From: Larry Karpack, PE, and Bob Elliot, PE, Watershed Science and Engineering
Cc: Chrissy Bailey, Office of Chehalis Basin; Jim Kramer and Ken Ghalambor, Office of Chehalis Basin consultant staff; Robert Montgomery, Heather Page, and Merri Martz, Anchor QEA, LLC
Re: Supplement to Local Actions Program Near-term Technical Analyses for Office of Chehalis Basin: Summary and Evaluation of Options for Increasing Floodplain Storage

Supplemental Information

In an October 30, 2020, memorandum to the Office of the Chehalis Basin (OCB), Watershed Science and Engineering (WSE) presented information summarizing an evaluation of the potential for increasing floodplain storage in the Chehalis River Basin (*Summary and Evaluation of Options for Increasing Floodplain Storage Technical Memorandum*; WSE and Anchor QEA 2020). Included in that memorandum was a table categorizing potential floodplain storage opportunities as "Potentially viable locations for floodplain storage," "Possible but with limited viability for floodplain storage," or "Unlikely to provide floodplain storage without impacts." These three categories were given the shorthand designations YES, MAYBE, and NO, respectively.

The information in WSE's October 30 memorandum was presented to the Technical Advisory Group (TAG) during a meeting on December 13, 2020. During and subsequent to that meeting, questions were raised by the TAG regarding the storage opportunities categorized as NO. Specifically, the TAG wanted to know the estimated volume of potential storage available at each of these sites and wanted additional information about WSE's methodology for categorizing these as unlikely to provide floodplain storage without impacts.

Figure 1 shows the location of each potential storage site identified by WSE within the 2D hydraulic model domain. Sites were identified using results of the hydraulic modeling of the 2080 condition 100-year flood, assuming a 26% increase in flows relative to historical conditions. Table 1 is an update to Table 2 in the *Summary and Evaluation of Options for Increasing Floodplain Storage Technical Memorandum*. For each potential storage site, the estimated amount of storage (in acre-feet) is provided in Table 1. In addition, supplemental notes are provided for each NO site describing why it was eliminated from further consideration. As shown in Table 1, a total of 2,064 acre-feet of potential floodplain storage was identified within the modeled floodplain. Of this, 511 acre-feet were categorized as unlikely to provide floodplain storage without impacts (i.e., NO).

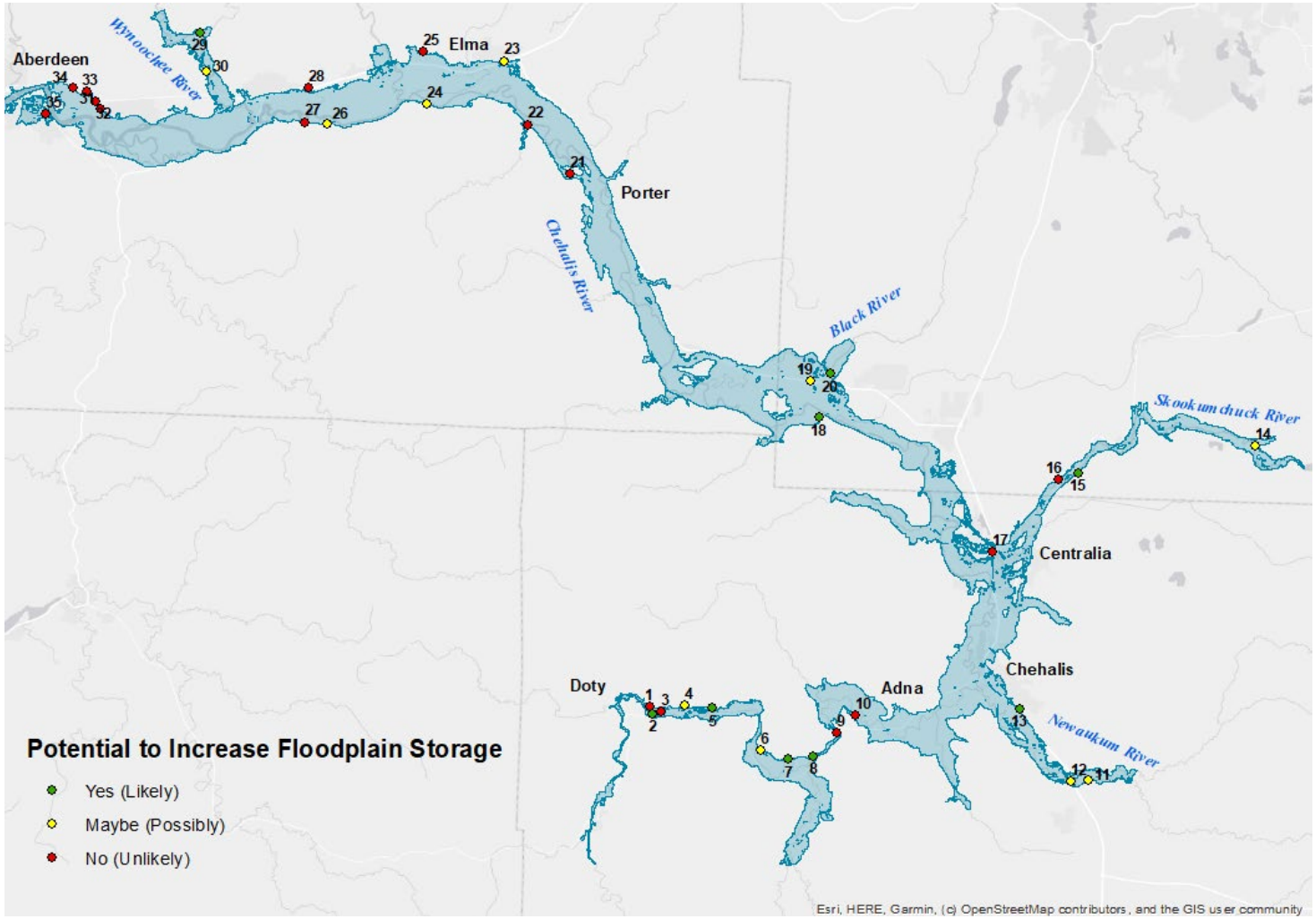
The greatest potential storage volume at any site categorized as NO was at location 17, on the west side of Interstate 5 (I-5) in the floodplain of the Skookumchuck River. Accessing this potential floodplain

