

Technical Memorandum

To: Rob Wilson, Grays Harbor County
From: Chris Frei, P.E., Watershed Science & Engineering
Date: August 31, 2017
Re: Wishkah Road Local Flood Issues Investigation

OVERVIEW

An investigation was undertaken to evaluate local flooding issues and provide recommendations to reduce flood impacts at two locations near the Wishkah Road in Grays Harbor County, along Buzzard Creek and along Wyman Creek near Aberdeen. Recommendations focus on reducing flooding from tributary streams, and do not address flooding from the Wishkah River – which was previously evaluated as part of the Wishkah Road Comprehensive Flood Study (WSE, 2017).

Chris Frei of Watershed Science & Engineering (WSE) and Kerrie McArthur of Confluence Environmental Consultants (Confluence) met onsite with local landowners on June 28th, 2017 to discuss flooding issues and inspect problem locations. Flooding descriptions below are based on landowner accounts.

LEUTZ ROAD OVERTOPPING AT BUZZARD CREEK

Leutz Road intersects Wishkah Road at two locations, near mileposts 4.0 and 4.5 (See Figure 1). Buzzard Creek flows along the west side of Leutz Road and then passes under the road through a three foot diameter circular concrete culvert. Residents report that Buzzard Creek floods Leutz Road near the culvert crossing following any significant rainfall. Flooding has been more frequent in recent years, and residents report that shallow water covered the road for a number of weeks this past winter.

WSE and Confluence visited the site on June 28th, 2017 to speak with residents and to complete a site investigation. The following is a summary of observations and issues contributing to flooding at this location:

1. The Buzzard Creek channel has been straightened, and runs parallel to the roadway upstream of the County culvert.
2. The creek channel is two to three feet deep along the majority of this reach, and is overgrown with reed canary grass and lined with thick blackberry bushes.
3. Sediment deposition has reduced channel capacity over time. This is a natural location for sediment deposition: the channel bed slope flattens as the creek transitions from a steep canyon to a relatively flat and wide floodplain. Residents report that sediment and vegetation were both managed in the past, but have not been addressed recently due to environmental regulations.
4. Leutz Road crosses the Buzzard Creek floodplain at-grade. Flow that exceeds the capacity of the County culvert backs up and flows over the road.

5. A beaver dam is located approximately 50 feet downstream from the County culvert, and ponding behind the dam has reduced the culvert capacity. The culvert outlet was completely submerged at the time of the site visit. Residents noted that beaver dams in this area used to be managed by the local Poggie club, but that they have not been addressed recently due to landowner access issues.
6. The driveway culverts at 49 Leutz Road are undersized and may contribute to flooding of Leutz road. Residents stated that the driveway is frequently overtopped.

POTENTIAL ALTERNATIVES

1. Manage beaver activity

The beaver dam downstream from Leutz Road could be removed or bypassed to restore capacity at the County culvert. This may be enough to reduce the frequency and duration of overtopping by lowering water levels near the crossing and increasing the capacity of the culvert to pass high flows.

Options include trapping the beavers and dismantling the dam, or installing devices to lower the downstream beaver pond and to encourage the beavers to build in another location. Either of these options would require Hydraulic Project Approval from Washington Department of Fish and Wildlife (WDFW), and permits from the U.S Army Corps of Engineers (USACE) (McArthur, Personal Communication).

2. Excavate the creek channel upstream from Leutz Road

Excavating the Buzzard Creek channel along Leutz Road would increase channel capacity and reduce overbank flooding. Sediment removal would require permits from the USACE and WDFW. Permits would likely limit removal to 10 cubic yards of material (McArthur, Personal Communication), which would allow the channel to be lowered approximately one foot for approximately 100 feet upstream from the County culvert. Upstream sediment will work its way downstream to this area following sediment removal, and removal would eventually need to be repeated to maintain channel capacity. Work could be completed from Leutz road during the WDFW approved in-water work window – a period where no fish are present.

3. Install a larger culvert under Leutz Road, or install additional drainage culverts

Replacing the existing culvert under Leutz Road with a larger structure would provide additional capacity for flood water to pass under the road before overtopping occurs. Backwatering of the culvert due to the existing beaver dam would need to be considered.

