

Wishkah Road Comprehensive Flood Study - Meeting 3

Project Update

Impacts, Benefits, and Feasibility

Grays Harbor County Public Works
With Funding From Chehalis River Basin Flood Authority

May 3, 2017





Study Purpose

- Funded by Chehalis River Basin Flood Authority
- Reach Scale Assessment MP 2.2 to MP 7.6
- Reduce or Eliminate Flooding
- Cost Effective
- Separate from Floodwall project

Project Process: Part 1 - Recap

- ✓ Assess Existing Conditions
 - ✓ Hydraulic Modeling of Existing Conditions
 - ✓ *Topographic (LiDAR) Data*
 - ✓ *Bathymetry (Channel Survey)*
 - ✓ *Hydrologic Analysis*
 - ✓ Verify Model

Calibration

January 5, 2015

Flood Event	Baretich Road	Ellison Dip	Long Swamp	Wyman Creek
Simulated Elevation	10.33	12.54	14.36	15.59
Observed Elevation	10.35	12.84	13.80	15.83
Difference	-0.02	-0.30	0.56	-0.24

(elevation in feet NAVD; depth in feet)

Calibration

Calibrated to two events

Calibration

January 7, 2009

Flood Event	Baretic h Road	Ellison Dip	Long Swamp	Leutz Road
Elevation	13.27	15.08	16.59	15.35
Depth Over Road	2.77	4.32	4.93	4.95
<i>(elevation in feet NAVD; depth in feet)</i>				



GARAGE DOOR
HANDLE
3' WATER
HEIGHT



1/07/09 by 11 Leutz Rd

Jane Lauzon
64 Leutz Rd
Aberdeen WA



Study Area #5 - Long Swamp (M.P. 4.6 - 5.3)

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Length of Road Flooded in 100-year Flood – 3,550 feet

Maximum depth – 5.9 feet

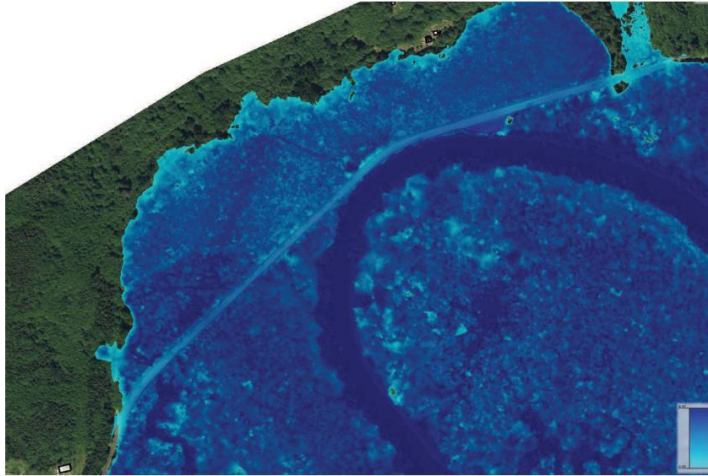
Cost of Road Closures¹:

\$500,000

Est. Cost to Correct:

\$2,250,000 to \$12,000,000

¹Estimated net present value of cost of road flooding over a 50-year life cycle (assuming this was the only location of Wishkah Road flooding)



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Flood Simulation Statistics:

100-year Event

Max Level: 17.5 feet

Duration: 48 Hours

10-year Event

Max Level: 15.1 feet

Duration: 30 Hours

2-year Event

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Project Process: Part 2

✓ Assess Flood Impacts

- ✓ Closure Frequency & Duration
- ✓ Closure Costs

✓ Identify Conceptual Alternatives & Costs

✓ Screen for Feasibility

- ✓ Benefit & Costs

☐ Next Steps

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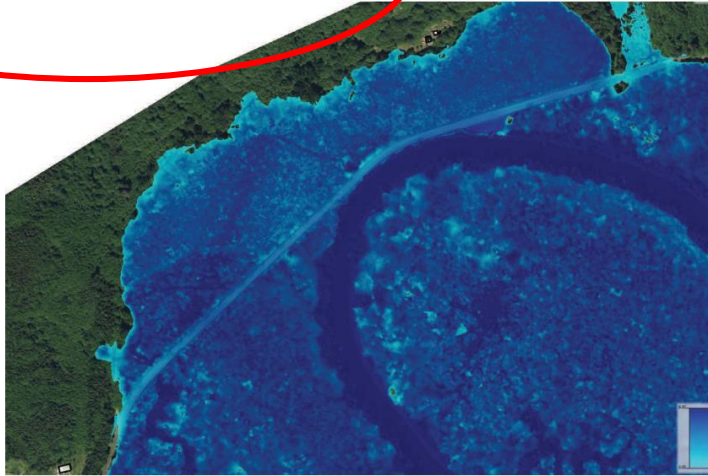
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Road Flooding Information

