

## APPENDIX C

### FLOOD PROBLEMS BY WATERSHED AREA

**Note: Comments listed below are included on Table 1 in Appendix C (geographic area groups may differ). Any comments pertaining to proposed causes or solutions to problems were provided by the interviewees and workshop participants and each comment was not verified.**

The problems described below were collected through public meetings, interviews and field visits at the beginning of the CFHMP process. Understanding regarding the sources and possible mitigations for the flood problems identified changed as additional mapping and other information was gathered. Since this preliminary information was gathered, some problems have been addressed and additional problems have been identified.

The initial geographic groupings for the problems (comments) below were later refined and errors were corrected. For this reason, some problems described and identified by number in this document are located on different geographic area maps in the final CFHMP.

#### **Ahtanum**

##### North Fork Ahtanum at John Cox diversion

North Fork Ahtanum Creek at the John Cox ditch headgate is an area frequently damaged during flood events. The John Cox ditch diverts North Fork flow eastward, serving irrigators in the Tampico area and West Valley. In 1970, the Army Corps of Engineers installed several grade control structures upstream and downstream of the North Fork Road bridge. The grade control structures have succeeded in holding sediment, elevating the streambed and thereby decreasing the freeboard under the bridge. During even moderate flood events (e.g. 2003), debris that becomes lodged behind the bridge blocks the channel and causes overbank flow upstream of the bridge. Erosion is also frequent near the bridge abutments. Additionally, the aggraded stream channel has caused overbank flow on the downstream side of the bridge and has caused the Ahtanum Irrigation District (AID) move the John Cox diversion location further and further upstream to maintain the proper head through the gate. Overbank flow also causes water over the North Fork Road and as a result hazardous road conditions, especially at near freezing temperatures. See comments no. 1, 2, 3, 4, 13, and 17 in Appendix C, Table 1.

##### Regular damage to private residential bridges on North Fork Road.

The North Fork Road is on the opposite side of the North Fork Ahtanum Creek from the homes and therefore several private bridges cross the creek to provide access. These bridges, which are in various states of repair, become clogged with debris and often get washed out during flood events. See comments no. 7, 8, 14, 18, and 22 in Appendix F, Table 1.

### Ahtanum Creek Transition at the Narrows

Ahtanum Creek goes through a transition from a narrow steeper gradient channel including and above the area commonly known as The Narrows, just east of Tampico, to a shallow low gradient stream. Low gradient streams are characterized by having slower velocities and thereby allowing suspended sediment to settle out and become part of the stream bed. Numerous comments regarding this transition zone pertain to a shallow creek bed and sediment accumulation in culverts causing overbank flow. At the Narrows, the creek is confined by the canyon walls and Ahtanum Road. The creek frequently undercuts Ahtanum Road during flood events. During the 1996 flood, the road shoulder eroded and collapsed where the creek nears and then bends away from the road. See comments no. 6, 16, and 20 in Appendix F, Table 1.

### **West Valley – North**

#### Overbank flow on Wide Hollow Creek upstream of Wide Hollow Rd “S” curve causes overland flow flooding at “S” curve

Several people documented flooded near the “S” curve of Wide Hollow Road. Upstream where Wide Hollow Road crosses over Wide Hollow Creek, there are reports of overbank flow caused by debris caught behind the bridge. Additionally, there are reports of a possible diversion of creek water which contributes to flooding problems. Water travels across the fields as well as down Wide Hollow Road to the “S” curve. Lack of deep roadside ditches and conveyance prevent water from making the first 90 degree turn and water travels across the road, flooding properties on both sides of the “S” curve. Water that does make the turn rejoins the Wide Hollow Creek main channel just upstream of the bridge at the “S” curve. The excess flow causes erosion on the upstream side of the bridge. See comments no. 24, 46, and 47 in Appendix F, Table 1.

#### Fish historically inhabited Wide Hollow Creek

The only public comments made stating fish inhabiting this area were made in reference to Wide Hollow Creek. It was reported that brown trout and Chinook salmon once lived in the stream but do no longer and the stream is not in its natural condition. See comments no. 39 and 41 in Appendix F, Table 1.

#### Cottonwood Creek

Bridges on Cottonwood Creek have low clearance and are in various states of repair. Photographs taken at each of the bridge locations illustrate sediment and debris accumulation underneath the bridges, which makes them susceptible to overtopping during floods. The stream channel upstream and downstream of bridge crossings also has areas of deposition, as well as areas of riprap reinforcement, indicating scour. There are reports that the creek was cleaned out near its confluence with Wide Hollow Creek. There are approximately 6 stream crossings on Cottonwood Canyon Road. Bridge alignment is poor and the stream is forced to make an “s” turn at each crossing. Sediment deposition and scour are likely a result of the realignment of the channel from its natural condition. See comments no. 48, 49, 50, 90, and 91 in Appendix F, Table 1.

Spill from Congdon Ditch

The Congdon Ditch intersects Wide Hollow Creek near Wide Hollow Road and S 101<sup>st</sup> Ave. Spill from the ditch alters the hydrology of Wide Hollow Creek because Wide Hollow Creek's flows decrease throughout the summer and it is not unusual for the creek to be dry late in the summer. At this time the Congdon Ditch is flowing because it is delivering much needed irrigation water. The altered hydrology of Wide Hollow Creek is driving the loss of Cottonwood trees. They are being replaced by Pacific Willow, which produce large amounts of debris that gets mobilized during flood events. See public comment no. 45 in Appendix F, Table 1.

**West Valley – South**

AID diversion and access bridge to WIP diversion

The access bridge to the Wapato Irrigation Project diversion (built in 1996/1997 by the Bureau of Reclamation), just east the Ahtanum Mission, is poorly aligned with Ahtanum Creek. The bridge alignment pushes the thalweg of the channel toward the left bank on the downstream side of the bridge, where overbank flow occurs during flood events causing flooding of the west field at the Mission. The right bank upstream of the bridge is eroding due in part to the misalignment of the bridge and also due to altered flow upstream. The left bank of the AID diversion at Bachelor Creek, just upstream of the access bridge, experiences erosion during every flood event. A rip rap structure was placed upstream which was supposed to divert flow away from AID but it does not work at high flows. This may also be contributing to the right bank erosion on the upstream side of the bridge. Additionally, the lower end of the fish bypass structure at the AID diversion is becoming dry because the outlet is on the left bank of the stream just above the bridge and this is where flows are migrating further toward the right bank. See public comments no. 65, 86, 87, and 84 in Appendix F, Table 1.