Alternately, installing a secondary drainage culvert under Leutz road, at a location upstream from the existing culvert (see Figure 2), would help to pass flood flow under the road before it has the chance to pond and create flooding issues.

4. Raise Leutz Road

Raising Leutz Road near the culvert crossing would reduce the occurrence and duration of road overtopping. It would also cause additional water to pond upstream, requiring consideration of impacts to upstream landowners. Widening the road base in order to elevate the road could impact wetland area - requiring mitigation.

PRIVATE DRIVEWAY FLOODING - BUZZARD CREEK

Less frequent flood events on Buzzard Creek can overtop private driveways and flood residential property adjacent to Leutz Road. According to residents, driveway flooding is common at 49 Leutz Road but has not been an issue at the most upstream driveway crossing (75 and 81 Leutz Road, Figure 1). Sediment deposition has reduced channel and culvert capacity at these driveway crossings over time.

Landowners should consider raising their driveways or enlarging driveway culverts to reduce this type of flooding. Driveway flooding at 49 Leutz Road might also be reduced through removal of the beaver dam downstream of Leutz Road, and would similarly be improved by channel sediment removal.

WISHKAH ROAD OVERTOPPING– BUZZARD CREEK

Flood water occasionally overtops Wishkah Road at the location of the Buzzard Creek culverts under Wishkah Road (Figure 1, approximately MP 4.4). This site was difficult to access during the June 28th site inspection due to thick vegetation; however, the existing culvert outlet appears to be mostly buried in sediment, and was only passing a small amount of flow downstream. County maintenance records indicate that there are two 18 inch CMP culverts at this location, and note that one is completely filled with sediment while the other is mostly filled with sediment.

Any significant overtopping of Wishkah Road at this location is due to backwater flooding from the Wishkah River. That issue was evaluated as part of the Wishkah Road Comprehensive Study (WSE, 2017), and is not the subject of this investigation. Overtopping of Wishkah Road due to Buzzard Creek alone would be shallow when not accompanied by high Wishkah River water levels. There is a wetland area upstream from the culverts that provides flood storage, which helps buffer against road overtopping when the capacity of the culverts is exceeded.

A second culvert crossing under Wishkah Road is located approximately 200-feet south of this location (M.P. 4.355), where the road elevation is approximately 2 feet higher. That culvert was not accessible during the site visit on June 28th. County maintenance records indicate that the crossing is a 48 inch CMP, and note that the culvert is also prone to sedimentation but tends to allow “good flow” (Freeman 2017, Personal Communication).

POTENTIAL ALTERNATIVES

1. Clean out the existing culverts at MP 4.4.

Regular maintenance to remove sediment from the culverts would help to maintain capacity and reduce the potential for road overtopping. Locating and inspecting the conditions of the MP 4.355 culvert would also be beneficial to understanding the condition and capacity of that crossing, and potential impacts on road overtopping at MP 4.4.

2. Install a larger culvert

Replacing the existing MP 4.4 culverts under with a larger structure would provide additional capacity for flood water to pass under the road before overtopping occurred. The County mentioned that there is a pipeline running below the existing culvert that may limit the space available for excavation to enlarge the existing culverts; therefore, enlarging the culvert may also require the road to be raised. Additional detailed hydraulic analysis would be required to determine if an additional culvert would significantly reduce flooding at this location. Backwatering of the culverts due to Wishkah River flooding would need to be considered in that analysis.

3. Raise Wishkah Road

Raising Wishkah Road near the MP 4.4 culvert crossing would reduce the occurrence and duration of road overtopping. Widening the road base in order to elevate the road could impact wetland area - requiring mitigation.

WISHKAH ROAD – WYMAN CREEK

Wyman Creek flows along the Bell property west of Wishkah Road, and then passes under the road through a County bridge (Figure 3). Downstream, the channel passes under two private driveway bridges and a large driveway culvert before reaching the Wishkah River. According to residents, Wyman Creek floods the field upstream of the County bridge following heavy rain, and occasionally overtops Wishkah Road a few hundred feet north of the bridge crossing (Figure 3). Flooding is reported to be shallow.