- Length & depth of flooding
- Guides project alternatives

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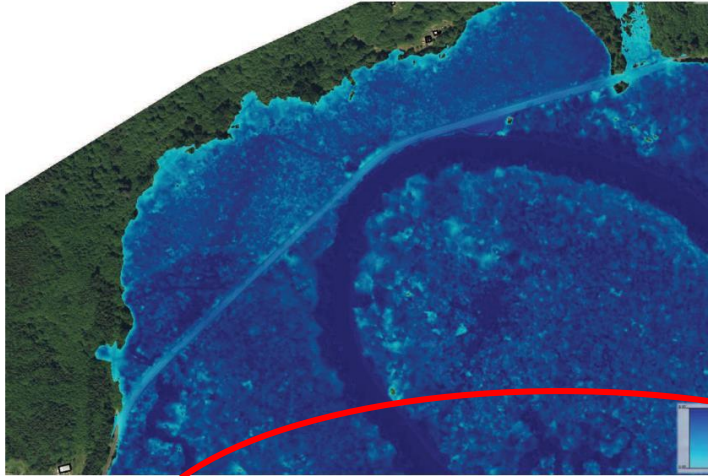
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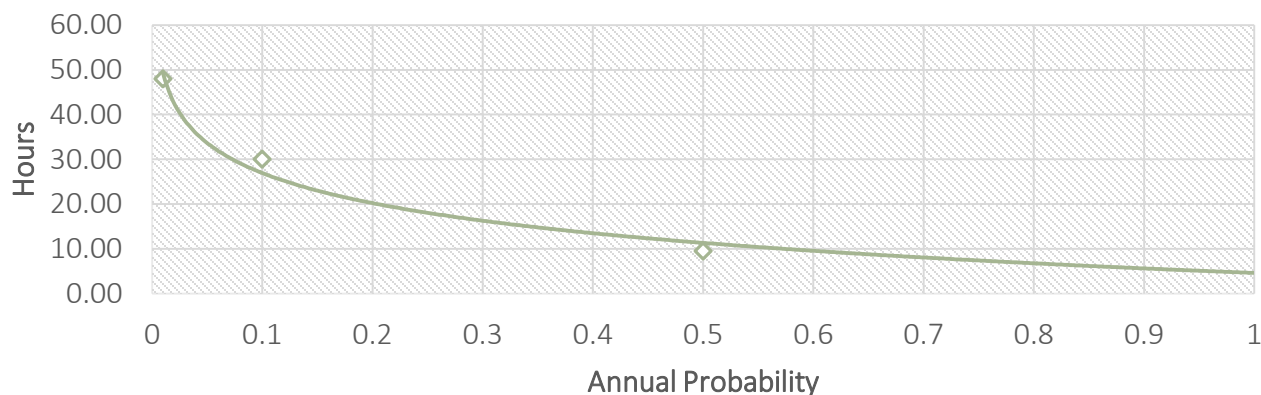
Flood Simulation Statistics

- Frequency, depth and duration of flooding
- Broken down by event
- Use to extrapolate average annual closure time

Long Swamp

Recurrence Interval	Annual Probability	Duration	Average Annual Closure Time (hours)
2	0.5	9.5	4.75
10	0.1	30	3
100	0.01	48	.48
Extrapolated Sum (Integral) – all events			10.5

Duration



Average Annual Closure Time

- Calculated annual closure time expected for each event we modeled
- Used worst-case for each recurrence interval calculation
- Used calculus (integral) to add up total closure time - for modeled events plus all the events in between

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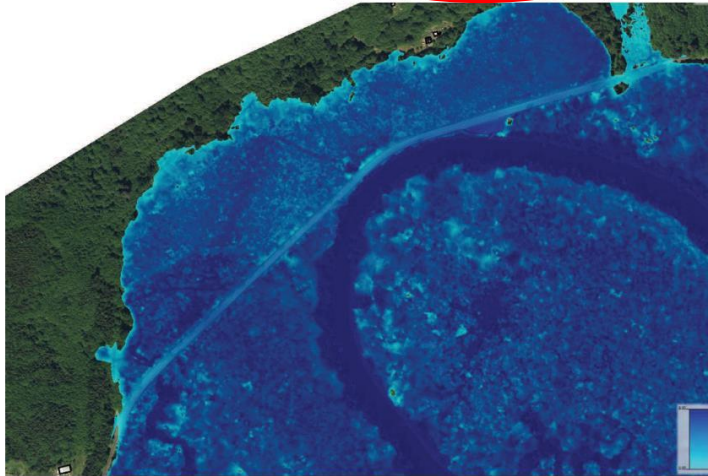
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Cost of Closures

- Calculated for 50 years
- Used same unit cost as recent Chehalis River flooding studies