Regular overbank flow from Ahtanum Creek into Hatton Creek

Irrigation diversion and transition in stream morphology near the Mission where Bachelor and Hatton Creek fork from Ahtanum Creek make this area unstable and unpredictable. The channel is aggrading downstream of the Mission, near the fork of Hatton Creek, encouraging the stream to branch into alternate channels. Ahtanum Creek experiences frequent overbank flow downstream of the Mission, resulting in excess flow into Hatton Creek. Bales of hay have been placed along the banks of Ahtanum Creek to prevent this from happening during flood events. LiDAR images indicate there may be an old channel upstream of the current Hatton Creek fork, where Ahtanum Creek experiences overbank flow. In addition, flood flows in the west field of the Mission contribute flow to Bachelor Creek and additional flow to Hatton Creek. See comments no. 64, 79, 88, and 89 in Appendix F, Table 1.

Overbank flow approaching Rutherford Rd, whose roadside ditches do not have adequate capacity to convey excess flow

During flood events, excess flow in Hatton and Bachelor Creeks travels east to Lynch Lane and Rutherford Rd. During extreme flood events, flow exceeds the capacity of the stream channels and flow travels as a sheet easterly. The bridges at Lynch Lane become overwhelmed and water floods into the roadside ditches of Rutherford Rd. Additional flow also enters Bachelor Creek at Lynch Lane. As occurred during the major flood events of 1974 and 1996, the roadside ditches exceed capacity and experience severe erosion and scour. Culverts become blocked with mobilized debris and get washed out. The Hatton Creek Bridge on Rutherford Rd experiences erosion and scour due to excess flows. The County built a dike to divert flow back into Hatton Creek at the west end of Rutherford Rd, but flood flows blow out the irrigation diversion on the other side of the creek.

Yakima County applied for a grant from the Washington Hazard Mitigation Grant Program in 1997 to mitigate against damage to Rutherford Road and surrounding property. The proposal stated that over topping structures would be built at the beginning of the road to stop the flood waters from gaining uncontrolled access to the roadside ditch. Additional control structures would be placed along the road side ditches to control the velocity of the water in the ditch to prevent the water from washing away the road. However, the grant was not awarded. See comments no. 53, 58, 59, 61, 66, 71, 75, 76, 78, 81, 94, and 95 in Appendix F, Table 1.

N-S oriented roads cause back up of flood flows

Flood flow traveling easterly along Rutherford Rd and between Bachelor and Hatton Creeks are slowed by North-South orienting roads such as Stanton Rd and Carlson Rd. Culverts and bridges do not have adequate capacity to pass flood flows so roads acts as dams for flood flow. Bridges become clogged by debris and flood flows erode and damage bridge abutments. See comments no. 54, 57, 95, and 99 in Appendix F, Table 1.

Hatton Creek at Meadowbrook Road

Hatton Creek at Meadowbrook Road is shallow and has low banks. The bridge at S 101<sup>st</sup> Ave has little freeboard, even at low flows. Excess flood flows in Hatton Creek - due in part to diversion of Ahtanum Creek into Hatton Creek - overwhelm the channel and bridge, causing overbank flow even during less severe flood events. Debris mobilized during a flood becomes caught upstream of the bridge due to lack of adequate freeboard. See comments no. 56, 68, 72, 82, and 97 in Appendix F, Table 1.

Ahtanum Creek flooding impacts S Ahtanum Rd

Flooding from Ahtanum Creek impacts homes on Lone Dove Lane. There are also reports of flooding along S Wiley Road near the Ahtanum Canal. The Ahtanum Canal, part of the WIP, gets shut off upstream of the Mission during flood events. See comments no. 73, 74, and 93 in Appendix F, Table 1.

## West Yakima

### Berms surrounding fruit plant force floodwaters onto surrounding properties

Highland Fruit Company has built berms along the southern and western edges of their property to keep Wide Hollow Creek from flooding the business. Residents to the north have reported flooding caused by water traveling across the road and away from Highland Fruit Company. Furthermore, Highland rebuilt their warehouse and never replaced the culvert they removed. Residents believe this contributes to flooding on the north side of the road. See comments no. 101, 102, 110, 113, and 114 in Appendix F, Table 1.

### Shaw Creek classification and alignment

Shaw Creek is not aligned in its original channel. The creek has been rerouted as an irrigation ditch and currently flows easterly just south of Tieton Drive until it meets S 80<sup>th</sup> Ave and takes a 90 degree turn south to become the roadside ditch. The ditch crosses through a culvert under S 80<sup>th</sup> Ave two times before joining Wide Hollow Creek. It was reported that Shaw Creek flows have been diverted and the creek has been dry for an extending period of time. Because the origin of Shaw Creek was determined to be irrigation return flow, the stream is not regulated. One resident along the creek has expressed the need for updated FEMA maps that eliminate the floodplain designation for this section of stream. See comments no. 115, 117, and 128 in Appendix F, Table 1.

### Constricted Channel in Wide Hollow Creek

Reaches of Wide Hollow Creek are constricted due to levees built along the banks. Channel constriction can exacerbate flood impacts because the channel conditions are not conducive for attenuating flows. In addition, a constricted channel may increase scour and/or erosion along the streambed and banks. See comments no. 118, 119, 123, and 199 in Appendix F, Table 1.

### Flooding on Wide Hollow Creek impacts Wide Hollow Rd mainly west of S 80<sup>th</sup> Ave

Road damage information for February 1995 and February 1996 floods indicate that the greatest impacts due to flooding of Wide Hollow Creek occur west of S 80<sup>th</sup> Ave and then in the Union Gap city limits. It is unclear whether this observation is due to a lack of information along Wide Hollow Creek west of S 80<sup>th</sup> Avenue. Alternatively, lack of development in this area combined with a more natural stream channel may prevent severe damage to the area east of S 80<sup>th</sup> Ave.