WSE and Confluence visited the site on June 28th, 2017 to speak with residents and to complete a site investigation. The following is a summary of observations and potential issues contributing to flooding at this location:

1. Wishkah Road bisects the historic Wyman Creek floodplain reducing the area connected to the creek and available for flood storage (see Figure 4).
2. Residents report that it is typical for flood water to pond upstream of Wishkah road and then slowly drain through the existing bridge crossing. Ponded water eventually overtops a low point in the road approximately 400 feet upstream of the County bridge (see Figure 3).
3. The channel slope is relatively flat through this reach. Water was 1 to 2 feet deep at the time of the site visit, and was moving very slowly through the County bridge and downstream driveway crossings. Flow in this reach may also be limited by the channel size and slope rather than bridge opening, as evidenced by a very small head drop across the bridge during the site visit.
4. In August 2016, a beaver dam upstream of Wishkah Road caused the upstream field to pond with water during a period of little to no rain (See Figure 3). This eliminated much of the available storage capacity of the upstream area. This beaver dam has since been removed, but resident Mr. Bell stated that recent beaver activity is a significant cause of road flooding.

POTENTIAL ALTERNATIVES

1. Manage beaver activity

Beaver activity near the Wishkah Road bridge helps to pond water in the field upstream of the road, thereby filling upstream flood storage and reducing the amount of water required to initiate road overtopping. Inspecting the bridge crossing and documenting beaver activity before each winter flood season would help determine what actions may be necessary. Options to manage beaver activity include trapping the beavers and dismantling the dams, or installing devices to lower the beaver ponds and to encourage the beavers to build in another location. Either option would require permits from WDFW and the USACE (McArthur, Personal Communication).

2. Install additional drainage culverts

Installing a secondary drainage culvert under Wishkah Road would reduce ponding in the upstream field and provide an additional route for the field to drain before overtopping can occur. A good location would be north of the existing bridge near the location of Wishkah Road overtopping (see Figure 4). Additional hydraulic and hydrologic investigation would be required to determine the appropriate culvert size and location, and to minimize potential impacts downstream from the crossing.

3. Enlarge the bridge at Wishkah Road

Installation of a larger road bridge may allow more water to pass under the road and reduce road overtopping and upstream flooding; however, a detailed hydraulic analysis would be required to determine whether flow is controlled by the bridge opening or by the downstream channel, and how much benefit could be attained through enlarging the bridge. If higher flows are passed downstream the impacts of this additional flow on downstream driveway bridges/culvert would need to be evaluated.

4. Raise Wishkah Road

Elevating Wishkah Road near the location of overtopping would reduce the occurrence and duration of overtopping. Widening the base of the road fill would be necessary to elevate the road, and this would likely impact wetlands and require expensive mitigation. .

STENSAGER DRIVEWAY OVER WYMAN CREEK

The Stensager's driveway is the last crossing of Wyman Creek before the creek reaches the Wishkah River (Figure 3). According to Mrs. Stensager water has overtopped the driveway twice in the last 5 years. During a large flood in January 2015 overtopping was up to 2.5 feet deep and a few hundred feet wide along the driveway. Access to their home was cut off for over 12 hours.

Based on a review of hydraulic modeling completed for the Wishkah Road Comprehensive study, water over the Stensager driveway in January 2015 was primarily the result of backwatering from the Wishkah River, and not flooding from Wyman Creek. The existing driveway culvert is also comparable in size to upstream driveway bridges.