storage would require passing flow through I-5, which would be technically challenging and costly. Furthermore, the potential storage site is currently fully built out with residential and commercial development and all of these structures would likely need to be relocated in order to use this site for flood storage. Given the likely expense and significant technical challenges at this site, it was apparent it would not be a good candidate for floodplain storage. Eliminating location 17, there is a total of approximately 211 acre-feet of potential storage categorized as NO. To put this volume in context, it is approximately 7% of the storage volume within the Chehalis Airport area or 0.3% of the storage volume of the proposed Flood Retention Expandable facility.

References

WSE (Watershed Science and Engineering) and Anchor QEA (Anchor QEA, LLC), 2020. Memorandum to: Andrea McNamara-Doyle, Office of Chehalis Basin. Regarding: Local Actions Program Near-term Technical Analyses for Office of Chehalis Basin: Summary and Evaluation of Options for Increasing Floodplain Storage. October 30, 2020.

Figure 1
Locations with Potential for Increased Floodplain Storage



RiverFlow2D late-century 100-year event mapped floodplain (with 26% increase in flows), identifying locations to potentially increase floodplain storage. Locations are color coded to indicate likelihood of project benefits exceeding impacts.

Table 1

Summary of Identified Locations for Possibly Increasing Floodplain Storage

POTENTIALLY VIABLE LOCATION FOR FLOODPLAIN STORAGE (YES)			POSSIBLE BUT WITH LIMITED VIABILITY FOR FLOODPLAIN STORAGE (MAYBE)			UNLIKELY TO PROVIDE FLOODPLAIN STORAGE WITHOUT IMPACTS (NO)			NOTES
ID	Description	acre-feet	ID	Description	acre-feet	ID	Description	acre-feet	**Additional information for areas unlikely to provide floodplain storage without impacts**
2	Doty-Dryad Road along right bank slightly elevated, limiting overflows to farmland with storage potential.	23	4	Floodplain area cut off by Willapa RR trail, likely too small to be significant.	4	1	Backwater from Willapa RR trail already provides upstream storage, downstream properties would be impacted.	0	Floodplain storage reduction upstream of the road grade would exceed the increase in storage downstream; thus, this site would result in a net reduction in floodplain storage.
5	Old road grade blocks flood access to north floodplain.	8	6	Willapa RR trail does not overtop. Landward floodplain backwaters but does not completely fill.	11	3	Chandler Road already stores water upstream but would exacerbate flooding downstream for at least one structure.	0	Floodplain storage reduction upstream of road grade would be approximately equal to storage gained downstream; thus, this site would not result in any net gain in storage.
7	Willapa RR trail prevents complete filling of area north. Would flood several feet deeper.	28	11	Kirkland Road blocking access to south floodplain, but if opened would likely short-circuit flow exacerbating downstream flooding.	11	9	Willapa RR trail blocks left overbank flow, but currently adds some upstream storage and prevents short-circuiting.	5	The estimated storage is very minimal and represents a high-end estimate of storage gained downstream, not accounting for possible storage lost upstream.
8	Willapa RR trail blocks access to modest landward floodplain area.	5	12	Levee and I-5 fill flock overflow. Would lose storage upstream and flood development downstream.	20	10	Willapa RR trail partially blocks area south. Would only add minimal depth and volume, and may short-circuit natural flow path.	30	This estimate assumes minimal upstream storage reduction and does not include any reductions that might be necessary to minimize downstream impacts, because these are impossible to determine without additional modeling. Thus, the actual storage is likely to be less than this amount.
13	I-5 grade blocks access to northeast floodplain margin and ponds.	35	14	Skookumchuck Road may block some floodplain access to north, but homes could be impacted.	10	16	Highway cuts off some floodplain area to the west, but too small to have significant benefit.	3	This site is a small impoundment of highway and only a very little area downstream. The amount of storage available was considered inconsequential.