Cost of Closures

- Average annual closure time
- Hourly traffic volume
 - *Cars vs trucks*
- Trapped vs detoured
 - *Trapped – time lost until road opens*
 - *Detoured – extra time and mileage*
- Closure cost = Cost of time and mileage
- Estimated Total Cost, all locations & events - \$670,000
- Break total cost down by site

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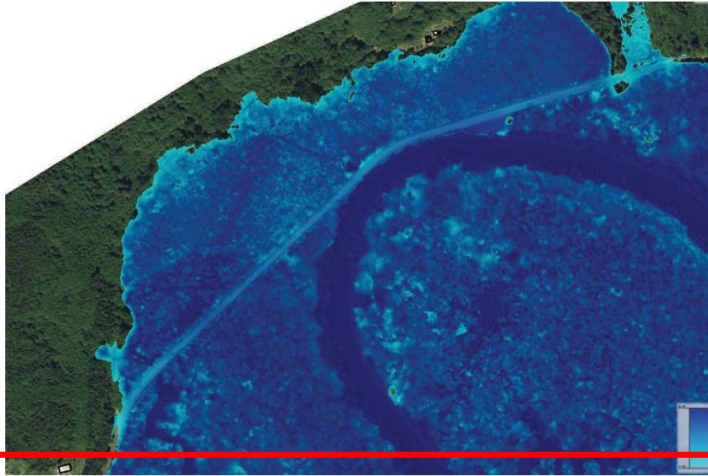
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Project Alternatives

➤ Workshop

- WSE – Hydrology, Hydraulics, Geomorphology
- KPFF Consulting Engineers – Civil Design
- Confluence Environmental – Permitting & Mitigation

- Raise road
 - Standard fill
 - Mechanically stabilized earth (MSE)
- Floodwall
- Improve culverts & bridges
- Relocate road or emergency bypass route
- Permitting & mitigation

Alternatives

- Conceptual
- Varied by site
- Least expensive

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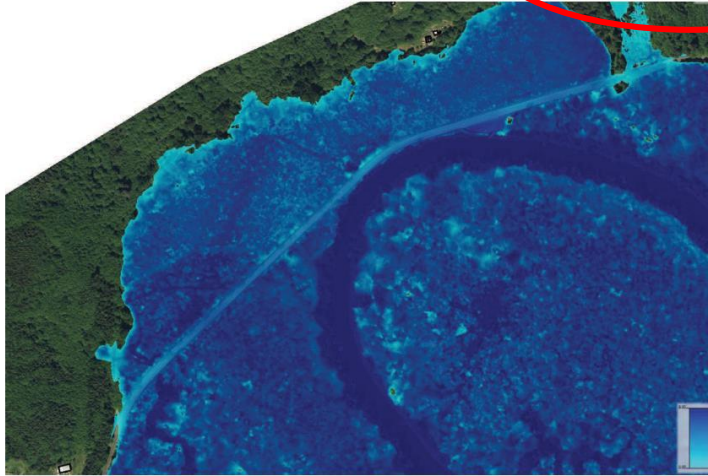
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Cost To Correct

- ROM – Rough Order of Magnitude
- Some had considerable range

Benefits and Costs

Closure Site	Cost of closures*	Cost to correct (low estimate)	Cost to correct (high estimate)
<i>Baretich Road</i>	\$150,000	\$4,300,000	\$5,300,000
<i>MP 2.9</i>		0	\$5,000
Ellison Dip	\$322,000	\$1,250,000	\$1,800,000
Leutz Road	\$250,000	\$2,500,000	\$2,500,000
Long Swamp	\$500,000	\$2,250,000	\$12,000,000
Wyman Creek	\$163,100	\$1,350,000	\$1,350,000
Miller Hill	\$126,200	\$500,000	\$1,000,000
Total	\$670,000*	\$7,850,000	\$18,650,000
<p><i>*Note: Since closure times overlap (e.g the road is closed at Ellison Dip for much of the time it is closed at Long Swamp) the total cost of closures in the project area is less than the sum of the individual site closures.</i></p>			

Summary sheets were not provided for Baretich Road or MP 2.9. Baretich Road project is under way, and MP 2.9 flooding is minor and can likely be corrected with standard road maintenance activities.

Other Impacts

Emergency Response

- Estimated average calls to 911 per residence per hour
 - *911 and census data*
 - *Police and Fire separately*
 - *Included all calls, not just those that generated a response*
- Counted Residences – in project area and upstream
- Multiplied calls per hour times hours road is closed
- Summed calls over 50 years life of project
- Police – 55 calls over 50 years – out of 46,000 total calls
- Fire – 9 calls over 50 years – out of 7,300 total calls

Wrap Up

Next Steps

Rob Wilson

Grays Harbor County Engineer

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Larry Karpack & Mark Indrebo

Watershed Science & Engineering

206-521-3000

mark@watershedse.com

Vicki Cummings

Grays Harbor Council of Government

360-537-4386

vcummings@ghcog.org

Thank You