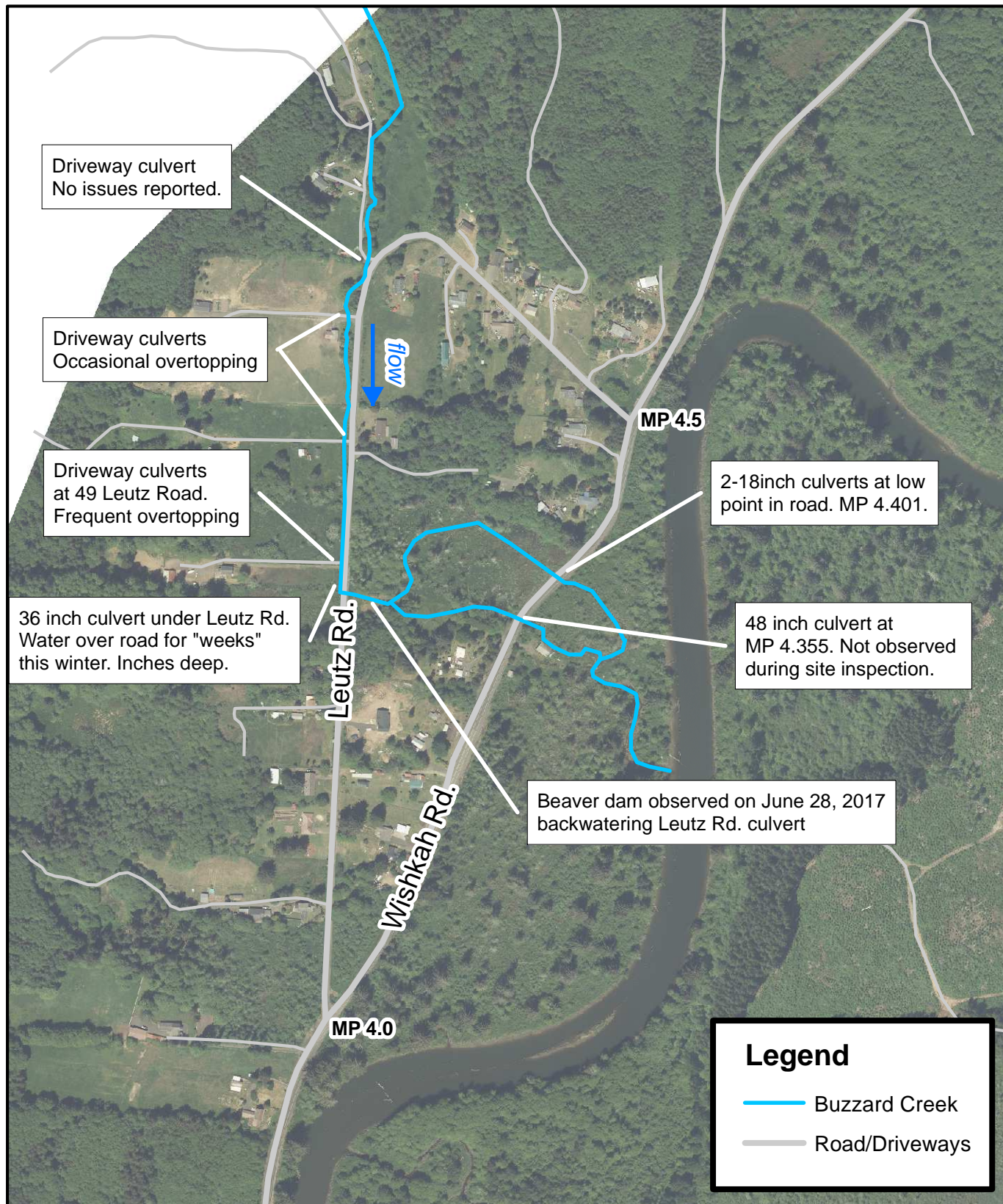
Raising the driveway would likely be prohibitively expensive due the height of fill required. Widening of the driveway would encroach into wetland area requiring mitigation. Mrs. Stensager inquired whether funds could be available to replace the culvert to meet fish passage requirements. The existing driveway culvert is unlikely a fish passage barrier, and so would not qualify for fish passage funds.

CONCLUSION

Local drainage problems evaluated in this study can be partially mitigated by regular inspection and maintenance of the crossings, including addressing beaver activity where beaver dams are reducing culvert capacity and available flood storage. Comprehensive solutions to the drainage problems investigated may require expensive improvements, such as road raising or new culverts or bridges, and would require additional evaluation including detailed hydrologic and hydraulic analysis. Comprehensive solutions would also require a more thorough evaluation of permit issues and mitigation requirements.

REFERENCES

- WSE (2017) *Wishkah Road Comprehensive Flood Study*, Memorandum to Rob Wilson, Grays Harbor County, Watershed Science and Engineering, May 26, 2017
- Freeman, Troy (2017, August 9). Email Communication, Grays Harbor County Engineer IV.
- McArthur, Kerrie (2017, June 28). Verbal Communication, Senior Biologist, Confluence Environmental Company.