15	BNSF RR cuts off landward floodplain and remnant channel.	150	19	Head difference across US 12 suggests it is limiting flood volume to the north. Could impact farms.	34	17	I-5 at Centralia cuts off access from Skookumchuck River to downstream floodplain, but this area is too intensively developed to be used for flood storage.	300	It is impossible to determine or even reasonably estimate the amount of storage and possible effects at this location without additional modeling. It is unknown where and how deep flow would spread with removal of I-5 (while flooding much of occupied West Centralia). This is a very rough estimate of storage and it is anticipated that impacts would be significant. Basically, this project would increase flooding in one developed area to reduce flooding in a different developed area.
18	Old RR grade does not overtop. Landward floodplain backwaters but does not completely fill.	50	23	US 12 blocking full access to north floodplain. Already floods but could be slightly deeper.	3	21	Nursery perimeter berm may inhibit floodplain storage function, but flooding nursery not an option.	50	Estimated from total flood volume in nursery, because current modeling ignores the likely flood fighting by nursery to plug hole in berm at nursery entry point. The model already stores water here, but would need to plug hole and examine change to flood levels outside nursery to see actual net benefit of flooding nursery.
20	Head difference across RR grade southwest to northeast indicates flood access is constricted into Black River floodplain.	1,100	24	Old RR grade blocks access to tributary backwater storage, but a culvert likely already exists.	11	22	Old RR grade blocking access to small part of floodplain to southwest, but too small to be significant.	1	Blocked floodplain is a very narrow strip, with not much available area.
29	Wynoochee Valley Road only barely overtops, not completely filling landward floodplain.	28	26	Old RR grade blocks access to backwater storage. Small area but reasonably deep.	4	25	RR grade may block access to some north floodplain, but small area at very shallow flood depths.	2	Flood depths added would be very shallow, over a limited area.

POTENTIALLY VIABLE LOCATION FOR FLOODPLAIN STORAGE (YES)			POSSIBLE BUT WITH LIMITED VIABILITY FOR FLOODPLAIN STORAGE (MAYBE)			UNLIKELY TO PROVIDE FLOODPLAIN STORAGE WITHOUT IMPACTS (NO)			NOTES
ID	Description	acre-feet	ID	Description	acre-feet	ID	Description	acre-feet	**Additional information for areas unlikely to provide floodplain storage without impacts**
			30	Full access to ponds limited by perimeter berm, would increase pond volume only marginally.	18	27	Minkler Road appears to cut off a tributary, but likely small and may flood a homestead.	1	Partially and locally deep within lower end of tributary but only over a very small area.
						28	US 12 freeway appears to cut off small tributary backwater storage. Likely culvert not in model.	3	Estimate assumes no culvert, as modeled. If culvert exists, which is likely, this area would already be inundated.
						31-34	Roadways cut off series of small backwater floodplains, but culvert(s) likely exist. Possible private property impacts. Minimal benefit this far downstream.	62	Estimate assumes no culverts, as modeled. If culverts exist at some of the areas, available flood storage volume may be considerably less than estimated. Van Winkle Creek provides the most storage at 36 acre-feet and must have a culvert (which is not modeled).
						35	Levee blocks floodplain access on edge of Cosmopolis, but too urbanized and too far downstream for any downstream benefit.	54	Impossible to determine or even reasonably estimate without modeling where flow would go and how deep with removal of levee, and how much would spread from Cosmopolis and into South Aberdeen. Very rough estimate.
		1,427			**126**			**511**	**Total Potential Storage by Category**
		249			**56**			**338**	**Total Potential Storage Upstream of Centralia by Category**

RR: railroad