## Southwest Yakima

### 90 degree turn of Ahtanum Creek at S 42<sup>nd</sup>

Ahtanum Creek was diverted from its original channel to follow a ridge to facilitate water conveyance for irrigation. The creek follows this ridgeline until it intersects S 42<sup>nd</sup> Ave. The creek flows under the road, takes a 90 degree turn south, and continues along S 42<sup>nd</sup> Ave until it rejoins the original stream channel. The area described experiences frequent overbank flow at the 90 degree turn, causing floodwaters to travel as a sheet eastward through a residential neighborhood. There are reports of undersized and damaged culverts

and ditches along Emma Lane and intersecting roads. The abandoned Shopshire ditch conveys flood flow through several properties in this area, which then collects at S 39<sup>th</sup> Ave and causes backwater flooding because no structures exist under S 39<sup>th</sup> Ave to provide flow through. Yakima County applied for a grant from the Washington Hazard Mitigation Grant Program in 1997 to create an alternate channel for Ahtanum Creek that is more closely aligned with what is thought to be the natural channel. However, the grant was not awarded.

The residential community near Emma Lane also experiences flooding from Hatton Creek and Bachelor Creek. Hatton Creek forks from Ahtanum Creek downstream of the Mission. The creek conveys additional flow during floods that escapes over banks of Ahtanum Creek just upstream of the Mission. Bachelor Creek accepts some flood flows at the AID diversion in attempt to mitigate against flooding on Ahtanum and Hatton Creeks. Overbank flow near the Ahtanum Mission also contributes to flow in Bachelor Creek. Lack of adequate freeboard under bridges at S 42<sup>nd</sup> Ave and Ahtanum Rd causes overbank flow which travels through the property between Ahtanum Rd and Emma Lane. See comments no. 131-139, 144-152, and 156-166 in Appendix F, Table 1.

#### Misaligned bridge at Ahtanum Rd and Bachelor Creek.

The bridge on Ahtanum Rd near S 38<sup>th</sup> Ave frequently causes flooding of nearby properties due to its alignment. The bridge is not oriented perpendicular to flow and water must make two sharps turns to remain within the creek banks. One property in this vicinity is a repeat claims property that has experienced flood damage many times. In addition, erosion of the creek banks near the bridge has been reported. See comments no. 135, 150, 153, and 154 in Appendix F, Table 1.

#### Incorrect FEMA mapping.

Residents southeast of the Ahtanum Creek Bridge at Ahtanum Rd frequently receive damaging flood waters. These properties are not mapped in the 100-year floodplain and therefore are not required to obtain flood insurance. At least one property in this area does have flood insurance and is a repetitive loss property. See comments no. 108 and 149 in Appendix F, Table 1.

### **Yakima/Union Gap**

#### Flooding on Wide Hollow Creek near S 16<sup>th</sup> Ave

Wide Hollow travels behind Perry Technical Institute near Washington Ave, across the road from the regional airport. The stream channel is perched and incised due to levees identified through review of LiDAR imagery and field reconnaissance. Placement of riprap along one bank is indicative of the need for stabilization in the channel. Flooding was reported downstream of Pioneer Avenue near East Valley Mall Blvd. The bridge at Pioneer Lane and Wide Hollow Creek is scheduled for removal in 2007. Reports indicate this bridge becomes caught with debris during flood periods. Reports also indicate flooding of the bridges on S 16<sup>th</sup> Ave is frequent, but the road is scheduled for removal due to the new East Valley Mall Blvd and Federal Aviation Administration regulations. Flooding of part of the runway

occurs when Spring Creek West and Bachelor Creek overflow their banks. See comments no. 122, 123, 176, 190, 199, and 200 in Appendix F, Table 1.

Parks serve as storage of floodwaters

Fulbright Park near the mouth of Ahtanum Creek frequently experiences flooding due to floodwaters in the Ahtanum Creek as well as backwater flooding from the Yakima River. There are no threatened residences in this area and the park has been seen as a means of good floodplain management because it can serve as a place to store floodwaters. The stream upstream of the park but downstream of Goodman Rd was re-channelized in the early part of the Century for irrigation use. Re-channelization of the creek may exacerbate flooding in Fulbright Park due to increased flow velocity. See comments no. 183, 195, 197, 205, and 206 in Appendix F, Table 1.

Goodman Rd floods just downstream of Bachelor Creek and Ahtanum Creek confluence

Numerous reports indicate flooding occurs on Goodman Rd at the Ahtanum Creek bridge crossing. Bachelor Creek rejoins Ahtanum Creek just upstream of this bridge. Lack of adequate freeboard to carry water and debris from large flood events causes flooding over the roadway in vicinity of the bridge. See comments no. 185, 210, and 211 in Appendix F, Table 1.

Wide Hollow Creek Impacts to Downtown Union Gap

Residents reported numerous conveyance problems and levee failures in the City of Union Gap during flood periods. Union Gap is subject to flooding even at low flood elevations, especially near Main Street. Union Gap is near the mouth of Wide Hollow Creek and Ahtanum Creek. Wide Hollow Creek just west of the intersection of 4<sup>th</sup> St and White St makes a 90 degree turn around a residential property boundary. Upstream and downstream of the 90 degree turn, Wide Hollow Creek follows a straight channel. During flood events, overbank flow often occurs at this turn and floods residences in downtown Union Gap. However, upstream of the railroad tracks there is a floodgate that can alleviate flooding in Union Gap by storing water in the fields to the west. See comments no. 180, 208, and 209 in Appendix F, Table 1.

Spring (Chambers) Creek East floodgate issues

Spring (Chambers) Creek East currently forks from the Yakima River east of Ahtanum Rd on the east side of Interstate 82 and flows into Wide Hollow Creek close to the I-82 and Highway 97 interchange. The Spring (Chambers) Creek channel was altered when I-82 was built and previously flowed directly into the Yakima River, not Wide Hollow Creek. Floodgates were placed where Spring Creek East travels under the I-82 as well as just upstream of where it joins Wide Hollow Creek. A small channel diverted water from Spring (Chambers) Creek eastward back under I-82, through the second flood gate (flapper gate). Both floodgates have been closed since January 28, 2003 and flooding has since not been a problem. However, during flood events when the upstream gate was open, flood waters from the Yakima River would enter Spring (Chambers) Creek through the floodgate and cause severe flooding in downtown Union Gap. With the two gates now closed, only the

500-year event, which would overtop the Interstate, would impact Spring (Chambers) Creek. Although the floodgates have been closed for more than two years, a permanent closure agreement does not exist and opening of the gates may be ordered to allow for fish passage in Spring (Chambers) Creek. See comments no. 192 and 201 in Appendix F, Table 1.