Grays Harbor County, WA



Leutz Road Buzzard Creek Overview

0 250 500
Feet

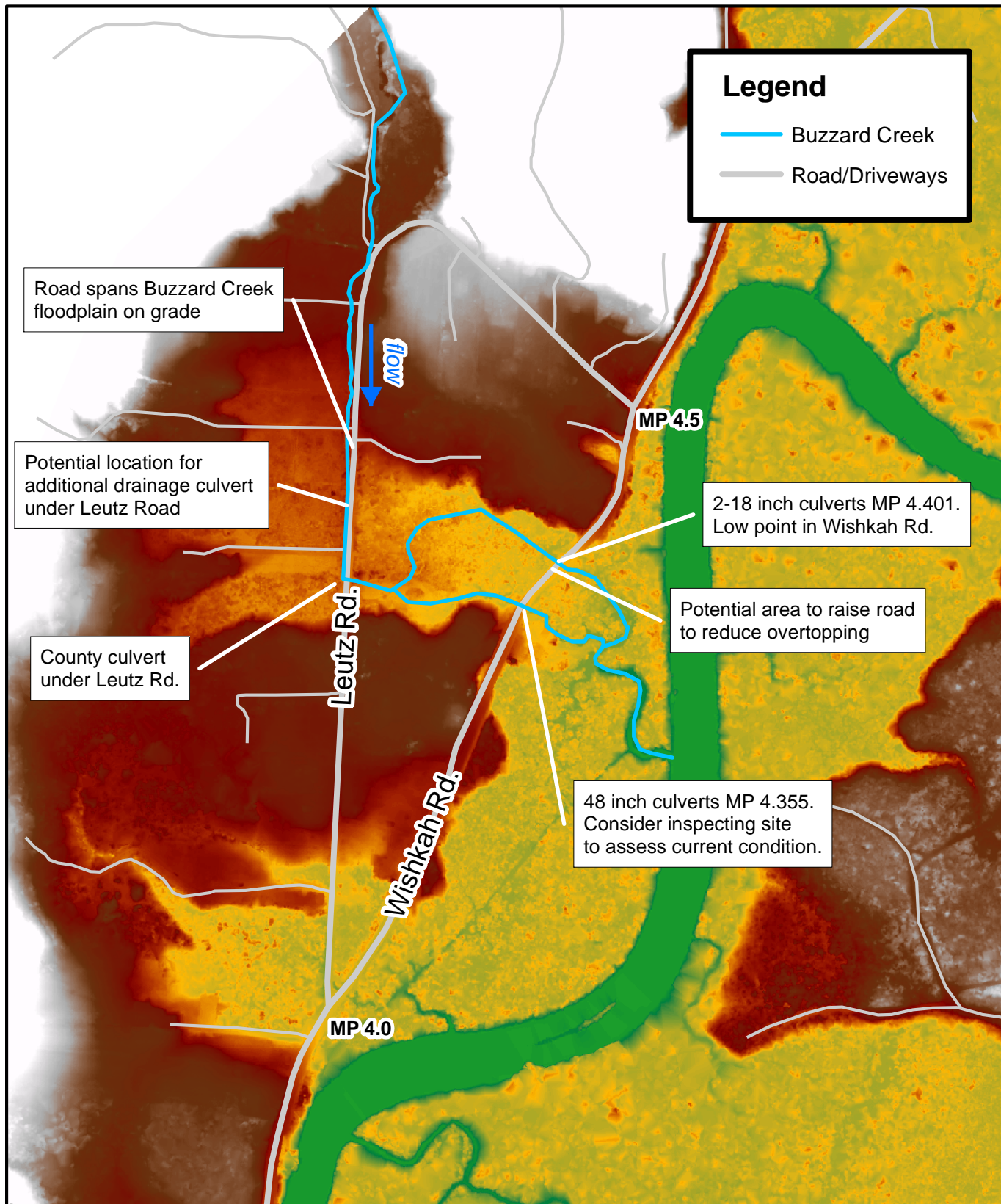


Scale: 1:6,000
NAD 1983 HARN
StatePlane Washington
South FIPS 4602 Feet

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Figure 1



