ATTACHMENT 7

Spreadsheet Calculations

COWLITZ TIMBER TRAILS ASSOCIATION

Shoreline Permitting Support

100-year Base Flood Elevation Estimation

Step 1 Estimate 100-year Base Flood Elevation at USGS 14238000

See separate Technical Bulletin 17 analysis

Elevation:	**256.43**	NAVD88

Step 2 Estimate bank-to-bank widths for 3 project sections and USGS 1423800

Use Lewis County GIS slope mapping and USGS quadrangle maps

Loction	**Bank to Bank Width, ft**	**Elevation, NAVD88**
Section1	492	202
Section 2	417	202
Section 3	507	210
USGS 1423800	293	240

Step 3 Estimate 100-year flood plain width using FEMA FIRMs

Location	**Width**
Section 1	616
Section 2	626
Section 3	590
USGS 1423800	592

Step 4 Estimate flow area between bank-to-bank elevation and 100-year floodplain elevaiton at USGS 1423800

Bank-to-bank width	ft	293	
Bank-to-bank elevation	NAVD88	240	
Floodplain width	ft	592	
Floodplain elevation	NAVD88	256.43	
Depth	ft	16.43	
Area	sq ft	7,270.28	

GOAL SEEK

Step 5 Estimate flood elevation at project area matching the flow area at USGS 1423800

Loction	**Bank-to-bank width, ft**	**Bank-to-bank elevation, NAVD88**	**Floodplain width, ft**	**Depth, ft**	**Area, sq ft**	**Floodplain elevation, NAVD88**
Section 1	492	202	616	13.12	7,270.28	215.12
Section 2	417	202	626	13.94	7,270.28	215.94
Section 3	507	210	590	13.25	7,270.28	223.25

Step 6	Estimate loss of volume in floodplain																			
Loction	**Type of fill**	**Approximate Average Ground Elevation, ft**	**Approximate Percentange**	**Approximate Average Ground Elevation, ft**	**Approximate Percentage**	**Approximate Average Ground Elevation, ft**	**Approximate Percentage**	**Approximate Existing Average Ground Elevation**	**BFE for structures; 2" depth for gravel pads**	**Potential Fill Area, sq ft**	**Potential Fill Volume, cu ft**	**Approximate Floodplain Area, sq ft**	**Approximate Bank-to-bank area, sq ft**	**Approixmate Floodplain Depth, ft**	**Floodplain area per foot of depth, sq ft/ft**	**Approixmate Current Floodplain volume, cu ft**	**Approximate Revised floodplain volume, cu ft**	**Revised floodplain area, sq ft**	**Depth to obtain approximate current floodplain volume, ft**	**Revised floodplain volume (= approximate current floodplain volume)**	**Approximate Rise, ft**
Area A	Structure	220.2	0.9			212.3	0.1	219.41	223.25	8,232	31,651	872,224	686,718	13.25	13,995	10,331,764	10,297,313	863,992	13.33	10,331,764	0.07
	Gravel pad	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17	16,800	2,800										
Area B	Structure	220.2	0.1	212.6	0.4	212.3	0.5	213.21	219.60	19,992	127,708	1,382,560	1,061,340	13.60	23,623	16,616,035	16,481,527	1,362,568	13.71	16,616,035	0.11
	Gravel pad	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17	40,800	6,800										
Area C	Structure			212.6	0.4	212.3	0.6	212.42	215.53	25,480	79,298	1,135,520	974,852	13.53	11,873	14,278,957	14,190,993	1,110,040	13.70	14,278,957	0.17
	Gravel pad	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17	52,000	8,667										
Area D	Structure			212.6	0.5	212.3	0.5	212.45	215.12	10,584	28,294	519,312	373,076	13.12	11,143	5,855,515	5,823,621	508,728	13.28	5,855,515	0.16
	Gravel pad	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17	21,600	3,600										