#### Backwater from Wapato Dam into Ahtanum and Wide Hollow Creeks

The Wapato Dam in Union Gap on the Yakima River is a diversion project that diverts water to the Bureau of Indian Affairs irrigation canal. During extreme flood events, the debris collects behind the dam, causing floodwaters to back up in the Yakima River. Backwater flooding can continue up into Ahtanum Creek and impact downtown Union Gap.

There are plans for upgrading the Dam to stabilize the region and more easily pass mobilized debris during flooding.

#### Wide Hollow Creek fish bypass near old mill

A bottleneck occurs on Wide Hollow Creek at the site of the old mill on Main Street. As a result, overbank flow can occur upstream due to the flow backup. Also contributing to flow back up is debris clogged behind the Main Street Bridge. The bridge has little freeboard even during average flows. The channel is perched west of Main Street and overbank flow travels by gravity to neighboring businesses. Eakin Fruit Company has reported frequent flooding. See comments no. 198 and 207 in Appendix C, Table 1.

#### Inundated Sewage Lift Stations

There are two sewage lift stations in Union Gap which transport wastewater to the wastewater treatment plant. These lift stations become inundated during extreme flood events, causing discharge of wastewater directly to the Yakima River.

**APPENDIX C**

**Table 1 Comprehensive List of Flood-Related Comments**

Note: Any comments pertaining to proposed causes or solutions to problems were provided by the workshop participants and people interviewed at the beginning of the CFHMP process and were not verified.

See Chapter 2 maps for approximate locations

Number	Geographic area	Comment
1	Ahtanum	Where John Cox diverts, bridge plugs with log debris causing log-jams. 1996 - Big flood washed road out east of bridge. Bridge has no clearance. Bridge designed in 1974. 350 people upstream of bridge in NF. Eroded bank on downstream side of bridge. Held up bedload. Takes out bank.
2	Ahtanum	Home just downstream from bridge, other side of John Cox. Erosion on property when bridge plugs up. Noticeable erosion.
3	Ahtanum	Culvert at bottom of wash plugs up from gravel, comes up road and flows toward home. Lots of snow that melts fast from rain on snow events. Water on road freezes and creates driving hazard everytime water on the road. County has to fix drainage. See digital photos he provided.
4	Ahtanum	Next bridge above John Cox diversion site, just upstream of John Cox ditch. Bridge jammed with debris and gravel, caused bridge to backup and wash out.
5	Ahtanum	Logged area. Left lots of debris in the channel.
6	West Valley South	50 yards + or - downstream of bridge, creek bed shallow. Water overtops and goes down Rutherford Road. Creek had choked for 600-800 ft downstream of the Mission.
7	Ahtanum	1.5 miles of stream adjacent to road totally blew out; Plum Creek and DNR mitigated it.
8	Ahtanum	Bedload dropped out right above the road; mitigated.
9	Ahtanum	Too small of a culvert; put one in; replace with larger pipe.
10	Ahtanum	Sediment came into slack area. Deposited bedload. Relocated road back to the bench.
11	Ahtanum	Big culvert; small stick backed up debris. Has been armored but needs to be replaced. County road.
12	Ahtanum	Beaver pond by pit; ice jam created debris flow; almost knocked house off foundation.
13	Ahtanum	Evacuation near John Cox Ditch, Nov 2003. County road almost blown out. County road parallels creek for 0.25-0.5 mi and restricts creek. Minimal damage from Foundation Creek.
14	Ahtanum	3 bridges. Volume coming down took out approach. 2 bridges need barbs. Series of small channels.

<b>Number</b>	<b>Geographic area</b>	<b>Comment</b>
15	Ahtanum	This creek contributes fresh bedload to SF, blows out culvert and road. Probably could replace culvert.
16	Ahtanum	Creek confined at this location, undercuts Ahtanum Rd, damages property and infrastructure. High likelihood of avulsion through property owner's land at this location.
17	Ahtanum	North Fork Bridge probably too small, stream alignment also very bad (John Cox diversion here as well). During floods stream channel aggrades. Massive LWD piles up against abutment, decreasing conveyance through the bridge further causing more aggradation.
18	Ahtanum	Series of new private bridges that constrict the channel and may fail during any flood.
19	Ahtanum	Log jam (2 in past), builds up water to flow over road, typically breaks, releasing flows.
20	Ahtanum	The Narrows, road washes out, County knows all about it.
21	Ahtanum	Property owner put jersey curbs along property to hold water back. County was not happy about curbs but they had already been installed. Indication of flooding problems at the South Fork.
22	Ahtanum	Log jam, 1 mile from Tampico park. Built up private bridge.
23	Ahtanum	Driveway just west of bridge gets washed out. Happened in 2003 (small event) and 1996. Both incidents required yards of shale and hours of repair.
24	West Valley - North	1/2 mile upstream, owner thought it would be neat to let creek meander, and diverted it so it jumped bank and Wide Hollow Rd on 1/1/03. No ditch on inside corner of "S" curve, so water puddles onto roadway. Culverts under driveways weren't large enough on west side of road to carry water away. Flood picked up manure from pasture - very dirty. See photos on CD and video.
25	West Valley - North	Owner put 2 4' culverts side by side under road (perpendicular to Wide Hollow) that didn't used to be there. Road was built up to act as dam and culverts weren't big enough.
26	West Valley - North	Willows and debris just upstream cause diversions onto her property. Owner upstream illegally put rip rap and was required to remove it and couldn't put it back. That rip rap helped many neighbors. County bridge on Wide Hollow Rd upstream gets dammed up with debris, which sends water around bridge on both sides. Some homes still have sewage piped right into the creek, which is a health hazard.
27	West Valley - North	Cottonwood Creek flowing more than Wide Hollow
28	West Valley - North	Build up driveway with narrow bridge at NE end. New houses after 1985 flood (~20).
29	West Valley - North	Stein Rd used to be gravel with a dip in it that let water over the road that came out of course where bridge takes a 90 degree turn. County has since raised road and installed a 36" culvert - too small (has pictures of dip in road).