Grays Harbor County, WA



Leutz Road Buzzard Creek Overview

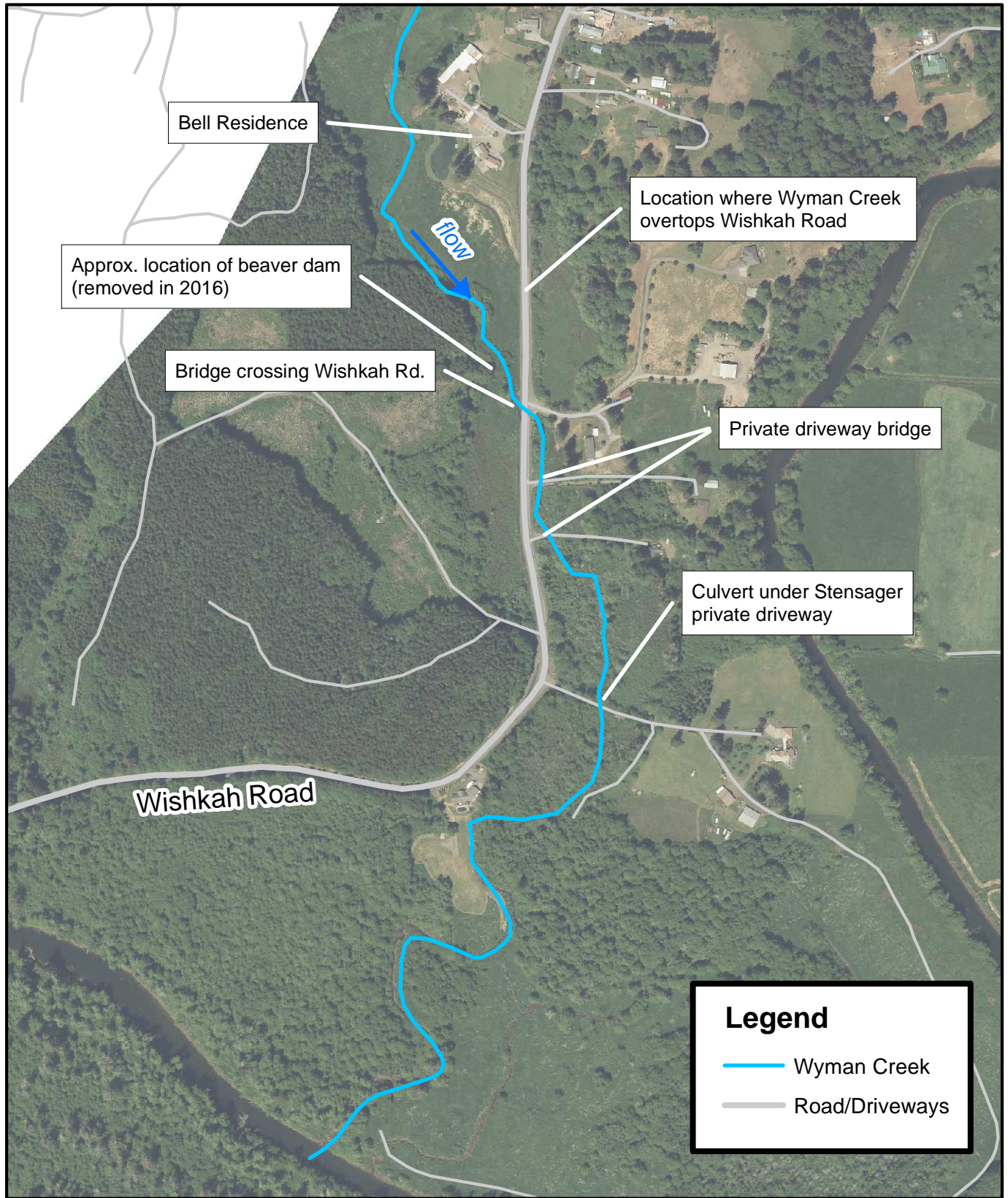
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StatePlane Washington
South FIPS 4602 Feet