Number	Geographic area	Comment
30	West Valley - North	Two houses built in this area. New started in July. Stick and frame and manufactured home. Water already under them now.
31	West Valley - North	Dug out creek after 1985 flood.
32	West Valley - North	Area filled in with gravel in the channel.
33	West Valley - North	Property owner would not let them dig out channel so that recently the high flows jumped out of the channel. Other property owners got together and dug out the stream channel but she would allow it.
34	West Valley - North	Has a home in this area. Home had 2 feet of water during the last spring flood.
35	West Valley - North	Culvert was put under driveway of group of homes. Culvert gets plugged frequently and causes flooding. They mentioned a woman who floods all the time.
36	West Valley - North	Somewhere in this region, they think the stream has been routed out of its original channel.
37	West Valley - North	Water jumps creek around the bridge and floods around barn and house.
38	West Valley - North	Used to be a holding pond where waters get high. People moved in and diverted water.
39	West Valley - North	Brown trout, used to fish and nothing alive anymore. It seems that it's just used for flood control. If we could get a way to get a living stream, by anchoring logs, etc. it would be fine.
40	West Valley - North	Clear out bridge, County bridge Wide Hollow.
41	West Valley - North	Big Chinook, very rarely draw floods. Connects water to Wide Hollow. 1974 was "the last" time it happened.
42	West Valley - North	Bad sediment transport at culvert.
43	West Valley - North	Chronic channel migration in denuded pasture
44	West Valley - North	Bad culvert, bank erosion downstream, flooding.
45	West Valley - North	Spill from Congdon Ditch enters here, making the hydrology of the Wide Hollow inverted, driving loss of Cottonwoods, to be replaced by Pacific Willow. The willow produces large amounts of debris which is mobilized during floods and catches on fences and bridges.
46	West Valley - North	Flood waters that overtopped banks upstream travel down roadside ditch at "S" curve and erode the ditch at its confluence with the creek just upstream of the bridge. Photos
47	West Valley - North	Upper part of "S" curve does not have a ditch on the inside of the curve. Water easily moves over roadway and floods residences. Ditch out front of one property was dug very deep during last big flood and she thinks this is why her property did not flood in '96.
48	West Valley - North	Bridge is undersized and rip rap is in place for stabilization of banks. Photos
49	West Valley - North	Debris placed along right bank as a berm. Photos

<b>Number</b>	<b>Geographic area</b>	<b>Comment</b>
50	West Valley - North	Low clearance. Side ditch coming in upstream of bridge. Debris downstream. No homes nearby to worry about. Photos
51	West Valley - North	Low clearance. Rip rap upstream. Photos
52	West Valley - North	Abandoned diversion took off 100 yards east of bridge; 2 pieces of steel fencing put in to assist dam and never removed; fish bypass put in and part of diversion removed. Beavers in area. Note: location unknown.
53	Ahtanum	Pacific Power is losing a pole from erosion 100' below John Cox Ditch.
54	Ahtanum	Bridge 6 miles up North Fork. Bridge clogged up with debris and washed out road abutment. Issue with cutting a path at road, erosion problem.
55	Ahtanum	Beaver dam. Large jam causes backwater. On other side of creek, erosion and digging out of channel. 6 miles upstream of John Cox Ditch.
56	Ahtanum	Bridge plugged with debris. Backwater from the jam floods our road, leading to erosion problem. Jam collected them broken loose carrying erosion. Depends on size of logs and flows (mostly dead trees). NF next bridge upstream.
57	Ahtanum	Beaver dams in area, whole drainage area. Upper Ahtanum Creek area.
58	West Valley - South	Below culvert, very shallow. Flows through Christmas tree farm from Rutherford Rd
59	West Valley - South	Bedload problem (gravel) - creek plugs, causes flooding to home.
60	West Valley - South	Have many beaver dams. Beavers are digging into dikes and causing leaks in dikes.
61	West Valley - South	Dike built by County dumps water into the irrigation diversion. Irrigation ditch overtops.
62	West Valley - South	Beaver dams flood field.
63	West Valley - South	No channel and water spreads out.
64	West Valley - South	Aggradation at Hatton diversion.
65	West Valley - South	Bridge is in bad alignment with creek and fish screen is catching debris and not passing debris.
66	West Valley - South	Repeated chronic stream erosion during flood events.
67	West Yakima	Put railroad ties on flood wall around property. 1964 thigh high, about 2 ft. Snow 23 inches in Yakima, next morning it all melted. 1973 to bottom of car doors. 1976 about the same. 1995 and 1996 have video.
68	West Valley - South	In 1996, water overflowed onto Meadowbrook Rd. Flooding also came from McCullough side (from north). Debris in channel is a big problem. Winds cause branches of trees to come down and debris collects in channel. Creek floods frequently. Gates (irrigation?) left open upstream (she heard). Culverts are small and partially buried. Water seeps into ground to the east of 101st (it does not visibly flow back into creek). Photos provided.

Number	Geographic area	Comment
69	West Valley - South	Their main concern is the proposed dam. Some are saying that there are flood controls benefits to the reservoir (documents from DOE). They are interested in non-structural improvements in the area.
70	West Valley - South	Homes built between channels are threatened by beaver dams and ice jams.
71	West Valley - South	Redesigned drainage pipe.
72	West Valley - South	Irrigation gate was hit by snowplow. Debris in channel. AID trying to get permits for cleaning entrances to headgates as part of maintenance. Half mile upstream many beaver dams.
73	West Valley - South	Little shed is island during flooding. Flood water coming down road goes back into creek here. Channel/bedload movement is significant problem.
74	West Valley - South	Where water jumps creek banks. Homes have not been flooded but backyards have been.
75	West Valley - South	During 2003 flood, water on either side of bar ditch and all around house. Road replaced from bridge to end of road.
76	West Valley - South	Low area where flood waters add to Bachelor Creek at Lynch Ln.
77	West Valley - South	Bedload deposition in creek causing water to jump banks near rock pit.
78	West Valley - South	In September 1997, Yakima County submitted a grant to the Hazard Mitigation Grant Program to create overtopping structures at west end of road to control flows. Additional control structures would be placed along the road. Not funded.
79	West Valley - South	Key to routing of flood waters down Bachelor and Hatton creek. Irrigation diversions and conversion of stream channel make this area unstable and unpredictable. Channel is aggraded downstream of Mission, resulting in routing of water down Hatton.
80	West Valley - South	Creek illegally rerouted to the south in this area, comes unglued during floods and threatens new expensive homes along creek.
81	West Valley - South	Chronic flooding from Hatton, damages the road and access to driveways at relatively low flows.
82	West Valley - South	High flows flood Meadowbrook Road and areas upstream, road, culverts, irrigation infrastructure all damaged by fairly low floods.
83	West Valley - South	Constrictions, erosion of roads, driveway culverts, plugging by debris, etc.
84	West Valley - South	Bridge alignment pushes channel flow to left bank; during floods water overtops and floods west field; fence catches debris. Bridge built in '96/'97 by Bureau, gives access to property across creek (WIP diversion); before '96, this flood area was not an issue.
85	West Valley - South	Above AID diversion, LB blows out at every flood event. Rip rap structure placed upstream supposed to direct flow away from AID, but doesn't work at high flow. Photos

<b>Number</b>	<b>Geographic area</b>	<b>Comment</b>
86	West Valley - South	Fish bypass structure at lower end is becoming dry because channel is moving away from it (toward RB). Photos.
87	West Valley - South	Right bank above bridge crossing is eroding due to altered flow upstream. Photos.
88	West Valley - South	Water jumps banks upstream of driveway and floods out west field as well as blows out driveway. Photos
89	West Valley - South	Ahtanum jumps banks below Mission and can go into Hatton Creek. Trying to prevent water from going into Hatton. Photos.
90	West Valley - South	Debris and sediment on inside of turn in stream, under bridge. Photos
91	West Valley - South	Rip rap both upstream and downstream of bridge. Bridge undersized. Photos
92	West Valley - South	Clogged with debris, so cannot be used to relieve Ahtanum from flood flows.
93	West Valley - South	Runoff from snowmelt plugging culverts causing damage, for example at S Wiley Road. Debris off slope is plugging ditch because there is not conveyance across ditch.
94	West Valley - South	Rutherford Road becomes conveyance. Water jumps out of creek downstream of the Mission and at Lynch Road.
95	West Valley - South	Culvert plugs with road debris (asphalt and gravel). 90 degree angle for stream and ice jams, causes creek to jump banks. Different grades on both roads after 1996, creates creek dam. Bridge still not cleared after 1996 flood.
96	West Valley - South	Driveway culverts too small during floods (too large when dry).
97	West Valley - South	No creek banks or channel on Hatton upstream of her site, water comes to bank by her property and collects. She has flooding in her basement.
98	West Valley - South	Before 1996, property owner changed channel for creek and have had problems since.
99	West Valley - South	S Marks Rd acts as a creek dam.
100	West Valley - South	Changes all the time; creek "on mtn"; channel never cleaned out.
101	West Yakima	Berm is degraded. During flood, water goes over and backs up toward house. West Yakima Valley Community park berm was lowered on the other side. Beaver damage.
102	West Yakima	Culvert degraded on runoff ditch.
103	West Yakima	In 1994, County took them out of the flood plain. Sent a letter saying they were no longer requiring flood insurance. Flooded in 1996.
104	West Yakima	Property owner has a bunch of stabilization permits for this area.
105	West Yakima	Developer plans development - 700 homes.
106	West Yakima	Bridge at S 91st is plugged with gravel. Property owner opens up his fence to let the water through on the south side of the bridge to let water go through.

Number	Geographic area	Comment
107	West Yakima	Built a berm to keep the water off their property and put it back into the creek.
108	West Yakima	Bridge has 2 feet of freeboard. Beaver downstream and just beyond fruit warehouse. Little house has made repetitive claims and has collected from FEMA four or so times. Have not lifted their home or taken other measures.
109	West Yakima	New subdivision in the hole, been there after 1985 (5-6 years ago).
110	West Yakima	Water from Shaw Creek and Wide Hollow Creek.
111	West Yakima	Place to let water out of channel, goes through baseball diamonds.
112	West Yakima	Little creek came from SW and flowed over Washington and flowed up 64th and flooded subdivision. Sandbagged from intersection to the west. Also dug ditch to let water out at Terry Ave.
113	West Yakima	On west side of warehouse, property owner has bermed up the property to keep things dry, so it shoves water across road onto another property. They rebuilt the warehouse and took the culverts out, which sends more water across the road.
114	West Yakima	Water jumps out of creek when it's north of Wide Hollow Rd and hits property to the east.
115	West Yakima	Rough alignment of Shaw Creek (needs to be proposed in the CFHMP).
116	West Yakima	Shaw Creek undersized and perched, causing flooding of mobile home park.
117	West Yakima	Shaw Creek flooding caused by conversion of creek to irrigation ditch and re-routing across the alluvial fan.
118	West Yakima	Out of bank flooding due to constriction, fences capturing debris.
119	West Yakima	Chronic flooding area - the dike that protects the apple warehouse across the creek forces flood waters here - the bridge downstream is probably undersized as well.
120	West Yakima	Future land use issues with the conversion of Congdon properties.
121	West Yakima	Area where new airport/industrial development could be subject to flooding.
122	West Yakima	Bridge at Wide Hollow has pump station and water conveyance system; photos.
123	West Yakima	Upstream of bridge on WH, lots of debris; rip rap indicates bank needed stabilization. Further upstream of bridge, levee on either side causing channelization; eroded RB levee; downstream stream takes right turn, where rip rap is stabilizing LB. Photos
124	West Yakima	New development; WH creek banks are low; looks like potential flooding at new development. Photos.
125	West Yakima	Generally more natural channel. Photos.
126	West Yakima	Debris placed along right bank as a berm. Photos.