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Figure 2



Grays Harbor County, WA



Wishkah Road Wyman Creek Overview

0 250 500
Feet

Scale: 1:6,000
NAD 1983 HARN
StatePlane Washington
South FIPS 4602 Feet

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Figure 3

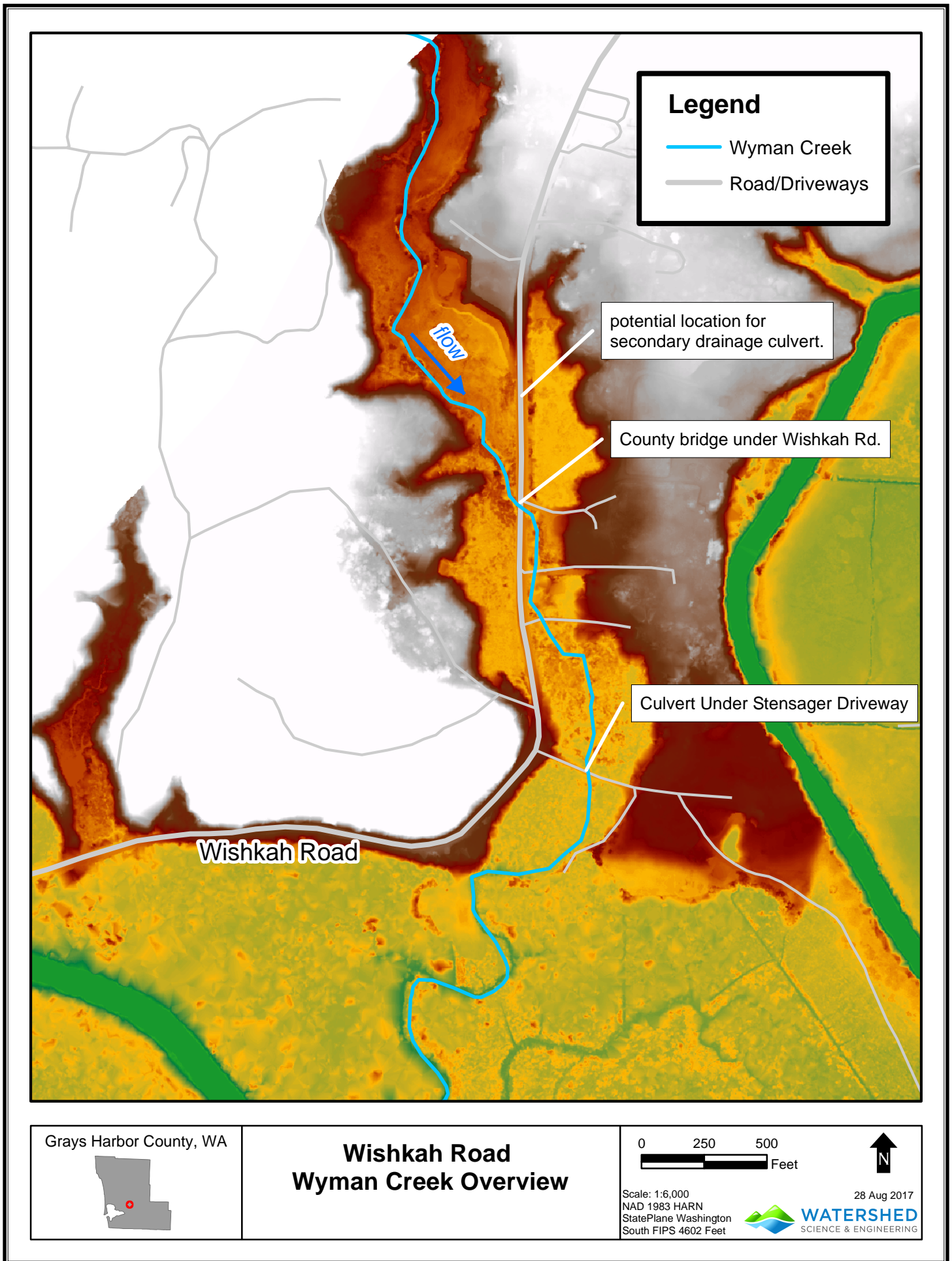


Figure 4