<b>Number</b>	<b>Geographic area</b>	<b>Comment</b>
127	West Yakima	Property owner wants to develop property and be mapped out of floodplain. She thinks development upstream is diverting water from creek. Photos.
128	West Valley North	Cul de sac across street has culvert that plugs. Asked City to take care of culvert but they said no because it was not part of their jurisdiction.
129	West Valley North	Bar ditch along Wide Hollow Rd not deep enough so overflows Wide Hollow Rd. Duct work under house was lost. Photos of damage are on CDs along with video of news reel. Neighbors involved started talking about putting in larger culverts under driveways but got conflicting info as to who should (could) do the work.
130	West Yakima	Beaver dams on Wide Hollow Creek.
131	Southwest Yakima	8.9 acre ranch on west side of 34th Ave. 2 houses. Lower house had 3ft of water during 96 flood. Built retaining wall around 3/4 of house. Didn't work because 2003 flood, water came from Bachelor Creek instead of Ahtanum Creek.
132	Southwest Yakima	Ditches on Emma Ln are not large enough, or do not exist. Culverts are not the same size and sometimes too small. Water jumps over some of the gravel roads off Emma Ln.
133	Southwest Yakima	Flooding occurs at 34th and Emma. Water back up on west side of 35th.
134	Southwest Yakima	House at 42nd and Ahtanum flooded during 1996 flood at the bridge. Water overtopped the bridge, flooding property.
135	Southwest Yakima	Bridge under Ahtanum Rd is not oriented perpendicular to creek flow. Creek must do sharp turns to stay in channel. Creek overflows here and floods property.
136	Southwest Yakima	Flooding behind culvert.
137	Southwest Yakima	Overtopped road between Emma Ln and Meadow Ln. Water backed up behind culvert.
138	Southwest Yakima	Branches plug hog wire fence and Bachelor Creek flooded his property and others around him in 1996. This was before he lived here and something he heard.
139	Southwest Yakima	Beaver dams causing water backup and flooding.
140	Southwest Yakima	Bridge washed out on Rutherford Rd, at S 79th or possibly a different location. She was not sure.
141	Southwest Yakima	Culvert that passes Spring Creek does not pass flood flows. Water runs down road ditches along Hatton and floods houses and driveways.
142	Southwest Yakima	East of bridge, willow reduces conveyance and causes backwater.
143	Southwest Yakima	Beaver dam in Hatton Creek causes flooding.

Number	Geographic area	Comment
144	Southwest Yakima	Property located on east side of 90 degree turn. Low point on property. Most flood water goes NE toward his home, flooding west to east (low grade). Water in their pasture pretty much every year (except 2004). Built dike with railroad ties (3 RR ties high) and made into flower box to help divert water. The channel on S 42nd is in low area and overtops banks easily. Water also goes through old channel. He increased his driveway culvert to 36". Did grade control for erosion. Dike on east side of 90 degree turn was replaced once by Job Corps (about 20 years ago in response to the 1974 flood) but has recently shown signs of degradation and leaking. Debris in channel.
145	Southwest Yakima	Water over roadway during floods at this location.
146	Southwest Yakima	3rd home on the right. 90 degree turn in Ahtanum Creek at Emma Ln. Beaver dam fills up then spills river bank floods. Fills up old ditch. WIP ditch spilled in 1996 and filled up back area. No bar ditch in front of home to street. Culvert crosses under road and pushes water upstream and under road. Not sure about flapper on culvert. Old Ahtanum Creek ran in alignment through backyard. Creek moved in 1890s (long time ago). Ahtanum Creek flows down a piece of high ground in its current alignment, perched above adjacent properties. County staff said, if channel put through old channel, then need to widen bridge at 16th.
147	Southwest Yakima	Rapid snowmelt in WIP ditch flows into ditch and overloads it. Ditch gets more narrow as you go downstream and eventually gets overloaded. 1996 was only time WIP ditch blew out.
148	Southwest Yakima	Check with news agency for pictures/videos of Emma Ln.
149	Southwest Yakima	Homes are all slab on grade, scraped off topsoil and poured foundation. Created low spot that is slightly lower than everything else and gets these houses wet every time. All their houses are in flood, but not mapped as in flood.
150	Southwest Yakima	At about 36th, where the creek crosses the street, there is a new bridge. It's the only new bridge.
151	Southwest Yakima	42nd goes 90 degrees. Water floods fields - hits 42nd Ave and goes over dike (water cannot go back into Ahtanum Creek) and floods down Emma Ln. Every 2-3 years water goes into the ditches.
152	Southwest Yakima	Small culverts along the road cause water to back up. Not everyone maintains them.
153	Southwest Yakima	Water line put in. Bank often erodes out. Could have some problems if it breaks.
154	Southwest Yakima	Bridge is oriented in wrong direction. Flooding at bridge.

Number	Geographic area	Comment
155	Southwest Yakima	See statement for full story. Concerned about fill placed in floodplain on neighboring property that impacted surrounding properties during flood; Concerned that SEPA process was not adhered to and was not done thoroughly when neighboring property was developed. EIS on neighboring property was not conducted because DNS was found. Looking for better enforcement of codes, including SEPA. Property taxes increased even though he is in the floodplain.
156	Southwest Yakima	Shopshire ditch used to go through her field but was abandoned when development went in. East side of road, in distance, is where proposed development of 150 homes will go.
157	Southwest Yakima	S 42nd Ave at old Shopshire ditch. Headworks not near creek due to channel migration. Ditch does not exist on other side of road - was smoothed out.
158	Southwest Yakima	Old channel of Ahtanum Creek and ditch diversion (diversion 6). Curve in creek has moved a lot due to flood events.
159	Southwest Yakima	Beaver dam on Bachelor Creek causes flooding on right bank since left bank is higher than right. Gillette spring feeds ditch on other side of their house.
160	Southwest Yakima	Stream restoration work. County is the planner; landowner; and AID is helping with project. Placing rip rap, cleaning channel and making bank slopes more gradual.
161	Southwest Yakima	Garage gets flooded. No culvert under road. West side of road a lake when flooded.
162	Southwest Yakima	In September 1997, Yakima County submitted a grant to the Hazard Mitigation Grant Program to create second channel to bypass 90 degree turn. Not funded.
163	Southwest Yakima	Floodwaters from Bachelor inundate this rapidly developing area.
164	Southwest Yakima	This whole area affected by the 42nd/Emma Lane problem. Water is routed from Ahtanum to Bachelor and other portions of the floodplain.
165	Southwest Yakima	Bridge plugged easily and frequently.
166	Southwest Yakima	Flooding in front of property in 1974 because church put snow in ditch and therefore altered the channel. Attorney - class action lawsuit against county for not maintaining culverts and ditches in response to 1974.
167	Southwest Yakima	Rechannelized for irrigation; irrigation company can clean channel but property owners cannot. Note: location unknown.

Number	Geographic area	Comment
168	Yakima/Union Gap	Water comes out of Emma Ln. Drain plugged at intersection. Backs up the storm drain. 18" deep at corner intersection of Ahtanum and 16th. Water runs across street into storage units and convenience store. Flows do not come from Ahtanum (down 16th). Flows get kicked back down Ahtanum at 34th when the bridge plugs and cannot get water around the corner (bridge is rotated at odd angle). In 2002, took 2 days to get the water from Emma Ln to 16th. Set up barricades to block off road to drivers, which causes waves. Couldn't walk through water because it was running too fast. Has lots of photos.
169	Yakima/Union Gap	Shortage of sandbags. Can't get enough bags.
170	Yakima/Union Gap	Kabota dealer pumped lots of water out of his property (it's a low spot). Knows lots of flooding problems.
171	Yakima/Union Gap	Convenience store - water goes down 16th toward Ahtanum Rd (from south).
172	Yakima/Union Gap	Bridge fills with debris.
173	Yakima/Union Gap	Trailer court flooded in 1996.
174	Yakima/Union Gap	In 1996, entire area south of my residence was under water apparently from river backup; came within a couple inches of flooding the mobile I had there; have since replaced the mobile with one that sits higher. Planner at City of Union Gap has video of this.
175	Yakima/Union Gap	Worked at park in 1996 when park flooded. Water came from the west and south of park, flowing east and north. Overflow from flooding on Ahtanum, west of 16th Ave. Several inches of water in park.
176	Yakima/Union Gap	Channel incised, bank erosion, threatens homes and infrastructure in residential areas of Union Gap and Yakima.
177	Yakima/Union Gap	Bridge undersized.
178	Yakima/Union Gap	Factory built in area of deep flooding in 1996.
179	Yakima/Union Gap	Spring Creek - management of Floodgate by County, management of stream channel under Union Gap Critical Areas Code.
180	Yakima/Union Gap	Numerous problems with conveyance and levee failure in City of Union Gap. High hazard at very low flood elevations, especially near Main Street.
181	Yakima/Union Gap	Very deep backwater in this undeveloped area when the Yakima River is in flood stage.
182	Yakima/Union Gap	Backwater from the Yakima.
183	Yakima/Union Gap	Some bank instability due to re-grade of the creek, probably from straightening in the early 1900s and backwater from the Wapato Dam.
184	Yakima/Union Gap	Goodman Rd. Backs up at bridge and runs/bridge undersized.

<b>Number</b>	<b>Geographic area</b>	<b>Comment</b>
185	Yakima/Union Gap	S. 3rd Ave. '70s - Washed out bridge. '96 - Not sure if it flooded. '99 - Widened existing bridge and installed 2 or 3 box overflow structures.
186	Yakima/Union Gap	16th - 1 1/2 ft of freeboard on bridge - causing a lot of problems.
187	Yakima/Union Gap	Overflows onto Ahtanum - land overflow. Ran along the road in '96.
188	Yakima/Union Gap	Backs up on the North side of Ahtanum - was overflowing onto Ahtanum in 2003.
189	Yakima/Union Gap	Pioneer Ln. debris gets caught up on bridge. This bridge is scheduled for removal in 2007 with Valley Mall Blvd. project.
190	Yakima/Union Gap	12th Ave. bridge - Union Gap keeps an eye on it. It has a lot of freeboard though.
191	Yakima/Union Gap	Greenway access - roadway floods.
192	Yakima/Union Gap	Freeway Ave. floods.
193	Yakima/Union Gap	I-82 is underwater in big ones.
194	Yakima/Union Gap	96 - 16th was shut down. 16th is scheduled to be closed because of the new Valley Mall Blvd. and FAA regulations.
195	Yakima/Union Gap	Fullbright Park Rd. floods. Mostly from backup of the Yakima River. 4 out of 6 years (?). Really aggravates if Ahtanum and Yakima are in flood stage.
196	Yakima/Union Gap	Sewage lift station- critical- very close call in '96.
197	Yakima/Union Gap	Smaller sewage lift station- often flooded.
198	Yakima/Union Gap	Old Water Mill - fish screen and ladder. More of a bottleneck.
199	Yakima/Union Gap	Levee at soccer park. Incised and straightened channel due to dike on L.B. Photos
200	Yakima/Union Gap	Debris dam upstream of bridge; low banks could easily overtop at high flow; downstream of bridge, there is backwater area. Next to channel is channelized irrigation ditch with no riparian vegetation. Photos.
201	Yakima/Union Gap	Yakima R during high flows jumps banks into gravel pit ponds. Area unstable. Worried about Yakima R water going into Spring Creek, which does not have the capacity for it; Flood gates were closed Jan 28, 2003. Several drains go into Spring Creek. Photos.
202	Yakima/Union Gap	Drain pipe from Ahtanum Rd. Was supposed to be connected to pipe going under the highway, but it was never connected.
203	Yakima/Union Gap	Spring Creek just south of property. Drains flow into creek. Water level has stayed fairly constant since the upper flood gates were closed.
204	Yakima/Union Gap	Used to be held open by blocks, which cause flooding from Yakima R in '96. They have since closed gate and it's no longer a problem. Property owner downstream is keeping water at high level for flood irrigation purposes.

Number	Geographic area	Comment
205	Yakima/Union Gap	Park under water during 1996 flood on Ahtanum Creek due to WIP diversion backup. Photos.
206	Yakima/Union Gap	Sewage Lift Station under water during floods. Photos.
207	Yakima/Union Gap	Constriction in channel; not much clearance under bridge. Company gets flooded regularly due to debris caught behind bridge and their parking lot is below channel level. Photos.
208	Yakima/Union Gap	Upstream of railroad crossing, there is a flood gate that is opened during high flows to flood field to prevent flooding of neighborhood in Union Gap. Location not verified. Photos.
209	Yakima/Union Gap	Flood waters cannot make this 90 degree turn. Surrounding neighborhood floods. Water also backs up in side channel, as evidenced by lots of debris. Stream banks are fairly high and channel is straight. Photos.
210	Yakima/Union Gap	Goodman Rd experiences water over the roadway during high flows. Photos.
211	Yakima/Union Gap	Bridge clearance looks good, but Goodman Rd is known for water on roadway at bridge during high flows. Right bank erosion downstream of bridge. Photos.
212	Yakima/Union Gap	End of runway floods. Piped water under runway. Spring and Bachelor Creeks overflow banks.
215	Yakima/Union Gap	Work will be done to expand dam. Worried about river going down canal during flood event, as almost happened in '96. Channels above dam clog with debris halfway up the island. Photos.
216	Southwest Yakima	64th and Occidental. Drainage on County Road is not adequate. Ministorage business was flooded as well as nearby subdivision. Water originates from Bachelor or Ahtanum (not sure exact location) and flows North up 64th.

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